Government of
Northwest Territories

NWT Housing Maintainer Occupational Standards

April 2022

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

Description of the Housing Maintainer trade: An overview of the trade's duties, work environment, job requirements, similar occupations and career progression

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

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

Essential Skills: The most relevant essential skills for this sub-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 to meet the learning outcomes for the sub-task

Range 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 - Tools and Equipment: a non-exhaustive list of tools and equipment used in this trade

Description of the Housing Maintainer trade

Housing Maintainers perform preventative and on-demand maintenance, minor repairs and modernization improvements on existing structures and components of buildings. These buildings include individual dwelling units, multi-residential units, small shops, and administrative buildings with individual heating units not exceeding 400,000 BTU's. Housing Maintainers may:

- Maintain or repair residential building piping, plumbing fixtures, and appliances for the supply and disposal of water
- Maintain or repair residential building appliances, outlets, fixtures and accessories;
- Lay out, measure, cut, shape, assemble and repair wood or wood substitutes in residential buildings including decks, stairs, walls, floors, ceilings, doors, windows, vents and cabinets;
- Maintain and replace concrete products, thermal insulation and heating systems;
- Maintain gutters, downspouts, flashings, shakes, and roofing systems;

- Maintain and repair walls of residential buildings including sheet goods, roll wall coverings, and paint;
- Maintain and repair tiles, rolled flooring goods, carpet and underlay in residential buildings;
- Maintain small outdoor power equipment for residential building maintenance; and
- Performs all duties according to federal, provincial and local building codes and bylaws

MAJOR WORK ACTIVITY A Performs Common Occupational Skills

TASK A-1 Performs Safety Related Functions

TASK DESCRIPTOR

Safety is integral to any and every aspect of the housing maintainer trade. Housing Maintainers maintain a safe work environment in order to prevent and correct any potential or immediate hazard, address an incident or accident, and follow up to ensure the safety and wellness of every person on the work site. Additional site-specific safety may be required. The use and maintenance of Personal Protective Equipment (PPE) and safety equipment are essential to every job. It is also very important to be proficient in the use of safety documentation. Lock-out of equipment and piping is important before working on systems to prevent spills, property damage, personal injury and fatalities.

INDUSTRY EXPECTED PERFORMANCE

These tasks must be performed according to the applicable jurisdictional codes and standards. All health and safety standards must be respected. Specific regulations and standards for this task include WHMIS, OH&S, Canadian Standards Association (CSA) Z460, Z462 and Z463, and client and company safety policy. Work should be done efficiently and at a high quality without material waste or harm to the environment. All requirements of the manufacturer, client specifications and the authority having jurisdiction (AHJ) must be met.

At a journeyperson level of performance, all tasks must be done with minimal direction and supervision

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

Essential Skills Thinking Skills, Document Use

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-1.01.01P	identify ***site hazards*** and regulations requiring the use of ***PPE*** and ***safety equipment***	***site hazards*** are determined by site visits and by doing a pre-job analysis
A-1.01.02P	select ***PPE*** and ***safety equipment***	***PPE*** and ***safety equipment*** are selected to match tasks and hazardous situations
A-1.01.03P	ensure fit of ***PPE*** for the application	***PPE*** are adjusted to provide maximum protection for the individual

A-1.01.04P	recognize worn, damaged or defective ***PPE*** and ***safety equipment*** and tag and replace damaged or faulty ***PPE*** and ***safety equipment***	***PPE*** and ***safety equipment*** are inspected prior to use and not used when damaged or faulty, and tagged as such
	inspect for function, expiration date and fit of ***PPE*** and ***safety equipment***	all equipment deficiencies are identified, and defective equipment is tagged and removed from service
A-1.01.05P	apply ***safety regulations and standards***	organizing, cleaning and storage procedures are done according to company procedures and manufacturers' specifications
A-1.01.06P	organize, clean and store ***PPE*** and ***safety equipment***	organizing, cleaning and storage procedures are done according to company procedures and manufacturers' specifications
A-1.01.07P	recognize limitation of use of ***PPE*** and ***safety equipment***	***PPE*** and ***safety equipment*** are not used for other than their intended purposes according to manufacturers' limitation specifications
A-1.01.08P	use ***PPE*** and ***safety equipment***	***PPE*** and ***safety equipment*** is being used in accordance with jurisdictional and manufacturers' guidelines

RANGE OF VARIABLES

PPE includes: shock hazard PPE, arc flash hazard PPE, hard hats, safety glasses, safety footwear, gloves, hearing protection, face shields, fire-retardant clothing, high-visibility clothing

safety equipment includes: fall protection (fall arrest and fall restraint), confined space equipment, respiratory protection, tag-out and lock-out equipment, fire extinguishers, first aid equipment, eye wash stations, signage, fume and toxic gas detectors, smoke and fume extractors

safety regulations and standards include: WHMIS, OH&S, CSA Z460, Z462 and Z463, client and company safety policy

site hazards include: working at heights, confined space, open excavation, live equipment, extreme weather conditions, hazardous locations, animals

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-1.01.01L	demonstrate knowledge of ***PPE*** and ***safety equipment***, its ***applications***, maintenance and procedures for use	identify types of ***PPE*** and ***safety equipment*** and describe their applications, limitations and procedures for use
		describe procedures used to care for, maintain and store ***PPE*** and ***safety equipment***
	demonstrate knowledge of regulatory requirements pertaining to ***PPE*** and ***safety equipment***	identify training required by jurisdictional codes and regulations, and site-specific regulations

	identify and interpret regulations and safety documentation pertaining to the use of ***PPE*** and ***safety equipment***

RANGE OF VARIABLES

PPE includes: shock hazard PPE, arc flash hazard PPE, hard hats, safety glasses, safety footwear, gloves, hearing protection

safety equipment includes: fall protection (fall arrest and fall restraint), confined space equipment, respiratory protection, tag-out and lock-out equipment, fire extinguishers, first aid equipment, eye wash stations, signage, fume and toxic gas detectors

applications include: hazardous locations, heights, confined spaces

A-1.02 Maintains safe work environment.

Essential Skills Reading, Document Use, Thinking Skills, Continuous Learning

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-1.02.01P	perform housekeeping practices	work area is clean and clutter-free
A-1.02.02P	participate in toolbox meetings	documentation of participation in meetings is signed off
A-1.02.03P	plan pre-hazard assessments before performing each task	pre-hazard assessment plan is in place and task is completed without incident
A-1.02.04P	identify, report and eliminate potential and existing ***hazards***	***hazards*** are identified and mitigated
A-1.02.05P	identify ventilation requirements and select ***ventilation equipment***	ventilation requirements are identified, and ***ventilation equipment*** is selected according to task at hand
A-1.02.06P	set up ***barriers*** and ***signage*** to explain ***hazards***	***hazards*** are well marked by ***barriers*** and ***signage***
A-1.02.07P	set up ***work environment protection***	***work environment protection*** is set up according to site-specific requirements and task at hand
A-1.02.08P	store materials and equipment	materials and equipment are stored in designated areas, according to WHMIS, client and company policies and practices, site-specific practices and AHJ

A-1.02.09P	recognize, handle, store and document ***hazardous materials***	***hazardous materials*** are recognized, handled, stored and documented according to Workplace Hazardous Materials Information System (WHMIS) and controlled products regulations
A-1.02.10P	identify and respect ***physical limitations*** of self and others	identify physical limitations and work within them
A-1.02.11P	locate and interpret ***WHMIS materials***	directions on SDS are being followed (such as use of PPE and ventilation)
A-1.02.12P	recognize and report unsafe conditions and ***worksite hazards***	conditions are brought to the attention of safety advisors and documented
A-1.02.13P	set up and identify locations containing ***safety components***	locations are identified with signage and on jobsite map
A-1.02.14P	enforce safe work practices	safe work practices are followed

RANGE OF VARIABLES

hazards include: arc flashes, liquid spills (flammable, corrosive, toxic), electric shocks, designated substance (asbestos, mercury, lead, silica), open holes, confined space, fire, tripping hazards, overhead work, hazardous locations

barriers and ***signage*** include: caution and danger tapes, fences, tags, signs

safety components include: first aid kits, fire extinguishers, material safety data sheets (MSDS) , eye wash stations

items include: inspections, potential hazards, safety meetings, injuries, training

physical limitations: neck, shoulder, elbow/forearm, wrist/hand , low back, knee, ankle

ventilation equipment includes: air movers, fans

work environment protection includes: hoarding, fire blankets, flash screens, barrier tape, barriers, lockouts, high lines

