EVERSOURCE	WORK METHOD STANDARD ELECTRIC OPERATIONS ORGANIZATION

Protective Grounding for OH Transmission Lines 69 kV & Above

Document Number:	Issued Date:	Revised Date:	Revision:	Applicability:
WMS 89.05-234	15-Nov-23	---	0	CT/WMA/NH

***** This Document Supersedes W8900 and M8-MT-3003 *****

Scope:

This work standard covers the safe work practices for installing Temporary Protective Grounding (TPG) assemblies on Overhead (OH) Transmission lines 69 kV and above.

Safety:

Providing a work environment, free of recognized hazards is a value at Eversource. Therefore, prior to the start of any work, ensure that you are familiar and knowledgeable with all Eversource Safety Rules, Policies and Procedures that are applicable to the work and tasks at hand and perform a job brief at the job site, prior to commencing work. PPE requirements to protect the worker shall be followed as required in the Eversource Employee Safety Manual.

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1.0 Introduction

1.1 The electric utility industry has three accepted work method practices allowing qualified workers to perform work within the Minimum Approach Distances (MAD) of energized or de-energized lines and equipment. These include insulation, isolation, and the use of protective grounding.

1.2 The grounding described in this standard pertains to work being performed on the Overhead (OH)Transmission Line System, rated 69 kV and above.

1.3 The development of an equipotential zone (EPZ) for personal protection is the primary work method covered by this standard.

1.4 This standard shall be used for Transmission grounding and to establish an equipotential zone while working on the Transmission system.

1.5 Appendix A shows various field scenarios and how to apply ground cables

2.0 Reference Documents

ASTM F855	Temporary Protective Grounds to be Used on De-energized Electric Power Lines and Equipment
ASTM F2249	Standard Spec for In-Service Test Methods for Temporary Grounding Jumper Assemblies
CAT 3000	Transmission & Distribution Grounding Material
CAT 3001	Substation Grounding Material
ESOP 100	Switching and Tagging
FIST	U.S. Bureau of Reclamation Facilities Instructions, Standards, and Techniques (FIST) Volume 5-1, “Personal Protective Grounding for Electric Power Facilities and Power Lines”, July 2005
IEEE	80 Guide for Safety in AC Substation Grounding
IEEE	1246 Guide for TPG Systems Used in Substations
OP-5087	OH Grounding Plan Form
OSHA	1910.269(n), Grounding for Protection of Employees
WMS 89.03	Vehicle & Equipment Grounding for Transmission
WMS 84.05	Maintenance & Testing of Hot-line Tools & Equipment
WMS 89.05	Applying Personal Protective Grounding for Transmission Lines, 115 kV & Above
WMS 89.06	Protective Grounding Inside Substations
WMS 89.11	Maintenance & Testing of Personal Protective Grounding Equipment
WMS 91.11	Testing for Voltage

3.0 Bill of Materials

3.1 Refer to **CAT 3000** and **CAT 3001** for the approved ground cable assembly materials, live-line, and cleaning tools.

4.0 Definitions

4.1 Bonding – The practice of intentionally electrically connecting all non-current-carrying metal parts, to create a safe low impedance path, for any current likely to be imposed on it.

4.2 Cluster Bar (Chain Binder) – A terminal that is clamped to a structure, below the workers feet, that provides a means for the attachment and bonding of TPGs and/or bonding cables to the structure.

4.2.1 When a ground stud is available on a steel structure, a cluster bar is not required. The ground stud performs the same function as a cluster bar.

4.2.2 Cluster bar's may be used to create an EPZ or as a multi-point attachment when grounding the system.

4.3 Bracket Grounding – Two or more sets of grounding jumpers installed on all sides and as close as practical to the work area.

4.4 Cradle-to-Cradle – The moment the aerial platform leaves its lowest position to the point when it returns to its lowest position. Applies to all aerial devices with or without cradles.

4.5 Equipotential Zone (EPZ) – For the purposes of protective grounding, a near identical state of electrical potential .

4.6 Ground to Ground – The moment the worker leaves the ground to climb a pole, prior to commencing work, to the time when they return back on the ground.

4.7 Grounding – The practice of intentionally connecting to earth through a ground connection.

4.8 Grounding Plan – The process to which the TPGs quantity, length and locations are discussed and determined.

4.9 Isolation – Includes grounding, isolating and removing temporary grounds. Workers can use the isolation method when working on lines and equipment by first grounding the lines and equipment using an approved method, and second removing the grounds to isolate the lines and equipment. To use the isolation method, the lines and equipment must:

4.9.1 Be de-energized under the provisions of the applicable switching authority.

4.9.2 Have no possibility of contact with another energized source.

4.9.3 Have no hazards of induced voltage possible.

NOTE: The isolation method may be an acceptable work method in some specific cases. However, approval from Eversource management, safety, and engineering is required to use the isolation method.

4.10 Known Source of Voltage – The one side of an energized primary switch or device in the open position, which if placed in the closed position, would energize a work zone. A generator identified on an Eversource primary circuit print supplying primary voltage (including wind and solar) is a Known Source of Voltage.

4.11 Master Grounds – A set of grounds used on Transmission structures to bond the three phases to ground away (remote) from the worksite. Permanently installed station ground blade disconnects shall not be utilized as master grounds.

4.12 Phase-to-Ground (Parallel) Grounding – The installation of TPGs from each phase to ground. The ground attachment point can be a common point for all three TPG ground connections or can be a different point for one or more TPG ground connections, but a low-resistance connection between any separated TPG ground connection points are required.

4.13 Phase-to-Phase (Chain) Grounding – The installation of TPGs from phase to phase to phase with an additional TPG connecting from one of the three phases to ground. “Balanced Chain Grounding” utilizes the “B” phase to ground. “Un-Balanced Chain Grounding” utilizes either the “A” or “C” phase to ground.

4.14 Single-Point Grounding – The application of temporary protective grounds only in the immediate vicinity of an electrically continuous worksite. The location of the TPGs must be close enough to the worksite to prevent a hazardous differential in potential across a worker at the worksite.

4.14.1 Establishes an equipotential safe working zone by the application of TPGs.

4.15 System Operator Ground – A ground whose installation, removal or operation is directed and tracked by the System Operator.

