NOVA SCOTIA
APPRENTICESHIP
AGENCY

NOVA SCOTIA
OCCUPATIONAL STANDARD
COMMUNICATIONS TECHNICIAN

NSOS V1

FORWARD

This occupational standard was developed by a committee of industry experts in the field led by a facilitator from the Nova Scotia Apprenticeship Agency. It has the following objectives:

- to describe and group the tasks performed by skilled workers;
- to identify which tasks are performed by skilled workers
- to develop instruments for use in the preparation of examinations and curricula for training leading to the certification of skilled workers;
- to facilitate the mobility of apprentices and skilled workers in Canada; and,
- 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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ACKNOWLEDGEMENTS

The Nova Scotia Apprenticeship Agency wishes to acknowledge the contributions of the following individuals and organizations, and all others who participated in the development of the original draft of the standard and provided expert advice throughout its development:

Blake Clothier	Able Electric Ltd.
Bob Murray	IBEW Local 625
Daniel Bentley	Plexus Canada
David MacLeod	Technical Safety, Labour, Skills and Immigration
David Wilson	Easco Electric Ltd.
Glenn Hines	Dramis Communications Solutions Ltd.
Gordon Hebb	Wilsons Security Ltd.
Matt Andrea	IBEW Local 625
Mike Jerrett	Bond & Coolen Electrical Contractors
Murray Simard	Dramis Communications Solutions Ltd.
Scott Rutledge	Cabco Communications Group

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STRUCTURE OF THE OCCUPATIONAL STANDARD

To facilitate the understanding of the occupation, the work performed is divided into the following categories:

Description of the trade: an overview of the trade's duties

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

Pie Chart of Red Seal Examination Weightings: a graph which depicts the 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

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

Range of Variables: elements and examples (not all inclusive) that provide a more in-depth description of a term used in the performance criteria, evidence of attainment, learning outcomes, or learning objectives

DESCRIPTION OF THE COMMUNICATIONS TECHNICIAN TRADE

"Communications Technician" is this trade's official provincial occupational title approved by the Nova Scotia Apprenticeship Agency. This standard covers tasks performed by a Communications Technician whose occupational title has been identified by some provinces and territories of Canada under the following names:

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
Communications Electrician													✓
Communication Technician									✓		✓		
Communications Technician		✓											

Communications Technicians plan, design, assemble, install, alter, upgrade, repair, inspect, verify, commission, connect, operate, maintain and decommission communication systems. Communication systems provide alarm, security, communication and control in residential, commercial, institutional, industrial, transportation and entertainment environments. Communications Technicians may be self employed or employed by communications contractors, security integrators, electrical contractors, audio visual (AV) integrators, utilities, and operations and maintenance departments of various facilities and municipalities.

Communications Technicians must read and interpret mechanical, civil and architectural drawings and specifications such as electrical, building, fire, and jurisdictional codes to complete communication systems installations. They use test equipment and digital technology to ensure system safety, functionality and compatibility.

Communications Technicians require good communication skills to negotiate, coordinate and facilitate work with clients, co-workers, jurisdictional authorities and other trades. Organizational skills are required to successfully plan and execute their work. They also require strong analytical and problem-solving skills in order to read and interpret diagrams, drawings and specifications. They require mechanical aptitude to install, diagnose and repair systems and components. It is beneficial for Communications Technicians to have good vision, the ability to distinguish colours, manual dexterity and a willingness to keep up with new developments in the trade. With changing technologies, digital and computer skills are necessary to this trade for job performance, learning methods and updating skills.

Their work may be performed indoors or outdoors, at heights, in confined spaces and in hazardous environments. They require stamina as Communications Technicians spend much of their time performing static and physical tasks such as climbing. Occupational risks include shocks, industrial diseases, arc flashes, falls and injury from repetitive motion, lifting and kneeling.

This standard recognizes similarities or overlaps with the work of Construction Electricians and Alarm and Security Technicians.

Communications Technicians work with a wide variety of construction tradespeople, engineers and inspectors. Communications Technicians play a crucial role as mentors and trainers to apprentices in the trade. They may also advance to positions such as lead technicians, instructors, project managers, superintendents, estimators, system designers or start their own contracting business. Communications Technicians may enhance their skills in different fields such as restorative, service or retrofit work rather than new construction.

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. The nine identified skills are:

- Reading
- Document Use
- Writing
- Oral Communication
- Numeracy
- Thinking
- Digital Technology
- Working with Others
- Continuous Learning

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.

Tools are available online or for order at:
https://www.canada.ca/en/services/jobs/training/initiatives/skills-success/tools.html

The application of these skills may be described throughout this document within the competency statements which support each subtask of the trade. For a complete description of the nine essential skills for this trade, please visit: https://www.jobbank.gc.ca/essentialskills

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.

