ELECTRICAL SAFETY

CONTENTS	Subpart

SUBPART A - PURPOSE

The purpose of this procedure is to protect employees from electrical shock when using portable power tools, and equipment.

SUBPART B - SCOPE

Applicable to all Berry Bros. General Contractors, Inc.'s supervisors and employees or where the Clients' procedures require additional action steps, they will become part of this procedure for the duration of work at that site.

SUBPART C - BASIS

The national safety council estimates that there are at least 300 deaths annually from on-the-job electrocutions in the United States. Most of these are preventable.

SUBPART D - GENERAL

Berry Bros. General Contractors, Inc. will ensure that work practices performed on or in proximity to electrical equipment/energy sources are evaluated to determine if proper safety precautions are instituted. This standard practice instruction is intended to address comprehensively the issues of:

- Evaluating and identifying potential energy sources where is performed.
- Evaluating the associated potential hazards.
- Communicating information concerning these hazards.
- Establishing appropriate procedures.
- Determining protective measures for our employees.

This standard practice instruction will cover work by both qualified and unqualified persons. The provisions of 29 CFR 1910.331 through 1910.335 will be detailed to cover electrical safety related work practices for both qualified persons (those who have training in avoiding the electrical hazards of working near exposed energized parts) and unqualified persons (those with little knowledge or no such training) working on, near or with the following installations:

1. Installations of electrical conductors and equipment within or on buildings or structures, and on other premises such as yards, carnival, parking, and other lots, and industrial substations.
2. Wiring for connection to supply installations of conductors that connect to the supply of electricity.
3. Installations of other outside conductors on the premises.
4. Installations of optical fiber cable where such installations are made along with electric conductors.
5. General electrical safety work practices by Berry Bros. General Contractors, Inc.'s employees.
6. The tie-in of temporary electrical systems and equipment to permanent electrical distribution systems is prohibited unless specifically approved by

the Qualified Electrical Responsible Person, as designated by site management.

7. The Qualified Electrical Responsible Person's competency will be assured through/via an Electrical Journeyman License or Certificate.

SUBPART E - RESPONSIBILITY

The HS&E / Risk Management Departments are responsible for overseeing all facets of this program and has full authority to make necessary decisions to ensure the success of this program. The HS&E Department will develop written detailed instructions covering each of the basic elements in this program and is authorized to amend these instructions.

SUBPART F - EVALUATIONS

The HS&E Department will evaluate the work sites as well as our facilities to determine where high risk from electrical hazards exists. Jobs/areas that present such risk will meet the criteria for the designation as an electrical hazard area.

Employees shall be notified using danger signs, conducting awareness training, or by any other equally effective means, of the existence and location of and the danger posed by electrical hazard areas. A sign reading "DANGER ELECTRICAL HAZARD, AUTHORIZED PERSONNEL ONLY" or similar language in accordance with OSHA will be used to satisfy the requirements of untrained employee/visitor notification.

SUBPART G - ALERTING TECHNIQUES

The following alerting techniques shall be used to warn and protect employees from hazards which could cause injury due to electric shock, burns, or failure of electric parts.

- Safety signs, safety symbols, or accident prevention tags shall be used where necessary to warn employees about electrical hazards which may endanger them.
- Barricades shall be used in conjunction with safety signs where necessary to prevent or limit employee access to work areas exposing employees to un-

insulated energized conductors or circuit parts. Conductive barricades may not be used where they might cause an electrical contact hazard.

- If signs and barricades do not provide sufficient warning and protection from electrical hazards, an attendant shall be stationed to warn and protect employees.

SUBPART H - WORK PRACTICES

1. Supervisors shall develop and ensure the use of standardized safety related work practices to prevent electrical shock or other injuries resulting from either direct or indirect electrical contacts. This will be accomplished whenever work is performed near or on equipment or circuits which are or may be energized. The specific safety related work practices should be consistent with the nature and extent of the associated electrical hazards.

