Engineering Grounds for Bonding Grounds:

Techniques solidly grounded in science (and experience).



Presented by:

Dan McMenamin

President

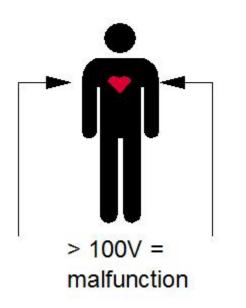
Dan McMenamin and Associates, Inc.

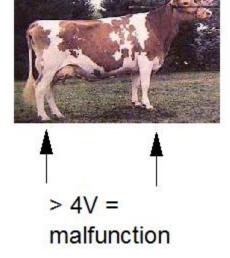
PEG 2017 Dallas, Texas March 14-16, 2017

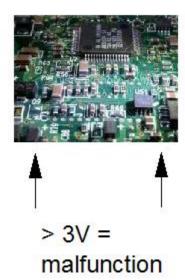




Difference in Potential

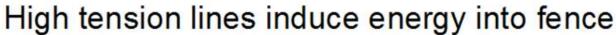




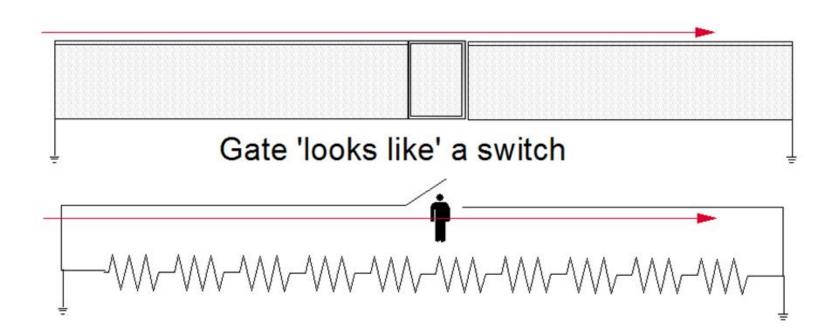






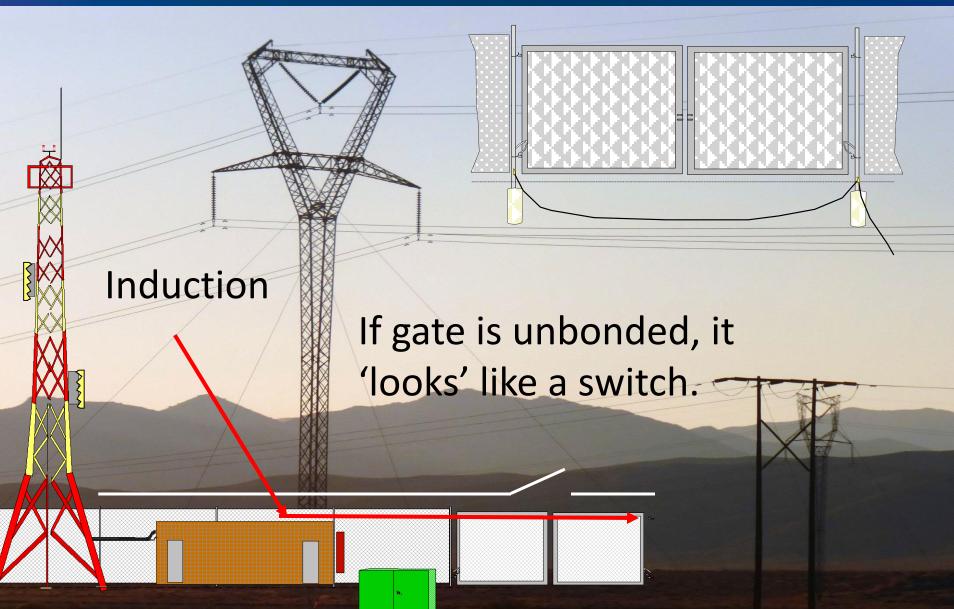










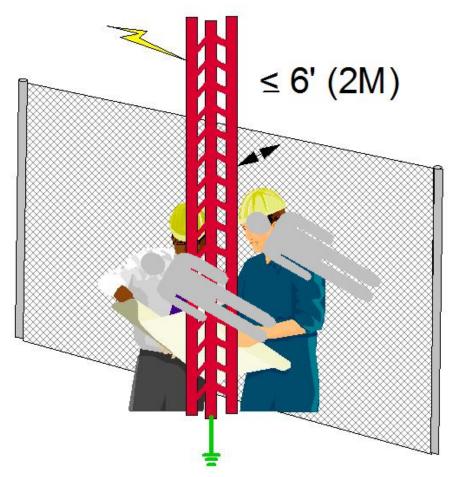






Bonding









Substations





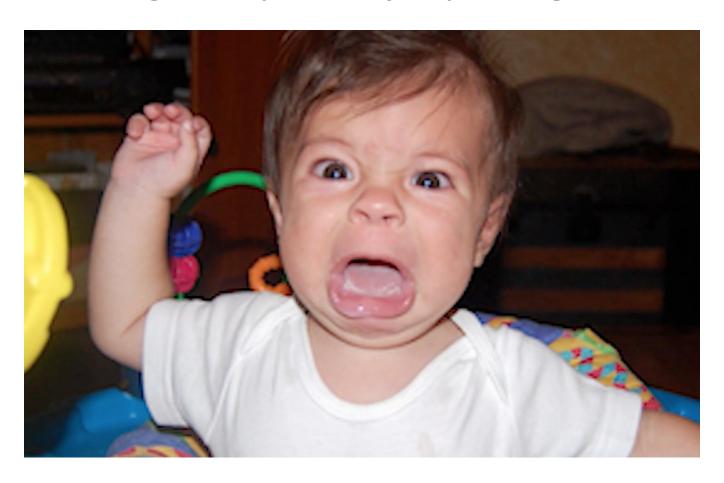








Warning: Graphic injury image ahead







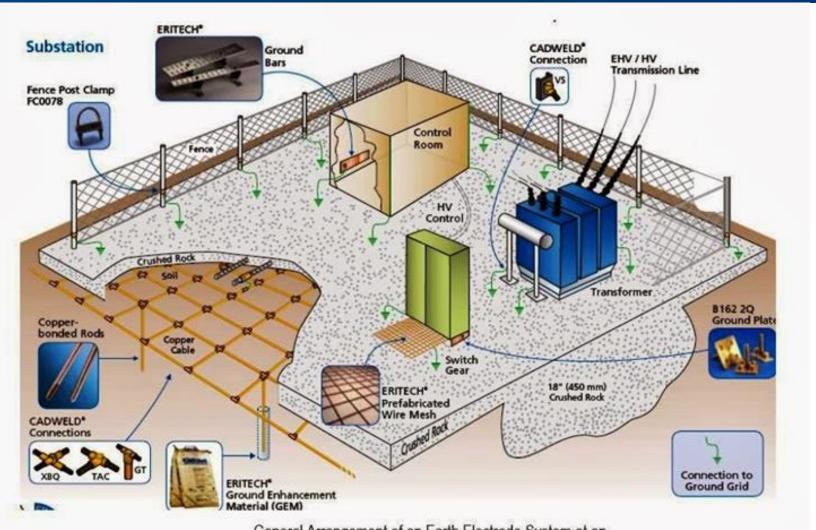


Ouch!









General Arrangement of an Earth Electrode System at an Electrical Sub-Station

Courtesy: Pentair Inc.