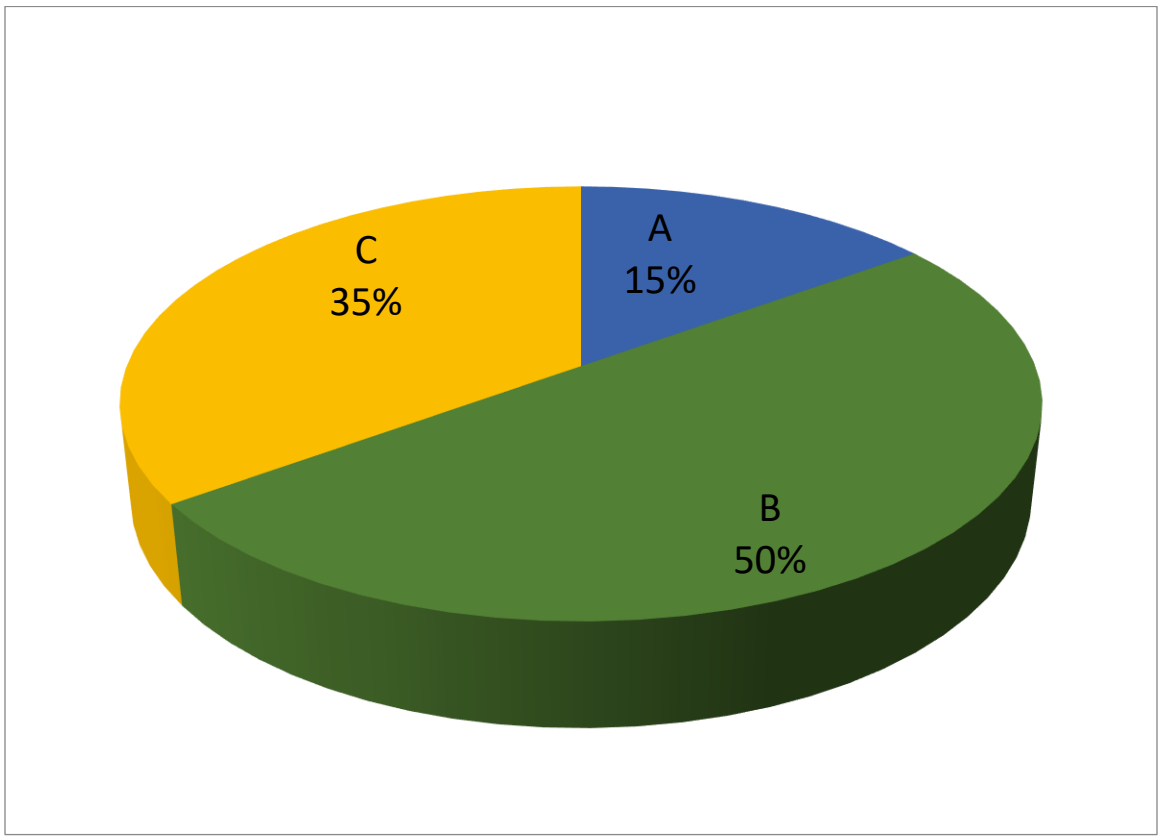
INDUSTRY EXPECTED PERFORMANCE

All tasks must be performed according to Nova Scotia regulations and standards. All health and safety standards must be respected and observed. Work should be performed efficiently and at a high quality without material waste or environmental damage. All requirements of the manufacturer specifications, employers and client expectations must be met. At a journeyperson level of performance, all tasks must be completed 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.

Canadian Electrical Code (CEC)

The Canadian Electrical Code (CEC) requirements must be applied to all applicable tasks and sub-tasks throughout this document, even when not directly referenced.

PIE CHART
OF CERTIFICATION EXAMINATION WEIGHTINGS



MWA A	Performs Common Occupational Skills	15%
MWA B	Installs and Services Cables Inside and Outside Plant	50%
MWA C	Installs and Services Signaling, Communication and Associated Systems	35%

This pie chart represents a breakdown of the Nova Scotia provincial certification examination. The task matrix on the following pages indicates the breakdown of tasks and sub-tasks within each major work activity. Provincial certification examinations typically have between 100 and 150 questions. This Provincial certification exam for this trade has 100 questions.

COMMUNICATIONS TECHNICIAN

TASK MATRIX

A – PERFORMS COMMON OCCUPATIONAL SKILLS — 15%

Task A-1 **Performs safety related functions** 20%	**A 1.01** Uses personal protective equipment (PPE) and safety equipment	**A 1.02** Maintains a safe work site	**A 1.03** Performs lock-out and tag-out procedures
	A 1.04 Performs access and egress procedures		
Task A-2 **Uses tools and equipment** 15%	**A 2.01** Uses hand, portable power and specialty tools and equipment	**A 2.02** Uses access equipment	**A 2.03** Uses lifting equipment
Task A-3 **Organizes work** 15%	**A 3.01** Interprets plans, drawings and specifications	**A 3.02** Organizes materials and supplies	**A 3.03** Plans project tasks and procedures
	A 3.04 Prepares worksite		
Task A-4 **Installs support components** 25%	**A 4.01** Installs brackets, hangers and fasteners	**A 4.02** Installs seismic restraint systems	
Task A-5 **Commissions and decommissions communication systems** 15%	**A 5.01** Performs commissioning of communication and associated systems	**A 5.02** Performs decommissioning of communication and associated systems	

Task A-6 **Perform labelling, testing and documentation** 10%	**A 6.01** Labels communication and associated systems	**A 6.02** Test communication and associated systems	**A 6.03** Performs final inspection of communication and associated systems
	A 6.04 Completes documentation		
Task A-7 **Uses communication and mentoring techniques** 0%	**A 7.01** Uses communication techniques	**A 7.02** Uses mentoring techniques	

B – INSTALLS AND SERVICES CABLES INSIDE AND OUTSIDE PLANT

50%

Task B-8 **Lays out and creates cable pathways (inside plant)** 20%	**B 8.01** Lays out and installs cable management and support systems	**B 8.02** Creates openings	
Task B-9 **Lays out and creates cable pathways (outside plant)** 10%	**B 9.01** Lays out and installs cable management and support systems	**B 9.02** Creates openings	
Task B-10 **Selects and prepares cable for installation (inside and outside plant)** 10%	**B 10.01** Determines media type	**B 10.02** Conducts acceptance testing	**B 10.03** Installs pulling medium in cable pathway
Task B-11 **Installs cable (inside and outside plant)** 50%	**B 11.01** Installs cable into support infrastructure	**B 11.02** Terminates cable	**B 11.03** Installs firestop
Task B-12 **Services cable plant infrastructure** 10%	**B 12.01** Performs cable plant audit	**B 12.02** Services cable plant faults	

