Thompson Electric, Inc.

49 Northmoreland Avenue • Munroe Falls, Ohio 44262

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2021

Line & Substation

Field Safety Manual

THOMPSON ELECTRIC INC.
49 Northmoreland Avenue, Munroe Falls, OH 44262
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Thompson Electric, Inc. *(TEI)* has issued this handbook as a guide to assist you in performing your assigned duties in accordance with our Standard Safe Work Practices.

It is the intent of TEI's Safety and Health Program that all employees will actively participate in all aspects of safety, including the reporting of hazards, incidents, injuries or illnesses without fear of reprisal.

As an employee of Thompson Electric, Inc., it is your responsibility to become familiar with, and abide by, these guidelines as they apply to the work scope that you will be performing for Thompson Electric, Inc. and our customers.

The following pages are a summary of TEI's Environmental, Health and Safety Program. It is not intended as a complete manual on safety and health, but should be used as a guide for the more common hazards of our work. If you would like a complete copy of TEI's Safety and Health Manual, please contact your supervisor or any of TEI's Safety Officers. TEI also utilizes Standard Work Instructions, Topic Specific Policies and training to fully encompass our specific task-related hazards and to more clearly outline not only your responsibilities, but management's.

I hereby acknowledge receipt of Thompson Electric, Inc.'s Field Safety and Health Handbook for Electrical Transmission and Distribution Construction.

_____
Employee Name (please print)

_____ _____
Employee Signature Date

_____
Issued by (please print)

_____ _____
Issued by (Signature) Date

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Section 400 Heavy Equipment Operation

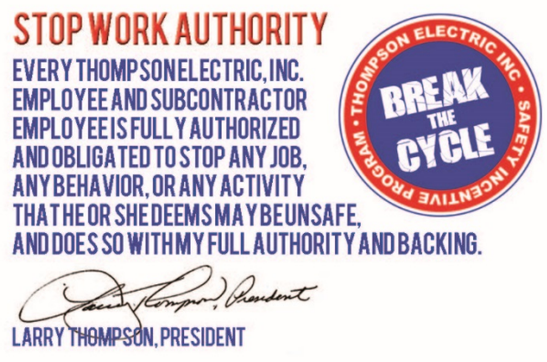
Section 500 General Data and Reference Information

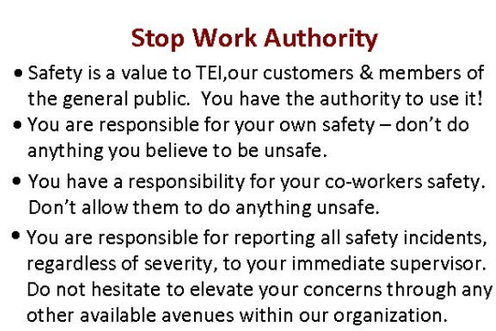
Stop Work Authority

At Thompson Electric, Inc. *(herein referred to as TEI) our* Stop Work Authority program establishes the authority and obligation of any individual to suspend a single work task or group operation when the control of Health, Safety and Environmental risk is not clearly established or understood.

This policy and its related procedures are based on the following fundamental values of TEI's President's Safety Philosophy:

- Safety is a value not only to TEI, but our customers and members of the public. Because of this you have Stop Work Authority and are expected to use it whenever you see something you believe to be unsafe.
- You are responsible for your own safety – don't do anything you believe to be unsafe.
- You have a responsibility for your co-worker's safety. At TEI we are "Our Brother's and Sister's Keeper". Don't allow them to do anything unsafe.
- You are responsible for reporting all safety incidents, regardless of severity, to your immediate supervisor. The near miss you bring to someone's attention today could prevent an accident or incident tomorrow.
- You are expected to report all safety concerns to your Foreman, Supervisor, Safety Department, Fleet Manager or your Division Manager. Do not hesitate to elevate your concerns through any other available avenues within our organization.
- Every employee of TEI will receive a copy of this hardhat sticker to re-inforce Managements commitment to our employees Safety, Health and our Environment.
- In order to re-inforce our commitment to our Stop Work Authority TEI's President has signed this hard hat sticker which each and every TEI employee will prominently display on their hard hat as a constant visual reminder of his true belief and commitment to this program.





Each Project Manager, Estimator, and Division Manager is responsible for notifying and furnishing our affected subcontractors with a copy of TEI's total commitment to our Stop Work Authority Standard Operating Procedure prior to their mobilization on our work sites.

Foreword

It is the policy of Thompson Electric, Inc. *(TEI)* to provide a place of employment that is free from recognized hazards that cause or are likely to cause harm to employees, our customers, or members of the general public. Therefore, we have established basic fundamental accident prevention guidelines, which will be used to establish uniformity and promote a safe working environment throughout our work sites.

When hazards exist that cannot be eliminated; engineering practices, administrative practices, safe work practices, and proper training will be implemented. These measures will be applied to assist in minimizing those hazards for the safety of employees, our customers, and members of the general public.

Respecting this, TEI will make every reasonable effort to provide a safe and healthful workplace that is free from any recognized or known potential hazards. Additionally, TEI has adopted these fundamental principles:

1. Incident and accident prevention is the foundation of our Environmental, Health and Safety Program. By supporting and enacting our EH&S policies in the field, we are able to promote better working conditions for everyone, be held in higher regard by our customers, and increase our productivity.
2. TEI subscribes to and supports Stop Work Authority for all employees. ***NO EMPLOYEE IS EVER REQUIRED*** to perform work that he or she believes is unsafe, or that he or she thinks is likely to cause injury or harm to themselves or others. All employees, contractors and subcontract employees have the authority and obligation to stop any task or operation where concerns or questions regarding the control of Environmental, Health & Safety *(EH&S)* risk is not clearly established and understood by all parties, regardless of status. It is the responsibility of management to support and endorse an employee's right to execute his or her Stop Work Authority without fear of reprisal, to discuss and resolve work and safety concerns. The Stop Work may include discussions with co-workers, supervision, or safety representation to resolve work related issues, address potential unsafe conditions, clarify work instructions, propose additional controls, etc.
3. Management is responsible for providing the safest possible workplace for our employees by allocating and providing reasonable resources needed to promote, implement and sustain our Environmental, Health and Safety policies and procedures.
4. Employees are responsible for following safe work practices, company rules, and for preventing incidents and accidents. Management will establish approved lines of communication to solicit and receive comments, information, suggestions, and assistance from employees where environmental, safety and health are concerned.
5. Our Environmental, Safety and Health Program applies to all employees and persons affected or associated in any way by the scope of our industry. By working together, we can prevent accidents and injuries and present Zero Harm to our work environments.

One of the first steps in your assisting Thompson Electric, Inc. in achieving its safety and environmental workplace goals is to familiarize yourself with this handbook and recognize that Safety is a shared responsibility. Safety is not only an obligation we owe to our fellow crewmembers, but also to our families.

Please join me in making every workday at Thompson Electric a Safe Work Day.

Thank You,
Kelly Sigler
Safety Director

Reporting Injuries

- Any work related injury or suspected injury or illness must be reported immediately to your supervisor and to the Safety Department.
- An accident/incident investigation will be conducted to determine a timeline, the "Root Cause" with supporting causal factors of the accident/incident. You will be asked to participate in this investigation.
- All employees are strongly encouraged to report hazardous conditions and "Near Miss" incidents to their supervisors before injuries or incidents result.

Compensation & Modified Duty Program

- Take time to handle the injury (or suspected injury) properly by reporting the incident to your Supervisor immediately and complete the "Employee Statement Regarding Injury/Illness/Incident" form even if you do not seek medical attention.
- If you must seek medical attention, you must tell the treating physician that TEI has a Transitional Work Program that you may be eligible for. Ask your physician for a "Return to Work Status Report" outlining your specific restrictions (if any).
- Unless otherwise directed by your Supervisor, or any other member of TEI management, you are expected to return to work with any medical restrictions on the same day as the accident or, if time prohibits, at the beginning of the following work day. If there is a question, call your Supervisor.
- If you will be off work, or late in reporting at the beginning of your shift, ***it is your responsibility*** to verbally inform your supervisor as soon as possible.
- You must keep your supervisor and the Human Resources representative, informed of your Return to Work status and follow-up medical appointments. Each time that you see a physician you must provide a physician's slip to your supervisor on the date that you receive it or the next business day. Provide updated Physician's Return to Work Status Reports whenever requested by TEI's Supervisors or any member of TEI Management.
- You must be aware of all your medical restrictions at all times. Do not attempt tasks that exceed your restrictions. If you have a question about an assigned task(s) at hand and your restrictions, talk to your supervisor immediately.
- If you feel that you can perform certain tasks that exceed current restrictions, talk to your physician to see if you can obtain new restrictions (in writing) that allow you to perform these tasks.
- The medical restrictions are in effect 24 hours per day. Be careful during non-work hours to be sure that the restrictions are maintained. If you have hobbies or outside interests, talk to the treating physician about possible conflicts. Follow your physician's instructions.
- Any employee who willingly engages in activities that are inconsistent with the assigned medical restrictions and/or treatment patterns (and against the supervisor's directives) while at work will be removed from the work activity immediately by their supervisor; and the failure to comply with assigned duties and restrictions reported to Human Resources. Human Resources will then work with Department Management as to how to proceed *(i.e., re-assignment, disciplinary procedure, reporting to Workers' Compensation of failure to comply, etc.)*

Definitions

Arc Flash	A short circuit through air. Arc flash incident, an enormous amount of concentrated radiant energy explodes outward from electrical equipment, creating pressure waves that can damage a person's hearing, a high-intensity flash that can damage a person's eyesight and a superheated ball of gas that can severely burn a person's body and melt metal. Pressure waves can also send loose material such as pieces of damaged equipment, tools and other objects flying through the air.
Alive or Live	See definition for "Hot or Live".
Approved	The term "Approved" when used in connection with methods, tools, or equipment, refers to those methods, tools or equipment that meets or exceeds current industry safety standards approved by TEI.
Authorized Person	One who has the authority to perform specific duties under certain conditions, or who is carrying out orders from responsible authority (i.e., General Foreman, Project Manager, Safety Director, etc.)
Automatic Circuit Re-closurer or Reclosure	A self-controlled device for automatically interrupting and reclosing an alternating current circuit with a predetermined sequence of opening and reclosing followed by resetting, hold closed, or lockout operation.
Barrier	A physical obstruction which is intended to prevent access to energized lines, equipment or other hazardous conditions.
Barricade	A physical obstruction, such as tapes, screens, or cones intended to warn and limit (but not physically prevent) access to a hazardous area.
Bond	An electrical connection from one conductive element to another for the purpose of minimizing potential differences, or providing suitable conductivity for fault current or for reducing leakage current and electrolytic action.
Cable	A conductor with insulation, or a stranded conductor with or without insulation and other coverings (single-conductor cable) or a combination of conductors insulated from one another (multiple-conductor cable).
Capacitor	Two conductive objects separated by a dielectric (insulating medium). It is an electrically conductive device characterized by its capacity to store an electric charge. When applied to substation safety, a capacitor is an object or conductor that has the potential to accumulate induced or direct voltage.
Circuit	A conductor or system of conductors through which an electric current is intended to flow.
Clearance for Working ***(i.e., Dispatcher's Approval – reference definition for Dispatcher or Operator)***	Notification from the customer's authorized dispatcher or the operator to an authorized TEI employee that all necessary procedures have been accomplished and that the assigned TEI work crew may proceed with work on equipment or lines that are under the customer's dispatcher's, or operator's control. • Equipment to be worked on has been electrically isolated from all sources of primary energy. • Specified line or piece of equipment is de-energized, drained, purged, depressurized or whatever is necessary to make equipment safe to work on, or in, and that control of the line or equipment is being turned over to the TEI Qualified Employee(s).
Clearance-From Hazard	Adequate separation or protection by the use of devices to prevent accidental contact by persons or objects on approach to a point of danger.
Clearance-Hot Line	An assurance that the automatic reclosing features of a circuit have been made inoperative.
Clearance Hot Stick Distance	The minimum distance for the use of live-line tools held by linemen when performing live-line work.
Communication Lines	The conductors and their supporting or containing structures that are used for public or private signal or communication service (i.e., telephone, railroad signal, data, fire, police-alarm, etc.)
Competent Person	A person who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to all individuals and who has the authorization to take prompt corrective measures to eliminate them.

Competent Person for Excavation	One who has specific training in, and is knowledgeable about soils analysis, the use of protective systems, and the requirements of the excavation standard. The individual has authority to take prompt, corrective measures including shut-down of work.
Conductor	A material, usually in the form of a wire, cable, or bus bar suitable for carrying an electric current.
Confined Space	A space that: 1) is large enough and so configured that an employee can bodily enter and perform assigned work: and 2) has limited or restricted means for entry or exit; and 3) is not designed for continuous employee occupancy. • Reference TEI's Confined Space Policy & Procedures additional definitions and procedures.
Cover	Approved, insulated protective equipment.
Covered	The condition of any conductor(s) equipment protected from physical contact by workers by means of TEI approved insulated protective equipment.
De-Energized	Disconnected from all sources of electricity.
Dead	When the word "Dead" is used in connection with wires or equipment that are a part of the electrical system, it shall be taken to mean disconnected from any electrical source of supply and properly tagged, shorted and grounded. • De-energized, tested, and properly grounded per TEI's policy.
Disconnected	Disconnected from any electrical source of supply.
Dispatcher or Operator	Refers to the transmission/distribution dispatcher, control room operator, or shift engineer who has operational supervision over the line, transformer, machine, or other apparatus.
Effectively Grounded	Intentionally connected to earth through a ground connection or connections of sufficiently low impedance and having sufficient current-carrying capacity to prevent the build-up of voltages which may result in undue hazard to connected equipment or to persons.
Electrically Isolated ***(i.e., Isolated)***	Removed from all primary sources of electrical energy by opening switches, disconnects, jumpers, taps, or other means of electrical supply. The line or equipment is isolated when all switches, disconnects, jumpers, taps or other means through which known sources of electrical energy may be supplied to the particular lines and equipment have been opened on a de-energized electrical circuit or equipment.
Employee ***(TEI employee)***	Any person authorized to inspect, service, repair, or otherwise be in contact with equipment. The term normally applies to a Journeyman or Apprentice rather than an engineer, project manager, inspector, or individual in a supervisory role.
Enclosed	Surrounded by a case, cage, or fence, which will protect the contained equipment and prevent accidental contact of a person with live parts.
Equipotential Work Zone	A work zone where all equipment is interconnected by jumpers, ground rods or grids that will provide acceptable potential differences between all parts of the zone under the worst case conditions of energization.
Exposed	• Exposed circuits or lines are those in such a position that in case of failure of supports or insulation, contact with another circuit or line may result. • Exposed equipment is an object or device that can be inadvertently touched or approached nearer than a safe distance by any person. The term is applied to objects not suitably guarded or isolated.
Fault (Current)	A current that flows from one conductor to ground or to another conductor because of an abnormal connection (including an arc) between the two.
Ground	A conducting connection, whether intentional or accidental, by which an electrical circuit or equipment is connected to earth, or to some conductive body of relatively large extent that serves in place of earth.
Grounding	The process or method of providing an electrical connection between electric equipment and earth, or to some conductive medium that is at earth's potential.
Grounding Electrode (Ground Electrode)	Conductor embedded in the earth, used for maintaining ground potential on conductors connected to it. • For dissipating into the earth current conducted to it.