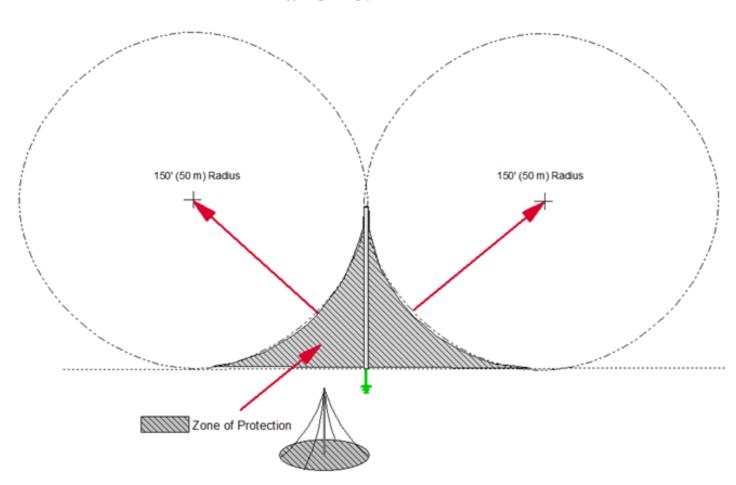






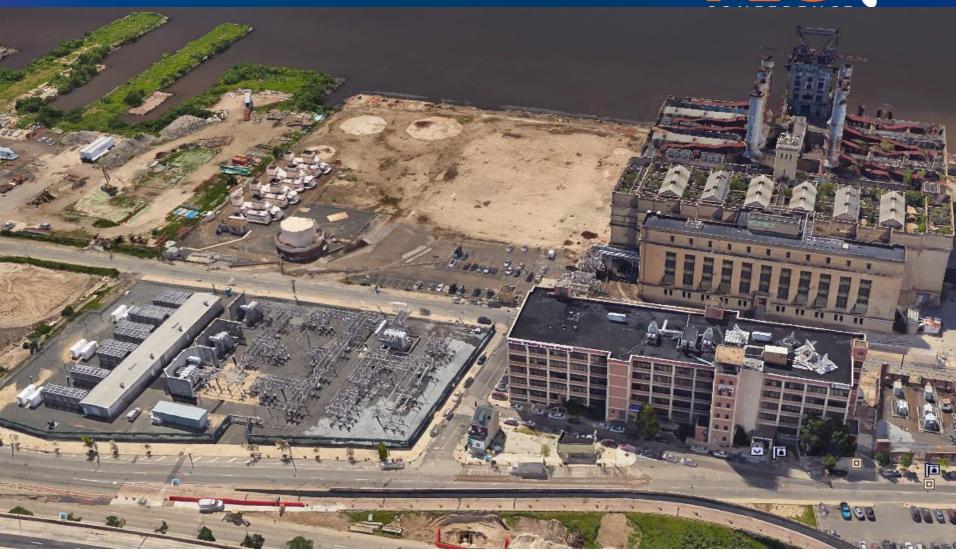


Mast Type lightning protection



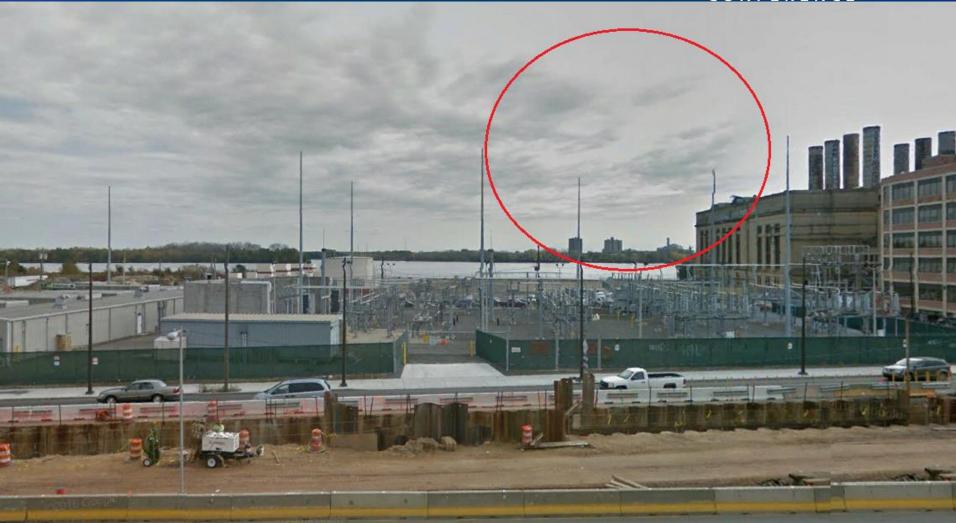


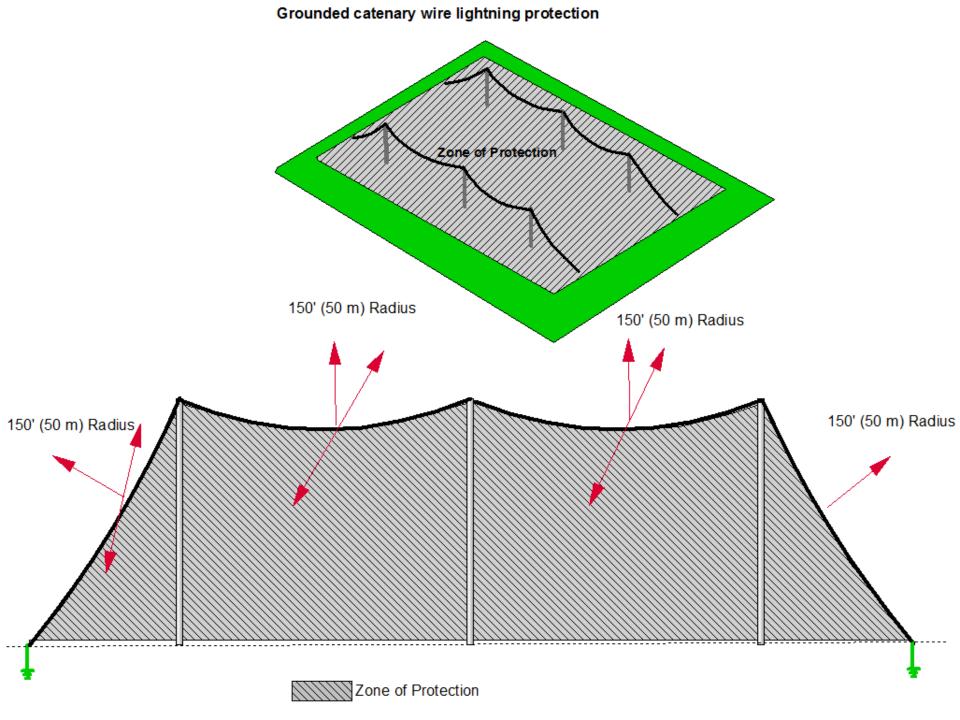


















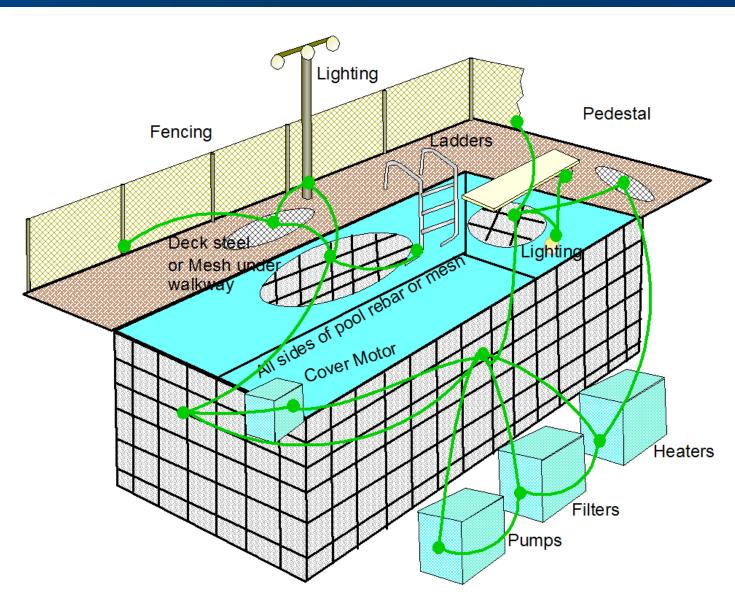






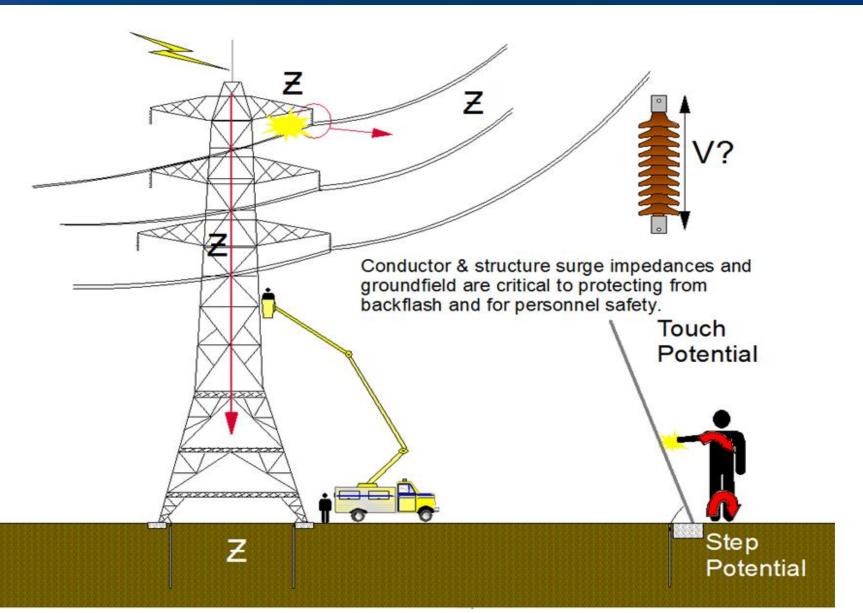