2. Live parts to which an employee may be exposed shall be de-energized before the employee works on or near them, unless it can be demonstrated that de-energizing introduces additional or increased hazards or is infeasible due to equipment design or operational limitations. Live parts that operate at less than 50 volts to ground need not be de-energized if there will be no increased exposure to electrical burns or to explosion due to electrical arcs.

3. Examples of increased or additional hazards include interruption of life support equipment, deactivation of emergency alarm systems, shutdown of hazardous ventilation equipment, or removal of illumination for an area.

4. Conductors and parts of electric equipment that have been de-energized but have not been locked out or tagged shall be treated as energized parts, and as such only qualified personnel will be allowed to work on or near them.

5. Examples of work that may be performed on or near energized parts because of infeasibility due to equipment design or operational limitations include testing of electric circuits that can only be performed with the circuit energized and work on circuits that form an integral part of a continuous industrial process in a chemical plant that would otherwise need to be completely shut down in order to permit work on one piece of equipment.

6. While any employee is exposed to contact with parts of fixed electric equipment or circuits which have been de-energized, the circuits energizing the parts shall

be locked out or tagged out or both in accordance with the requirements of Berry Bros. General Contractors, Inc.'s lockout/tagout program.

7. If exposed live parts are not de-energized (i.e. for reasons of increased or additional hazards or infeasibility), supervisors will ensure that other safety-related work practices are used to protect employees who may be exposed to the electrical hazards involved. Such work practices shall protect employees against contact with energized circuit parts directly with any part of the body or indirectly through some other conductive object. The work practices that are used shall be suitable for the conditions under which the work is to be performed and for the voltage level of the exposed electric conductors or circuit parts. Only qualified company employees may work on electric circuit parts or equipment that have not been de-energized.

8. Only trained and qualified employees are authorized to work on or near exposed energized parts that have not been de-energized and will be familiar with the use of special precautionary techniques, PPE, insulation and shielding materials as well as special insulated tools.

9. Employees will be notified that they may be required to provide proof of certification for working on energized circuits, and shall be familiar with the proper use of special precautionary techniques, personal protective equipment, insulating and shielding materials and insulating tools.

10. If work is to be performed near overhead lines, the lines shall be de-energized and grounded, or other protective measures shall be provided before work is started. If the lines are to be de-energized, arrangements shall be made with the person or organization that operates or controls the electric circuits involved to de-energize and ground them. If protective measures such as guarding, isolating, or insulating are provided, these precautions shall prevent employees from contacting such lines directly with any part of their body or indirectly through conductive materials, tools, or equipment. Unqualified persons are prohibited from performing this type of work.

Unqualified

1. When an unqualified employee is working in an elevated position near overhead lines, the location shall be such that the person and the longest

conductive object he or she may contact cannot come closer to any unguarded, energized overhead line that the following distances:

a. For voltages to ground 50kv or below – 10 feet (305 cm)
b. For voltages to ground over 50kv – 10 feet (305 cm) plus 4 in. (10 cm) for every 10kv over 50kv.

2. Unqualified employees working on the ground or in the vicinity of overhead lines, the person may not bring any conductive object closer to unguarded, energized overhead lines than the distances given below.

3. For voltages to ground of 50kv or below – 10 feet (305 cm)
4. For voltages to ground over 50kv – 10 feet (305 cm) plus 4 in. (10 cm) for every 10kv over 50kv.\

Note: For voltages normally encountered with overhead lines, objects not having an insulating rating for the voltage involved will be considered to be conductive.

Qualified

- When a qualified person is working in the vacinity of overhead lines, whether in an elevated position or on the ground, the person may not approach or take any conductive object without an approved insulating handle closer to exposed energized parts than shown in table S-5 (29 CFR 1910.333) unless:

  - The person is insulated from energized parts (gloves, with sleeves if necessary, rated for the voltage involved) are considered to be insulation of the person from the energized part on which work is performed.
  - The energized part is insulated both from all other conductive objects at a different potential and from the person.
  - The person is insulated from all conductive objects at a potential different from that of the energized part.

