CONTENTS

1.0 INTRODUCTION...................................................................................................................... 3
2.0 OBJECTIVES AND METRICS ............................................................................................ 3
3.0 SCOPE........................................................................................................................................ 3
4.0 ROLES AND RESPONSIBILITIES ...................................................................................... 3
5.0 GENERAL REQUIREMENTS ............................................................................................. 6
6.0 ELECTRICAL EQUIPMENT INSTALLATION & LABELING ............................................ 7
7.0 SAFE WORK PRACTICES ................................................................................................. 7
8.0 PERSONAL PROTECTIVE EQUIPMENT ........................................................................... 9
9.0 PORTABLE ELECTRIC TOOLS ......................................................................................... 10
10.0 EXTENSION CORDS, OUTLETS & GFCIs................................................................. 11
11.0 PORTABLE GENERATORS............................................................................................... 11
12.0 BATTERY CHARGING STATIONS ................................................................................ 12
13.0 CODE COMPLIANCE & INSPECTION.............................................................................. 12
14.0 REPORTING INJURIES AND ELECTRICAL HAZARDS ............................................ 12
15.0 REQUIREMENTS FOR PROCUREMENT OF ELECTRICAL EQUIPMENT, MATERIALS, TOOLS, AND APPLIANCES ............................................................... 13
16.0 TRAINING.......................................................................................................................... 13
17.0 RECORDS AND DOCUMENT CONTROL ................................................................... 15
18.0 DEFINITIONS.................................................................................................................... 15
19.0 REFERENCES.................................................................................................................... 17
20.0 DOCUMENT HISTORY..................................................................................................... 17
1.0 **INTRODUCTION**

1.1 This Electrical Safe Work Practices program has been developed to help individuals recognize and avoid electrical hazards. The goal is to reduce and manage the risk of electrical arc flash hazard, shock, equipment damage, and fire.

2.0 **OBJECTIVES AND METRICS**

2.1 The purpose of this section is to provide a process for ensuring the program meets the requirements of applicable standards, such as OSHA, NEC, and NFPA 70E. Specifically, the purpose of this Electrical Safe Work Practices program is to:

- 2.1.2 Apply the National Fire Protection Association (NFPA) standard and any exceptions by applicable state or local municipal requirements to the design, construction, and maintenance of facilities and equipment.
- 2.1.3 Protect people, property, and the environment.

2.2 This section also defines the process by which the Electrical Safe Work Practices program will be audited.

- 2.2.1 This written program will be audited by the Electrical Safety Lead Team every three years.
- 2.2.2 Results of all audits shall be retained by the Electrical Safety Lead Team for three years.
- 2.2.3 Internal and external electrical auditors shall be approved by the Electrical Safety Lead Team.

3.0 **SCOPE**

3.1 This Electrical Safe Work Practices program applies to all Cornell University employees, except those at Weill Medical College.

4.0 **ROLES AND RESPONSIBILITIES**

4.1 **University Administration**

- 4.1.1 University Administrators provide senior management support for implementing the Electrical Safe Work Practices program and ensure that resources are allocated for implementing this program.

4.2 **Environment, Health and Safety (EHS)**

- 4.2.1 The Cornell University Department of Environment, Health and Safety develops and oversees implementation of the Electrical Safe Work Practices program, and supports the program by:
  
  a. Providing sponsorship to the Electrical Safety Lead Team.
  b. Develops and maintains the various written components comprising the Electrical Safe Work Practices program.
c. Approves all electrical safety training and instructors.
d. Ensuring the Electrical Safe Work Practices program is integrated into the daily operations of Cornell.

4.2.2 EHS has the authority to enforce the Electrical Safe Work Practices program requirements.

4.3 Electrical Safe Work Practices Program Lead Team

4.3.1 The Electrical Safety Lead Team is the lead University authority for interpretation/application of electrical codes and regulations at Cornell University.

4.3.2 Is the lead contact for, and works closely with, all governmental authorities having jurisdiction.

4.3.3 Maintains and oversees implementation of the Electrical Safe Work Practices program.

4.3.4 Develops and monitors compliance with the training requirements of the Electrical Safe Work Practices program.

4.3.5 Assists departments in interpreting the electrical requirements of the various codes, standards, and practices.

4.3.6 Establishes procedures to ensure compliance with electrical codes governing new installations and major modifications.