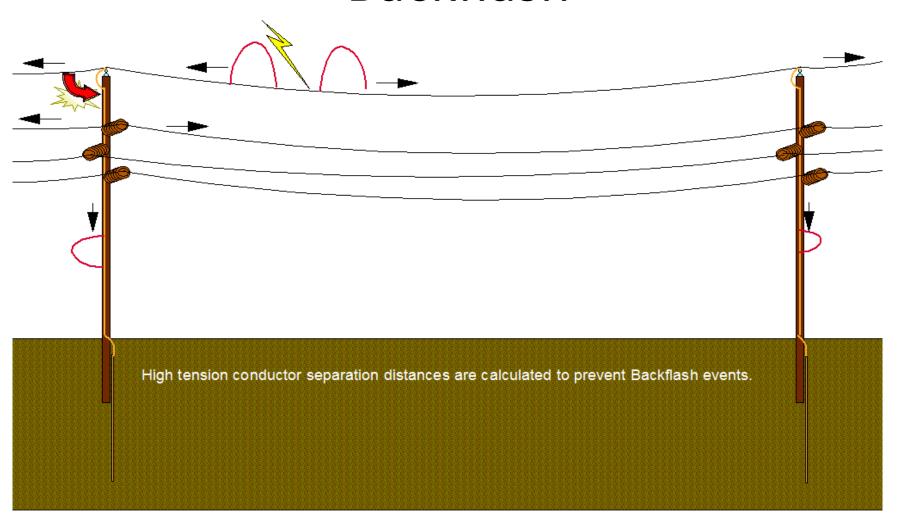






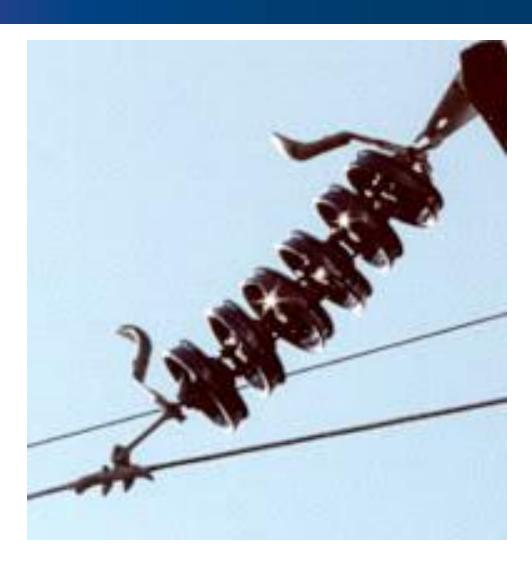


Backflash









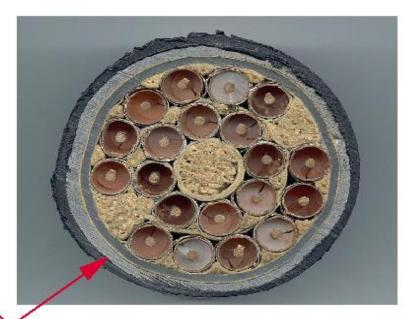




Bonding cable shields to ground is intended to prevent flashover arcing and insulation between the cable shield and the communication wires within the cable core.