4.16 Temporary Protective Grounding (TPG) – A cable, ferrule and clamp assembly designed to limit the voltage difference between any two accessible points at the worksite to a safe value and having enough current withstand rating.

4.16.1 TPGs can be used for system operator grounds, personal grounds, worker grounds, and ground cable assemblies .

4.17 Worker Ground – Grounds whose installation or removal is directed and tracked by the Clearance Holder.

4.18 Zone of Protection – An area isolated from all Known Sources of Voltage whereby the perimeter limits are in their protective position and the work area is subsequently grounded.

5.0 General

5.1 Prior to working on OH Transmission lines as de-energized, refer to applicable **ESOP 100** requirements.

5.2 Eversource Engineering has specified the required cable quantity based on fault current and clearing times.

5.3 There are two (2) grounding practices, “Phase-to-Phase” or “Phase-to-Ground” grounding.

5.3.1 The preferred grounding practice is “Phase-to-Phase” grounding, to reduce circulating currents.

5.4 Workers are best protected by installing worksite grounds, often referred to as grounding jumpers or temporary protective grounds (TPG).

5.4.1 TPG’s consist of a clamp, ferrule, cable, and heat shrink tubing (where applicable) to make up a “cable assembly”.

5.4.2 For the remainder of this standard, the terms TPG and cable assembly will be used interchangeably.

5.5 During testing, ground cable assemblies may be removed per ESOP 100 and in accordance with the grounding plan. Throughout testing, the worker SHALL use insulated equipment or insulated tools and ensure isolation from any live electrical hazards.

5.6 When required to apply TPGs in a Substation, refer to **WMS 89.06**.

6.0 Ground Selection

CAUTION: Prior to selecting TPGs, verify the ground cable requirement (quantity and grade) based on Attachment 1 (“Fault Current & Grounding Requirement Tables”).

6.1 The grounding plan shall be determined prior to the start of work, refer to Form **OP-5087** “OH Grounding Plan”.

6.2 Eversource Engineering has specified the cable quantity based on fault current and clearing time studies, and determined that:

6.2.1 When grounding (master grounds), the minimum cable size SHALL be 4/0 AWG.

6.2.2 When bonding for the purpose of creating an of an EPZ (after the master ground has been established), the minimum cable size SHALL be 2/0 AWG

6.2.3 Whenever possible, the shortest ground cable SHALL be used. Shorter grounding cables reduce the weight for workers to handle, the electrical resistance, and the voltage drop across the cable.

6.3 When two (2) or more ground cable assemblies are required they SHALL be:

6.3.1 Equal length.

6.3.2 Equal rating for the cable, clamps, and ferrules.

6.3.3 Assembled using uniform components (same manufacturer, type, rating, etc.). Refer to Figure 1.

Example: Double fifteen (15) foot TPG assemblies from phase to phase, and the double TPG assemblies from the phase to static wire could be 20 feet.

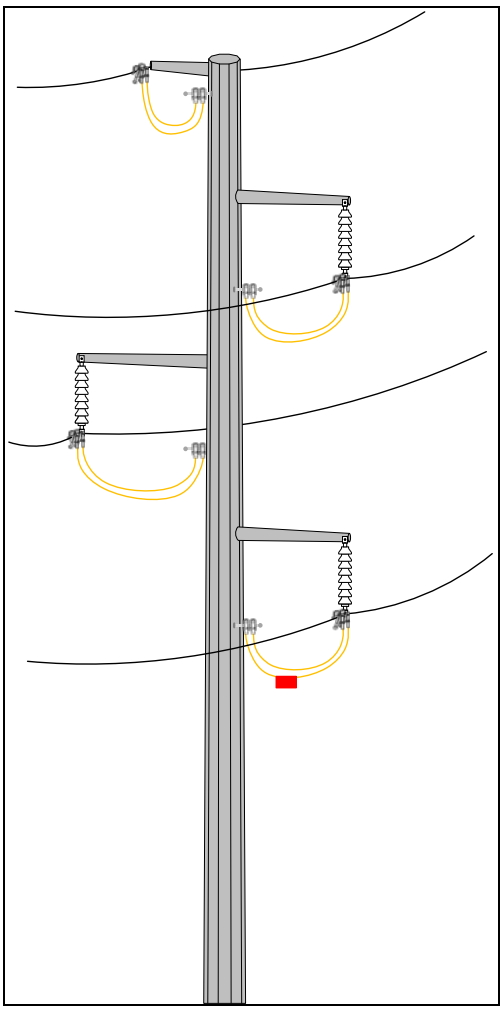


Figure 1 – Multiple Grounds Attach to Steel Pole

NOTE: The shortest ground cable SHALL always be used.

7.0 TPG Preparation

7.1 Vehicles or equipment shall be connected to a ground source as specified in Work standard **WMS 89.03.**

7.2 Clearance shall be given by the System Control Center as specified under the provisions of the applicable Eversource switching authority. Refer to **ESOP 100**.

7.3 Prior to installing TPGs, test the equipment for potential to prove it is de-energized per Work standard **WMS 91.11**.

7.4 Prior to the installation of ground cable assemblies, visually inspect and clean each assembly as detailed in Work standard **WMS 89.11**.

7.4.1 If any damage is found, return the ground cable assembly for repair and testing.

8.0 Installation and Removal

CAUTION: Always use the shortest length ground cable, to minimize cable slack, reducing the severe and dangerous forces developed by fault currents.

8.1 When the field conditions do not allow for the installation of a ground cable assembly at the work location, contact your Supervisor or T&D Standards Engineering group for guidance.

8.2 All ground cable assemblies installed and removed shall be tracked per **ESOP 100.**

8.3 Vehicles or equipment shall be connected to a ground source as specified in Work standard **WMS 89.03.**

8.3.1 When working in an equipotential zone from a non-insulated aerial device or lift install a personal bond by attaching a 2/0 AWG cable assembly from the basket to a grounded phase conductor.

CAUTION: When a non-insulated aerial device (as defined in **WMS 89.03**) is to be used during work, it SHALL be grounded to the same ground location.

8.4 When installing or removing ground cable assemblies, the worker(s) must be constantly aware of**.**

8.4.1 MAD

8.4.2 Approach/Egress path to live parts.

8.4.3 Proximity and clearance to live parts in the vicinity to the work area.

8.4.4 Proper work positioning to prevent injury.

8.5 When performing balanced grounding and installing grounds from phase-to-phase:

8.5.1 The clamp coming from the cluster bar/neutral shall be in the center (middle), between the clamps connecting the phases.