4.3.7 Establishes procedures to ensure proper review and approval for all electrical equipment, material and appliances purchased by the University or brought on-site by individual employees.

4.3.8 Reviews and approves all requests for alternate methods and procedures that provide equivalent protection.

4.3.9 This team has the authority to enforce the Electrical Safe Work Practices program requirements. For the current calendar year, the Electrical Safe Work Practices program Lead Team is: Levi Harmon (ljh252), Jeff Lapar (jll43), Brian Wanck (bkw24), and John Bell (jab635).

4.4 Supervisors

4.4.1 Cornell University Supervisors support the Electrical Safe Work Practices program by:

4.4.2 Providing necessary resources to support the activities of the Electrical Safety Lead Team.

4.4.3 Ensuring all projects implemented are in compliance with 29 CFR 1910 Subparts S & R, and NFPA Standards.

4.4.4 Ensuring that all affected department personnel attend required training as defined in Section 16 of this program.

4.4.5 Communicates to the appropriate individuals all pertinent electrical safety information (e.g., major incidents, product recalls, product notices, and safety bulletins).

4.5 Maintenance Management

4.5.1 Cornell University Maintenance Management supports the Electrical Safe Work Practices program by:

a. Ensuring a low-voltage electrical preventative maintenance program is implemented.

b. Providing necessary resources to support the activities of the Electrical Safety Lead Team.
c. Ensuring all projects implemented are in compliance with 29 CFR 1910 Subparts S & R, and NFPA Standards.
d. Communicates to the appropriate individuals all pertinent electrical safety information (e.g., major incidents, product recalls, product notices, and safety bulletins).

4.6 Facilities Services Electric Shop Superintendent

4.6.1 The Electrical Shop Superintendent supports the Electrical Safe Work Practices program by:

a. Providing necessary resources to support the activities of the Electrical Safety Lead Team.
b. Providing qualified electricians for all electrical and medium/high voltage work. Ensuring maintenance and construction personnel complete all applicable courses of electrical safety training.
c. Ensuring all maintenance projects implemented are in compliance with 29 CFR 1910 Subparts S & R, and NFPA Standards.
d. Ensuring electrical preventative maintenance program tasks are executed.
e. Supporting efforts to maintain facilities in compliance with applicable regulations.

4.7 Utilities

4.7.1 Utilities Enterprises supports the Electrical Safe Work Practices program by:

a. Providing necessary resources to support the activities of the Electrical Safety Lead Team.
b. Ensuring a medium-voltage electrical preventative maintenance program is implemented.
c. Providing a University power-system model, including arc flash hazard levels, at limited points on the power system.

4.8 Employees

4.8.1 All Cornell University employees and contract employees must comply with the Electrical Safe Work Practices program. University employees must report unsafe electrical installations and activities by contacting EHS. The safety-related work practices contained in this program shall be implemented by employees.

4.8.2 Cornell University employees who are qualified electricians must support the Electrical Safe Work Practices program by:

a. Attend all applicable training and pass applicable written exams to ensure personal safety.
b. Ensure all maintenance and construction projects and installations are in compliance with this Electrical Safe Work Practices program, 29 CFR 1910 & 1926, and NFPA Standards.
c. Recognize and report unsafe electrical installations.
d. Perform work activities in compliance with the Cornell University Lock/Tag/Verify Program.
e. Wear personal protective equipment as required by the Electrical Safe Work Practices program.
4.9 General Contractors

4.9.1 All general contractors must comply with applicable Federal, State and Local regulations. Contractor safety and health programs may be subject to review by EHS and the Electrical Safety Lead Team.

4.9.2 Cornell University shall inform contract employers of:
   a. Known hazards that are related to the contract employer’s work, and that might not be recognized by the contract employer or its employees.
   b. Information about the employer’s installation that the contract employer needs to make the proper risk assessments.
   c. Observed violations of this standard.

4.9.3 The contract employer shall advise Cornell University Project Managers of:
   a. Any unique hazards presented by the contract employer’s work.
   b. Any unanticipated hazards found during the contract employer’s work that the host employer did not mention.
   c. The measures the contractor took to correct any violations reported by Cornell University to prevent such violation from recurring in the future.

5.0 GENERAL REQUIREMENTS

5.1 Electrical safety procedures are considered to be one of the most important safety control measures at Cornell University. Failure of any employee to follow these procedures shall be considered a major and serious violation of safety policy and can result in disciplinary action. The rules contained in this section apply to all Cornell University employees.

