Acceptable service entrance grounding electrode methods

Use this drawing when:
- Resolving network communication issues related to electrical noise
- Designing new network for best noise immunity and equipment/personnel protection
- Adding/upgrading equipment to the network
The goal is to implement a single ground reference throughout more effectively than standard cable. This is a result of equalizing potential conductors (EPC) or equalizing potential barriers (EPB). An EPC system eliminates the noise source by moving it to the outside of the enclosure. This can be done by bonding the enclosure to the ground system at multiple points, creating equipotential zones. The strongest EPC systems are those that completely enclose the equipment and provide a return path for induced or conducted noise.

The challenge is to maintain equipotential (or intentional) equipotentiality. In a completely shielded enclosure, the EPC system is effective as it has a metallic sheath that is bonded to dissipate the electrical noise. Grounding and bonding are designed to carry electricity such as enclosures, trays, racks, cable armor, etc. to a ground. A dedicated grounding conductor safely directs the hazardous stray electrical current to ground. The terms earthing, grounding, and bonding are often interchanged. However, there are specific meanings:

- **Earthing** - Earth or a conductive body that is connected to earth.
- **Grounding** - The point at which all "Bonded" conductors come together at "Earth".
- **Bonding** - Electrically connecting all exposed metallic items not designed to carry electricity such as enclosures, trays, racks, cable armor, etc. to a ground.

**Grounding for Safety**

Cable trays, enclosures, communication/control cable, chassis, or metallic surface can be inadvertently energized by a power cable short or lightening, potentially leading to shock causing injury or equipment damage. A dedicated grounding conductor safely directs the hazardous stray electrical current to ground. Ground Loop

A ground loop is an unwanted current in a conductor connecting two points that should be at the same potential. This is a result of multiple ground connections to earth creating a potential difference. This can be DC voltage, AC voltage, EMI noise, power harmonics, etc.

**Grounding and Bonding for Network Communication**

Stray electrical noise and ground loops can disrupt electronic equipment, especially Ethernet gear. There are varying methods to suppress. Unshielded Twisted Pair (UTP) Ethernet cable has limited noise cancellation. Shielded Twisted Pair (STP) cable is more effective as it has a metallic sheath that is bonded to dissipate the electrical noise. The challenge is to maintain equipotential (An Equalizing Potential Conductor may be needed). Network cable protected by a grounded noise shield or shielded duct is designed to dissipate electrical noise in an enclosure. Also, a flat, wide bonding strap bonded to the enclosure door and side panels dissipates noise more effectively than standard cable (skin effect of high freq. noise). The goal is to implement a single ground reference throughout.