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Red Seal Occupational Standard

Powerline Technician

INTERPROVINCIAL STANDARD
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PROGRAM PROGRAMME
EXCELLENCE
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RED SEAL OCCUPATIONAL STANDARD

POWERLINE TECHNICIAN

Title: Powerline Technician

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FOREWORD

The Canadian Council of Directors of Apprenticeship (CCDA) recognizes this Red Seal Occupational Standard (RSOS) as the Red Seal standard for the Powerline Technician trade.

Background

The first National Conference on Apprenticeship in Trades and Industries, held in Ottawa in 1952, recommended that the federal government be requested to cooperate with provincial and territorial apprenticeship committees and officials in preparing analyses of a number of skilled occupations. Employment and Social Development Canada (ESDC) sponsors the Red Seal Program, which, under the guidance of the CCDA, develops a national occupational standard for each of the Red Seal trades.

Standards have the following objectives:

- to describe and group the tasks performed by skilled workers;
- to identify which tasks are performed in every province and territory;
- to develop instruments for use in the preparation of Interprovincial Red Seal Examinations and assessment tools for apprenticeship and certification authorities;
- to develop common tools for apprenticeship on-the-job and technical training in Canada;
- to facilitate the mobility of apprentices and skilled workers in Canada;
- to supply employers, employees, associations, industries, training institutions and governments with analyses of occupations.

Any questions, comments, or suggestions for changes, corrections, or revisions to this standard or any of its related products may be forwarded to:

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Larry Arthur	Nova Scotia
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This standard was prepared by the Apprenticeship and Sectoral Initiatives Directorate of ESDC. The coordinating, facilitating and processing of this standard were undertaken by employees of the standards development team of the Trades and Apprenticeship Division and the Government of Alberta, the host jurisdiction for this trade.

STRUCTURE OF THE OCCUPATIONAL STANDARD

To facilitate understanding of the occupation, this standard contains the following sections:

Methodology: an overview of the process for development, review, validation and weighting of the standard

Description of the Powerline Technician trade: an overview of the trade's duties, work environment, job requirements, similar occupations and career progression

Trends in the Powerline Technician trade: some of the trends identified by industry as being the most important for workers in this trade

Essential Skills Summary: An overview of how each of the 9 essential skills is applied in this trade

Roles and Opportunities for Skilled Trades in a Sustainable Future: an overarching description of how in the context of climate change, skilled trades play a large role in implementing solutions and adjusting to changes in the world. In addition to highlighting the importance of this awareness, the standard may also contain more details on activities, skills and knowledge elements that are specific to the trade

Industry Expected Performance: description of the expectations regarding the level of performance of the tasks, including information related to specific codes, regulations and standards that must be observed

Language Requirements: description of the language requirements for working and studying in this trade in Canada

Pie Chart of Red Seal Examination Weightings: a graph which depicts the national percentages of exam questions assigned to the major work activities

Task Matrix: a chart which outlines graphically the major work activities, tasks and sub-tasks of this standard

Major Work Activity (MWA): the largest division within the standard that is comprised of a distinct set of trade activities

Task: distinct actions that describe the activities within a major work activity

Task Descriptor: a general description of the task

Sub-task: distinct actions that describe the activities within a task

Skills:

Performance Criteria: description of the activities that are done as the sub-task is performed

Evidence of Attainment: proof that the activities of the sub-task meet the expected performance of a tradesperson who has reached journeyperson level

Knowledge:

Learning Outcomes: describes what should be learned relating to a sub-task while participating in technical or in-school training

Learning Objectives: topics to be covered during technical or in-school training in order to meet the learning outcomes for the sub-task

Range of Variables: elements that provide a more in-depth description of a term used in the performance criteria, evidence of attainment, learning outcomes, or learning objectives

Appendix A – Acronyms: a list of acronyms used in the standard with their full name

Appendix B – Tools and Equipment / Outils et équipement: a non-exhaustive list of tools and equipment used in this trade

Appendix C – Glossary / Glossaire: definitions or explanations of selected technical terms used in the standard

METHODOLOGY

Development of the Standard

A draft standard is developed by a broad group of trade representatives, including tradespeople, instructors and employers at a National Workshop led by a team of facilitators. This draft standard breaks down all the tasks performed in the occupation and describes the knowledge and abilities required for a tradesperson to demonstrate competence in the trade.

Online Survey

The draft standard is made available to stakeholders to review, comment and validate the activities described in it. These stakeholders are invited to participate in this consultation through apprenticeship authorities, as well as national stakeholder groups.

Draft Review

The RSOS development team forwards a copy of the standard and its translation to provincial and territorial authorities who consult with industry representatives to review it. Comments received through the online survey were provided for consideration. Their recommendations are assessed and incorporated into the standard.

Validation and Weighting

Participating provinces and territories also consult with industry to validate and weight the document for the purpose of planning the makeup of the Red Seal Interprovincial Examination for the trade. They validate and weight the major work activities (MWA), tasks and sub-tasks, of the standard as follows:

MWA	Each jurisdiction assigns a percentage of questions to each MWA for an examination that would cover the entire trade.
TASKS	Each jurisdiction assigns a percentage of exam questions to each task within a MWA.
SUB-TASKS	Each jurisdiction indicates, with a YES or NO, whether or not each sub-task is performed by skilled workers within the occupation in its jurisdiction.

The results of this exercise are submitted to the RSOS development team who then analyzes the data and incorporates it into the document. The RSOS provides the individual jurisdictional validation results as well as the national averages of all responses. The national averages for MWA and task weighting guide the Interprovincial Red Seal Examination plan for the trade.

The validation of the RSOS is used to identify common core sub-tasks across Canada for the occupation. If at least 70% of the responding jurisdictions' industry performs a sub-task, it shall be considered common core. Interprovincial Red Seal Examination questions are limited to the common core sub-tasks identified through this validation process.

Definitions for Validation and Weighting

YES	sub-task performed by qualified workers in the occupation in that province or territory
NO	sub-task not performed by qualified workers in the occupation in that province or territory
NV	standard Not Validated by that province or territory
ND	trade Not Designated in a province or territory
NOT COMMON CORE (NCC)	sub-task, task or MWA performed less than 70% of responding jurisdictions; these will not be tested by the Interprovincial Red Seal Examination for the trade
NATIONAL AVERAGE %	average percentage of questions assigned to each MWA and task in Interprovincial Red Seal Examination for the trade

Provincial/Territorial Abbreviations

NL	Newfoundland and Labrador
NS	Nova Scotia
PE	Prince Edward Island
NB	New Brunswick
QC	Quebec
ON	Ontario
MB	Manitoba
SK	Saskatchewan
AB	Alberta
BC	British Columbia
NT	Northwest Territories
YT	Yukon Territory
NU	Nunavut

DESCRIPTION OF THE POWERLINE TECHNICIAN TRADE

“Powerline Technician” is this trade’s official Red Seal occupational title approved by the CCDA. This standard covers tasks performed by powerline technicians in Canada.

Powerline technicians construct, operate, maintain and repair overhead, underground and underwater electrical transmission and distribution systems. They install, maintain and repair overhead, underground and underwater powerlines and cables, and other associated equipment such as insulators, conductors, lightning arrestors, switches, metering systems, transformers and lighting systems. They erect and maintain steel, wood, fibreglass, laminate and concrete poles, structures and other related hardware. They splice and terminate conductors and related wiring to connect power distribution and transmission networks. In some jurisdictions, powerline technicians may also install and transfer communication devices such as cellular antennas and communication lines.

Powerline technicians are employed by electric power generation, transmission or distribution companies, powerline contractors and public utility commissions. Powerline technicians may also specialize in one of the following areas: transmission lines, overhead or underground distribution systems, communication networks and electrical power stations. They may also be employed in the mining, construction or oilfield sector.

Powerline technicians require good communication skills to coordinate and facilitate work with customers, co-workers and other trades. They also require strong analytical skills in order to read and interpret diagrams, drawings and specifications. They need to be able to plan their work; including making considerations to prevent damage during construction to local wildlife habitats. They must have good mechanical aptitude to install, troubleshoot and repair equipment. They must also have good vision and the ability to distinguish colours. The ability to adapt to change and a willingness to keep up with new developments is important to this trade.

Powerline technicians work outdoors at various worksites, at any hour and in any weather. The work always involves travel to and from the worksite, which is often in remote areas, necessitating the use of a variety of access equipment such as all-terrain vehicles, snowmobiles, aircrafts and watercrafts.

Occupational hazards in this trade are working with high voltage equipment, working in confined spaces, working at heights, and in extreme weather and environmental conditions. This also could include exposure to asbestos, silica dust, mercury, lead and PCBs.

The work may be strenuous and requires frequent heavy lifting, working in awkward positions, carrying and reaching. Getting to powerlines requires climbing poles and structures, working from aerial work platforms and entering maintenance holes and underground vaults.

This standard recognizes similarities or overlaps with the work of construction electricians and industrial electricians. Powerline technicians work with a wide variety of tradespersons, engineers and inspectors.

With experience, powerline technicians may act as mentors and trainers to apprentices in the trade. They may advance to senior journeyperson, foreperson, supervisory or managerial positions. They can also transfer their skills to related occupations in areas such as design, planning, safety, technical support services and system control.

TRENDS IN THE POWERLINE TECHNICIAN TRADE

Communication within the trade is crucial. Evolutions in technology, such as mobile information systems and global positioning systems (GPS), allow all parties to keep in touch, helping to improve safety, responsiveness in emergencies, and effectiveness in following work procedures.

There is an increase in safety and environmental regulations across jurisdictions, which requires more administrative controls, preparation time and training for powerline technicians. Safety concerns have also led to an increase in the use of aerial work platforms (AWP).

Transmission systems are being constructed with direct current (DC) lines in some parts of the country due to greater efficiency and energy savings.

Metering devices are moving towards digital and smart meters. Radio frequency meters and cellular chip meters are being installed to aid in reading meters and troubleshooting.

New technology in auxiliary equipment is creating much smaller components with greater fault interrupting capabilities.

An increase in the development of the renewable energy sectors (solar, wind, tidal) will require powerline technicians to facilitate the distribution and transmission of electricity generated by these systems.

More and more, utilities are sharing infrastructure with digital and wireless communication companies. As a result, cellular antennas are being installed on electrical structures. Because of the proximity to energized conductors they can only be accessed and installed by qualified powerline technicians.

There is an increase in the use of technology-based equipment such as digital reclosers, robotic devices, drones, computers and tablets to facilitate more reliable and efficient operation, maintenance and repair of systems. Devices used for system protection and control are increasingly remotely controlled rather than manually controlled.

More environmentally friendly materials (such as plant-based oils in transformers) are always being introduced in distribution and transmission systems.

ESSENTIAL SKILLS SUMMARY

Essential skills are needed for work, learning and life. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change.

Through extensive research, the Government of Canada and other national and international agencies have identified and validated nine essential skills. These skills are used in nearly every occupation and throughout daily life in different ways.

A series of CCDA-endorsed tools have been developed to support apprentices in their training and to be better prepared for a career in the trades. The tools can be used independently or with the assistance of a tradesperson, trainer, employer, teacher or mentor to:

- understand how essential skills are used in the trades;
- learn about individual essential skills strengths and areas for improvement; and
- improve essential skills and increase success in an apprenticeship program.

The tools are available online or for order at: https://www.canada.ca/en/employment-social-development/programs/essential-skills/profiles.html.

The application of these skills may be described throughout this document within the skills and knowledge which support each sub-task of the trade. The following are summaries of the requirements in each of the essential skills, taken from the essential skills profile. A link to the complete essential skills profile can be found at http://www.red-seal.ca/.

READING

Powerline technicians read code books, standards and regulations to ensure work is done in compliance with industry standards. They read drawings and forms that contain technical information related to construction standards or specifications. They also read emails and other correspondence to stay informed on issues. They consult textbooks to determine steps to take when encountering new or infrequent tasks.

DOCUMENT USE

Powerline technicians interpret information on lists, logbooks and timesheets, and they scan work orders for information about current projects such as job location, job description, timelines, scheduling, contractor requirements, project hazards and project contacts. They use area maps and equipment identification codes to identify their work location. They complete a variety of forms and checklists. They interpret symbols and codes on construction drawings, and use schematic drawings to assemble a piece of equipment or to isolate a circuit. Powerline technicians use information taken from tables and charts to perform calculations such as voltage drop or appropriate conductor sag.

WRITING

Powerline technicians keep a daily logbook containing reminders and notes about job progress, deliveries, weather conditions and unusual occurrences. They may prepare training evaluations, switching authorizations and work protection documents. They document safety hazards and precautions or measures taken to implement barriers and controls to manage risks.

ORAL COMMUNICATION

Powerline technicians communicate with dispatchers to exchange information about work in progress or to obtain new assignments, and with supervisors and other crew members several times a day to share crucial information about tasks that need to be completed and unforeseen problems. They maintain constant contact with all crew members during operations to ensure the safety of all workers. Powerline technicians interact with property owners, the general public and various contractors. They also explain and demonstrate safe working techniques to new employees.

NUMERACY

Powerline technicians estimate time and verify or determine materials and equipment required for a job. They calculate to what depth to bury poles, the weight of a load to be rigged, fuse size, the tension and angle of guy wires, and average kilo-voltage-amperes (kVA). Powerline technicians work in both metric and imperial systems of measurement and must be able to convert between the two systems.

THINKING

Powerline technicians use problem solving skills to determine how to proceed with an installation when safety hazards or unforeseen obstructions present themselves. They identify the people such as fire fighters, police, city representatives, customers and dispatchers, who need to be consulted to determine course of action when faced with emergencies such as downed wires or traffic lights, and storms. Powerline technicians use decision making skills to decide alternate work activities to be completed when weather prevents planned work. They decide on the suitability of materials and proper procedures to follow to accomplish tasks in a safe and efficient manner. Powerline technicians establish critical timelines for assigned projects keeping in mind that electrical power must be restored as quickly and safely as possible.

WORKING WITH OTHERS

Powerline technicians work as part of a crew to perform critical and often highly hazardous work; therefore, collaboration is crucial. They participate in formal and informal discussions with co-workers, supervisors and other work groups about work processes. They monitor the work of others and may assign tasks to them or inform them of how to perform a task.

DIGITAL TECHNOLOGY

Powerline technicians use communications software such as email and texting to communicate. They may access the Internet to obtain information, or to review electrical schematics or construction drawings. They also use other computer applications such as global information system (GIS) software to locate or place powerline devices or components. They may also use remote monitoring devices such as drones and supervisory control and data acquisition (SCADA) technology.

CONTINUOUS LEARNING

Powerline technicians need to maintain and upgrade their skills and knowledge of industry standards and regulations by attending educational sessions or courses offered by provincial or federal associations, and employers. Powerline technicians must also maintain their safety certifications such as cardiopulmonary resuscitation (CPR), automated external defibrillator (AED) and First Aid. They also learn from experienced co-workers.

Roles and Opportunities for Skilled Trades in a Sustainable Future

Climate change affects all of us. Trades play a large role in implementing solutions and adjusting to changes in the world.

Throughout this standard, there may be specific references to tasks, skills and knowledge that clearly show this trade's role in a more sustainable future. Each trade has different roles to play and contributions to make in their own way.

For example:

- Construction tradespeople need to consider the materials they are using, building methods, and improvements to mechanical and electrical installations. There are important changes to codes and standards to help meet the climate change goals and commitments set for 2030 and 2050. Retrofits and new construction of low-energy buildings provide enormous opportunities for workers in this sector. Concepts, such as energy efficiency and regarding buildings as systems are foundational.

- Automotive and mechanical trades are seeing a shift towards the electrification of vehicles and equipment. As a result, new skills and knowledge will be required for tradespeople working in this sector. There are mandates for sales of new light-duty zero-emission vehicles (ZEV) in Canada, with the goal of achieving 100% ZEV sales by 2035. Due to this mandate, the demand for these vehicles is growing quickly among consumers and fleets. With this escalating demand, the need for skilled workers to maintain and repair these vehicles is also increasing.

- In industrial and resource sectors, there is pressure to move towards increased electrification of industrial processes. Many industrial and commercial facilities are also being upgraded to improve energy efficiency in areas such as lighting systems, and new production processes and technologies. There are also opportunities in carbon capture, utilization and storage (CCUS), as well as the production and export of low-carbon hydrogen.

- Trades in the service sector may also need to be aware of responsible sourcing, as well as efficient use of products and materials. New ways of working better are always a part of the job.

There are fast-moving changes in guidelines, codes, regulations and specifications. Many are being implemented for the purpose of energy efficiency and climate change. Those that affect specific trades may be mentioned within the standard. Examples of these guidelines and legislation include:

- The National Energy Code of Canada for Buildings (NECB).

- The Canadian Net-Zero Emissions Accountability Act (CNZEAA).

- programs that encourage sustainable building design and construction such as Leadership in Energy and Environmental Design (LEED) and the Zero Carbon Building (ZCB) standards.

- the Montreal Protocol for phasing out R22 refrigerants.

- energy efficiency programs such as ENERGY STAR.

- principles of the United Nations Declaration for the Rights of Indigenous Peoples pertaining to energy sector development.

Apprentices and tradespeople need to increase their climate literacy and reinforce their own understanding of energy issues and environmental practices. It is important for them to understand why these changes are happening and their effect on trades' work. While individual tradespeople and apprentices may not be able to choose certain elements like; the architectural design of buildings, building material selection, regulatory requirements, use of electric vehicles and technologies, they must understand the impact of using these elements in their work. Impacts include using environmentally friendly products and following requirements related to the disposal and recycling of materials.

In apprenticeship, as well as in ongoing professional development, employers and instructors should encourage learning about these concepts, why they are important, how they are implemented, and the overarching targets they are aiming to achieve.

All in all, it's about doing the work better and building a better world.

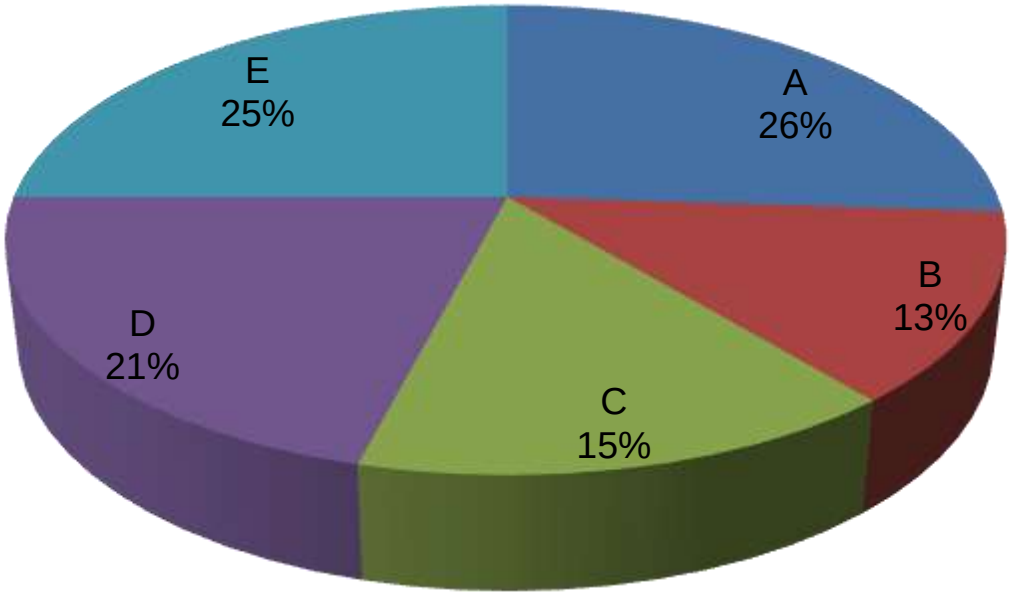
INDUSTRY EXPECTED PERFORMANCE

All tasks must be performed according to the applicable jurisdictional codes and standards. All health and safety standards must be respected and observed. Work should be done efficiently and at a high quality without material waste or environmental damage. All requirements of the manufacturer, client specifications, the Occupational Health and Safety (OH&S) Acts, and WHMIS regulations must be met. At a journeyperson level of performance, all tasks must be done with minimal direction and supervision. As a journeyperson progresses in their career, there is an expectation they continue to upgrade their skills and knowledge to keep pace with industry and promote continuous learning in their trade through mentoring of apprentices.

LANGUAGE REQUIREMENTS

It is expected that journeypersons are able to understand and communicate in either English or French, which are Canada's official languages. English or French are the common languages of business as well as languages of instruction in apprenticeship programs.

PIE CHART OF RED SEAL EXAMINATION WEIGHTINGS



MWA A	Performs common occupational skills	26%
MWA B	Installs structures	13%
MWA C	Installs conductor systems	15%
MWA D	Installs auxiliary equipment	21%
MWA E	Performs operation, maintenance and repair	25%

This pie chart represents a breakdown of the interprovincial Red Seal examination. Percentages are based on the collective input from workers from the trade from across Canada. The Task Matrix on the next pages indicates the breakdown of tasks and sub-tasks within each Major Work Activity and the breakdown of questions assigned to the Tasks. The Interprovincial examination for this trade has 125 questions.

POWERLINE TECHNICIAN

TASK MATRIX

A – Performs common occupational skills — 26%

Task A-1 **Performs safety-related functions** **23%**	**A-1.01 Uses personal protective equipment (PPE) and safety equipment**	**A-1.02 Controls powerline hazards**	**A-1.03 Controls environmental hazards**
	A-1.04 Performs lock-out and tag-out procedures	**A-1.05 Performs temporary grounding and bonding procedures**	
Task A-2 **Uses and maintains tools and equipment** **19%**	**A-2.01 Uses hand, power and powder-actuated tools and equipment**	**A-2.02 Uses electrical measuring and testing equipment**	**A-2.03 Uses rigging, hoisting and lifting equipment**
Task A-3 **Organizes work** **16%**	**A-3.01 Interprets plans, drawings and specifications**	**A-3.02 Prepares worksite**	**A-3.03 Plans job tasks and procedures**
Task A-4 **Accesses work area** **12%**	**A-4.01 Climbs poles and steel lattice structures**	**A-4.02 Uses access equipment**	**A-4.03 Uses on- and off-road equipment**
Task A-5 **Uses live-line methods** **23%**	**A-5.01 Uses cover-up**	**A-5.02 Uses rubber gloves**	**A-5.03 Uses bare-hand methods (Not Common Core)**
	A-5.04 Uses fibreglass reinforced plastic (FRP) tools (hot sticks)		
Task A-6 **Uses communication and mentoring techniques** **7%**	**A-6.01 Uses communication techniques**	**A-6.02 Uses mentoring techniques**	

B – Installs structures

13%

Task B-7 **Installs pole structures** **79%**	**B-7.01 Frames pole structures**	**B-7.02 Sets pole structures**	**B-7.03 Installs pole structure guys and anchors**
Task B-8 **Installs steel lattice structures** **21%**	**B-8.01 Assembles steel lattice structures**	**B-8.02 Erects steel lattice structures**	**B-8.03 Installs steel lattice structure guy wires and anchors**

C – Installs conductor systems

15%

Task C-9 **Installs overhead conductors and cables** **67%**	**C-9.01 Strings overhead conductors and cables**	**C-9.02 Sags overhead conductors and cables**	**C-9.03 Ties-in overhead conductors and cables**
	C-9.04 Installs splices and connections to overhead conductors and cables		
Task C-10 **Installs underground and underwater cable** **33%**	**C-10.01 Installs conduit and cable**	**C-10.02 Places direct buried cable**	**C-10.03 Splices underground and underwater cable**
	C-10.04 Terminates underground and underwater cable		

D – Installs auxiliary equipment

21%

Task D-11 **Installs lighting systems** **13%**	**D-11.01 Installs street lights**	**D-11.02 Maintains street lights**

Task D-12 **Installs voltage control equipment** **33%**	**D-12.01 Installs transformers**	**D-12.02 Installs capacitors**	**D-12.03 Installs voltage regulators**
	D-12.04 Installs switches	**D-12.05 Installs reactors (Not Common Core)**	
Task D-13 **Installs protection equipment** **29%**	**D-13.01 Installs reclosers**	**D-13.02 Installs sectionalizers**	**D-13.03 Installs fuses**
	D-13.04 Installs lightning arrestors		
Task D-14 **Installs metering equipment** **17%**	**D-14.01 Installs primary metering equipment**	**D-14.02 Installs secondary metering equipment**	
Task D-15 **Installs communication devices** **8%**	**D-15.01 Installs cellular antennas**	**D-15.02 Transfers communication lines**	

E – Performs operation, maintenance and repair — 25%

Task E-16 **Operates distribution and transmission systems** **26%**	**E-16.01 Operates transmission systems**	**E-16.02 Operates distribution systems**	**E-16.03 Performs station switching**
Task E-17 **Maintains distribution and transmission systems** **28%**	**E-17.01 Inspects distribution and transmission systems**	**E-17.02 Maintains pole structures**	**E-17.03 Maintains steel lattice structures**
	E-17.04 Maintains system components	**E-17.05 Trims trees**	

Task E-18 **Repairs distribution systems** **27%**	**E-18.01 Troubleshoots overhead distribution systems**	**E-18.02 Troubleshoots underground and underwater distribution systems**	**E-18.03 Repairs overhead distribution systems**
	E-18.04 Repairs underground and underwater distribution systems		
Task E-19 **Repairs transmission systems** **19%**	**E-19.01 Troubleshoots overhead transmission systems**	**E-19.02 Troubleshoots underground and underwater transmission systems**	**E-19.03 Repairs overhead transmission systems**
	E-19.04 Repairs underground and underwater transmission systems		

Harmonization of Apprenticeship Training

Provincial and territorial apprenticeship authorities are each responsible for their respective apprenticeship programs. In the spirit of continual improvement, and to facilitate mobility among apprentices in Canada, participating authorities have agreed to work towards harmonizing certain aspects of their programs where possible. After consulting with their stakeholders in the trade, they have reached consensus on the following elements. Note that implementation of these elements may vary from jurisdiction to jurisdiction, depending on their own circumstances. For more information on the implementation in any province and territory, please contact that jurisdiction's apprenticeship authority.

