RESIDENTIAL ELECTRICAL SERVICE UPGRADE

REQUIRED DOCUMENTS

- Provide Building Application, and two copies of Scope of Work (as necessary)
- All work shall comply with 2019 California Building Code (CBC), California Residential Code (CRC), California Electric Code (CEC), California Energy Efficiency Standards, and California Green Building Standards (CalGreen).

ELECTRICAL REQUIREMENTS

- Working space clearance in front of electrical equipment shall be a minimum of 36", with a width of 30" minimum, and height from grade of 6'6". [CEC 110.26(A)(1)]
- Overhead and underground service conductors shall be sized to have sufficient capacity to serve the property loads (CEC 230.42).
- The grounding electrode system shall be completed and verified for all new service panels, and all new sub panels. Common grounding electrode systems include:
  - a) **Ufer** - a concrete-encased grounding electrode conductor, not smaller than #4 copper AWG, 20' minimum length, installed with the rebar of the property foundation.
  - b) Two **ground rods**, driven 8' into the earth, #6 minimum copper AWG, minimum 6' apart. See CEC section 250.52 for additional details.
- The grounding electrode conductor shall be sized to the largest ungrounded service-entrance conductor at the property, per CEC Table 250.66:

Main Circuit Breaker Amperage	**Size of Largest Ungrounded Service-Entrance Conductor for Parallel Conductors (AWG/kcmil)**		**Size of Grounding Electrode Conductor (AWG/kcmil)**	
	Copper	**Aluminum or Copper-Clad Aluminum**	**Copper**	**Aluminum or Copper-Clad Aluminum**
100 or 125	2 or smaller	1/0 or smaller	8	6
150	1 or 1/0	2/0 or 3/0	6	4
200 or 225	2/0 or 3/0	4/0 or 250	4	2
** *Residential services greater than 225A shall require specific plan check and approval.*				

- A separate grounding electrode system shall be provided for accessory buildings with more than one circuit (CEC 250.32).
- Bonding of existing metal piping shall be required, including hot and cold metal water pipes, and gas piping (CEC 250.104). An intersystem bond device shall be provided (CEC 250.94).
- New service panels shall be located a minimum 36" from existing gas regulator valves or other foreign piping (CEC 110.26(E)(2)(c).

- No circuit breaker nor overcurrent device shall be located higher than 6'7" from grade at the service panel location (CEC 240.24).
- The minimum size of the main circuit breaker serving the property shall be 100A [CEC 230.79(C)].
- If the property contains existing PV, ESS, or generator secondary-source power supply systems, associated labels shall be installed at the main electric service (CEC 705.12).

INSPECTION PROCESS

1) Temporary Power Inspection:
   - Permit card and plans must be on site.
   - New main service panel must be installed in its proposed location, and feeder conductors must be protected and routed, ready for PG&E connection.
   - Grounding electrode conductor must be permanently connected between the new panel and the ufer/ground rods.
   - A City of Davis "Authorization to Connect" red sticker shall be applied to the new panel by the field inspector when these requirements are met, allowing PG&E to connect power.
   - A new main electric service installation shall provide a permanent connection between the intentionally grounded conductor (neutral wire) and the grounding electrode conductor (ground wire) at the main service equipment panel, per CEC 250.24.
   - A sub panel installation typically does not require this temporary power inspection, and most sub panel installation work can proceed directly to final inspection.

2) Final inspection:
   - Permit card and plans must be on site.
   - All work must be completed, including installation of all circuit breakers and termination of all conductors.
   - All bonds (gas, water) shall be complete.
   - For a new sub panel, the neutral conductor and equipment grounding conductor terminal bars and associated conductor terminations shall be separated.
   - All circuits must be labeled.
   - All exterior equipment shall be flashed and waterproof.

ADDITIONAL ADVISORIES

- Front counter staff, or field inspectors, may request written utility (aka PG&E) approval for service panel change outs when the ampacity of the main circuit breaker is upsized from the previous main breaker size.
- Load calculations shall be provided for any new subpanel, to confirm the breaker feeding that panel is adequately sized to serve those loads.
- If only one ground rod can be verified at the property, a second ground rod shall be provided.
- All smoke alarms and carbon monoxide detectors must be in working condition and installed in all required locations (CA Health and Safety, 13113.7), and shall be confirmed and certified at final inspection.