8.5.2 The clamps shall be as close as practical to each other, not to exceed three (3) inches apart.

8.6 When grounding from an aerial device:

8.6.1 And it is determined necessary, an additional qualified person (Spotter), other than the person(s) performing work, SHALL be designated to observe the MAD to exposed lines and equipment while operating the aerial device.

.1.1. The Spotter shall provide timely warnings before the MAD is reached.

8.6.2 It is REQUIRED to wear FULL PPE cradle-to-cradle or ground-to-ground per Eversource Safety Manual

CAUTION: Do not assume conductors that have been tested de-energized will stay de-energized. Always install proper grounding devices before working.

8.7 Approved live-line tools SHALL be used to install and remove ground cable assemblies, from both the live and cold ends.

8.7.1 Verify all live-line tools have been tested and labeled per **WMS 84.05**.

8.7.2 If field conditions do NOT permit the use of live-line tools, contact Eversource Supervision.

8.8 When installing a personal ground on a steel structure connect a cable assembly from the steel structure below the work area to the phase being worked on.

8.9 When installing a master ground on a steel structure connect a cable assembly from the steel structure below the work area to all three phases and the static wire. Refer to Figure 1.

8.10 When a ground cable is coiled or on a reel, it SHALL be completely removed from the reel or holder.

8.10.1 Unwind and straighten the cable or lay it out in an “S” shape on the ground without crossover, to reduce the possibility of induced voltages.

8.11 Clean all connection points to remove contaminants.

8.11.1 If a wire brush cannot be used, then clean the connection point by the sequence of “tightening-loosening-tightening” the clamp repeatedly.

CAUTION: When installing a ground cable assembly with a live-line tool, the worker shall NOT touch or hold the ground cable.

A ground cable assembly shall NOT be extended by connecting multiple assemblies together (a.k.a. daisy chain) under any circumstance.

8.12 Ground source locations SHALL be barricaded at a 6-foot radius, using cones and/or tape as required, to prevent entry and to protect personnel against step potential.

8.13 When installing master grounds WITH a separate EPZ:

8.13.1 Install the master ground outside of the work area, but as close to the work area as possible.

8.13.2 Install the EPZ on the pole/structure being worked.

8.14 When single point grounding (master grounds and EPZ installed on the same structure):

8.14.1 All TPG assemblies SHALL be a minimum 4/0.

NOTE: For All Grounding Methods: If more than one (1) ground cable is required per phase, install all required cable assemblies FIRST (i.e., to Phase 1) prior to installing grounds on Phase 2 and 3.

8.15 When two (2) or more ground cable assemblies are required on each phase they SHALL be physically installed

8.15.1 With the clamps facing the same direction.

8.15.2 No more than 3 inches apart from each other.

CAUTION: A structure step (bail or rung) is NOT an acceptable ground point.

8.16 The order for selecting a ground connection is:

8.16.1 Static/shield wire

8.16.2 Steel structures that are grounded

.2.1. Steel steps are NOT an acceptable TPG connection.

8.16.3 Equipment ground rod

8.16.4 Guy anchor rod

8.16.5 Temporary screw ground rod

8.16.6 Temporary driven ground rod

8.17 When it is necessary to use temporary screw grounds or temporary driven ground rods:

8.17.1 Location should be out of the immediate work area to reduce tripping risks and the hazard of step and touch potentials.

8.17.2 They SHALL be barricaded at a 6-foot radius, using cones and/or tape as required, to prevent entry and to protect personnel against step potential.

8.17.3 Soil condition should be considered to obtain an effective ground.

.3.1. Low lying areas with permanent moisture shall be used whenever they can be found near the work area.

.3.2. Loose loam and sandy soil shall be set to maximum depth, multiple grounds may be required.

8.17.4 The ground rods must be driven 7 feet deep, and at a minimum distance of 25 feet away from the base of the Transmission structure where work is to be performed.

8.17.5 If maximum depth (7 feet) is difficult in gravel, hardpan, or other soil conditions:

.5.1. Ground rods shall be set at an angle so that as much of its surface area as possible is in contact with the earth

or

.5.2. Drive and connect an additional ground rod separated 6 feet from other ground rods and maintain a minimum distance of 25 feet away from the base of the Transmission structure. See Figure 2.

8.18 Attach at least one (1) approved, high visibility, non-conductive, “Ground Flag” in each location where ground cables are installed.

CAUTION: The cluster bar and grounding jumper are important parts of personal protective grounding. They are used at the work location to minimize the voltage difference in the aerial work zone (whether working from an aerial device or on a pole). If the cluster bar is not used, the grounding jumpers alone will not provide maximum personal protection.

8.19 A cluster bar is to be attached on ALL wooden poles that are to be climbed, or when working from an aerial lift, where the pole is within reaching distance of the worker.

NOTE: A cluster bar is not required for steel structures that are adequately bonded to the neutral with a:

1) Bolted connector and a #4 conductor

or

2) The threaded insert and a stainless-steel ground lug

8.19.1 The cluster bar is connected to a phase conductor, ground, and/or the static wire.

8.19.2 The cluster bar shall be bonded to a wooden pole with hardware that penetrates the pole.

.2.1. E.g., permanent neutral to pole hardware, stapled bare down leads, spiking screws and/or hardware bolts.

8.19.3 The cluster bar shall be attached on the pole below the working position, leaving adequate working space above it.

8.19.4 When a worker is climbing and will be physically working from the structure, the cluster bar shall be installed and the penetration point shall be positioned as close as practical to the worker's feet, no greater than 3 feet.

8.20 Substation ground blades may be closed when installing master grounds and/or work grounds, for work on overhead Transmission lines. They SHALL NOT be used for personal safety.

8.20.1 Substation ground blades MUST be opened after master grounds are installed.

CAUTION: For TPGs to provide proper protection, continuity must be maintained between the point of connection and the work location.

Any device capable of transforming voltage or producing a voltage drop shall NOT be considered as maintaining continuity for the purpose of personnel safety. Such devices include transformers, fuses, reactors, resistors, circuit breakers, disconnect switches and line traps.

If the situation does not allow for other options, stop and consult supervision.

