PETERSBURG
MUNICIPAL POWER & LIGHT

PMPL Home Wiring Guidance

A Homeowner's Guide to Wiring a New Home — PMPL & NEC 2020 Edition

Prepared for Petersburg, Alaska homeowners. Educational reference only; not a substitute for licensed work or inspection.

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Introduction

This guide was developed by **Petersburg Municipal Power & Light (PMPL)** to help homeowners better understand the fundamentals of residential electrical wiring and common installation practices. It is **not all-encompassing** and should **never be used as a substitute for the National Electrical Code (NEC)** or the **expertise of a licensed electrician**. Always follow the **most recent version of the NEC as adopted by the State of Alaska**, and when in doubt, **contact your local electrical inspector** for clarification before proceeding with any work.

Electrical systems are complex, and the NEC is the result of over a century of refinement, research, and real-world experience. It would be impossible to condense a lifetime of trade knowledge, formal training, and the complete NEC Code into a short reference booklet. A licensed electrician completes **a minimum of four years of intense, hands-on and classroom training**, and in Alaska, they are required to maintain **8 to 16 hours of continuing education annually** to stay current with code updates and safety standards.

This booklet is intended only as a **practical reference**—a compilation of **the most common code violations, frequently asked questions, and field observations** encountered by PMPL staff and inspectors. It is meant to promote **safe, code-compliant electrical installations** and to encourage homeowners to understand the importance of proper wiring methods, grounding, clearances, and device installation.

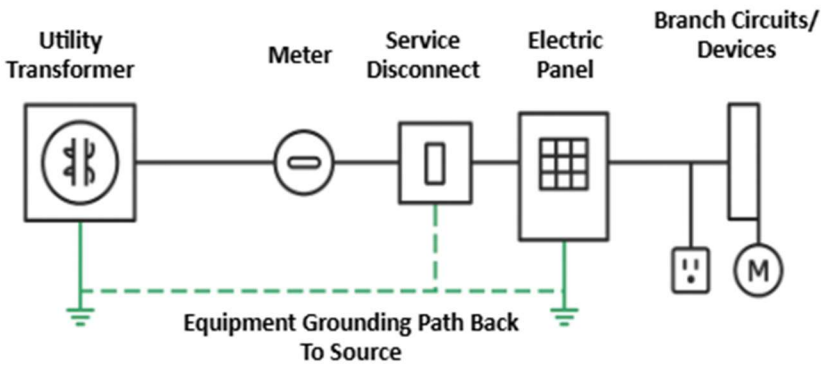
Always remember: **when in doubt, ask**—your safety, and the reliability of Petersburg's electrical system, depend on it.

Table of Contents

1. Fundamentals of Safe Residential Wiring

• Safety: Always turn off power, verify with a tester, and use UL-listed parts. Never bypass protective devices.

• System Path: Utility transformer → Service drop/lateral → Meter → Service disconnect (outside required) → Panel → Branch circuits → Devices → Equipment grounding path back to source.



2. Permits, Inspections, and Workflow

- Planning and circuits, load calculation.
- Submit permit and Electrical Supplement (through Borough Building Inspector).
- Temporary service (Inspection Required) if needed.
- Foundation Inspection before concrete is poured.
- Rough-in (boxes, cables, staples, nail plates).
- Rough inspection.
- Insulate/drywall.
- Trim out (devices/fixtures).
- Final inspection.
- PMPL meter set.

Electrical Inspections
For Electrical Inspections call PMPL at 907-772-4203

Call for inspections:

- Prior to pouring any foundations – UFER ground required
- Prior to any service hook up, Temporary or Permanent
    - **NOTE: Temporary Services are for 6 months only, after that they may be extended for another 6 months, per PMPL's discretion, per the current rate**
- Prior to covering wiring with anything, insulation, vapor barrier, or drywall for example. This would be called a rough in inspection
- When all wiring is complete and devices are installed for permanent use. This would be called a final inspection.
- After the installation of a heat pump installation that is not part of a new home construction.