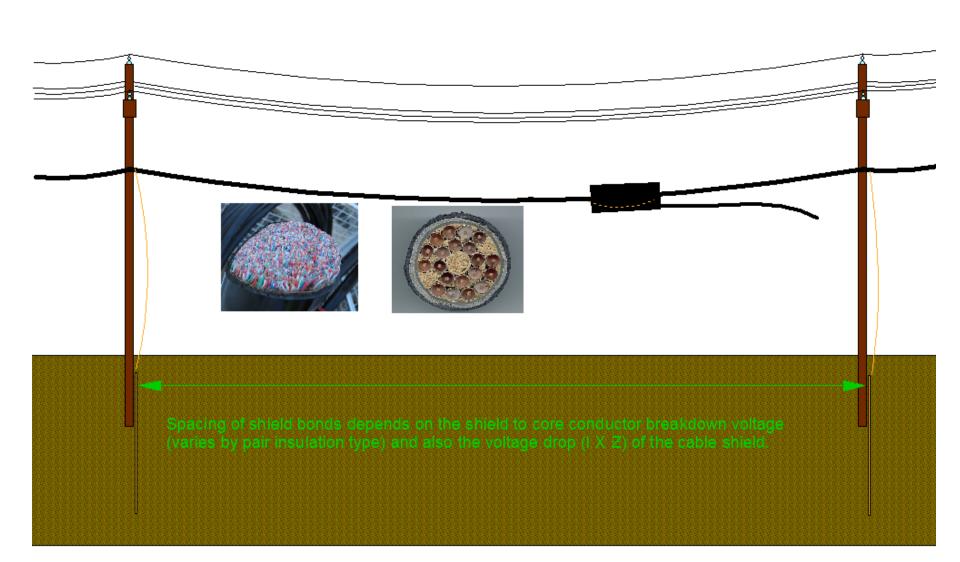
Plastic Insulation



Shield Paper Insulation

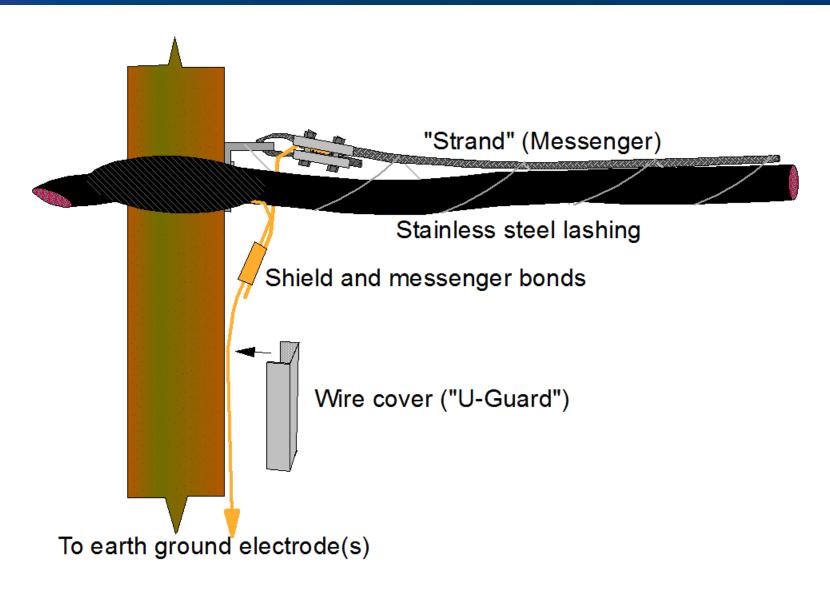
















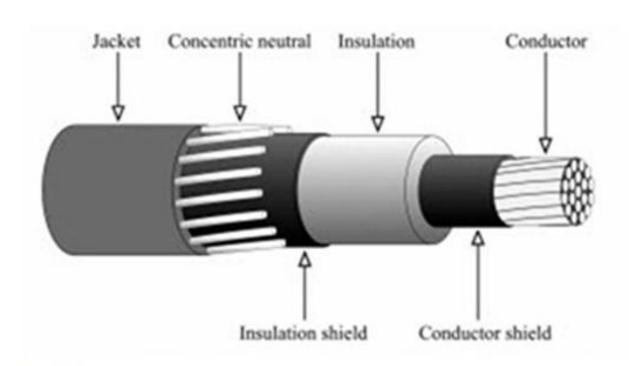
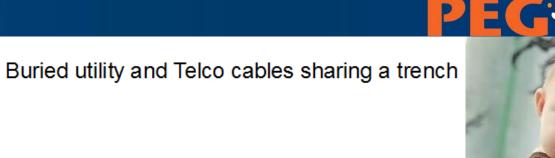
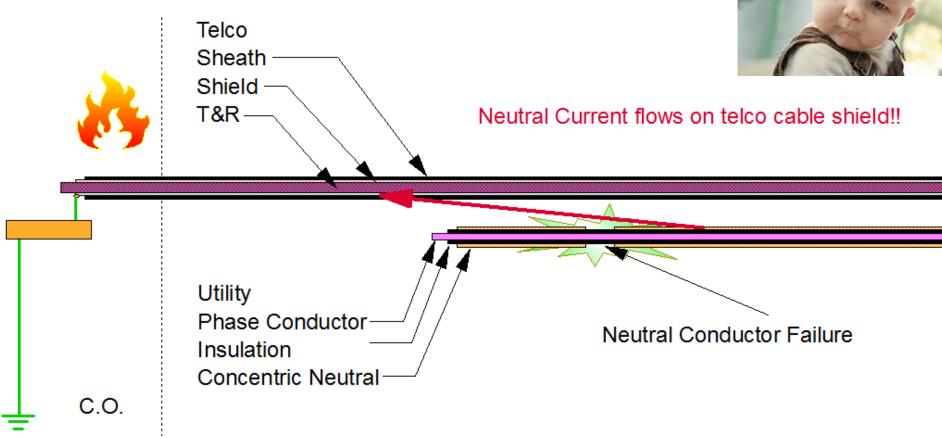


FIGURE 3.2

A concentric neutral cable, typically used for underground residential power delivery.

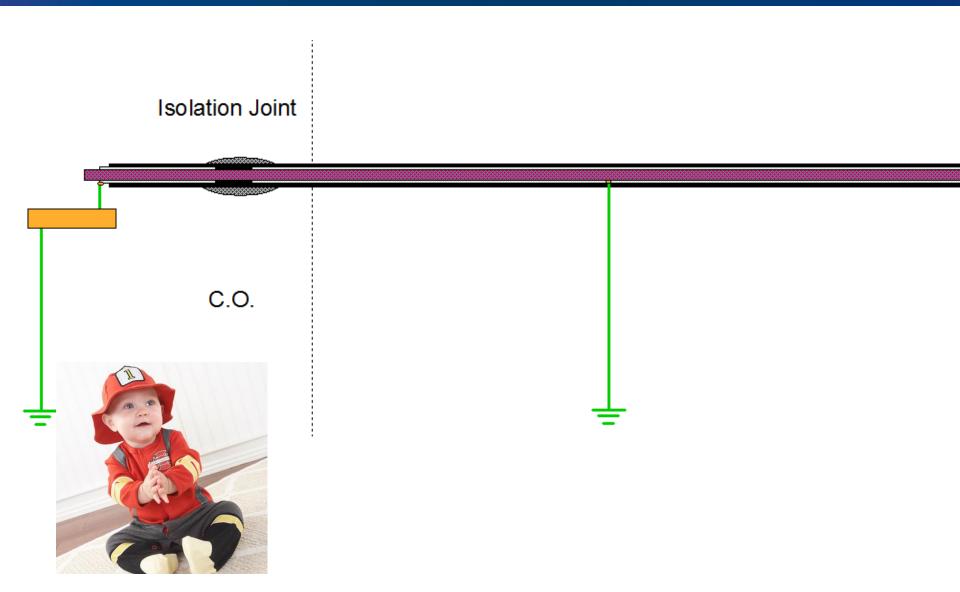


















FP

2

Utility service Grounded conductor Service pane 👸 CATV service Potential --difference Television Potentia difference 20 25 Cable Potential difference 20 Receptacles

EXHIBIT 250.39 A CATV installation that does I Code, illustrating why bonding between different

LPED

EDFCZP

F E L O P Z D
DEFPOTEC

Value Value

F D P L T C E O

PEZOLCFTD

3

4

ed

ersystem

ponding

Service panel

No potential difference

No potential difference

No potential difference

Receptacles

5

6

7

7.62M

20 FT

8

15 FT 4 57M

10

installation that complies with 250.94.