5.2 This section outlines general rules for all persons exposed to electrical hazards. The goal is to eliminate the risk of electrical arc flash hazard, shock, equipment damage, and fire. Adherence with this component is required to comply with OSHA Standard 1910 & 1926, the National Electrical Code, and NFPA 70E 2012.

5.2.1 All electrical equipment greater than 50 Volts shall be UL listed or otherwise designed to meet its equivalent safety requirements. Tools and electrical testing equipment shall not be modified.

5.2.2 Product bulletins and recall information shall be communicated through the appropriate engineering and maintenance organizations. Supervisors shall assure all personnel have been informed.

5.2.3 All entrance doors to rooms, buildings, or enclosures containing exposed live parts shall be kept locked. All substation gates are to be kept locked.

5.2.4 Any work area where exposed, energized conductors or live parts are present shall be barricaded and controlled to prevent affected persons from contacting such equipment. If signs and barricades do not provide sufficient warning and protection from electrical hazards, an attendant shall be stationed to warn and protect employees.

5.2.5 Underground Utility Surveys are required when excavating or penetrating 6” or more into ground surface or in any case when power excavation equipment is used at Cornell University. Utility surveys can be requested by calling: Cornell University Customer Service, 255-5322.

5.2.6 All abandoned wiring shall be physically removed where possible or, at a minimum, disconnected, insulated and identified at opposite ends. The Cornell University
Asbestos Management Program shall be followed when applicable.

5.2.7 Clear access in front of all electrical panel boards, switchboards, and disconnects shall be maintained at all times.

5.2.8 Storage of materials in substations or under exposed high voltage lines is prohibited.

5.2.9 Portable ladders used for electrical tasks shall have non-conductive side rails.

5.2.10 Only qualified personnel, trained in the use of electrical test equipment, shall operate and use electrical test equipment.

5.2.11 Unqualified personnel are prohibited from opening electrical enclosures. Unqualified personnel may only operate isolating devices rated 50 Volts or less.

5.2.12 Energized parts operated at less than 50 volts and which pose no significant electrical burn or arc flash hazard (arc energy less than 1.2 cal/cm²) are not required to be de-energized to satisfy an electrically safe work condition.

5.2.13 Compliance with the University Lock/Tag/Verify program is required.

6.0 ELECTRICAL EQUIPMENT INSTALLATION & LABELING

6.1 Electrical panel boards, switch boards, and motor control centers shall have an arc flash hazard analysis completed for all new installations (2009 and beyond) or major modifications to existing installations. The EHS and Electrical Safety Lead teams shall have access to these records. Electrical apparatus shall be labeled with the appropriate arc flash hazard warning. Permanent labels installed on all new electrical equipment (2009 and beyond) shall comply with all applicable requirements and regulations.

6.2 All new installations and major modifications of panel boards, switchboards, and disconnects shall have the minimum clear access identified by physical barricades or clear access areas painted on the floor.

6.3 All live parts operating at 50 volts or greater shall be guarded against accidental contact by any of the following methods.

6.3.1 By location in a room, vault, or enclosure accessible to qualified personnel only.

6.3.2 Suitable, permanent substantial screens, partitions, guards, cabinets, or enclosures.

6.3.3 By an elevation of at least eight feet for up to 600V and nine feet for more than 600V and accessible to qualified personnel only.

6.3.4 All control houses containing exposed live parts shall be kept locked and accessible to qualified personnel only.

6.3.5 Entrances to substations, rooms, vaults or enclosures containing live parts operating at 480 volts shall have a permanent and conspicuous warning sign reading “DANGER – ELECTRICAL HAZARD – AUTHORIZED PERSONNEL ONLY”.

6.3.6 Entrances to substations, rooms, vaults or enclosures containing live parts operating at over 600 volts shall have a permanent and conspicuous warning sign reading “DANGER – HIGH VOLTAGE – AUTHORIZED PERSONNEL ONLY”.

7.0 SAFE WORK PRACTICES

7.1 This section defines safe work practices for all personnel performing work involving electrical parts and equipment, and complies with the National Electric Code, NFPA 70E, and OSHA requirements. The safe work practices outlined in this section apply to all personnel working in areas containing electrical parts and equipment.
7.1.1 Every electrical conductor or circuit part is considered energized until proven otherwise. Energized parts that personnel may contact shall be de-energized before any work commences. Deenergizing an electrical conductor or circuit part and making it safe to work on is in itself a potentially hazardous task. No bare-hand contact is to be made with exposed energized electrical conductors or circuit parts above 50 volts to ground.

