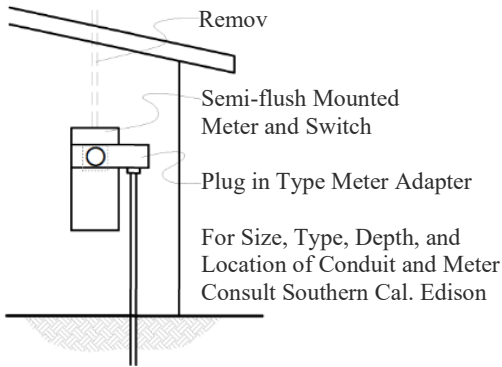




Electrical Panel Upgrade - Residential

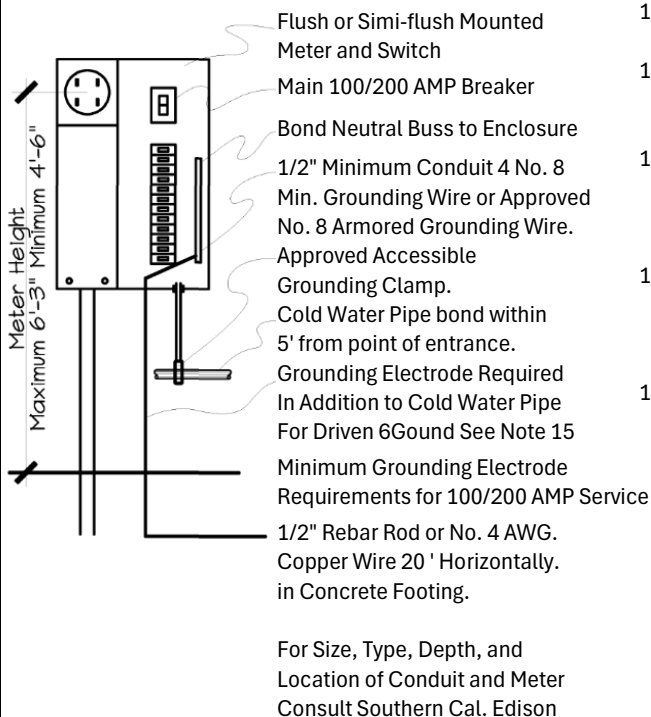
ELECTRICAL DETAILS

TYPICAL SERVICE CONVERSION FROM OVERHEAD TO UNDERGROUND

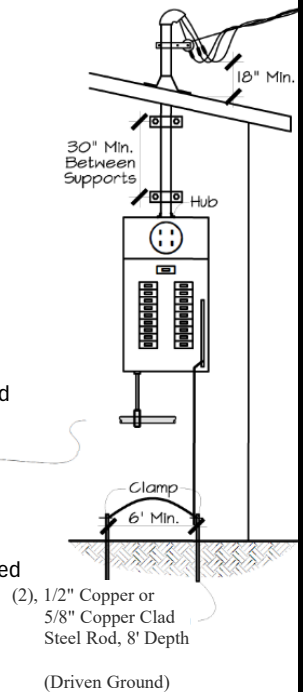


This drawing is intended to illustrate the requirement not the arrangement.

NEW SERVICE INSTALLATION



1. Approved weatherproof service head, 10'-0" min. height above grade and the drip loop shall be 18" min. above roof.
2. Service drop to have single point of contact to riser.
3. Provide 18" of free conductor from service head for attaching to service drop.
4. Clearance for service head and service drop
Areas above one and two family residences - 10'
Above structures on which men are able to walk - 8'
5. Service heads for dwellings need not be located on the wall nearest the pole from which the service drops are to be run but shall be so located that the service drop may be installed with only one point of attachment without crossing over adjacent premises.
6. Dwellings having over 10 kw load or 1,000 sq ft. Floor area require 1-1/4" conduit, 3 - no. 4 minimum (copper).
If service conduit is installed with lock nuts, Install a ground bushing or device and bond to the enclosure.
7. If service conduit is installed with lock nuts, install a ground bushing or device and bond to the enclosure.
8. For location, height, and type of meter socket consult utility company.
9. Switches, panel boards, etc., Installed outdoors shall be of a type approved for outdoor installation.
10. Main breaker or fusible switch required.
11. Bond neutral bus to include 1/2" minimum conduit, and #8 AWG minimum grounding wire or approved 8 AWG minimum armored grounding cable.
12. Approved accessible grounding clamp.
13. Grounding electrode required in addition to cold water water pipe. See Note 15.
14. Neutral conductors must be white, non-metallic seethed cable with grounding conductor permitted for single family dwellings where concealed in walls and attics.
15. Where driven ground rods are used two rods are required, or a test verifying the systems meets the 25 OHM test will be required, the rods shall be separated by 6 feet.
16. Minimum required branch circuits:
1-15 or 20 AMP Lights
2-20 AMP Kitchen Receptacles
1-20 AMP Laundry Receptacle
17. Surge Protector must be installed.