. 11

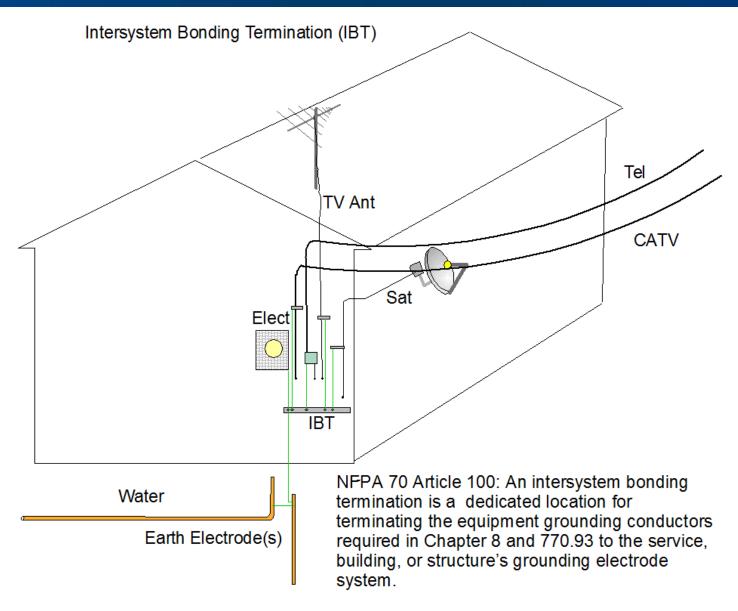


200

100



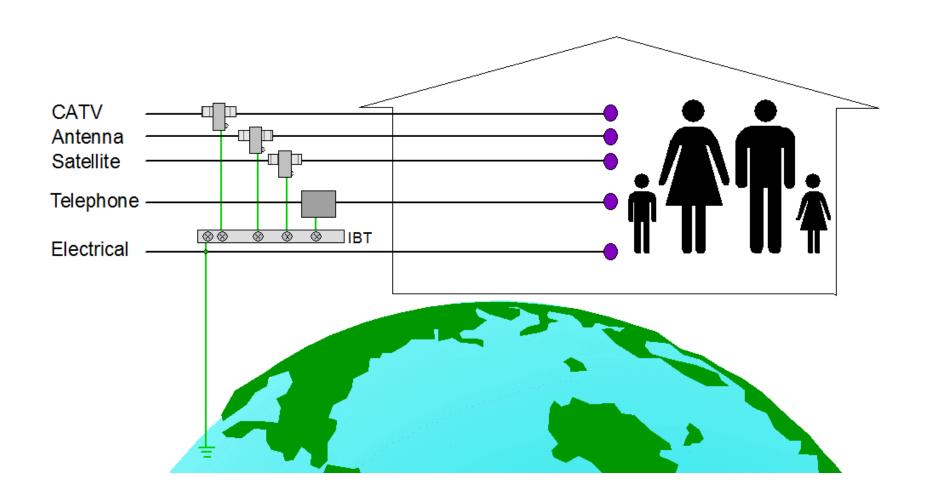






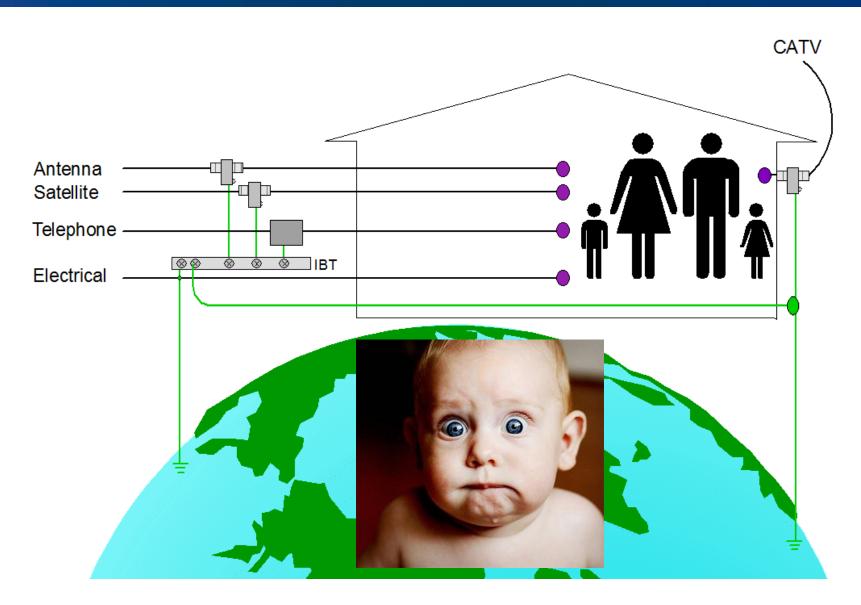


Intersystem Bonding Termination minimizes electrical hazards













Intersystem Bonding Termination(s)