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-1.02.01L	demonstrate knowledge of safe work practices	identify ***hazards*** and describe safe work practices to maintain safe work environment
		describe components of ***professional conduct***
		identify common causes of accidents in the work environment
		describe good housekeeping practices
A-1.02.02L	demonstrate knowledge of ***regulatory requirements*** pertaining to workplace safety, ***hazards*** and ***emergency situations***	identify and interpret the regulatory requirements pertaining to ***hazards*** and ***emergency situations***
		identify responsibilities regarding site specific safety policies and procedures
		describe the procedures used in ***emergency situations***

		identify the location of Safety Data Sheet (SDS) documents
		describe the roles and responsibilities of employer, supplier and worker described in WHMIS
		identify certification requirements
		define and describe what is meant by a WHMIS labels and distinguish between supplier and workplace labels and other means of identification
		explain how WHMIS applies to and is implemented in the workplace
		describe the Workers' Compensation Board, jurisdictional and OH&S injury reporting requirements
A-1.02.03L	demonstrate knowledge of safe handling of hazardous materials	identify safe disposal and recycling procedures for hazardous materials
A-1.02.04L	demonstrate knowledge of workplace hazards	identify workplace hazards
		identify fire hazards existing in the work environment
		identify classes of fires and the extinguishing medium in each case
		describe operation of fire-extinguishing equipment for extinguishing various classes of fires
		identify reactive chemicals
		identify hazardous gases
		describe prevention methods of hazards

RANGE OF VARIABLES

work site hazards include: poor housekeeping, overhead hazards, tripping hazards, shoring hazards, electrical hazards, confined space hazards, hot/cold work hazards, environmental hazards, vibration hazards, air quality hazards, falling hazards, liquid spills noise hazards,

hazardous materials include: silica and asbestos, ceramic fibers

professional conduct includes: no horseplay or rough housing, no drug and alcohol use (either at work or prior to coming to work), no harassment, appropriate work attire

safety and health laws and requirements include: WHMIS, Transportation of Dangerous Goods (TDG)
emergency situations include: evacuation, fire, hazardous chemical alarms, environmental spills
regulatory requirements include: Transportation of Dangerous Goods (TDG), WHMIS, OH&S

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

Essential Skills	Oral Communication, Document Use, Thinking

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-1.03.01P	coordinate lock-out and tag-out requirements with appropriate authorities and other trades	authorities and other trades are informed of isolation of system or equipment
A-1.03.02P	determine lock-out and tag-out requirements for ***system components***	requirements for lock-out and tag-out are met according to local AHJ and site-specific guidelines
A-1.03.03P	select ***approved device*** to ensure lock-out and tag-out	***approved device*** is selected to match the equipment
A-1.03.04P	obtain and install designated ***lock-out and tag-out equipment***	***lock-out and tag-out equipment*** is placed in correct location based on documentation from owner's representative
A-1.03.05P	complete required ***documentation*** for lock-out and tag-out	***documentation*** for lock-out and tag-out is signed off by involved personnel
A-1.03.06P	apply ***isolation methods*** to system being locked out	system is at a zero-energy state
A-1.03.07P	test system for zero potential using ***voltage-rated equipment***	system is tested for absence of voltage
A-1.03.08P	verify lock-out and tag-out	lock-out and tag-out is completed

A-1.03.09P	remove lock-out equipment	***procedures*** for lock-out removal are followed

RANGE OF VARIABLES

approved devices include: breaker lock, scissors, tag, and arc flash protection equipment

isolation methods include double-block-and-bleed, blinding, breaker locks, opening low point valves, checking gauges and switches, inspecting sight glasses

lock-out and tag-out equipment includes: lock and key, chains and tags, lock-out scissor clamps, lockbox

lock-out documentation includes: lock-out and tag-out permits, toolbox meeting reports, sign-in and sign-out sheets

system components include: pumps, valves, electrical panels

procedures include: tag-in and tag-out, sign-in and sign-out, company-specific policies

voltage-rated equipment include: voltmeters, ground straps, high voltage testers

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-1.03.01L	demonstrate knowledge of regulations, applications and ***procedures*** for locking out equipment	identify situations and system components that require lock-out
		identify lock-out equipment
		describe procedures for locking out equipment and piping
		identify safety regulations pertaining to locking out electrical equipment, piping equipment and piping
A-1.03.02L	demonstrate knowledge of safety checks of equipment	describe safety checks to be performed to ensure zero energy state
A-1.03.03L	demonstrate knowledge of procedures for voltage testing	describe how to determine the testing equipment to be used is matched to the voltage and energy rating

RANGE OF VARIABLES

system components include: pumps, valves, electrical panels
lock-out equipment includes: lock and key, chains and tags, lock-out scissor clamps, lock-box
procedures for locking out include: tag-in and tag-out, sign-in and sign-out, company policies

A- 1.04 Safely handles hazardous materials.

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-1.04.01P	Identify hazardous materials that have a spill risk.	Uses **MSDS** to identify hazards
A-1.04.02P	Selects PPE	Appropriate PPE is selected based on the hazard.
A-1.04 .03P	Transport hazardous materials safely.	Materials are transported without leaks or spills.
A-1.04.04P	When transferring hazardous materials between containers follows safety procedures	Appropriate containers are selected for transferring hazardous materials
A-1.04.05P	Stores hazardous materials	Hazardous materials are stored according to MSDS instructions
A-1.04.06P	Disposes of hazardous materials	Hazardous materials are disposed of according to MSDS instructions
A-1.04.07P	Imitates a spill response protocol if a spill occurs	Identifies whether the spill is ***major*** or ***minor*** and acts accordingly.

RANGE OF VARIABLES

Material Safety Data Sheet (MSDS) – A document prepared by the manufacturer of a hazardous chemical that contains information about the hazards of the chemical and the appropriate work practices required for safe use and spill response.
Major Spill - Any hazardous chemical spill that involves highly toxic, highly reactive, explosive or life-threatening chemicals. Any spill situation that presents significant fire, explosion, or other physical or health hazard risks, particularly if a person may be or has been significantly exposed, contaminated or injured to such an extent that medical or other outside assistance is required. Any spill situation that may adversely impact the external environment whether the spill occurred internal or external to a building.
Minor Spill - Any hazardous chemical spill that does not involve highly toxic, highly reactive, or explosive chemicals in a situation that would not constitute an immediate risk to an individual's health and wellbeing. This type of spill presents a

manageable physical or health hazard to personnel who, when wearing proper Personal Protective Equipment (PPE), will not be exposed to any chemical at a level that exceeds any recognized Occupation Health and Safety Act (OHSA) limit.
Physical Hazard - A hazardous chemical with physical characteristics that make it combustible, flammable, explosive, reactive, a compressed or cryogenic gas, organic peroxide, or an oxidizer.

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-1.04.01L	Demonstrates knowledge of the types of spills that can occur at a worksite	Is able to differentiate between biological, chemical, and hazardous chemical spills
A-1.04.02P	Demonstrates knowledge of spill response protocols.	Identifies company spill response policy and can describe their responsibility within the policy.

RANGE OF VARIABLES

Biological Spill – Any unplanned or uncontrolled release of any biological agent that can pose a potential safety or health risk to people, animals, or the environment.
Chemical Spill – Any unplanned or uncontrolled release of any solid, semi-solid, liquid, or gaseous hazardous chemical that can pose a potential safety or health risk to people or the environment.
Hazardous Chemical - Any solid, semi-solid, liquid, or gaseous chemical that may pose a physical hazard or a health hazard. This would include the following: corrosives (acids, bases), paints, petroleum products, poisons, oxidizers, reactives, and solvents (paint thinners, alcohols).
Health Hazard – Chemicals that may cause various acute or chronic adverse health effects such as corrosives, carcinogens, irritants, mutagens, teratogens and sensitizers.

TASK A-2 Uses Tools and Equipment

TASK DESCRIPTOR

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

INDUSTRY EXPECTED PERFORMANCE

The task must be performed according to the applicable jurisdictional codes and standards. All health and safety standards must be respected. Work should be done efficiently and at a high quality without material waste or harm to the environment. All requirements of the manufacturer, client specifications and the AHJ must be met.

At a journeyperson level of performance, all tasks must be done with minimal direction and supervision.