C – INSTALLS AND SERVICES SIGNALING, COMMUNICATION AND ASSOCIATED SYSTEMS

35%

Task C-13 **Installs security and surveillance systems** 35%	**C 13.01** Installs security and surveillance systems	**C 13.02** Performs servicing of security and surveillance systems
Task C-14 **Installs and services communication and associated systems** 40%	**C 14.01** Installs voice/data/video (VDV) and community antenna television (CATV) systems	**C 14.02** Performs servicing of communication and associated systems
Task C-15 **Installs and services building automation systems** 25%	**C 15.01** Installs building automation systems	**C 15.02** Performs servicing of building automation systems

MAJOR WORK ACTIVITY A

MWA A Performs common occupational skills

TASK A-1 Performs safety-related functions

Task Descriptor

Communication technicians are responsible for ensuring the safety of themselves and others in the work environment. They must follow company, client and jurisdictional regulations. It is critical that construction electricians be constantly aware of their surroundings and the hazards they may encounter.

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

Essential Skills	Reading, Thinking, Oral Communication

Performance Criteria

1.01.01 Organize ***PPE*** and ***safety equipment***
1.01.02 Select ***PPE*** and ***safety equipment*** specific to job task
1.01.03 Recognize worn, damaged or defective ***PPE*** and safety equipment
1.01.04 Ensure fit of ***PPE*** and ***safety equipment***
1.01.05 Ensure cables and straps for ***PPE*** are secured
1.01.06 Clean and store ***PPE*** and ***safety equipment***

Range of Variables

PPE include: safety glasses (face shield), respirators, hardhats, footwear, gloves, coveralls, personal monitors, fall protection, hearing protection, high-visibility clothing
safety equipment include: lockout devices, fire extinguishers, gas detectors, first aid kit, fall protection equipment and devices

A-1.02 Maintains a safe worksite

Essential Skills	Document Use, Oral Communication, Working with Others

Performance Criteria

1.02.01 Recognize and address ***hazards***
1.02.02 Report unsafe working conditions and near misses
1.02.03 Handle and store hazardous materials according to WHMIS
1.02.04 Install ***safety protection***
1.02.05 Identify and implement ventilation in workspace
1.02.06 Ensure clear path of access and egress
1.02.07 Test air quality of confined spaces
1.02.08 Follow confined space procedures and ***jurisdictional regulations***

Range of Variables

hazards include: poor housekeeping, improper use of ***PPE***, lack of monitoring devices, improper hardware selection, poor air quality, poor ventilation

jurisdictional regulations include: federal (Workplace Hazardous Materials Information System (WHMIS)), provincial/territorial (worker's rights and responsibilities), municipal

safety protection include: signage, barrier tape and barricades, ***PPE***, monitors, warning devices (e.g. horns)

PPE include: safety glasses (face shield), respirators, hardhats, footwear, gloves, coveralls, personal monitors, fall protection, hearing protection, high-visibility clothing

A-1.03 Performs lock-out and tag-out procedures

Essential Skills	Thinking, Document Use, Reading

Performance Criteria

1.03.01 Recognize and de-energize ***energy potential in machines, process systems and components*** and confirm zero-energy state

1.03.02 Follow recognized standard operating procedure (SOP) for shutdown, lock-out and tag-out

Range of Variables

energy potential in machines, process systems and components include: accumulators, suspended loads, pneumatic and hydraulic equipment, gravity, piping, pipe blockages, rotating equipment, stress, strain and/or tension, material memory (e.g. coiled cable, springs), electrical, thermal

A-1.04 Performs access and egress procedures

Essential Skills	Thinking, Document Use, Reading

Performance Criteria

1.04.01 Select ***tools and equipment*** for task

1.04.02 Perform mount /ascend and descend /dismount procedures in ***work area***

1.04.03 Use required fall protection means

1.04.04 Verify appropriate ***safety requirements***

Range of Variables

Tools and equipment include: barricades, unlocking devices, access keys, PPE, ladders

work area include: rooftops, power poles, confined spaces

safety requirements include: government safety regulations, manufactures recommendations, approved industry standards

TASK A-2 Uses tools and equipment

Task Descriptor

Communication technicians must be able to select, use and maintain tools and equipment in a safe and effective manner relevant to the task being performed.

A-2.01 Uses hand, portable power and specialty tools and equipment

Essential Skills	Thinking, Numeracy, Continuous Learning

Performance Criteria

2.01.01 Select required **hand** and **power tools**
2.01.02 Recognize worn, damaged or defective ***hand*** and ***portable power tools***
2.01.03 Operate ***hand*** and ***portable power tools***
2.01.04 Maintain ***hand*** and ***portable power tools***
2.01.05 Store ***hand*** and ***portable power tools***

Range of Variables

hand tools include: wrenches, screwdrivers, measuring tools, hammers, hand saws, hydraulic tools, crimp tools, testing equipment, cable prep tools
portable power tools include: grinders, power metal saws, drilling machines, powder actuated devices

A-2.02 Uses access equipment

Essential Skills	Continuous Learning, Document Use, Thinking

Performance Criteria

2.02.01 Select ***access equipment***
2.02.02 Set up and use ***access equipment***
2.02.03 Identify and remove from service unsafe, worn, damaged or defective ***access equipment***
2.02.04 Clean and lubricate ***access equipment***
2.02.05 Store ***access equipment***

Range of Variables

access equipment include: powered mobile equipment (PME), ladders

A-2.03 Uses lifting equipment

Essential Skills	Thinking, Oral Communication, Working with Others

Performance Criteria

2.03.01 Identify traffic areas and potential hazards
2.03.02 Install barricades and signage to contain work zone
2.03.03 Select lifting equipment
2.03.04 Visually and mechanically inspect for worn, damaged and defective lifting equipment
2.03.05 Report, tag and decommission unsafe, damaged and defective lifting equipment

Range of Variables

potential hazards include: overhead hazards, dropped loads, congested worksites, confined spaces, trenches

TASK A-3 Organizes work

Task Descriptor

Communication technicians organize projects in order to safely and efficiently use material, labour, tools and equipment. They interpret drawings, plans and specifications to identify required resources. Prior to starting they must plan their tasks, prepare the worksite and organize the materials and supplies needed. Communication technicians must document their work and prepare as-built drawings and operations and maintenance (O&M) manuals.