1. Trade name

The official Red Seal name for this trade is Powerline Technician.

2. Number of Levels of Apprenticeship

The number of levels of technical training recommended for this trade is 4 (four).

3. Total Training Hours During Apprenticeship Training

The total hours of training, including both on-the-job and in-school training for this trade is 7200.

4. Sequencing Topics and Related Sub-tasks

The topic titles in the table below are placed in a column for each apprenticeship level for technical training. Each topic is accompanied by the sub-tasks and their reference number. The topics in the grey shaded cells represent those that are covered "in context" with other training in the subsequent years.

Level 1	Level 2	Level 3	Level 4
	Context	Context	Context
	Safety-Related Functions	Safety-Related Functions	Safety-Related Functions
	Organizes Work	Organizes Work	Organizes Work
	Tools and Equipment	Tools and Equipment	Tools and Equipment
Safety-related functions 1.01 Uses personal protective equipment (PPE) and safety equipment 1.02 Controls powerline hazards 1.03 Controls environmental hazards 1.04 Performs lock-out and tag-out procedures 1.05 Performs temporary grounding and bonding procedures			

Level 1	Level 2	Level 3	Level 4
Tools and Equipment 2.01 Uses hand, power and powder-actuated tools and equipment 2.02 Uses electrical measuring and testing equipment 2.03 Uses rigging, hoisting and lifting equipment			
Organizes Work 3.01 Interprets plans, drawings and specifications 3.02 Prepares worksite 3.03 Plans job tasks and procedures			
Work Area Access 4.01 Climbs poles and steel lattice structures 4.02 Uses access equipment 4.03 Uses on- and off-road equipment			
Live-Line Methods (Introduction) 5.01 Uses cover-up 5.02 Uses rubber gloves 5.04 Uses fibreglass reinforced plastic (FRP) tools (hot sticks)	**Live-Line Methods** 5.01 Uses cover-up 5.02 Uses rubber gloves 5.04 Uses fibreglass reinforced plastic (FRP) tools (hot sticks)	**Live-Line Methods** 5.01 Uses cover-up 5.02 Uses rubber gloves 5.04 Uses fibreglass reinforced plastic (FRP) tools (hot sticks	**Live-Line Methods** 5.01 Uses cover-up 5.02 Uses rubber gloves 5.03 Uses bare hand methods 5.04 Uses fibreglass reinforced plastic (FRP) tools (hot sticks)
Communication 6.01 Uses communication techniques			**Mentoring** 6.02 Uses mentoring techniques
Pole Structures 7.01 Frames pole structures 7.02 Sets pole structures 7.03 Installs pole structure guys and anchors			
Steel Lattice Structures 8.01 Assembles steel lattice structures 8.02 Erects steel lattice structures 8.03 Installs steel lattice structure guy wires and anchors			

Level 1	Level 2	Level 3	Level 4
Overhead Conductors and Cables 9.01 Strings overhead conductors and cables *(Non-tension method)* 9.02 Sags overhead conductors and cables 9.03 Ties in overhead conductors and cables 9.04 Installs splices and connections to overhead conductors and cables	**Overhead Conductors and Cables** 9.01 Strings overhead conductors and cables *(Introduction to tension stringing method)* 9.02 Sags overhead conductors and cables 9.03 Ties in overhead conductors and cables 9.04 Installs splices and connections to overhead conductors and cables	**Overhead Conductors and Cables** 9.01 Strings overhead conductors and cables *(Distribution tension method)* 9.02 Sags overhead conductors and cables 9.03 Ties in overhead conductors and cables 9.04 Installs splices and connections to overhead conductors and cables	**Overhead Conductors and Cables** 9.01 Strings overhead conductors and cables *(Transmission tension method)* 9.02 Sags overhead conductors and cables 9.03 Ties in overhead conductors and cables 9.04 Installs splices and connections to overhead conductors and cables
	Underground and Underwater Cable (Secondary) 10.01 Installs conduit and cable 10.02 Places direct buried cable 10.03 Splices underground and underwater cable 10.04 Terminates underground and underwater cable	**Underground and Underwater Cable (Primary)** 10.01 Installs conduit and cable 10.02 Places direct buried cable 10.03 Splices underground and underwater cable 10.04 Terminates underground and underwater cable	
	Lighting Systems 11.01 Installs street lights 11.02 Maintains street lights		
Voltage Control Equipment 12.01 Installs transformers *(single-phase)* 12.04 Installs switches	**Voltage Control Equipment** 12.01 Installs transformers[1] *(single-phase)* 12.04 Installs switches	**Voltage Control Equipment** 12.01 Installs transformers *(three-phase)* 12.03 Installs voltage regulators 12.04 Installs switches	**Voltage Control Equipment** 12.02 Installs capacitors 12.03 Installs voltage regulators 12.05 Installs reactors
	Protection Equipment 13.03 Installs fuses 13.04 Installs lightning arrestors	**Protection Equipment[2]** 13.01 Installs reclosers 13.02 Installs sectionalizers 13.03 Installs fuses	**Protection Equipment** 13.01 Installs reclosers 13.02 Installs sectionalizers 13.03 Installs fuses
	Metering Equipment 14.02 Installs secondary metering equipment	**Metering Equipment** 14.01 Installs primary metering equipment	
Communication Devices 15.02 Transfers communication lines			**Communication Equipment** 15.01 Installs cellular antennas

[1] Alberta, British Columbia (meet and exceed) 12.01 (Three-Phase) will be delivered in L2 and L3
[2] Ontario 13.01, 13.02 delivered in L2

Level 1	Level 2	Level 3	Level 4
	Distribution and Transmission Systems (Operation) 16.02 Operates distribution systems	**Distribution and Transmission Systems (Operation)** 16.01 Operates transmission systems	**Distribution and Transmission Systems (Operation)** 16.01 Operates transmission systems 16.02 Operates distribution systems 16.03 Performs station switching
	Distribution and Transmission Systems (Maintenance) 17.02 Maintains pole structures 17.04 Maintains system components 17.05 Trims trees	**Distribution and Transmission Systems (Maintenance)** 17.01 Inspects distribution and transmission systems 17.02 Maintains pole structures 17.04 Maintains system components	**Distribution and Transmission Systems (Maintenance)** 17.01 Inspects distribution and transmission systems 17.02 Maintains pole structures 17.03 Maintains steel lattice structures 17.04 Maintains system components
	Distribution Systems (Repair) 18.03 Repairs overhead distribution systems 18.04 Repairs underground and underwater distribution systems	**Distribution Systems (Troubleshoot and Repair)** 18.01 Troubleshoots overhead distribution systems 18.02 Troubleshoots underground and underwater distribution systems 18.03 Repairs overhead distribution systems 18.04 Repairs underground and underwater distribution systems	**Distribution Systems (Troubleshoot and Repair)** 18.01 Troubleshoots overhead distribution systems 18.02 Troubleshoots underground and underwater distribution systems 18.03 Repairs overhead distribution systems 18.04 Repairs underground and underwater distribution systems
	Transmission Systems (Repair) 19.03 Repairs overhead transmission systems 19.04 Repairs underground and underwater transmission systems	**Transmission Systems (Troubleshoot and Repair)** 19.01 Troubleshoots overhead transmission systems 19.02 Troubleshoots underground and underwater transmission systems 19.03 Repairs overhead transmission systems 19.04 Repairs underground and underwater transmission systems	**Transmission Systems (Troubleshoot and Repair)** 19.01 Troubleshoots overhead transmission systems 19.02 Troubleshoots underground and underwater transmission systems 19.03 Repairs overhead transmission systems 19.04 Repairs underground and underwater transmission systems

MAJOR WORK ACTIVITY A

Performs common occupational skills

TASK A-1 Performs safety-related functions

TASK DESCRIPTOR

Powerline technicians are responsible for ensuring the safety of themselves and others in the work environment. It is critical that powerline technicians be constantly aware of their surroundings and hazards they may encounter. These hazards may be electrical, gravitational, mechanical, vehicular, environmental or chemical. They present risks to the powerline technician, the public, the electrical system and equipment. Environmental hazards are those which present a risk to the surrounding environment.

A-1.01 Uses personal protective equipment (PPE) and safety equipment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-1.01.01P	select and use ***personal protective equipment (PPE)***	***PPE*** is selected and used according to company policies and standards
A-1.01.02P	select and use ***safety equipment***	***safety equipment*** is selected and used according to job requirements
A-1.01.03P	ensure fit of ***PPE***	***PPE*** are adjusted to provide maximum protection for the individual
A-1.01.04P	clean and store ***PPE*** and ***safety equipment*** in designated area	***PPE*** and ***safety equipment*** are cleaned and stored in designated area according to manufacturers' specifications and company policies
A-1.01.05P	tag and remove defective, expired, damaged or worn ***PPE*** and ***safety equipment*** from service	***PPE*** and ***safety equipment*** are tagged and removed from service according to manufacturers' specifications and company policies

RANGE OF VARIABLES

PPE includes: hard hats, rubber gloves, safety boots, safety glasses, face shields, hearing protection, flame retardant clothing (FRC), arc flash clothing

safety equipment includes: fire extinguishers, first aid kits, rescue equipment, automated external defibrillator (AED), burn kit

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-1.01.01L	demonstrate knowledge of ***safety equipment***, their applications, maintenance and procedures for use	identify types of ***PPE*** and describe their applications and limitations
		describe procedures used to maintain ***PPE***
A-1.01.02L	demonstrate knowledge of safe work practices	identify ***overhead, underground and underwater hazards*** and describe safe work practices
A-1.01.03L	demonstrate knowledge of regulatory requirements pertaining to safety	identify and describe workplace safety and health regulations

RANGE OF VARIABLES

safety equipment includes: fire extinguishers, first aid kits, rescue equipment, automated external defibrillator (AED), burn kit

PPE includes: hard hats, rubber gloves, safety boots, safety glasses, face shields, hearing protection, flame retardant clothing (FRC), arc flash clothing

overhead work hazards include: foreign debris, broken poles, insulators, tie wires, crossarms

underground and underwater work hazards include: gases, fumes, flooding, cave-ins

A-1.02 Controls powerline hazards

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-1.02.01P	identify ***overhead work hazards***	***overhead work hazards*** are identified
A-1.02.02P	identify ***underground and underwater work hazards***	***underground and underwater work hazards*** are identified
A-1.02.03P	manage ***overhead, underground and underwater hazards***	***overhead, underground and underwater hazards*** are managed by using ***signage and protective barriers*** according to limits of approach and live-line procedures
A-1.02.04P	identify and manage second points of contact (step and touch potential)	second points of contact (step and touch potential) are identified and managed by installing ***protective barriers***
A-1.02.05P	ventilate ***confined and restricted spaces***	***confined and restricted spaces*** are ventilated

A-1.02.06P	select and use ***rescue and monitoring equipment for confined spaces***	***rescue and monitoring equipment for confined spaces*** are selected and used according to work procedures and jurisdictional regulations
A-1.02.07P	communicate ***overhead, underground and underwater hazard*** information to ***stakeholders***	***overhead, underground and underwater hazard*** information is communicated to ***stakeholders***

RANGE OF VARIABLES

overhead work hazards include: foreign debris, broken poles, insulators, tie wires, crossarms

underground and underwater work hazards include: gases, fumes, flooding, cave-ins

signage and protective barriers include: barricades, cover-up, rubber gloves, fibreglass reinforced plastic (FRP) tools (hot sticks)

confined and restricted spaces include: tunnels, trenches, vaults

rescue and monitoring equipment for confined spaces include: gas detector, tripod, self-retractable line (SRL) block

stakeholders include: co-workers, other work groups, the public, government agencies

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-1.02.01L	demonstrate knowledge of safety equipment and PPE, their applications, maintenance and procedures for use	identify types of safety equipment and PPE, and describe their applications and limitations
		describe procedures used to maintain safety equipment and PPE
A-1.02.02L	demonstrate knowledge of safe work practices	identify ***overhead, underground and underwater hazards*** and describe safe work practices
		identify and describe workplace safety and health regulations
A-1.02.03L	demonstrate knowledge of ***live-line work*** and its applications	define terminology associated with ***live-line work***
		identify hazards and describe safe work practices pertaining to ***live-line work***
		interpret information pertaining to ***live-line work*** found in procedures and specifications
		identify ***tools and equipment*** used for ***live-line work*** and describe their applications and procedures for use
		interpret ***information*** and perform ***calculations*** pertaining to live-line rigging
		identify types of ***live-line work*** and describe their applications
		identify line protection requirements relating to ***live-line work***

A-1.02.04L	demonstrate knowledge of regulatory requirements pertaining to safety	interpret codes, standards and regulations pertaining to ***live-line work***
A-1.02.05L	demonstrate knowledge of principles of ***live-line work***	describe principles of ***live-line work***
A-1.02.06L	demonstrate knowledge of ***procedures*** used to perform ***live-line work***	describe ***procedures*** used to perform ***live-line work***

RANGE OF VARIABLES

overhead work hazards include: foreign debris, broken poles, insulators, tie wires, crossarms

underground and underwater work hazards include: gases, fumes, flooding, cave-ins

live-line work includes: FRP tools (hot sticks), rubber gloves, bare-hand

tools and equipment for live-line work includes: FRP, insulated aerial device, rubber gloves, cover-up

information and calculations include: weights and tensions, working load limits (WLL), safe working loads (SWL)

procedures include: hold-offs, tailboard, limits of approach, work permits

A-1.03 Controls environmental hazards

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-1.03.01P	identify potential ***environmental hazards***	potential ***environmental hazards*** are identified
A-1.03.02P	clean and report oil spill	oil spill is cleaned by using spill kits and reported according to location of spill and environmental regulations
A-1.03.03P	minimize ***environmental hazard***	***environmental hazard*** is minimized by installing ***protective barriers*** according to type of ***environmental hazard*** and jurisdictional regulations
A-1.03.04P	report ***environmental hazards*** to emergency services	***environmental hazards*** are reported to emergency services and according to company standards
A-1.03.05P	adjust ***work procedures***	***work procedures*** are adjusted according to potential ***environmental hazards***

RANGE OF VARIABLES

environmental hazards include: oil spills, gas spills, fire conditions, working in the vicinity of environmentally sensitive areas, protected wildlife

protective barriers include: silt screens, sand bags, dyke

work procedures include: use of tools and equipment, clean-up,reporting

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-1.03.01L	demonstrate knowledge of safety equipment and PPE, their applications, maintenance and procedures for use	identify types of safety equipment and PPE, and describe their applications and limitations pertaining to ***environmental hazards***
		describe procedures used to inspect and maintain safety equipment and PPE pertaining to ***environmental hazards***
		describe procedures to use safety equipment and PPE pertaining to ***environmental hazards***
A-1.03.02L	demonstrate knowledge of safe work practices	identify ***environmental hazards*** and describe safe work practices
A-1.03.03L	demonstrate knowledge of regulatory requirements pertaining to ***environmental hazards***	interpret codes, standards and regulations pertaining to ***environmental hazards***
		identify and describe workplace safety and health regulations pertaining to ***environmental hazards***

RANGE OF VARIABLES

environmental hazards include: oil spills, gas spills, fire conditions, working in the vicinity of environmentally sensitive areas, protected wildlife

A-1.04 Performs lock-out and tag-out procedures

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-1.04.01P	coordinate ***lock-out and tag-out requirements***	***lock-out and tag-out requirements*** are coordinated with appropriate authorities, other trades and work groups
A-1.04.02P	identify isolation points for lock-out and tag-out	isolation points and voltage are identified using ***information***
A-1.04.03P	isolate ***equipment***	***equipment*** is isolated
A-1.04.04P	lock-out and tag-out isolated ***equipment***	***equipment*** is locked-out and tagged-out according to work procedures

A-1.04.05P	test system for potential	system is tested for potential using ***voltage-rated equipment***
A-1.04.06P	report and document lock-out and tag-out procedure	lock-out and tag-out procedure is reported and documented according to work procedures

RANGE OF VARIABLES

lock-out and tag-out requirements include: work permit, hold off, conditional permit
information includes: panel schedules, drawings, single-line diagrams, cable and equipment tags
equipment includes: elbows, isolation points, switches, circuits
voltage-rated equipment includes: voltmeters, high voltage testers, potential indicators

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-1.04.01L	demonstrate knowledge of lock-out and tag-out procedures and legislation	describe lock-out and tag-out procedures and legislation governing minimum standards
A-1.04.02L	demonstrate knowledge of safety checks of ***equipment***	describe safety checks to be performed
A-1.04.03L	demonstrate knowledge of procedures for checking for potential	describe procedures for checking for potential

RANGE OF VARIABLES

equipment includes: elbows, isolation points, switches, circuits

A-1.05 Performs temporary grounding and bonding procedures

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-1.05.01P	select ***tools and equipment*** to perform temporary grounding and bonding procedures	***tools and equipment*** are selected to perform temporary grounding and bonding procedures according to jurisdictional regulations and job requirements
A-1.05.02P	verify that ***tools and equipment*** have valid test date or expiration date	***tools and equipment*** used to perform temporary grounding and bonding procedures are verified for valid test date or expiration date

A-1.05.03P	perform visual inspection and cleaning of ***tools and equipment***	visual inspection and cleaning of ***tools and equipment*** used to perform temporary grounding and bonding procedures is performed
A-1.05.04P	maintain minimum approach distances (MAD) from second point of contact	MAD are maintained from second point of contact according to jurisdictional regulations
A-1.05.05P	position body and ***access equipment***	body and ***access equipment*** are positioned for safety and ease of task, according to MAD
A-1.05.06P	perform potential check	potential check is performed
A-1.05.07P	install temporary grounding and bonding equipment	temporary grounding and bonding equipment is installed according to jurisdictional regulations and work procedures
A-1.05.08P	remove temporary grounding and bonding equipment	temporary grounding and bonding equipment is removed according to jurisdictional regulations and work procedures
A-1.05.09P	maintain, clean and store temporary grounding and bonding ***tools and equipment***	temporary grounding and bonding ***tools and equipment*** are maintained, cleaned and stored or removed from service

RANGE OF VARIABLES

tools and equipment include: temporary grounds, pole band, temporary ground rod, potential indicator, FRP tools (hot sticks), wire brush
access equipment include: See Appendix B

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-1.05.01L	demonstrate knowledge of principles of temporary grounding and bonding procedures	define terminology associated with temporary grounding and bonding procedures
		identify hazards and describe safe work practices pertaining to temporary grounding and bonding procedures
		interpret jurisdictional codes, rules and regulations pertaining to temporary grounding and bonding procedures
		interpret information pertaining to temporary grounding and bonding procedures found on drawings and specifications
		identify ***tools and equipment*** used for temporary grounding and bonding procedures and describe their applications and procedures for use

		interpret ***information and*** perform ***calculations*** pertaining to temporary grounding and bonding procedures
		identify types of temporary grounding and bonding procedures and describe their applications
		identify line protection requirements relating to temporary grounding and bonding procedures
		describe principles of temporary grounding and bonding procedures
A-1.05.02L	demonstrate knowledge of procedures used to perform temporary grounding and bonding	describe procedures used to perform temporary grounding and bonding

RANGE OF VARIABLES

tools and equipment include: temporary grounds, pole band, temporary ground rod, potential indicator, FRP tools (hot sticks), wire brush
information and calculations include: fault current levels, current leakage test

TASK A-2 Uses and maintains tools and equipment

TASK DESCRIPTOR

Powerline technicians must select, use and maintain tools and equipment in order to safely and effectively perform the duties of their trade.

A-2.01 Uses hand, power and powder-actuated tools and equipment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-2.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to manufacturers' specifications and company policies
A-2.01.02P	clean and store ***tools and equipment***	***tools and equipment*** are cleaned and stored according to manufacturers' specifications and company policies
A-2.01.03P	identify worn, damaged and defective ***tools and equipment***	worn, damaged and defective ***tools and equipment*** are tagged and replaced or repaired according to manufacturers' specifications

A-2.01.04P	store shells for powder-actuated tools	shells for powder-actuated tools are stored according to jurisdictional regulations and Workplace Hazardous Materials Information System (WHMIS)
A-2.01.05P	sharpen ***hand tools***	***hand tools*** are sharpened
A-2.01.06P	lubricate and adjust ***tools and equipment***	***tools and equipment*** are lubricated and adjusted according to manufacturers' specifications
	assemble and disassemble ***tools and equipment***	***tools and equipment*** are assembled and disassembled for cleaning and repair

RANGE OF VARIABLES

tools and equipment include: See Appendix B
hand tools include: knives, bits

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-2.01.01L	demonstrate knowledge of ***tools and equipment***, their applications, and procedures for use	identify types of ***hand tools*** and describe their applications and procedures for use
		identify types of power tools and describe their applications and procedures for use
		identify types of powder-actuated tools and describe their applications and procedures for use
A-2.01.02L	demonstrate knowledge of procedures used to inspect and maintain ***tools and equipment***	describe procedures used to inspect and maintain ***hand tools***
		describe procedures used to inspect and maintain power tools
		describe procedures used to inspect and maintain powder-actuated tools

RANGE OF VARIABLES

tools and equipment include: See Appendix B
hand tools include: knives, bits

A-2.02 Uses electrical measuring and testing equipment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-2.02.01P	select and use ***electrical measuring and testing equipment***	***electrical measuring and testing equipment*** is selected and used
A-2.02.02P	identify worn, damaged, expired and defective ***electrical measuring and testing equipment***	worn, damaged, expired and defective ***electrical measuring and testing equipment*** are removed from service
A-2.02.03P	replace ***electrical measuring and testing equipment components***	***electrical measuring and testing equipment components*** are replaced
A-2.02.04P	store ***electrical measuring and testing equipment***	***electrical measuring and testing equipment*** is stored according to manufacturers' specifications

RANGE OF VARIABLES

electrical measuring and testing equipment includes: voltmeter, phasing sticks, rotation meter, ammeter, megger

electrical measuring and testing equipment components include: batteries, leads

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-2.02.01L	demonstrate knowledge of ***electrical measuring and testing equipment***, their ***components***, applications, maintenance and procedures for use	identify types of ***electrical measuring and test equipment*** and describe their general applications
A-2.02.02L	demonstrate knowledge of procedures to use ***electrical measuring and testing equipment***, and their ***components***	describe procedures used to inspect and maintain ***electrical measuring and test equipment*** and their ***components***

RANGE OF VARIABLES

electrical measuring and testing equipment include: voltmeter, phasing sticks, rotation meter, ammeter, megger

electrical measuring and testing equipment components include: batteries, leads

A-2.03 Uses rigging, hoisting and lifting equipment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-2.03.01P	calculate weight of load	weight of load is calculated using load charts and name plates
A-2.03.02P	select ***rigging***, ***hoisting and lifting equipment***	***rigging, hoisting and lifting equipment*** is selected according to job requirements
A-2.03.03P	identify the type of lift to be made (standard or critical)	standard or critical lifts are made according to worksite hazards and limitations
A-2.03.04P	measure weight of load and sag conductors	weight of load and sag conductors are measured using a dynamometer
A-2.03.05P	rig load	load is rigged according to job task to facilitate the hoisting of load
A-2.03.06P	splice ropes and tie knots	ropes are spliced according to manufacturers' specifications and knots are tied to assist in rigging
A-2.03.07P	hoist load considering ***factors***	load is hoisted considering ***factors***
A-2.03.08P	store ***rigging, hoisting and lifting equipment***	***rigging, hoisting and lifting equipment*** are stored according to manufacturers' specifications and company policies
A-2.03.09P	identify damaged, worn and unsafe ***rigging, hoisting and lifting equipment***	damaged, worn and unsafe ***rigging, hoisting and lifting equipment*** are identified, tagged and removed from service
A-2.03.10P	clean and lubricate ***rigging, hoisting and lifting equipment***	***rigging, hoisting and lifting equipment*** are cleaned and lubricated according to manufacturers' specifications

RANGE OF VARIABLES

rigging equipment includes: slings, wire/conductor grips, shackles, ropes, cables

hoisting and lifting equipment includes: chain hoists, rope blocks, cable winches, capstan hoists, web hoist, levers

factors include: weight of load, travel path, weather conditions, conductor weights and tensions

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-2.03.01L	demonstrate knowledge of ***rigging, hoisting and lifting equipment***, their applications, limitations and procedures for use	define terminology associated with ***rigging, hoisting and lifting equipment***
		identify hazards and describe safe work practices pertaining to ***rigging, hoisting and lifting equipment***
		identify codes and regulations pertaining to ***rigging, hoisting and lifting equipment***
		interpret information pertaining to ***rigging, hoisting and lifting equipment*** found on drawings and specifications
		identify types of ***rigging, hoisting and lifting equipment*** and describe their applications and procedures for use
A-2.03.02L	demonstrate knowledge of rigging, hoisting and lifting techniques	identify types of knots, hitches, splices and bends and describe their applications
		describe ***considerations*** when ***rigging, hoisting and lifting equipment*** or material
		describe procedures used when ***rigging, hoisting and lifting equipment*** or material

RANGE OF VARIABLES

rigging equipment includes: slings, wire/conductor grips, shackles, ropes, cables

hoisting and lifting equipment includes: chain hoists, rope blocks, cable winches, capstan hoists, web hoist, levers

considerations include: load characteristics, load charts, equipment and accessories, anchor points, sling angles

TASK A-3 Organizes work

TASK DESCRIPTOR

Powerline technicians organize their work by using documentation, work protection codes, standards and regulations, and by planning their daily tasks before starting a job. These tasks are important for safety and productivity.