Grounded System	A system of conductors in which at least one conductor or point (usually the middle wire, or neutral point of transformer or generator windings) is intentionally grounded, either solidly or through a current-limiting device (not a current interrupting device).
Guarded	Covered, fenced, enclosed, or otherwise protected, by means of suitable covers or casings, barrier rails or screens mats or platforms, designed to minimize the possibility, under normal conditions, of dangerous approach or accidental contact by persons or objects. • Wires that are insulated, but not otherwise protected are not considered as guarded.
Hazard	A source, situation, or act with a potential for harm in terms of human injury and/or ill health.
Hold Cards or Hold Tags	A card or tag-type device, usually having a predominant color of red which warns against the operation of a particular switch, device, valve, circuit, tool or machine. • These tags must be respected: equipment or items so tagged must not be activated or used without full and proper authority from a responsible person.
Hot (i.e., energized or Live *"alive")*	Electrically connected to a source of potential difference, or electrically charged so as to have a potential significantly different from that of the earth in the vicinity. The term "live" is sometimes used in place of the term "current-carrying", where intent is clear, to avoid repetition of the longer term.
Hot Line Tools & Ropes	Those tools and ropes which are especially designed for work on energized high voltage lines and equipment. • Insulated aerial equipment especially designed for work on energized high voltage lines and equipment shall be considered "Hot Line".
Induction *(Coupling)*	The process of generating time varying voltages and/or currents in otherwise un-energized conductive objects or electric circuits by the influence of the time varying electric and/or magnetic fields.
Insulated	Separated from other conducting surfaces by a dielectric substance (including air space) permanently offering a high resistance to the passage of current and to disruptive discharge through the substance or space.
Insulated Working Support or Insulated Tool	A support or tool that is insulated from ground or other potential by an insulating material • All insulated tools must be properly marked, and rated for the voltage for which it is to be used.
Insulating Gloves Method	Performing work when workers wear personal insulating protective equipment (PIPE) as insulation between themselves and energized equipment on which work is being performed.
Insulator	A non-conducting support that provides physical separation between equipment that may be at different potentials.
Isolated	Electrically isolated means there is no chance of accidental energization from any source or, when considering the worker, that there is no second point of contact between different potentials that establishes a path for current to flow.
Line of Fire	A physical position that lies within the zone where a hazard will exist when stored energy is released.
Live-line Tool ***(or Hot Stick)***	An insulating member in the form of a stick or pole having means on one or both ends for performing work while permitting the worker who holds the tool to remain insulated and at a safe distance from energized equipment.
Live-line Tool Method	Performing work using live-line tools that insulate workers from energized equipment on which work is performed.
Load Dispatcher, Power Dispatcher, System Operator	Person designated as having authority over switching and clearances of high voltage lines and station equipment.

Minimum Approach Distance (MAD)	The minimum working distance from energized conductors and equipment for personnel. This includes: 1) The minimum approach distance to be maintained by workers and objects carried by them except insulated live-line tools) from energized conductors and equipment; 2)The minimum distance workers shall maintain themselves and their support platforms, or be maintained by other means, from grounded parts or other energized conductors or equipment when approaching, leaving, or bonded to an energized conductor or piece of equipment; and 3) The minimum distance any piece of mechanized equipment may be set up or operated from an energized conductor or piece of equipment by other than properly trained and supervised TEI personnel.
Nominal Voltage ***(of a circuit or system)***	The rated voltage assigned for convenient designation between phase conductors of a three-phase line, or the two conductors of a single-phase line, whether or not one of the conductors is grounded. If not otherwise stated, voltages given in this policy are nominal values. The actual voltage of a circuit may be higher or lower than the nominal rating.
Pad Mount	Equipment or device which is surface mounted and normally worked from ground level.
Personal Insulated Protective Equipment ***(PIPE)***	Personal protective equipment isolated from ground or other potential by an approved insulating material.
Personal Protective Equipment ***(PPE)***	Protective Equipment assigned to and worn by a person during work.
Potential	The degree of electrification at a point in an electric circuit with respect to some other point of reference such as earth.
Primary Compartment	A compartment containing current-carrying devices above 500 volts.
Primary Voltage	Any electrical circuit that normally operates at more than 500 volts.
Protected	The condition of a space, conductor(s) or equipment, isolated from approach or physical contact by anyone by means of barriers and/or approved, insulated protective equipment.
Protective Equipment	Insulated, insulating, or other approved equipment used to facilitate work on energized lines or equipment.
Public	Any individual not an employee or representative of TEI or the customer or utility we are working for.
Qualified Observer	*(When energized work in a bucket is being done)* – A person on the ground that is responsible for understanding, communicating with, and watching the work as it progresses. This individual is not assigned other duties while the bucket is in the primary zone and the person has the authority to question and even STOP the work if it appears to be departing from that which was originally communicated and outlined in the Pre-Job Task Hazard Analysis.
Qualified Person	A person who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience has successfully demonstrated their ability to solve or resolve problems relating to the subject matter, the work, or the project. • A TEI 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 is considered to be a Qualified Person for the performance of those duties as outlined on the Pre-Job Task Hazard Analysis.
Safety Rule or Procedure	A positive rule or procedure requiring compliance by all TEI employees (regardless of status), TEI Sub-Contractor Employees and TEI Visitors. Deviation from safety rules and procedures is not permitted and shall be subject to disciplinary action per TEI's Discipline in Support of Safety Policy.
Scope	Identifies the nature and degree of the work to be done. The scope of a job shall be defined in the Pre-Job Briefing and/or Task Hazard Analysis.
Secondary Compartment	A compartment containing current-carrying devices below 500 volts.
Secondary Voltage	Any supply voltage less than 500 volts.

Switch	A device for opening and closing or changing the connection of a circuit. In these rules, a switch is understood to be manually operable, unless otherwise stated.
Substation	Part of a power system concentrated in a given place, including mainly the terminations of transmission or distribution lines, switchgear and housing and which may also include transformers. It generally includes facilities necessary for system security and control (i.e., protective devices).
Step Voltage	The difference in surface potential experienced by a person bridging a distance of one meter (approximately 3.25 feet – considered the normal stride of an average adult) with the feet without contacting any other grounded object. • Step voltage will be greatest near the point where the fault current enters the earth and will reduce rapidly as one moves away from that point.
Touch Potential	The difference in potential between a grounded structure or station and the surface potential at that point where a person is standing while at the same time having a hand in contact with the grounded structure or object.
Transferred Touch Voltage	A special case of touch voltage where a voltage is conducted toward or away from a grounded structure or station to a remote point. • A transferred touch voltage (potential) can be contacted between the hands or hands and feet.
Underground Residential Distribution (URD)	The facilities necessary to furnish underground service, generally to residential and commercial-type customers, usually through directly buried cable.
Unsafe Conditions	Dangerous, hazardous, defective, or unusual conditions which could cause accidents, incidents, or near misses with either people or equipment.
Vault	An enclosure above or below ground which personnel may enter. It is used for installing, operating, and maintaining equipment or cable.
Voltage	The effective (RMS) potential difference between any two conductors or between a conductor and ground. The voltage specified in this Handbook shall mean the maximum effective voltage to which the personnel or protective equipment may be subjected. • Low voltage includes up to 500 volts. • High voltage shall mean voltage in excess of 500 volts.
Voltage of an Effectively Grounded Circuit	The voltage between any conductor and ground, unless otherwise indicated.
Warning Signs	For purpose of these guidelines, a warning sign is any sign or similar means of alerting an employee, customer employee, visitor, or the public of an actual or possible hazard. Included are “Danger” signs, “Caution” signs, traffic control signs, instructional signs and informational signs.

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100 General Safety

This handbook is intended to supplement, not replace Thompson Electric, Inc.'s *(herein referred to as TEI)* safety program and its related policies, procedures, and standard work instructions. ***In the event a TEI procedure and the customer's procedure conflict, the more stringent rule shall be followed and the General Foreman, Project Manager and Safety Department shall be notified.***

The benefit you gain from this handbook will depend on your personal effort to understand and apply the instructions. Become familiar with it and strictly observe the safe practices as outlined.

TEI has adopted and enforces some basic "Safe Work Practices and Principles"

- Whenever practical, eliminate hazards by changing the work process or by substituting a less dangerous component.
- When it is impractical to eliminate the hazard, safeguard it using the practices outlined in this booklet.
- If no specific practices are identified for safeguarding the hazard, use the work planning process to evaluate the hazard.

Responsibilities

Management:

- Provide training for qualified and unqualified employees.
- Conduct job site inspections to help identify safety deficiencies and reinforce safe work practices.
- Ensure any safety deficiencies are corrected promptly.

Supervisory

- The TEI designated supervisor shall observe and direct the work and is to remain on the jobsite in non-work status and pay strict attention to the ongoing procedural activities while work by any TEI employee or TEI Sub-Contractor employee is being performed.
- Supervisory personnel are expected to pre-plan all work to minimize the potential for personal injury and property damage. Develop the plan in a project specific nature, which is designed to anticipate and identify hazards before work begins. Know in advance what measures will be taken to eliminate hazards or adequately control the anticipated risks for each scope of work. This information shall include, but is not limited to: scope of work, sequence of activities, site-specific fall protection, high angle rescue procedures, safety control methods, training records, Competent Persons critical lifts, standard lifts, excavations, hot work, etc. The planning process does not stop at the pre-planning stage, but is a continuous process of assessment and evaluation. When changes occur or new hazard identified during the course of the Project, the work should be suspended while the plan is revised.
- The interpretation and implementation of this policy on an assigned TEI project.
- The supervisor shall be aware of the physical and mental condition of each crew member.
- Ensuring that no one, including the supervisory representative, is allowed to work in a condition that could jeopardize the safe operation of the crew or equipment.

101	**Overview of Responsibilities**
101.1	**Employee Responsibility** – Employees are primarily responsible for their own safety. Each employee must become thoroughly familiar with and observe all the practices set forth in this Safety and Health Handbook (herein referred to as SHH) and perform duties in a manner that will ensure at all times the highest achievable level of safety to oneself, fellow employees, our customers and members of the general public.
101.2	**Supervisor Responsibility** – It is the responsibility of all supervisors or persons-in-charge to see that all work performed by themselves or under their direction is performed in compliance with the practices contained in this SHH, our Safety Work Instructions, Safety Policies, and Customer Requirements. Any supervisor or person-in-charge must not tolerate work methods which violate, wholly or in part, any established safe work practices. Also the supervisor must ensure that the work assignments are given to employees who are able and qualified to perform them safely and that thorough job briefings are being conducted and documented.
102	**Personal Conduct**
102.1	TEI expects its employees to conduct themselves in a professional manner. Horseplay, practical jokes, and harassment are strictly prohibited. No form of harassment or fighting will be tolerated while on locations or property under TEI's control.
102.2	TEI prohibits the use, possession, transportation, or sale of unauthorized explosives, unauthorized flammable materials, firearms, or other weapons while on TEI premises, TEI work sites, engaged in company business, in a company vehicle, or operating company equipment

102 Personal Conduct

102.3 TEI supports and enforces standards, policies, and procedures for maintaining a drug-free and alcohol-free workplace. Consumption of and/or possession of alcoholic beverages on TEI job sites is prohibited. The possession, transfer, purchase, sale, use or distribution of unauthorized drugs while on TEI premises/job site or while engaged in TEI's work is prohibited.

102.4 Use of prescription or over-the-counter medication is permitted only if such use does not have side effects that could adversely affect work performance. Employees in safety sensitive functions that are using over-the-counter or prescription drugs that include warnings about driving, operation of machinery, or any other potentially dangerous operation, are required to inform their supervisor of the prescription warnings or possible side effects. If an employee brings prescription drugs onto TEI premises/job site, the medication must be in the bottle or container in which it was originally dispensed and must be prescribed to the individual.

102.5 Any incident resulting in property damage of TEI or a customer's property should require a drug test of those involved. TEI's Designated Employer Representative for Drug and Alcohol testing matters is to be consulted for a final decision (330-414-3687). The customer's post-accident or Incident testing guidelines shall also be consulted for guidance.

TEI reserves the right to request an alcohol and drug test for those involved in any level of incident.

102.6 Employees are not to vault, climb, or jump over fences. Gates or ladders must be used to gain access to a fenced area.

102.7 Employees are to exercise caution when walking or working on slippery surfaces. Never run or move in a manner that might cause you to lose your balance. When appropriate, use TEI approved and supplied slip-resistant devices.

102.8 Employees are responsible for ensuring they only perform operations or procedures that they have been properly trained and authorized to perform.

103 Safeguarding the Public & Landowner Concerns

103.1 When work is conducted along public streets or highways, pedestrian as well as vehicular traffic must be warned by the proper placement of signs, flags, and/or flashing lights. When required by regulations or conditions, trained and certified flaggers attired in proper apparel and personal protective equipment must be provided.

103.2 Barricades, signs or appropriate protective devices must be placed at all open manholes, exposed open ditches, and excavations in order to protect the public and employees who are working either above or below the ground.

- Consult Section 330 Barricades, Barriers & Signs for additional guidance and requirements for traffic work. These barricades, barriers & signage methods must be addressed in the THA.

103.3 Any employee who discovers any condition or situation involving TEI that might result in personal injury or property damage, must report it immediately to his or her supervisor, Safety Department and/or the appropriate Project Manager.

103.4 Only authorized employees are permitted to enter our various work sites, substations, garages, storerooms, or any other Company property not ordinarily and customarily open to the public unless he or she has obtained permission from the appropriate Project Manager, has proper identification, and is qualified to enter the facility or location.

103.5 While on a construction project, if you are approached by a landowner or other stakeholder with concerns or complaints:

- Acknowledge the complaint or concern
- Obtain the person's name and contact information
- Obtain information on the nature of the complaint
- Immediately notify your supervisor and Project Manager
- Do not offer any suggestions or resolutions to the complaint and let the landowner know you will pass the information along to the appropriate TEI representative. Give them the Project Manager's name and TEI extension if needed, but offer no additional contact phone numbers or e-mails.

104 Work Planning Process (Pre-Job Briefings, Job Planning & the Task Hazard Analysis)

104.1 ***Pre-Job Briefing*** - Prior to starting work, the supervisor/foreman shall conduct a job briefing with the involved TEI employees and/or any related subcontractor employees assigned to perform the work. The job briefing must include at a minimum, the following:

- Hazards associated with the job
- Steps involved in performing a specific job/task
- The existing or potential safety & health hazards associated with each step.
- The actions and/or procedures that will eliminate or reduce these hazards and the risks of a workplace injury or illness.
- Special precautions
- Energy source controls
- Personal protective equipment requirements
- Customer specific requirements

104.2 Following the job briefing, the supervisor/foreman must ascertain each worker's understanding of the specific job assignment and the overall job setup. It is the responsibility of the supervisor/foreman to determine that each worker understands the assignment and the hazards involved.

104.3 If the original crew complement of an ongoing job has changed, a new job briefing must be conducted.

104.4 If the status of the job changes, if work is temporarily stopped, or if unexpected conditions arise, a new job briefing is required.