A-3.01 Interprets plans, drawings and specifications

Essential Skills	Thinking, Document Use, Working with Others

Performance Criteria

3.01.01 Determine scope of job
3.01.02 Develop a safety plan
3.01.03 Gather documents
3.01.04 Determine tools and equipment
3.01.05 Identify required materials
3.01.06 Produce field drawings and sketches
3.01.07 Coordinate work with other trades
3.01.08 Estimate time to complete job

Range of Variables

scope of job include: labour and equipment requirements
documents include: work orders (written), Safety Data Sheets (SDS), safety documents, manuals, standard operating procedure (SOP), drawings
materials include: consumables, parts, rigging, lifting equipment

A-3.02 Organizes material and supplies

Essential Skills	Numeracy, Writing, Document Use

Performance Criteria

3.02.01 Identify and select ***materials*** and ***supplies***
3.02.02 Locate, order and schedule delivery of ***materials*** and ***supplies***
3.02.03 Load, unload and store ***materials*** and ***supplies***
3.02.04 Perform material take-off to identify required ***materials*** and ***supplies***
3.02.05 Coordinate receiving of ***materials*** and ***supplies*** to ensure delivery of shipment
3.02.06 Verify shipments of ***materials*** and ***supplies*** to ensure that quality and quantity match order
3.02.07 Perform inventory control

Range of Variables

materials include: wires and cables, distribution equipment, fittings, raceways, support hardware, connectivity hardware, active components, passive components
supplies (consumables) include: pulling compounds, tape, thread compounds, cable tie, hook and loop closures

A-3.03 Plans project tasks and procedures

Essential Skills	Numeracy, Digital Technology, Document Use

Performance Criteria

3.03.01 Visually inspect work environment to determine job requirements from approved documentation
3.03.02 Determine labour and equipment requirements
3.03.03 Establish and maintain schedules
3.03.04 Coordinate work with other trades
3.03.04 Draw and sketch layouts

A-3.04 Prepares worksite

Essential Skills	Document Use, Digital Technology, Numeracy

Performance Criteria

3.04.01 Perform pre-job assessment
3.04.02 Visually inspect to identify traffic areas and ***potential hazards***
3.04.03 Install barricades and signage to contain work zone
3.04.04 Create openings and penetrations in structures and equipment
3.04.05 Ensure sufficient lighting and ventilation of work area
3.04.06 Ensure required materials and equipment are on site
3.04.07 Control workplace and storage access
3.04.08 Ensure surveys and locates are completed and marked-out

Range of Variables

potential hazards include: confined spaces and trenches, overhead hazards, uneven ground, high traffic area, elevated work areas

TASK A-4 Installs support components

Task Descriptor

Communication technicians fabricate support structures to protect and support equipment and components. They use various methods to secure equipment to structures in order to maintain a safe installation, and reduce hazards and unwanted movements. Seismic restraint systems are used as a secondary support.

A-4.01 Installs brackets, hangers and fasteners

Essential Skills	Numeracy, Document Use, Thinking

Performance Criteria

4.01.01 Select brackets, hangers and fasteners
4.01.02 Determine installation location to avoid obstructions
4.01.03 Secure brackets, hangers and fasteners to structure

Range of Variables

obstructions include: duct work, plumbing pipes, structural members, equipment ***brackets*** includes: angle brackets, T brackets, L brackets, floor brackets, ceiling brackets
hangers include: trapezes, pipe clamps, beam clamps, J-hooks
fasteners include: spring nuts, bolts, screws, concrete anchors

A-4.02 Installs seismic restraint systems

Essential Skills	Numeracy, Document Use, Thinking

Performance Criteria

4.02.01 Select seismic restraint systems
4.02.02 Determine installation location to avoid obstructions
obstructions are avoided
4.02.03 Position, mount and secure seismic restraint systems to structure

Range of Variables

seismic restraint systems include: chains, cables, rods, aircraft wires
obstructions include: duct work, plumbing pipes

TASK A-5 Commissions and decommissions communication and associated systems

Task Descriptor

Communication technicians start up and commission communication and associated systems to ensure safe and intended operation. Commissioning of communication and associated systems may require

liaison with equipment manufacturers. Communication technicians also shut down systems to perform preventative maintenance or to replace defective equipment. They decommission systems to prepare them for removal.

A-5.01 Performs commissioning of communication and associated systems.