A-3.01 Interprets plans, drawings and specifications

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-3.01.01P	locate ***information*** in specifications, standards and amendments	***information*** is located in specifications, standards and amendments
A-3.01.02P	analyze plans, drawings and specifications	plans, drawings and specifications are analyzed
A-3.01.03P	verify materials required for job	materials required for job are verified

RANGE OF VARIABLES

information includes: symbols, abbreviations

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-3.01.01L	demonstrate knowledge of drawings, schematics and specifications and their ***applications***	define terminology associated with drawings, schematics and specifications
		identify types of drawings and describe their ***applications***
A-3.01.02L	demonstrate knowledge of interpreting and extracting ***information*** from drawings, schematics and specifications	interpret and extract ***information*** from drawings, schematics and specifications

RANGE OF VARIABLES

applications include: electrical, construction standards

information includes: symbols, abbreviations

A-3.02 Prepares worksite

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-3.02.01P	determine location of ***overhead and underground services***	location of ***overhead and underground services*** is confirmed
A-3.02.02P	identify and remove or manage ***obstacles and hazards***	***obstacles and hazards*** are identified and removed or managed
A-3.02.03P	organize and choose materials and supplies	materials and supplies are organized and chosen according to job requirements
A-3.02.04P	identify and implement traffic control	traffic control needs are identified and implemented according to jurisdictional regulations

RANGE OF VARIABLES

overhead and underground services include: gas, communication, electrical, water, sewer

obstacles and hazards include: snow, ice, trees, boulders, traffic, public, workplace (biohazards [used needles]), fire, heights, chemicals, gas, radiation, asbestos, environmental (discharge/spills)

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-3.02.01L	demonstrate knowledge of safe work practices	identify ***obstacles and hazards*** and describe safe work practices
A-3.02.02L	demonstrate knowledge of regulatory requirements pertaining to safety	identify and describe ***workplace safety and health regulations***
A-3.02.03L	demonstrate knowledge of procedures used to prepare worksite	identify ***sources of information*** relevant to planning job tasks identify codes and regulations pertaining to job planning describe ***considerations*** to follow the job plan and organize job tasks

RANGE OF VARIABLES

obstacles and hazards include: snow, ice, trees, boulders, traffic, public, workplace (biohazards [used needles]), fire, heights, chemicals, gas, radiation, asbestos, environmental (discharge/spills)

workplace safety and health regulations include: federal (safety data sheets [SDS], WHMIS, transportation of dangerous goods [TDG]), provincial/territorial (occupational health and safety [OH&S]), municipal

sources of information include: documentation (standard operating procedures [SOPs]), drawings), related professionals, clients

considerations include: permits, risk assessments (tailboard), personnel, tools and equipment, materials and supplies, scheduling/sequencing, environmental, traffic, public safety

A-3.03 Plans job tasks and procedures

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-3.03.01P	adapt work to weather conditions	work is adapted to weather conditions following safety parameters when performing live-line work
A-3.03.02P	determine ***impact to customers/public***	***impact to customers/public*** is determined
A-3.03.03P	estimate time to complete tasks	time to complete tasks is estimated to establish daily goals, taking into consideration the need for other trades/workers and their level of experience
A-3.03.04P	identify feeder status	feeder status is identified
A-3.03.05P	arrange for materials and supplies required for job	materials and supplies required for job are obtained
A-3.03.06P	obtain ***permits and authorizations for work***	***permits and authorizations for work*** are obtained

RANGE OF VARIABLES

impact to customers/public includes: outages, traffic control, property

permits and authorizations for work include: live-line, de-energized, self-protection permit

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-3.03.01L	demonstrate knowledge of procedures used to plan and organize job tasks	identify ***sources of information*** relevant to planning job tasks
		identify codes and regulations pertaining to job planning
		describe ***considerations*** to plan and organize job tasks

RANGE OF VARIABLES

sources of information include: documentation (SOPs, drawings), related professionals, clients

considerations include: permits, risk assessments (tailboard), personnel, tools and equipment, materials and supplies, scheduling/sequencing, environmental, traffic

TASK A-4 Accesses work area

TASK DESCRIPTOR

Powerline technicians access work areas by climbing poles and steel lattice structures, using access equipment, and on- and off-road equipment. They may be flown in helicopters to access structures in remote areas.

A-4.01 Climbs pole and steel lattice structures

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-4.01.01P	select and inspect ***pole climbing equipment***	***pole climbing equipment*** is selected and inspected according to manufacturers' specifications
A-4.01.02P	inspect pole or steel lattice structure	pole or steel lattice structure is inspected by performing visual checks and integrity tests to ensure safety and stability
A-4.01.03P	position and adjust ***pole climbing equipment***	***pole climbing equipment*** is positioned and adjusted according to type and size of pole or steel lattice structure, and individual fit

A-4.01.04P	use climbing techniques	climbing techniques are used according to working conditions
A-4.01.05P	perform pole top rescue	pole top rescue is performed according to company and fall-arrest standards

RANGE OF VARIABLES

pole climbing equipment includes: belts, spurs, fall restrict equipment

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-4.01.01L	demonstrate knowledge of pole structure climbing, ***pole climbing equipment***, and its applications, limitations and procedures for use	define terminology associated with pole structure climbing and ***pole climbing equipment***
		identify ***hazards*** and describe safe work practices pertaining to pole structure climbing and ***pole climbing equipment***
		identify codes and ***regulations*** pertaining to **pole climbing equipment**
		identify ***pole climbing equipment*** and describe their characteristics and applications
A-4.01.02L	demonstrate knowledge of procedures used to climb pole structures and inspect and maintain ***pole climbing equipment***	describe procedures used to climb using ***pole climbing equipment***
		describe procedures used to perform pole top rescue
		describe procedures used to inspect, maintain and store ***pole climbing equipment***
A-4.01.03L	demonstrate knowledge of steel lattice structure climbing, ***steel lattice structure climbing equipment***, its applications, limitations and procedures for use	define terminology associated with ***steel lattice structure climbing*** and ***equipment***
		identify ***hazards*** and describe safe work practices pertaining to ***steel lattice structure climbing*** and ***equipment***
		identify codes and ***regulations*** pertaining to steel lattice structure climbing and associated equipment
		identify types of ***steel lattice structure climbing equipment*** and describe their characteristics and applications
A-4.01.04L	demonstrate knowledge of procedures used to climb steel lattice structures and inspect and maintain ***steel lattice structure climbing equipment***	describe procedures used to climb using ***steel lattice structure climbing equipment***

	describe procedures used to perform rescue on steel lattice structures
	describe procedures used to inspect, maintain and store ***steel lattice structure climbing equipment***

RANGE OF VARIABLES

pole climbing equipment includes: belts, spurs, fall restrict equipment
hazards include: falling, electrocution
regulations include: training, certification requirements, jurisdictional
steel lattice structure climbing equipment includes: tower harnesses, lanyards, life-line/fall-line, shepherd's hook

A-4.02 Uses access equipment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-4.02.01P	select and use ***access equipment***	***access equipment*** is selected and used according to job requirements
A-4.02.02P	use rescue systems	rescue systems are used for retrieval, descent and lateral transfers according to manufacturers' specifications
A-4.02.03P	identify and adapt to ***work conditions***	***work conditions*** are identified and adapted to
A-4.02.04P	use aerial work platform (AWP)	AWP is used according to manufacturers' specifications to access work position on structures
A-4.02.05P	use ***confined space monitoring equipment***	***confined space monitoring equipment*** is used according to jurisdictional regulations
A-4.02.06P	inspect, maintain, assemble and store ***access equipment***	***access equipment*** is inspected, maintained, assembled and stored according to company policies and manufacturers' specifications

RANGE OF VARIABLES

access equipment includes: See Appendix B (aerial work platforms) AWP??
work conditions include: slippery ground, inclement weather, uneven terrain
confined space monitoring equipment includes: gas detector, tripod, SRL block

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-4.02.01L	demonstrate knowledge of ***access equipment***, their characteristics, applications and limitations	define terminology associated with ***access equipment***
		identify ***hazards*** and describe safe work practices pertaining to ***access equipment***
		identify codes and regulations pertaining to ***access equipment***
		identify types of ***access equipment*** and describe their characteristics, applications and limitations
A-4.02.02L	demonstrate knowledge of procedures used to erect, remove, inspect, maintain, transport and store ***access equipment***, their characteristics, applications and limitations	describe procedures used to erect and remove ***access equipment***
		describe procedures used to inspect and maintain ***access equipment***
		describe procedures used to transport ***access equipment***
		describe procedures used to store ***access equipment***

RANGE OF VARIABLES

access equipment includes: See Appendix B (aerial work platforms)
hazards include: falling, electrocution

A-4.03 Uses on- and off-road equipment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-4.03.01P	follow jurisdictional safety techniques for helicopter access and ***all-terrain vehicles***	jurisdictional safety techniques for helicopter access and ***all-terrain vehicles*** are followed
A-4.03.02P	select and operate equipment	equipment is selected and operated according to job requirements and ***manufacturers' specifications***

A-4.03.03P	level ***on- and off-road equipment***	***on- and off-road equipment*** is levelled to ensure stability according to ***manufacturers' specifications***
A-4.03.04P	inspect ***on- and off-road equipment***	***on- and off-road equipment*** is inspected to ensure safe operation according to ***manufacturers' specifications*** and company standards

RANGE OF VARIABLES

all-terrain vehicles include: quads, side-by-sides, boats, snowmobiles

manufacturers' specifications include: load chart information, WLL

on- and off-road equipment includes: bucket trucks (material handling, personnel lift), radial boom derricks, off-road track machines, hydro-vacuum excavators

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-4.03.01L	demonstrate knowledge of ***on- and off-road equipment*** and their characteristics and applications	define terminology associated with ***on- and off-road equipment***
		identify types of ***on- and off-road equipment*** and describe their characteristics and applications
		identify ***hazards*** and describe safe work practices pertaining to ***on- and off-road equipment***
		interpret ***regulations*** pertaining to ***on- and off-road equipment***
		interpret ***information*** pertaining to ***on- and off-road equipment*** found in manufacturers' specifications
		identify ***on- and off-road equipment*** components and accessories and describe their characteristics and applications
A-4.03.02L	demonstrate knowledge of procedures used to operate, inspect and maintain ***on- and off-road equipment***	describe procedures used to operate ***on- and off-road equipment***
		describe procedures used to inspect and maintain ***on- and off-road equipment***

RANGE OF VARIABLES

on- and off-road equipment includes: bucket trucks (material handling, personnel lift), radial boom derricks, off-road track machines, hydro-vacuum excavators

hazards include: uneven terrain, vehicle roll-over, water, ice, wildlife

regulations include: training, certification, licensing requirements, environmental

information includes: load charts, WLL, SWL, stability

TASK A-5 Uses live-line methods

TASK DESCRIPTOR

Live-line work is done by powerline technicians so that electrical service is not interrupted. Proper work methods ensure safety and may vary by system authority and jurisdiction. Use of live-line bare-hand work procedures is a specialized area of powerline work.

A-5.01 Uses cover-up

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-5.01.01P	select and use ***tools and equipment*** to install ***cover-up***	***tools and equipment*** to install ***cover-up*** are selected and used according to job requirements
A-5.01.02P	select class and type of ***cover-up***	class and type of ***cover-up*** is selected according to job specifications, circuit status and voltage
A-5.01.03P	verify ***cover-up*** has valid test date or expiration date	***cover-up*** is verified for valid test date or expiration date
A-5.01.04P	perform visual inspection of ***cover-up*** for ***defects***	visual inspection of ***cover-up*** for ***defects*** is completed
A-5.01.05P	install ***cover-up***	***cover-up*** is installed to prevent second point of contact
A-5.01.06P	maintain MAD from second point of contact	MAD are maintained from second point of contact according to job specifications, circuit status and voltage
A-5.01.07P	remove ***cover-up***	***cover-up*** is removed
A-5.01.08P	maintain, clean and store ***cover-up***	***cover-up*** is maintained, cleaned and stored according to manufacturers' specifications and company standards

RANGE OF VARIABLES

tools and equipment include: rigging, live-line tools, hose/stick bag, clothes pins
cover-up includes: line hose, solid blanket, split blanket, insulator hood, hard covers
defects include: cuts, abrasions, corona cutting

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-5.01.01L	demonstrate knowledge of principles of ***live-line work*** using ***cover-up***	define terminology associated with ***live-line work*** using ***cover-up***
		identify hazards and describe safe work practices pertaining to ***live-line work*** using ***cover-up***
		interpret jurisdictional codes, rules and regulations pertaining to ***live-line work*** using ***cover-up***
		interpret information pertaining to ***live-line work*** using ***cover-up*** found on drawings and specifications
		identify ***tools and equipment*** used for ***live-line work*** using ***cover-up*** and describe their applications and procedures for use
		interpret ***information and*** perform ***calculations*** pertaining to live-line rigging using ***cover-up***
		identify types of ***live-line work*** and describe their applications using ***cover-up***
		identify line protection requirements relating to ***live-line work*** using ***cover-up***
		describe principles of ***live-line work*** using ***cover-up***
		identify class and types of ***cover-up***
A-5.01.02L	demonstrate knowledge of procedures to use ***cover-up***	describe procedures used for ***cover-up***

RANGE OF VARIABLES

live-line work includes: FRP tools (hot sticks), rubber gloves, bare-hand
cover-up includes: line hose, solid blanket, split blanket, insulator hood, hard covers
tools and equipment include: rigging, live-line tools, hose/stick bag, clothes pins
information and calculations include: weights and tensions, WLL, SWL

A-5.02 Uses rubber gloves

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-5.02.01P	select class of rubber gloves	class of rubber gloves is selected according to voltage
A-5.02.02P	verify that rubber gloves have valid test date or expiration date	rubber gloves are verified for valid test date or expiration date
A-5.02.03P	perform air and roll tests and visually inspect rubber gloves	air and roll tests are performed and rubber gloves are visually inspected for cuts and abrasions before each use
A-5.02.04P	verify glove covers	glove covers are verified for class of rubber gloves
A-5.02.05P	visually inspect glove covers	glove covers are visually inspected for cuts and abrasions
A-5.02.06P	position body and access equipment	body and access equipment are positioned for safety and ease of task, according to MAD
A-5.02.07P	verify insulated aerial device has valid test date or expiration date	insulated aerial device is verified for valid test date or expiration date according to safety and company standards
A-5.02.08P	clean insulated aerial device	insulated aerial device is cleaned according to manufacturers' specifications
A-5.02.09P	perform current leakage test	current leakage test is performed according to jurisdictional regulations and company policies

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-5.02.01L	demonstrate knowledge of principles of ***live-line work*** using rubber gloves	define terminology associated with ***live-line work*** using rubber gloves
		identify hazards and describe safe work practices pertaining to ***live-line work*** using rubber gloves
		interpret codes, standards and regulations pertaining to ***live-line work*** using rubber gloves
		interpret information pertaining to ***live-line work*** using rubber gloves found on drawings and specifications

		identify ***tools and equipment*** used for ***live-line work*** using rubber gloves and describe their applications and procedures for use
		interpret ***information and*** perform ***calculations*** pertaining to live-line rigging using cover-up
		identify types of ***live-line work*** using cover-up and describe their applications
		identify line protection requirements relating to ***live-line work*** using cover-up
		describe principles of ***live-line work*** using cover-up
A-5.02.02L	demonstrate knowledge of procedures used to perform ***live-line work*** using rubber gloves	describe procedures used to perform ***live-line work*** using rubber gloves

RANGE OF VARIABLES

live-line work includes: FRP tools, rubber gloves, bare-hand
tools and equipment include: rubber gloves, insulated aerial device, current leakage meter
information and calculations include: weights and tensions, WLL, SWL, current leakage test

A-5.03 Uses bare-hand methods (Not Common Core)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
no	no	no	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-5.03.01P	clean insulated aerial device	insulated aerial device is cleaned according to manufacturers' specifications
A-5.03.02P	perform current leakage test	current leakage test is performed according to safety standards and company policies
A-5.03.03P	select and use ***tools and equipment***	***tools and equipment*** for bare-hand work are selected according to job requirements
A-5.03.04P	follow bare-hand methods	bare-hand methods are followed according to safety standards and company policies
A-5.03.05P	continuously observe current leakage meter	current leakage meter is continuously observed according to safety standards and company policies

RANGE OF VARIABLES

tools and equipment include: insulated aerial device, metal grids, current leakage meter

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-5.03.01L	demonstrate knowledge of principles of ***live-line work*** using bare-hand methods	define terminology associated with ***live-line work*** using bare-hand methods
		identify hazards and describe safe work practices pertaining to ***live-line work*** using bare-hand methods
		interpret codes, standards and regulations pertaining to ***live-line work*** using bare-hand methods
		interpret information pertaining to ***live-line work*** using bare-hand methods found on drawings and specifications
		identify ***tools and equipment*** used for ***live-line work*** using bare-hand methods and describe their applications and procedures for use
		interpret ***information and*** perform ***calculations*** pertaining to live-line rigging using bare-hand methods
		identify types of ***live-line work*** using bare-hand methods and describe their applications
		identify line protection requirements relating to ***live-line work*** using bare-hand methods
		describe principles of ***live-line work*** using bare-hand methods
A-5.03.02L	demonstrate knowledge of procedures used to perform bare-hand methods	describe procedures used to perform bare-hand methods

RANGE OF VARIABLES

live-line work includes: FRP tools (hot sticks), rubber gloves, bare-hand
tools and equipment include: insulated aerial device, metal grids, current leakage meter
information and calculations include: weights and tensions, WLL, SWL, current leakage test

A-5.04 Uses fibreglass reinforced plastic (FRP) tools (hot sticks)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-5.04.01P	select ***FRP tools (hot sticks)***	***FRP tools (hot sticks)*** are selected according to job requirements
A-5.04.02P	verify ***FRP tools (hot sticks)*** have valid test or expiration dates	***FRP tools (hot sticks)*** are verified for valid test or expiration dates
A-5.04.03P	calculate weights and tensions for ***FRP tool (hot stick)*** selection	weights and tensions for ***FRP tool (hot stick)*** selection are calculated
A-5.04.04P	select ***FRP tool (hot stick) attachments***	***FRP tool (hot stick) attachments*** are selected according to job requirements
A-5.04.05P	clean and visually inspect ***FRP tools (hot sticks)***	***FRP tools (hot sticks)*** are cleaned and visually inspected for ***defects*** before use
A-5.04.06P	position body and access equipment	body and access equipment are positioned for safety and ease of task, according to MAD
A-5.04.07P	store ***FRP tools (hot sticks)***	***FRP tools (hot sticks)*** are stored according to manufacturers' specifications

RANGE OF VARIABLES

FRP tools (hot sticks) include: hot sticks, universal sticks, switch sticks, hot line cutters, holding and lifting tongs with associated equipment, telescopic sticks, link sticks

FRP tool (hot stick) attachments include: tie cutters, rotary blades, rotary prongs, cotter key installers

defects include: cracks, loose fittings, scratches

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-5.04.01L	demonstrate knowledge of principles of ***live-line work*** using ***FRP tools (hot sticks)***	define terminology associated with ***live-line work*** using ***FRP tools (hot sticks)***
		identify hazards and describe safe work practices pertaining to ***live-line work*** using ***FRP tools (hot sticks)***
		interpret codes, standards and regulations pertaining to ***live-line work*** using ***FRP tools (hot sticks)***
		interpret information pertaining to ***live-line work*** using ***FRP tools (hot sticks)*** found on drawings and specifications

		identify ***tools and equipment*** used for ***live-line work*** using ***FRP tools (hot sticks)*** and describe their applications and procedures for use
		interpret ***information and*** perform ***calculations*** pertaining to live-line rigging using ***FRP tools (hot sticks)***
		identify types of ***live-line work*** using ***FRP tools (hot sticks)*** and describe their applications
		identify line protection requirements relating to ***live-line work*** using ***FRP tools (hot sticks)***
		describe principles of ***live-line work*** using ***FRP tools (hot sticks)***
A-5.04.02L	demonstrate knowledge of procedures to use ***FRP tools (hot sticks)***	describe procedures used with ***FRP tools (hot sticks)***

RANGE OF VARIABLES

live-line work includes: FRP tools (hot sticks), rubber gloves, bare-hand

FRP tools (hot sticks) include: hot sticks, universal sticks, switch sticks, hot line cutters, holding and lifting tongs with associated equipment, telescopic sticks, link sticks

tools and equipment include: jib, insulated aerial device

information and calculations include: weights and tensions, WLL, SWL

TASK A-6 Uses communication and mentoring techniques

TASK DESCRIPTOR

Learning in the trades is done primarily in the workplace with tradespeople passing on their skills and knowledge to apprentices, as well as sharing knowledge among themselves. Apprenticeship is, and always has been about mentoring – learning workplace skills and passing them on. Because of the importance of this to the trade, this task covers the activities related to communication in the workplace and mentoring skills.

A-6.01 Uses communication techniques

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-6.01.01P	demonstrate communication practices with individuals or in a group	instructions and messages are understood by all parties involved in communication
A-6.01.02P	listen using ***active listening*** practices	steps of ***active listening*** are utilized
A-6.01.03P	receive and respond to feedback on work	response to feedback indicates understanding and corrective measures are taken if required
A-6.01.04P	explain and provide feedback	explanation and feedback is provided and task is carried out as directed
A-6.01.05P	use questioning to improve communication	questions are used to enhance understanding, on-the-job training and goal setting
A-6.01.06P	participate in safety and information meetings	meetings are attended, information is relayed to the workforce, and is understood and applied

RANGE OF VARIABLES

active listening includes: hearing, interpreting, reflecting, responding, paraphrasing

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-6.01.01L	demonstrate knowledge of trade terminology	define terminology used in the trade
A-6.01.02L	demonstrate knowledge of effective communication practices	describe the importance of using effective verbal and non-verbal communication with ***people in the workplace***
		identify ***sources of information*** to effectively communicate

	identify communication and ***learning styles***
	describe effective listening and speaking skills
	identify ***personal responsibilities and attitudes*** that contribute to on-the-job success
	identify the value of diversity in the workplace
	identify communication that constitutes ***harassment*** and ***discrimination***

RANGE OF VARIABLES

people in the workplace include: other tradespeople, colleagues, apprentices, supervisors, customers, jurisdictional authorities, manufacturers

sources of information include: jurisdictional regulations, standards, codes, occupational health and safety requirements, jurisdictional authority requirements, prints, drawings, operating maps, specifications, company and customer documentation

learning styles include: seeing it, hearing it, trying it

personal responsibilities and attitudes include: asking questions, working safely, accepting constructive feedback, time management and punctuality, respect for authority, good stewardship of materials, tools and property, efficient work practice, personal work ethics, responsibility for own actions

harassment includes: objectionable conduct, comment or display made either on a one-time or continuous basis that demeans, belittles, or causes personal humiliation or embarrassment to the recipient

discrimination is prohibited based on: race, national or ethnic origin, colour, religion, age, sex, sexual orientation, gender identity or expression, marital status, family status, disability, genetic characteristics, pardoned conviction

A-6.02 Uses mentoring techniques

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-6.02.01P	identify and communicate learning objective and point of lesson	apprentice or learner can explain objective and point of lesson
A-6.02.02P	link lesson to other lessons and job	lesson order and unplanned learning opportunities are defined
A-6.02.03P	demonstrate performance of a skill to an apprentice or learner	***steps required to demonstrate a skill*** are performed
A-6.02.04P	set up conditions required for an apprentice or learner to practice a skill	***practice conditions*** are set up so that the skill can be practiced safely by the apprentice or learner

A-6.02.05P	assess apprentice or learner's ability to perform tasks with increasing independence	performance of apprentice or learner improves with practice to a point where skill can be done with little supervision
A-6.02.06P	give supportive and corrective feedback	apprentice or learner adopts best practice after having been given supportive or corrective feedback
A-6.02.07P	support apprentices or learners in pursuing technical training opportunities	technical training is completed within timeframe prescribed by apprenticeship authority
A-6.02.08P	support equity group apprentices	workplace is harassment and discrimination-free
A-6.02.09P	assess employee suitability to the trade during probationary period	apprentice or learner is given feedback that helps them identify their own strengths and weaknesses and suitability for the trade

RANGE OF VARIABLES

steps required to demonstrate a skill include: understanding the who, what, where, when, why, and how, explaining, showing, giving encouragement, following up to ensure skill is performed correctly

practice conditions means: guided, limited independence, full independence

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-6.02.01L	demonstrate knowledge of strategies for learning skills in the workplace	describe the importance of individual experience
		describe the shared responsibilities for workplace learning
		determine one's own learning preferences and explain how these relate to learning new skills
		describe the importance of different types of skills in the workplace
		describe the importance of ***essential skills*** in the workplace
		identify different ***learning styles***
		identify different ***learning needs*** and strategies to meet ***learning needs***
		identify ***strategies to assist in learning a skill***
A-6.02.02L	demonstrate knowledge of ***strategies for teaching*** workplace skills	identify different roles played by a workplace mentor
		describe ***teaching skills***
		explain the importance of identifying the point of a lesson
		identify how to choose a good time to present a lesson

	explain the importance of linking the lessons
	identify the components of the skill (the context)
	describe considerations in setting up opportunities for skill practice
	explain the importance of providing feedback
	identify techniques for giving effective feedback
	describe a skills assessment
	identify methods of assessing progress
	explain how to adjust a lesson to different situations

RANGE OF VARIABLES

essential skills are: reading, document use, writing, oral communication, numeracy, thinking, working with others, digital technology, continuous learning

learning styles include: seeing it, hearing it, trying it

learning needs include: learning disabilities, learning preferences, language proficiency

strategies to assist in learning a skill include: understanding the basic principles of instruction, developing coaching skills, being mature and patient, providing feedback

teaching skills include: identifying the point of the lesson, linking the lesson, demonstrating the skill, providing practice, giving feedback, assessing skills and progress

MAJOR WORK ACTIVITY B
Installs structures

TASK B-7 Installs pole structures

TASK DESCRIPTOR

Pole structures are installed to support overhead distribution and transmission power systems. They are made from various materials such as wood, steel, concrete and fibreglass.