A-2.01 Uses common and specialty tools and equipment

Essential Skills	Thinking Skills, Document Use, Reading

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-2.01.01P	organize and store tools, equipment and components	tools, equipment and components are organized and stored in designated cases and areas according to company and job site requirements
A-2.01.02P	clean, lubricate, sharpen and adjust ***tools and equipment***	***tools and equipment*** are maintained according to manufacturers' specifications
A-2.01.03P	perform visual inspection before using tools and equipment	***deficiencies or defects*** are identified and reported/recorded
A-2.01.04P	identify worn, damaged and defective ***tools and equipment***	damaged and defective ***tools and equipment*** are tagged and replaced or repaired according to manufacturers' specifications
	ensure calibration of measuring equipment	measuring equipment is calibrated according to manufacturers' specifications
A-2.01.05P	change tool ***components*** perform visual inspection before using ***tools and equipment***	***components*** are changed according to job requirements
A-2.01.06P	follow scheduled maintenance procedures for ***tools and equipment***	documentation is completed for maintenance of ***tools and equipment***
A-2.01.07P	identify hazards associated with ***tools and equipment***	***tools and equipment*** are used with PPE and safety equipment according to location, environment and application

RANGE OF VARIABLES

components include: chucks, bits, blades, cords, attachment plugs

deficiencies or defects include: worn, bent, broken, damaged and inoperable tools

identification markings include: tape, colour codes, markings, tags

tools and equipment (for a list of Hand Tools, Power Tools and Equipment, Pipe Cutting and Joining Equipment, and Testing, Measuring and Communication Equipment see Appendix A)

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-2.01.01L	demonstrate knowledge of ***tools and equipment***, their applications and procedures for use	identify types of ***tools and equipment*** and describe their applications and procedures for use
A-2.01.02L	demonstrate knowledge of manufacturers' specifications, and operating and maintenance instructions	describe operating and maintenance procedures of ***tools and equipment***
A-2.01.03L	demonstrate knowledge of ***tools and equipment***, their applications and procedures for use	identify types of ***tools and equipment*** and describe their applications and procedures for use
A-2.01.04L	demonstrate knowledge of manufacturers' specifications, and operating and maintenance instructions	describe operating and maintenance procedures of ***tools and equipment***
A-2.01.05L	demonstrate knowledge of inspection procedures	describe the procedures used to inspect tools and equipment
A-2.01.06L	demonstrate knowledge of limitations and ratings of electrical measuring equipment	describe limitations of measuring equipment and identify measuring equipment for task at hand
A-2.01.07L	demonstrate knowledge of certification requirements to operate powder-actuated tools	describe certification requirements to use powder-actuated tools

RANGE OF VARIABLES

tools and equipment include: standard tools, power tools and equipment, specialty tools and equipment, measuring equipment

A-2.02 Uses Access Equipment.

Essential Skills	Working with Others, Document Use, Continuous Learning

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-2.02.01P	select ***ladders***	***ladder*** selected meets application requirements
A-2.02.02P	select ***aerial work platforms***	***aerial work platform*** selected meets application requirements
A-2.02.03P	perform visual inspection of ladders and aerial work platforms prior to and during use	safety documentation is completed with required signatures
A-2.02.04P	secure ladders and aerial work platforms	ladders and aerial work platforms are secured according to safety codes, jurisdictional guidelines and site-specific requirements
A-2.02.05P	identify, tag and replace worn, damaged or defective ladders and aerial work platforms	ladders and aerial work platforms are tagged and removed from service
A-2.02.06P	store ladders and aerial work platforms	ladders and aerial work platforms are organized and stored to prevent damage
A-2.02.07P	check certification dates for aerial work platforms	documentation confirms that any aerial work platforms' certifications are current
	obtain ***motorized aerial work platform*** training	training meets company policy and jurisdictional requirements

RANGE OF VARIABLES

ladders include: step ladders, extension ladders, platform ladders

aerial work platforms include: scaffolds, motorized work platforms

motorized aerial work platforms include: scissor lift, articulated boom, personnel basket

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-2.02.01L	demonstrate knowledge of ladders and aerial work platforms, their applications, limitations and procedures for use	identify hazards and describe safe work practices pertaining to ladders and aerial work platforms
A-2.02.02L		identify jurisdictional regulations and site specific requirements pertaining to ladders and aerial work platforms

A-2.02.03L	identify types of ladders and describe their characteristics and applications
A-2.02.04L	identify types of aerial work platforms and describe their characteristics and applications
A-2.02.05L	identify types of motorized aerial work platforms and describe their characteristics and applications
A-2.02.06L	describe the procedures used to erect and dismantle ladders and aerial work platforms

RANGE OF VARIABLES

ladders include: step ladders, extension ladders, platform ladders

aerial work platforms include: scaffolds, motorized work platforms

jurisdictional regulations and site-specific requirements include: personnel training/certification, equipment certification requirements, proper use and limitations of equipment

motorized aerial work platforms include: scissor lift, articulated boom, personnel basket

A-2.03 Uses rigging, hoisting, lifting and positioning equipment.

Essential Skills	Thinking, Numeracy, Working with Others

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-2.03.01P	plans lift	lift plan and communication strategy is implemented according to job requirements and site conditions
A-2.03.02P	identify new and existing hazards	hazards are identified and recorded, and hazard assessment forms are completed
A-2.03.03P	determine the equipment used is suitable for load requirements	***rigging, hoisting, lifting and positioning equipment*** is verified to meet working load limit (WLL) requirements
A-2.03.04P	detect rigging, hoisting, lifting and positioning equipment faults	equipment is inspected physically and visually, and is determined to be in good condition
A-2.03.05P	assess, report and, tag and remove damaged equipment from service	damaged equipment is tagged and removed from service

A-2.03.06P	inspect line for knots, hitches and bends	lines are de-rated when ***knots, hitches and bends*** are faulty, and lines are removed from service
A-2.03.07P	communicate lift plan to others	personnel, clients and authorities are advised of lift plan
A-2.03.08P	identify potential obstructions and hazards for rigging, hoisting, lifting and positioning equipment	rigging, hoisting, lifting and positioning equipment is positioned to clear obstructions and hazards
A-2.03.09P	restrict access to lift area and path of travel using barrier tape, barricades and signage	barrier tape, barricades and signage are erected to restrict personnel traffic to lift area
A-2.03.10P	select rigging, hoisting, lifting and positioning equipment and attach to load to ensure a safe lift	rigging, hoisting, lifting and positioning equipment is visually and physically inspected according to safe work practices
A-2.03.11P	tie knots, hitches and bends	knots, hitches and bends are visually inspected
A-2.03.12P	place (land) load and secure in location using various methods	methods for securing load without damage to personnel and property are used
A-2.03.13P	clean and lubricate equipment	equipment is cleaned, lubricated and maintained according to manufacturers' specifications

RANGE OF VARIABLES

communication strategy includes: using hand signals, radio communication and a signaler

hazards include: blind spots, overhead piping, live equipment, site-specific hazards

load requirements include: WLL, final location of load

rigging, hoisting, lifting, and positioning equipment include: block and tackle, chain blocks, come-along, snatch blocks, pallet jacks, tugger (power), winches, forklifts, grip hoists, wire ropes, shackles, nylon slings, softeners, rope

equipment faults include: rips, tears, cracks, bird-caging, frayed wire rope, frayed synthetic slings, worn shackles, hydraulic oil leaks, missing rating tags, non-CSA approved equipment

knots, hitches and bends include: bowline, cat's paw, clove hitch, half hitch

methods for securing load include: bolting, lashing, site-specific methods

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-2.03.01L	demonstrate knowledge of ***rigging, hoisting, lifting and positioning equipment***, their applications, limitations and procedures for use	define terminology associated with rigging, hoisting, lifting and positioning
		identify types of ***rigging, hoisting, lifting and positioning equipment*** and accessories and describe their applications and load capacity
		identify ***hazards*** and describe safe work practices pertaining to hoisting, lifting, rigging and positioning
		describe the ***procedures used to ensure the work area is safe*** for rigging, hoisting, lifting and positioning
		describe ***procedures used to communicate*** during rigging, hoisting, lifting and positioning operations
		identify types of equipment used to secure the lift area
		describe the procedures used to rig material/equipment for lifting, hoisting and positioning
		identify types of ***knots, hitches and bends*** and describe their applications and the procedures used to tie them
		describe the procedures used for attaching rigging equipment to the load
A-2.03.02L	demonstrate knowledge of calculations required when performing hoisting and lifting and positioning operations	explain how to calculate load weight
		explain ***sling angle*** when preparing for hoisting and lifting operation
		explain correlation of sling angles to sling capacities
		identify the factors to consider when selecting rigging, hoisting, lifting and positioning equipment
		calculate equipment de-rating criteria according to specifications
A-2.03.03L	demonstrate knowledge of inspection for ***rigging, hoisting, lifting and positioning equipment***	identify hazards and describe safe work practices pertaining to rigging, hoisting, lifting and positioning

	describe the procedures used to inspect, maintain and store ***rigging, hoisting, lifting and positioning equipment***
	identify types of ***knots, hitches and bends*** describe their applications and the procedures for inspecting them