3. Concrete Foundations and Ufer Grounds

If rebar is used in the concrete foundation, the National Electrical Code (NEC) requires a Ufer ground to be installed. The grounding electrode conductor must be securely attached to the rebar with an approved grounding clamp or fitting before the concrete is poured. If the foundation does not contain rebar or bare copper wire, other code-approved grounding methods, such as ground rods, must be used.

4. Planning The Minimum Required Circuits

Area/Appliance	Min Circuits	Amps	Protection	Notes
Kitchen, small appliances (this is required in every home)	2	20A	GFCI + AFCI	Countertops only; separate from lighting
Dishwasher if used	1	15–20A	GFCI	Per nameplate
Microwave (built-in)	1	20A	AFCI	Per nameplate
Refrigerator	1	15–20A	AFCI	GFCI if within 6 ft of sink
Range/Oven (electric)	1	40–50A	Standard	240V per nameplate, 3-wire plus ground
Laundry receptacle (this is required in every home)	1	20A	GFCI	Washer/gas dryer
Electric dryer	1	30A	Standard	240V, 3-wire plus ground
Bathroom receptacle (this is required in every home)	1	20A	GFCI	No other rooms on this circuit
Garage	1	15–20A	GFCI	WR/TR receptacles
Outdoor	1	15–20A	GFCI	WR/TR receptacles, in-use cover required
Bedrooms/Living/Halls (this is required in every home see outlet spacing in section 6.)	As needed	15–20A	AFCI	General lighting/receptacles, TR-rated outlets

5. GFCI/AFCI Receptacle / Breaker Requirements

Protection	Where Required	Typical Circuits	Notes
GFCI	Bathrooms, kitchens, near sinks and other wet locations, laundry, garages, basements, crawlspaces,	15–20A receptacles	Use WR outdoors; in-use covers

	outdoors, dishwashers		
AFCI	All 120V 15–20A outlets/devices in habitable rooms	Lighting & receptacles	Use branch/feeder or combo type
Dual-Function	Where both GFCI + AFCI apply	Kitchen small-appliance, laundry, baths	Simplifies protection at breaker

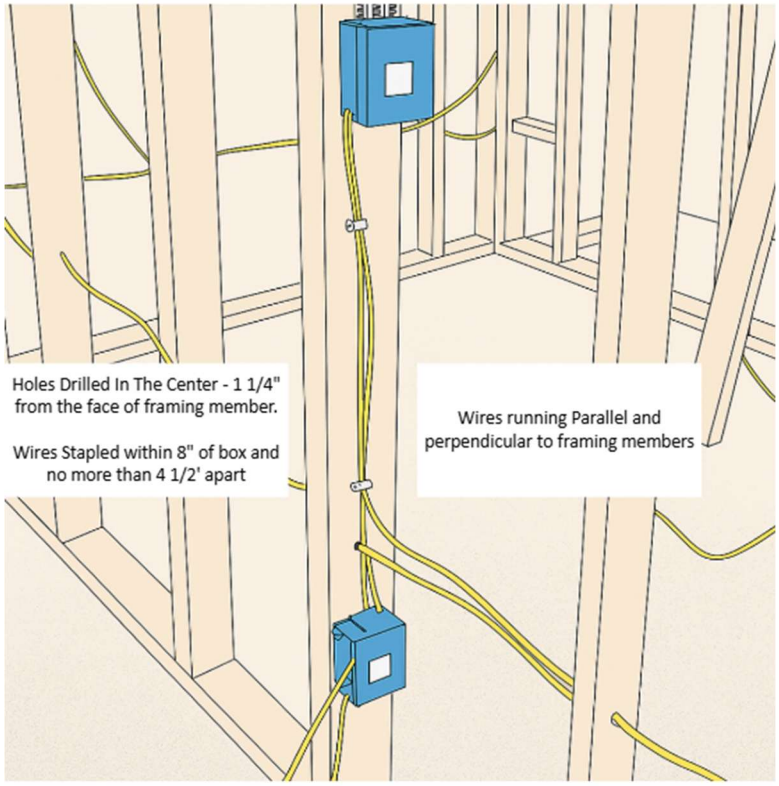
6. Receptacle Spacing and Other Requirements