B-7.01 Frames pole structures

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-7.01.01P	select and use ***tools and equipment***	***tools and equipment*** to frame pole structures are selected and used according to job requirements and company standards
B-7.01.02P	check ***pole stamp information***	***pole stamp information*** is checked to ensure pole meets engineering standards
B-7.01.03P	inspect poles for ***defects*** and structural integrity	poles are inspected for ***defects*** and to ensure they are treated properly
B-7.01.04P	install ground wire on pole structures	ground wire is installed on pole structures to provide a path to ground according to engineering standards and jurisdictional regulations
B-7.01.05P	measure distances for placement of hardware and equipment	distances for placement of hardware and equipment are measured according to company standards
B-7.01.06P	drill holes	holes are drilled straight and level at required spacing according to company standards
B-7.01.07P	attach ***hardware*** and ***equipment components***	***hardware*** and ***equipment components*** are attached according to company standards

RANGE OF VARIABLES

tools and equipment include: cant hook, framing pole cradle, drill

pole stamp information includes: length, class, treatment type, pole type, date, manufacturer

defects include: knots, rotting

hardware includes: bolts, nuts, washers

equipment components include: pole mounted transformers, single-phase and three-phase switching points, capacitor banks, regulator banks, reclosers

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-7.01.01L	demonstrate knowledge of ***pole structures***, their ***components***, characteristics and applications	define terminology associated with framing ***pole structures*** and their ***components***
		identify hazards and describe safe work practices pertaining to framing ***pole structures*** and their ***components***
		interpret codes, standards and regulations pertaining to ***pole structures*** and their ***components***
		interpret information pertaining to framing ***pole structures*** and their ***components*** found on drawings and specifications
		identify ***tools and equipment*** relating to framing ***pole structures*** and their ***components*** and describe their applications and procedures for use
		identify types of ***pole structures*** and their ***components*** and describe their characteristics and applications
		identify ***hardware*** and ***structure component*** accessories and describe their characteristics and applications
		identify types of ***equipment components***
B-7.01.02L	demonstrate knowledge of procedures used to frame ***pole structures***, their ***components*** and accessories	describe procedures used to frame ***pole structures***, their ***components*** and accessories

RANGE OF VARIABLES

pole structures include: single-pole, multi-pole, tangent, angle, dead-end, take-off (or tap), joint use construction, self-supporting poles (wood, steel, fibreglass, concrete, laminate)

pole structure components include: crossarms, insulators, pole top pins

tools and equipment include: cant hook, framing pole cradle, drill

hardware includes: bolts, nuts, washers

equipment components include: pole mounted transformers, single-phase and three-phase switching points, capacitor banks, regulator banks, reclosers

B-7.02 Sets pole structures

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
B-7.02.01P	select and use ***tools and equipment***	***tools and equipment*** to set ***pole structures*** are selected and used according to job requirements
B-7.02.02P	obtain ***locates***	***locates*** are obtained according to jurisdictional regulations
B-7.02.03P	excavate hole(s)	hole(s) is excavated to required depth according to company standards
B-7.02.04P	install ***pole structure supporting devices***	***pole structure supporting devices*** are installed according to job requirements and soil condition
B-7.02.05P	place ***pole structure*** in hole	***pole structure*** is placed in hole according to work procedures
B-7.02.06P	plumb and secure ***pole structure***	***pole structure*** is plumbed and secured according to work procedures and jurisdictional regulations

RANGE OF VARIABLES

tools and equipment include: radial boom derrick (RBD), cant hook, insulated pole tongs

pole structures include: single-pole, multi-pole, tangent, angle, dead-end, take-off (or tap), joint use construction, self-supporting poles (wood, steel, fibreglass, concrete, laminate)

locates include: pipelines, utilities, water, sewer

pole supporting devices include: pole cribbing, rock mounts, tri-anchor brackets (star pole anchor)

KNOWLEDGE

	Learning Outcomes	Learning Objectives
B-7.02.01L	demonstrate knowledge of principles of setting ***pole structures***	define terminology pertaining to setting ***pole structures***
		identify hazards and describe safe work practices pertaining to setting ***pole structures***
		interpret standards and jurisdictional regulations pertaining to setting ***pole structures***
		interpret information found on drawings and specifications pertaining to setting ***pole structures***

		identify ***tools and equipment*** pertaining to setting ***pole structures*** and describe their applications and procedures for use
		identify types of ***pole structures*** and describe their characteristics and applications
B-7.02.02L	demonstrate knowledge of procedures used to set ***pole structures***	describe procedures to set ***pole structures***

RANGE OF VARIABLES

pole structures include: single-pole, multi-pole, tangent, angle, dead-end, take-off (or tap), joint use construction, self-supporting poles (wood, steel, fibreglass, concrete, laminate)

tools and equipment include: radial boom derrick (RBD), cant hook, insulated pole tongs

B-7.03 Installs pole structure guys and anchors

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
B-7.03.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to manufacturers' specifications and job requirements
B-7.03.02P	obtain ***locates***	***locates*** are obtained according to jurisdictional regulations
B-7.03.03P	install ***anchors***	***anchors*** are installed according to job requirements and soil condition
B-7.03.04P	install ***attachments***, guy strain insulators and ***guys***	***attachments***, guy strain insulators and ***guys*** are installed according to company standards
B-7.03.05P	secure and tension ***guys***	***guys*** are secured and tensioned using ***tools and equipment*** according to company standards
B-7.03.06P	install guards and barriers	guards and barriers are installed according to company standards and jurisdictional regulations

RANGE OF VARIABLES

tools and equipment include: chain hoists, RBD, slings, grips
locates include: pipelines, gas lines, communication, water, sewer, electric
anchors include: helix, rock, cross plates, expansion, log
attachments include: preforms, anchor eye nuts, three-bolt clamps
guys include: down, span, sidewalk (struts), push brace

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-7.03.01L	demonstrate knowledge of principles of pole ***guys*** and ***anchors*** and their applications for use	define terminology associated with ***guys*** and ***anchors***
		identify hazards and describe safe work practices pertaining to the installation of ***guys*** and ***anchors***
		interpret standards and jurisdictional regulations pertaining to the installation of ***guys*** and ***anchors***
		interpret information pertaining to the installation of ***guys*** and ***anchors*** found on drawings and specifications
		identify ***tools and equipment*** pertaining to the installation of ***guys*** and ***anchors*** and describe their applications and procedures for use
		identify types of ***guys*** and ***anchors*** and describe their characteristics and applications
		identify guy and anchor ***attachments*** and describe their characteristics and applications
B-7.03.02L	demonstrate knowledge of procedures used to install pole ***guys*** and ***anchors***	describe procedures used to install pole ***guys*** and ***anchors***

RANGE OF VARIABLES

guys include: down, span, sidewalk (struts), push brace
anchors include: helix, rock, cross plates, expansion, log
tools and equipment include: chain hoists, RBD, slings, grips
attachments include: preforms, anchor eye nuts, three-bolt clamps

TASK B-8 Installs steel lattice structures

TASK DESCRIPTOR

Steel lattice structures are installed to support overhead power systems. These structures are preferred in order to accommodate increased clearances required by high operating voltage, weight of conductors and longer distances between the structures.

B-8.01 Assembles steel lattice structures

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-8.01.01P	select and use ***tools and equipment***	***tools and equipment*** to assemble ***steel lattice structures*** are selected and used according to manufacturers' specifications and job requirements
B-8.01.02P	lay out and verify steel lattice structure components	steel lattice structure components are laid out and verified according to manufacturers' specifications
B-8.01.03P	assemble steel lattice structure components and hardware	steel lattice structure components and hardware are assembled using lifting equipment according to manufacturers' specifications and work procedures

RANGE OF VARIABLES

tools and equipment include: torque wrench, impact drill, cranes
steel lattice structures include: dead-end, corner, tangent

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-8.01.01L	demonstrate knowledge of assembling ***steel lattice structures***, their components, characteristics and applications	define terminology associated with ***steel lattice structures***
		identify hazards and describe safe work practices pertaining to assembly of ***steel lattice structures***
		interpret standards and regulations pertaining to assembly of ***steel lattice structures***

		identify ***tools and equipment*** pertaining to assembling ***steel lattice structures*** and describe their applications and procedures for use
		identify types of ***steel lattice structures*** and describe their characteristics and applications
		interpret information pertaining to ***steel lattice structures*** found on drawings and specifications
B-8.01.02L	demonstrate knowledge of procedures used to assemble ***steel lattice structures*** and their components	describe procedures used to assemble ***steel lattice structures*** and their components

RANGE OF VARIABLES

steel lattice structures include: dead-end, corner, tangent
tools and equipment include: torque wrench, impact drill, cranes

B-8.02 Erects steel lattice structures

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
B-8.02.01P	select and use ***tools and equipment***	***tools and equipment*** to erect ***steel lattice structures*** are selected and used according to manufacturers' specifications and job requirements
B-8.02.02P	place and secure base or structure on footing	base of a multi-sectioned ***steel lattice structure*** or the entire structure is placed and secured according to manufacturers' specifications and company standards
B-8.02.03P	connect remaining ***steel lattice structure*** sections	remaining ***steel lattice structure*** sections are connected aloft and in sequence according to manufacturers' specifications and work procedures
B-8.02.04P	use temporary guy wires	temporary guy wires are used depending on type of structure according to work procedures to ensure stability during erection
B-8.02.05P	torque bolts	bolts are torqued according to manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: slings, cranes, helicopters
steel lattice structures include: dead-end, corner, tangent

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-8.02.01L	demonstrate knowledge of procedures used to erect ***steel lattice structures***	define terminology associated with ***steel lattice structures***
		identify hazards and describe safe work practices pertaining to erecting ***steel lattice structures***
		interpret standards and jurisdictional regulations pertaining to ***steel lattice structures***
		identify ***tools and equipment*** relating to erecting ***steel lattice structures*** and describe their applications and procedures for use
		interpret information pertaining to erection of ***steel lattice structures*** found on drawings and specifications
B-8.02.02L	demonstrate knowledge of procedures used to erect ***steel lattice structures*** and their components	describe procedures used to erect ***steel lattice structures*** and their components

RANGE OF VARIABLES

steel lattice structures include: dead-end, corner, tangent
tools and equipment include: slings, cranes, helicopters

B-8.03 Installs steel lattice structure guy wires and anchors

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-8.03.01P	select anchor type	anchor type is selected according to company standards and soil condition
B-8.03.02P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to manufacturers' specifications and job requirements
B-8.03.03P	select guy wire size and guy attachments	guy wire size and guy attachments are selected according to company standards

B-8.03.04P	obtain ***locates***	***locates*** are obtained according to jurisdictional regulations
B-8.03.05P	position and install ***anchors*** for structures	***anchors*** are positioned and installed for structures according to work procedures and company standards
B-8.03.06P	assemble, secure and tension guy wires	guy wires are assembled, secured and tensioned while ensuring structure is plumb according to company standards and work procedures

RANGE OF VARIABLES

tools and equipment include: chain hoists, RBD, grips, dynamometer
locates include: pipelines, gas lines, communication, water, sewer, electric
anchors include: helix, rock, cross plates, expansion

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-8.03.01L	demonstrate knowledge of guy wires and ***anchors***, their characteristics and applications	define terminology associated with guy wires and ***anchors***
		identify hazards and describe safe work practices pertaining to installing guy wires and ***anchors***
		interpret standards and jurisdictional regulations pertaining to the installation of guy wires and ***anchors***
		identify ***tools and equipment*** pertaining to the installation of guy wires and ***anchors*** and describe their applications and procedures for use
		identify types of guy wires and ***anchors*** and describe their characteristics and applications
		interpret information pertaining to installation of guy wires and ***anchors*** found on drawings and specifications
B-8.03.02L	demonstrate knowledge of procedures used to install guy wires and ***anchors***	describe procedures used to install guy wires and ***anchors***

RANGE OF VARIABLES

anchors include: helix, rock, cross plates, expansion
tools and equipment include: chain hoists, RBD, grips, dynamometer

MAJOR WORK ACTIVITY C
Installs conductor systems

TASK C-9 Installs overhead conductors and cables

TASK DESCRIPTOR

Overhead conductors and cables are installed to deliver electricity from the generating facilities (wind, solar, coal, hydro) to customers. They are also used to interconnect utilities. This includes communication lines such as fibre optic cable.

Overhead conductors are easier to access than underground or underwater conductors. There are various types of overhead conductors such as primary and secondary. Some are bare and others are insulated.

C-9.01 Strings overhead conductors and cables

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-9.01.01P	select and use ***tools and equipment***	***tools and equipment*** to string ***overhead conductors and cables*** are selected and used according to job requirements
C-9.01.02P	install travelers	travellers are installed on pole or steel lattice structures
C-9.01.03P	run conductor or rope through travellers	conductor or rope is temporarily run through travellers to reduce friction when sagging
C-9.01.04P	attach pulling equipment	pulling equipment is attached to conductor or rope
C-9.01.05P	set up and operate stringing equipment	stringing equipment is set up and operated when installing ***overhead conductors and cables***

RANGE OF VARIABLES

tools and equipment include: pulling equipment, tension stringing equipment, grounding equipment, break-a-ways, cover-up

overhead conductors and cables include: transmission, distribution

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-9.01.01L	demonstrate knowledge of ***overhead conductors and cables***, their characteristics and applications	define terminology associated with ***overhead conductors and cables***
		identify hazards and describe safe work practices pertaining to ***overhead conductors and cables***
		interpret utility standards pertaining to ***overhead conductors and cables***
		interpret information pertaining to ***overhead conductors and cables*** found on drawings and specifications
		identify tools and equipment relating to stringing ***overhead conductors and cables*** and describe their applications and procedures for use
		identify types of ***overhead conductors and cables*** and describe their characteristics and applications
		identify considerations and requirements for selecting ***overhead conductors and cables***
C-9.01.02L	demonstrate knowledge of ***conductor and cable protection methods***, procedures and their applications	identify ***conductor and cable protection methods*** and describe their characteristics, procedures and applications
		describe ***conductor and cable protection methods*** used to provide electrical protection
C-9.01.03L	demonstrate knowledge of distribution lines, their applications and operation	define terminology associated with distribution lines
		identify hazards and describe safe work practices pertaining to distribution lines
		interpret codes, standards and regulations pertaining to distribution lines
		interpret information pertaining to distribution lines found on drawings and specifications
		identify ***tools and equipment*** relating to stringing distribution lines and describe their applications and procedures for use
		explain principles of electrical distribution
		identify types of electrical distribution systems and describe their characteristics and applications
C-9.01.04L	demonstrate knowledge of ***procedures used to string distribution lines***	describe ***procedures used to string distribution lines***

		describe distribution line design theory
		identify basic electrical design requirements of distribution lines
C-9.01.05L	demonstrate knowledge of transmission lines, their applications and operation	define terminology associated with transmission lines
		identify hazards and describe safe work practices pertaining to transmission lines
		interpret codes, standards and regulations pertaining to transmission lines
		interpret information pertaining to transmission lines found on drawings and specifications
		identify tools and equipment relating to transmission lines and describe their applications and procedures for use
		identify types of transmission lines and describe their characteristics and applications
C-9.01.06L	demonstrate knowledge of electrical principles	explain principles of electricity
		identify transmission lines components and describe their applications and operation
		describe procedures used to install transmission lines
C-9.01.07L	demonstrate knowledge of procedures used in temporary grounding and bonding of transmission and distribution lines	identify temporary grounding and bonding procedures pertaining to transmission and distribution lines
		describe procedures used for temporary grounding and bonding of transmission and distribution lines
		explain troubleshooting and repair procedures pertaining to transmission and distribution lines

RANGE OF VARIABLES

overhead conductors and cables include: transmission, distribution

conductor and cable protection methods include: mechanical, electrical

tools and equipment include: pulling equipment, tension stringing equipment, grounding equipment, break-a-ways, cover-up

procedures used to string distribution lines include: conventional stringing, non-tension, tension stringing

C-9.02 Sags overhead conductors and cables

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-9.02.01P	select and use ***tools and equipment***	***tools and equipment*** to sag overhead conductors and cables are selected and used according to job requirements
C-9.02.02P	adjust conductor and cable tension	conductor and cable tension is adjusted based on ***information***
C-9.02.03P	secure conductor and cable	conductor and cable are secured to dead-end fixtures depending on type and size of conductor

RANGE OF VARIABLES

tools and equipment include: jacks, slings, chains, grips, sag boards, scopes, transits, dynamometer
information includes: sag charts, temperature, conductor type, weights and tensions

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-9.02.01L	demonstrate knowledge of effects of sagging on overhead conductors and cables	define terminology associated with sagging overhead conductors and cables
		identify hazards and describe safe work practices pertaining to sagging overhead conductors and cables
		interpret codes, standards and regulations pertaining to sagging overhead conductors and cables
		interpret ***information*** and perform calculations pertaining to sagging overhead conductors and cables found on drawings and specifications
		identify ***tools and equipment*** relating to sagging overhead conductors and cables and describe their applications and procedures for use
		explain effects of sagging on overhead conductors and cables
		identify types and sizes of overhead conductors and cables and describe their characteristics and applications

		identify considerations and requirements for selecting dead-ends for overhead conductors and cables
C-9.02.02L	demonstrate knowledge of procedures used to sag overhead conductors and cables	describe procedures used to sag overhead conductors and cables

RANGE OF VARIABLES

information includes: sag charts, temperature, conductor type, weights and tensions
tools and equipment include: jacks, slings, chains, grips, sag boards, scopes, transits, dynamometer

C-9.03 Ties-in overhead conductors and cables

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-9.03.01P	select and use ***tools and equipment***	***tools and equipment*** to tie-in overhead conductors and cables are selected and used according to job requirements
C-9.03.02P	transfer conductor and cables	conductor and cables are transferred from travellers to insulators
C-9.03.03P	install ***components***	***components*** are installed according to company standards
C-9.03.04P	secure conductor and cables	conductor and cables are secured using clamps or ties
C-9.03.05P	remove travellers	travellers are removed

RANGE OF VARIABLES

tools and equipment include: lineman pliers, ratchets, wrenches, cordless impact driver
components include: dampers, spacers, aerial markers, armour rods

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-9.03.01L	demonstrate knowledge of overhead conductor and cable tie-ins and ***components***	define terminology associated with overhead conductor and cable tie-ins and ***components***
		identify hazards and describe safe work practices pertaining to overhead conductor and cable tie-ins and ***components***

		interpret utility standards pertaining to overhead conductor and cable tie-ins and ***components***
		interpret information pertaining to overhead conductor and cable tie-ins and ***components*** found on drawings and specifications
		identify ***tools and equipment*** relating to tying in overhead conductor and cable tie-ins and ***components*** and describe their applications and procedures for use
		identify overhead conductor and cable tie-ins and ***components***
		identify considerations and requirements for selecting overhead conductor and cable tie-ins and ***components***
C-9.03.02L	demonstrate knowledge of ***conductor and cable protection methods*** used for tie-ins	identify ***conductor and cable protection methods*** used for tie-ins
		describe ***conductor and cable protection methods*** used to provide mechanical protection and support
C-9.03.03L	demonstrate knowledge of distribution and transmission lines, their ***components***, applications and operation	identify distribution and transmission lines and their ***components***
		describe the application and operation of distribution and transmission lines and their ***components***

RANGE OF VARIABLES

components include: dampers, spacers, aerial markers, armour rods
tools and equipment include: lineman pliers, ratchets, wrenches, cordless impact driver
conductor and cable protection methods include: mechanical, electrical

C-9.04 Installs splices and connections to overhead conductors and cables

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-9.04.01P	select and use ***tools and equipment***	***tools and equipment*** to splice overhead conductors and cables are selected and used according to job requirements
C-9.04.02P	select and apply ***sleeves***	***sleeves*** are selected and applied on ends of overhead conductors and cables to be spliced according to engineering standards
C-9.04.03P	select and apply ***connectors***	***connectors*** are selected and applied on ends of overhead conductors and cables to be connected according to engineering standards
C-9.04.04P	follow splicing techniques	splicing techniques are followed according to manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: wire brushes, cable cutters, presses, jacks, powder-actuated tools
sleeves include: automatic, mechanical, compression, implosive
connectors include: powder-actuated, mechanical, compression, implosive

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-9.04.01L	demonstrate knowledge of splices and connections for overhead conductors and cables	define terminology associated with splices and connections for overhead conductors and cables
		identify hazards and describe safe work practices pertaining to splices and connections for conductors and cables
		interpret utility standards pertaining to splices and connections for overhead conductors and cables
		interpret information pertaining to splices and connections for overhead conductors and cables found on drawings and specifications
		identify ***tools and equipment*** relating to splices and connections for overhead conductors and cables and describe their applications and procedures for use

		identify types of splices and connections for overhead conductors and cables and describe their characteristics and applications
C-9.04.02L	demonstrate knowledge of ***conductor and cable protection methods*** for splices and connections	identify ***conductor and cable protection methods*** for splices and connections and, describe their characteristics, procedures and applications
		describe ***conductor and cable protection methods*** used to provide electrical protection for splices and connections
C-9.04.03L	demonstrate knowledge of procedures used to splice conductors and cables	describe procedures used to splice conductors and cables

RANGE OF VARIABLES

tools and equipment include: wire brushes, cable cutters, presses, jacks, powder-actuated tools
conductor and cable protection methods include: mechanical, electrical

TASK C-10 Installs underground and underwater cable

TASK DESCRIPTOR

Powerline technicians install underground and underwater cable for aesthetic, clearance, geographic and safety reasons. These types of installations require special care when installing. If improperly installed, repair is more costly and time consuming which in turn affects customer service because of longer outages.