RANGE OF VARIABLES

rigging equipment includes: lugs, chain falls, come-along, shackles, slings, tuggers
hoisting, lifting and positioning equipment includes: forklifts, rollers, chain falls, jacks, cable grip hoists (Tirfor™)
hazards include: shock loading, equipment fatigue, floor openings
procedures used to ensure a safe work area include: supervision of lift, securing work area, communication
procedures used to communicate include: electronic communications, audio/visual
knots, hitches and bends include: bowline, cat's paw, clove hitch, half hitch
sling angle includes: 45°, 60°
factors include: load characteristics, rigging inspection, environment, safety factors, sling angles

TASK A-3 Organizes Work

TASK DESCRIPTOR

Housing Maintainers participate in organizing jobs, planning the work, generating material lists and managing their time to meet project deadlines. They ensure maintenance on a housing unit is done in a logical sequence and completed to industry standards. Housing Maintainers use drawings and specifications to determine scope of work, and materials and methods to be used for specific installations or repairs. Drawings are also used to communicate detailed construction information such as dimensions, materials used, joining methods and templates.

It is very important for housing maintainers to develop a strong understanding of labour costs, material costs, and efficiencies in their work. Being able to keep "the big picture" and the final product in mind, while paying close attention to detail and maintaining a commitment to safe work practices is important for task organization. To maintain productivity, lifelong learning is crucial in this trade.

Housing Maintainers must develop the ability to continuously do preliminary quality control checks to ensure compliance with specifications and AHJ requirements.

A-3.01 Interprets plans, drawings and specifications.

Essential Skills	Document Use, Reading, Numeracy

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-3.01.01P	identify symbols found on drawings and specifications	symbols are identified from legends, notes and specifications
A-3.01.02P	scale dimensions to determine location of devices	location of devices is determined by making a measurement using scaling from drawings
A-3.01.03P	locate and cross-reference information on plans, drawings, specifications and contract documents	installation information is obtained by interpreting plans, drawings, specifications and contract documents
A-3.01.04P	visualize finished product based on information in plans, drawings and specifications	visualization is described to supervisor and confirmed as matching the job requirements
A-3.01.05P	determine if plans, drawings, schematics and specifications are current	plans, drawings, schematics and specifications are compared with the existing installation

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-3.01.01L	demonstrate knowledge of ***drawings***, schematics and specifications and their applications	identify types of ***drawings, schematics and specifications,*** and describe their applications
		identify documentation requirements for modifying drawings and specifications
		describe the procedures used to document changes made to equipment and wiring
A-3.01.02L	demonstrate knowledge of imperial and SI (système internationale) units in trade documentation	interpret imperial and SI units of measure used
A-3.01.03L	demonstrate knowledge of interpreting and extracting ***information*** from drawings, schematics and specifications	interpret and extract ***information*** from drawings, schematics and specifications
		explain how scaling is performed to position devices

RANGE OF VARIABLES

drawings, schematics and specifications include: civil/site, architectural, mechanical, structural, electrical, shop, sketches, as-builts

information includes: elevations, scales, legends, symbols, and abbreviations, notes and specifications, addendums, Construction Specifications Canada (CSC) Specification Divisions 25, 26, 27 and 28

A-3.02 Organizes materials and supplies

Essential Skills	Thinking, Document Use, Digital Technology

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-3.02.01P	estimate ***materials*** and ***supplies*** required	materials and supplies are in place to prevent cost overruns and to enable smooth operation of project
A-3.02.02P	select material and equipment for task	material and equipment for task meets site requirements and specifications
A-3.02.03P	locate, order and schedule delivery of ***materials*** and ***supplies***	materials and supplies are ordered and delivered according to ***criteria***
A-3.02.04P	load, unload and store materials and supplies	materials and supplies are loaded, unloaded and stored according to ***factors***
A-3.02.05P	schedule the use of material and supplies throughout the project	sufficient materials and supplies are available through to successful completion of the project
A-3.02.06P	arrange for secure and organized storage of materials and supplies	materials and supplies are organized and stored to prevent theft and damage, and to ensure availability
A-3.02.07P	verify shipments of materials and supplies to ensure that quality and quantity match order	materials and supplies are counted and compared to order, and are inspected for shipping damage
A-3.02.08P	perform inventory control	inventory is counted and stored in secured area

RANGE OF VARIABLES

materials include: wires and cables, luminaires, panel boards, starters and contactors, transformers, distribution equipment, fittings, raceways, support hardware

supplies (consumables) include: pulling compounds, tape, thread compounds

criteria include: storage availability, shelf life, product availability, delivery and site schedules

factors include: installation sequence, job specifications, site conditions

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-3.02.01L	demonstrate knowledge of procedures used to organize and maintain materials and supplies	identify sources of information relevant to organizing materials and supplies
		describe considerations for determining material and supply requirements
		describe procedures to organize and maintain inventory

RANGE OF VARIABLES

considerations include: plans, specifications, drawings, environment, NPC, AHJ. storage location ,available space, schedule,

materials include: wires and cables, luminaires, panel boards, starters and contactors, transformers, distribution equipment, fittings, raceways, support hardware

supplies (consumables) include: pulling compounds, tape, thread compounds

sources of information include: drawings, specifications, client requirements

A-3.03 Plans project tasks and procedures.

Essential Skills	Thinking Skills, Document Use, Working with Others

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-3.03.01P	visually inspect work environment to determine job requirements from approved documentation	job requirements are determined by site visit, and approved documentation
A-3.03.02P	determine labour and equipment requirements	labour and equipment requirements are determined according to job specifications
A-3.03.03P	establish and maintain schedules	schedules are maintained according to criteria
A-3.03.04P	coordinate work with other trades	work is coordinated with other trades according to requirements
A-3.03.05P	draw and sketch layouts	layouts are drawn according to the installation task at hand

RANGE OF VARIABLES

job specifications include: CEC, conductor sizes, load requirements locations

criteria include: weather, product availability project progression

requirements include: shutdown and installation sequencing

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-3.03.01L	demonstrate knowledge of the procedures used to plan and organize job tasks and procedures	identify sources of information relevant to planning job tasks and procedures
		describe the considerations to plan and organize job tasks and procedures
		describe the function of project schedule charts

RANGE OF VARIABLES

sources of information include: drawings, specifications, client requirements

considerations include: available space, schedule/sequence, permits, hazards assessment, personnel, tools and equipment, materials and supplies, storage location

A-3.04 Prepares worksite.

Essential Skills	Thinking Skills, Document Use, Working with Others

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-3.04.01P	perform pre-job assessment	pre-job assessment is performed by site visit
A-3.04.02P	visually inspect to identify traffic areas and ***potential hazards***	traffic areas and ***potential hazards*** are identified by site visit
A-3.04.03P	install barricades and signage to contain work zone	work zone is contained according to job requirements and safety codes

A-3.04.04P	create openings and penetrations in structures and equipment	openings and penetrations are created according to job requirements and building codes
A-3.04.05P	ensure sufficient lighting and ventilation of work area	work area is ventilated and level of lighting is according to safety and building codes
A-3.04.06P	ensure required materials and equipment are on site	materials and equipment are readily accessible for installation
A-3.04.07P	control workplace and storage access	workplace and storage access is controlled by gates, fences and barriers to limit access
A-3.04.08P	ensure surveys and ***locates*** are completed and marked-out	***locates*** are identified on the ground with paint and on site plan

RANGE OF VARIABLES

potential hazards include: confined spaces and trenches, overhead hazards, uneven ground, elevated work areas, poor housekeeping, animals

locates include: underground services and utilities, concealed building elements

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-3.04.01L	demonstrate knowledge of the procedures used to prepare worksite	identify sources of information relevant to prepare worksite
		identify potential hazards relevant to prepare worksite
		describe the considerations to prepare worksite
A-3.04.02L	demonstrate knowledge of the procedures used to locate elements encased in concrete and soil	identify types of surveying equipment used to locate elements in concrete walls and floors, concrete slab on grade and in soil

RANGE OF VARIABLES

sources of information include: drawings, specifications, AHJ and client requirements

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

considerations include: available space, schedule/sequence, permits, hazards assessment, personnel, tools and equipment, materials and supplies, storage location

elements include: conduits, heating cables, pipes, reinforcement bar, post-tensioned cables

A-3.05 Finalizes required documentation.