TABLE S-5

Approach Distances for Qualified Employees – Alternating Current

Voltage Range (phase to phase)	Min. approach distance
300V and less	Avoid contact
Over 300V, not over 750V	1 ft 0 in.
Over 750V, not over 2kv	1 ft. 6 in.
Over 2kv, not over 15kv	2 ft. 0 in.
Over 15kv, not over 37kv	3 ft. 0 in.
Over 37kv, not over 87.5kv	3 ft. 6 in.
Over 87.5, not over 121kv	4 ft. 0 in.
Over 121kv, not over 140kv.	4 ft. 6 in.

SUBPART I - VEHICULAR TRAFFIC

Company vehicles or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that a clearance of 10 ft. is maintained. If voltage is higher than 50kv, the clearance shall be increased 4 in. for every 10kv over that voltage. However, under any of the following conditions, the clearance may be reduced:

1. If the vehicle is in transit with its structure lowered, the clearance may be reduced to 4 ft. If the voltage is higher than 50kv, the clearance shall be increased 4 in. for every 10kv over that voltage.
2. If insulating barriers are installed to prevent contact with the lines, and if the barriers are rated for the voltage of the line being guarded and are not a part of or an attachment to the vehicle or its raised structure, the clearance may be reduced to a distance within the designated working dimensions of the insulating barrier.
3. If the equipment is an aerial lift insulated for the voltage involved, and if the work is performed by a qualified person, the clearance (between the insulated portion of the aerial lift and the power line) may be reduced to the distance given in Table S-5.

Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

1. The employee is using protective equipment rated for the voltage.
2. The equipment is located so that no un-insulated part of its structure (that portion of the structure that provides a conductive path to employees on the ground) can come closer to the line than 10 ft. If the voltage is higher than 50kv, the clearance shall be increased 4 in. for every 10kv over that voltage.
3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of overhead contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous ground potentials, depending on earth resistively and fault currents, which can develop within the first few feet or more outward from the grounding point.

SUBPART J - ILLUMINATION

Supervisors shall ensure that employees do not enter spaces containing exposed energized parts, unless illumination is provided which enables the employee to perform the work safely.

Where lack of illumination or an obstruction precludes observation of the work to be performed, employees may not perform tasks near exposed energized parts. Employees may not reach blindly into areas which may contain energized parts. Additionally, unless known otherwise the space shall be evaluated to determine if it meets the criteria for designation as a confined space. The company-confined space will be implemented to manage the entry.

SUBPART K - CONFINED SPACES

When an employee works in a confined or enclosed space (such as a manhole or vault) that contains exposed energized parts, this employer shall provide, and the employee shall use protective shields, protective barriers, or insulating materials as necessary to avoid inadvertent contact with these parts. Doors, hinged panels, and the like shall be secured to prevent their swinging into an employee and causing the employee to contact exposed energized parts. Additionally, unless known otherwise the space shall be evaluated to determine if it meets the criteria for designation as a confined space. The company confined space program will be implemented to manage the entry.

SUBPART L - CONDUCTIVE MATERIAL and EQUIPMENT

Conductive materials and equipment that are in contact with any part of an employee's body shall be handled in a manner that will prevent them from contacting exposed energized conductors or circuit parts. Supervisors will ensure pre-written safety procedures are in place, and that all employees are trained when long dimensional conductive objects (such as ducts or pipes) in areas with exposed live parts, are used. Other protective measures (such as the use of insulating, guarding, and material handling techniques) will be considered and used to minimize the hazard.

PORTABLE LADDERS

Portable ladders shall have nonconductive side rails if they are used where the employee or the ladder could contact exposed energized parts.

CONDUCTIVE APPAREL

Conductive articles of jewelry and clothing (such as watch bands, bracelets, rings, key chains, etc.) may not be worn if they might contact exposed energized parts. However, such articles may be worn if they are rendered nonconductive by covering, wrapping, or insulating means.

