Mast and Pole Mounting

Safety first

Erecting and climbing masts is hazardous. Before any mast work:

- **Overhead power lines:** Keep the mast's full fall radius clear of power lines - allow a clearance of at least the mast length plus 10 ft in every direction. A falling or tipping mast that contacts an overhead line can be fatal; power-line contact is the leading cause of installer electrocution.
- **Never raise a mast alone.** Use a spotter, and never raise or work on a mast in wind or near power lines without help.
- **Fall protection:** Use fall protection for any rooftop or elevated work, and do not climb push-up or telescoping masts - they are not rated to support a person.

Mast options

- **J-pipe mounts:** Common TV antenna hardware. Good for moderate antennas on walls or chimneys.
- **Galvanized conduit:** 1-1.5" Schedule 40 steel conduit. Strong, affordable, easy to work with. Suitable for short unguyed masts (commonly cited around 4-5 meters), but the safe free-standing height depends heavily on wind load and antenna weight - for taller masts or heavier antennas, guy the mast or consult a structural/EIA-222 or manufacturer guideline rather than relying on a flat height figure.
- **Telescoping push-up masts:** Aluminum sections. Easy to deploy. Common for temporary or semi-permanent installs.
- **Non-penetrating roof base:** A weighted base holds a mast on a flat roof without drilling. Ballast requirements scale with mast height and antenna wind load - 50 lb of paving blocks is a minimum for short masts only. Calculate the overturning moment for your wind zone; tall masts may need several hundred pounds of ballast or guying. An inadequately ballasted mast can blow over, becoming a falling hazard or striking power lines.

Guy wires

Masts more than about 3-4 meters free-standing (and any telescoping push-up mast above roughly 4 m) need guy wires. Use three guys at 120 degree intervals (a triangular arrangement). Use stainless cable or UV-resistant rope. Guy at 2/3 height and near the top. The exact threshold depends on mast type, antenna wind load, and exposure - guy sooner for heavier antennas or windy sites.

Grounding and lightning protection

Ground the mast and antenna with a bonding/down conductor not smaller than #10 AWG copper (NEC 810.21); #8 AWG or larger exceeds this minimum and is fine. If you drive a separate ground rod for the antenna, it **must** be bonded to the building's main grounding electrode system with at least a #6 AWG copper conductor (NEC 810/250) - grounding the mast to its own isolated rod without bonding to building ground creates a dangerous ground-potential difference and is a code violation. Install a coaxial lightning arrestor rated for 915 MHz at the building entry point and bond it to building ground. See the dedicated grounding and lightning protection page for full detail.

Key rules

- Mount antenna as high as practical, clear of obstructions
- Keep the coax run short by mounting the radio enclosure close to the antenna
- Use stainless steel hardware outdoors to prevent galvanic corrosion
- **Never power on the radio without an antenna connected** - transmitting into an open or shorted port can damage the power amplifier. LoRa transceivers (SX126x/SX127x) often survive brief keying into an open port, but sustained transmission without a proper load can cause permanent damage, so always connect the antenna (or a 50-ohm dummy load) before transmitting. This caution applies most during bench testing - see the getting-started and testing material.

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