C-10.01 Installs conduit and cable

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-10.01.01P	select and use ***tools and equipment***	***tools and equipment*** to install conduits and cable are selected and used according to job requirements
C-10.01.02P	excavate trenches	trenches are cut for conduit and cable placement
C-10.01.03P	place conduits	conduits are placed in trench or waterway according to company standards and jurisdictional regulations

C-10.01.04P	install pulling ropes or tape	pulling ropes or tape are installed to facilitate future cable installation
C-10.01.05P	backfill trenches	trenches are backfilled using ***materials***
C-10.01.06P	tamp soil	soil is tamped using compacting equipment
C-10.01.07P	prepare conduit for cable installation	conduit is prepared for cable installation by cleaning and clearing conduit
C-10.01.08P	apply cable lubricant	cable lubricant is applied to reduce friction when running cable through conduit
C-10.01.09P	attach ***pulling connections***	***pulling connections*** are attached to pulling rope
C-10.01.10P	pull cable through conduit	cable is pulled through conduit
C-10.01.11P	label cable	cable is labeled to identify circuit and phasing

RANGE OF VARIABLES

tools and equipment include: trenchers, vibratory plow, directional drill, backhoe, tamper, shovel, tugger, winch, swivel, cable pulling sock

materials include: sand, clean fill, native soil

pulling connections include: swivels, cable pulling sock

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-10.01.01L	demonstrate knowledge of ***underground and underwater systems,*** their ***components***, characteristics and applications	define terminology associated with ***underground and underwater systems*** and their ***components***
		identify hazards and describe safe work practices pertaining to ***underground and underwater systems***
		interpret utility standards pertaining to ***underground and underwater systems***
		interpret information pertaining to ***underground and underwater systems*** found on drawings and specifications
		identify ***tools and equipment*** relating to ***underground and underwater systems*** and describe their applications and procedures for use
		identify types of ***underground and underwater systems*** and describe their characteristics and applications
		identify underground and underwater systems ***components*** and describe their characteristics and applications

		identify considerations and requirements for selecting ***underground and underwater systems*** and their ***components***
C-10.01.02L	demonstrate knowledge of ***cable protection methods*** and their applications	identify ***cable protection methods*** and describe their characteristics and applications
		describe procedures used to provide protection for underground and underwater cables
C-10.01.03L	demonstrate knowledge of ***underground and underwater systems*** construction principles	explain principles of ***underground and underwater systems*** construction
C-10.01.04L	demonstrate knowledge of procedures used to install ***underground and underwater systems***, and their ***components***	describe procedures used to install ***underground and underwater systems***, and their ***components***

RANGE OF VARIABLES

underground and underwater systems include: radial, loop, network

components include: cables (concentric neutral, non-shielded, shielded), cable protection, system grounds, conduit

tools and equipment include: trenchers, vibratory plow, directional drill, backhoe, tamper, shovel, tugger, winch, swivel, cable pulling sock

cable protection methods include: mechanical, electrical

C-10.02 Places direct buried cable

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-10.02.01P	select and use ***tools and equipment***	***tools and equipment*** to place direct buried underground and underwater cable are selected and used according to job requirements
C-10.02.02P	excavate trenches	trenches are cut for direct buried underground and underwater cable placement
C-10.02.03P	lay direct buried underground and underwater cable	direct buried underground and underwater cable are placed in trench or waterway according to company standards and jurisdictional regulations

C-10.02.04P	label direct buried underground and underwater cable	direct buried underground and underwater cable are labeled to identify circuit and phasing
C-10.02.05P	backfill trenches	trenches are backfilled using ***materials***
C-10.02.06P	tamp soil	soil is tamped using compacting equipment

RANGE OF VARIABLES

tools and equipment include: trenchers, vibratory plow, directional drill, backhoe, tamper, shovel, swivel, cable pulling sock

materials include: sand, clean fill, native soil

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-10.02.01L	demonstrate knowledge of direct buried underground and underwater cable	define terminology associated with direct buried underground and underwater cable
		identify hazards and describe safe work practices pertaining to direct buried underground and underwater cable
		interpret information pertaining to direct buried underground and underwater cable found on drawings and specifications
		interpret codes, standards and regulations pertaining to underground and underwater systems
		identify ***tools and equipment*** relating to direct buried underground and underwater cable and describe their applications and procedures for use
		identify types of direct buried underground and underwater cable and describe their characteristics and applications
		identify direct buried underground and underwater cable components and accessories and describe their characteristics and applications
C-10.02.02L	demonstrate knowledge of ***cable protection methods*** and their applications	identify ***cable protection methods*** and describe their characteristics and applications
		describe procedures used to provide protection for direct buried underground and underwater cable

C-10.02.03L	demonstrate knowledge of direct buried ***underground and underwater systems*** construction principles	explain principles of direct buried ***underground and underwater systems*** construction
C-10.02.04L	demonstrate knowledge of procedures used to install direct buried ***underground and underwater systems***, and their ***components***	describe procedures used to install direct buried ***underground and underwater systems***, and their ***components***

RANGE OF VARIABLES

tools and equipment include: trenchers, vibratory plow, directional drill, backhoe, tamper, shovel, swivel, cable pulling sock

cable protection methods include: mechanical, electrical

underground and underwater systems include: radial, loop, network

C-10.03 Splices underground and underwater cable

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-10.03.01P	select and use ***tools and equipment***	***tools and equipment*** to splice underground and underwater ***cable*** are selected and used according to job requirements
C-10.03.02P	prepare ***cable***	***cable*** is prepared according to manufacturers' specifications and company standards
C-10.03.03P	apply ***sleeve***	***sleeves*** are applied on ends of cables to be spliced according to engineering standards
C-10.03.04P	make mechanical or compression connection	connection is installed according to manufacturers' specifications
C-10.03.05P	complete splice	splice is completed according to manufacturers' specifications and company standards
C-10.03.06P	label ***cable***	***cable*** is labeled to identify circuit and phasing

RANGE OF VARIABLES

tools and equipment include: wire brushes, cable cutters, cable strippers, presses, tape measure, ratchets, hacksaws, lineman pliers, hack knife

cables include: concentric neutral, non-shielded, shielded

sleeves include: mechanical, compression

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-10.03.01L	demonstrate knowledge of underground and underwater splices for ***cables***, their characteristics and applications	define terminology associated with splices for underground and underwater ***cables***
		identify hazards and describe safe work practices pertaining to splices for underground and underwater ***cables***
		interpret utility standards pertaining to splices for underground and underwater ***cables***
		interpret information pertaining to splices for underground and underwater ***cables*** found on drawings and specifications
		identify ***tools and equipment*** relating to splices for underground and underwater ***cables*** and describe their applications and procedures for use
		identify types of splices for underground and underwater ***cables*** and describe their characteristics and applications
C-10.03.02L	demonstrate knowledge of ***cable protection methods*** and their characteristics, applications and procedures used to provide protection	identify ***cable protection methods*** and describe their characteristics and applications
		describe procedures used to provide protection for underground and underwater ***cable*** splices
C-10.03.03L	demonstrate knowledge of ***underground and underwater systems***, their characteristics and applications	define terminology associated with ***underground and underwater systems***
		identify hazards and describe safe work practices pertaining to ***underground and underwater systems***
		interpret codes, standards and regulations pertaining to ***underground and underwater systems***
		interpret information pertaining to ***underground and underwater systems*** found on drawings and specifications
		identify ***tools and equipment*** relating to ***underground and underwater systems*** and describe their applications and procedures for use
		identify types of ***underground and underwater systems*** and describe their applications

		identify ***underground and underwater systems components and accessories*** and describe their characteristics and applications
C-10.03.04L	demonstrate knowledge of ***underground and underwater systems*** construction principles	explain principles of ***underground and underwater systems*** construction
C-10.03.05L	demonstrate knowledge of procedures used to splice and test underground and underwater ***cables***	describe procedures used to cut, strip and splice underground and underwater ***cables***
		describe procedures used to test underground and underwater ***cables***

RANGE OF VARIABLES

cables include: concentric neutral, non-shielded, shielded

tools and equipment include: wire brushes, cable cutters, cable strippers, presses, tape measure, ratchets, hacksaws, lineman pliers, hack knife

cable protection methods include: mechanical, electrical

underground and underwater systems include: radial, loop, network

underground and underwater system components and accessories include: cables (concentric neutral, non-shielded, shielded), cable protection, system grounds, duct systems, direct-buried systems

C-10.04 Terminates underground and underwater cable

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-10.04.01P	select and use ***tools and equipment***	***tools and equipment*** to terminate underground and underwater cable are selected and used according to job requirements
C-10.04.02P	prepare underground and underwater cable for termination	underground and underwater cable is prepared for termination by following manufacturers' specifications and company standards
C-10.04.03P	apply fittings	fittings are applied on end of underground and underwater cable to be terminated according to engineering standards
C-10.04.04P	make connection	connectors are installed on underground and underwater cables according to manufacturers' specifications and company standards

C-10.04.05P	install ***terminations***	***terminations*** are installed on end of underground and underwater cable according to manufacturers' specifications and company standards
C-10.04.06P	test underground and underwater cable integrity	confirm underground and underwater cable integrity using ***methods***
C-10.04.07P	label underground and underwater cable	underground and underwater cable is labeled to identify circuit and phasing

RANGE OF VARIABLES

tools and equipment include: wire brushes, cable cutters, cable strippers, presses, tape measure, ratchets, hacksaws, lineman pliers, hatchet, heat gun

terminations include: elbows, stress cones, t-body

methods include: ultra low frequency (ULF), very low frequency (VLF), resistance test, high potential test

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-10.04.01L	demonstrate knowledge of underground and underwater cable terminations	define terminology associated with underground and underwater ***cable*** terminations
		identify hazards and describe safe work practices pertaining to underground and underwater ***cable*** terminations
		interpret utility standards pertaining to underground and underwater ***cable*** terminations
		interpret information pertaining to underground and underwater ***cable*** terminations found on drawings and specifications
		identify ***tools and equipment*** relating to underground and underwater ***cable*** terminations and describe their applications and procedures for use
		identify types of underground and underwater ***cable*** terminations and describe their characteristics and applications
C-10.04.02L	demonstrate knowledge of underground and underwater ***cable protection methods*** and their applications	identify ***cable protection methods*** and describe their characteristics and applications
		describe procedures used to provide protection for underground and underwater ***cable*** terminations
C-10.04.03L	demonstrate knowledge of ***underground and underwater systems***, their characteristics and applications	define terminology associated with ***underground and underwater systems***

		identify hazards and describe safe work practices pertaining to ***underground and underwater systems***
		interpret codes, standards and regulations pertaining to ***underground and underwater systems***
		interpret information pertaining to ***underground and underwater systems*** found on drawings and specifications
		identify ***tools and equipment*** relating to ***underground and underwater systems*** and describe their applications and procedures for use
		identify types of ***underground and underwater systems*** and describe their applications
		identify ***underground and underwater systems components and accessories*** and describe their characteristics and applications
C-10.04.04L	demonstrate knowledge of underground and underwater system construction principles	explain principles of ***underground and underwater systems*** construction
C-10.04.05L	demonstrate knowledge of procedures used to terminate and test underground and underwater ***cables***	describe procedures used to test underground and underwater ***cables***
		describe procedures used to terminate underground and underwater ***cables***

RANGE OF VARIABLES

cables include: concentric neutral, non-shielded, shielded

tools and equipment include: wire brushes, cable cutters, cable strippers, presses, tape measure, ratchets, hacksaws, lineman pliers, hatchet, heat gun

cable protection methods include: mechanical, electrical

underground and underwater systems include: radial, loop, network

underground and underwater system components and accessories include: cables (concentric neutral, non-shielded, shielded), cable protection, system grounds, duct systems, direct-buried systems

MAJOR WORK ACTIVITY D
Installs auxiliary equipment

TASK D-11 Installs lighting systems

TASK DESCRIPTOR

This task explains the process of assembling, installing and maintaining lighting systems on structures.

D-11.01 Installs street lights

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-11.01.01P	select and use ***tools and equipment***	***tools and equipment*** to install street lights are selected and used according to job requirements
D-11.01.02P	select street light components and wiring	street light components and wiring are selected according to ***company standards***
D-11.01.03P	assemble fixture and mounting arm components	fixture and mounting arm components are assembled according to manufacturers' specifications
D-11.01.04P	fasten mounting arm	mounting arm is fastened to structure according to company standards for location and fastening procedures
D-11.01.05P	mount and position fixture	fixture is mounted and positioned to direct light to desired location
D-11.01.06P	connect fixture wiring	fixture wiring is connected according to company standards
D-11.01.07P	test operation of street light	operation of street light is tested

RANGE OF VARIABLES

tools and equipment include: drills, AWP, compression tools, multi-meters
company standards include: voltage, wattage, type required, location

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-11.01.01L	demonstrate knowledge of street lighting systems, their characteristics and applications	define terminology associated with street lighting systems
		identify hazards and describe safe work practices pertaining to installing street lighting systems
		interpret codes, standards and regulations pertaining to street lighting systems
		identify ***tools and equipment*** relating to street lighting systems and describe their applications and procedures for use
		identify ***types of street lighting systems*** and describe their characteristics and applications
		identify ***street lighting system components*** and accessories and describe their characteristics and applications
		identify considerations and requirements for selecting ***street lighting system components*** and accessories
D-11.01.02L	demonstrate knowledge of procedures used to install, connect, troubleshoot and test street lighting systems, their ***components*** and accessories	describe procedures used to install and connect street lighting systems, their ***components*** and accessories
		describe procedures used to troubleshoot and test street lighting systems, their ***components*** and accessories
D-11.01.03L	demonstrate knowledge of procedures used to store and dispose of ballasts, capacitors and lamps	describe procedures used to store and dispose of ballasts, capacitors and lamps
		identify hazards associated with storage and disposal of ballasts, capacitors and lamps

RANGE OF VARIABLES

tools and equipment include: drills, AWP, compression tools, multi-meters
types of street lighting systems include: light-emitting diode (LED), cascade, pilot wire
street lighting system components include: lamps, bird stops, photocells, installation arms, starter

D-11.02 Maintains street lights

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-11.02.01P	select and use ***tools and equipment***	***tools and equipment*** to maintain street lights are selected and used according to job requirements
D-11.02.02P	visually inspect street lights	street lights are visually inspected for ***problems***
D-11.02.03P	check source voltage	source voltage is checked using multi-meters
D-11.02.04P	check for defective ***street lighting system components***	defective ***street lighting system components*** are identified using multi-meters
D-11.02.05P	check for correct bulb	bulb is confirmed according to type of fixture and manufacturers' specifications
D-11.02.06P	repair, replace and dispose of damaged ***street lighting system components***	damaged ***street lighting system components*** are repaired, replaced and disposed of according to manufacturers' specifications and environmental regulations
D-11.02.07P	test operation of street light	operation of street light is tested

RANGE OF VARIABLES

tools and equipment include: AWP, compression tools, multi-meters
problems include: loose connections, burnt wires, broken photocells, burnt out bulbs
street lighting system components include: lamps, bird stops, photocells, installation arms, starter

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-11.02.01L	demonstrate knowledge of street lighting systems, their characteristics and applications	define terminology associated with street lighting systems
		identify hazards and describe safe work practices pertaining to street lighting systems
		interpret codes, standards and regulations pertaining to street lighting systems
		identify ***tools and equipment*** pertaining to street lighting systems and describe their applications and procedures for use

		identify ***types of street lighting systems*** and describe their characteristics and applications
		identify ***street lighting system components*** and accessories and describe their characteristics and applications
		identify considerations and requirements for selecting ***street lighting system components*** and accessories
D-11.02.02L	demonstrate knowledge of procedures used to troubleshoot, inspect, maintain, repair and test street lighting systems, their ***components*** and accessories	describe procedures used to troubleshoot street lighting systems, their ***components*** and accessories
		describe procedures used to inspect and maintain street lighting systems, their ***components*** and accessories
		describe procedures used to repair and test street lighting systems, their ***components*** and accessories
D-11.02.03L	demonstrate knowledge of procedures used to store and dispose of ballasts, capacitors and lamps	describe procedures used to store and dispose of ballasts, capacitors and lamps
		identify hazards associated with storage and disposal of ballasts, capacitors and lamps

RANGE OF VARIABLES

tools and equipment include: AWP, compression tools, multi-meters
types of street lighting systems include: LED, cascade, pilot wire, high intensity discharge (HID)
street lighting system components include: lamps, bird stops, photocells, installation arms, starter

TASK D-12 Installs voltage control equipment

TASK DESCRIPTOR

Powerline technicians install transformers, capacitors, regulators, switches and reactors in order to control or modify voltage, and to maintain the correct power factor. This ensures a reliable product for customers. For example, it helps to keep machinery running at a consistent pace and minimizes damage to sensitive electrical equipment.

D-12.01 Installs transformers

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-12.01.01P	select and use ***tools and equipment***	***tools and equipment*** to install transformers are selected and used according to job requirements
D-12.01.02P	select transformer	transformer required for application is selected by interpreting name plate information and according to job requirements
D-12.01.03P	check and change internal connections	internal connections are checked or changed according to required voltage
D-12.01.04P	fasten aerial transformer	aerial transformer is fastened to structure according to company standards and manufacturers' specifications
D-12.01.05P	position and secure pad-mounted transformer on pad	pad-mounted transformer is positioned on pad and secured according to company standards and manufacturers' specifications
D-12.01.06P	make ***wiring connections***	***wiring connections*** are made according to company standards
D-12.01.07P	energize transformer and check voltage and phase rotation	transformer is energized, and voltage and phase rotation is checked
D-12.01.08P	install identification labelling on pad-mounted transformers	identification labelling is installed on pad-mounted transformers according to company standards

RANGE OF VARIABLES

tools and equipment include: drills, AWP, FRP tools (hot sticks), multi-meter, phase rotation meter, transformer tester

wiring connections include: primary, secondary, grounding, transmission

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-12.01.01L	demonstrate knowledge of transformer operating principles	define terminology associated with transformers
		identify hazards and describe safe work practices pertaining to transformers
		interpret codes, standards and regulations pertaining to transformers
		interpret information pertaining to transformers found on nameplates, drawings and specifications
		identify ***tools and equipment*** relating to transformers and describe their applications and procedures for use
		identify ***types of distribution transformers*** and describe their applications
		explain transformer operating principles and their applications
		perform transformer load calculations
		describe single-phase transformer wiring configurations
		describe procedures used for paralleling single-phase transformers
		explain transformer fusing principles and their applications relating to single-phase transformation
D-12.01.02L	demonstrate knowledge of ***transformer components***, their applications and operation	identify ***transformer components*** and describe their purpose and operation
D-12.01.03L	demonstrate knowledge of procedures used to install transformers	describe procedures used to install transformers
D-12.01.04L	demonstrate knowledge of managing hazardous materials associated with transformers	describe procedures used to manage oils and other petroleum products pertaining to transformers
D-12.01.05L	demonstrate knowledge of transformer banking	define terminology associated with transformer banking
		identify hazards and describe safe work practices pertaining to transformer banking
		interpret codes, standards and regulations pertaining to transformer banking
		interpret information pertaining to transformer banking found on nameplates, drawings and specifications

		identify ***tools and equipment*** relating to transformer banking and describe their applications and procedures for use
		identify considerations for selecting transformer banks to satisfy clients' needs
		describe transformer bank wiring configurations
		explain transformer fusing principles and their applications relating to transformer banks
D-12.01.06L	demonstrate knowledge of self-contained three-phase transformers	identify the characteristics of self-contained three-phase transformers
D-12.01.07L	demonstrate knowledge of procedures used to install transformer banks	describe procedures used to install transformer banks
		describe procedures used for paralleling transformer banks
		describe procedures used to perform ***tests*** on transformer banks
D-12.01.08L	demonstrate knowledge of ***transformer connection*** types, their applications and implications	identify types of ***transformer connections*** and describe their applications
D-12.01.09L	demonstrate knowledge of ***power transformer*** operating principles	define terminology associated with ***power transformers***
		identify hazards and describe safe work practices pertaining to ***power transformers***
		interpret codes, standards and regulations pertaining to ***power transformers***
		interpret information pertaining to ***power transformers*** found on nameplates, drawings and specifications
		identify ***tools and equipment*** relating to ***power transformers*** and describe their applications and procedures for use
		identify types of ***power transformers*** and describe their applications
		identify types of ***power transformer connections*** and describe their applications
		explain ***power transformer*** operating principles and their applications
		describe ***power transformer*** wiring configurations
		explain transformer protection principles and their applications relating to ***power transformers***

D-12.01.10L	demonstrate knowledge of procedures used to install and parallel ***power transformers***	describe procedures used to install ***power transformers***
		describe procedures used for paralleling ***power transformers***
D-12.01.11L	demonstrate knowledge of ***power transformer components***, their applications and operation	identify ***power transformer components*** and describe their functions

RANGE OF VARIABLES

tools and equipment include: drills, AWP, FRP tools (hot sticks), multi-meter, phase rotation meter, transformer tester

types of distribution transformers include: pole-mounted, pad-mounted, submersible, platform, self-contained three-phase

transformer components include: core, windings, oil, bushings, gaskets, tank, cover, taps and tap changer, mounting brackets, switches, fault indicators

tests include: phase rotation, voltages, amperages

transformer connections include: parallel, delta-delta, wye-wye, delta-wye, wye-delta, open wye-open delta, open delta-open delta

power transformers include: stationary, mobile

power transformer connections include: two-winding, autotransformer, tertiary

power transformer components include: core, windings, oil, bushings, gaskets, tank, cover, taps and tap changer, mounting brackets, switches, cooling systems, protection alarms

D-12.02 Installs capacitors

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-12.02.01P	select and use ***tools and equipment***	***tools and equipment*** to install capacitors are selected and used according to job requirements
D-12.02.02P	verify selection of ***capacitors***	selection of ***capacitors*** is verified according to company and engineering standards
D-12.02.03P	control capacitive charge	capacitive charge is controlled when installing and removing capacitors according to work procedures
D-12.02.04P	mount and connect ***capacitors***	***capacitors*** are mounted and connected on structure according to company standards

D-12.02.05P	perform ***tests***	***tests*** are performed according to company standards
D-12.02.06P	energize and de-energize ***capacitors***	***capacitors*** are energized and de-energized

RANGE OF VARIABLES

tools and equipment include: drills, AWP, FRP tools (hot sticks), multi-meters
capacitors include: shunt connection, series connection, series-parallel
tests include: visual, electrical

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-12.02.01L	demonstrate knowledge of ***capacitors***, their characteristics and applications	define terminology associated with ***capacitors***
		identify hazards and describe safe work practices pertaining to ***capacitors***
		interpret codes, standards and regulations pertaining to ***capacitors***
		interpret information pertaining to ***capacitors*** found on drawings and specifications
		identify ***tools and equipment*** relating to ***capacitors*** and describe their applications and procedures for use
		identify types of ***capacitors*** and describe their characteristics and applications
		identify ***capacitor components and accessories*** and describe their characteristics and applications
		identify considerations and requirements for selecting ***capacitors*** and accessories
D-12.02.02L	demonstrate knowledge of operating principles of ***capacitors***	describe operating principles of ***capacitors***
D-12.02.03L	demonstrate knowledge of procedures used to install, operate, protect, inspect and test ***capacitors***	describe procedures used to install and operate ***capacitors,*** and their ***components and accessories***
		describe procedures used to protect ***capacitors***, their ***components and accessories***
		describe procedures used to inspect ***capacitors***, their ***components and accessories***

	describe procedures used to test ***capacitors***, their ***components and accessories***
	describe commissioning requirements for ***capacitor*** controls

RANGE OF VARIABLES

capacitors include: shunt connection, series connection, series-parallel
tools and equipment include: drills, AWP, FRP tools (hot sticks), multi-meters
capacitor components and accessories include: di-electric insulation, plates, case, bushings

D-12.03 Installs voltage regulators

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-12.03.01P	select and use ***tools and equipment***	***tools and equipment*** to install ***voltage regulation and control devices*** are selected and used according to job requirements
D-12.03.02P	verify selection of ***voltage regulation and control devices***	selection of ***voltage regulation and control devices*** is verified according to engineering standards
D-12.03.03P	place and secure ***voltage regulation and control devices***	***voltage regulation and control devices*** are placed and secured according to company standards
D-12.03.04P	connect ***voltage regulation and control devices***	***voltage regulation and control devices*** are connected according to company standards
D-12.03.05P	switch ***voltage regulation and control devices*** in and out of service	***voltage regulation and control devices*** are switched in and out of service according to company policies
D-12.03.06P	operate ***voltage regulation and control devices***	***voltage regulation and control devices*** are operated to test functionality

RANGE OF VARIABLES

tools and equipment include: AWP, drills, compression tools, FRP tools (hot sticks), multi-meter, neutral detector
voltage regulation and control devices include: bridging reactor, tap changers (on-load, off-load), voltage regulators, auto boosters

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-12.03.01L	demonstrate knowledge of ***voltage regulation and control devices***, their characteristics and applications	define terminology associated with ***voltage regulation and control devices***
		identify hazards and describe safe work practices pertaining to ***voltage regulation and control devices***
		interpret codes, standards and regulations pertaining to ***voltage regulation and control devices***
		interpret information pertaining to ***voltage regulation and control devices*** found on drawings and specifications
		identify ***tools and equipment*** relating to ***voltage regulation and control devices*** and describe their applications and procedures for use
		identify ***voltage regulation and control devices*** and accessories and describe their characteristics and applications
		identify considerations and requirements for selecting ***voltage regulation and control devices*** and accessories
D-12.03.02L	demonstrate knowledge of procedures used to install and operate ***voltage regulation and control devices***	describe procedures used to install and operate ***voltage regulation and control devices***, their components and accessories
		describe procedure for switching ***voltage regulation and control devices*** in and out of service
		describe commissioning and decommissioning requirements for ***voltage regulation and control devices***

RANGE OF VARIABLES

voltage regulation and control devices include: bridging reactor, tap changers (on-load, off-load), voltage regulators, auto boosters

tools and equipment include: AWP, drills, compression tools, FRP tools (hot sticks), multi-meter, neutral detector

D-12.04 Installs switches

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-12.04.01P	select and use ***tools and equipment***	***tools and equipment*** to install switches are selected and used according to job requirements
D-12.04.02P	place and secure switch	switch is placed and secured in specified location according to company standards and type of switch
D-12.04.03P	make switch operational	switch is made operational by making connections according to company standards
D-12.04.04P	adjust switch	switch is adjusted according to manufacturers' specifications
D-12.04.05P	verify that switches are operational	switches operate in conjunction with each other where required according to manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: drills, compression tools, FRP tools (hot sticks), powder-actuated tools

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-12.04.01L	demonstrate knowledge of switches, their characteristics and applications	define terminology associated with switches
		identify hazards and describe safe work practices pertaining to switches
		interpret codes, standards and regulations pertaining to switches
		interpret information pertaining to switches found on drawings and specifications
		identify ***tools and equipment*** pertaining to switches and describe their applications and procedures for use
		identify ***types of switches*** and describe their characteristics and applications
		identify switch components and describe their characteristics and applications

		identify considerations and requirements for selecting switches
D-12.04.02L	demonstrate knowledge of operating principles of switches	explain operating principles of switches
		explain switches and their applications relating to line protection
		explain principles relating to switching and protection coordination
D-12.04.03L	demonstrate knowledge of procedures used to install, operate, troubleshoot and inspect switches	describe procedures used to install and operate switches and their components
		describe procedures used to troubleshoot switches and their components
		describe procedures used to inspect switches and their components

RANGE OF VARIABLES

tools and equipment include: drills, compression tools, FRP tools (hot sticks), powder-actuated tools

types of switches include: load break or non-load break, single-phase, three-phase (gang operated), sequenced, non-sequenced

D-12.05 Installs reactors (Not Common Core)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
no	yes	no	no	NV	no	NV	yes	no	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-12.05.01P	select and use ***tools and equipment***	***tools and equipment*** to install reactors are selected and used according to job requirements
D-12.05.02P	verify selection of reactor	selection of reactor is verified according to company and engineering standards
D-12.05.03P	place and secure reactor	reactor is placed and secured in specified location according to company standards and manufacturers' specifications
D-12.05.04P	make reactor operational	reactor is made operational by making connections and energizing
D-12.05.05P	perform tests	tests are performed according to company standards

RANGE OF VARIABLES

tools and equipment include: drills, compression tools, FRP tools (hot sticks)

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-12.05.01L	demonstrate knowledge of reactors, their characteristics and applications	define terminology associated with reactors
		identify hazards and describe safe work practices pertaining to reactors
		interpret codes, standards and regulations pertaining to reactors
		interpret information pertaining to reactors found on drawings and specifications
		identify ***tools and equipment*** relating to reactors and describe their applications and procedures for use
		identify types of reactors and describe their characteristics and applications
		identify reactor components and describe their characteristics and applications
		identify considerations and requirements for selecting reactors
D-12.05.02L	demonstrate knowledge of operating principles of reactors	explain operating principles of reactors
		explain reactors and their applications relating to line protection
		explain principles relating to reactor coordination
D-12.05.03L	demonstrate knowledge of procedures used to install, operate, troubleshoot and inspect reactors	describe procedures used to install and operate reactors and their components
		describe procedures used to troubleshoot reactors and their components
		describe procedures used to inspect reactors and their components

RANGE OF VARIABLES

tools and equipment include: drills, compression tools, FRP tools (hot sticks)

TASK D-13 Installs protection equipment

TASK DESCRIPTOR

Powerline technicians install reclosers, sectionalizers and fuses to protect line-equipment. Lightning arrestors are used to dissipate over-voltage.