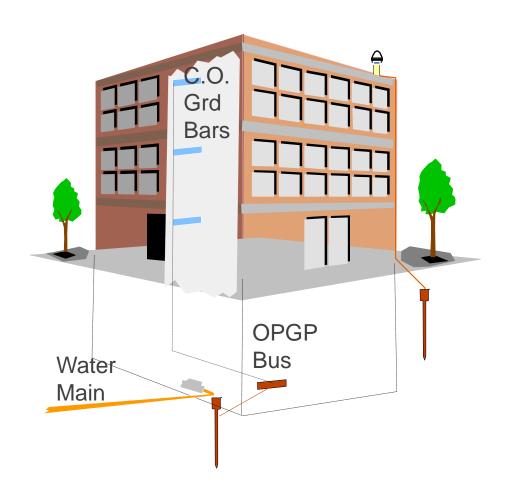
Residential





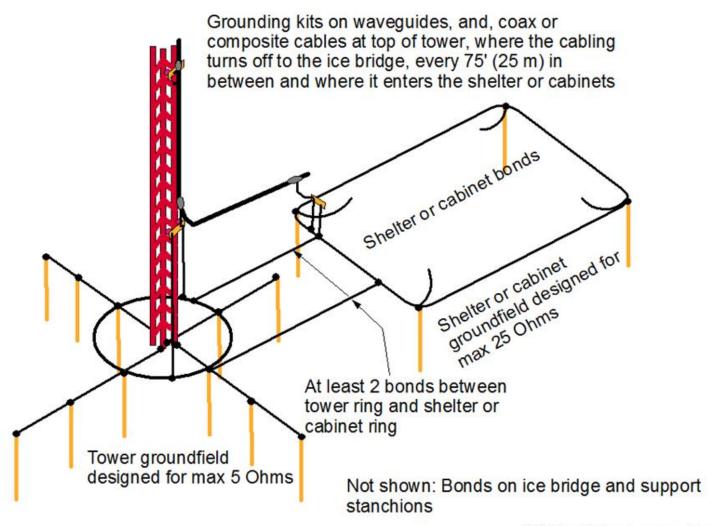


Dangerous: Unbonded ground systems



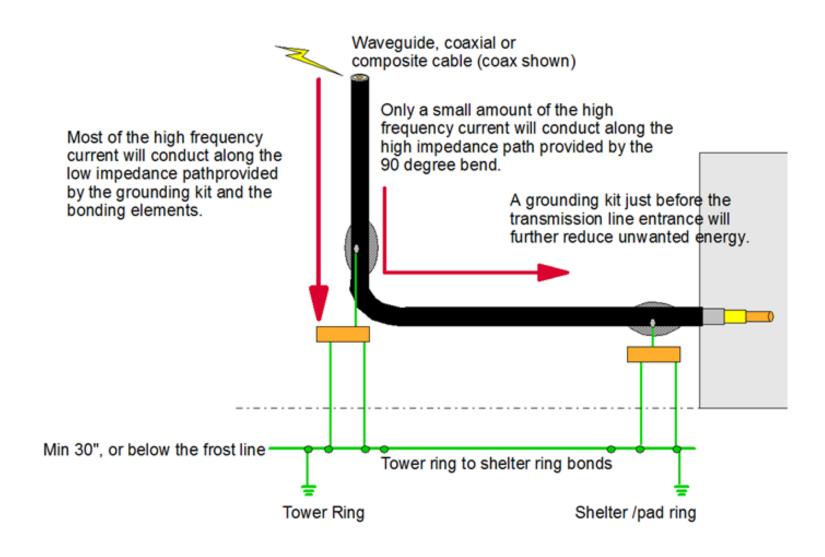






















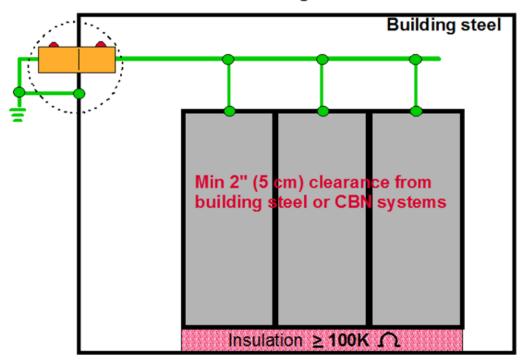








Isolated Bonding Network

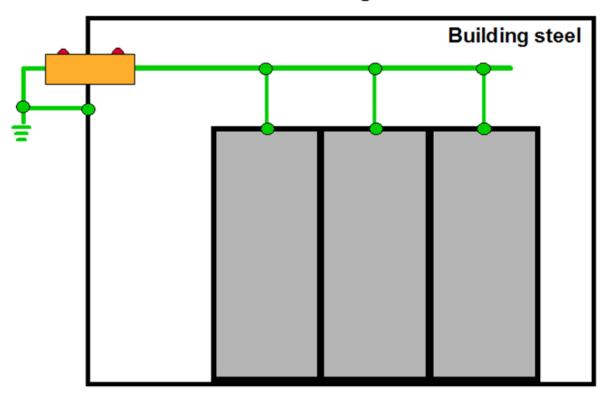






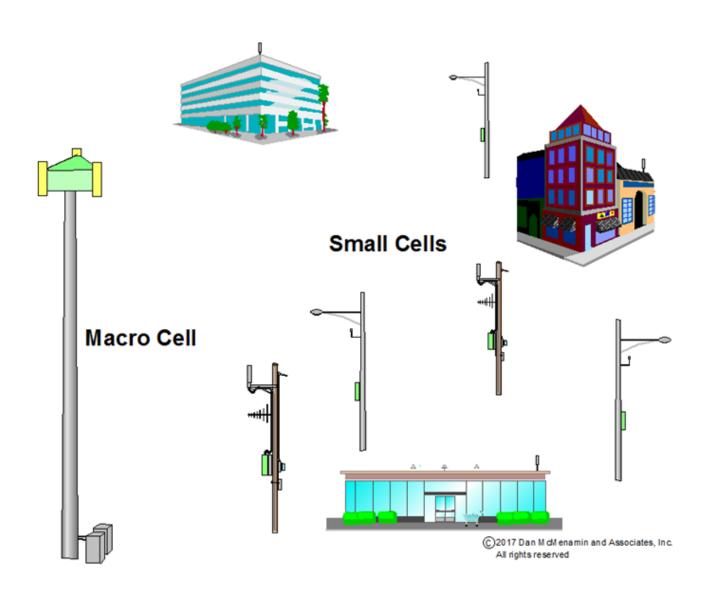


Common Bonding Network





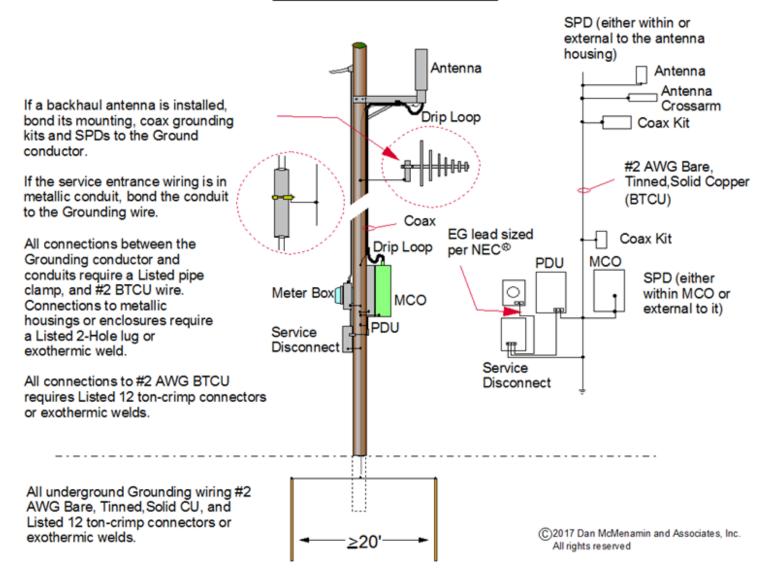








Wooden Pole Mounted Small Cells