In situations where grounding cannot be achieved, refer to **ESOP 100**.

8.21 When grounding underground Transmission and Distribution lines, permanently installed substation ground blades may be closed.

8.21.1 When used with dead-tank equipment (i.e. GIS), they CAN be used for personal safety.

NOTE: The phase identification (A, B, & C) used below are for explanation and figure reference purposes ONLY.

8.22 Equipment and jobsite configurations dictate the safest way to apply TPG assemblies. The preferred method for applying TPGs is the Balanced "Phase-to-Phase" Grounding method.

8.22.1 Application of Balanced "Phase-to-Phase" Grounding (Refer to Figure 2):

.1.1. First Cable: Attach one end of the cable to a ground end source. Attach the other end to the Middle Phase "B".

.1.2. Second Cable: Attach one end of the cable to the first phase grounded. Attach the other end of this cable to Phase "A" or Phase "C".

.1.3. Third Cable: Attach one end of the cable to the second phase grounded. Attach the other end of this cable to final phase to be grounded (Phase "A" or Phase "C").

8.22.2 Removing grounds for the Balanced "Phase-to-Phase" method:

.2.1. Remove the ground assembly clamp(s) from Phase "A".

.2.2. Remove the ground assembly clamp(s) from Phase "C".

.2.3. Remove the ground assembly clamps from Phase “B”.

.2.4. Finally remove the ground assembly clamp(s) at the grounded point.

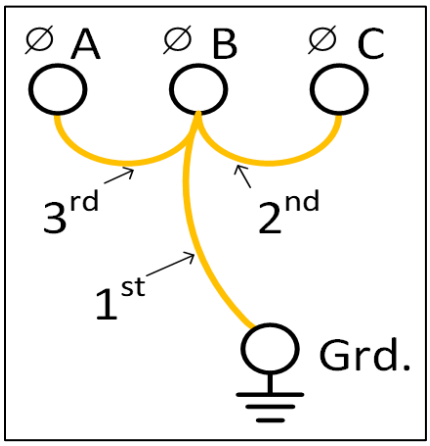


Figure 2 – Example of “Phase to Phase”
(Balanced Chain Grounding) Grounding Application

8.23 If the Balanced “Phase to Phase” Grounding method cannot be performed, the following can be followed:

8.23.1 Application of Un-Balanced “Phase-to-Phase” Grounding (refer to Figure 3):

.1.1. First Cable: Attach one end of the cable to a ground end source. Attach the other end to the first phase to be grounded (Phase “A” or “C”).

.1.2. Second Cable: Attach one end of the cable to the first phase grounded. Attach the other end of this cable to Phase “B”.

.1.3. Third Cable: Attach one end of the cable to Phase “B”. Attach the other end of this cable to the final phase to be grounded (Phase “A” or “C”).

8.23.2 Removing grounds for the Un-Balanced “Phase-to-Phase method:

.2.1. Remove the ground assembly clamp(s) from the first phase (either Phase “A” or “C”).

.2.2. Remove the ground assembly clamp(s) from Phase “B”.

.2.3. Remove the ground assembly clamps from the final phase (either Phase “C” or Phase “A”).

.2.4. Finally remove the ground assembly clamp(s) at the grounded point.

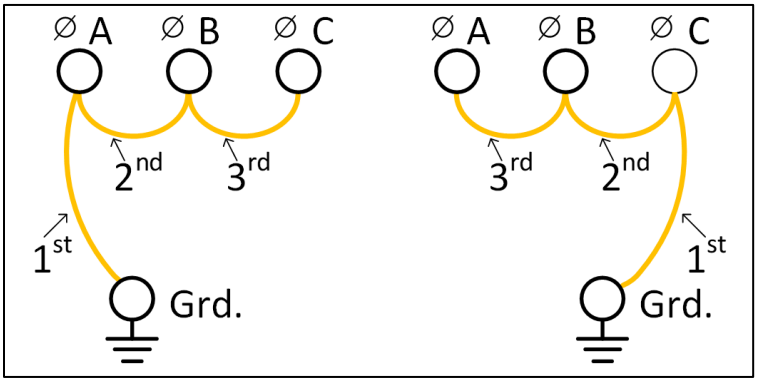


Figure 3 – Examples of “Phase to Phase”

(Un-Balanced Chain) Grounding Applications

8.23.3 Application of "Phase-to-Ground" (Parallel) Grounding (Reference Figure 4):

.3.1. First: Attach one end of each grounding cable to the ground end source.

.3.2. Second: Attach the other end of each grounding cable to the equipment-grounding point for each of the three (3) phases.

8.23.4 Removing ground for the "Phase-to-Ground" (Parallel) Grounding:

.4.1. First: Remove each grounding cable from the equipment-grounding point connections.

.4.2. Second: Remove each grounding cable from the ground end source.

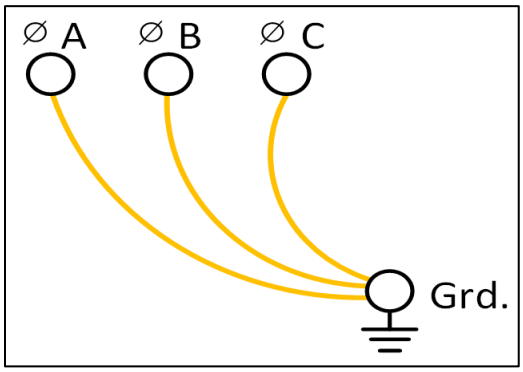


Figure 4 – "Phase-to-Ground" (Parallel) Grounding

8.24 Using an Eversource approved voltage detector, test the line(s) and equipment being worked to ensure they are de-energized. Refer to **WMS 91.11.**

CAUTION: A conductor SHALL be considered energized until it is de-energized, tested for potential, verified for NO potential and then grounded