Essential Skills Document Use, Numeracy, Thinking

Performance Criteria

5.01.01 Identify systems or equipment that needs to be commissioned
5.01.02 Test systems or equipment for faults
5.01.03 Follow specifications sequence for startup
5.01.04 Check system peripherals for specified operation system
5.02.05 Adjust components to achieve desired operation
5.01.06 Verify that safety and shipping material has been removed from equipment and check for tools and loose hardware prior to startup
5.01.07 Notify required personnel of startup procedure

Range of Variables

communication systems include: VDV and CATV systems, distributed antenna system (DAS), PA systems, intercom systems, nurse call systems, Ethernet and industrial data communication systems

associated systems include: wireless, telephone systems, data systems, security and surveillance systems, PA and intercom systems, nurse call systems, patient wandering systems

A-5.02 Performs decommissioning of communication and associated systems

Essential Skills Document Use, Reading, Numeracy

Performance Criteria

5.02.01 Identify systems or equipment that needs to be decommissioned
5.02.02 Isolate systems outside scope of work
5.02.03 Follow specifications sequence for shutdown
5.02.04 Remove identified system
5.02.05 Ensure proper disposal of system and materials
5.02.06 Notify required personnel of shutdown procedure

Range of Variables

communication systems include: VDV and CATV systems, distributed antenna system (DAS), PA systems, intercom systems, nurse call systems, Ethernet and industrial data communication systems

associated systems include: wireless, telephone systems, data systems, security and surveillance systems, PA and intercom systems, nurse call systems, patient wandering systems

TASK A-6 Performs labelling, testing and documentation

Task Descriptor

Communication technicians label communication and associated systems such VDV and CATV systems, distributed antenna system (DAS), PA systems, intercom systems, nurse call systems, wireless, telephone systems, data systems, security and surveillance systems, PA and intercom systems, nurse call systems, and patient wandering systems. They perform tests of these systems and resolve any deficiencies once they have been inspected.

A-6.01 Labels communication and associated systems

Essential Skills	Reading, Document Use, Writing

Performance Criteria

6.01.01 Identify labelling ***requirements***
6.01.02 Audit client labelling specifications, if supplied
6.01.03 Place mechanically printed label on ***system components***
6.01.04 Complete as-built documentations per site conditions

Range of Variables

associated systems include: wireless, telephone systems, data systems, security and surveillance systems, PA and intercom systems, nurse call systems, patient wandering systems
communication systems include: VDV and CATV systems, distributed antenna system (DAS), PA systems, intercom systems, nurse call systems, Ethernet and industrial data communication systems

requirements include: drawings and specifications, current industry standards, CSA, job and manufacturers' specifications, company or client site-specific standards

system components include: mounting equipment, station and distribution cable ends, termination hardware, inter-connect cables, raceway and pathways, patch cords and equipment cords

A-6.02 Tests communication and associated systems

Essential Skills	Digital Technology, Reading, Document Use

Performance Criteria

6.02.01 Identify system to be tested
6.02.02 Select industry approved test equipment
6.02.03 Perform test of system
6.02.04 Interpret test results
6.02.05 Verify test results of system according to ***specifications***
6.02.06 Document test results

Range of Variables

associated systems include: wireless, telephone systems, data systems, security and surveillance systems, PA and intercom systems, nurse call systems, patient wandering systems
communication systems include: VDV and CATV systems, distributed antenna system (DAS), PA systems, intercom systems, nurse call systems, Ethernet and industrial data communication systems
specifications include: drawings, TIA, job and manufacturers' specifications and company or client site -specific standards

A-6.03 Performs final inspection of communication and associated systems

Essential Skills	Working with Others, Oral Communication, Document Use

Performance Criteria

6.03.01 Conduct walk through of the installation
6.03.02 Verify systems are labelled, tested and documented
6.03.03 Resolve any deficiencies

Range of Variables

associated systems include: wireless, telephone systems, data systems, security and surveillance systems, PA and intercom systems, nurse call systems, patient wandering systems
communication systems include: VDV and CATV systems, distributed antenna system (DAS), PA systems, intercom systems, nurse call systems, Ethernet and industrial data communication systems

A-6.04 Completes documentation

Essential Skills	Writing, Reading, Document Use

Performance Criteria

6.04.01 Collect job site specific ***documentation***
6.04.02 Audit documentation for accuracy
6.04.03 Create customer facing documents
6.04.04 Submit documentation as required by local authority

Range of Variables

documentation include: cable records, test document, as-built information, work orders, change orders, equipment records, firestop records, inspection data, company-specific documents

TASK A-7 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-7.01 Uses communication techniques

Essential Skills	Reading, Writing, Oral Communication

Performance Criteria

7.01.01 Demonstrates ***communication practices*** individually or in a group
7.01.02 Listens using ***active listening*** practices
7.01.03 Receives and responds to feedback on work
7.01.04 Explains and provides feedback
7.01.05 Uses questioning to improve communication
7.01.06 Participates in safety and information meetings
7.01.07 Confirms understanding of information

Range of Variables

communication practices include: verbal communication techniques, written communication techniques, electronic communication techniques, hand signal techniques
active listening include: hearing, interpreting, reflecting, responding, paraphrasing, questioning

A-7.02 Uses mentoring techniques

Essential Skills	Oral Communication, Working with Others, Continuous Learning

Performance Criteria

7.02.01 Demonstrates performance of a skill to a learner
7.02.02 Set up conditions required for a learner to develop proficiency in a skill
7.02.03 Assess and give feedback
7.02.04 Support apprentices in pursuing technical training opportunities

MAJOR WORK ACTIVITY B

MWA B INSTALLS AND SERVICES CABLES INSIDE AND OUTSIDE PLANT

TASK B-8 Lays out and creates cable pathways (inside plant)

Task Descriptor

Communication technicians lay out and create cable pathways (inside of the plant). They visually inspect the work area and fasten cable management and support systems according to CEC and manufacturer specifications before installing a sleeve or poke-thru device.

B-8.01 Lays out and installs cable management and support systems

Essential Skills	Document Use, Thinking, Working with Others

Performance Criteria

8.01.01 Interprets drawings and specifications
8.01.02 Identifies utility location information
8.01.03 Visually inspects work area
8.01.04 Sets up ***tools and equipment***
8.01.05 Fastens ***cable management and support systems*** according to CEC and manufacturer specifications

Range of Variables

cable management and support systems include: J-hooks, cable trays, sleeving, seismic bracing, duct
tools and equipment include: cutting and fastening tools

B-8.02 Creates openings

Essential Skills	Document Use, Thinking, Working with Others

Performance Criteria

8.02.01 Identifies ***material*** to be bored
8.02.02 Selects appropriate tools and equipment
8.02.03 Installs sleeve or poke-thru device

Range of Variables

material include: concrete, drywall, steel, wood

TASK B-9 Lays out and creates cable pathways (outside plant).