SUBPART M - HOUSEKEEPING DUTIES

Where energized parts are present an electrical contact hazard, employees may not perform housekeeping duties at such close distances to the parts that there is a possibility of contact, unless adequate safeguards (such as insulating equipment) are provided. Electrically conductive cleaning materials (including conductive solids such as steel wool, as well as conductive liquid solutions) may not be used in proximity to energized parts unless procedures are followed that will prevent electrical contact.

SUBPART N - INTERLOCKS

Only qualified employees may defeat an electrical safety interlock, and then only while he or she is working on the equipment. The interlock system shall be returned to its operable condition when this work is completed.

SUBPART O - USE of EQUIPMENT

This section applies to the use of cord and plug connected equipment, including flexible cord sets, (extension cords).

1. Portable equipment shall be handled in a manner which will not cause damage. Flexible cords connected to equipment may not be used for raising or lowering the equipment. Flexible cords may not be fastened with staples or otherwise hung in such a fashion as could cause damage to the outer jacket or insulation.
2. Portable cord sets and plug connected equipment shall be inspected before use on any shift for external defects (such as loose parts, deformed and missing pins, or damage to outer jacket or insulation) and for evidence of possible internal damage (such as pinched or crushed outer jacket). Cord and plug connected equipment and flexible cord sets (extension cords) which remain connected once they are put in place and are not exposed to damage need not be visually inspected until they are relocated.
3. If there is a defect or evidence of damage that might expose an employee to injury, the defective or damaged item shall be removed from service, and no employee may use it until repairs and test necessary to render the equipment safe have been made.
4. When an attachment plug is to be connected to a receptacle (including cord set), the relationship of the plug and receptacle contacts shall first be checked to ensure that they are of proper mating configurations.
5. Attachment plugs and receptacles may not be connected or altered in a manner which would prevent proper continuity of the equipment-grounding conductor at the point where plugs are attached to receptacles. Additionally, these devices may not be altered to allow the grounding pole of a plug to be inserted into slots intended for connection to the current carrying conductors.
6. Adapters which interrupt the continuity of the grounding connection may not be used.
7. Portable electric equipment and flexible cords used in highly conductive work locations (such as those inundated with water or other conductive liquids) shall be approved for these locations.
8. Employee's hands may not be wet when plugging and unplugging flexible cords and cord and plug connected equipment, if energized equipment is involved.
9. Energized plug and receptacle connections may be handled only with insulating protective equipment if the condition of the connection could

provide a conductive path the employee's hand (for example: a cord is wet from being immersed in water).

10. Locking type connectors shall be properly secured after connection.
11. Only Extension cords that contain 12AWG conductors or greater shall be utilized.

ELECTRIC POWER and LIGHTING CIRCUITS

Load rated switches, circuit breakers, or other devices specifically designed as disconnecting means shall be used for the opening, reversing, or closing of circuits under load conditions. Cable connectors not of the load break type, fuses, terminal lugs, and cable splice connections may not be used for such purposes, except in an emergency.

After a circuit is de-energized by a circuit protective device, the circuit may not be manually re-energized until it has been determined that the equipment and the circuit can be safely energized. The repetitive manual re-closing of circuit breakers or re-energizing circuits through replaced fuses is prohibited.

Note: When it can be determined from the design of the circuit and the over current devices involved that the automatic operation of a device was caused by an overload rather than a fault condition, no examination of the circuit or connected equipment is needed before the circuit is re-energized.

Over current protection of circuits and conductors may not be modified even on a temporary basis, beyond that allowed by 29 CFR 1910.304(e), the installation safety requirements for over current protection.

TEST INSTRUMENTS and EQUIPMENT

Only company qualified persons may perform testing work on electric circuits and equipment.