7.1.2 Prior to any work activity, qualified personnel shall open (de-energize) and voltage test each phase conductor or circuit part with an adequately rated voltage detector to verify the equipment is de-energized. Before and after each test, personnel must determine that the voltage detector is operating correctly by checking the tester on a known energized voltage source.

7.1.3 When a task cannot be performed in a de-energized state, work on energized equipment is limited to testing and troubleshooting by qualified personnel. Appropriate PPE, insulating and shielding materials, and insulated tools must be used. The Energized Work Permit (HS6F_004_EnergizedWorkPermit) must be completed before work begins.
   a. The person performing the troubleshooting must be an authorized employee who is knowledgeable with the design and operation of the equipment/system, the hazards involved, and in avoiding hazards of working on or near exposed parts and moving equipment.
   b. The authorized employee performing the troubleshooting shall perform a hazard assessment (HS6F_001_ElectricalWorkAssessment), utilize appropriate safe work practices, and wear the designated personal protective equipment for the energized work task.
   c. Remove non-authorized employees, tools, and materials from the hazardous equipment area.
   d. Remove lock(s) and tag(s).
   e. Re-energize and proceed with testing or positioning.
   f. De-energize all systems and reapply lock(s) and tag(s) immediately after testing/troubleshooting is complete.

7.1.4 Before starting each job, the employee in charge shall conduct a job briefing utilizing the HS6F_002_JobBriefingAndPlanningForm with other personnel involved. The briefing shall cover such subjects as hazards associated with the job, work procedures involved, special precautions, energy source controls, and PPE requirements. If the work or operations to be performed during the work day or shift are repetitive and similar, at least one job briefing shall be conducted before the start of the first job of the day or shift. Additional job briefings shall be held if significant changes might affect the safety of employees during the course of the work. A brief discussion shall be satisfactory if the work involved is routine and if the employee, by virtue of training and experience, can reasonably be expected to recognize and avoid the hazards involved in the job. A more extensive discussion shall be conducted if:
   a. The work is complicated or particularly hazardous; or
   b. The employee cannot be expected to recognize and avoid the hazards involved in the job.

7.1.5 Conductors or electric parts that have been de-energized but not locked out shall be considered energized.

7.1.6 Persons exposed to energized or potentially energized electrical equipment shall wear
appropriate arc-rated clothing. Anything that may present an electrical contact hazard, such as jewelry or belts, shall not be worn.

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

7.1.8 Personnel working in areas within the arc flash hazard boundary or where potential electrical hazards exist shall use the appropriate PPE as defined in GD_005_ProtectiveClothingAndPPECategories.

7.1.9 Protective equipment such as shields, barriers, insulating materials, and PPE shall be used whenever qualified personnel are working near exposed, energized conductors or parts.

7.1.10 Unqualified personnel performing maintenance, repairs, or modifications shall be protected from arc flash hazards and contact with exposed, energized parts. Barricading with safety signs and isolating or insulating are acceptable methods of protection. Barricading shall be placed no closer than the arc flash hazard boundary (GD_001_ApproachBoundariesAC) or six feet, whichever is greater.

7.1.11 Whenever possible, personnel shall use the "left hand rule" to operate electrical disconnects and circuit breakers. This process positions the individual to the right of the electrical disconnect or circuit breaker. Operation is accomplished by using the left hand and, Taking and holding a deep breath, turning away from the device, operating the mechanism.

7.1.12 When working or performing tasks on or near exposed, energized conductors or parts, all personnel shall use insulated tools or equipment if contact is possible. Insulated tools shall be protected from damage during storage or in transit. Damaged insulated tools shall be considered un-insulated and removed from service.

7.1.13 All electrical test instruments, tools, and equipment shall be visually inspected before each use. Test instruments, tools, and equipment shall be fully tested and calibrated per the manufacturers’ recommendation. Documentation of calibration shall be maintained.

7.1.14 During energy isolation procedures for electrical work to be performed, visually verify that all blades of disconnecting devices are fully open or that draw out type circuit breakers are withdrawn to the fully disconnected position.