Task Descriptor

Communication technicians lay out and create cable pathways (outside of the plant). They visually inspect the work area and fasten cable management and support systems according to applicable authority having jurisdiction before installing a sleeve or poke-thru device.

B-9.01 Lays out and installs cable management and support systems

Essential Skills	Document Use, Thinking, Working with Users

Performance Criteria

9.01.01 Interprets drawings and specifications
9.01.02 Identifies utility location information
9.01.03 Acquires proper authorization from governing utility
9.01.04 Visually inspects work area
8.01.05 Sets up ***tools and equipment***
8.01.06 Fastens ***cable management and support systems*** according to applicable authority having ***jurisdiction***

Range of Variables

cable management and support systems include: support strands, duct, poles, guy wires
tools and equipment include: cutting and fastening tools, bucket trucks, winches
jurisdiction include***:*** municipal, provincial, federal, governing utility

B-9.02 Creates openings

Essential Skills	Document Use, Thinking, Working with Others

Performance Criteria

9.02.01 Identifies ***material*** to be bored
9.02.02 Selects appropriate ***tools and equipment***
9.02.03 Installs sleeve or poke-thru device

Range of Variables

material includes: subterranean, concrete, drywall, steel, wood

TASK B-10 Selects and prepares cable for installation (inside and outside plant).

Task Descriptor

Communication technicians select and prepare cable for installation (inside and outside of the plant). They identify the environment of the cable run and conduct acceptance testing and resolve any deficiencies. They also select and install a pulling medium in the cable pathway according to industry code standards.

B-10.01 Determines media type

Essential Skills	Continuous Learning, Reading, Document Use

Performance Criteria

10.01.01 Identifies ***system*** requirements
10.01.02 Identifies ***environment*** of the cable run
10.01.03 Measures distance of the cable run
10.01.04 Ensures compliance with codes and standards

Range of Variables

environment include: plenum, non-plenum, inside, outside, subterranean
system include: structured wiring systems, building automation, security

B-10.02 Conducts acceptance testing

Essential Skills	Digital Technology, Reading, Document Use

Performance Criteria

10.02.01 Selects test ***parameters*** and equipment
10.02.02 Connects ***testing equipment***
10.02.03 Performs acceptance test
10.02.04 Documents and reviews test results
10.02.05 Resolves any deficiencies

Range of Variables

testing equipment include: fiber testers, twisted pair, coaxial, sound and light meters
parameters include: manufacturer specifications, industry standards

B-10.03 Installs pulling medium in cable pathway

Essential Skills	Working with Others, Oral Communication, Numeracy

Performance Criteria

10.03.01 Visually inspects work space

10.03.02 Selects ***pulling medium***
10.03.03 Sets up for the pull
10.03.04 Installs according to industry code standards

Range of Variables

pulling medium include: rope, string, fish rod, fish tape

TASK B-11 Installs cable (inside and outside plant)

Task Descriptor

Communication technicians install cable into cable management and support systems to meet acceptable standards. These types of systems may be support strands, duct, poles, guy wires, J-hooks, cable trays and sleeving. They also conduct terminations of cable to meet acceptable standards; and install fire stop materials around architectural, structural, mechanical, and electrical components.

B-11.01 Installs cable into support infrastructure

Essential Skills	Working with Others, Oral Communication, Document Use

Performance Criteria

11.01.01 Sets up cable installation ***equipment*** and ***resources***
11.01.02 Labels cable
11.01.03 Applies lubricants
11.01.04 Installs cable into ***cable management and support system*** to meet acceptable ***standards***
11.01.05 Dresses cable to meet acceptable ***standards***

Range of Variables

cable management and support system include: support strands, duct, poles, guy wires, J-hooks, cable trays, sleeving, seismic bracing, duct

equipment include: pullies, lasher, jack stands, cable pulling device
resources include: human, communication devices
standards include: manufacturer specifications, industry, codes (CEC, NBC), jurisdictional

B-11.02 Terminates cable

Essential Skills	Document Use, Continuous Learning, Thinking

Performance Criteria

11.02.01 Determines ***cable*** and ***connector*** type
11.02.02 Organizes cables

11.02.03 Identifies installation standard
11.02.04 Conducts terminations to meet acceptable ***standards***

Range of Variables

cable includes: copper, fiber
connector includes: copper, fiber
standards include: manufacturer specifications, industry, codes (CEC, NBC), jurisdictional

B-11.03 Installs firestop

Essential Skills	Reading, Document Use, Digital Technology

Performance Criteria

11.03.01 Calculate materials needed
11.03.02 Mix materials
11.03.03 Fill ***voids*** with ***damming materials***
11.03.04 Wrap, stuff, spray, trowel or fasten ***fire stop material*** around architectural, structural, mechanical, and electrical components
11.03.05 Arrange for inspection and verification of fire stops

Range of Variables

voids include: abutments, joints, wall and floor penetrations
damming materials include: mineral fiber, ceramic fibre, backer rod
fire stop materials include: caulking, wrap strips, intumescent boards and collars, bricks, pillows, putty, mortar, mineral fiber, foams, cement

TASK B-12 Services cable plant infrastructure

Task Descriptor

Communication technicians service cable plant infrastructure by troubleshooting, diagnosing faults, and repairing them. They perform maintenance to ensure the cable plant is in good operating condition. They test the cable plant and perform maintenance to ensure it meets operational requirements.