8.25 Establish Master Grounds as close to the work area as possible.

8.26 Master grounds (refer to Figures 5 and 6) consist of the required ground cable assembly(ies) connected to:

8.26.1 All phases and static wires.

8.26.2 The structure, via cluster bar, ground stud, or and approved structure clamp.

8.26.3 The cluster bar to ground.

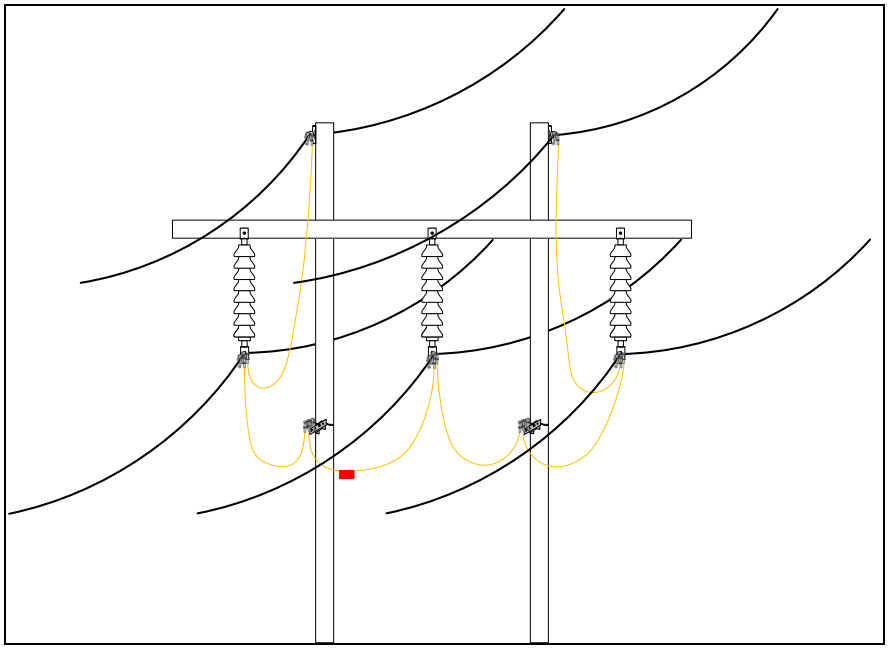


Figure 5 – Master Ground using Static Wire

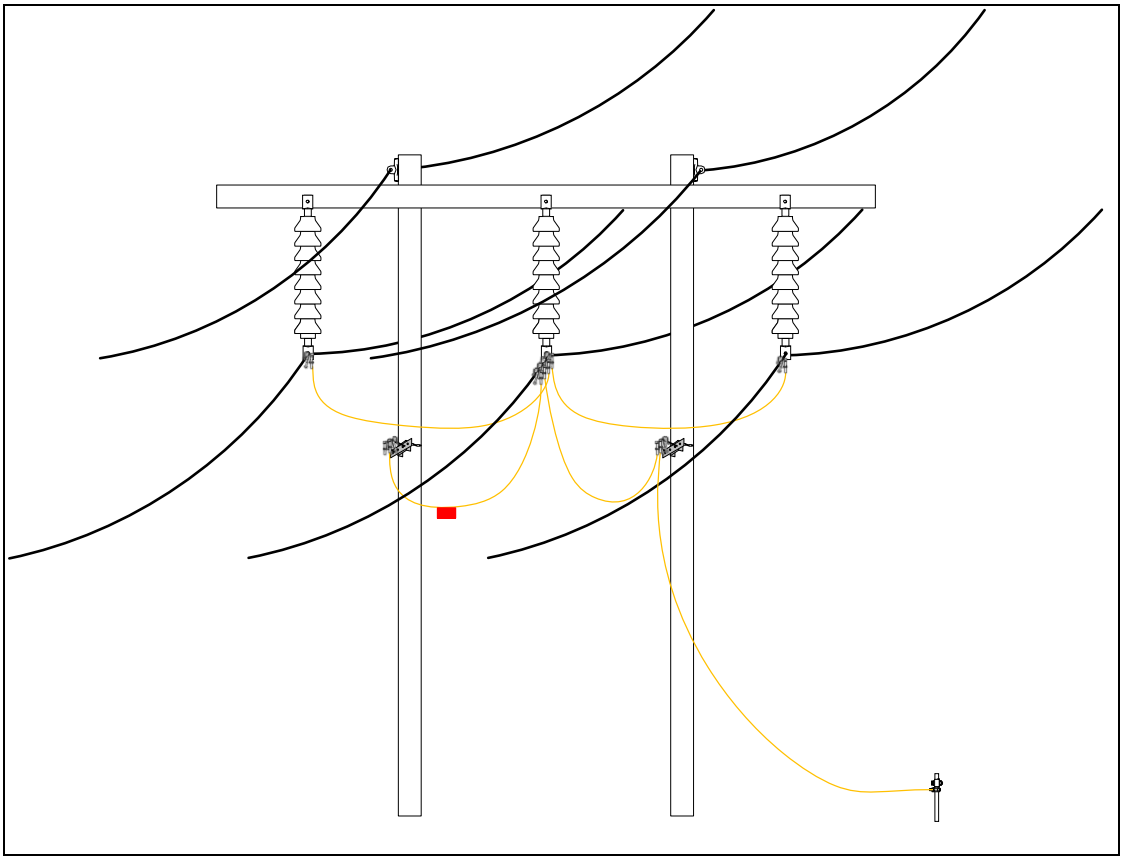


Figure 6 – Master Ground without Static Wire

Attachment 1 – OH Transmission Grounding Requirements per Line

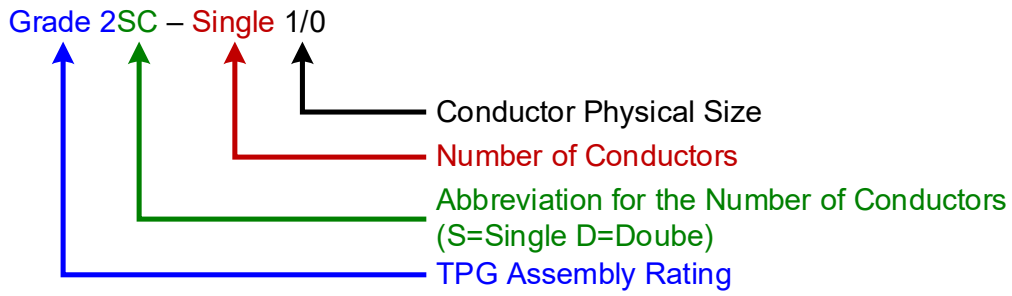
NOTE: When an OH transmission line is not included/listed in the Transmission ArcFlash & Grounding Database (see link below) refer to the applicable Substation Grounding document (**WMS 89.06**) for the appropriate TPG selection.