- Walls: No point along floor line more than 6 ft from a receptacle; ≤12 ft between receptacles. (A break in the wall, such as doorways, fireplaces, and built-in bookcases, starts the measurement over.)
- Walls ≥2 ft: At least one receptacle.
- Hallways ≥10 ft: At least one receptacle.
- At least one receptacle within 25’ of all heat pumps.
- At least one receptacle by each exterior man door.
- Countertops: No point more than 24 in from a receptacle. (A break in the countertop, such as sinks, starts the measurement over.)
- Typical heights: Receptacles 12–18 in AFF; switches ~48 in AFF.
- Garage receptacles, or those installed on floors at the same height as garages, must be at least 18 inches above the floor to the bottom of the boxes.
- All receptacles in living spaces must be tamper resistant (marked with TR)
- All receptacles in wet areas need to be water resistant (marked with WR)

7. Wiring Practices

Staple NM cables within 8 inches of boxes (12 inches if using a cable clamp), every 4½ feet thereafter. Bore holes through center third of studs; use steel nail plates if closer than 1¼ inches to edge. Avoid over-bending, keep cables neat and supported. Maintain separation from ducts, plumbing, gas lines, and high-heat sources. Protect cables where exposed, use

proper connectors, label circuits clearly.



8. Wire Length in Boxes

Minimum length: At least 6 inches from the front edge of the box to the connection point. Leave a little extra length; too short is a code violation.

Leaving extra wire reduces connection stress, simplifies repairs, and allows devices to be installed without splicing or extensions that may weaken the circuit.

When trimming wires, err on the side of leaving a little extra length—too short is a code violation, but slightly longer is acceptable and safer.

9. NEC Box Fill — Understanding and Applying the Rules

Each UL Listed box is labeled with its volume size

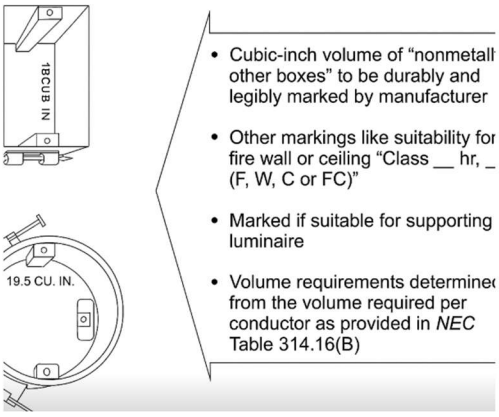
The code states how much we can put in the boxes by using the following:

- Counting Conductors:
  - Each conductor: count 1.
  - Pigtails that stay in box: do not count.
  - All grounds together: count as 1.

• Each yoke-mounted device: count as 2. (a regular switch or outlet that only has (1) top and (1) bottom screw is = 1 Yoke. A typical range or dryer outlet that has (2) top and (2) bottom screws = 2 yoke)
• Integral clamps: count as 1.
You must use the largest wire size in the box for your calculations

Conductor size (AWG)	Volume per conductor (in^3)
14	2.00
12	2.25
10	2.50
8	3.00
6	5.00

Example Calculation: 7 insulated conductors + 1 ground + 2 device + 1 clamp = 11 conductors. For 12 AWG: 11 × 2.25 in^3 = 24.75 in^3 needed. Box = 30.3 in^3 → OK.