Test instruments and equipment and all associated test leads, cables, power cords, probes, and connectors shall be visually inspected for external defects and damage before the equipment is used. If there is a defect or evidence of damage that might expose an employee to injury, the defective or damaged item shall be removed from service, and no employee may use it until repairs and test necessary to render the equipment safe has been made.

Test instruments and equipment and their accessories shall be rated for the circuits and equipment to which they will be connected and shall be designed for the environment in which they will be used. Test equipment shall be calibrated annually, and have documentation on-hand or affixed stickers with calibration dates when in use. Before testing of AC voltage on components or live parts, the test equipment or meter shall be verified on a known source before and after testing occurs.

SUBPART P - PERSONAL PROTECTIVE EQUIPMENT

Employees working in areas where there are potential hazards shall be provided with, and shall use, electrical protective equipment that is appropriate for the specific parts of the body to be protected and for the work to be performed.

1. PPE shall be maintained in a safe, reliable condition and shall be periodically inspected or tested, as required.
2. If the insulating capability of protective equipment may be subject to damage during use, the insulating material shall be protected. (For example, an outer covering of leather is sometimes used for protection of rubber insulating material.)
3. Employees shall wear nonconductive head protection whenever there is a danger of head injury from electric shock or burns due to contact with exposed energized parts.
4. Employees shall wear protective equipment for the eyes or face whenever there is danger to the eyes or face from electric arcs or flashes or from flying objects resulting from electrical explosion.
5. Employees shall use insulating tools if they may come into contact with conductors or parts. If the insulating capability of insulating tools or handling equipment is subject to damage, the insulating material shall be protected.
6. Fuse handing equipment, insulated for the circuit voltage, shall be used to remove or install fuses when the fuse terminals are energized.
7. Ropes and hand lines used near exposed energized parts shall be nonconductive.
8. Protective shields, protective barriers, or insulating materials shall be used to protect each employee from electric shock, burns, or other electrically related injury while that employee is working near exposed energized parts which might be accidentally contacted or where dangerous electric heating or arcing might occur. When normally enclosed live parts are exposed for maintenance

or repair, they shall be guarded to protect unqualified persons from contact with the live parts.

9. PPE shall be rated in accordance with incident energy calculations or arc flash labels.

SUBPART Q - GENERAL ELECTRICAL SAFETY RULES

1. Never use an electrical cord, if it has exposed wires. Repair or replace the cord before using.
2. Cords should never be hung over nails or other sharp objects that could cut into the cord.
3. Cords should be protected from oil, hot surfaces, chemicals and other harmful elements.
4. Always repair cords with approved electrical tape and other approved materials.
5. Unauthorized or untrained personnel should not attempt to repair cords or other electrical equipment.
6. Only qualified personnel shall be allowed to repair, maintain, or work on electrical circuits, extension cords, and electrical panels of any kind.
7. Extension cords are intended for temporary use only.
8. Never operate or work on electrical equipment when standing in water or just being wet.
9. Never overload an electrical circuit.
10. Use extreme caution while washing down an area with a water hose around electrical outlets or other electrical sources.
11. Always unplug a power tool before working on it. Never work on an electrical tool while the power is still connected.
12. All power tools should be properly grounded.
13. Before using an electrical tool in an area, check to make certain it is safe to do so. If explosion proof tools are required, use only those tools.
14. Never operate a rotating tool in such a manner that a shirttail or other type of clothing or hair might be tangled.

SUBPART R - TRAINING

All employees receive basic electrical awareness level training through PEC. Those individuals with licenses shall receive additional training as needed for their licenses.

ELECTRICAL SAFETY

Employees who face a risk of electric shock but who are not qualified individuals shall be trained and made familiar with electrically related safety practices. In addition, employees will be trained in safety related practices that pertain to their respective job duties/requirements/assignments. This will also include the clearance distances while working around energized lines and equipment.

Note: Electricity makes our life a lot easier, but it can also be a killer!!!

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Approved By: Joe Berry & Safety Committee