

### 5.3 Sheath Bonding and Grounding:

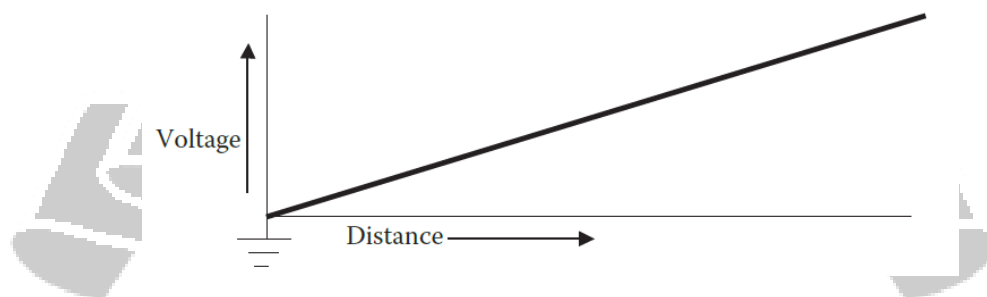
- This discussion provides an overview of the reasons and methods for reducing sheath losses in large cables.
- Sheath refers to a water impervious, tubular metallic component of a cable that is applied over the insulation.
- Shield refers to the conducting component of a cable that must be grounded to confine the dielectric field to the inside of the cable.

#### Cable A Transformer:

- When alternating current flows in the “central” conductor of a cable, that current produces electromagnetic flux in the metallic shield when present, or in any parallel conductor.
- This becomes a “one-turn” transformer when the shield is grounded two or more times since a circuit is formed and current flows.

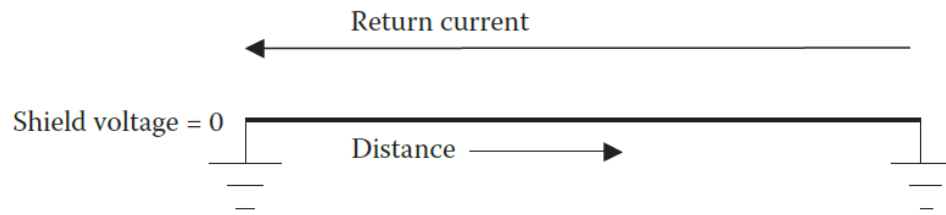
We will first consider a single, shielded cable:

If the shield is only grounded one time and a circuit is not completed, the magnetic flux produces a voltage in the shield. The amount of voltage is proportional to the current in the conductor and increases as the distance from the ground increases



Single-point grounding.

Sheath Bonding and Grounding



- If the shield is grounded two or more times or otherwise completes a circuit, the magnetic flux produces a current flow in the shield. The amount of current in the shield is inversely proportional to the resistance of the shield.
- The voltage remains at zero, but the same current flows regardless of the distance between the grounds.
- An important concept regarding multiple grounds is that the distance between the grounds has no effect on the magnitude of the current.

**AMPACITY:**

- If the heat generation in any segment is decreased, such as in the sheath, then the entire cable will have a greater ability to carry useful current.
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