104.5 TEI's Division Specific Task Hazard Analysis form/card or Daily Job Briefing Form must be utilized to document job briefings. The document must be completed during the course of each job briefing and must be legibly signed by each crew member at the conclusion of the job briefing. After mid-shift break the entire crew shall again review the job briefing form, make any necessary changes or revisions and initial at the conclusion of this mid-shift review prior to returning to any work activity.

105 Safe Work Practices Principle

105.1

- Whenever practical, eliminate hazards by changing the work process or by substituting a less hazardous component.
- When it is impractical to eliminate the hazard, safeguard it using the practices outlined in this handbook.
- If no specific practices are identified for safeguarding the hazard, use the work planning process to evaluate the hazard and to specify appropriate precautions.
- Never rely on Personal Protective Equipment (PPE) or Live Line Tools to prevent an injury. PPE is to be used as a back-up to established safeguards only as the last line of defense against injury.
- Employees shall always place themselves in a safe and secure position. The care exercised by others shall not be relied upon for one's own protection.
- When a TEI employee observes a hazardous condition that may cause injury or property damage or interference with services, he/she shall report it promptly to a proper authority and when necessary guard it.

106 Life Saving Rules

Over the course of time TEI and the customers we work for have strived to identify the fundamental rules which play an important part in the daily safety and health performance of our employees. These rules and the related procedures are outlined in the contents of this handbook as well as our formal Safety and Health Policies and the related Standard Work Instructions (SWI's).

Within the review of these fundamental rules, there are some that are identified as rising above the rest. That is, certain rules (expectations) have been identified as the foundation for the work that we perform. While they have many different names and acronyms we have elected to follow the majority of our customer's and identify these as Life Saving Rules (LSR's). While these are identified based on the type of work being done within a specified TEI Division, there are a few that could be applicable anywhere in any TEI Division at any given time. The LSR's within TEI and for many of our customers have been identified as follows in sections 106.1 to 106.3.

106 Life Saving Rules (continued)

106.1 Distribution

- Training – All employees shall be appropriately trained for any work they are assigned to, or supervised by a Qualified Employee as part of an on-the-job training program.
- Gloves, sleeves, and Cover-up insulate to ensure there is always a protective, non-conductive barrier in place from energized conductor/equipment, or any conductor/equipment that has the potential to become energized.
- Minimum Approach Distance (MAD) – Unless properly protected, qualified personnel must maintain minimum approach distance (MAD) from energized equipment. Reference to Section 300 in this manual.
- Qualified Observer – Utilize qualified observer to verify that critical steps are completed by employees working on “Primary Voltage”.
- Stored Energy and Line of Fire – Keep work areas clear, positioning personnel away, and not underneath, potential areas of line of fire.
- Fall Protection – Proper fall protection must be in place and used when working from elevated positions and/or where there is a potential for falling. When climbing wood poles/structures, 100% fall protection shall be used.
- Energized Work – All electrical equipment shall be treated as energized until de-energized, tested, and properly grounded. No person shall perform system work without proper authorization and meeting all customer requirements. Proper personal protective equipment must be used for all jobs where employees are exposed to energized surfaces or where there is a risk of arc, flash, or electrical contact.
- Seat belts – Must be worn at all times by the driver/operator (of any vehicle or piece of equipment) where provided, whenever the vehicle or equipment is in motion.

106.2 Transmission/Substation

- Training – All employees shall be appropriately trained for any work they are assigned to, or supervised by a Qualified Employee as part of an on-the-job training program.
- Fall Protection – Proper fall protection must be in place and used when working from elevated positions and/or where there is a potential for falling. When climbing wood poles/structures, 100% fall protection shall be used.
- Confined Space Entry – No person shall enter a confined space/trench without proper authorization and all protective steps taken per TEI’s Confined Space Procedures.
- Control of Hazardous Energy – Strict adherence to the Switching and Tagging Procedures where applicable is required at all times. In those situations that the Switching and Tagging Procedure does not address, the Control of Hazardous Energy Policy shall be used where applicable (i.e., verify with customer).
- Energized Work – All electrical equipment shall be treated as energized until de-energized, tested, and properly grounded. No person shall perform system work without proper authorization and meeting all customer requirements. Proper personal protective equipment must be used for all jobs where employees are exposed to energized surfaces or where there is a risk of arc, flash, or electrical contact.
- Seat belts – Must be worn at all times by the driver/operator (of any vehicle or piece of equipment) where provided, whenever the vehicle or equipment is in motion.

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106 Life Saving Rules (continued)

106.3 **Generation**

- **Fall Protection** – Proper fall protection must be in place and used when working from a position six (6) feet or higher and/or where there is a potential for falling. Some customers may require fall protection over 4 feet; this should be specifically addressed in the daily THA.
- **Confined Space Entry** – No person shall enter a confined space/trench without proper authorization and all protective steps taken per TEI's Confined Space Procedures.
- **Control of Hazardous Energy** – Strict adherence to the customer's Clearance Permit program or related policies for the control of hazardous energy is required at all times.
- **Energized Work** – All electrical equipment shall be treated as energized until de-energized, tested, and properly grounded. No person shall perform system work without proper authorization and permit. Proper personal protective equipment must be used for all jobs where employees are exposed to energized surfaces or where there is a risk of arc, flash, or electrical contact.
- **Working Near Water** – Use caution when walking/working near the edge of a barge, boat, river cell, or other water-related equipment or structure. Avoid stepping or jumping over open water gaps. Personal flotation devices shall always be worn in designated areas.
- **Working Near Moving Machinery** – Employees shall use extreme caution when working near moving machinery such as conveyor belts, mobile equipment, vehicles, and other equipment where there is a risk of pinch points.
- **Seat belts** – Must be worn at all times by the driver/operator (of any vehicle or piece of equipment) where provided, whenever the vehicle or equipment is in motion.

107 Personal Protective Equipment (PPE)

107.1 **Engineering and administrative controls** – Should be instituted to reduce employee exposure whenever possible. Where these controls are not feasible or effective, Personal Protective Equipment (PPE) shall be used whenever directed or whenever it provides greater protection.

107.2 Prior to each use, employees are required to inspect their personal protective equipment. All defective or compromised PPE must be removed from service. The use of PPE does not eliminate hazards or replace the need for complying with established safe work practices

107.3 Additional PPE for specific tasks will be determined through the use of TEI's Task Hazard Analysis and/or Daily Job Briefing and must be identified in a job briefing.

107.4 **Head Protection** – Approved hard hats must be worn to provide protection from exposure to hazards such as falling objects, electrical shock, or contact with stationary objects. Hard hats and suspension systems must not be altered. Head protection must be worn as designed by the manufacturer (hard cap/suspension system cannot be worn in reverse). Head protection must comply with the current consensus standard ANSI Z89.1.

107.5 **Face Protection (General)** – Approved face protection (in conjunction with approved safety glasses) will provide protection from exposure to hazards such as flying particles, molten metal, liquid chemicals, acids, chemical gases/vapors, or potentially harmful light radiation. Face protection must comply with current consensus standard ANSI Z87.1.

107.6 **Face Protection (Arc-Resistant)** – Approved arc resistant face shields (in conjunction with approved safety glasses) will provide protection from burns associated with electrical arcs. Arc resistant face shields must be worn when performing work in/on energized three-phase meter cabinets (i.e., installing or removing self-contained meters), racking station breakers, or performing switching in vaults/manholes, cutting/terminating/removing cables or when identified on a TEI Daily, Job Briefing/Task Hazard Analysis or customer requirements.

107.7 **Safety Glasses (Non-Prescription and Prescription)** – Approved safety glasses must be worn to provide protection for eyes from exposure to hazards such as flying particles, molten metal, liquid chemicals, acids, chemical gases/vapors or potentially harmful light radiation. Safety glasses must provide side protection in the form of side shields or a wrap-around design. Approved "over-the-glass" safety glasses are required to be worn with personal (i.e., non-safety rated) prescription glasses. Safety glasses and slip-on side shields must comply with the current consensus standard ANSI Z87.1.

107 Personal Protective Equipment (PPE)

107.8 **Hand Protection** – Approved hand protection must be worn (as indicated in the table below) to provide protection from exposure to the following hazards:

Identified Hazard	Approved Hand Protection
Abrasion	Leather, canvas with reinforced palm/fingers
Chemical	Latex, neoprene, nitrile, polyvinyl chloride (PVC), or vinyl -- as indicated by the manufacturer's Material Safety Data Sheet (MSDS)
Electrical	Rubber glove (appropriately rated)
Laceration	Dyneema, Kevlar, and Spectra
Poor Grip	Standard glove reinforced/coated
Temperature (cold exposure)	Standard glove lined with cotton, thinsulate, or wool
Temperature (heat exposure)	Kevlar, leather with Kevlar/wool lining
Vibration/Impact	Standard glove with ergonomic properties (i.e., gel pads)

107.9 **Hearing Protection** – Approved hearing protection must be worn (as indicated in the table below) to provide protection from exposure to high noise levels or in areas designated as requiring hearing protection. Hearing protection must comply with ANSI S12:

Identified Equipment	Anticipated Decibel Level (dbA)	Approved Hearing Protection
Air Compressor	90	Ear Plug
Chain Saw (Gas Powered)	110	Ear Muff
Circular Saw	115	Ear Muff
Concrete Saw	95	Ear Plug
Excavating Equipment	90	Ear Plug
Generator (industrial/residential)	75	Not Required
Jackhammer	110	Ear Muff
Vacuum Truck	114	Ear Muff

107.10 **Personal Flotation Devices** – Approved life jackets must be worn whenever an employee may be pulled or pushed or may fall into water where the danger of drowning exists. This hazard shall be specifically addressed on the relevant Task Hazard Analysis or Daily Job Briefing.

107.11 **Hi-Visibility Vest/Clothing** – Approved Hi-Visibility Vest/Clothing must be worn to provide visibility to vehicular and/or construction traffic and to comply with various customer requirements. Employees will be permitted to remove their vest while working aloft (i.e., bucket) unless specifically prohibited by the customer. Hi-Visibility vests or clothing must be Class II, III and comply with ANSI 107. Additionally, flame resistant Hi-Visibility vest/clothing must comply with NFPA 701. The level of Hi-Visibility Vest/Clothing will be addressed on the Task Hazard Analysis or Daily Job Briefing.

107.12 **Arc Hazard Apparel** – Approved arc hazard apparel (i.e., jacket & pants) provide protection from burns associated with electrical arcs. Employees are required to don arc hazard apparel when performing work on energized equipment (racking station breakers, switching in vaults, manholes, etc.) where incident energy levels will exceed the protection provided by approved FR daily wear.

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108 Wearing Apparel

108.1 **Overhead & Underground T&D Division** – While performing any work "on or near" exposed or energized Transmission or Distribution (T&D) lines, qualified electrical workers shall wear the appropriate rated Fire Retardant (FR) clothing (including pants) from "neck to ankles"; the appropriate FR rated Fall Protection Equipment (FPE); the appropriate Personal Protective Equipment (PPE); and Dielectric Overshoes.

On or near is defined as working within fifteen (15) feet of any exposed or energized part(s).
In addition to the requirements as outlined by the Occupational Safety and Health Administration (OSHA), working on or near exposed, energized part(s) includes, but is not limited to:

- When working within the minimum approach distances (MAD)
- When rubber gloves or rubber gloves and sleeves are required
- When performing hot-stick work as required by the customer or General Foreman
- When grounding conductors or equipment
- When testing lines or equipment to be de-energized
- When performing switching operations
- When entering enclosed/confined spaces with energized lines or equipment
- When connecting and disconnecting testing meters
- When an employee is required to physically assist with energized work on lines or equipment where mechanical failure or human error could expose employee to a flash

Employees are also required to abide by **ARTICLE III (FR Clothing) of the IBEW 4th District Safety Rules**. In addition, if at any time the Customer's requirements exceed, or are more stringent than these requirements, employees must abide by the Customer's requirements.

108.2 **Rainwear** worn by employees who may be exposed to electrical arcs must be FR type and must comply with the provisions of ASTM F1891.

108.3 Employees who may be exposed to hazards associated with electrical arcs are prohibited from wearing clothing made all or in part from synthetic fabrics unless they are flame-retardant treated or are inherently flame resistant (FR). FR garments must meet the requirements of the ASTM F1506 standard.

108.4 When work is performed within reaching distance of exposed energized parts, equipment or conductors, the employee must remove all exposed conductive personal articles (i.e., jewelry, necklaces, chains, etc.) or render material non-conductive by covering all exposed items with electrically rated protective equipment.

108.5 Rings may not be worn in work locations where injuries to the finger could occur.

108.6 Neckties and loose-fitting clothing, including shirt-tails not tucked in, are prohibited when working around machinery or rotating equipment.

108.7 Appropriate footwear providing adequate ankle support must be worn at all times. Safety-toed shoes with a class 75-toe protection rating must be worn in all work area. Soles must be in good condition and of sufficient thickness to prevent puncture by sharp objects. Heels of shoes or boots must be appropriate for the type of work the employee is normally assigned. Safety shoes must comply with the current ASTM F2413 standard.

108.8 Employees performing work on energized meter pans/bases are required to wear FR apparel with effective arc rating of at least 20 cal/cm2.

109 Confined Spaces

109.1 Confined space openings must be protected by suitable barriers, marked with flags by day, and warning lights visible in all directions at night.

109.2 Before entering a confined space, tests must be performed to determine the presence of adequate oxygen levels and the absence of a hazardous atmosphere. Forced ventilation must be used to provide/maintain adequate oxygen levels and remove the hazardous atmosphere prior to entering the confined space.

109.3 Welding, cutting, and brazing are prohibited in confined spaces, unless thoroughly ventilated and proven by atmospheric testing to be free of explosive gases.

109.4 All containers that have held any flammable or toxic material must be thoroughly steamed, washed, or purged before entering.

109	**Confined Spaces (continued(**
109.5	Prior to entering a permit-required confined space, a retrieval system must be in place. The retrieval system must consist of a full-body harness with a retrieval line. The exception to this would be if the retrieval equipment would increase risk or not contribute to the entrant's rescue; which means an alternative, approved means of rescue must be in place. • Consult TEI's Confined Space Policy and Procedure to ensure full compliance. • Contact TEI's Safety Director for assistance.
109.6	A Competent and Qualified Attendant must be stationed outside a permit-required confined space for the duration of the entry operations.
109.7	When required to work with hazardous chemicals in a confined space, proper measures (i.e., respiratory protection, forced air ventilation, etc.) must be taken in order to ensure the safety and health of all entrants.
110	**Manholes and Vaults Containing Electrical Equipment Only (Enclosed Spaces)**
110.1	The requirements of an enclosed space apply to manholes and vaults that are designed for periodic employee entry and, under normal operating conditions, do not contain any hazards other than electrical equipment.
110.2	Manholes must be tested for adverse pressure or heat extremes before the manhole cover is removed.
110.3	Tests must be conducted to determine the presence of adequate levels of oxygen and the absence of a hazardous atmosphere prior to entering an enclosed space and must be continued as long as personnel are in the manhole or vault. Atmosphere readings taken must be documented on the Confined Space Review and Permit.
110.4	Personnel entering a manhole or vault must wear a full body harness in order to facilitate rescue should it be necessary.
110.5	A barricade must be placed around a manhole or vault as soon as the cover is removed or opened.
110.6	While work is being performed in manholes or vaults, a Competent and Qualified Attendant must be present at all times to render emergency assistance. The Attendant shall not be permitted to perform other duties and is not to be distracted in any way from their monitoring duties.
111	**Dog Attack**
111.1	Employees must perform a site analysis before accessing the premises to determine whether or not a dog is present.
111.2	Employees are responsible for being prepared, protecting themselves, and avoiding dangerous situations where dogs may be involved.
111.3	Employees must report to their supervisor and Customer any property-access issues due to dogs.