1. The OH transmission grounding database is a comprehensive list of TPG requirements on the Eversource transmission lines.

2. Prior to applying TPG to a transmission line, the "database" shall be used to determine the correct TPG assembly.

3. To make the appropriate TPG selection, utilize the known transmission line information and locate the grounding requirements in the "database":
   a. Line Number – Transmission line that is to be grounded.
   b. Voltage (kV) – Line voltage.
   c. Max Fault Current (kA) – Maximum fault current from every Station attached to the line including their max phase and ground currents from 3LG, 2LG, 1LG, L-L faults from each.
   d. Grounding Requirement (# of cables, ASTM Grade) – The minimum acceptable ground cable that is allowed to be applied to the line.

4. "Grounding Requirements" explained:



5. "Grounding Requirements" examples:
   a. Grade 3HSC – Single 2/0 H Rated: This is a single 2/0 cable with Grade 3H rated clamps and ferules.
   b. Grade 5HDC – Double 4/0 H Rated: This is two (2) 4/0 cables with Grade 5H rated Clamps. When TPG cables a doubled up, the assemblies should be identical (length and clamp type).
   c. Grade 6HSC – Single 4/0 H Rated: This is a single 4/0 6H cable with Grade 6H rated clamps.

6. To Access the Eversource Transmission ArcFlash & Grounding Database, CLICK HERE.

Appendix A – Examples of Transmission Grounding

1) When planning to cut a conductor or working on broken conductors:
   a) Establish a master ground on one side of the conductor.
   b) Bond and/or ground the other side of the conductor, establishing continuity between both sides of the conductor prior to commencing work. Refer to Figure A1.
   c) Cable work can only be completed on the ground when an equipotential zone is created.

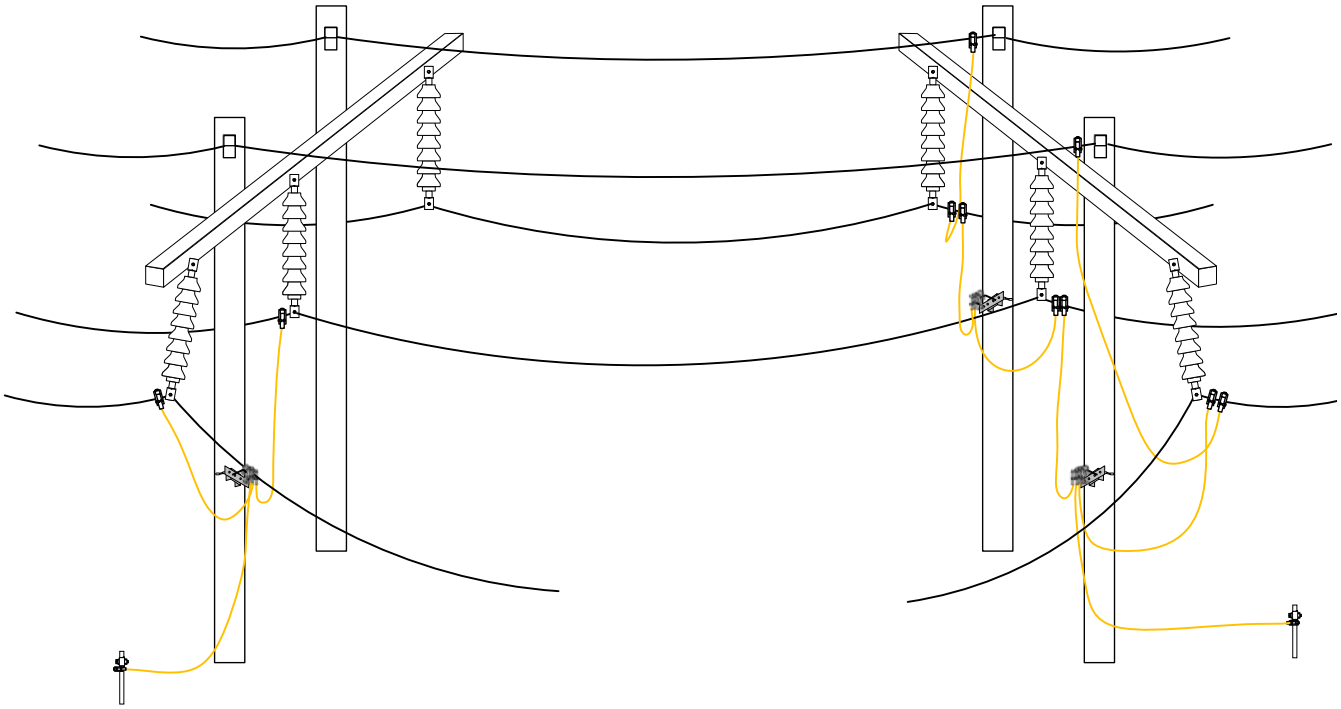


Figure A1 – Broken Conductor

2) When working on the same Transmission structure where a master ground is installed:
   a) An EPZ shall be established, and work may proceed.