7.1.15 Adequate illumination is required to perform work safely when operating or servicing any electrical equipment. Recommend 30 foot-candles at minimum, 50 fc or higher when visual performance is of critical nature. Supplemental task lighting is to be provided by personnel operating or servicing equipment.

8.0 PERSONAL PROTECTIVE EQUIPMENT

8.1 Protective equipment provides the last line of defense against inadvertent contact with energized parts or burns resulting from electrical arcs. The purpose of this section is to ensure personnel have an adequate understanding of potential electrical hazards and the knowledge to select and wear the proper PPE based on the hazards. PPE requirements apply to all persons exposed to potential electrical shock or arc flash hazards. This section of the Electrical Safe Work Practices program meets the following rules and requirements of OSHA 1910, 1926, and NFPA 70e.

8.2 Personnel shall use the personal protective equipment, the protective devices, and the special tools provided for their work. Before starting work these devices and tools shall be carefully inspected to make sure they are in good working condition.
8.3 Personnel shall NOT wear clothing made from combustible synthetic materials such as acetate, nylon, polyester, or rayon, either alone or in blends with cotton or other natural fibers, unless that material has been approved for Arc Hazard Protection.

8.4 Personnel shall wear EH-rated shoes while working on or around energized electrical equipment.

8.5 Personnel shall wear 600 Volt voltage-rated gloves when performing tasks within 12 inches of energized equipment operating at or above 50 V AC or DC but below 600 Volts.

8.6 At a minimum, all persons performing electrical work on energized parts or within the flash boundary of energized parts shall wear an Arc Rated long sleeve shirt, Arc Rated long pants, 20kV hard hat, safety glasses with side shields, hearing protection, and EH-rated shoes. Note – An appropriately rated Arc Rated smock worn over 100% cotton clothing may be substituted for the Arc Rated pants and shirt.

8.7 GD_003_DefaultArcFlashBoundaries shall be used to determine the Arc Flash Boundary unless a specific Arc Flash Analysis has been completed for the equipment.

8.7.1 See GD_003_DefaultArcFlashBoundaries table below.

<table>
<thead>
<tr>
<th>Electrical System Voltage (Phase to Phase)</th>
<th>Electric Arc Flash Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 – 600 volts</td>
<td>6.0</td>
</tr>
<tr>
<td>601 – 999 volts</td>
<td>8.0</td>
</tr>
<tr>
<td>600 – 15,000 volts</td>
<td>14.0</td>
</tr>
<tr>
<td>15,001 – 36,000 volts</td>
<td>16.0</td>
</tr>
<tr>
<td>36,001 – 46,000 volts</td>
<td>20.0</td>
</tr>
</tbody>
</table>

For voltages above 46 KV, stop task and contact the Central Zone’s Utilities Distribution Office for guidance.

8.8 The PPE requirements in GD_006_TaskHazardRiskCategoriesChartAC&DC shall be worn unless the electrical device has an Arc Flash Hazard Analysis (AFHA) label. If the label is present, the PPE level listed on the label shall be worn.

8.9 No personnel shall approach or take any conductive object closer to live parts than the restricted approach boundary unless:

8.9.1 The individual is qualified and insulated or guarded from the live parts and no uninsulated part of the qualified employee's body enters the restricted approach boundary.

8.9.2 The live part is insulated from the qualified employee and from any other conductive object at a different potential. Insulated gloves of the appropriate voltage rating satisfy this requirement.

8.9.3 The qualified employee is insulated from any other conductive object.

9.0 PORTABLE ELECTRIC TOOLS
9.1 All portable electric tools shall be visually inspected prior to each use. Damaged equipment shall be repaired or removed from service.

9.2 Portable electric power tools shall be operated within the guidelines set forth in the equipment operator manual.

9.3 Any worn, frayed, altered, or damaged power cords shall be repaired by a qualified electrician or removed from service.

9.4 GFCIs (portable or fixed) are required when using any portable electric tool when not plugged into permanently installed outlets or when working in a wet environment. A portable GFCI shall be plugged directly into a receptacle and the cord plugged into the portable GFCI.

10.0 EXTENSION CORDS, OUTLETS & GFCIs

10.1 All extension cords and GFCIs shall be visually inspected prior to each use. Any worn, frayed or damaged extension cords shall be repaired or removed from service. Splices are not allowed in extension cords.