Section 200 Operational Work

201	**Handling Poles**
201.1	When loading or unloading poles, employees must work at the end of the poles.
201.2	Anyone not involved in the operation must be kept away when poles are being handled or raised. Barriers and a watchman must be utilized when necessary. No one will be permitted to pass beneath a pole when it is suspended. Poles placed in earthen holes dug for that purpose are not a suspended load.
201.3	Poles loaded on a trailer must be blocked to prevent rolling or moving while other poles are loaded. Poles must be placed on a trailer so that tipping weight of the load is on the tongue end. The trailer must not be moved without the load being properly secured.
201.4	A suitable device securely fastened to one pole in lieu of a long-tongued trailer may be used for coupling the trailer load of poles to the pintle hook of the truck. All towed equipment, including trailers, must be coupled with stay chains or cables to the vehicle by which it is being drawn.
201.5	Transporting poles attached to the truck above the floor is prohibited.
201.6	For raising, lowering, or pulling poles, a truck boom with pole guides must be used whenever possible. When pulling a pole, a hydraulic pole jack must be used to prevent overstressing to the boom or winch line.

201	Handling Poles (continued)
201.7	The entire crew must wear approved rubber gloves and dielectric shoes when handling, installing or removing poles or equipment near energized conductors. The operator staged on a vehicle with an uninsulated boom is not required to wear rubber gloves while operating the boom. The vehicle performing the lift and all other vehicles within 10 feet of that vehicle must be bonded. When poles are set in the proximity of energized conductor(s), pole guards must be used or the conductors must be properly covered with appropriately rated electrical cover-up materials.
201.8	Poles or equipment being raised near energized circuits must be controlled with tag lines or direct handling.
201.9	When piking or setting poles, extreme caution must be used to keep the pole under control at all times. Orders or signals other than a stop command will be given by one designated person who shall be appropriately identified on the Daily Job Briefing.
201.10	Wires or other materials that may interfere with the raising or lowering of the pole must not be installed on the pole prior to setting the pole near energized conductors.
201.11	Transformers and capacitors must not be mounted onto a pole prior to setting the pole.
201.12	No one is permitted to be on a gin pole when it is being used as rigging, for example, to raise another pole or similar structure.
201.13	When rolling poles with cant hooks, employees must work with extreme care to avoid injuring themselves or others. Poles must always be rolled away from oneself and, where possible, from the end of the pole.
201.14	If any holes are left unfilled at the end of the work period, they shall be protected with secured coverings (capable of supporting 4 times their intended load) with appropriate signage stating “Hole”.
202	**Pole Hauling and Temporary Storage**
202.1	The trailing end of a load of poles shall be marked by a red flag during the day and a red light at night (or equivalent approved by the TEI Fleet Manager). As an additional precaution, warning flags or lights may be placed in the center of long loads. A Qualified and Authorized Employee shall be used for flagging when required.
202.2	If it becomes necessary to store poles at the location where they are to be set, they shall be so placed that they will not interfere with traffic and the landowner’s right-of-way’s.
203.3	Poles shall be placed or blocked so that they will not roll.
203.4	Employees shall not remain on a pole pile while poles are being hoisted.
203.5	Poles loaded on a truck or trailer shall be securely fastened every ten (10) feet.
203.6	The wheels of the transporting vehicle shall be chocked or securely braked prior to loading.
203	**Rope**
203.1	A rope shall not be overloaded or dragged over rough or sharp objects. Short bends over sharp-edged surfaces shall also be avoided.
203.2	Kinks shall be removed before any strain is put on a roped.
203.3	When not in use, rope shall be dried and stored properly and kept free form mechanical damage and excessive heat and dryness.
203.4	Rope shall be examined regularly for cuts, worn spots, burns and rot. The rope shall be untwisted at various places and inspected for poor fiber and dry rot. • The outward appearance of rope shall not be accepted as proof of quality or strength.
203.5	Hand lines shall be a minimum of ½ inch diameter and have a strength equivalent to ½ inch manila (minimum).
203.6	Eyes and splices shall be made in accordance with the instructions given by the rope manufacturer.
203.7	The “Safe Load” rating for the rope must be known and may never be exceeded.
203.8	All rope shall be properly coiled and stored when not in use and kept free from contaminates and moisture.

The following are intended only as a field guide. Always consult the manufacturer's specific guidelines

Safe Loads on NEW 3-Strand Manila Rope							
Diameter in Inches	Circumference in Inches	Approx. Wt. per ft. in Pounds	SINGLE ROPE		TWO PART SLING		
			Breaking Strength	Safe Load	 60°	 45°	 30°
¼	¾	.020	600	120	210	170	120
3/8	1-1/8	.041	1350	270	470	380	270
½	1-1/2	.075	2650	530	920	750	530
5/8	2	.133	4400	880	1520	1245	880
¾	2-1/4	.167	5400	1080	1870	1530	1080
7/8	2-3/4	.225	7700	1540	2660	2180	1540
1	3	.270	9000	1800	3100	2545	1800
1-1/8	3-1/2	.360	12000	2400	4150	3395	2400
1-1/4	3-3/4	.418	13500	2700	4670	3820	2700
1-1/2	4-1/2	.600	18500	3700	6400	5230	3700
1-5/8	5	.744	22500	4500	7785	6360	4500
1-3/4	5-1/2	.895	26500	5300	9170	7495	5300
2	6	1.080	31000	6200	10725	8770	6200

The following are intended only as a field guide. Always consult the manufacturer's specific guidelines

Safe Loads on NEW Synthetic Fiber Rope							
Diameter Inches	Circumference Inches	NYLON			POLYPROPYLENE		
		Pounds per 100 ft.	Tensile Strength Pounds	Safe Load Pounds	Pounds per 100 ft.	Tensile Strength Pounds	Safe Load Pounds
1/4	3/4	1.54	1500	300	1.56	1200	240
3/8	1-1/8	3.50	3500	700	2.78	2500	500
1/2	1-1/2	6.06	6000	1200	4.76	4300	860
5/8	2	10.30	10000	2000	8.00	6700	1340
3/4	2-1/4	13.90	14000	2800	10.50	9000	1800
7/8	2-3/4	20.00	19000	3800	14.28	11500	2300
1	3	24.40	24000	4800	18.10	14000	2800
1-1/8	3-1/2	33.30	30000	6000	22.22	17000	3400
1-1/4	3-3/4	38.40	35000	7000	26.70	19000	3800
1-1/2	4-1/2	55.50	50000	10000	36.30	27500	5500
1-5/8	5	66.60	62000	12400	45.45	33000	6600
1-3/4	5-1/2	80.00	75500	15000	55.50	40000	8000

204 Chain Saw & Tree Safety

204.1 When it is necessary to work near energized circuits, the employee must follow energized work procedures.

204.2 When working on trees, extreme care must be exercised in handling all tools so that they do not contact energized circuits.

204.3 The employee cutting the limb must give a warning when the limb is about to be dropped from the tree.

204.4 All limbs and brush being cut must be dropped inside the protected work area. When there is danger that a tree or limb being felled may cause injury or damage, its fall must be controlled with work ropes.

204.5 Limbs and brush that inadvertently fall in the traveled portion of the highway outside the protected work area must be removed as soon as possible under proper work zone controls.

204.6 The engine of a power chain saw must not be started until the employee using the saw is ready to make a cut. Provide for warm-up of the chain saw on the ground before going aloft.

200	Chain Saw & Tree Safety

204.7 Power saws must be adjusted so that when the trigger is released, the saw will return to idling speed and the cutting chain will stop.

204.8 When operating a power saw, both hands must be on the power saw to remain in control of it if kickback occurs.

204.9 The chain brake must be used and maintained as equipped.

204.10 Chain saws must be stopped and, where applicable, disconnected from the power source for all fueling, cleaning, adjustments, and repairs.

204.11 All appropriate personal protective equipment, including hearing protection (i.e., ear muffs), chain saw chaps (when operating from the ground), safety glasses with face shield, must be worn when operating the chain saw.

205	Excavations

205.1 Prior to beginning an excavation or trench contact the appropriate organization (i.e., One Call) to identify and mark the location of all underground utilities.

205.2 Conduct appropriate job planning, identifying soil characteristics and prescribe methods of wall retention, piling, cribbing, sloping, shoring, and trench boxing to maintain trench and excavation walls.

- All excavations five (5) feet or deeper must be sloped, shored, or benched. This also applies if the excavation is less than five feet and the Competent Person identifies a potential for cave-in.
- The appropriate ratio for sloping is 1.5 feet horizontal per one foot rise vertical.
- Keep spoil and equipment at least two (2) feet away from the excavation to prevent additional pressure on excavation wall.
- Prior to entering excavations greater than four (4) feet deep, test for oxygen deficiency, hazardous atmosphere, and flammable vapors where these hazards can reasonably be expected to exist.
- Ladders or other means of egress (i.e., ramps) must be located in trench excavations that are at least four (4) feet deep and spaced so that employees are within twenty-five (25) feet of a ladder for exit.
- All excavations must be protected with barricades, cones, flashing lights, and other necessary warning devices to properly protect employees and the public.

205.3 Employees in an excavation or trench shall be protected from cave-ins or other hazards immediately adjacent to the excavation by an adequate protective system designed by a Competent Person, except when:

a) Excavations are made entirely in stable rock; or
b) Excavations are less than 5 feet in depth and examination of the ground by a Competent Person provides no indication of a potential cave-in.

Additional information and guidelines can be found in TEI's Excavating & Trenching Policy

205.4 Whenever excavating is done in proximity to buried energized facilities, gas lines, or communication cables (i.e., phone, CATV, fiber optic), it shall be done only by hand digging or hydro excavation. When buried facilities are visually located, mechanical excavation can resume.

205.5 Trenches and excavations, in which employees are working, shall be inspected at a minimum daily by a Competent Person. More frequent inspections shall be made when necessary because of rainstorms, freezing/thawing conditions, and other hazard-increasing occurrences.

205.6 Pole holes and footing excavations shall not be left unattended or unguarded in areas where they present a hazard to employees or the public.

206	Tool and Equipment Safety

206.1 All tools regardless of ownership shall be of an approved type and maintained in good condition and inspected prior to each use and used only if they are appropriate for the task and in good working order.

- Defective tools/equipment shall be immediately removed from service, tagged (i.e., "Defective Equipment, Do Not Use), turned over to the Foreman for return to the Line Shop.

206.2 Interlocks, machine guards, and other safety devices shall not be removed or modified to defeat their intended function.

206.3 Compressed air or gas shall not be blown at a fellow employee nor be used for dusting clothing or any part of the body. When using compressed air for cleaning purposes, the pressure shall be regulated at 30 psi or less.

206.4 When pneumatic tools are used, all couplings shall be secured with safety clips (if so designed) and a whip check (i.e., hose restraint).

206.5 Pneumatic and hydraulic tools, used in close proximity to energized lines or equipment, shall have non-conducting hoses, and shall be supplied only with de-moisturized air or insulating fluid.

206.6 Before making adjustments or changing air tools, unless equipped with quick-change connectors, the air shall be shut off at the air supply valve ahead of the hose. The hose shall be bled at the tool before breaking the connection.

206.7 Pipe or other extensions shall not be used on any tool handle to increase leverage, unless the tool is specifically designed for use of such extension and authorized by supervision and Safety.

206.8 Only approved equipment shall be used in phasing out circuits and transformers and in testing for potential.

206.9 Tools shall not be thrown from place to place or from person to person; tools that must be raised or lowered from one elevation to another shall be placed in tool buckets or firmly attached to hand lines.

206.10 Tools shall never be placed unsecured on elevated places.

206.11 Chisels, drills, punches, ground rods and pipes shall be held with suitable holders or tongs (not with the hands) while being struck by another employee.

206.12 Pipe shall not be used to extend a wrench handle for added leverage unless the wrench handle was specifically designed by the manufacturer for such use.

- Shims shall not be used to make a wrench fit.
- Wrenches with sprung or damaged jaws shall not be used.

206.13 All power tools shall be examined prior to use to insure general serviceability and the presence of all applicable safety devices.

206.14 Powered tools shall be used only within their design capability and shall be operated in accordance with the instructions of the manufacturer.

206.15 All tools shall be kept in good repair and shall be disconnected from the power source while repairs are being made.

206.16 Impact tools such as chisels, punches, drift pins that become mushroomed or cracked, shall be red-tagged until they can be dressed, repaired or replaced before further use.

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Section 300 Electrical Safety

OSHA defines a Qualified Person as someone who is trained and competent in the skills and techniques necessary to distinguish exposed live parts from other parts of electrical equipment, the skills necessary to determine the nominal voltage of exposed live parts, the minimum approach distances to corresponding voltages, and the proper use of special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools for working on or near exposed energized parts of electric equipment. Only Qualified Workers are permitted to perform work on energized conductors, circuits, or electrical equipment.

Minimum Approach Distance (as referenced in the table below) is the closest distance a "Qualified Employee" is permitted to approach or bring a conductive object to an unguarded, energized conductor or equipment.

MINIMUM APPROACH DISTANCE

NEW Nominal System kV	Phase-to-Ground Feet - Inches	Phase-to-Phase Feet - Inches
0.05 - .300	AVOID CONTACT	
.301 - .750	1-1	1-1
.751 - 5.0	2-1	2-1
5.1 - 15.0	2-2	2-3
15.1 - 36.0	2-7	2-11
36.1 - 46.0	2-9	3-3
46.1 - 72.5	3-4	3-11
72.6 - 121	3-4	4-3
138 - 145	3-7	4-11
161 - 169	4-0	5-8
230 - 242	5-3	7-6
345 - 362	8-6	12-6
500 - 550	11-3	18-1
765 - 800	14-11	26-0

NOTE: Always check with our customer to ensure that they are not adhering to a stricter Minimum Approach Distance. If they are, this must be recorded on the Daily Job Briefing/Task Hazard Analysis, all affected employees educated and the stricter MAD maintained. Questions regarding a stricter customer minimum approach distance must be directed to the General Foreman.

- Contact distance is the distance a "Qualified Employee" must maintain from an unguarded, energized object to prevent any inadvertent action from causing him/her to come in contact with the energized object as work is being performed.

301 Rubber Glove and Sleeve Use

301.1 The use of rubber gloves and sleeves provides a Qualified Electrical Worker with a safe means of protection from personal injury while working on or within the minimum approach distances of energized conductor/equipment or any conductor/equipment that has the potential to become energized.

301.2 Rubber gloves must be visually inspected and the integrity of the rubber gloves tested by determining if the gloves will hold air pressure before each day's use.

301.3 Appropriately rated rubber gloves with leather protectors and leather sleeves (as indicated in the table below) must be worn while:

- Working on or within the minimum approach distance or any energized conductors or equipment; or
- Working on any conductor or equipment that has the potential to become energized.