Size of Grounding and Bonding Wires		
Largest Service Entrance Conductor	Bonding or Grounding	Conduit Size
#2 or Smaller	#8 AWG	1/2"
#1 or #0	#6 AWG	1/2"
For Larger Conductors Consult Building Dept.		



Electrical Panel Upgrade - Residential

Electrical - Upgrading the Main Electrical Panel

The following 10 items pertain to upgrading the main electrical panel in a single family dwelling:

1. An electrical permit is required to upgrade the main panel.
2. The owner or a state-licensed contractor may obtain a permit.
3. Plans are not required.
4. Load calculations are generally not required for a service upgrade unless additional load is being added, and the inspector determines that calculations are necessary.
5. Under grounding the main service entrance is not required unless,
 - The existing service entrance is underground or
 - If required by either the Planning Department or Southern California Edison.
6. The height of the meter must be between 48" to 75" above the ground.
7. The clear working space in front of a panel is 30" wide by 36" deep with a minimum headroom clearance of 6' 6".
8. Circuit breakers –
 - Circuit breakers must be listed and approved types for panels (The brand of breakers must be specifically approved for use within the panel as stated on the panel's label).
 - A multi-wire circuit (3-wire, 240 volt circuit) to a single duplex receptacle requires a handle-tie on the circuit breakers. This is commonly the case where a single duplex receptacle serves both the garbage disposal and the dishwasher.
9. Grounding shall be per the National Electric. Code (NEC) - See Table 250-94 to size the grounding electrode conductor (GECG).
 - The water piping system is not allowed to be the sole grounding source. A supplemental electrodes (usually ground rod) must be installed if the water piping system is the only source of grounding.
 - A ground rod must be at least 8 feet buried in the ground. When made of iron or steel, the ground rod must be a minimum 5/8" diameter. Listed stainless steel or non-ferrous rods may be 1/2" in diameter. The ground rods should be located as close as practicable to the electric. service.
 - Two ground rods will be required, unless the installation is shown to pass the 25 OHM or less resistance to ground. The ground rods must be separated by not less than 6'.
10. Bonding shall be per the NEC - See Table 250-94 to size bonding conductors.

The water piping system must be bonded –

 - If the main water service piping to the house is metallic, the bonding must occur within five feet of where the water service enters the house. (Only if it is used as part of the electrode grounding system)
 - Made electrodes of the rod, pipe or plate (i.e.. ground rods) that supplement a metal water pipe grounding electrode shall not exceed 25-ohms to ground resistance. NEC Section 250-56.
 - If the main water service piping is non-metallic. (e.g. - PVC), the cold water piping system may be bonded at any accessible location.

Note: Piping is commonly bonded at the water heater.

 - The hot and cold water piping systems are effectively bonded together via plumbing mixing valves at tubs and showers, etc.. Therefore, the City of Upland accepts a single bond to the cold water piping only.

Note: An independent bonding jumper to the hot water piping is not required.

The gas piping system must be bonded - See NEC Section 250-104 (b) & (c)

 - The gas piping is bonded via the grounding conductor in the branch circuit to the gas appliances (If available).
 - If the electrical system does not contain equipment grounds, then the gas piping system must be bonded externally with a bonding jumper (same as water pipe).
 - Gas bonding shall only be connected to the house side of the meter.

For additional grounding and bonding requirements, refer to the NEC, Article 250.