D-13.01 Installs reclosers

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-13.01.01P	select and use ***tools and equipment***	***tools and equipment*** to install reclosers are selected and used according to job requirements
D-13.01.02P	select recloser	recloser is selected according to company and engineering standards
D-13.01.03P	place and secure recloser	recloser is placed and secured to structure according to engineering and company standards
D-13.01.04P	connect recloser	recloser is connected according to company standards
D-13.01.05P	energize recloser	recloser is energized
D-13.01.06P	perform tests	tests are performed according to company standards

RANGE OF VARIABLES

tools and equipment include: drills, AWP, FRP tools (hot sticks), powder-actuated tools

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-13.01.01L	demonstrate knowledge of reclosers, their characteristics and applications	define terminology associated with reclosers
		identify hazards and describe safe work practices pertaining to reclosers
		interpret codes, standards and regulations pertaining to reclosers
		interpret information pertaining to reclosers found on drawings and specifications

		identify ***tools and equipment*** relating to reclosers and describe their applications and procedures for use
		identify types of reclosers and describe their characteristics and applications
		identify ***recloser components*** and describe their characteristics and applications
		identify considerations and requirements for selecting reclosers
D-13.01.02L	demonstrate knowledge of operating principles of reclosers	explain operating principles of reclosers
		explain recloser applications relating to line protection coordination
D-13.01.03L	demonstrate knowledge of procedures used to install reclosers	describe procedures used to install reclosers

RANGE OF VARIABLES

tools and equipment include: drills, AWP, FRP tools (hot sticks), powder-actuated tools

recloser components include: sight glass, tank, reclosing coil, contacts, control panels, switches, bushings, open/close indicators

D-13.02 Installs sectionalizers

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	no	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-13.02.01P	select and use ***tools and equipment***	***tools and equipment*** to install sectionalizers are selected and used according to job requirements
D-13.02.02P	select sectionalizer	sectionalizer is selected according to engineering and company standards
D-13.02.03P	place and secure sectionalizer	sectionalizer is placed and secured to structure according to company standards
D-13.02.04P	connect sectionalizer	sectionalizer is connected according to company standards
D-13.02.05P	energize sectionalizer	sectionalizer is energized

RANGE OF VARIABLES

tools and equipment include: drills, AWP, FRP tools (hot sticks), powder-actuated tools

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-13.02.01L	demonstrate knowledge of sectionalizers, their characteristics and applications	define terminology associated with sectionalizers
		identify hazards and describe safe work practices pertaining to sectionalizers
		interpret standards and regulations pertaining to sectionalizers
		interpret information pertaining to sectionalizers found on drawings and specifications
		identify ***tools and equipment*** relating to sectionalizers and describe their applications and procedures for use
		identify types of sectionalizers and describe their characteristics and applications
		identify considerations and requirements for selecting sectionalizers
D-13.02.02L	demonstrate knowledge of operating principles of sectionalizers	explain operating principles of sectionalizers
		explain sectionalizer applications relating to line protection coordination
D-13.02.03L	demonstrate knowledge of procedures used to install sectionalizers	describe procedures used to install sectionalizers

RANGE OF VARIABLES

tools and equipment include: drills, AWP, FRP tools (hot sticks), powder-actuated tools

D-13.03 Installs fuses

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-13.03.01P	select and use ***tools and equipment***	***tools and equipment*** to install fuses are selected and used according to job requirements
D-13.03.02P	identify and select fuse	fuse is determined and selected according to company and engineering standards
D-13.03.03P	check switch	switch is visually checked for ***defects***

D-13.03.04P	place fuse into holder	fuse is placed into holder according to manufacturers' specifications
D-13.03.05P	place fuse holder into switch and energize	fuse holder is placed into switch and energized according to manufacturers' specifications
D-13.03.06P	identify defective fuse	defective fuse is identified through visual inspection or use of multi-meter continuity test

RANGE OF VARIABLES

tools and equipment include: wrenches, pliers, multi-meters, FRP tools (hot sticks)
defects include: cracks, component misalignment, chips, broken

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-13.03.01L	demonstrate knowledge of fuses, their characteristics and applications	define terminology associated with fuses
		identify hazards and describe safe work practices pertaining to fuses
		interpret standards and regulations pertaining to fuses
		interpret information pertaining to fuses found on drawings and specifications
		identify ***tools and equipment*** pertaining to fuses and describe their applications and procedures for use
		identify ***types of fuses*** and describe their characteristics and applications
		identify fuse components and describe their characteristics and applications
D-13.03.02L	demonstrate knowledge of operating principles of fuses	explain operating principles of fuses
		explain fuse applications relating to line protection coordination
		identify considerations and requirements for selecting fuses
D-13.03.03L	demonstrate knowledge of procedures used to install fuses	describe procedures used to install fuses

RANGE OF VARIABLES

tools and equipment include: wrenches, pliers, multi-meters, FRP tools (hot sticks)
types of fuses include: expulsion, bayonet, current limiting

D-13.04 Installs lightning arrestors

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-13.04.01P	select and use ***tools and equipment***	***tools and equipment*** to install lightning arrestors are selected and used according to job requirements
D-13.04.02P	select lightning arrestor	lightning arrestor is selected according to engineering standards
D-13.04.03P	inspect lightning arrestor	lightning arrestor is visually inspected for ***defects***
D-13.04.04P	mount and connect lightning arrestor	lightning arrestor is mounted and connected according to company standards

RANGE OF VARIABLES

tools and equipment include: wrenches, pliers, FRP tools (hot sticks)
defects include: damaged components, cracks, broken, torn

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-13.04.01L	demonstrate knowledge of lightning arrestors, their characteristics and applications	define terminology associated with lightning arrestors
		identify hazards and describe safe work practices pertaining to lightning arrestors
		interpret standards and regulations pertaining to lightning arrestors
		interpret information pertaining to lightning arrestors found on drawings and specifications
		identify ***tools and equipment*** pertaining to lightning arrestors and describe their applications and procedures for use
		identify types of lightning arrestors and describe their characteristics and applications
D-13.04.02L	demonstrate knowledge of operating principles of lightning arrestors	explain operating principles of lightning arrestors

		identify considerations and requirements for selecting lightning arrestors
D-13.04.03L	demonstrate knowledge of procedures used to install lightning arrestors	describe procedures used to install lightning arrestors

RANGE OF VARIABLES

tools and equipment include: wrenches, pliers, FRP tools (hot sticks)

TASK D-14 Installs metering equipment

TASK DESCRIPTOR

Metering equipment is used to measure electrical consumption at all levels of voltages. Metering equipment could include primary and secondary metering.

D-14.01 Installs primary metering equipment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-14.01.01P	select and use ***tools and equipment***	***tools and equipment*** to install primary metering equipment are selected and used according to job requirements
D-14.01.02P	select ***primary metering equipment***	***primary metering equipment*** is selected according to company and engineering standards and jurisdictional regulations
D-14.01.03P	mount and connect metering cabinet	metering cabinet is mounted and connected to metering tank on structure according to company standards

RANGE OF VARIABLES

tools and equipment include: drills, AWP, FRP tools (hot sticks)
primary metering equipment includes: tank, cabinet, metering unit

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-14.01.01L	demonstrate knowledge of ***primary metering equipment***, their components, characteristics and applications	define terminology associated with ***primary metering equipment***
		identify hazards and describe safe work practices pertaining to ***primary metering equipment***
		interpret codes, standards and regulations pertaining to ***primary metering equipment***
		interpret information pertaining to ***primary metering equipment*** found on drawings and specifications
		identify ***tools and equipment*** relating to ***primary metering equipment*** and describe their applications and procedures for use
		identify types of ***primary metering equipment*** and describe their characteristics and applications
		identify ***primary metering equipment components*** and describe their functions
D-14.01.02L	demonstrate knowledge of ***primary metering equipment*** operating procedures	explain ***primary metering equipment*** operating procedures
D-14.01.03L	demonstrate knowledge of procedures used to remove and install ***primary metering equipment***	describe procedures used to remove and install ***primary metering equipment***

RANGE OF VARIABLES

primary metering equipment includes: tank, cabinet, metering unit

tools and equipment include: drills, AWP, FRP tools (hot sticks)

primary metering equipment components include: current transformers (CT) and potential transformers (PT), test blocks, meter base

D-14.02 Installs secondary metering equipment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-14.02.01P	select and use ***tools and equipment***	***tools and equipment*** to install secondary metering equipment are selected and used according to job requirements
D-14.02.02P	select ***secondary metering equipment***	***secondary metering equipment*** is selected according to company and engineering standards
D-14.02.03P	perform meter box safety checks	meter box safety checks are performed to identify ***problems***
D-14.02.04P	perform ***meter base test***	***meter base test*** is performed according to work procedures
D-14.02.05P	place and secure meter into base	meter is placed and secured to base and seal is installed
D-14.02.06P	record meter reading	meter reading is recorded

RANGE OF VARIABLES

tools and equipment include: pliers, screw drivers, multi-meters, hex keys, meter pullers
secondary metering equipment includes: self-contained, transformer-rated, bases
problems include: damaged panel, broken porcelain, improper connection
meter base tests include: voltage check, load check, continuity check

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-14.02.01L	demonstrate knowledge of ***secondary metering equipment***, their components and applications	define terminology associated with ***secondary metering equipment***
		identify hazards and describe safe work practices pertaining to ***secondary metering equipment***
		interpret codes, standards and regulations pertaining to ***secondary metering equipment***
		interpret information pertaining to ***secondary metering equipment*** found on drawings and specifications
		identify ***tools and equipment*** relating to ***secondary metering equipment*** and describe their applications and procedures for use

		identify types of ***secondary metering equipment*** and describe their applications
		identify ***secondary metering equipment components*** and describe their functions
		identify ***smart metering equipment*** and describe their functions
D-14.02.02L	demonstrate knowledge of ***secondary metering equipment*** operating procedures	explain ***secondary metering equipment*** operating procedures
D-14.02.03L	demonstrate knowledge of procedures used to remove and install ***secondary metering equipment***	describe procedures used to remove and install ***secondary metering equipment***

RANGE OF VARIABLES

secondary metering equipment includes: self-contained, transformer-rated, bases
tools and equipment include: pliers, screw drivers, multi-meters, hex keys, meter pullers
secondary metering equipment components include: CTs, PTs, test blocks
smart metering equipment includes: collectors, repeaters

TASK D-15 Installs communication devices

TASK DESCRIPTOR

Powerline technicians install cellular antennas and transfer communication lines between structures. This work is being done by powerline technicians due to its proximity to high voltage distribution and transmission lines.

D-15.01 Installs cellular antennas

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
no	yes	no	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-15.01.01P	select and use ***tools and equipment***	***tools and equipment*** to install cellular antennas are selected and used according to job requirements
D-15.01.02P	mount and secure cellular antennas	cellular antennas are mounted and secured according to company standards and manufacturers' specifications
D-15.01.03P	run fibre and power cable	fibre and power cable are run from the antenna to the ground and attached to the structure according to company standards and manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: drills, wrenches, rigging equipment

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-15.01.01L	demonstrate knowledge of cellular antenna operating principles	define terminology associated with cellular antennas
		identify hazards and describe safe work practices pertaining to cellular antennas
		interpret standards and regulations pertaining to cellular antennas
		identify ***tools and equipment*** pertaining to cellular antennas and describe their applications and procedures for use

		identify types of cellular antennas and describe their applications
D-15.01.02L	demonstrate knowledge of procedures used to install cellular antennas	describe procedures used to install cellular antennas

RANGE OF VARIABLES

tools and equipment include: drills, wrenches, rigging equipment

D-15.02 Transfers communication lines

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-15.02.01P	select and use ***tools and equipment***	***tools and equipment*** to transfer ***communication lines*** are selected and used according to job requirements
D-15.02.02P	unbolt clamps	clamps are unbolted from structure
D-15.02.03P	transfer ***communication lines***	***communication lines*** are transferred to the new structure according to company and customer standards
D-15.02.04P	re-attach clamps	clamps are re-attached to secure ***communication lines*** according to company standards
D-15.02.05P	identify and manage hazards	hazards associated with ***communication lines*** are identified and managed

RANGE OF VARIABLES

tools and equipment include: drills, wrenches, rigging equipment
communication lines include: fibre, coaxial, telephone

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-15.02.01L	demonstrate knowledge of ***communication lines*** and their operating principles	define terminology associated with ***communication lines***
		identify hazards and describe safe work practices pertaining to transferring ***communication lines***
		interpret codes, standards and regulations pertaining to ***communication lines***

		identify ***tools and equipment*** pertaining to transferring ***communication lines*** and describe their applications and procedures for use
		identify types of ***communication lines*** and describe their applications
D-15.02.02L	demonstrate knowledge of procedures used to transfer ***communication lines***	describe procedures used to transfer ***communication lines***

RANGE OF VARIABLES

communication lines include: fibre, coaxial, telephone
tools and equipment include: drills, wrenches, rigging equipment

MAJOR WORK ACTIVITY E

Performs operation, maintenance and repair

TASK E-16 Operates distribution and transmission systems

TASK DESCRIPTOR

Powerline technicians operate a system by changing its configuration to isolate sections, transfer loads and to allow for repairs, installation or upgrades. This ensures system reliability and reduces customer outage time.

E-16.01 Operates transmission systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
E-16.01.01P	select and use ***tools and equipment***	***tools and equipment*** to operate overhead, underground and underwater transmission systems are selected and used according to job requirements
E-16.01.02P	identify circuits and equipment	circuits and equipment are identified to prevent switching errors and to ensure that work is being performed at correct location
E-16.01.03P	operate ***system equipment***	***system equipment*** is operated according to work procedures
E-16.01.04P	change circuit status	circuit status is changed according to order from system authority
E-16.01.05P	test, commission and energize new transmission systems	new transmission systems are tested, commissioned and energized according to engineering standards and work procedures

E-16.01.06P	confirm completion of operation	completion of operation is confirmed according to order from system authority
E-16.01.07P	verify and test completion of operation steps	completion of operation steps are visually verified and tested according to jurisdictional regulations and work procedures

RANGE OF VARIABLES

tools and equipment include: load break tools, FRP tools (hot sticks), temporary grounding system, voltage indicators

system equipment includes: switches, breakers, insulators

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
E-16.01.01L	demonstrate knowledge of overhead, underground and underwater transmission systems, their characteristics and applications	define terminology associated with overhead, underground and underwater transmission systems
		identify hazards and describe safe work practices pertaining to overhead, underground and underwater transmission systems
		interpret codes, standards and regulations pertaining to overhead, underground and underwater transmission systems
		interpret information pertaining to overhead, underground and underwater transmission systems found on drawings and ***specifications***
		identify ***tools and equipment*** relating to overhead, underground and underwater transmission systems and describe their applications and procedures for use
		identify types of overhead, underground and underwater transmission systems and describe their characteristics and applications
		identify overhead, underground and underwater transmission system components and accessories, and describe their applications and operation
E-16.01.02L	demonstrate knowledge of electrical principles	explain principles of electricity

E-16.01.03L	demonstrate knowledge of procedures used to operate overhead, underground and underwater transmission systems	describe procedures used to operate overhead transmission systems
		describe procedures used to operate underground and underwater transmission systems

RANGE OF VARIABLES

specifications include: manufacturers', engineering, testing

tools and equipment include: load break tools, FRP tools (hot sticks), temporary grounding system, voltage indicators

E-16.02 Operates distribution systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
E-16.02.01P	select and use ***tools and equipment***	***tools and equipment*** to operate overhead, underground and underwater distribution systems are selected and used according to job requirements
E-16.02.02P	identify circuits and equipment	circuits and equipment are identified to prevent switching errors and to ensure that work is being performed at correct location
E-16.02.03P	operate ***system equipment***	***system equipment*** is operated according to work procedures
E-16.02.04P	change circuit status	circuit status is changed according to order from system authority
E-16.02.05P	test, commission and energize new distribution systems	new distribution systems are tested, commissioned and energized according to engineering standards and work procedures
E-16.02.06P	confirm completion of operation	completion of operation is confirmed according to order from system authority
E-16.02.07P	verify and test completion of operation steps	completion of operation steps are visually verified and tested according to jurisdictional regulations and work procedures

RANGE OF VARIABLES

tools and equipment include: rubber gloves, load break tools, FRP tools (hot sticks), temporary grounding system, voltage indicators

system equipment includes: switches (tie-points), risers, reclosers, elbows, capacitors, regulators, sectionalizers

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
E-16.02.01L	demonstrate knowledge of overhead, underground and underwater distribution systems, their characteristics and applications	define terminology associated with overhead, underground and underwater distribution systems
		identify hazards and describe safe work practices pertaining to overhead, underground and underwater distribution systems
		interpret codes, standards and regulations pertaining to overhead, underground and underwater distribution systems
		interpret information pertaining to overhead, underground and underwater distribution systems found on drawings and specifications
		identify ***tools and equipment*** relating to overhead, underground and underwater distribution systems and describe their applications and procedures for use
		identify ***overhead components and accessories*** used in distribution systems and describe their characteristics and applications
		identify ***underground and underwater components and accessories*** used in distribution systems and describe their characteristics and applications
		identify ***types of distribution systems*** and describe their applications
E-16.02.02L	demonstrate knowledge of electrical principles	explain principles of electricity
E-16.02.03L	demonstrate knowledge of operating procedures for overhead, underground and underwater distribution systems, and their ***components and accessories***	describe procedures used to operate overhead, underground and underwater distribution systems, and their ***components and accessories***

RANGE OF VARIABLES

tools and equipment include: rubber gloves, load break tools, FRP tools (hot sticks), temporary grounding system, voltage indicators

overhead components and accessories include: transformers, disconnects, conductors, poles, insulators, reclosers

underground and underwater components and accessories include: cables (concentric neutral, non-shielded, shielded), cable protection, system grounds, duct systems, direct-buried systems, pad-mounted transformers, disconnects

types of distribution systems include: underground (radial, loop, network), overhead and underwater (radial, loop)

E-16.03 Performs station switching

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
E-16.03.01P	select and use ***tools and equipment***	***tools and equipment*** to perform station switching are selected and used according to job requirements
E-16.03.02P	identify circuits	circuits are identified to prevent switching errors and to ensure that work is being performed on correct switching apparatus
E-16.03.03P	change circuit status	circuit status is changed by switching according to order from system authority
E-16.03.04P	perform switch, lock-out and tag-out procedures	switch, lock-out and tag-out procedures are performed according to order from system authority, work procedures and jurisdictional regulations
E-16.03.05P	visually verify, test and confirm completion of operation steps	completion of operation steps are visually verified and tested according to work procedures and completion of operation is confirmed to system authority

RANGE OF VARIABLES

tools and equipment include: rubber gloves, load break tools, FRP tools (hot sticks), temporary grounding system, voltage indicators

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
E-16.03.01L	demonstrate knowledge of substations, switching stations and terminals, their characteristics and applications	define terminology associated with substations, switching stations and terminals
		identify hazards and describe safe work practices pertaining to substations, switching stations and terminals
		interpret codes, standards and regulations pertaining to substations, switching stations and terminals
		interpret information pertaining to substations, switching stations and terminals found on drawings and specifications
		identify ***tools and equipment*** pertaining to substations, switching stations and terminals and describe their applications and procedures for use
		identify types of substations, switching stations and terminals and describe their characteristics and applications
		identify substation, switching station and terminal components and accessories and describe their operation
E-16.03.02L	demonstrate knowledge of electrical principles	explain principles of electricity
E-16.03.03L	demonstrate knowledge of procedures used to inspect and maintain substations, switching stations and terminals	describe procedures used to inspect and maintain substations, and their components and accessories
		describe procedures used to inspect and maintain switching stations, and their components and accessories
		describe procedures used to inspect and maintain terminals, and their components and accessories

RANGE OF VARIABLES

tools and equipment include: rubber gloves, load break tools, FRP tools (hot sticks), temporary grounding system, voltage indicators

TASK E -17 Maintains distribution and transmission systems

TASK DESCRIPTOR

Routine inspection and maintenance are done on these systems to detect and prevent deficiencies before they affect system reliability.