10.2 GFCIs (portable or fixed) are required when using any extension cords and/or portable electric tools when not plugged into permanently installed outlets or when working in a wet environment. A portable GFCI shall be plugged directly into a receptacle and the extension cord plugged into the portable GFCI.

10.3 Extension cords shall not be used in lieu of permanent wiring, and must be unplugged when not in use. Extension cords must be appropriately rated for their application.

10.4 Extension cords shall be placed so they do not cause slip, trip, or fall hazards. Extension cords shall not be placed across walkways, in aisles, or in other areas used by mechanical equipment or vehicles unless the cords are protected from damage. Extension cords must be protected from pinch points and sharp corners.

10.5 Extension cords shall be secured or suspended using non-conductive means. Electrical cables shall not be used as mechanical supports.

10.6 Inspect receptacle intended for power connection. Any damaged or altered outlet/box/cover shall be replaced prior to use.

11.0 PORTABLE GENERATORS

11.1 Portable generators shall be so placed to ensure exhaust fumes do not enter nearby buildings. Portable generators shall not be used indoors.

11.2 Portable generators shall be separated from the public by a physical barricade.

11.3 Generators must be turned off and allowed to cool before refueling. Fuel containers shall be stored at least 20 feet from the generator.
11.4 Portable generators shall not be overloaded.

11.5 Portable generators shall be in firm contact with the ground surface, or be grounded with a grounding rod.

11.6 Only qualified electricians may connect a portable generator directly to the electrical system of a structure, and only when the equipment has a properly installed transfer switch.

12.0 BATTERY CHARGING STATIONS

12.1 Open-cell (unsealed) battery charging installations shall be located in areas designated for that purpose. Facilities shall be provided for flushing and neutralizing spilled electrolyte, for fire protection, for protecting charging apparatus from damage by vehicles, and for adequate ventilation for dispersal of fumes from gassing batteries.

12.2 Battery charging locations must be free of ignition sources.

12.3 Battery chargers shall be inspected for damage before use. Battery chargers shall be compatible with the batteries they will be charging.

12.4 A properly rated fire extinguisher must be located within 20 feet of the charging station.

12.5 An approved eye wash station capable of providing 15 minutes of flushing must be located within 50 feet of the charging station.

13.0 CODE COMPLIANCE & INSPECTION

13.1 The Code Compliance and Inspection section provides a process to identify code compliance and inspections of electrical installations. Insuring code compliance will reduce the potential for electrical hazards and subsequent injuries. This section applies to all personnel responsible for design, installation, and maintenance of electrical systems.

13.1.1 All electrical installations and modifications of existing equipment shall comply with the latest edition of the Building Code of New York State.

13.1.2 All electrical personnel shall have access to the latest version of the National Electric Code. Access is available through the Electrical Safety Lead Team members.

14.0 REPORTING INJURIES AND ELECTRICAL HAZARDS

14.1 This section defines a process by which electrical hazards and injuries are reported, resolved, and eliminated. This section applies to all University personnel.

14.1.1 All electrical incidents resulting in physical injury shall be reported by completing a University on-line injury/illness report. This can be found on the EHS web page http://www.ehs.cornell.edu/.

14.1.2 Electrical incidents involving physical injury or property damage shall be reviewed to determine if program enhancements are required. The Electrical Safety Lead Team shall
16.1 The purpose of this section is to establish a continuous training schedule and to outline the types of training required by personnel with varying job assignments. This section applies to all University personnel. Types of training required, training frequency, documentation, and extent of training are defined. The frequency of refresher training may be more often, if a need is identified by the annual self-assessment or other indicators. See GD_007_ElectricalSafetyTrainingMatrix.

16.1.1 All electrical safety training programs and instructors shall be approved by the EHS Electrical Safety Lead Team.

16.1.2 All training shall be documented and training records made available for audits and self-assessments. Attendance records shall be kept with sign-in sheets showing the name of attendees, date, instructor, and type of training. These records shall be sent to EHS (Attn: OSH Section, East Hill Office Building) and will be electronically stored on the Cornell University training record database (CU Learn).

16.1.3 The level of training personnel receive shall be dependent upon their exposure to the hazards and the types of tasks they perform. Personnel shall receive initial training and then refresher training as defined in GD_007_ElectricalSafetyTrainingMatrix.