Nominal Voltage (Phase to Phase Voltage AC)	Rubber Gloves	Rubber Sleeves	Maximum Use Voltage AC
50 - 600	Class 0 (1 kV) Required	As specified by Competent Person	600 V
Greater than 600 and less than 17,000	Class 2 (20 kV) Required	Class 2 (20 kV) Required	17,000 V
Greater than 17,000 and less than 26,500	Class 3 (30 kV) Required	Class 3 (30 kV) Required	26,500 V
Greater than 26,500 and less than 36,000	Class 4 (40 kV) Required	Class 4 (40 kV) Required	36,000 V

301.4 **Ground to Ground Rule (positioned on structure)**: When working on distribution circuits and equipment appropriately rated rubber gloves must be put on before leaving the ground and must not be removed until the employee returns to the ground.

- Employees aloft on a structure may remove rubber gloves for a short period of time only if communicated to the entire crew and the employee is outside of contact distance. Prior to re-engaging the task, all employees will refocus and don all appropriate PPE.
- When necessary to prevent damage to rubber gloves, employees will be permitted to ascend a ten (10) foot height above ground before being required to don the rubber glove.

301.5 **Cradle-to-Cradle Rule (positioned in an aerial device)** – When working on distribution circuits and equipment, appropriately rated rubber gloves and rubber sleeves (where required) must be put on before raising the boom from the cradle and must not be removed until the boom is returned to the cradle. Employees aloft in a bucket may remove rubber glove for a short period of time only if communicated to the entire crew and the employee is outside of the contact distance. Prior to re-engaging in the task, all employees will refocus and don all appropriate PPE.

301.6 **Switching Operations** – Rubber gloves are not required when switching operations are being performed on overhead circuits and equipment using hot line tools from the ground level.

- Rubber gloves (Class 2 or higher) are required when performing URD or underground network switching.
- Rubber gloves (Class 2 or higher) must be worn when operating ground/gang-operated switches, regardless of voltage.

301.7 Rubber gloves must be worn when working aloft with hot line tools on distribution voltages not exceeding the rated voltage of the gloves. When performing work with hot line tools on circuits energized at more than 17 kV phase to phase, rubber gloves are not required unless the employee is working within the contact distance of circuits/equipment energized at or below 17 kV.

301.8 To change class of gloves once aloft the employee must descend. The scope of work has now changed and an additional documented re-briefing is required.

301.9 When installing new underground cable in a pad mounted enclosure that currently contains energized underground cables, employees are permitted to remove rubber gloves for detailed work, such as cable termination. Rubber gloves may be removed only if the employee is not within contact distance of unguarded energized conductors or equipment.

- When detailed work is to be conducted on existing cables, rubber gloves may be removed only after all sources of energy are isolated, clearance has been established, the cable is tested for the absence of voltage, and grounded. Prior to removing/donning rubber gloves, communication must be provided to the entire crew.

301.10 In situations where equipotential grounding methods are not utilized to perform de-energized work, employees must place approved ground sets at the structure being worked or on both sides of the work with one set preferably within eyesight. When the required work is performed in these situations, Class 2 (or higher) rubber gloves must be utilized.

301.11 When performing work on downed primary conductors up to 15 kV, approved rubber gloves, sleeves, and dielectric overshoes must be put on before coming within contact distance of the downed conductor(s). Employee(s) must maintain positive control of the conductor to prevent contact with any uninsulated portion of their body in the event the conductor becomes inadvertently re-energized. Prior to handling, ensure the following:

- Wye System: The downed conductor(s) are disconnected and tested for the absence of nominal voltage.
- Delta System: All phase conductors must be isolated from the system and tested for the absence of nominal voltage.
- When conductor(s) cannot be safely handled, a clearance control must be obtained, the conductor(s) tested for the absence of nominal voltage, temporary protective grounds applied, and Class 2 rubber gloves/dielectric footwear must be worn before coming in contact distance of the downed conductor(s).
- Downed conductors that are above 15 kV must be isolated from the system, a clearance control obtained, tested for the absence of nominal voltage, temporary protective grounds applied, and Class 2 rubber gloves/dielectric footwear must be worn before coming in contact distance of the downed conductor(s).

301.12 Employees must wear appropriate rubber gloves with protectors when using a hand-held potential tester or tong ammeter to test any secondary conductors or equipment.

302 Care of Hot Sticks and Insulated Tools

302.1 Hot-line tools must be visually inspected and wiped down with the approved wiping cloth before each day's use.

a) If contaminates are found and cannot be removed with the appropriate wiping cloth, tools must be removed from service, thoroughly cleaned, re-waxed, retested, ad labeled before use.
b) If defects are found, or the testing date exceeds 12 months, tools must be removed from service (i.e., tagged out-of-service), repaired, electrically tested, and labeled before being put back into service.
c) Periodic electrical tests with documentation must be performed by TEI Competent and Qualified Person at a minimum annually on all hot-line tools.

302.2 Visually inspect the end fittings of hot line tools before each day's use to ensure they are properly sealed, secured, and free from defects.

303 Care of Rubber Protective Equipment

303.1 All rubber goods shall conform to the requirements of ANSI J 6 series

303.2 The employee must properly inspect approved rubber-insulated protective equipment before each and every use.

303.3 Rubber blankets, rubber line hoses, or other approved insulating protective equipment must be used to protect personnel while working on or within contact distance of energized conductors or equipment. Approved rubber protective equipment must be installed from a safe position.

303.4 ***NO RUBBER GLOVES OR SLEEVES SHALL BE USED MORE THAN 60 DAYS BEYOND THE ISSUE DATE AND NO MORE THAN 120 DAYS BEYOUND THE TEST DATE STAMPED ON THE GLOVES OR SLEEVES.***

- Rubber gloves and sleeves shall be issued on a sixty (60) day rotation basis. A TEI Safety Officer will be responsible to ensure that the sixty day rotation period is adhered to. An entire crew or job shall have all of the gloves and sleeves rotated at the same time to avoid confusion.
- A notice shall be posted at a visible location on the job site, or where the gloves and sleeves are normally stored, as to when they will expire (rotation date).
- They will be delivered in a plastic container with a label indicating the job location and the expiration of the rotation date.
- All gloves and sleeves in service are to be turned in at the same time that the newly tested ones are issued.
- Employees who make frequent use of rubber protective equipment must change their protective equipment as often as necessary to ensure the integrity of the equipment.

303.5 Rubber protective equipment that is defective or thought to be defective must be removed from service/tagged and returned to the TEI Line Shop for testing by a certified testing laboratory. Notify your Foreman or General Foreman to arrange for appropriate replacement.

303.6 All testing of rubber gloves and sleeves will be conducted by a certified testing laboratory. Newly tested gloves and sleeves shall be individually sealed either by a plastic bag or cardboard box with the test date being clearly stamped on the glove or sleeve. Gloves and sleeves that do not pass the test at the lab will be destroyed.

303.7 All rubber gloves and sleeves that are out of date (either 60 days from issue date, or 120 days from the test date) shall be taken out of service, removed from the job site, and stored in an area at TEI's lab facility where they can be secured and monitored until sent for retesting.

303.8 Before rubber gloves or sleeves are sent to the lab for testing, a visual inspection shall be made looking for cuts, gouges, discoloration, dry rotting, holes, etc. An air test shall also be conducted. If the glove or sleeve fails either of these tests, the glove or sleeve is to be destroyed.

303.9 The use, maintenance, care, and testing of rubber gloves and sleeves shall be in accordance with the IBEW 4th District Safety Rules or the customers, whichever is stricter.

303.10 Rubber gloves shall never be worn inside out or without leather protective covers. They shall be exchanged at any time they become damaged or the employee to whom they are assigned becomes suspicious of them. Leather protectors or over glove covers shall not be worn as work gloves except when in use over rubber gloves.

303	**Care of Rubber Protective Equipment (continued)**
303.11	Rubber gloves and sleeves shall be inspected for corona cracks or other damage and the gloves shall be given an air test each day while in use, at the beginning of the work period and at any other time when condition is in doubt. They shall be given a visual inspection before each use.
303.12	Rubber gloves and sleeves when not in use shall be kept in canvas bags or other approved containers and stored where they will not become damaged from sharp objects or exposed to direct sunlight. They shall never be folded while stored nor shall other objects be placed upon them or with them in their canvas bags or approved containers.
303.13	Rubber gloves shall be stored in the glove bag with the cuffs down to permit drainage, provide better ventilation and reduce the possibility of damage.
303.14	Rubber Blankets may be rolled but never folded.
303.15	Rubber blankets must be tested, at a minimum, every 6 months by an accredited testing laboratory.
304	**Working on or Near *Energized* Circuits and Equipment**
304.1	Before starting work, employees must identify and determine the position of all exposed energized parts and conductors within reach. Conductive objects being handled by the employee must be considered when maintaining minimum approach distances from energized parts or conductors.
304.2	When testing devices are used to determine whether equipment and circuits are energized, or for phase relationship, the device must be checked before and after on known energized sources or by utilizing the manufacturer's test feature to determine that the testing device is operating properly.
304.3	When working within contact distance of energized circuits and equipment over 600 V, barriers or protective equipment must be used to prevent contact with the energized parts. When this is not practical, someone must be designated to watch and warn employees on clearances.
304.4	Employees must not work above, bend over, or reach out over unprotected energized conductors or equipment when within contact distance.
304.5	When connecting equipment to an energized circuit, the connection to the energized circuit must be made last, and when removing, it should be disconnected first.
304.6	Secondary circuits, common neutral conductors, guys, ground wires, telephone lines, cable television circuits, and similar attachments in close proximity to the work area must not be contacted. Where necessary to prevent contact, protective equipment must be used. Pole platforms must be used when necessary for additional clearance or when the protective equipment is not adequate.
304.7	Insulated pole platforms must be visually inspected for cracks, nicks, gouges, and contaminants on the platform surface before each day's use. Defective platforms must be tagged as "Defective Equipment – Do Not Use", removed from service, and the supervisor and General Foreman notified.
304.8	Limbs of trees in contact with energized conductors must be cut with insulated tools and must be handled as energized conductors.
304.9	Approved voltage-indicating devices of the appropriate voltage range must be used when testing circuits or equipment for the presence of nominal voltage.
304.10	All meter sockets and enclosures must be grounded by properly bonding before service is energized. Secondary circuits or meter instrument transformers must be grounded as appropriate before they are energized.
304.11	All ground conductors and neutral conductors that are or may be opened must be treated as energized at the primary voltage of the circuit involved.
304.12	Overhead series street lighting circuits and equipment must be considered energized and worked with as such, unless they are properly grounded. Underground series street light circuits are considered properly grounded if cable is disconnected and grounded at the point where cable goes underground.
304.13	Where feasible, approved tools must be used to provide clearance from physical contact with the bulb, when replacing bulbs in energized series street light fixtures.
304.14	Open telephone and control lines must be considered energized and worked around as such.
304.15	When using hot line tools for the purpose of transferring or tying in, "free-sticking" of such conductors is prohibited.

304	**Working on or Near *Energized* Circuits and Equipment**
304.16	An employee working alone must not attempt to repair conductors energized above 600 V without assistance. Employees working alone may eliminate hazards, perform routine switching and minor repairs with hot line tools to circuits energized above 600 V if, in their opinion, and with the approval of TEI's General Foreman, the work can be done safely.
304.17	When working on poles or structures carrying transmission/sub-transmission conductors above distribution conductors and the employee is above and beyond contact distance to the distribution conductors, the employee may wear leather work gloves to work on grounded transmission/sub-transmission circuits or energized transmission/sub-transmission circuits when using hot sticks.
305	**Working on *De-Energized* Circuits and Equipment**
305.1	De-energized conductors running parallel to, and in close proximity to, energized conductors may be energized due to induced voltage. Induced voltage is not a static voltage and has the potential for creating currents that can be lethal. The hazards associated with induced voltages can be minimized by grounding; however, these voltages cannot be totally eliminated unless the parallel source is eliminated. Induced voltages and currents can be created by two different phenomena; capacitive coupling, with the nearby energized lines; and magnetic coupling with nearby current carrying conductors; or a combination of the two. These phenomena can create life threatening levels of induced voltage and current. It is essential to maintain safe distances, as determined by training and qualifications, from downed or low conductors and don the appropriate PPE when necessary to make contact with conductors for repairs. Rubber gloves and dielectric boots/overshoes must be donned prior to handling any downed conductors.
305.2	All circuits and equipment that are to be worked on as de-energized must be grounded. Grounding must be done with approved grounding equipment properly placed to protect against all possible sources of feed.
305.3	All cable circuit conductors to be worked on as de-energized must be properly grounded unless the making of a ground is not feasible. Some examples of where the making of a ground may not be feasible are: On an underground cable system; metered or metering secondary circuits; or anywhere the conditions make it more hazardous to ground the circuit than work on the isolated line without grounding. Grounding may be omitted and the systems worked on only if the component to be worked on is absent of voltage and there is no possibility of it becoming energized or in contact with another energized source.
305.4	When test work requires that protective grounds be left off, the circuit must be grounded prior to connecting the test leads, the test leads connected as required, and then the grounds removed. When it is not feasible to attach test leads with the grounds in place, the test leads must be connected by use of a hot stick or appropriately rated PPE. Employees must always maintain proper distance from test leads when conducting electrical test.
305.5	Where potential transformers are removed from service for testing, the secondary leads must be opened or grounded before test leads are connected.
305.6	Protective grounding conductors/sets must be connected first to the ground and last to the circuit or equipment to be grounded. They must be removed in reverse order. Disconnect first from the circuit and last from the ground. Hot sticks must be used in making and removing connections of the grounding conductors/sets to and from the circuit to be grounded. Employees must avoid contact with grounding conductors/sets in service. If grounds are to be moved/repositioned, a hot stick must be used and equipment must be considered energized until grounds are reestablished. Manual sliding of grounds by hand is prohibited.
305.7	When a cable is to be cut or spliced and testing has determined that a cable is de-energized, it must be spiked or severed with an approved grounding spiking or cutter spiking tool. Employees are not permitted to be in the manhole, vault, ditch, etc. during the initial spiking or severing of the cable.
305.8	The customer's clearance control procedures must be adhered to whenever electrical conductors or equipment are to be removed from service.
305.9	Any electrical conductor or equipment that is locked/tagged out of service must never be placed back in service until it has been properly released by following the customer's clearance control procedures.

306 Electrical Potential Testing

306.1 Use an approved voltage test device for voltages of 50 V to 600 V. Appropriate personal protective equipment must be utilized when working with voltage test equipment.

306.2 When testing for the presence of voltage, an approved potential tester (i.e., noisy tester) or approved (appropriately rated) voltage-indicating device must be used on all voltages. Caution should be used if the approved potential tester has been exposed to temperatures below 32 degrees Fahrenheit for a prolonged time. The instrument may not function properly.

306.3 Use an approved tester on cables with metallic sheaths.

306.4 All potential testers must be tested on a known energized circuit by an employee qualified to know the capabilities/limitations of the device and to ensure the tester is operating correctly both before and after checking de-energized circuits (Hot-Dead-Hot).

The test buttons on some models or potential/proximity testers check only the condition of the battery while other models are capable of simulating the electrical test for accuracy. The analog model tests will give you a visual deflection of the needle.

307 Grounding

307.1 For the purpose of working on circuits, equipment cables and conductors as de-energized, they must be isolated from the system, tested for the absence of nominal voltage, and properly grounded with approved grounding equipment.