E-17.01 Inspects distribution and transmission systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
E-17.01.01P	visually inspect ***distribution and transmission system components***	***distribution and transmission system components*** are visually inspected to verify systems' integrity
E-17.01.02P	select and use ***test equipment***	***test equipment*** is selected and used according to work procedures
E-17.01.03P	identify deficiencies	deficiencies are identified, documented and reported according to company policies and standards
E-17.01.04P	perform load checks	load checks are performed to identify imbalanced and overloaded circuits
E-17.01.05P	report findings of inspection	findings of inspection are reported to prioritize repair according to company policies and standards

RANGE OF VARIABLES

distribution and transmission systems components include: poles, structures, footings, apparatus, transformers, disconnects, capacitors

test equipment includes: infrared equipment, thermal equipment, core samplers

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
E-17.01.01L	demonstrate knowledge of distribution and transmission systems, their characteristics and applications	define terminology associated with distribution and transmission systems
		identify hazards and describe safe work practices pertaining to distribution and transmission systems
		interpret codes, standards and regulations pertaining to distribution and transmission systems

		interpret information pertaining to distribution and transmission systems found on drawings and specifications
		identify tools and equipment pertaining to distribution and transmission systems and describe their applications and procedures for use
		identify ***types of distribution*** and transmission ***systems*** and describe their characteristics and applications
		identify ***distribution and transmission system components*** and describe their applications and operation
E-17.01.02L	demonstrate knowledge of electrical principles	explain principles of electricity
E-17.01.03L	demonstrate knowledge of procedures used to inspect, maintain and operate overhead, underground and underwater distribution and transmission systems	describe procedures used to inspect and maintain overhead, underground and underwater distribution systems, their ***components*** and accessories
		describe procedures used to inspect and maintain overhead, underground and underwater transmission systems, their ***components*** and accessories
		describe procedures used to operate distribution and transmission systems

RANGE OF VARIABLES

types of distribution systems include: underground (radial, loop, network), overhead and underwater (radial, loop)

distribution and transmission systems components include: poles, structures, footings, apparatus, transformers, disconnects, capacitors

E-17.02 Maintains pole structures

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
E-17.02.01P	stub ***pole structures***	***pole structures*** are stubbed to stabilize and extend life
E-17.02.02P	top, cap and treat ***pole structures***	***pole structures*** are topped, capped and treated to extend life
E-17.02.03P	straighten ***pole structures***	***pole structures*** are straightened by using tools and equipment

E-17.02.04P	remove and replace ***pole structures***	***pole structures*** are removed and replaced depending on ***conditions*** identified in inspection documentation
E-17.02.05P	insert or replace ***pole structures'*** top extensions	***pole structures'*** top extensions are inserted or replaced for clearance or repair purposes
E-17.02.06P	document completed maintenance work	completed maintenance work is documented according to company policies

RANGE OF VARIABLES

pole structures include: single-pole, multi-pole, tangent, angle, dead-end, take-off (or tap), joint use construction, self-supporting poles (wood, steel, fibreglass, concrete, laminate)

conditions include: rotten, infested, fallen, damaged

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
E-17.02.01L	demonstrate knowledge of ***pole structures***, their characteristics and applications, and maintenance	define terminology associated with ***pole structures*** and their maintenance
		interpret codes, standards and regulations pertaining to ***pole structures***
		interpret information pertaining to ***pole structures*** on drawings and specifications
		identify types of ***pole structures*** and describe their characteristics and applications
		identify hazards and describe safe work practices pertaining to the maintenance of ***pole structures***
		identify tools and equipment pertaining to the maintenance of ***pole structures*** and describe their applications and procedures for use
E-17.02.02L	demonstrate knowledge of pole structure components and accessories, their characteristics, applications and operation	identify pole structure components and accessories and describe their operation
E-17.02.03L	demonstrate knowledge of procedures used to inspect and maintain ***pole structures,*** their components and accessories	describe procedures used to inspect and maintain ***pole structures***
		describe procedures used to inspect and maintain pole structure components and accessories

E-17.02.04L	demonstrate knowledge of overhead distribution system construction principles	explain principles of overhead distribution system construction
E-17.02.05L	demonstrate knowledge of electrical principles	explain principles of electricity

RANGE OF VARIABLES

pole structures include: single-pole, multi-pole, tangent, angle, dead-end, take-off (or tap), joint use construction, self-supporting poles (wood, steel, fibreglass, concrete, laminate)

E-17.03 Maintains steel lattice structures

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
E-17.03.01P	select and use ***tools and equipment***	***tools and equipment*** to maintain steel lattice structures are selected and used according to job requirements
E-17.03.02P	paint steel lattice structures	steel lattice structures are painted to prevent corrosion and for aerial visibility
E-17.03.03P	tighten hardware and change steel lattice bracing	hardware is tightened and steel lattice bracing changed to ensure structural integrity
E-17.03.04P	repair concrete and wrap footings	concrete is repaired and footings wrapped to ensure structural integrity
E-17.03.05P	document completed maintenance work	completed maintenance work is documented according to company policies

RANGE OF VARIABLES

tools and equipment include: torque, spud wrenches, drift pins, AWP

KNOWLEDGE

	Learning Outcomes	Learning Objectives
E-17.03.01L	demonstrate knowledge of steel lattice structures, their characteristics and applications	define terminology associated with maintenance of steel lattice structures
		identify hazards and describe safe work practices pertaining to the maintenance of steel lattice structures

		interpret codes, standards and regulations pertaining to the maintenance of steel lattice structures
		interpret information pertaining to steel lattice structures on drawings and specifications
		identify ***tools and equipment*** relating to maintenance of steel lattice structures and describe their applications and procedures for use
		identify types of steel lattice structures and describe their characteristics and applications
		identify steel lattice structure components and accessories
E-17.03.02L	demonstrate knowledge of electrical principles	explain principles of electricity
E-17.03.03L	demonstrate knowledge of procedures used to inspect and maintain steel lattice structures, their components and accessories	describe procedures used to inspect and maintain steel lattice structures
		describe procedures used to inspect and maintain steel lattice structure components and accessories

RANGE OF VARIABLES

tools and equipment include: torque, spud wrenches, drift pins, AWP

E-17.04 Maintains system components

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
E-17.04.01P	select and use ***tools and equipment***	***tools and equipment*** to maintain system components are selected and used according to job requirements
E-17.04.02P	replace ***system components***	***system components*** are replaced according to company standards and inspection reports
E-17.04.03P	replace ***pole structure*** grounds and mouldings	***pole structure*** grounds and mouldings are replaced according to company standards and inspection reports

E-17.04.04P	remove contaminants	contaminants are removed from contacts of disconnect switches and insulators to comply with design specifications
E-17.04.05P	manually operate equipment and apparatus	equipment and apparatus is manually operated periodically to comply with design specifications according to company standards and jurisdictional regulations
E-17.04.06P	document completed maintenance work	completed maintenance work is documented according to company policies and standards

RANGE OF VARIABLES

tools and equipment include: rubber gloves, test equipment, live-line tools, hand tools, rigging tools and equipment

system components include: insulators, transformers, guy wires, conductors and cables, single-phase metering, three-phase metering, voltage regulation and control devices, line protective devices, line capacitors, switching stations and terminals

pole structure includes: single pole, multi-pole, tangent, angle, dead-end, take-off (or tap), joint use construction, self-supporting poles (wood, steel, fibreglass, concrete, laminate)

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
E-17.04.01L	demonstrate knowledge of ***system components***, their operation, characteristics and applications	define terminology associated with maintenance of ***system components***
		identify hazards and describe safe work practices pertaining to maintenance of ***system components***
		interpret codes, standards and regulations pertaining to maintenance of ***system components***
		interpret information pertaining to ***system components*** on drawings and specifications
		identify tools and equipment pertaining to maintenance of ***system components*** and describe their applications and procedures for use
		identify types of ***system components*** and describe their characteristics, applications and accessories
		explain ***system component*** operating principles and their applications
E-17.04.02L	demonstrate knowledge of procedures used to inspect and maintain ***system components***	describe procedures used to inspect and maintain ***system components***

E-17.04.03L	demonstrate knowledge of transformers and power transformers, their ***components***, applications and operation	interpret information pertaining to transformers and power transformers found on nameplates, drawings and specifications
		identify power transformer and ***transformer components*** and describe their purpose and operation
		perform transformer and power transformer load calculations
		explain transformer fusing principles and their applications
		identify types of ***power transformer connections*** and describe their applications
E-17.04.04L	demonstrate knowledge of electrical principles	explain principles of electricity
E-17.04.05L	demonstrate knowledge of managing hazardous materials associated with transformers	describe procedures used to manage oils and other petroleum products pertaining to transformers
E-17.04.06L	demonstrate knowledge of ***methods of cable protection*** and their applications	identify ***methods of cable protection*** and describe their characteristics and applications
E-17.04.07L	demonstrate knowledge of procedures used to mechanically protect and support cables	describe procedures used to provide mechanical protection and support for cables
E-17.04.08L	demonstrate knowledge of ***single-phase*** and ***three-phase*** metering procedures	explain ***single-phase*** and ***three-phase*** metering procedures
E-17.04.09L	demonstrate knowledge of procedures used to inspect and maintain ***protective devices***	describe procedures used to inspect and maintain ***protective devices***, their components and accessories
		explain protective principles and their applications relating to line protection
		explain principles relating to protective device coordination
E-17.04.10L	demonstrate knowledge of procedures used to inspect, maintain and test ***line capacitors***, their components and accessories	describe procedures used to inspect, maintain and test ***line capacitors***, their components and accessories

RANGE OF VARIABLES

system components include: insulators, transformers, guy wires, conductors and cables, single-phase metering, three-phase metering, voltage regulation and control devices, line protective devices, line capacitors, switching stations and terminals

transformer components include: core, windings, oil, bushings, gaskets, tank, cover, taps and tap changer, mounting brackets, switches

power transformer connections include: two-winding, autotransformer, tertiary

methods of cable protection include: mechanical, electrical

single-phase meters include: primary, secondary, self-contained, transformer rated

three-phase meters include: primary, secondary, self-contained, transformer rated (CTs, PTs, test switches)

protective devices include: air break devices (load breaking and non-load breaking), fuses, power fuses, oil devices, vacuum devices, de-ionizing gas devices (sulphur hexafluoride gas [SF_6], circuit breaker), lightning arrestors, current limiting fuses

line capacitors include: shunt connection, series connection, series-parallel connection

E-17.05 Trims trees

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
E-17.05.01P	select and use ***tools and equipment***	***tools and equipment*** to trim trees are selected and used according to job requirements
E-17.05.02P	identify ***hazards*** of trimming trees	***hazards*** of trimming trees are identified
E-17.05.03P	follow forestry cutting procedures	forestry cutting procedures are followed to ensure safe felling
E-17.05.04P	avoid cross-contamination	cross-contamination is avoided by cleaning equipment and disposing of trimmings
E-17.05.05P	remove debris	debris is removed according to jurisdictional and environmental regulations
E-17.05.06P	document completed maintenance work	completed maintenance work is documented according to company policies

RANGE OF VARIABLES

tools and equipment include: chain saws, hand saws, hydraulic saws, mechanical pruning equipment, rigging, pruning saws, AWP, chippers

hazards include: electrical, public, gravity, wood debris

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
E-17.05.01L	demonstrate knowledge of tree trimming, equipment, their applications, maintenance and procedures for use	define terminology associated with tree trimming
		identify ***hazards*** and describe safe work practices pertaining to tree trimming
		interpret guidelines, codes and regulations pertaining to tree trimming
		identify ***tools and equipment*** pertaining to tree trimming and describe their applications and procedures for use
E-17.05.02L	demonstrate knowledge of techniques and procedures used to trim trees	identify techniques used to trim trees
		describe procedures used to trim trees

RANGE OF VARIABLES

hazards include: electrical, public, gravity, wood debris

tools and equipment include: chain saws, hand saws, hydraulic saws, mechanical pruning equipment, rigging, pruning saws, AWP, chippers

TASK E -18 Repairs distribution systems

TASK DESCRIPTOR

Powerline technicians troubleshoot and repair distribution systems to restore power and maintain system reliability. Repairs on distribution systems can be performed on either energized or de-energized lines. Depending on the status, the repair procedures and accompanying considerations will vary.

E-18.01 Troubleshoots overhead distribution systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
E-18.01.01P	patrol circuit	circuit is patrolled to identify obvious ***damage***
E-18.01.02P	select and use ***test equipment***	***test equipment*** to troubleshoot overhead distribution systems is selected and used according to work procedures and job requirements

E-18.01.03P	sectionalize circuit	circuit is sectionalized to determine location of fault
E-18.01.04P	isolate fault, damage or hazard and restore power	fault, damage or hazard is isolated and power restored
E-18.01.05P	document switching procedures	switching procedures are documented according to company policies
E-18.01.06P	report trouble, ***required actions*** and estimated repair time	trouble, ***required actions*** and estimated repair time are reported to system authority according to company policies

RANGE OF VARIABLES

damage includes: fallen trees, damaged poles, downed lines, defective equipment and components
test equipment includes: potential indicators, fault indicators, voltmeters, service conductor tester
required actions include: repairs, replacements

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
E-18.01.01L	demonstrate knowledge of overhead distribution systems, their applications and operation	define terminology associated with troubleshooting overhead distribution systems
		identify hazards and describe safe work practices pertaining to troubleshooting overhead distribution systems
		interpret standards and regulations pertaining to overhead distribution systems
		interpret information pertaining to overhead distribution systems found on drawings and specifications
		identify tools and equipment pertaining to troubleshooting overhead distribution systems and describe their applications and procedures for use
		identify types of overhead distribution systems and describe their applications
		identify ***components and accessories*** used in overhead distribution systems and describe their characteristics and applications
E-18.01.02L	demonstrate knowledge of overhead distribution system construction principles	explain principles of overhead distribution system construction
E-18.01.03L	demonstrate knowledge of electrical principles	explain principles of electricity
E-18.01.04L	demonstrate knowledge of procedures to troubleshoot and test overhead distribution systems, and their ***components and accessories***	describe procedures used to troubleshoot overhead distribution systems, and their ***components and accessories***

		describe procedures used to test overhead distribution systems, their ***components and accessories***
E-18.01.05L	demonstrate knowledge of procedures used in temporary grounding and bonding of overhead distribution systems	identify temporary grounding and bonding requirements pertaining to overhead distribution systems
		describe procedures used for temporary grounding and bonding of overhead distribution systems

RANGE OF VARIABLES

components and accessories include: transformers, reclosers, capacitors, conductors, system grounds, voltage regulators, disconnects, pole structures, insulators

E-18.02 Troubleshoots underground and underwater distribution systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
E-18.02.01P	patrol circuit	circuit is patrolled to identify obvious ***damage***
E-18.02.02P	select and use ***test equipment***	***test equipment*** to troubleshoot underground and underwater distribution systems is selected and used according to work procedures, job requirements and company policies
E-18.02.03P	sectionalize circuit	circuit is sectionalized to determine location of fault
E-18.02.04P	identify defective ***components and accessories***	defective ***components and accessories*** are identified
E-18.02.05P	isolate fault, damage or hazard and restore distribution system to service	fault, damage or hazard is isolated and power restored according to system authority and work procedures
E-18.02.06P	document switching	switching is documented according to company policies
E-18.02.07P	report trouble, ***required actions*** and estimated repair time	trouble, ***required actions*** and estimated repair time are reported to system authority according to company policies

RANGE OF VARIABLES

damage includes: damaged poles, transformers, switching kiosks, cables

test equipment includes: potential indicators, fault indicators, voltmeters, VLF tester, meggers, hi-pot testers, service conductor tester

components and accessories include: cables (concentric neutral, non-shielded, shielded), cable protection, system grounds, duct systems, direct-buried systems, pad-mounted transformers, terminations, splices

required actions include: repair, replace, troubleshoot

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
E-18.02.01L	demonstrate knowledge of underground and underwater distribution systems, their characteristics, applications and operating procedures	define terminology associated with troubleshooting underground and underwater distribution systems
		identify hazards and describe safe work practices pertaining to troubleshooting underground and underwater distribution systems
		interpret standards and regulations pertaining to underground and underwater distribution systems
		interpret information pertaining to underground and underwater distribution systems found on drawings and specifications
		identify tools and equipment to troubleshoot underground and underwater distribution systems and describe their applications and procedures for use
		identify ***components and accessories*** used in underground and underwater distribution systems and describe their characteristics and applications
		describe operating procedures for underground and underwater distribution systems
		identify ***types of distribution systems*** and describe their applications
E-18.02.02L	demonstrate knowledge of underground and underwater distribution system construction principles	explain principles of underground and underwater distribution system construction
E-18.02.03L	demonstrate knowledge of electrical principles	explain principles of electricity
E-18.02.04L	demonstrate knowledge of procedures used to troubleshoot and test underground and underwater distribution systems, and their ***components and accessories***	describe procedures used to troubleshoot underground and underwater distribution systems, and their ***components and accessories***

		describe procedures used to test underground and underwater distribution systems, and their ***components and accessories***
E-18.02.05L	demonstrate knowledge of procedures used to fish, install, splice, cut, strip and terminate cables	describe procedures used to fish and install cables and their components and accessories
		describe procedures used to splice cables
		describe procedures used to cut, strip and terminate cables
E-18.02.06L	demonstrate knowledge of procedures used in temporary grounding and bonding of underground and underwater distribution systems	identify temporary grounding and bonding requirements relating to underground and underwater distribution systems
		describe procedures used for temporary grounding and bonding of underground and underwater distribution systems

RANGE OF VARIABLES

components and accessories include: cables (concentric neutral, non-shielded, shielded), cable protection, system grounds, duct systems, direct-buried systems, pad-mounted transformers, terminations, splices

types of distribution systems include: underground (radial, loop, network), underwater (radial, loop)

E-18.03 Repairs overhead distribution systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
E-18.03.01P	select and use ***tools and equipment***	***tools and equipment*** to repair overhead distribution systems are selected and used according to job requirements
E-18.03.02P	follow ***work procedures***	***work procedures*** are followed according to company standards and policies
E-18.03.03P	remove ***objects***	***objects*** are removed in order to access lines
E-18.03.04P	replace ***components and accessories***	***components and accessories*** are replaced according to job requirements and company standards
E-18.03.05P	repair conductor	conductor is repaired by splicing

E-18.03.06P	restore system	system is restored to normal operating status
E-18.03.07P	report completed repairs or replacement of ***components*** and restoration of system	completed repairs or replacement of ***components*** and restoration of system are reported according to company policies

RANGE OF VARIABLES

tools and equipment include: live-line tools, temporary grounding system, potential indicators, rigging tools and equipment, rubber gloves

work procedures include: grounding, bonding, lock-out, tag-out

objects include: trees, obstructions, running shoes, back packs, wildlife

components and accessories include: transformers, reclosers, capacitors, conductors, system grounds, voltage regulators, disconnects, poles, insulators

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
E-18.03.01L	demonstrate knowledge of overhead distribution systems, their applications and operation	define terminology associated with repairing overhead distribution systems
		identify hazards and describe safe work practices pertaining to repairing overhead distribution systems
		interpret codes, standards and regulations pertaining to overhead distribution systems
		interpret information pertaining to overhead distribution systems found on drawings and specifications
		identify ***tools and equipment*** pertaining to repairing overhead distribution systems and describe their applications and procedures for use
		identify types of overhead distribution systems and describe their applications
		identify overhead distribution systems ***components and accessories*** and describe their characteristics and applications
E-18.03.02L	demonstrate knowledge of overhead distribution system construction principles	explain principles of overhead distribution system construction
E-18.03.03L	demonstrate knowledge of electrical principles	explain principles of electricity
E-18.03.04L	demonstrate knowledge of requirements and procedures used in temporary grounding and bonding of overhead distribution systems	identify temporary grounding and bonding requirements relating to overhead distribution systems

		describe procedures used for temporary grounding and bonding of overhead distribution systems
E-18.03.05L	demonstrate knowledge of procedures used to repair, test and operate overhead distribution system ***components and accessories***	describe procedures used to repair overhead distribution systems,and their ***components and accessories***
		describe procedures used to test overhead distribution systems, their ***components and accessories***
		describe operating procedures for overhead distribution systems

RANGE OF VARIABLES

tools and equipment include: live-line tools, temporary grounding system, potential indicators, rigging tools and equipment, rubber gloves

components and accessories include: transformers, reclosers, capacitors, conductors, system grounds, voltage regulators, disconnects, poles, insulators

E-18.04 Repairs underground and underwater distribution systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
E-18.04.01P	select and use ***tools and equipment***	***tools and equipment*** to repair underground and underwater distribution systems are selected and used according to job requirements
E-18.04.02P	follow ***work procedures***	***work procedures*** are followed
E-18.04.03P	expose faulted cables	faulted cables are exposed using ***methods***
E-18.04.04P	repair or replace cable	cable is repaired by splicing or replaced
E-18.04.05P	replace ***components and accessories***	***components and accessories*** are replaced according to job requirements
E-18.04.06P	test equipment and cables	equipment and cables are tested using ***test equipment*** to verify integrity of fault repair

E-18.04.07P	restore system	system is restored to normal operating status by using switching procedures
E-18.04.08P	report completed repairs or replacement of ***components and accessories*** and restoration of system	completed repairs or replacement of ***components and accessories*** and restoration of system are reported according to company policies

RANGE OF VARIABLES

tools and equipment include: live-line tools, temporary grounding system, potential indicators, rigging tools and equipment

work procedures include: grounding, bonding, testing cable, switching

methods include: mechanical digging, manual digging, hydro-vacuums

components and accessories include: cables (concentric neutral, non-shielded, shielded), cable protection, system grounds, duct systems, direct-buried systems, pad-mounted transformers

test equipment includes: potential indicators, fault indicators, voltmeters, VLF tester, meggers, hi-pot testers

KNOWLEDGE

	Learning Outcomes	Learning Objectives
E-18.04.01L	demonstrate knowledge of underground and underwater systems, their characteristics and applications	define terminology associated with repairing underground and underwater distribution systems
		identify hazards and describe safe work practices pertaining to repairing underground and underwater distribution systems
		interpret codes, standards and regulations pertaining to underground and underwater distribution systems
		interpret information pertaining to underground and underwater distribution systems found on drawings and specifications
		identify ***tools and equipment*** to repair underground and underwater distribution systems and describe their applications and procedures for use
		identify ***components and accessories*** used in underground and underwater distribution systems and describe their characteristics and applications
		identify ***types of distribution systems*** and describe their characteristics and applications
E-18.04.02L	demonstrate knowledge of underground and underwater distribution system construction principles	explain principles of underground and underwater distribution system construction

E-18.04.03L	demonstrate knowledge of electrical principles	explain principles of electricity
E-18.04.04L	demonstrate knowledge of procedures used to repair and test underground and underwater systems, and their ***components and accessories***	describe procedures used to repair underground and underwater distribution systems, and their ***components and accessories***
		describe procedures used to test underground and underwater distribution systems, and their ***components and accessories***
E-18.04.05L	demonstrate knowledge of procedures used to fish, install, splice, cut, strip and terminate cables	describe procedures used to fish and install cables and their components and accessories
		describe procedures used to splice cables
		describe procedures used to cut, strip and terminate cables
E-18.04.06L	demonstrate knowledge of procedures used in temporary grounding and bonding of underground and underwater distribution systems	identify temporary grounding and bonding requirements relating to underground and underwater distribution systems
		describe procedures used for temporary grounding and bonding of underground and underwater distribution systems
		describe operating procedures for underground and underwater distribution systems

RANGE OF VARIABLES

tools and equipment include: live-line tools, temporary grounding system, potential indicators, rigging tools and equipment

components and accessories include: cables (concentric neutral, non-shielded, shielded), cable protection, system grounds, duct systems, direct-buried systems, pad-mounted transformers

types of distribution systems include: underground (radial, loop, network), underwater (radial, loop)

TASK E -19 Repairs transmission systems

TASK DESCRIPTOR

Powerline technicians repair transmission systems to restore power and maintain system reliability. Repairs on transmission systems can be performed on either energized or de-energized lines. Depending on the status, the repair procedures and accompanying considerations will vary.

