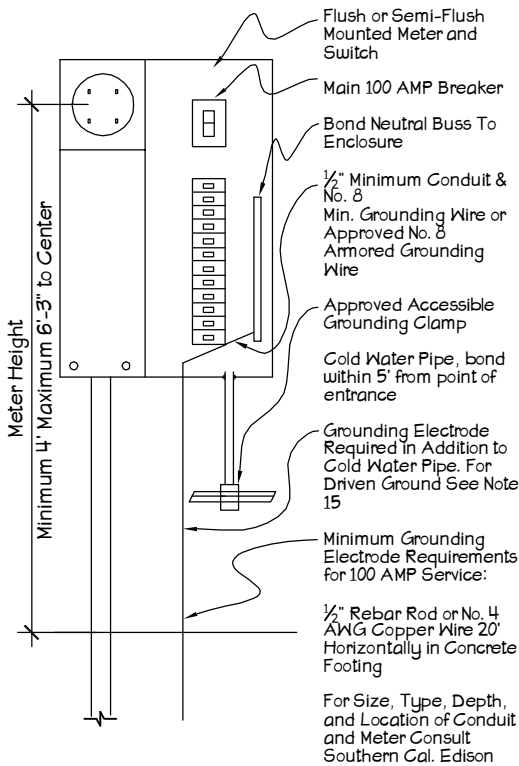




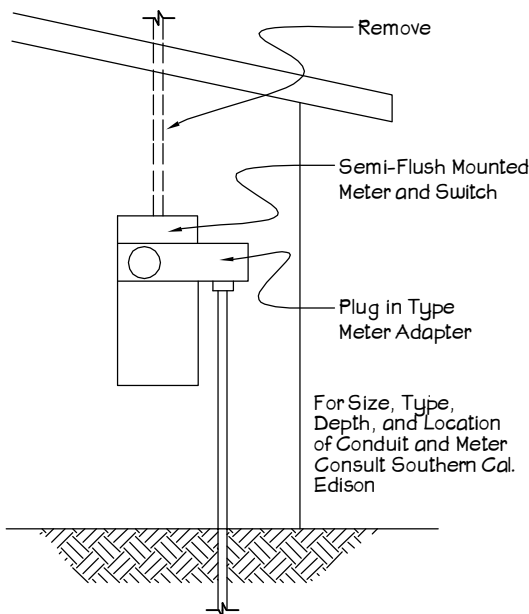
RESIDENTIAL ELECTRICAL PANEL UPGRADE

ELECTRICAL DETAILS

NEW SERVICE INSTALLATION



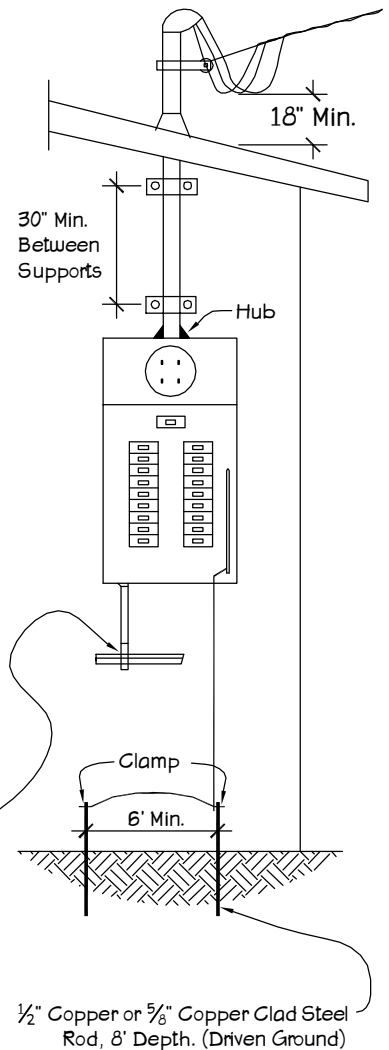
TYPICAL SERVICE CONVERSION FROM OVERHEAD TO UNDERGROUND



This drawing is intended to illustrate the requirements not the arrangement

- Approved weatherproof service head, 10'-0" min. height above grade and the drip loop shall be 18" min. above roof.
- Service drop to have single point of contact to riser.
- Provide 18" of free conductor from service head for attaching to service drop.
- Clearance for service head and service drop.
Areas above one and two family residences-8'
Above areas or sidewalks accessible to pedestrians-10'
- 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.
- Dwellings having a 100 AMP service require 1-1/4" conduit, 3- # 4 min. copper. 200 AMP requires 1-1/2" conduit, 3-2/0 copper.
- If service conduit is installed with lock nuts, install a ground bushing or device and bond to the enclosure.
- For location, height, and type of meter socket consult utility company.
- Switches, panel boards, etc., installed outdoors shall be of a type approved for outdoor installation.
- Main breaker or fusible switch required.
- Neutral bus bond to include 1/2" minimum conduit, and #8 AWG minimum grounding wire or approved #8 AWG minimum armored grounding cable
- Approved accessible grounding clamp.
- Grounding electrode required in addition to cold water pipe. See note 15.
- Neutral conductors must be white. Non-metallic sheathed cable with grounding conductor permitted for single family dwellings where concealed in walls.
- Where driven ground rods are used, two rods are required or a verification the system meets the 25 ohm test is required. The rods shall be separated by 6 feet.
- Minimum required branch circuits:
1-15 or 20 AMP for lights
2-20 AMP for Kitchen receptacles
1-20 AMP for Laundry receptacle
1-20 AMP Bathroom

SERVICE CLEARANCE & GROUNDING REQUIREMENTS



Size of Grounding and Bonding Wires		
Largest Service Entrance Conductor	Bonding or Grounding	Conduit Size
#2 or Smaller	#8 AWG	1/2"
#2/0 or #3/0	#4 AWG	1/2"

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 service 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,
 - a. The existing service entrance is underground.
 - b. If required by the Planning Department or Southern California Edison.
6. The height to the center 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,
 - a. Circuit breakers must be listed and approved types for panels. The brand of breakers must be specifically approved for use with the panel as stated on the panel's label.
 - b. 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 California Electrical Code- See Table 250-66 to size the grounding electrode conductor.
 - a. The water piping system is not allowed to be the sole grounding source.
 - b. A ground rod must be buried at least 8' in the ground. When made of iron or steel, the ground rod must be a minimum of 5/8" diameter. Listed stainless steel or nonferrous rods may be 1/2" in diameter. The ground rods should be located as close as practical to the electric service.
 - c. Two ground rods will be required, unless the installation is shown to pass the 25 ohm or less resistance to ground test. The ground rods must be separated by not less than 6'.
10. Bonding shall be per the CEC, see Table 250-66 to size bonding conductors. The water piping system must be bonded,
 - a. If the main water service piping to the house is metallic, the bonding must occur within 5' of where the water service enters the house. (Only if it is used as part of the electrode grounding system)
 - b. Made electrodes of the rod, pipe, or plate type that supplement a metal water pipe grounding electrode shall not exceed 25 ohms to ground resistance.
 - c. If the main water service piping is non-metallic, the cold water piping system may be bonded at any accessible location. (Piping is commonly bonded at the water heater.)
 - d. The hot and cold water piping systems are effectively bonded together via plumbing mixing valves at tubs and showers, etc. Therefore a single bond to the cold water piping is acceptable.
11. The gas piping must be bonded. CEC 250-104.
 - a. The gas piping system is bonded to the cold water piping system typically at the water heater via a bonding jumper.
 - b. Gas bonding shall only be connected to the house side of the meter.
 - c. For additional grounding and bonding requirements, refer to the CEC, Article 250.