B-12.01 Performs cable plant audit

Essential Skills	Reading, Document Use, Digital Technology

Performance Criteria

12.01.01 Obtain detailed description of malfunction of cable plant from client
12.01.02 Identify existing cable plant ***components***
12.01.03 Test cable plant

12.01.04 Analyze test results

Range of Variables

components includes: cabling, termination blocks, outlet jacks, patch panels, face plates, patch cables, cable supports, cable management devices, surge protection, connectors, splice trays, cabinets, racks, bonding hardware

B-12.02 Services cable plant faults

Essential Skills	Reading, Document Use, Digital Technology

Performance Criteria

12.02.01 Identify existing cable plant components
12.02.02 Replace cable plant ***components***
12.02.03 Test cable plant
12.02.04 update documentation to reflect servicing, testing, inspections or maintenance performed
12.02.05 Notify and explain system changes to client

Range of Variables

components include: cabling, termination blocks, outlet jacks, patch panels, face plates, patch cables, cable supports, cable management devices, surge protection, connectors, splice trays, cabinets, racks, bonding hardware

MAJOR WORK ACTIVITY C

MWA C INSTALLS AND SERVICES SIGNALING, COMMUNICATION AND ASSOCIATED SYSTEMS

TASK C-13 Installs security and surveillance systems

Task Descriptor

Communication technicians install security and surveillance systems such as smoke alarms, cameras, video recorders and electronic locks which allow for the protection and management of people and property. These types of systems may be low voltage circuit, extra-low voltage circuit, Class 1 or Class 2 circuits.

C-13.01 Installs security and surveillance systems

Essential Skills	Document Use, Digital Technology, Numeracy

Performance Criteria

13.01.01 Identify type of ***security and surveillance system*** required for new installation
13.01.02 Remove and dispose of existing ***security and surveillance system*** when replacing and update ***documentation***
13.01.03 Determine ***security and surveillance system*** layout
13.01.04 Select ***security and surveillance system components***
13.01.05 Position, mount and assemble ***security and surveillance system components***
13.01.06 Terminate and interconnect ***security and surveillance system components*** and associated systems
13.01.07 Program and configure ***security and surveillance system***
13.01.08 Test ***security and surveillance components*** to ensure functionality
13.01.09 Participate in start-up and commissioning inspections
13.02.10 Create ***documentation*** to reflect new installation

Range of Variables

security and surveillance systems include: perimeter, space, spot
security and surveillance system components include: smoke alarms, cameras, video recorders, motion sensors, card readers, electronic locks, horns, panels
documentation include: as-builts, shop drawings

C-13.02 Performs servicing of security and surveillance systems

Essential Skills	Oral Communication, Digital Technology, Numeracy

Performance Criteria

13.02.01 Obtain detailed description of malfunction of ***security and surveillance system*** from client
13.02.02 Identify existing ***security and surveillance system and components***
13.02.03 Program and configure ***security and surveillance system***
13.02.04 Conduct ***security and surveillance system*** tests
13.02.05 Analyze test results
13.02.06 Replace defective ***security and surveillance system components***
13.02.07 Clean and adjust components
13.02.08 Update ***documentation*** to reflect servicing, testing, inspections or maintenance performed
13.02.09 Notify and explain system changes to system monitor

Range of Variables

security and surveillance systems include: ***perimeter, space, spot***
security and surveillance system components include: ***smoke alarms, cameras, video recorders, motion sensors, card readers, electronic locks, horns, panels***
documentation include: maintenance logs, as-builts

TASK C-14 Installs and services communication and associated systems

Task Descriptor

Communication and associated systems allow information to be transmitted from one point to another, using different media such as fiber optic, copper and coaxial cables. These types of systems may include low-voltage power circuit, extra-low voltage power circuit or low energy power circuit. They include voice/data/video (VDV), community antenna television (CATV), public address (PA), intercom and nurse call systems. For the purpose of this standard, installation includes both new installations and upgrading of systems by removing and replacing components. Communication technicians service communication systems by troubleshooting, diagnosing faults and repairing them. They also perform maintenance to ensure communication and associated systems are in good operating condition.

C-14.01 Installs voice/data/video (VDV) and community antenna television (CATV) systems

Essential Skills	Oral Communication, Digital Technology, Numeracy

Performance Criteria

14.01.01 Determine ***VDV and CATV system*** required for new installation
14.01.02 Remove and dispose of existing ***VDV and CATV system*** when replacing and update documentation
14.01.03 Determine ***VDV and CATV system*** layout
14.01.04 Select ***VDV and CATV system components***
14.01.05 Temporarily label and install cabling
14.01.06 Position, mount and assemble ***VDV and CATV system components***
14.01.07 Terminate and interconnect ***VDV and CATV system components*** and ***associated systems***
14.01.08 Test and label ***VDV and CATV system components***
14.01.09 Update documentation for manufacturer certification

Range of Variables

VDV and CATV systems include: unshielded twisted pair (UTP), screened twisted pair (ScTP), category cable, fiber optic, multi-mode and single-mode, coaxial, distributed antenna system (wireless)
VDV and CATV system components include: cabling, termination blocks, cable supports, surge protection devices, cabinets, racks, broadcast transmitters, receiving equipment, noise suppressors, amplifiers, bonding hardware
associated systems include: wireless, telephone systems, data systems, security and surveillance systems, PA and intercom systems, nurse call systems, patient wandering systems

C-14.02 Performs servicing of communication and associated systems

Essential Skills	Oral Communication, Digital Technology, Writing

Performance Criteria

14.02.01 Obtain detailed description of malfunction of ***communication and associated system*** from client
14.02.02 Identify existing ***communication and associated system*** and ***components***
14.02.03 Test ***communication and associated systems***
14.02.04 Analyze test results
14.02.05 Replace ***communication and associated system components***
14.02.06 Update documentation to reflect servicing, testing, inspections or maintenance performed
14.02.07 Update operating software for ***communication and associated systems*** as required