307.2 An equipotential zone must be established at the work site to consider the equipment as properly grounded and de-energized for work without rubber gloves.

307.3 If equipotential grounding methods are not utilized, then approved ground sets must be place at the structure being worked or on both sides of the work with one set preferably within eyesight and Class 2 (or higher) rubber gloves must be worn.

307.4 All approved personal protective grounds must be capable of conducting the anticipated fault current and must meet TEI's following minimum size requirements:

- #4/0 stranded copper for substation, sub-transmission, and transmission circuits and equipment; and
- #4/0 stranded copper for distribution circuits and equipment.

307.5 Personal protective grounding must comply with the following:

a) All testing devices must be tested for the absence of nominal voltage prior to the attachment of personal protective grounds.
b) De-energized equipment must be tested for the absence of nominal voltage prior to the attachment of personal protective grounds.
c) Personal protective grounds must be installed by using a hot line tool before any work is done on de-energized transmission, sub-transmission, or distribution circuits or equipment. Personal protective grounds may also be required for certain work associated with plant facility circuits and equipment.
d) Employees must not allow the personal protective grounds to touch any part of their body when attaching or removing grounds from de-energized facilities. In instances where there is a likelihood that the ground set could come in contact with the employee, a minimum Class 2 gloves and sleeves must be worn.
e) Personal protective grounds may be temporarily removed only when necessary for test purposes. When this is done, the equipment must be considered energized and appropriate gloves and sleeves must be worn.
f) Personal protective grounds must remain attached until all work on the equipment has been completed.
g) If the conductor or equipment is isolated but not grounded, work may proceed only if the conductor or equipment is treated as if it could be inadvertently re-energized (i.e., using the appropriate class rubber protective equipment or hot-line tool).

307.6 Vehicle Grounding – Employees working on the ground near vehicles with derricks, aerial devices, and other equipment being operating in the vicinity of energized or potentially energized primary or uninsulated secondary circuits or equipment must be protected from the hazards of step and touch potentials. Vehicles and equipment must be properly grounded and/or barricaded. Vehicles that are grounded with boom in the air and stationed within 10 feet of each other must be bonded with appropriately sized grounding sets.

307.7 Vehicles with high-voltage test equipment installed must be properly grounded before utilizing the test equipment.

308 Attaching Personal Protective Grounds

308.1 Ground connections must be made to clean surfaces, both on the conductor/equipment as well as at the ground attachment point.

308.2 Only TEI approved protective grounding equipment that has been inspected, tested and is in good condition may be used.

308.3 The following sequence must be followed when grounding de-energized conductors/equipment:

1) Before attaching protective grounds, clearance must be obtained from the appropriate switching authority (i.e., Dispatcher, Control Room Operator, etc.) indicating that the facilities have been isolated and tagged.
2) Select your ground(s) and inspect for damage, testing date, etc.
3) Test facilities with an approved voltage-indicating device to make sure circuits are absent the presence of nominal voltage.
4) Attach ground end clamp securely to the ground source before proceeding. Where two or more employees are involved with the installation of grounds, the employee attaching the conductors must first ascertain that the ground end attachments have been completed.
5) The protective grounds may now be attached to the isolated conductor/equipment by the use of an approved hot-line tool. When making attachments to the conductor/equipment the self-cleaning clamps are not available, the conductor must be cleaned using an approved conductor brush before applying grounds.
6) Attach protective grounds to nearest conductor/equipment first. Attach subsequent protective grounds to conductor/equipment, working away from the first grounding attachment.

308.4 When removing grounds, reverse the above procedures.

- **Caution** – Stay as far as possible below overhead conductors while attaching and removing protective grounding equipment.

309 Transformers, Cutouts, Disconnects and Arrestors

309.1 Before connecting equipment to circuits, the nameplate information must be checked to determine proper application.

309.2 When connecting equipment to an energized circuit, the connection to the energized circuit must be made last, and when removing, must be disconnected first. The equipment neutrals (where required) and grounds must be connected first when installing, and disconnected last when removing.

309.3 Unless properly grounded, transformer cases must be considered as energized while the transformer is connected to the circuit.

309.4 All transformers could potentially have “back feed” from secondary sources including station power.

309.5 When a “banked” or paralleled transformer is to be removed from service, the secondary leads must be visibly opened first. The transformer must be considered energized until both the primary and secondary leads have been disconnected.

309.6 Approved devices must be used in phasing together circuits, transformers, and equipment. Test lamps cannot be used for this purpose.

309.7 Hot line tools must be used when operating cutouts and disconnects that are made and approved for hot-line tool operations. Whenever possible, the door of the cutout must be installed or removed with an approved hot stick device.

309.8 Load break tools or devices must be used when opening cutouts or disconnects compatible with their use. Cutouts or disconnects that are not compatible with load break tools should be operated from the ground with an extendable hot stick when possible.

309.9 Before working on the secondary circuit of a current transformer, steps must be taken to prevent the secondary from opening. Failure to do this will cause an open circuit on the secondary and may result in high voltage on the secondary terminals, causing damage to equipment or injury to personnel.

309.10 If it is necessary to disconnect the lightning arrestor ground wire, the arrestor must first be disconnected from the line. When reconnecting, reverse this procedure.

309.11 Blocks and tackles used in the installation or removal of a transformer must be carefully inspected before each use.

309.12 Transformers must not be installed on poles until the poles have been checked (i.e., visual inspection, check the osmose tag, perform “butt test”, etc.) to determine that they are strong enough to carry the added weight.

309.13 When transformers are raised or lowered, workers on the ground must stand in the clear. The lineperson on the pole should be on the opposite side of the transformer that is being raised or lowered.

309.14 The oil compartment cover plate on URD transformers must not be removed unless the following conditions are met:

a) The primary cable is de-energized and grounded or removed from the bushings, and the secondary cables are shorted and grounded.
b) All doors to pad-mounted enclosures must be removed or firmly secured while work is being performed.

309.15 Disconnect the power before working on a transformer tap changer.

309.16 Prior to operating any electrical equipment or devices, a visual inspection must be performed when possible to ensure the integrity of the equipment or device.

310 Capacitors

310.1 Before work is started on any capacitor bank, it must be disconnected from the circuit, allowed to discharge for at least five (5) minutes (15 minutes for substation capacitor banks), and all terminals must be shunted. During the process of installing, removing, or storing capacitor units, the terminals must be shorted.

310.2 Capacitor cases must be considered energized unless grounded.

310.3 Blown fuses on capacitors must not be replaced until a complete visual inspection has been made and a capacitance test performed. If the case is bulging, leaking, or an insulator is cracked, the fuse must not be replaced. When possible, fuses must only be replaced by employees using a bucket truck or working from the ground.

310.4 Any employee observing a leaking capacitor must notify supervision.

310.5 Appropriate personal protective equipment (i.e., disposable coveralls, gloves, etc.) must be worn when handling leaking capacitors.

311 Network/Underground

311.1 After installation/repair, all primary cables in a ducted/manhole system must be tested with an appropriate testing device to ensure the integrity of the cable before re-energizing at system voltage.

311.2 Inspect all energized underground switches prior to operation. If the switch shows any sign of defect, the switch must not be operated and the defect immediately reported to the Regional Dispatch Office and the proper supervisor (as per the Manual of Operations).

311.3 Switches energized at primary voltages, must not be operated from within an enclosed space. Switches with current interrupting or load pick-up capabilities may be operated, from above the opening of an enclosed space, with the use of approved tooling.

311.4 The initial cutting of a de-energized cable must be accomplished by the use of a remotely-operated grounded cutting tool. Operation must be performed from outside the enclosed space and away from opening.

311.5 Prior to moving any energized underground cables, the cable/splices must be thoroughly inspected for defects. If defects are found, the cable must be de-energized prior to moving.

311.6 Phasing of energized cable ends (hot phasing) must be performed outside of the manhole with an approved phasing device. If it is necessary to perform the phasing within the manhole, personnel shall be required to wear Class 2 rubber gloves, FR switching suit and an arc resistant face shield in addition to all other PPE required while working in a manhole.

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312 Minimum Approach Distances From Energized Conductors or Equipment

312.1 Unless properly protected, Qualified Personnel must maintain minimum approach distances and clear hot-stick distances from uninsulated and energized equipment as outlined in the following:

MINIMUM APPROACH DISTANCE

NEW Nominal System kV	Phase-to-Ground Feet - Inches	Phase-to-Phase Feet - Inches
0.05 - .300	AVOID CONTACT	
.301 - .750	1-1	1-1
.751 - 5.0	2-1	2-1
5.1 - 15.0	2-2	2-3
15.1 - 36.0	2-7	2-11
36.1 - 46.0	2-9	3-3
46.1 - 72.5	3-4	3-11
72.6 - 121	3-4	4-3
138 - 145	3-7	4-11
161 - 169	4-0	5-8
230 - 242	5-3	7-6
345 - 362	8-6	12-6
500 - 550	11-3	18-1
765 - 800	14-11	26-0

312.2 Only insulated vehicles/equipment designed for work at the voltage levels present may be operated closer to any energized exposed line or equipment than the clearance set forth in the above chart.

312.3 Employees not electrically qualified per the requirements of 1910.269 must maintain a minimum approach of at least 10 feet from energized conductors and equipment.

313 Aerial Device with Insulated Boom - Bucket Truck

313.1 Inspections of aerial device equipment must be conducted in accordance with the appropriate Company or manufacturer's inspection forms.

313.2 Aerial devices used for lifting employees or equipment, when parked in a working position, must have brakes set, the gear selector placed in the appropriate position and the rear wheels chocked.

313.3 Flashing warning lights on the vehicle must be used when positioned at the job site.

313.4 Protection from step and touch potential must be provided for employees working on the ground when an aerial device is operated near energized conductors or equipment. When aerial devices are being used for street light maintenance and there is no possibility of contact with energized conductors or equipment, grounding the vehicle is not necessary.

313.5 An employee in the bucket must wear a full body harness and a shock-absorbing lanyard appropriately attached to the aerial device.

313.6 Employee(s) operating the aerial device must check that the outriggers are properly set, the gear selector is in the appropriate position, the brake is set or engaged, and the rear wheels are chocked before going aloft. Keep hands and feet clear of outriggers when setting the outriggers. Prior to raising/lowering the outriggers, the operator is required to provide communication to the entire crew.

313.7 Aerial devices must not be moved with the boom elevated in a working position. Short moves from pole to pole may be made with an employee in the bucket provided the bucket is lowered/stored in the cradle position and the employee remains in fall protection at all times.

313.8 Climbers (hooks) must not be worn in the bucket.

313.9 Employees must not stand on top of the bucket for any reason.

313.10 Transferring from a bucket to a pole or from a pole to a bucket is prohibited. However, transferring to or from other flat/horizontal working surfaces would be permitted after a hazard assessment has been completed and it is determined that transferring is the safest means of accessing the working surface. When transferring is performed, all fall hazards must be eliminated by the use of fall protection.

NOTE: At TEI only a General Foreman can conduct the hazard assessment as outlined above and must directly oversee the actions to completion.

313.11 Never attempt to stop or slow down a pressure break in hydraulic lines by the use of hands, feet, or any other part of the body. Disengage hydraulic pump as soon as a leak is detected and report it to the Fleet Manager.

313	**Aerial Device with Insulated Boom - Bucket Truck (continued)**
313.12	A pin-on bucket attached to a boom extension on a digger derrick where controls are available only at ground level must not be used in areas where the operator is unable to observe the employee in the bucket at all times.
313.13	Bucket capacities must not be exceeded. When working aloft, a hand line must be affixed to the structure for the purpose of raising and lowering equipment and tools.
313.14	Employee(s) on the ground must periodically observe the outriggers, level of the truck, position of the boom, traffic conditions, wires, and the operator in the bucket while work is in progress.
314	**Stringing and Removing Wires**
314.1	When stringing or removing wire or rope near energized circuits, all employees handling ropes, wires, and reels must wear rubber gloves. The employee attending the reel must keep all parts of his/her body free from contact with the wire reel and stringing equipment. Conditions being installed or removed must be grounded with grounding sheaves.
314.2	When wires are strung or removed and there is danger of the wire interfering with or falling into traffic, one or more signalmen must be placed at a suitable location or locations. Work area protection must conform to applicable state guidelines.
314.3	When stringing or removing wires near energized lines, suitable guard structure must be installed at points of crossing, and automatic reclosing must be disabled.
314.4	Other than those employees operating the equipment, care must be taken to prevent anyone from coming into contact with conductors, vehicles, or stringing equipment.
314.5	Vehicles and stringing equipment must be grounded whenever possible. If vehicle equipment cannot be grounded, appropriate barricades and warning signs must be used.
315	**Working on Wood Poles and Towers**
315.1	Before climbing a pole, it must be examined to verify that it is safe. Unless proven sound by inspection, a pole must be considered as being held by the wires attached to it. Before these wires are removed, the pole must be properly secured by attaching a digger derrick to the pole or by proper safe guying.
315.2	Employees must not be on poles that are being plumbed or tamped.
315.3	When climbing poles, care must be exercised to set gaffs securely in the pole and to avoid weather cracks, knot holes, nails, signs, grounds, or other pole attachments.
315.4	Employees must take normal steps with their gaffs when coming down a pole. Intentional sliding or jumping is prohibited.
315.5	Gaffs must conform to the appropriate manufacturer's gaff gauge provided and must be kept properly sharpened and in good condition. The inside measurement of the gaffs must not be less than the manufacturer's recommended minimum length.
315.6	Climbers must not be worn while working on the ground, riding in a Company vehicle, or on ladders, except when necessary on hook ladders suspended from wood pole structures, when using a ladder to climb by a pole splice, when the ladder is required to gain safe access to the pole.
315.7	Wood pole fall arrest devices (i.e., Buck-Squeeze) must be utilized when climbing or working on wood poles. Prior to climbing a wood pole, care must be taken to select the proper route (i.e., normally the high side) for ascending/descending the pole.
315.8	Tower and steel structure fall protection systems must be utilized by employees working on steel structures. • Fall protection may not be required to be used by trained and qualified employees climbing or changing position on steel structures unless conditions exist that might cause the employee to slip or lose their grip. In conditions such as high winds, icy, wet/'contaminated surfaces or structures with poor hand hold would require the climber(s) to be in fall protection the entire time they are aloft. Prior to the decision being made as to an employee's qualification and training the General Foreman must be consulted and will make the final decision and noted on the Daily Job Briefing.
315.9	All snaps or carabiners on straps must be of the locking type and all straps, belts, snaps, D rings, etc. must be inspected before use each day. Climbing equipment found to be defective or excessively worn must be replaced.
315.10	Straps and belts must be kept away from heat. They must never be stored near sharp-edged tools or equipment.