E-19.01 Troubleshoots overhead transmission systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
E-19.01.01P	patrol circuit	circuit is patrolled to identify ***damage***
E-19.01.02P	select and use ***test equipment***	***test equipment*** to troubleshoot overhead transmission systems is selected and used according to work procedures and job requirements
E-19.01.03P	isolate section of transmission lines	section of transmission lines is isolated by operating equipment and ***devices*** according to switching orders from system authority
E-19.01.04P	document switching procedures	switching procedures are documented according to company policies
E-19.01.05P	report trouble, ***required actions*** and estimated repair time	trouble, ***required actions*** and estimated repair time are reported according to company policies and to system authority

RANGE OF VARIABLES

damage includes: fallen trees, damaged poles and steel lattice, downed lines, defective equipment and components, faults

test equipment includes: potential indicators, fault indicators, phasing sticks

devices include: switches, circuit breakers, jumpers

required actions include: repair, replace, troubleshoot, switching

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
E-19.01.01L	demonstrate knowledge of overhead transmission systems, their characteristics and applications	define terminology associated with repairing overhead transmission systems
		identify hazards and describe safe work practices pertaining to repairing overhead transmission systems

		interpret codes, standards and regulations pertaining to overhead transmission systems
		interpret information pertaining to overhead transmission systems found on drawings and specifications
		identify tools and equipment to repair overhead transmission systems and describe their applications and procedures for use
		identify types of overhead transmission systems and describe their characteristics and applications
		identify overhead transmission system components and accessories and describe their applications and operation
E-19.01.02L	demonstrate knowledge of electrical principles	explain principles of electricity
E-19.01.03L	demonstrate knowledge of overhead transmission system construction principles	explain principles of overhead transmission system construction
E-19.01.04L	demonstrate knowledge of procedures to troubleshoot and test overhead transmission systems, and their components and accessories	describe procedures used to troubleshoot overhead transmission systems, and their components and accessories
		describe procedures used to test overhead transmission systems, and their components and accessories
E-19.01.05L	demonstrate knowledge of procedures used in temporary grounding and bonding of overhead transmission systems	identify temporary grounding and bonding requirements relating to overhead transmission systems
		describe procedures used for temporary grounding and bonding of overhead transmission systems

E-19.02 Troubleshoots underground and underwater transmission systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
E-19.02.01P	locate faults	faults are located by selecting and using ***test equipment***
E-19.02.02P	isolate fault, damage and hazards	fault, damage and hazards are isolated according to switching order from system authority and work procedures
E-19.02.03P	identify defective ***components and accessories***	defective ***components and accessories*** are identified
E-19.02.04P	document switching	switching is documented according to company policies
E-19.02.05P	report trouble, ***required actions*** and estimated repair time	trouble, ***required actions*** and estimated repair time are reported according to company policies and to system authority

RANGE OF VARIABLES

test equipment includes: potential indicators, hi-pot testers, high voltage test units

components and accessories include: cables (armoured, shielded), cable protection, system grounds, duct systems, direct-buried systems, terminations, splices

required actions include: repair, replace, troubleshoot

KNOWLEDGE

	Learning Outcomes	Learning Objectives
E-19.02.01L	demonstrate knowledge of underground and underwater transmission systems, and their characteristics and applications	define terminology associated with troubleshooting underground and underwater transmission systems
		identify hazards and describe safe work practices pertaining to troubleshooting underground and underwater transmission systems
		interpret codes, standards and regulations pertaining to underground and underwater transmission systems
		interpret information pertaining to underground and underwater transmission systems found on drawings and specifications

		identify tools and equipment pertaining to troubleshooting underground and underwater transmission systems and describe their applications and procedures for use
		identify types of underground and underwater transmission systems and describe their characteristics and applications
		identify underground and underwater transmission system ***components and accessories*** and describe their characteristics, applications and operation
E-19.02.02L	demonstrate knowledge of underground and underwater transmission system construction principles	explain principles of underground and underwater transmission system construction
E-19.02.03L	demonstrate knowledge of electrical principles	explain principles of electricity
E-19.02.04L	demonstrate knowledge of procedures used to troubleshoot and test underground and underwater transmission systems, their ***components and accessories***	describe procedures used to troubleshoot underground and underwater transmission systems, their ***components and accessories***
		describe procedures used to test underground and underwater transmission systems, their ***components and accessories***
E-19.02.05L	demonstrate knowledge of procedures used to fish, install, splice, cut, strip and terminate cables	describe procedures used to fish and install cables and their ***components and accessories***
		describe procedures used to splice cables
		describe procedures used to cut, strip and terminate cables
E-19.02.06L	demonstrate knowledge of procedures used in temporary grounding and bonding of underground and underwater transmission systems	identify temporary grounding and bonding requirements relating to underground and underwater transmission systems
		describe procedures used for temporary grounding and bonding of underground and underwater transmission systems

RANGE OF VARIABLES

components and accessories include: cables (armoured, shielded), cable protection, system grounds, duct systems, direct-buried systems, terminations, splices

E-19.03 Repairs overhead transmission systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
E-19.03.01P	select and use ***tools and equipment***	***tools and equipment*** to repair overhead transmission systems are selected and used according to job requirements
E-19.03.02P	follow ***work procedures***	***work procedures*** are followed according to company standards
E-19.03.03P	remove ***objects***	***objects*** are removed in order to access lines
E-19.03.04P	replace ***components*** and accessories	***components*** and accessories are replaced according to job requirements and company standards
E-19.03.05P	repair conductor and cable	conductor and cable are repaired by splicing
E-19.03.06P	restore system	system is restored to normal operating status
E-19.03.07P	report completed repairs or replacement of ***components*** and restoration of system	completed repairs or replacement of ***components*** and restoration of system are reported according to company policies

RANGE OF VARIABLES

tools and equipment include: ladders, chainsaws, temporary grounding system, gin poles, live-line tools, rigging tools and equipment, platform boards

work procedures include: grounding, bonding, live-line methods

objects include: trees, obstructions, wildlife

components include: crossarms (timbers), conductors, poles, insulators

KNOWLEDGE

	Learning Outcomes	Learning Objectives
E-19.03.01L	demonstrate knowledge of repairing overhead transmission systems, their applications and operation	define terminology associated with repairing overhead transmission systems
		identify hazards and describe safe work practices pertaining to repairing overhead transmission systems
		interpret codes, standards and regulations pertaining to overhead transmission systems

		interpret information pertaining to overhead transmission systems found on drawings and specifications
		identify ***tools and equipment*** pertaining to repairing overhead transmission systems and describe their applications and procedures for use
		identify types of overhead transmission systems and describe their characteristics and applications
		identify overhead transmission system components and describe their characteristics, applications and operation
E-19.03.02L	demonstrate knowledge of overhead transmission system construction principles	explain principles of overhead transmission system construction
E-19.03.03L	demonstrate knowledge of electrical principles	explain principles of electricity
E-19.03.04L	demonstrate knowledge of procedures used in temporary grounding and bonding of overhead transmission systems	identify temporary grounding and bonding requirements pertaining to overhead transmission systems
		describe procedures used for temporary grounding and bonding of overhead transmission systems
E-19.03.05L	demonstrate knowledge of procedures used to repair and test overhead transmission system ***components*** and accessories	describe procedures used to repair overhead transmission systems, and their ***components*** and accessories
		describe procedures used to test overhead transmission systems, and their ***components*** and accessories

RANGE OF VARIABLES

tools and equipment include: ladders, chainsaws, temporary grounding system, gin poles, live-line tools, rigging tools and equipment, platform boards

components include: crossarms (timbers), conductors, poles, insulators

E-19.04 Repairs underground and underwater transmission systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	no	no	yes	NV	yes	NV	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
E-19.04.01P	select and use ***tools and equipment***	***tools and equipment*** to repair underground and underwater transmission systems are selected and used according to job requirements
E-19.04.02P	follow ***work procedures***	***work procedures*** are followed
E-19.04.03P	expose faulted cables	faulted cables are exposed using ***methods***
E-19.04.04P	repair or replace cable	cable is repaired or replaced
E-19.04.05P	replace ***components***	***components*** are replaced according to job requirements
E-19.04.06P	test equipment and cables	equipment and cables are tested using ***test equipment*** to verify integrity of fault repair
E-19.04.07P	restore system	system is restored to normal operating status by using switching procedures
E-19.04.08P	report completed repairs or replacement of ***components*** and restoration of system	completed repairs or replacement of ***components*** and restoration of system are reported according to company policies

RANGE OF VARIABLES

tools and equipment include: live-line tools, temporary grounding systems, potential indicators, rigging tools and equipment

work procedures include: grounding, bonding, testing cable

methods include: mechanical digging, manual digging, hydro-vacuums

components include: cables (armoured, shielded), cable protection, system grounds, duct systems, direct-buried systems, terminations, splices

test equipment includes: potential indicators, hi-pot testers, high voltage test units

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
E-19.04.01L	demonstrate knowledge of underground and underwater transmission systems, their characteristics and applications	define terminology associated with repairing underground and underwater transmission systems
		identify hazards and describe safe work practices pertaining to repairing underground and underwater transmission systems

		interpret codes, standards and regulations pertaining to underground and underwater transmission systems
		interpret information pertaining to underground and underwater transmission systems found on drawings and specifications
		identify ***tools and equipment*** pertaining to repairing underground and underwater transmission systems and describe their applications and procedures for use
		identify ***components*** used in repairing underground and underwater transmission systems and describe their characteristics and applications
		identify types of underground and underwater transmission systems and describe their characteristics and applications
		identify underground and underwater transmission system components and describe their applications and operation
E-19.04.02L	demonstrate knowledge of underground and underwater system construction principles	explain principles of underground and underwater transmission system construction
E-19.04.03L	demonstrate knowledge of electrical principles	explain principles of electricity
E-19.04.04L	demonstrate knowledge of procedures used to repair and test underground and underwater system ***components***	describe procedures used to repair underground and underwater transmission systems, and their ***components***
		describe procedures used to test underground and underwater transmission systems, and their ***components***
E-19.04.05L	demonstrate knowledge of procedures used to fish, install, splice, cut, strip and terminate cables	describe procedures used to fish and install cables and their components and accessories
		describe procedures used to splice cables
		describe procedures used to cut, strip and terminate cables
E-19.04.06L	demonstrate knowledge of procedures used in temporary grounding and bonding of underground and underwater transmission systems	identify temporary grounding and bonding requirements relating to underground and underwater transmission systems
		describe procedures used for temporary grounding and bonding of underground and underwater transmission systems

RANGE OF VARIABLES

tools and equipment include: live-line tools, temporary grounding systems, potential indicators, rigging tools and equipment

components include: cables (armoured, shielded), cable protection, system grounds, duct systems, direct-buried systems, terminations, splices

APPENDIX A
ACRONYMS

AED	automated external defibrillator
AWP	aerial work platforms
CPR	cardiopulmonary resuscitation
DC	direct current
FRC	flame retardant clothing
FRP	fibreglass reinforced plastic
GIS	global information system
GPS	global positioning system
HID	high intensity discharge
kVA	kilo-voltage-amperes
LED	light emitting diode
MAD	minimum approach distances
MHAD	material handling aerial device
OH&S	Occupational Health and Safety
PT	potential transformers
PPE	personal protective equipment
RBD	radial boom derricks
SCADA	supervisory control and data acquisition
SF_6	sulphur hexafluoride gas
SOP	standard operating procedures
SRL	self-retractable line
SWL	safe working loads
TDG	transportation of dangerous goods
TDR	time domain reflectometers
ULF	ultra low frequency
VLF	very low frequency
WHMIS	Workplace Hazardous Materials Information System
WLL	working load limit

APPENDIX B

TOOLS AND EQUIPMENT / OUTILS ET ÉQUIPEMENT

Hand Tools / Outils à main

banding tools	outils de cerclage
bolt cutters	coupe-boulons
brace and bits	vilebrequin et mèches
brushing rakes	râteaux de débroussaillage
cable cutters	coupe-câbles
cant hooks (peavey)	tourne-billes
channel lock pliers	pince multiprise
chisels	ciseaux
compression tools	outils de compression
crow bars	pieds-de-biche
digging bars	barres de creusage
digging spoons	bêches
drill bits	forets
files	limes
flashlights	lampes de poche
folding tape measures	règles pliantes en bois
hammers	marteaux
hex keys	clés hexagonales
knives	couteaux
levels	niveaux
locking pliers	pince-étau
nut drivers	tourne-écrous
picks	pics
pliers	pinces
plumb bob	fil à plomb
pruning equipment	équipement d'élagage
saws (hand, buck, hack)	scies (égoïne, scie à bûches, scie à métaux)
screwdrivers	tournevis
shovels	pelles
vices	étaux
wire cutters	coupe-fil
wrenches (adjustable, torque, spud)	clés (ajustables, dynamométriques, à mâchoires)

Climbing Gear / Matériel de grimpage

climbing belts	ceintures de monteur de ligne
fall restraint devices	dispositifs antichute
pole climbers	grimpettes
pole strap	sangles
tower harness	harnais
tower strap	longe de positionnement

Personal Protective Equipment / Équipement de protection individuelle

conductive clothing (bare-hand suits)	vêtements conducteurs
face shields	écrans faciaux
fall restraint devices	dispositifs de retenue
flame retardant clothing	vêtements ignifuges
flash glasses	lunettes antiéblouissement
goggles	lunettes étanches
hard hats	casques de sécurité
harness/lanyard “fall arrest”	harnais antichute
hearing protection	protecteurs d’oreilles
helmets	casques
high visibility clothing	gilet de sécurité
insulated gloves	gants isolants
leather gloves	gants en cuir
rubber gloves/sleeves	gants/manchons en caoutchouc
safety footwear	chaussures de sécurité
safety glasses	lunettes de sécurité
tower harness	harnais d’ascension de tours

Safety Equipment / Équipement de sécurité

anemometer	anémomètre
barricades	barricades
breathing protection	appareil de protection respiratoire
burn kits	trousses pour brûlures
caution tapes	rubans d’avertissement
cones	cônes
defibrillators	défibrillateurs
descent equipment	équipement de descente
explosive gas, toxic gas and oxygen detectors	détecteurs d’oxygène, de gaz toxiques et de gaz explosifs
fire blankets	couvertures antifeu
fire extinguishers	extincteur
first-aid kits	trousses de premiers soins
flares	fusées éclairantes
grounding devices	dispositifs de mise à la terre
meter pullers	extracteurs de compteur
rescue equipment	équipement de sauvetage
traffic control signage and equipment	Panneaux et équipement de signalisation routière
wheel chocks	cales de roue

Live-Line Tools / Outils isolants

auxiliary arm and accessories	traverse auxiliaires et accessoires
bonding wands	tiges de continuité des masses
bypass jumpers	bretelles de contournement
fibreglass reinforced plastic (FRP) tools (sticks)	outils en plastique renforcé de fibre de verre (PRFV) (perches)
fuse pullers	extracteurs de fusible
hard covers (plastic line guards, plastic pole guards, insulator guards, cut-out guards)	protecteurs rigides (dispositifs de protection de ligne en plastique, dispositifs de protection de poteau en plastique, dispositifs de protection d’isolateur, dispositifs de protection de coupe-circuit)
insulated web hoists	palans isolé à courroie
insulator supports	supports d’isolateur

load break tools	outils sectionneur de charge
load pick-up tools	outils d’interconnexion
rubber protective cover-ups (hoses, hoods, blankets)	protecteurs isolants en caoutchouc (tuyaux, capuchons, couvertures)

Electrical Measuring Equipment / Équipement électrique de mesure

continuity testers	vérificateurs de continuité
current leakage meters	détecteurs de fuite de courant
digital recording ammeters	ampèremètres enregistreurs numériques
digital recording voltmeters	voltmètres enregistreurs numériques
energized insulator testers	testeurs d’isolant sous tension
fault indicators	indicateurs de défaut
hi-pot testers	appareil d'essai haute tension
meggers	mégohmmètres
multi-meter	multimètre
ohmmeters	ohmmètres
phase rotation meters	indicateurs d’ordre des phases
phasing sticks	contrôleurs-repéreurs de phases
potential indicators	indicateurs de tension
time domain reflectometers (TDR)	réflectomètres temporels

Power Tools / Outils mécaniques

chain saws (gas powered, hydraulic, battery)	scies à chaîne (à essence, hydraulique, à batterie)
cutters (cable, bolt, hydraulic)	cisailles (coupe-câbles, boulon, hydraulique)
drills	perceuses
impact guns	clés à chocs
jack hammers	marteaux perforateurs
portable generators	génératrices portatives
power pruning equipment	équipement d’élagage électrique
presses	presses
saws (circular, reciprocating, chop)	scies (circulaire, alternative, à sectionner)
tampers	compacteurs

Specialty Tools and Equipment / Outils et équipement specialisés

air compressors	compresseurs d’air
binoculars	jumelles
cable identification equipment	identification du câble téléphonique
cable locators / underground fault locators	détecteurs de câble / localisateurs de défaut souterrain
cable strippers	dénudeurs de câble
collapsible reels	nivelettes
core sampling tools	carottiers
dynamometers	dynamomètres
feed-through devices	dispositifs de traverse
field lashing tools	outils de ligatures
gaff gauges	jauges de pointes
global positioning systems (GPS)	systèmes mondiaux de localisation (GPS)
ground rod drivers	marteaux pour tiges de mise à la terre
hydro vacuum excavators	excavateurs hydropneumatiques
infrared cameras	caméras infrarouge
infrared heat guns	pistolets à rayons infrarouges
magnetic drills	perceuses magnétiques
oil sample test kits	trousses d’essai d’échantillon d’huile

propane torches	chalumeaux au propane
pruning equipment	équipement d'élagage
pulling equipment	équipement de tirage
range finders	télémètres
reel jacks	chevalets de déroulage
grounding equipment	dispositif de mise à la terre mobile
sag boards	nivelettes
silicon cloths	chiffons à la silicone
spot lights	projecteurs
tension stringing equipment	équipement de déroulage sous tension mécanique
tool buckets/tool boards	sceaux à outils / râteliers d'outillage

Powder-Actuated Tools / Outils à charge explosive

powder-actuated connection tools	outils de connexion à charge explosive
powder-actuated nail guns	cloueuses à charge explosive
powder-actuated spiking tools	perforeuses à charge explosive
powder-actuated splicing tools	outils à épisser à charge explosive
thermal welding tools	outils de soudage thermique

Aerial Work Platforms / Plateformes élévatrices de travail

aerial boom/scissor lift	flèche élévatrice / plateforme élévatrice à ciseaux
bucket trucks	camion-nacelle
crane with work platforms	grues à nacelle
fibreglass ladders	échelles en fibre de verre
insulated pole platforms (diving board)	plateformes isolées sur un poteau (tremplin)
Material Handling Aerial Device (MHAD)	appareil de manutention aérienne de matériaux
radial boom derricks (RBD) with bucket attachment	grues à flèche radiale avec attachement de nacelle

Rigging, Hoisting and Lifting Equipment / Équipement de gréage, de hissage et de levage

block and tackle	palan à moufles
cranes	grues
gin poles	mâts de levage
grips	crochets
hoists (chain, nylon, cable, capstan)	palans (chaîne, nylon, câble, cabestan)
nylon straps	courroies de nylon
pike poles	perches à poteau
pole jacks (pullers)	vérins pour poteau (treuils de déroulage)
power reel trailers	remorques porte-touret
rope	cordes de service
shackles	manilles
slings	élingues
tension machines	tensionneurs
travellers	poulies de déroulage
wire mesh grips	chaussettes de tirage

Off-Road Equipment / Équipement tout terrain

all-terrain track machines	véhicules à chenilles
all-terrain vehicles	véhicules tout-terrain
backhoes	rétrocaveuses
boats	bateaux
bulldozers	bulldozers

excavators	excavatrices
helicopters	hélicoptères
skidders	débusqueuses
skid steers	chargeurs à direction à glissement
snowmobiles	motoneiges
trenchers	excavateurs de tranchées

Communications Equipment / Matériel de communication

cellular phones	téléphones cellulaires
computers	ordinateurs
fax machines	télécopieurs
printers	imprimantes
satellite phones	téléphones satellites
tablets	tablettes
telephones	téléphones
two-way radios	radios avec émetteur-récepteur

APPENDIX C
GLOSSARY/GLOSSAIRE

bonding	making a mechanically secure electrical connection between two or more objects to ensure they are at the same potential	**mise à la masse**	établissement d'une connexion électrique mécaniquement sûre entre au moins deux objets pour les maintenir au même potentiel
capacitor	device that improves power quality	**condensateur**	dispositif permettant d'améliorer la qualité du courant
cascade lighting	method of switching street lights in the first circuit, which, upon being energized, activates a relay that, in turn, energizes the second; the second then energizes the third, and so on	**éclairage en cascade**	méthode de commutation du courant des lampadaires dans le premier circuit, qui, une fois alimenté, active un relais qui, à son tour, alimente le deuxième circuit qui en alimente un troisième, et ainsi de suite
communication lines	lines that transmit communication data; may be fibreoptic, coaxial or telephone lines	**lignes de communication**	lignes qui transmettent des données de communication : peut s'agir de lignes à fibres optiques, coaxiales ou téléphoniques
company standards	local or utility-based structural designs	**normes de l'entreprise**	conception de structures locale ou des services publics
conductor	that part of a cable, overhead line or apparatus intended to conduct the flow of electrical energy	**conducteur**	partie d'un câble, d'une ligne aérienne ou d'un appareil destiné au passage de l'énergie électrique
counterpoise	method of bonding transmission towers, either to ground or to each other	**contrepoids**	méthode pour lier les pylônes de transmission, soit entre eux ou par mise à la masse
cribbing	method of increasing pole stability in poor soil conditions	**calage**	méthode pour augmenter la stabilité d'un pôle en sol instable

delta system	three-wire system with one possible voltage	**réseau monté en triangle**	réseau monté à trois fils avec une seule tension possible
de-energized	where any potential electrical energy has been discharged through a mechanically secure connection to an effective ground potential	**hors tension**	état d'un élément dont l'énergie électrique potentielle a été déchargée au moyen d'une connexion mécaniquement sûre vers un point à potentiel de terre efficace
distribution system	operating system which delivers energy from substation to customers and generally operates between 2400 volts and 34,500 volts	**réseau de distribution**	réseau opérationnel distribuant l'énergie d'un poste électrique aux clients et fonctionnant en général entre 2 400 et 34 500 volts
energized	capable of delivering energy by reason of being dynamically alive or charged	**sous tension**	état d'un élément en mesure de distribuer de l'énergie parce qu'il est dynamiquement alimenté ou chargé
fault indicators	device which indicates a defect or abnormal condition in a conductor	**indicateur de défauts**	dispositif indiquant la présence de défauts ou de conditions anormales dans un conducteur
fibreglass reinforced plastic (FRP) tool	insulated live-line tools; also known as hot stick	**outil en PRFV**	outil isolé pour le travail sur ligne sous tension : aussi appelé perches isolantes
footing	concrete or grillage support for a structure; the base	**massif**	support en béton ou en grillage d'une structure : la base
grillage	buried portion of a steel tower acting as a footing	**grillage**	partie enfouie d'un pylône d'acier qui sert de semelle
grounding	placing interconnected parts at ground/earth potential	**mise à la terre**	connexion à la terre ou au potentiel de la terre de parties interconnectées
guys	devices used to offset conductor tension and equipment load	**haubans**	dispositifs utilisés pour compenser la tension du conducteur et de la charge de l'équipement

guy wires	high tensile steel wire attached to an anchor point which is installed to offset conductor tension and equipment load	**câble de hauban**	câble d’acier à traction élevée attaché à un point d’ancrage et installé pour assurer la stabilité d’un conducteur et d’une charge d’équipement
hydro-vacuum excavation	excavating with high-pressure water and a vacuum system	**excavation hydro-pneumatique**	excavation au moyen d’eau à haute pression et d’un système d’aspiration
isolated	separated from all sources of dynamic energy	**isolé**	séparé de toutes les sources d’énergie dynamique
laminate poles	poles made of laminated wood	**poteau stratifié**	poteau fait en bois stratifié
lock-out and tag-out	procedure to prevent unauthorised operation of equipment	**verrouillage et étiquetage**	procédure permettant d’empêcher l’utilisation non autorisée de l’équipement
maintenance programs	preventative or pro-active programs to ensure reliability of system	**programme d’entretien**	programme de prévention ou proactif pour assurer la fiabilité du réseau
meggering	to apply potential to test electrical equipment for continuity and insulation	**essais au mégohmmètre**	utilisation du potentiel pour vérifier la continuité et l’isolation de l’équipement électrique
metering equipment	equipment used to track consumption of electricity	**équipement de mesure**	équipement servant à mesurer la consommation d’énergie électrique
network systems	connecting points of generation or supply sources	**système de réseau**	points de connexion au réseau de production d’énergie électrique ou aux sources d’alimentation
nomenclature	powerlines and electrical apparatus designated by alphabetic and numeric codes	**nomenclature**	matériel des lignes électriques et appareils électriques désignés par des codes alphabétiques et numériques
peening	deformation of threads to prevent nuts from loosening due to vibration	**marteler**	déformation du filetage pour prévenir le desserrage des écrous en raison des vibrations
potential	latent energy (potential presence of voltage)	**potential électrique**	énergie latente (potentiel de présence de tension)

powder-actuated tools	tools that requires an explosive charge to operate	**outil à charge explosive**	outil dont le fonctionnement nécessite une charge explosive
primary	voltage above 750 volts	**tension primaire**	tension supérieure à 750 volts
reactor	equipment that limits over-current and over-voltage conditions	**bobine de réactance**	équipement qui stabilise les surintensités et les surtensions
recloser	equipment that is used to detect and interrupt momentary transient faults, allowing downstream devices to operate; they clear temporary faults and isolate permanent faults	**disjoncteur réenclencheur**	équipement utilisé pour détecter et interrompre les défauts transitoires momentanés, permettant aux dispositifs en aval de fonctionner : ils éliminent les défauts temporaires et isolent les défauts permanents
secondary	voltage 750 volts and below	**tension secondaire**	tension de 750 volts et moins
sectionalize	to isolate or separate sections of line	**sectionner**	isoler ou séparer des sections d’une ligne
splicing	the joining of two conductors together end to end	**épissage**	jonction de deux conducteurs par entrelacement de torons
structure	a device used to support conductors or cables and related equipment	**structure**	dispositif conçu pour supporter des conducteurs ou des câbles et l’équipement connexe
switching	an operation that affects or modifies the status of an electrical system	**commutation**	opération qui affecte ou modifie l’état d’un réseau électrique
transformer	equipment used to step down or step up voltage and current to desired level	**transformateur**	équipement utilisé pour abaisser ou augmenter la tension et le courant au niveau souhaité
transmission line	power line with an operating voltage over 34,500 volts	**ligne de transport**	ligne acheminant une tension de service supérieure à 34 500 volts
transmission system	system that transmits electricity from the generating station to substations that deliver power to customers	**réseau de transport**	réseau qui achemine l’électricité de la centrale électrique aux postes électriques qui distribue le courant aux clients

voltage regulator	equipment used to maintain a desired voltage	**régulateur de tension**	équipement utilisé pour maintenir la tension souhaitée
wye system	four-wire system with two possible voltages	**réseau monté en étoile**	réseau monté à quatre fils avec deux tensions possibles