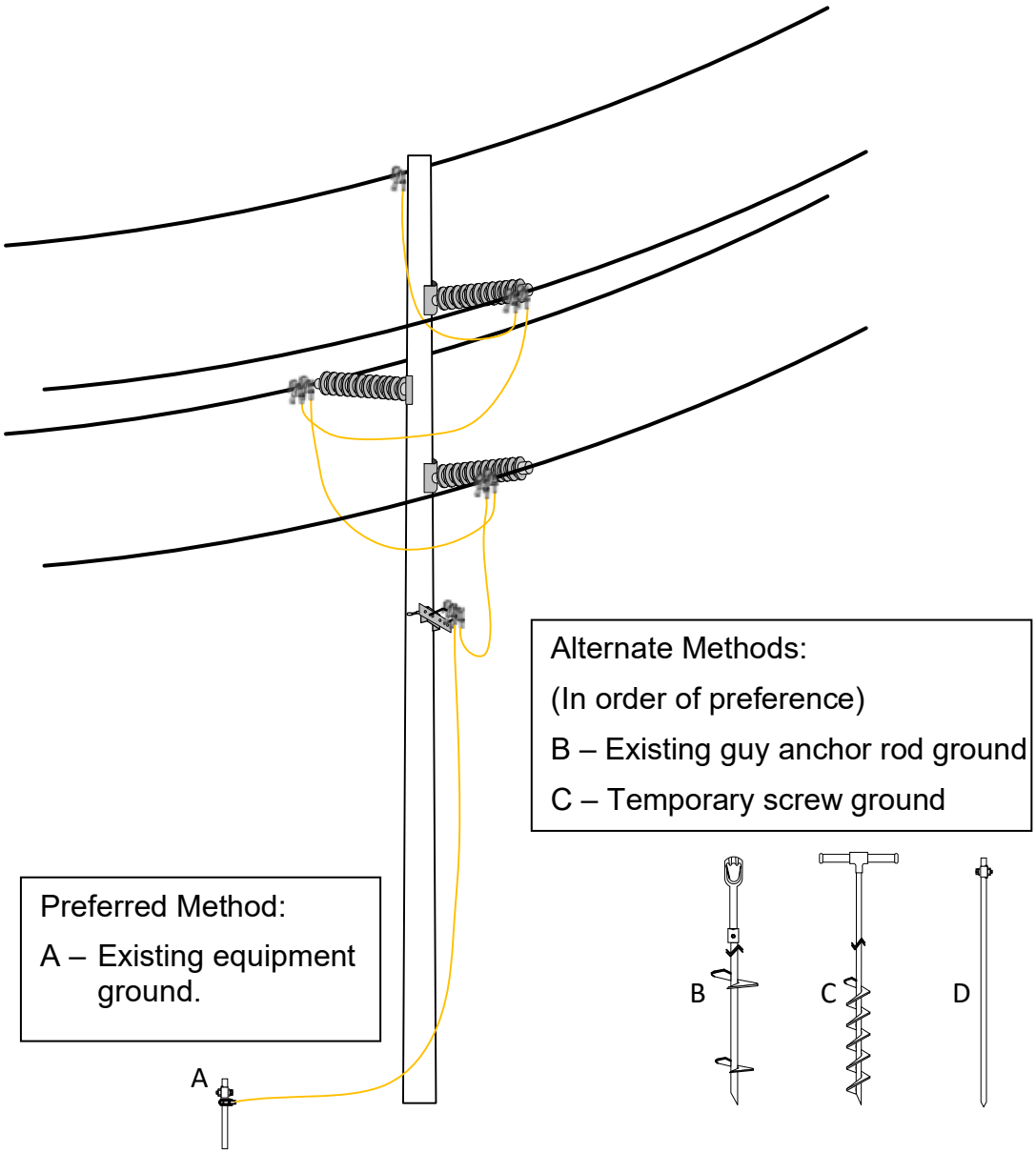


Figure A2 – Grounding Selection

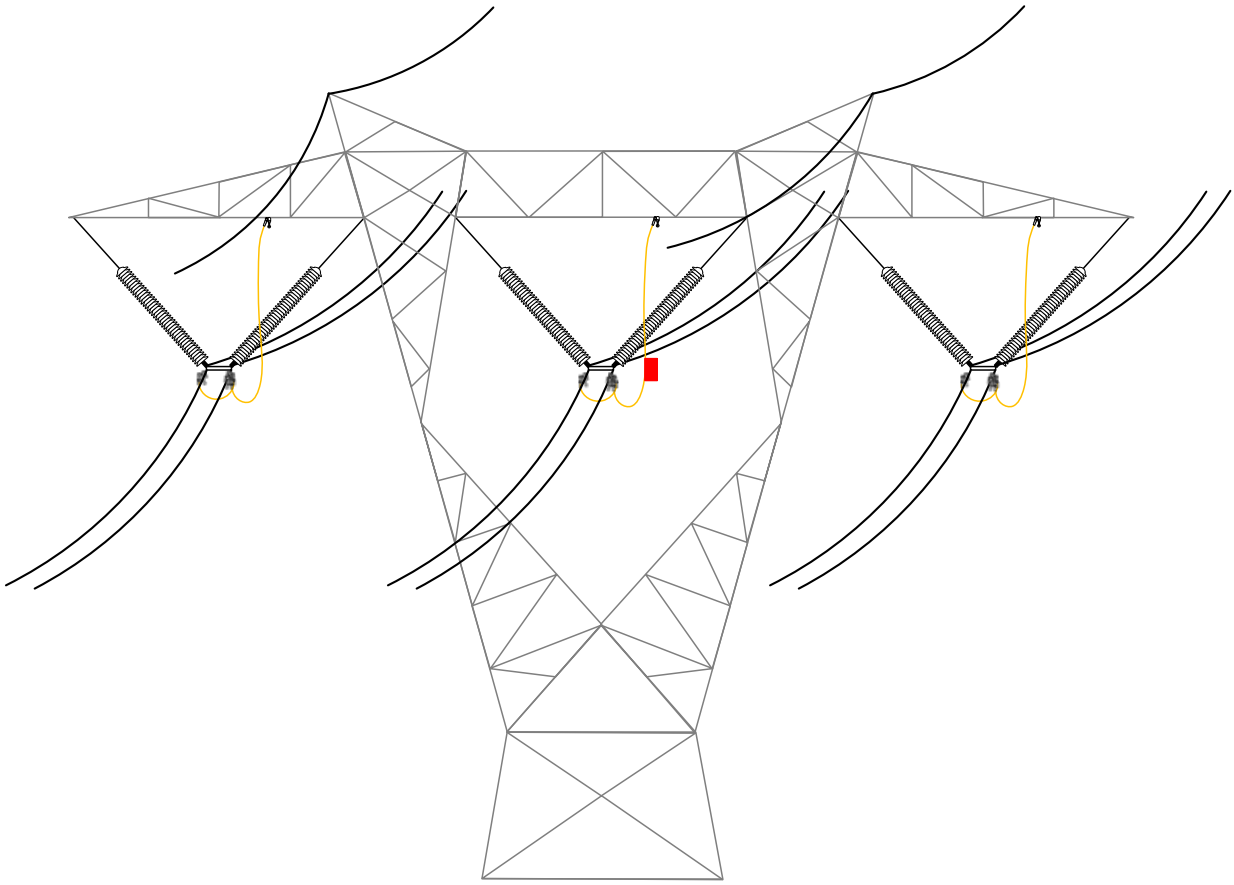


Figure A3 – Steel Lattice Structure with Bundled Conductor Single Point Grounding