16.1.4 The following is the training topic requirements for awareness level electrical safety training:

a. Electrical Safe Work Practices program Purpose, Scope and Responsibilities
b. General Rules
c. Reporting Injuries and Electrical Hazards
d. Safe Work Practices - All persons working in areas with electrical equipment and parts shall receive training on safe work practices based upon the extent of their involvement. Affected and other persons shall be trained on electrical safety awareness; all other personnel groups shall receive training based upon the extent of
their involvement.

e. Personal Protective Equipment - All persons working in areas with electrical equipment and parts will receive training on PPE.

f. Electrical Equipment, Material, and Appliance Purchasing Approval – All personnel who purchase electrical equipment, materials, appliances and tools shall be trained on the compliance program for these purchases.

16.1.5 Qualified Person. In addition to the topics covered in Awareness training, a qualified person shall be trained and knowledgeable of the construction and operation of equipment or a specific work method and be trained to recognize and avoid the electrical hazards that might be present with respect to that equipment or work method. Each qualified person shall attend Qualified & Authorized Electrical Safety training, and shall receive refresher training at least every three years.

a. Such persons shall also be familiar with the proper use of the special precautionary techniques, personal protective equipment, including arc-flash, insulating and shielding materials, and insulated tools and test equipment. A person can be considered qualified with respect to certain equipment and methods but still be unqualified for others.

b. Such persons permitted to work within the Limited Approach Boundary of exposed energized electrical conductors and circuit parts operating at 50 volts or more shall, at a minimum, be additionally trained in all of the following:
   - The skills and techniques necessary to distinguish exposed energized electrical conductors and circuit parts from other parts of electrical equipment.
   - The skills and techniques necessary to determine the nominal voltage of exposed energized electrical conductors and circuit parts.
   - The approach distances specified in GD_001_ApproachBoundariesAC or GD_002_ApproachBoundariesDC and the corresponding voltages to which the qualified person will be exposed.
   - The decision-making process necessary to determine the degree and extent of the hazard and the personal protective equipment and job planning necessary to perform the task safely.

c. Medium & High Voltage Safety - All individuals exposed to medium and high voltage electrical hazards must be educated in the recognition of electrical hazards to prevent injury and equipment damage.
   - All individuals exposed to medium and high voltage electrical hazards must hold a current certification in Adult CPR/AED and First Aid.

d. Electrical Preventive Maintenance - Individuals responsible for the maintenance and installation of existing or new equipment shall be trained. The extent of the training depends upon the type of involvement.

e. Code Compliance and Inspection - All personnel responsible for design, installation or maintenance of electrical systems shall be trained in the requirements of the National Electric Code.

f. An employee who is undergoing on-the-job training and who, in the course of such training, has demonstrated an ability to perform duties safely at his or her level of training and who is under the direct supervision of a qualified person shall be considered to be a qualified person for the performance of those duties.

g. Employees shall be trained to select an appropriate voltage detector and shall demonstrate how to use a device to verify the absence of voltage, including
interpreting indications provided by the device. The training shall include information that enables the employee to understand all limitations of each specific voltage detector that may be used.

16.1.6 Retraining. An employee shall receive additional training (or retraining) under any of the following conditions:

a. If the supervision or annual inspections indicate that the employee is not complying with the safety-related work practices.

b. If new technology, new types of equipment, or changes in procedures necessitate the use of safety-related work practices that are different from those that the employee would normally use.

c. If he or she must employ safety-related work practices that are not normally used during his or her regular job duties.

17.0 RECORDS AND DOCUMENT CONTROL

17.1 Environmental Health & Safety will hold and maintain all Electrical Safe Work Practices program records.

<table>
<thead>
<tr>
<th>Form Name / Number</th>
<th>Retention Policy</th>
<th>Maintain Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>HS6F_001_ElectricalWorkAssessment</td>
<td>Retain completed form throughout the duration of the job.</td>
<td>Maintain at work site throughout the duration of the job.</td>
</tr>
<tr>
<td>HS6F_002_JobBriefingAndPlanningForm</td>
<td>Retain completed form throughout the duration of the Contractor’s Project.</td>
<td>Maintain at contract project site or equivalent throughout the duration of the project.</td>
</tr>
<tr>
<td>HS6F_003_ContractorJobBriefingAndPlanningForm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HS6F_004_EnergizedWorkPermit</td>
<td>Electric Shop Superintendent or equivalent to retain completed form(s) for one year. Completed forms must be forwarded to EHS at the completion of work task.</td>
<td>Completed forms must be filed and maintained within the Electric Shop Superintendents Dept. records</td>
</tr>
</tbody>
</table>

18.0 DEFINITIONS

Affected Personnel (Affected Person) Any unqualified person (employee, visitor, or contractor).