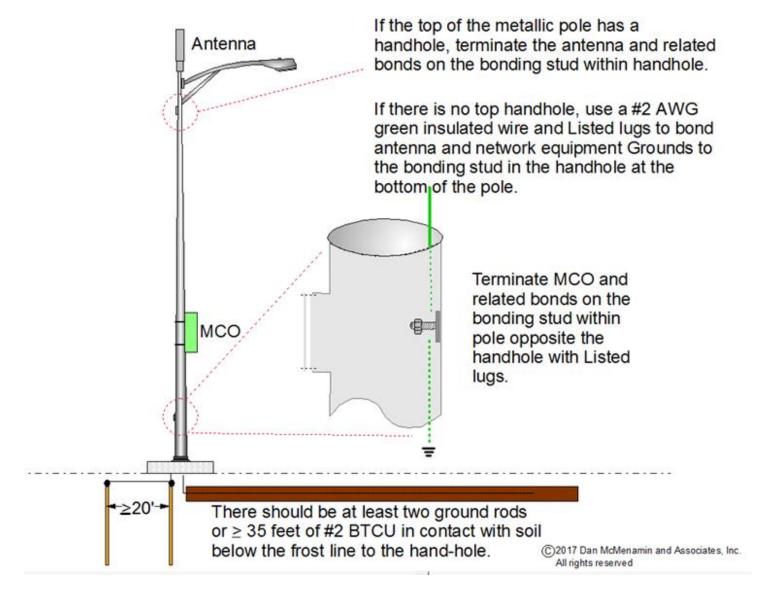






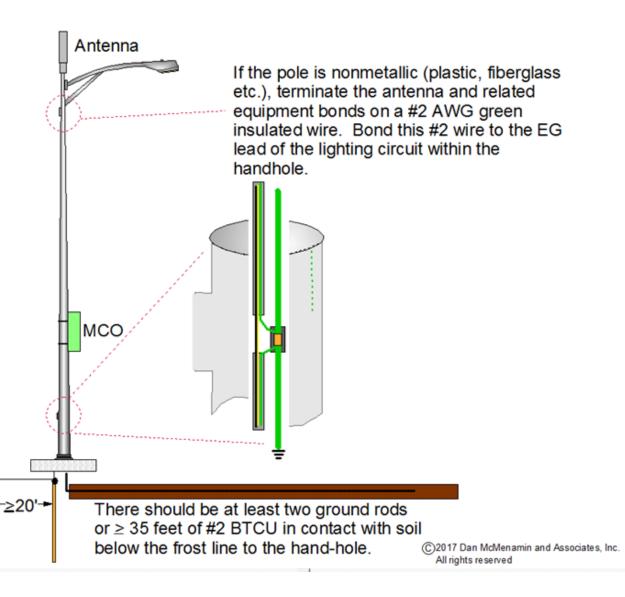






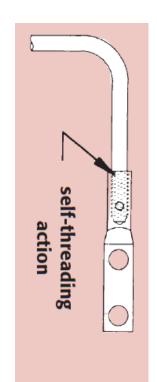


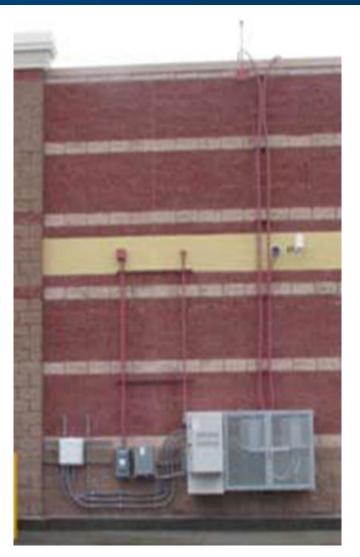


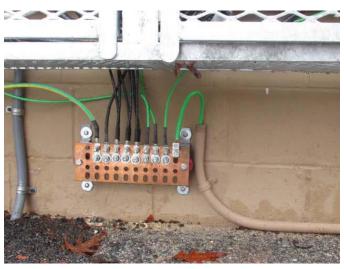










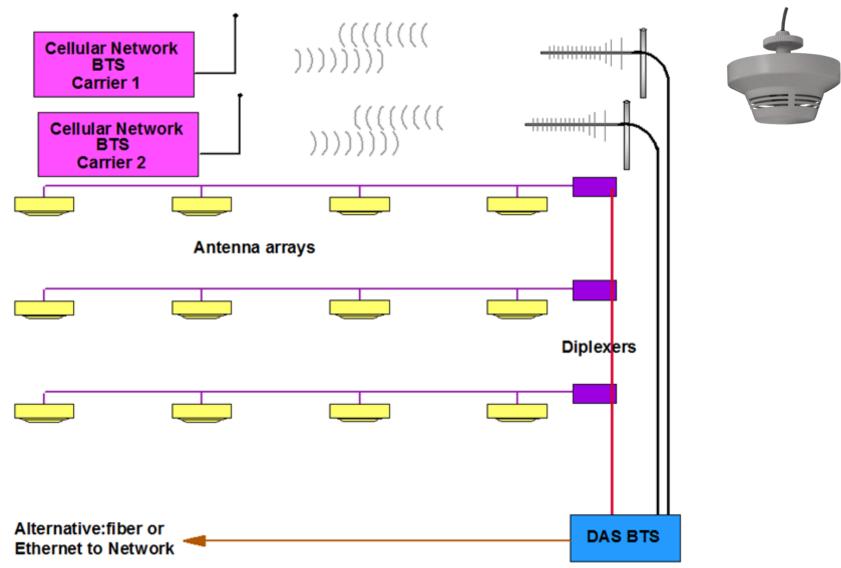






















Summary

 Bonding and grounding are all about safety and equipment health & performance.

Avoid confusion: always consult the latest

relevant documentation.