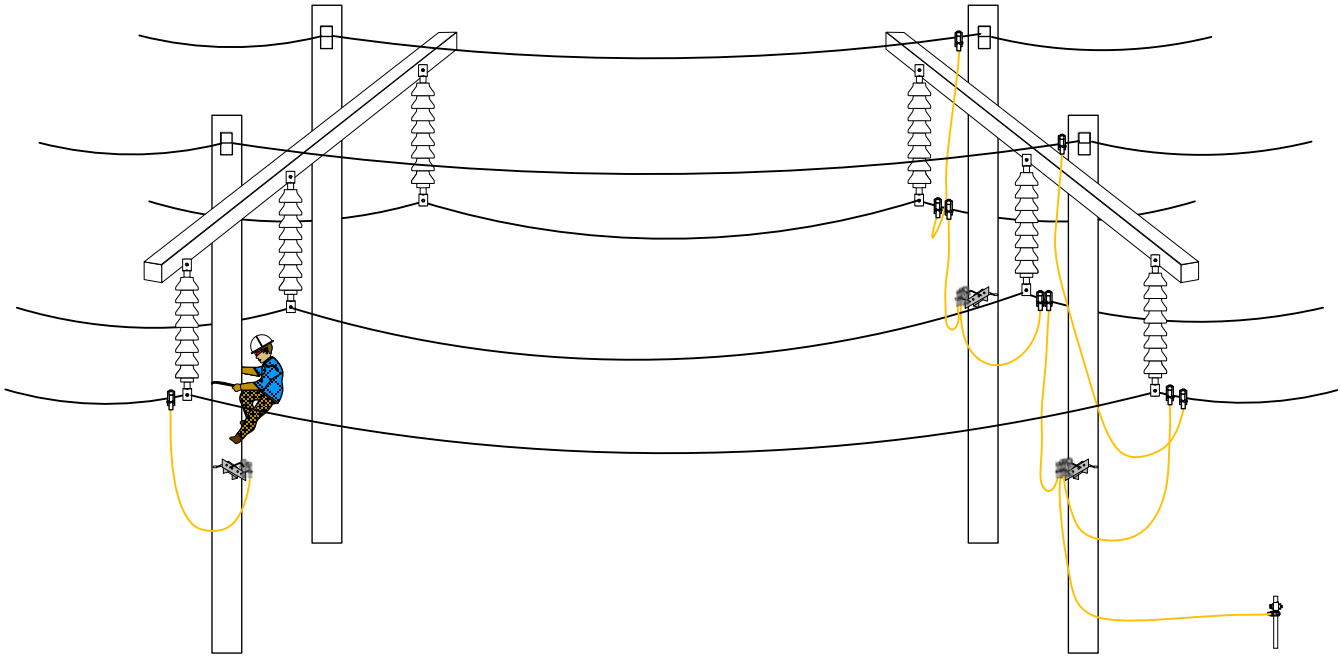


Figure A4 – Master Ground with EPZ

Appendix B – Example of OP-5087 OH Grounding Plan Form

OH Grounding Plan OP-5087
Transmission & Distribution

Supervisor Review
NAME:_____ DATE: _____

EVERSOURCE

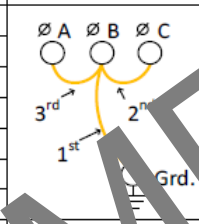
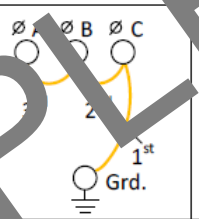
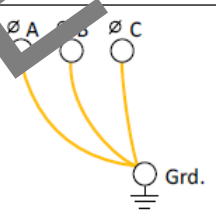
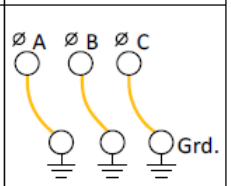
LOCATION	CREW INFORMATION	RELEVANT PROCEDURES	
Work Location / Address:	Clearance Holder:	Distribution OH Grounding	Vehicle & Equipment Grounding
City / Town:	Crew Size:	Transmission OH Grounding	
Nearest Intersection / Landmark:	Switching Control #:	Care of Live Line Tools	Material Catalog Books
Time: Date:		Maintenance & Testing of Grounding Equipment	

JOB DESCRIPTION OF WORK BEING PERFORMED & GROUNDING REQUIREMENT(S) FROM WMS

Feeder/Line #:		Grounding Requirement in WMS:	

Description of Work:

FIELD INFORMATION

System Voltage (kV)	# TPG Per Phase: 1 2	Balanced	Un-balanced	Phase-to-Ground	Ph-to-Gnd Short Cable
Ground Points Cleaned: YES NO					
Clamp Rating: (write-in)					
Cable Rating: (write-in)					
TPG Assembly Rating: (circle) Grade 2 2H 3 3H 5 5H 6H					
TPG Inspected: YES NO	TPG Date Satisfactory: YES NO				
Threaded Ferrules: YES NO	Noncompliant TPG Removed: YES NO				
Vehicle Grounded: YES NO	Cable Uncoiled: YES NO				
Vehicle Bonded: YES NO	Mobile Bond Used: YES NO				

Ground Bar Used: YES NO **If No,** Live-Line methods shall be used.

System Diagram Marked-up & Attached?: YES NO N/A

Additional Bonding Needed in the Work Zone: YES NO N/A

NOTES: (1) When two (2) or more ground cable assemblies are required on each phase, the clamps shall be physically installed facing in the same direction and no more than three (3) inches of each other.
(2) If the boundary or work scope has changed engage Supervision to re-evaluate the Grounding Plan.

PERSONAL PROTECTION & WORK AREA IDENTIFICATION

Identify the Work Zone / Zone of Protection and list the devices, locations and tags used for the isolation of the Work Zone.

Identify and list the Source Paths to the Work Zone and list the known Source Voltages.

JOB SAFETY

Equipment and lines shall be tested with an approved testing device using a live, dead, live process.	Approved live-line tools and methods SHALL be used to install and remove ground cable assemblies, from both the live and cold ends. If field conditions do not permit the use of live line tools, contact Eversource Supervision.	If a Grounding Plan cannot be executed because of the System Design, Safety must be consulted and a JOB SAFETY ANALYSIS **SHALL** be performed. Consult Supervision.