Range of Variables

communication systems include: VDV and CATV systems, distributed antenna system (DAS), PA systems, intercom systems, nurse call systems, Ethernet and industrial data communication systems
communication system components include: power supplies, broadcast transmitters, receiving equipment, suppressors, satellite dishes, amplifiers, splitters, attenuators, microphones, speakers, panels, cameras, monitors
associated systems include: wireless, telephone systems, data systems, security and surveillance systems, PA and intercom systems, nurse call systems, patient wandering systems

TASK C-15 | Installs and Services Building Automation Systems

Task Descriptor

Communication technicians install and service building systems such as energy management, telephone systems, data systems, security and surveillance systems which allow for the protection and management of people and property. These types of systems may be low voltage circuit, extra-low voltage circuit, Class 1 or Class 2 circuits.

C-15.01 Installs building automation systems

Essential Skills	Document Use, Digital Technology, Numeracy

Performance Criteria

15.01.01 Identify type of ***building automation system*** required for new installation
15.01.02 Remove and dispose of existing ***building automation system*** when replacing and update documentation
15.01.03 Determine ***building automation system*** layout
15.01.04 Select ***building automation system components***
15.01.05 Position, mount and assemble ***building automation system components***
15.01.06 Terminate and interconnect ***building automation system components*** and ***associated systems***
15.01.07 Test ***building automation system components*** to ensure functionality
15.01.08 Participate in startup and commissioning inspections

Range of Variables

building automation systems include: energy management, security and surveillance systems, occupancy, inter-system communications

building automation system components include: network cabling, sensors such as occupancy and light levels, servers, Power over Ethernet (PoE) switches, GUIs

associated systems include: wireless, telephone systems, data systems, security and surveillance systems, PA and intercom systems, nurse call systems, patient wandering systems

C-15.02 Performs servicing of building automation systems

Essential Skills	Oral Communication, Digital Technology, Writing

Performance Criteria

15.02.01 Obtain detailed description of malfunction of ***building automation system*** from client

15.02.02 Identify ***building automation system*** and ***components***

15.02.03 Test ***building automation system***

15.02.04 Analyze test results

15.02.05 Adjust ***components***

15.02.06 Replace ***building automation system components***

15.02.07 Update documentation to reflect servicing, testing, inspections and maintenance performed

15.02.08 Notify and explain system changes to system operator

Range of Variables

building automation systems include: energy management, security and surveillance systems, occupancy, inter-system communications

building automation system components include: network cabling, sensors such as occupancy and light levels, servers, Power over Ethernet (PoE) switches, GUIs

APPENDIX A: ACRONYMS

CATV	Community antenna television
CEC	Canadian Electrical Code
DAS	Distributed antenna system
GUI	Graphical user interface
NBC	National Building Code
PA	Public address
PME	Powered mobile equipment
PoE	Power over ethernet
PPE	Personal protective equipment
ScTP	Screened twisted pair
SDS	Safety data sheets
SOP	Standard operating procedure
TIA	Telecommunications Industry Association
UTP	Unshielded twisted pair
VDV	Voice / data / video

APPENDIX B: TOOLS AND EQUIPMENT

Hand Tools: wrenches, screwdrivers, measuring tools, hammers, hand saws, hydraulic tools, crimp tools, testing equipment, cable prep tools, cutting tools, fastening tools, winches

Portable Power Tools: grinders, power metal saws, drilling machines, powder actuated devices

Personal Protective Equipment: safety glasses (face shield), respirators, hardhats, footwear, gloves, coveralls, personal monitors, fall protection, hearing protection, high-visibility clothing

Safety Equipment: lockout devices, unlocking devices, fire extinguishers, gas detectors, first aid kit, fall protection equipment and devices

Access Equipment: access keys, bucket trucks, ladders, powered mobile equipment (PME)

Testing Equipment: fiber testers, twisted pair, coaxial, sound and light meters

APPENDIX C: GLOSSARY

Ancillary: functions performed by the fire alarm system as an output of the fire alarm system, controlled by a relay or similar device, for example, elevator recall, fan shut down and door release

Bonding: a low impedance path obtained by permanently joining all non-currentcarrying metal parts to assure electrical continuity and having the capacity to conduct safely any current likely to be imposed on it

Cathodic protection: technique to control the corrosion of a metal surface by making that surface the cathode of an electrochemical cell

Extra low voltage: any voltage not exceeding 30V

Grounding: a permanent and continuous conductive path to the earth with sufficient ampacity to carry any fault current liable to be imposed on it, and of a sufficiently low impedance to limit the voltage rise above ground and to facilitate the operation of the protective devices in the circuit

High voltage: any voltage exceeding 750V

Low energy power circuit: a circuit where the power is limited to 100 Volt Amperes (VA) where V is the open circuit voltage

Low voltage: any voltage exceeding 30V but not exceeding 750V

Luminaires: a complete lighting unit designed to accommodate the lamp(s) and to connect the lamp(s) to circuit conductors, for example, florescent, High Intensity Discharge (HID) and incandescent

Raceway: any channel designed for holding wires, cables, or busbars, and, unless otherwise qualified by rules of the CEC, the term includes conduit (rigid, flexible, metal, non-metallic), electrical metallic and non-metallic tubing, underfloor raceways, cellular floors, surface raceways, wireways, cable trays, busways, and auxiliary gutters

Specifications: an explicit set of requirements to be satisfied by a material, product or service including but not limited to local and national building codes, any documentation that holds legal obligations, schematics, manufacturers specs, local code, provincial/federal authority, engineered drawings and diagrams and schematics, client requirements, warranty documents, site drawings, shop drawings, company requirements