Typical Maximum Romex cables in a box with one device

Cable gauge	18 in^3 box	22 in^3 box
14/2	3 cables	4 cables
12/2	2 cables	3 cables
10/2	2 cables	2 cables

10. Wire & Breaker Sizing and Panel Location Restrictions

Wire (Cu)	Typical Use	Breaker
14 AWG	Gen. lighting/receptacles	15A
12 AWG	Kitchen/bath/laundry	20A
10 AWG	Water heater/dryer (Cu)	30A
8 AWG	Range/AC (Cu)	40A
6 AWG	Large loads (Cu)	50A

Panel Location: Accessible, dry locations only. Not in bathrooms, closets, or damp/confined spaces. Working clearances: ≥30" wide, 36" deep, 6.5' high. Highest breaker handle ≤6'7" above floor. Adequate lighting required.

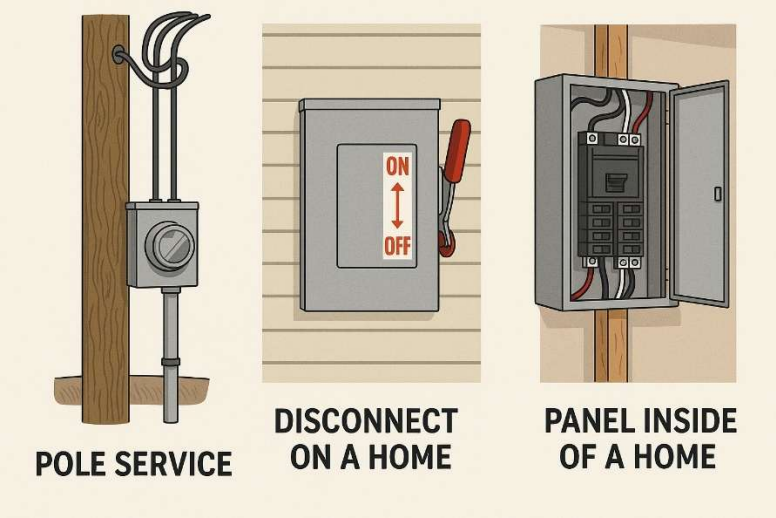
11. Buried Service Conduit Depth Requirements

PVC Schedule 40, 24 inches minimum. Under driveways/roads: 24–30 inches. Mark underground conduits with red “ELECTRIC” tape 12 inches above during backfill. Maintain at least 12 inches horizontal separation from communication or water lines.

12. PMPL Typical Residential Service Configurations

Prior to any work a site visit is required with PMPL personnel – Call 907-772-4203

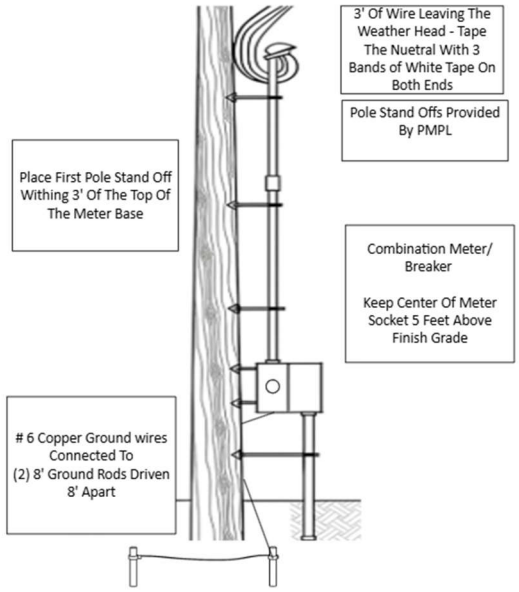
Service Disconnect: Must be outside; pole-mounted service must also provide disconnect at pole and house exterior.