Essential Skills	Oral Communication, Thinking, Working with Others, Reading, Document Use, Digital Technology

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-3.05.01P	document alterations by modifying plans, schematics and drawings to reflect changes and additions made to original application	plans, schematics and drawings are modified to reflect changes
A-3.05.02P	log data from various ***sources*** to assist with maintenance and replacement	paper and digital copies of setting files are saved to assist with maintenance
A-3.05.03P	Compile, update and store maintenance manuals from installed equipment manufacturers' specifications	product data sheets for various equipment are included in the maintenance manuals
A-3.05.04P	submit required final documentation, including as-built drawings, to client	***documentation*** is recorded in a ***data management system***
A-3.05.05P	Write short reports	Reports are submitted to management error free.
A-3.05.06P	Complete purchase orders and work order forms	Documentation is submitted to appropriate staff who are accountable for finances.

RANGE OF VARIABLES

sources include: checklists, maintenance manuals, work orders, diagrams or programs

documentation includes: checklists, work orders, unit condition rating inspection report

data management systems include: Maintenance Management Operating Systems, finance systems, paper base files, databases or spreadsheets

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-3.05.01L	demonstrate knowledge of documentation, its purpose, application and use	describe and identify types of documentation developed from different tasks
		follows procedures for finalizing documentation

TASK A-4 Performs Routine Trade Activities

A-4.01 Calculates and measures materials.

Essential Skills	Reading, Numeracy, Thinking Skills, Digital Technology

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-4.01.01P	Take a variety of measurements using basic tools	Uses measuring tape ad yard sticks to take measurements
A-4.01.02P	Calculate ***material*** requirements	Materials ordered is within 2-5% of what is required
A-4.01.03P	Take precise measurements using ***specialized measuring instruments***	Measurements result in accurate bending, cutting, joining of materials with little waste.
A-4.01.04P	Calculate runs, rises and offsets	stringers, stairway and ramps rises and runs and the offsets result in stairs and ramps that meet code
A-4.01.05P	Convert Imperial measurement to metric to fabricate or modify a part	Identifies when converting measurements are required.
A-4.01.06P	Use geometry, such as bisecting angles and constructing a circle from chords, to lay out materials	Joins are correctly done.
A-4.01.07P	Calculate the Working Load Limit for a variety of wire and fibre rope types.	Load limit is within acceptable ranges.
	Measure angles to cut tubing/pipe to specifications	Piping is properly cut, with little wastage.

RANGE OF VARIABLES

specialized measuring instruments include: calipers

material includes: drywall, floor covering, wood, pipe, concrete

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-4.01.01L	Geometry principles	use vectors and trigonometric constants to calculate saddles and angles
		measure the inside and outside diameters
		Uses appropriate formula to determine which size and type of rope to use when hoisting a load

A-4.02 Follow process for construction projects

Essential Skills Thinking Skills

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-4.02.01P	inform tenants of work that will be done and how it will impact them	Tenants are prepared for the work to be done in their unit.
A-4.02.01P	assess risks	Barriers and security measure are in place to secure unit.
A-4.02.01P	secure area to prevent trespass	
A-4.02.01P	protect the occupants' property	
A-4.02.01P	gather and inventory tools, equipment and excess materials	tools, equipment and excess materials are gathered and inventoried
A-4.02.01P	wear appropriate PPE	appropriate PPE is selected for the work being done
A-4.02.01P	salvage building materials	excess materials are removed and stored for future use
A-4.02.02P	follow good ***housekeeping practices***	Workplace is hazard free

RANGE OF VARIABLES

housekeeping practises include: keeping work areas neat and orderly, maintaining halls and floors free of slip and trip hazards, and removing of waste materials (e.g., paper, cardboard) and other fire hazards from work areas. It also includes paying attention to important details such as the layout of the whole workplace, aisle marking, the adequacy of storage facilities, and maintenance.

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-4.02.01L	Demonstrate the ability to analyze the problem that has been identified by the client	Identify root causes of problems using critical thinking
		Interpret information the client gives using prompting questions
		Relate relevant information or past experience
A-4.02.02L	Demonstrate the ability to assess risks	Identify risks to property in a variety of situations

TASK A-5 Develops Others

A-5.01 Uses mentoring techniques.

Essential Skills	Working with Others, Oral Communication Skills, Thinking, Continuous Learning

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-5.01.01P	identify and communicate learning objective and point of lesson	apprentice or learner can explain the objective and point of the lesson
A-5.01.02P	link lesson to other lessons and the job	lesson order and unplanned learning opportunities are defined
A-5.01.03P	demonstrates performance of a skill to an apprentice or learner	***steps required to demonstrate a skill*** are performed

A-5.01.04P	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-5.01.05P	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-5.01.06P	give supportive and corrective feedback	apprentice or learner adopts best practice after having been given supportive or corrective feedback
A-5.01.07P	support apprentices in pursuing technical training opportunities	technical training is completed within timeframe prescribed by apprenticeship authority
A-5.01.08P	support equity group learners and apprentices	workplace is harassment and discrimination-free
A-5.01.09P	implement probationary period for learners to assess their suitability to the trade	commitment is demonstrated by the learner and more suitable career options are provided to others

RANGE OF VARIABLES

steps required to demonstrate a skill include: 5 Ws, 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-5.01.01L	identify, explain and demonstrate 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 ways of learning

		identify different ***learning needs*** and strategies to meet ***learning needs***
		identify ***strategies to assist in learning a skill***
A-5.01.02L	identify, explain and demonstrate ***strategies for teaching*** workplace skills	identify different roles played by a workplace mentor
		describe the ***steps*** involved in 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 how to choose a good time to present a lesson
		identify the components of the skill (the context)
		evaluate considerations in setting up opportunities for skill practice
		explain the importance of providing feedback
		Select the appropriate techniques for giving effective feedback
		conduct a skills assessment
		use various methods of assessing progress
		adjust a lesson to different situations

RANGE OF VARIABLES

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

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

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

A-5.02 Supervises Staff.

Essential Skills Working with others, Oral Communication, Thinking Skills, Continuous Learning, Reading

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-5.02.01P	Plan work processes and schedules to ensure full use of all equipment and ***staff***	Work schedules are established based on skill of staff and available resources
A-5.02.02P	Use communications software to email programs to exchange messages and data with staff	Emails assist staff in completing their assigned work and keep them informed of changes.
A-5.02.03P	Lead safety meetings	Safety meetings are clearly presented and staff action items coming out of the meetings.
A-5.02.04P	Evaluate performance of staff	Staff understands what they are doing well and know how to improve their performance.

RANGE OF VARIABLES

staff include: trades helpers, students, interns, apprentices

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-5.02.01L	Define, discuss, and demonstrate best practices of workplace scheduling.	Develops a work schedule that meets operational needs.
A-5.02.02L	Identify, explain and demonstrate ***strategies for improving performance***.	Describe the purpose, benefits, and best practices of conducting and writing Performance Appraisals (PA)
		Practice preparing, writing, and delivering an effective PA.

RANGE OF VARIABLES

strategies for improving performance includes: feedback, rewards & recognition, regular meetings, goal setting, share information, support training

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 based on 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.

INDUSTRY EXPECTED PERFORMANCE

Communication and mentoring on the job must be done with mutual respect and must take into account personal responsibilities, attitude, oral communication and career outcomes. Construction electricians must communicate with appropriate trade terminology as defined in occupational health and safety requirements and the trades' codes, such as the Canadian Electrical Code (CEC) and the National Building Code (NBC).

All communication must be done in accordance with the Canadian Human Rights Act and be free from harassment and discrimination.

Mentoring styles can vary by workplace and individual. Different things work for different people. A focus on workplace mentoring is about helping ensure that the skills, tips, techniques and best practices are passed on. This benefits industry as a whole by raising productivity and creating safer and healthier workplaces.