Appliance Equipment Generally other than industrial, normally built in standardized sizes or types that is installed or connected as a unit to perform one or more functions such as coffee pots and warming ovens.

Approved Instructor An individual recognized by training, experience, education or credentials possessing the skills and techniques necessary to provide a good command of the subject matter and competent instructional skills, and has been granted approval from the EHS Electrical Safety Lead Team.

Arc Flash Hazard The force and heat produced by an electric arc that damages and destroys human tissue.

Arc Flash Hazard Analysis Arc flash hazard analysis shall determine the Flash Protection Boundary and
the personal protective equipment that people within the FPB shall use.

**Arc Flash Hazard Boundary** The distance from an arc flash hazard source to a calculated safe working distance to prevent a second degree burn when wearing secondary clothing.

**Arc Incident Energy** The energy, measured in calories per square centimeter that a surface will receive if an arc flash occurs. A second degree burn starts at 1.2 cal/cm².

**Authority Having Jurisdiction** (AHJ) An individual or group responsible for the interpretation or enforcement of specific documents or codes (National Electric Code).

**Authorized Personnel** (Authorized Person) A person trained and assigned the authority and responsibility to perform a specific task.

**Close Proximity** Close enough to reach, fall into, or otherwise accidentally contact a voltage source.

**Electrical Safety Lead Team** The committee responsible for the creation, implementation and maintenance of the Cornell University Electrical Safe Work Practices program.

**Electrical Arc** A projection of energy when a phase-to-ground, or phase-to-phase, fault occurs

**Electrical Preventative Maintenance** (EPM) Program to inspect and test to insure electrical hazard-free operation of equipment.

**Exposed** (as applied to live parts) Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to parts not suitably guarded, isolated, or insulated.

**Ground** The ground grid, also known as the grounding electrode conductor system.

**High Voltage** For the purpose of this program, high voltage means greater than 600 volts.

**High Voltage Designee** A qualified person assigned by the location manager to take on the responsibilities enforcing the requirements of high voltage on the manager’s behalf.

**High Voltage Qualified Personnel** (High Voltage Qualified Person) A person recognized by location management as knowledgeable, trained and experienced in the construction, maintenance and operation of high voltage equipment. A qualified person shall know the hazards involved, the applicable safety related work practices and have received specific safety training.

**Insulated** Separated from other conducting surfaces by a dielectric offering a high resistance to the passage of current. Note: When an object is said to be insulated, it is understood to be insulated for the conditions to which it is normally subject. Otherwise, it is to be considered un-insulated.

**Listed** Listed, labeled, recognized or certified by any world testing authority (UL, IEC, CEU).

**Major Modifications** Modifications to equipment that are beyond routine maintenance and repairs.

**Mechanical Inspection** Mechanical tests involve observation of the mechanical operation of equipment
not requiring electrical stimulation, such as manual operation of breaker trip and close functions. It may include tightening of hardware, cleaning, and lubrication, Infrared or ultrasonic inspections.

**Personnel** Generic term designating employees and on-site contractors.

**Personal Protective Equipment** (PPE) Equipment designed to provide personal protection from hazardous conditions.

**Primary Clothing** Garments you wear over your normal clothing. Primary clothing provides the primary protection from the hazards encountered in your work environment.

**Qualified Personnel** (Qualified Person) A person recognized by management as knowledgeable, trained and experienced in the construction, maintenance and operation of electrical equipment. A qualified person shall know the hazards involved, the applicable safety related work practices and has received specific training.

**Secondary Clothing** Commonly called “street clothing.” Secondary clothing includes your shirt, pants and undergarments, and provides a second layer of protection under your primary clothing.

**Visual Inspection** Qualitative observation of physical characteristics, including cleanliness, physical integrity, evidence of overheating, lubrication, etc.

19.0 **REFERENCES**

19.2 NFPA 70E, National Electric Code (NEC)

20.0 **DOCUMENT HISTORY**

<table>
<thead>
<tr>
<th>Date</th>
<th>Change</th>
<th>Made by</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Initial Document</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>