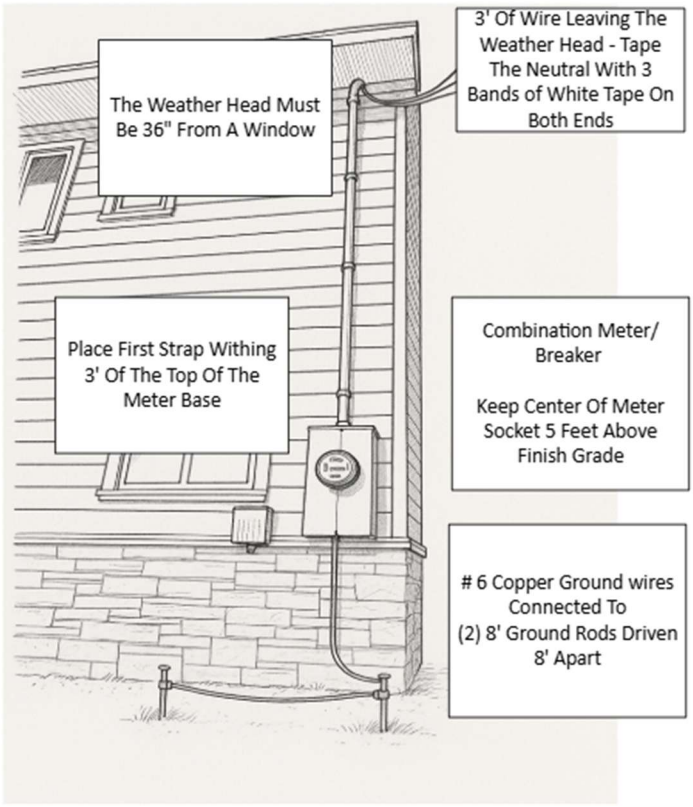
Wire sizing: 100A Copper #2, 100A Aluminum 1/0, 200A Copper 2/0, 200A Aluminum 4/0.

The service disconnect is a breaker sized for the wire. If an additional disconnect is needed (i.e. the exterior of the house for a pole mounted service) a properly sized breaker or a properly sized blade disconnect can be used. For pole-fed homes, they must include a grounding wire sized to the ungrounded wires (the hot wires) usually #6 ground wire, ran from the service to the panel.

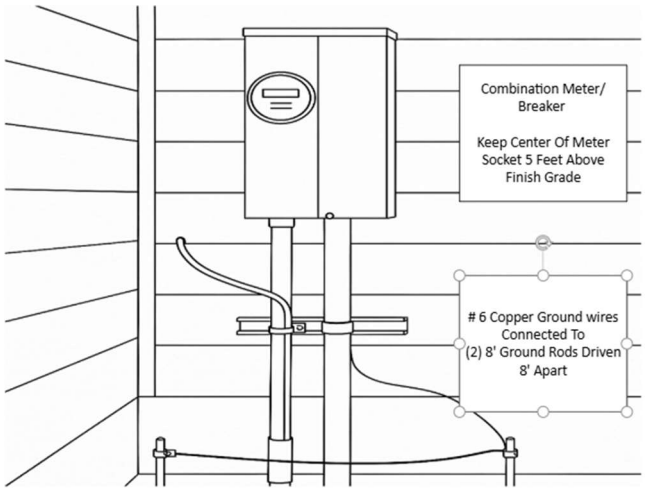
Homeowners and contractors are responsible for providing and installing the meter base/breaker combination unit, all required risers (including conduit, conductors, and weather heads), grounding electrodes (ground rods), and grounding conductors for all overhead, pole-mounted, and temporary services. PMPL will supply the Pole Standoff Brackets and clamps, but it is the homeowner or their contractor's responsibility to install these. For underground services, homeowners and contractors are likewise responsible for furnishing and installing the meter base/breaker combination unit, ground rods, and grounding conductors, as well as completing all trenching and associated excavation needed to install the service lateral. In all cases PMPL does not supply or perform the installation of any wiring or equipment after the meter.