A-6.01 Uses communication techniques

Essential Skills	Oral Communication, Working with Others, Continuous Learning, Digital Technology

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-6.01.01P	demonstrates two-way communication practices	instructions and messages are understood by both parties involved in communication
A-6.01.02P	listens using ***active listening*** practices	steps of ***active listening*** are utilized
A-6.01.03P	receives and responds to feedback on work	response to feedback indicates understanding and corrective measures are taken
A-6.01.04P	uses questioning to improve communication	questions enhance understanding, on-the-job training and goal setting
A-6.01.05P	participates in safety and information meetings	meetings are attended and information is understood and applied

A-6.01.06P	write reminders and notes to co-workers	co-workers are aware of, and able to action written requests
A-6.01.07P	use communications software to email programs to exchange messages and data with clients, suppliers and co-workers	emails are written in a manner that elicits an appropriate response.
A-6.01.08P	responds at a level compatible to client's level of comprehension	communication of the problem and solution is understood by client

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	Uses trades terminology correctly
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***
		identify ***personal responsibilities and attitudes*** that contribute to on-the-job success
		identify communication that constitutes ***harassment and discrimination***
		Checks for understanding from the other party
A-6.01.03L	Demonstrates knowledge of problems, causes and possible solutions to common building system problems	Predict likely causes and identify solutions to common building systems problems

RANGE OF VARIABLES

people in the workplace include: other tradespeople, colleagues, apprentices, supervisors, clients, AHJ, manufacturers
sources of information include: regulations, codes, occupational health and safety requirements, AHJ requirements, prints, drawings, specifications, company and client documentation
learning styles include: seeing it, hearing it, trying it

personal responsibilities and attitudes include, but are not limited to: asking questions, working safely, accepting constructive feedback, time management and punctuality, respect for authority, good stewardship of materials, tools and property, efficient work practice
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, marital status, family status, disability or conviction for which a pardon has been granted

A-6.02 Commits to Continuous Learning.

Essential Skills	Continuous Learning, Reading, Digital Technology

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-6.02.01P	maintain current knowledge of ***information sources***	***information sources*** are kept current and out of date information is archived
A-6.02.02P	utilize new skills and methods emerging due to technological advancements	applies new skills and methods in keeping with the workplace tools and technology available
A-6.02.03P	takes advantage of available training opportunities to improve personal and team effectiveness.	registers for/accepts professional development opportunities
A-6.02.04P	learns from mistakes to find new and better work methods.	analyzes errors and does not make the same mistake twice
A-6.02.04P	devotes time and attention to improving job knowledge and skills.	seeks out those more skilled to learn from

RANGE OF VARIABLES

Information sources includes codes, regulations, standards, occupational health and safety requirements and materials

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-6.02.01L	Identify and apply changes found in information sources	Interprets and applies new information to work plan
		Relate changes in ***information sources*** to the work site

A-6.02.02L	Employs new skills and methods of work	Identifies when a new method or skill should be employed
		Ask others for feedback to evaluate own performance and to identify opportunities for improvement.

A-6.03 Work Effectively with Others.

Essential Skills Oral Communication, Working With Others

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-6.03.01P	share information and expertise with others to help them achieve team goals.	advice is sought out by others and information is freely exchanged
A-6.03.02P	acknowledge shared work	give credit and recognition to others who have contributed to the team.
A-6.03.03P	address problems when they arise	Communicate openly and respectfully when addressing problems with other team members.
A-6.03.04P	refrains from judgement of others	Treat all clients with dignity, respect and a welcoming attitude
A-6.03.05P	builds strong relationships	Follows through on commitments, maintains confidences

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-6.03.01L	recognise and value the roles of other people	analyse the roles and behaviour of others and adapting your own behaviour to deal with the complexity of worksite relationships
A-6.03.02L	taking responsibility for your own contribution	identifying strengths and weaknesses in the ways you worked with others
A-6.03.02L	identify ways of ***building trust***	assess personal trustworthiness

RANGE OF VARIABLES

building trust includes*:* reliability, congruence, acceptance, openness, responsibility, honesty

A-6.04 Manage Stress.

Essential Skills Oral Communication, Working with Others

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-6.04.01P	manages workload and resources	monitors and anticipates workload, scheduling resources accordingly
A-6.04.02P	maintain self-control in the face of hostility or provocation	controls response when criticized, attacked or provoked
A-6.04.03P	maintains ***healthy habits***	makes healthy choices that reduce/relieve stress

RANGE OF VARIABLES

healthy habits include: regular exercise, quality sleep, healthy eating, spirituality, and communicating

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-6.04.01L	identifies link between lifestyle and stress	analyzes lifestyle factors related to stress
A-6.04.02L	identifies stressors	lists common stressors
A-6.04.03L	explain the impact of stress on performance	distinguishes between eustress and distress
A-6.04.04L	manages emotions	applies strategies for managing emotions

A-6.05 Demonstrates Professional Attributes.

Essential Skills Oral Communication, Working with Others

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-6.05.01P	Maintains ***certifications***	Professional ***certifications*** are current and are not allowed to lapse
A-6.05.02P	Attends and assists during ***emergency situations***	Apprentice recognizes the need to assist during emergency events in the community and does so willingly
A-6.05.03P	Demonstrates the professional ***competencies*** required for the trade	Apprentice behaviour on the worksite reflects the competencies required to be seen as a professional

RANGE OF VARIABLES

Certifications include***:*** WHMIS, first-aid, fall-arrest, confined space entry,

emergency situations include: fire, natural disasters,

competencies include: initiative, reliability, honesty, integrity, cultural awareness, physical fitness, patience, safety conscious

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-6.05.01L	Identifies certifications required for the job	describes the importance of the each required certification
		knows how to obtain the certification
		knows the duration of each certification
A-6.05.02L	Identifies competencies required for the trade	explains the importance of each competency
		identifies the behaviours that make up each competency
A-6.05.03L		describes how to demonstrate these competencies in the workplace

MAJOR WORK ACTIVITY B Repairs and Maintains Unit's Systems

TASK B-7 Maintain Heating Systems

TASK DESCRIPTOR

Housing Maintainers may be required to maintain and repair these systems and must have basic knowledge of how they are planned, installed and operated. For the purpose of this standard, service includes troubleshooting, diagnosing, maintenance and repairs. service and maintenance include removing, replacing and repair of components. Appliances being serviced shall not exceed 400,000 BTUs

B-7.01 Perform preventative maintenance on furnaces and forced air distribution systems.

Essential Skills	Numeracy, Document Use, Thinking, Continuous Learning, Digital Technology

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-7.01.01P	Evaluates and mitigates ***worksite hazards*** and ***work hazards***	Worksite and work hazards are identified and address prior to work starting
B-7.01.02P	Identifies ***faults*** and ***conditions requiring servicing***	Faults and conditions requiring servicing are documented
B-7.01.03P	perform furnace service according to current version B139 code	***components*** and accessories are installed according to code and manufacturers specifications
B-7.01.04P	Clean, repair or replace defective components	***components*** are cleaned, repair or replaced according to manufacturers' specifications
B-7.01.05P	confirm operation of furnace and safety controls	system is returned to service and correct operation is verified
B-7.01.06P	Verify operation of blocked vent switch	determine continuity through switch
B-7.01.07P	Inspect duct work	Conforms to manufacturers specifications

RANGE OF VARIABLES

Components: burner unit, igniter, blower unit, fan/limit controls, combustion chamber, heat exchanger, ducts, supply/return grills, plenum, thermostat, emergency switch, hangers

Hazards: electrical, fuel spill, excess fuel in the combustion chamber, carbon monoxide, airborne particulate

Faults: Cracks, corrosion, heat damage,

Conditions requiring servicing: noise, wear

worksite hazards include: poor housekeeping, overhead hazards, confined space

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-7.01.01L	Demonstrate knowledge of furnace servicing procedures	Describe procedure for servicing furnace
		Identify relevant sections of the B139 code and manufactures recommendation
		Identify tools and equipment required for maintenance
		Identify **hazards** and **safe work practices** pertaining to burner servicing
		Demonstrate knowledge of lock out and tag out procedures
B-7.01.02L	Demonstrate knowledge of proper location of blocked vent switch	Describe the conditions that need to be present for vent switches to operate properly

RANGE OF VARIABLES

Hazards: electrical, fuel spill, excess fuel in the combustion chamber, carbon monoxide, fall protection

Safe work practices: lockout/ tag-out, wearing PPE, WHMIS, working at heights, confined space entry

B-7.02 Perform preventative maintenance on atomizing burners.