315	Working on Wood Poles and Towers (continued)
315.11	Employees must not punch holes in, add wire rings, hooks, rivets, or other equipment to a tool belt.
315.12	The pole strap must never be placed around pins, braces, bolts, or other similar parts of the structure. It must never be placed near the top of the pole or at the end of an arm where it is likely to slip or slide off.
315.13	Cross arm braces or pins must not be relied upon to support an employee's weight.
315.14	When work is overhead on a pole or tower, a lifeline of one-half (½) inch rope or its equivalent must be fastened to the pole or the tower, for instant use. A hand line can fill this requirement. Emergency descent or rescue devices must have a line adequate for their intended use.
315.15	All tools and equipment to be used aloft that are of such size and weight to fit into a standard material bucket/bag or other approved container. All other equipment must be raised and lowered by the use of hand lines. Care must be taken by employees working overheat to prevent dropping tools or material. Employees on the ground are to stay clear of overhead work to prevent being struck by falling objects.
315.16	Tools and equipment must not be left unsecured in overhead positions. Large objects must be securely tied. Tools and small objects must be stored in the material bucket/bag or other approved container when working aloft.
315.17	When working along streets or highways, hand lines should be operated on the field side of the pole or structure unless conditions prevent it. Care must be taken to keep hand lines from blowing into the line of traffic.
315.18	Hand lines and pulling ropes must be tied off eight (8) or more feet above ground when left unattended overnight. Unless they are within locked enclosures.
315.19	When working on or near energized circuits on wood poles, employees must not stand on or touch grounded circuits such as telephone wires, cable television circuits, messenger wires, cable sheaths, ground wires, guy wires, or transformer cases. Grounds should be covered with approved protective equipment. Pole platforms or aerial devices with insulated booms must be used when necessary for additional clearance or when the protective equipment is not adequate.
315.20	An energized conductor that is to be laid temporarily on a cross arm or other conductor-supporting member after being untied from the insulator, must be insulated from the cross arm or other conductor supporting member with approved protective equipment.

Section 400 Heavy Equipment Operation

401	Bulldozer Operations
401.1	Only properly trained and authorized employees may operate bulldozers.
401.2	Bulldozers must be thoroughly inspected before operation. Discovery of defective parts that could affect the safe operation of the equipment must be documented and reported to supervision and the Fleet Manager immediately.
401.3	No work may be performed on the blade or motor while the equipment is running. Proper blocking must be used before working on the blade.
401.4	The blade must not be left hoisted when the bulldozer is not in use.
401.5	When operating a bulldozer, the blade must be carried as low as possible to provide maximum visibility and stability.
401.6	Employees other than operators are not permitted to ride on bulldozers, unless specifically authorized by the General Foreman and Safety for Training Purposes only.
401.7	Employees must access the bulldozer using the footsteps/handholds provided, maintaining three (3) points of contact with the equipment at all times. Seatbelts shall be properly used at all times the equipment is in use/motion.
402	**Backhoe/Bobcat Operations**
402.1	Only properly trained and authorized employees may operate backhoes/bobcats.
402.2	Riders are only permitted in the seats provided and seat belts shall be properly used at all times the equipment is in use/motion.

402	Backhoe/Bobcat Operations (continued)
402.3	Backhoes/bobcats must be thoroughly inspected before operation. Discovery of defective parts that could affect the safe operation of the equipment must be documented and reported to supervision and the Fleet Manager immediately.
402.4	Employees must access the backhoe/bobcat using the footsteps/handholds provided, maintaining three (3) points of contact with the equipment at all times.
402.5	Employees must not begin operating a backhoe/bobcat without first checking for underground or overhead obstructions.
402.6	Employees are not permitted under backhoe/bobcat buckets or within the swing radius/area of the boom while in operation.
402.7	An employee must be posted to assist the backhoe/bobcat operator when: a) The backhoe is in a congested area b) Digging is not visible to the operator c) Uncovering utilities
402.8	All hydraulic equipment must be resting on the ground or properly blocked when the backhoe/bobcat is parked.
403	**Rigging and Hoisting**
403.1	All load-lifting equipment must be inspected at regular intervals based on the manufacturer's specifications and OSHA requirements. This equipment must not be used until it has been determined to be free from defects and safe to operate.
403.2	Employees must not work underneath a vehicle or piece of equipment that is not properly supported by equipment designed for that purpose. Portable jacks do not meet this requirement. Questions regarding this issue are to be directed to the Fleet Manager.
403.3	Employee(s) must be certain that the attachment point for a hoist will support the load to be lifted.
403.4	Poles, or other devices used as stiff legs, must be secured at the base to prevent kicking out.
403.5	Prior to operating a crane or derrick, the operator must accept only one designated person's signal to start raising, lowering, or swinging the load. The operator must stop immediately upon receiving a stop signal from anyone (refer to the hand signal chart in the "Data" section of this Employee Handbook).
403.6	Equipment with a derrick in the raised position must not be moved unless the vehicle is designed for that operation and a designated person is assigned to ensure the derrick is kept free of obstructions and conductors.
403.7	Extreme caution must be used when working near cables or ropes under tension. Employees must never place themselves within the angle formed by ropes or cables under tension.
403.8	Employees must not walk or stand under a suspended load. And at no time shall they allow another person to do so.
403.9	Proper knots, ties, and hitches must be used. Ropes, cables, slings, fittings, hooks must always be used within their rated capacity. Hooks used for lifting must be the closed type. Lifting shackles may be used in lieu of closed-type hooks.
403.10	Chains must not be spliced or joined by makeshift means such as open links, bolts, or wire.
403.11	Wire ropes or cables must not be allowed to kink. Protective pads must be used when lifting loads with sharp edges or corners.
403.12	The use of nylon slings is recommended when lifting or pulling loads in or near energized areas. Where a sling has a potential to contact sharp objects, a protective pad must be used.
403.13	All ropes and slings must be inspected before each use and removed from service and destroyed if defects are found.
403.14	An operator must be at the controls while a capstan, power take-up, or winch is being used. When pulling wires or lifting lads, the operators must operate the winch of a truck only when a designated person gives the proper signal.
403.15	When tag lines are used during lifting procedures, employees must maintain a safe distance from the load being hoisted so that accidental dropping of the load would not endanger them.
403.16	Leather gloves must be worn when handling ropes or cables.

403	Rigging & Hoisting (continued)
403.17	U-Bolt-type clamps must not be used to make a sling eye. They must be installed with the U of the bolt over the dead end of the cable, and the clamp and nuts on the live end that carries the load.
403.18	Slings that have eyes made with U-bolts must not be used for more than 80% of the safe working load of the wire rope used in their fabrication.
403.19	Wire rope slings must be properly stored by hanging and not to be left lying on a floor/truck bed.
404	**Mobile Crane and Boom Truck Operations**
404.1	Employees must be properly trained and authorized to operate mobile cranes and boom trucks.
404.2	Riders are only permitted in the seats provided.
404.3	Mobile cranes and boom trucks must not be loaded beyond the capacity indicated by the load chart installed on the unit by the manufacturer. If the chart becomes defaced or illegible the Fleet Manager is to be contacted immediately to obtain the authorized replacement.
404.4	Ratings for mobile cranes and boom trucks are based on the unit being operated on level ground. Operating on a grade increases boom stress. If the unit is designed to be operated on grades, the percent of grade must be taken into consideration when calculating the load.
404.5	Mobile crane and boom truck operators must ensure that the unit is not operated on ground that is too soft or with outriggers that are improperly blocked or extended.
404.6	Mobile crane and boom truck operators are responsible for the safe operating condition of the unit, and must determine that the unit has received proper inspections per regulations and TEI policy.
404.7	Employees are not permitted to ride the load line.
404.8	Employees must never call instructions to the operator. Hand signals or approved communication devices must be used.
404.9	Prior to operating a mobile crane or boom truck, the operator must accept only one designated person's signal to start raising, lowering, or swinging the load. The operator must stop immediately upon receiving a stop signal from anyone *(refer to the hand signal chart in the Data Section of this Employee Handbook).*
404.10	A designated spotter must be assigned when a unit is working near overhead lines and identified as such on the Daily Job Briefing.
404.11	Mobile-crane and boom-truck operators must not handle heavy loads with a large surface area during periods of high winds. Wind gusts can create unstable conditions.
404.12	Mobile-crane and boom-truck operators must avoid fast operations. Fast swings increase the load radius. Rapid hoisting or braking increases the boom stress and can overload the rigging.
404.13	Mobile-crane and boom-truck operators are not permitted to leave their position at the controls of the unit without first landing the load.
404.14	Mobile-crane and boom-truck operators have the responsibility to: a) Ensure the crane/boom truck and load are properly rigged b) Ensure that the correct counter weight is installed c) Determine the proper boom mounting position d) Ensure that adequate parts of line are rigged for the lift.
404.15	Mobile-crane and boom-truck operators must avoid traveling with a heavy load. The boom is subject to shock and bending stresses if moved over uneven ground. Mobile cranes and boom trucks that are not intended by the manufacturer to be capable of traveling under load must never be used in this way.
404.16	Mobile-crane and boom-truck operators must check daily for cable and sheave wear. The operator must warm up all unit functions before using.
404.17	Mobile cranes and boom trucks must be thoroughly inspected before operation. Discovery of defective parts that could affect the safe operation of the equipment must be reported to supervision and the Fleet Manager immediately.

405 Derrick Trucks, Tractors, and other Equipment with Power Diggers

405.1 Before the boom of the digger is raised near energized conductors, the vehicle must be grounded. When the boom is near energized conductors, all workers must remain clear of the vehicle until movement of the boom has ceased and the operator has so indicated. When it is necessary for employees to contact materials (for example, a pole) or equipment during lifting operations, approved PPE must be utilized.

405.2 Employees required to operate booms and diggers must be properly trained, qualified and familiar with the use of the equipment. The operator must use caution before permitting helpers to remove an obstruction from a hole; the digger must be raised, moved to a clear position, and stopped.

405.3 Before placing a power digger in position to bore a hole, the operator must make sure the boom will clear conductors and the location is free from wire or debris that could get tangled in the auger.

405.4 When obstructions are contacted while digging a hole, the operator must make sure the auger is not in contact with underground facilities such as cables and pipes. Employees must not smoke in the immediate vicinity when digging with power equipment.

405.5 Winch lines must not be considered insulated.

405.6 Booms, winches, or augers that are not operating properly are not to be used. Supervision and the Fleet Manager are to be contacted immediately.

405.7 When there is a possibility of the boom or winch line contacting energized conductors or equipment, the equipment must be properly grounded, and energized conductors must be properly covered with approved electrical protective equipment.

406 Stopping/Parking on Highway (i.e., Roadway)

406.1 Stopping on the highway shall be avoided. When it is absolutely necessary to stop on the highway, extreme caution shall be used. Warning signals and lights shall be used.

- Rotating beacon or LED Strobe lights shall be used, if vehicle is so equipped.
- Tail lights/emergency flashers shall be used.
- Flares or reflectors shall be placed to give adequate advance warning if other traffic control measures or devices are not in place.
- All employees exiting the vehicle, or working next to or on the highway shall wear a Class III Hi-visibility vest, shirt, or coat as their outermost layer of clothing.
- If work is in progress, traffic control devices (together with flaggers, where necessary) shall be used.

406.2 When vehicles, derrick trucks, tractors and other equipment must be parked on the highway or roadway, they shall be parked on the right-hand side facing in the direction of traffic flow, whenever possible.

406.3 When parking on a highway or roadway, vehicles shall park off the traveled road surface, whenever possible.

- When vehicles must park closer than 10 feet to the traveled road surface, appropriate warning devices and/or traffic control shall be used.

406.4 Trucks or trailers stopped on any public highway or roadway shall be protected by proper warning lights, reflectors or red flags in accordance with state or local requirements.

406.5 Vehicles, derrick trucks, tractors and other equipment shall not be parked on bridges or over culverts except when necessary for work.

406.6 When a truck (other than a pickup) is parked, the driver shall make sure the vehicle is left in a safe position. The engine shall be turned off, the transmission shall be placed in the lowest gear, parking brake shall be set, and the wheels chocked. When parked on an incline, the front wheels shall be cut into the curb if present. Rear wheels shall be chocked.

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Section 500 General Data and Reference Information

501 General

501.1 The information contained in this section is intended as a reference guide only for frequently used information and includes various charts, tables, and diagrams of useful information. If the manufacturer's Specification and/or values are available they shall be utilized and adhered to.

502 Weight and Measures

502.1 ***Metric Conversion Factors:***

To Convert From	To	Multiply By:
Inches	Millimeters (mm)	25.40
Feet	Meters (m)	0.3048
Miles	Meters (m)	1609.347
Acres	Sq. Meters (m2)	4046.873
Pounds (Mass)	Kilograms (kg)	0.4536
Pounds (Force)	Newtons (N)	4.4482
Pounds per Square Inch (psi)	Pascals (Pa)	6894.757
Cubic Feet	Cubic Meters	0.0283
Circular Mils (CMils)	Sq. Millimeters (mm2)	0.005067
Gallons	Liters	3.785
NOTE: Water weighs 8.32 lbs/gallon. To determine weight of other liquids refer to the MSDS sheet		

502.2 **Approximate Wood Pole Weights**

Southern Yellow Pine (0.6# CCA/9# Creosote/0.38# Penta). NOTE takes the heaviest weight as guideline							
Length (ft.)	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7
30	1,224	1,068	924	798	696	606	516
35	1,572	1,368	1,182	1,026	888	768	666
40	1,956	1,692	1,470	1,272	1,104	954	
45	2,358	2,046	1,770	1,536	1,332		
50	3,029	2,696	2,275	1,976	1,710		
55	3,530	3,062	2,652	2,301			
60	4,069	3,523	3,055	2,646			
65	4,622	4,004	3,471	3,016			
70	5,207	4,518	3,913				
75	5,818	5,051	4,375				
80	6,455	5,597	4,849				
85	7,124	6,169	5,350				
90	7,807	6,760	5,863				

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502.2 Approximate Wood Pole Weights (continued)

Western Red Cedar (0.38# Penta)						
Length (ft.)	Class H3	Class H2	Class H1	Class 1	Class 2	Class 3
25				750	65	530
30				880	750	645
35				1,055	880	750
40				1,320	1,145	970
45				1,585	1,365	1,145
50				1,760	1,585	1,365
55				2,025	1,760	1,540
60	2,800	2,600	2,500	2,290	1,935	1,760
65	3,400	3,200	3,000	2,815	2,200	2,025
70	3,900	3,600	3,400	3,170	2,640	2,375
75	4,500	4,200	4,000	3,695	3,170	2,730
80	5,400	5,100	4,700	4,400	3,695	3,170
85	5,900	5,600	5,200	4,840	3,960	3,520
90	7,100	6,700	6,200	5,810	4,930	4,225
95	8,300	7,800	7,300	6,750	5,950	5,250
100	9,200	8,600	8,100	7,500	6,550	
105	10,100	9,500	8,900	8,250	7,100	
110	11,000	10,300	9,700	9,000	7,750	
115	11,900	11,200	10,500	9,750	8,350	
120	12,800	12,100	11,300	10,500	9,050	
125	13,900	13,000	12,200	11,350	9,800	

503 Material Handling

503.1 ***Ropes and Slings***. The types of ropes referred to in this section are natural or synthetic ropes of the conventional three strand construction.

503.2 Some knots if not properly tied and tightened, before load tension is applied, may slip. To avoid this problem, allow the free ends of all knots to extend at least six (6) inches – minimum tail length. In addition, check that the knot is tied properly and pull the knot tight before tension is applied.

503.3 Rope and synthetic slings shall be properly cared for to retain strength and lasting quality and shall be inspected before each use.