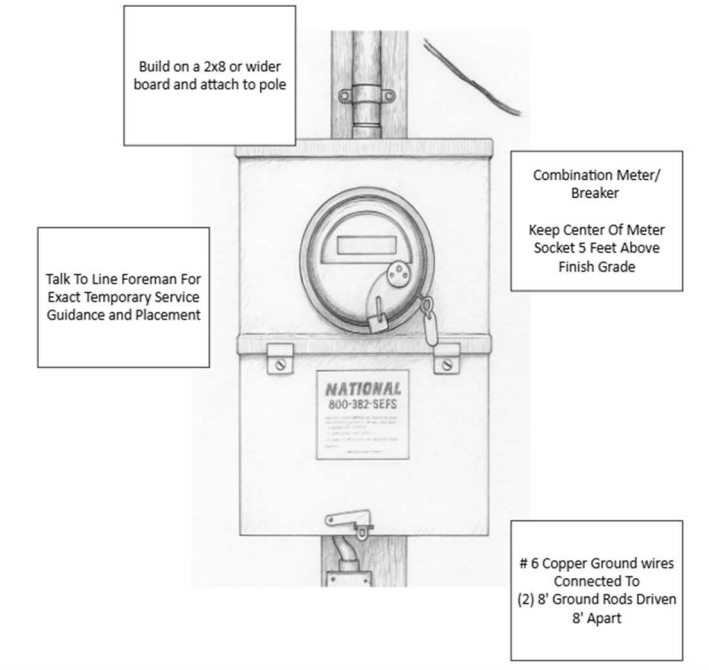
Typical Pole Service



Typical Over Head Service



Typical Underground Service

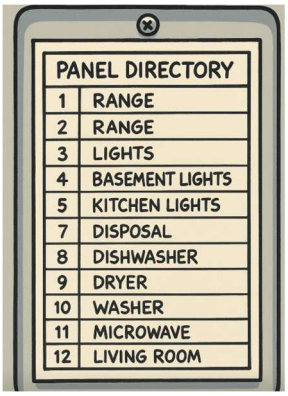


Typical Temporary Service

The point of attachment for any weather head must be 3’ or more away from any door, window, deck, etc.

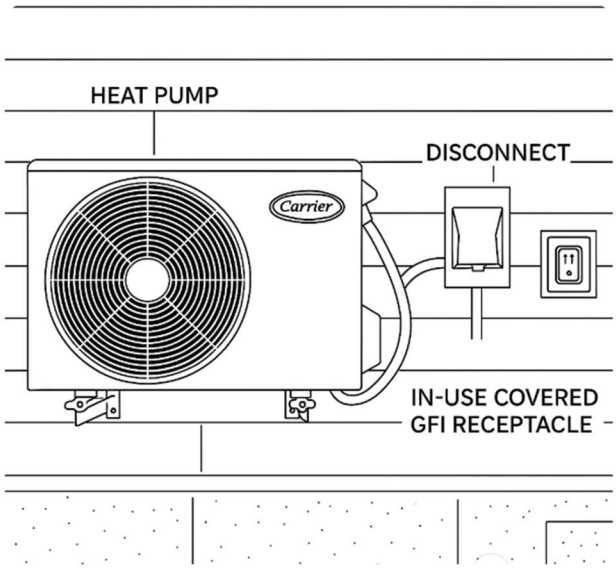
13. Panels, Labeling, and Circuit Directories

Label each breaker with room/load. Keep a typed or clear handwritten directory.



14. Heat Pumps — Disconnects, Line of Sight, and Required Outlet

Required Disconnect: Must be within sight (≤50 ft) and in line of sight, accessible, rated for load/type. If the disconnect is not visible, use a lockable disconnect. Working Space Clearance: ≥30" wide, 36" deep, 6.5' high. Required Receptacle Outlet: 120V, 15/20A GFCI-protected, within 25 ft, **not on the heat pump circuit.** Weather Protection: Use weatherproof covers and rated enclosures.


HEAT PUMP
DISCONNECT
Carrier
IN-USE COVERED
GFI RECEPTACLE