Essential Skills	Thinking Skills, Document Use, Reading, Numeracy

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-7.02.01P	perform service according to current version B139 code	**components** and **accessories** are installed according to code and manufacturers specifications
B-7.02.02P	Identify and record visible ***faults*** and ***hazards***	Faults and hazards are properly documented as per company policies
B-7.02.03P	Clean, repair or replace defective ***components***	***components*** are cleaned, repair or replaced according to manufacturers' specifications
B-7.02.04P	confirm operation of burner and safety devices	system is returned to service and correct operation is verified
B-7.02.05P	Ensure proper combustion of oil-burner	Perform combustion analysis
B-7.02.06P	Ensure adequate combustion air is available	Combustion air meets code requirements

RANGE OF VARIABLES

Components: nozzle, electrode assembly, transformer/igniter, burner motor, burner blower wheel, coupling, fuel pump, valves

Hazards: electrical, fuel spill, excess fuel in the combustion chamber, carbon monoxide

Faults: Cracks, corrosion, heat damage, damaged transformer

Conditions requiring servicing: noise, wear,

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-7.02.01L	Demonstrate knowledge of oil burner service procedures	Describe procedure for servicing burner ***components***
		Identify relevant ***information sources***
		Identify tools and equipment required for maintenance
		Identify **hazards** and safe work practices pertaining to burner servicing
		Demonstrate knowledge of lock out and tag out procedures

RANGE OF VARIABLES

Components: nozzle, electrode assembly, transformer/igniter, burner motor, burner blower wheel, coupling, fuel pump, valves

Information sources: B139 code, manufactures instructions

B-7.03 Perform preventative maintenance on vaporizing burners.

Essential Skills	Writing, Document Use, Reading, Thinking Skills

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-7.03.01P	perform service ***according information sources*** specifications	**components** and **accessories** are installed according to code and manufacturers specifications
B-7.03.02P	Inspect vaporing burner for ***faults*** and ***conditions requiring servicing***	vaporizing burners are inspected for ***conditions requiring servicing***
B-7.03.03P	Clean ***components***	***components*** are cleaned to prolong life of system
B-7.03.04P	determine whether ***components*** require replacement or repair	***components*** are determined to be in need of repair or replacement according to industry standard
B-7.03.05P	replace ***components***	***components*** are replaced according to manufacturers' specifications
B-7.03.06P	repair ***components***	***components*** are repaired according to manufacturers' specifications
B-7.03.07P	complete required ***documentation***	***documentation*** is completed according to AHJ and company policies
B-7.03.08P	return system to service and verify system operation	system is returned to service and system operation is verified to meet design specifications

RANGE OF VARIABLES

Components include: electrode assembly, igniter, burner motor, burner blower wheel, valves, flow control valve, lift pump, blower motor

Information sources include: B139 code, manufactures instructions

Hazards include: electrical, fuel spill, excess fuel in the combustion chamber, carbon monoxide

Faults include: cracks, corrosion, heat damage,

Conditions requiring servicing include: noise, wear,

documentation includes: service reports, maintenance reports

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-7.03.01L	Demonstrate knowledge of vaporizing burner service procedures	Describe procedure for servicing burner
		Identify relevant sections of the B139 code
		Identify tools and equipment required for maintenance
		Identify hazards and safe work practices pertaining to burner servicing
		Demonstrate knowledge of lock out and tag out procedures

RANGE OF VARIABLES

Hazards: electrical, fuel spill, excess fuel in the combustion chamber, carbon monoxide

Safe work practices: lockout/ tag-out, wearing PPE, WHMIS

B-7.04 Perform preventative maintenance on boilers and hot water system.

Essential Skills Document Use, Thinking Skills, Digital Technology, Continuous Learning

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-7.04.01P	perform boiler service according to current pressure vessels code B-51	**components** and **accessories** are installed according to code and manufacturers specifications
B-7.04.01P	select and use ***tools*** and equipment	***tools*** and equipment are selected and used according to applications
B-7.04.02P	perform scheduled maintenance of systems	scheduled maintenance of system is performed
B-7.04.03P	verify operation of piping and ***components***	operation of piping and ***component***s is verified according to system design and manufacturers' specifications
B-7.04.04P	inspect piping and ***components*** for ***faults*** or ***conditions requiring service***	piping and ***component*** are inspected for ***conditions requiring service***
B-7.04.05P	determine whether ***component*** require replacement or repair	***component*** are determined to be in need of repair or replacement according to industry standard
B-7.04.06P	clean ***components***	***components*** are cleaned to prolong life of system and maintain adequate flow
B-7.04.07P	replace ***components***	***components*** are replaced according to manufacturers' specifications

B-7.04.08P	repair ***components***	***components*** are repaired according to manufacturers' specifications
B-7.04.09P	inspect ***fluid*** quality	***fluid*** is treated according to system requirements
B-7.04.10P	complete required ***documentation***	***documentation*** is completed according to Authority Having Jurisdiction (AHJ) and company policies
B-7.04.11P	return system to service and verify system operation	system is returned to service and system operation is verified according to system design
B7.04.12P	Verify operation of blocked vent switch	determine continuity through switch

RANGE OF VARIABLES

***hazards*:** electrical, fuel spill, excess fuel in the combustion chamber, carbon monoxide, airborne particulate

fluid includes: water, air, and brine solutions

documentation includes: service reports, maintenance reports, building logbooks

faults include: cracks, corrosion, inadequate flow, air lock

additives include: treatment chemicals

components include: valves, air removal devices, circulators, gauges and thermometers, heat transfer units, dirt elimination devices, pipes, radiators, unit heater, fan coil unit

Faults: cracks, corrosion, heat damage,

***Conditions requiring servicing*:** noise, wear, leaks, corrosion

***Tools*:** multi-meter, common hand tools, power drill,

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-7.04.01P	demonstrate an understanding of the principles of heat	examine and describe heat.
		describe measurement of pressure.
		discuss characteristics of heat transfer.
		define heat terminology
B7.04.02P	demonstrate knowledge of servicing piping and ***components*** for hydronic systems	describe procedures used to diagnose problems with piping and ***components*** for hydronic systems
		interpret drawings, specifications and equipment manuals required for system service
		identify the tools and equipment used to service the system
		describe procedures for lock-out and tag-out of hydronic systems

		describe procedures for disassembly of the problem area of the system, for repair or replacement of the faulty ***components*** and for reassembly of the system
		describe procedures for reinstating system to operating condition and verifying repair
B7.04.03P	demonstrate knowledge of documenting	describe program of scheduled service the service for hydronic systems
		identify required ***documentation*** pertaining to servicing hydronic systems

RANGE OF VARIABLES

Safe work practices: lockout/ tag-out, wearing PPE, WHMIS, working at heights, confined space entry

conditions requiring service include: wear, noise, leaks, corrosion

hazards include: high temperature, high pressure, cross-contamination, electrical, spillage, excess fuel in the combustion chamber, carbon monoxide

components include: valves, air removal devices, circulators, gauges and thermometers, heat transfer units, dirt elimination devices

documentation includes: service reports, maintenance reports, building logbooks

Tools**:** multi-meter, common hand tools, power drill,

B-7.05 Perform preventative maintenance on heat recovery ventilation systems

Essential Skills	Document Use, Thinking Skills, Digital Technology, Continuous Learning

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-7.05.01P	Conduct visual inspection	Visual inspection of unit is done to identify ***faults*** and ***conditions requiring servicing***
B-7.05.02P	perform service according to manufacturers' specifications	***components*** and ***accessories*** are installed according to manufacturers' specifications
B-7.05.03P	clean ***components***	***components*** are cleaned, repair or replaced according to manufacturers' specifications

B-7.05.04P	repair defective ***components***	defective ***components*** are repaired according to manufacturers' specifications and task at hand
B-7.05.05P	replace defective ***components***	***components*** are in place and are installed to specifications
B-7.05.06P	confirm operation of heat recovery ventilation	system is returned to service and correct operation is verified
B-7.05.07P	Ensure proper balance of air	Pressure differential set as per manufacturers recommendations
B-7.05.08P	select and use ***tools and equipment***	tools and equipment are selected and used according to applications

RANGE OF VARIABLES

***Components*:** filters, diffusers, hangers, ducting, blower motor

***Tools and equipment*:** Anemometer, magnehelic pressure gauge, **hand tools**

***Information sources*:** manufactures instructions

***Hazards*:** electrical, carbon monoxide, confined space

Faults: Cracks, corrosion, condensate drain, snow and ice on intake/exhaust

***Conditions requiring servicing*:** noise, wear

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-7.05.01L	Demonstrate knowledge of heat recovery ventilation	Describe procedure for servicing HRV
		Identify tools and equipment required for maintenance
		Identify **hazards** and **safe work practices** pertaining to HRV servicing
		Demonstrate knowledge of lock out and tag out procedures
B-7.05.02L	Demonstrate knowledge of required tools to balance air	Describe the operating procedures of Anemometer and magnehelic pressure gauge

RANGE OF VARIABLES

Hazards: electrical, fuel spill, excess fuel in the combustion chamber, carbon monoxide

Safe work practices: lockout/ tag-out, wearing PPE, WHMIS

B-7.06 Preventative Maintenance on Chimneys and vents.