503.4 Splicing Rope: All splices in rope slings shall be made in accordance with fiber rope manufacturer's recommendations or the following:

- In manila rope, eye splices shall consist of at least three (3) full tucks, and short splices shall consist of at least six (6) full tucks, three (3) on each side of the splice centerline.
- In synthetic fiber rope, eye splices shall consist of at least four (4) full tucks and short splices shall consist of at least eight (8) full tucks, four (4) on each side of the splice centerline.

503.5 Strand end tails shall not be trimmed flush with the surface of the rope immediately adjacent to the full tucks. This applies to all types of fiber rope and both eye and short splices. For fiber rope less than one inch in diameter, the tail shall project at least six (6) inches beyond the last full tuck. Where a projecting tail interferes with the use of the sling, the tail shall be tapered and spliced into the body of the rope using at least two (2) additional tucks - which will require a tail length of approximately six (6) rope diameters beyond the last full tuck.

503.6 Fiber rope slings shall have a minimum clear length of rope between eye splices equal to ten (10) times the rope diameter.

503.7 Knots shall not be used in lieu of splices.

503.8 Clamps not designed specifically for fiber ropes shall not be used for splicing.

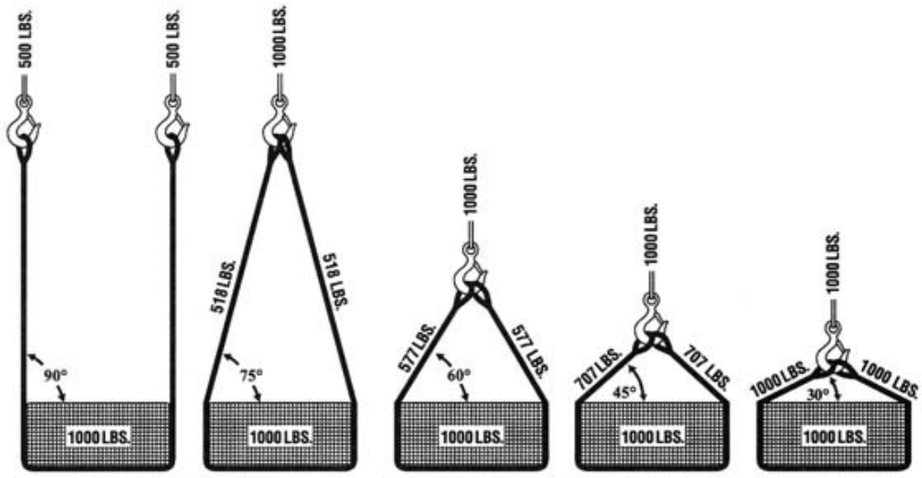
503.9 For all eye splices, the eye shall be of such size to provide an included angle of not greater than 60 degrees at the splice when the eye is placed over the load support.

503.10 Fiber rope slings shall not be used if end attachments in contact with the rope have sharp edges or projections.

503.11 Natural and synthetic fiber rope slings shall be immediately removed from service if any of the following conditions are present:

- Abnormal wear;
- Powdered fiber between strands;
- Broken or cut fibers;
- Variations in the size or roundness of strands;
- Discoloration or rotting; or distortion of hardware in the sling.

503.12 Distribution of Loads on Slings



503.13 Efficiency of Knots in Fiber Rope – Approximate efficiency of various knots in fiber rope as a percentage of the full strength of the rope:

Type of Knot	**Efficiency**
New rope (un-knotted)	100%
Eye splice over iron thimble	90%
Short hand splice	80%
Timber hitch (round turn & half hitch)	65%
Bowline, slip-knot, or clove hitch	60%
Square knot, weaver's knot or sheet bend	50%
Flemish loop or overhand knot	45%

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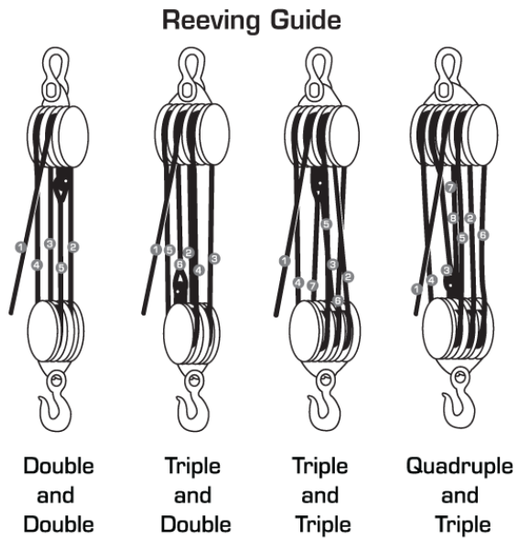
503.14

Blocks & Tackle – Proper Method for Reeving Tackle Blocks

- Lead line and becket line should come off middle sheave when blocks contain more than two (2) sheaves. Upper and lower blocks will then be at right angles to each other eliminating the tendency to tip and accompanying losses in efficiency.



- Sisal rope, reduce the above values by 25% or use the next larger size rope.
- Nylon and polyester rope, increase the above values up to 25%
- Polypropylene rope, increase the above values up to 10%
- Data applies to standard blocks not designed for full working loads of ropes.

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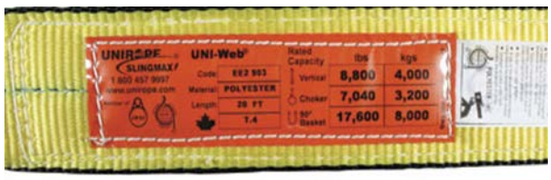
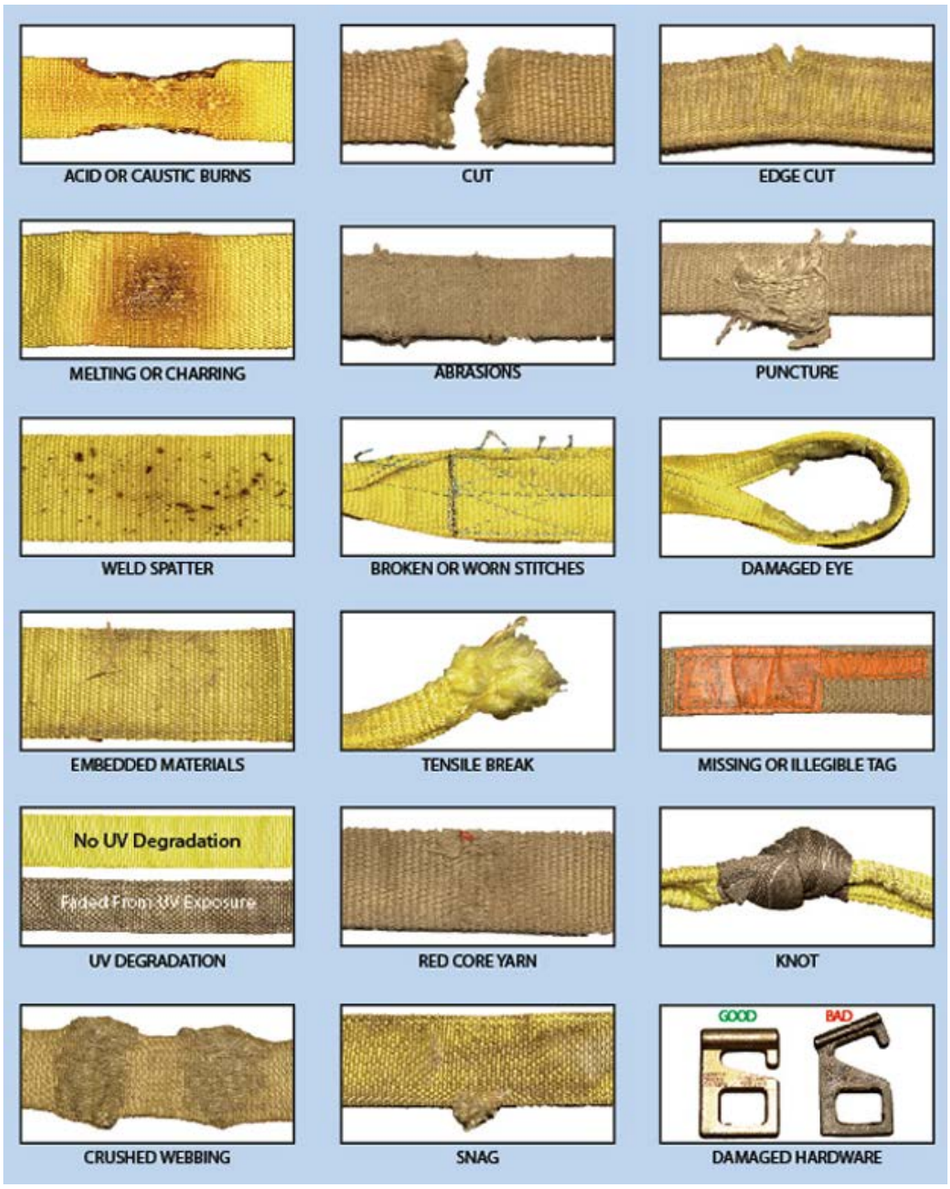
503.15 **Synthetic Web Slings:** Each synthetic web sling shall be permanently marked with the following (or immediately red tagged and removed from service)

- Name or trademark of Manufacturing
- Rated capacities of the type of hitch
- Type of material



The additional conditions depicted below shall result in the sling being immediately removed from service and promptly destroyed to prevent accidental usage.



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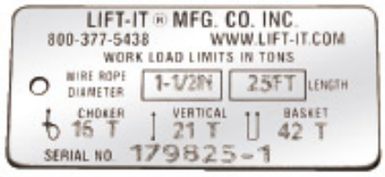
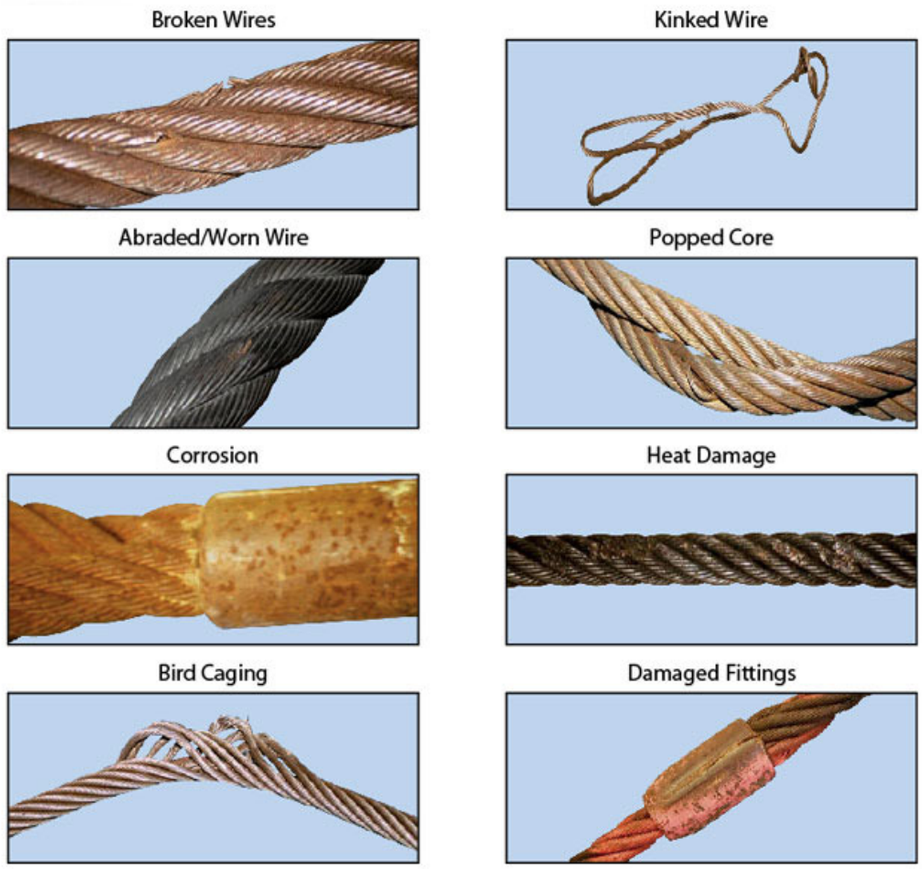
503.16 **Wire Rope and Wire Rope Slings:** Each wire rope sling shall be tagged with the following information or immediately red tagged and removed from service

- Name or trademark of Manufacturer
- Phone number of Manufacturer
- Rated capacities of the type of hitch
- ID or Serial Number



The additional conditions depicted below shall result in the wire rope or wire rope sling being immediately removed from service and promptly destroyed to prevent accidental usage.



503.17 **Inspections**

- Slings, all fastenings, and attachments shall be inspected before use and during the shift as circumstances warrant.
- All slings and chokers shall be inspected at least annually by a Competent Person.
  - This annual inspection must be documented.

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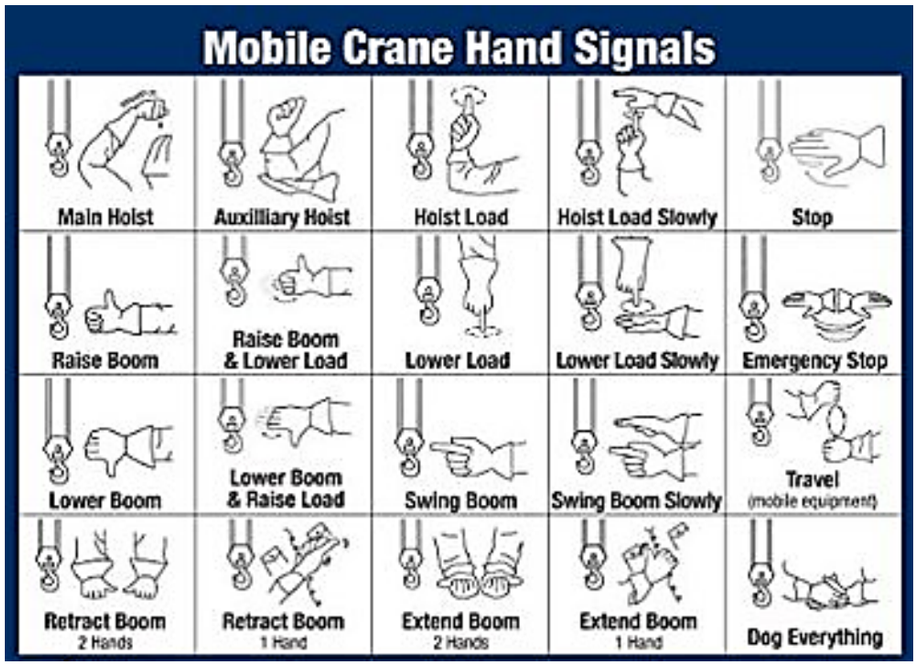
504 Signals

504.1 The following signals are the recommended signals to be used by TEI employees.



505 Phonetic Alphabet

505.1 The following is the Phonetic Alphabet utilized to reduce errors by converting letters into words to enhance effective communication.

A	Alpha	**N**	November
B	Bravo	**O**	Oscar
C	Charlie	**P**	Papa
D	Delta	**Q**	Quebec
E	Echo	**R**	Romeo
F	Foxtrot	**S**	Sierra
G	Golf	**T**	Tango
H	Hotel	**U**	Uniform
I	India	**V**	Victor
J	Juliet	**W**	Whiskey
K	Kilo	**X**	X-ray
L	Lima	**Y**	Yankee
M	Mike	**Z**	Zulu