Essential Skills	Document Use, Thinking

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-7.06.01P	perform inspection according to current version B139 code	**components** are installed according to code and manufacturers specifications
B-7.06.02P	Select appropriate ***tools***	***tools*** are selected based on the parameters of the job
B-7.06.03P	Clean defective ***components***	***components*** are cleaned, repair or replaced according to manufacturers' specifications
B-7.06.04P	Repair defective ***components***	***components*** are repaired to manufacturers' specifications and information sources are consulted
B-7.06.05P	Replace defective ***components***	***components*** are repaired to manufacturers' specifications and information sources are consulted
B-7.06.06P	Check stack temperature	stack temperature is within B139 code

RANGE OF VARIABLES

Components: cap, flashing, storm collar, roof supports, wall support, draft regulators, base-T, power vents

Information sources: B139 code, manufactures instructions, CAN/ULC–S629 CAN/ULC–S604, CAN/ULC–S609, ULC/ORD–C959

Hazards: carbon monoxide, sharp edges, heat, airborne particulate, fall arrest

Faults: Cracks, corrosion, heat damage, collapsed liner,

Conditions requiring servicing: corrosion, noise

Tools: brush, vacuum, trouble light, flashlight, ladder, stack thermometer

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-7.06.01L	Demonstrate knowledge of safe work practices	To be able to work safely at heights
		Identify **hazards** and **safe work practices** pertaining to chimneys
B-7.06.02L	Demonstrate knowledge of venting principles	Describe stack principles

	Identify the relationship between stack temperature and chimney height
	Identify symptoms of a low stack temperature
	Identify collapsed chimney

RANGE OF VARIABLES

Components: cap, flashing, storm collar, roof supports, wall support, draft regulators, base-T, power vents

Hazards: carbon monoxide, sharp edges, heat, airborne particulate, fall arrest

Faults: Cracks, corrosion, heat damage,

Conditions requiring servicing: noise, wear

B-7.07 Preventative Maintenance on wood burning appliances.

Essential Skills Document Use, Thinking Skills

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-7.07.01P	Visually inspect exterior of chimney to identify ***defects***	***defects*** are identified if present
B-7.07.02P	document ***exterior component*** conditions and recommend repairs or further evaluation	Documentation is filed and accessible to others
B-7.07.03P	Visually inspect ***interior components*** of the wood-burning appliance for ***interior defects***	***Interior defects*** are identified if present
B-7.07.04P	Order/replace ***components***	Correct ***components*** are ordered for the model unit
B-7.07.05P	Remove faulty ***components***	***Components*** are removed and properly disposed of
B-7.07.06P	New components are installed to ***standards***	***components*** operate as expected and meet standards

RANGE OF VARIABLES

defects include: signs of abnormal movement, aging corrosion and separation, defective masonry, etc.
exterior components include: braces, clean-outs, caps, liners, flue, vents, dampers,

interior components include: door, fire brick, brick rail, baffle, manifold, blower

interior defects includes: cracks, corrosion, damaged or sagging door gasket, cracked glass, excessive warping, burned out sections

standards include: manufacturers specification, WETT, JHA requirements and codes

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-7.07.01L	Demonstrate knowledge of safe work practices	To be able to work safely at heights
		Identify **hazards** and **safe work practices** pertaining to chimneys
B-7.07.02L	Demonstrate knowledge of venting principles	Describe stack principles
		Identify the relationship between stack temperature and chimney height
		Identify symptoms of a low stack temperature
B-7.07.03L	Demonstrate knowledge of chimney structure	Identify collapsed chimney
		Identify ***standards*** related to the installation of chimneys

RANGE OF VARIABLES

standards includes: compatibility, sizing, fuel types, height, and clearance requirements

B-7.08 Preventative Maintenance on gas fired appliances.

Essential Skills Document Use, Thinking Skills

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-7.08.01P	Visually inspect exterior of to identify ***defects***	***defects*** are identified if present

B-7.08.02P	document ***exterior component*** conditions and recommend repairs or further evaluation required by a certified Gasfitter	Documentation is completed according to AHJ and company policies and accessible to others
B-7.08.03P	Visually inspect ***components*** of the gas fired appliance for ***defects***	***defects*** are identified if present

RANGE OF VARIABLES

sensory inspection includes: visual, auditory and tactile testing

defects include: signs of abnormal movement, aging corrosion and separation, obvious signs of deterioration of the furnace, etc.

exterior components include: braces, clean-outs, caps, liners, flue, vents

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-7.08.01L	Demonstrate knowledge of safe work practices	To be able to work safely at heights
		Identify **hazards** and **safe work practices** pertaining to venting and air supply
B-7.08.02L	Demonstrate knowledge of theory of combustion	Describe heat generation and transfer
		Identify the relationship between stack temperature and CO levels
		Identify condensate lines
B-7.08.03L	Demonstrate knowledge of checking for leaks	Identify testing equipment required for leak detection

RANGE OF VARIABLES

standards include: manufacturers specification, JHA requirements and codes

documentation includes: service reports, maintenance reports

TASK B-8 Service and Maintain Electrical Systems

TASK DESCRIPTOR

Distribution equipment provides power for all electrical systems and equipment. This equipment allows for safe utilization of electricity.

For the purpose of this standard, service and maintenance includes removing, replacing and repair of components.
Housing Maintainers inspect electrical systems by trouble shooting faults, and make minor repairs. They also identify and report major electrical concerns beyond their scope.

INDUSTRY EXPECTED PERFORMANCE

The task must be performed according to the applicable jurisdictional codes and standards. All health and safety standards must be respected. Work should be done efficiently and at a high quality without material waste or harm to the environment. All requirements of the manufacturer, client specifications and the AHJ must be met.

At a journeyperson level of performance, all tasks must be done with minimal direction and supervision and within the confines of the AHJ of the electrical trade.

B-8.01 Performs servicing and maintenance of Electrical systems and components.

Essential Skills Working with Others, Document Use, Continuous Learning

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-8.01.01P	obtain detailed description of malfunction from client	malfunction issues and information are identified and recorded
B-8.01.02P	conduct ***field assessment*** using ***diagnostic and test equipment***	***field assessments*** are conducted using the ***diagnostic and test equipment*** that provides the most definitive diagnostics
B-8.01.03P	determine source of malfunction based on ***field assessment***	source of malfunction is identified based on ***diagnostic and test equipment*** results
B-8.01.04P	determine course of action	course of action for the type of malfunction is identified
B-8.01.05P	repair malfunctioning components	repaired components are operational
B-8.01.07P	install replacement ***components***	replacement components are installed with minimal disruptions
B-8.01.08P	create maintenance schedule	maintenance schedule is created by considering maintenance requirements

B-8.01.09P	follow maintenance schedule	maintenance tasks are done according to established schedule
B-8.01.10P	conduct tests using ***diagnostic and test equipment***	tests are conducted according to established maintenance schedule and test results are recorded
B-8.01.11P	update maintenance log	maintenance log is updated to reflect servicing and maintenance tasks performed

RANGE OF VARIABLES

field assessments includes: sensory inspections, technical inspections

diagnostic and test equipment includes: multimeters, voltage testers, ammeters, circuit testers, insulation resistance testers

components includes: plug, switches, light fixtures, replacement motors

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-8.01.01L	demonstrate knowledge of the methods and theory used to service and maintain ***Electrical Systems***	describe the methods and theory to service ***Electrical Systems*** and their components
		describe the methods and theory used to maintain ***power distribution equipment*** and their components

RANGE OF VARIABLES

Electrical Systems

power distribution equipment

TASK B-9 Maintain Plumbing Systems

TASK DESCRIPTOR

Housing maintainers are required to perform routine plumbing maintenance and repair on residential units and buildings owned by housing authorities.

INDUSTRY EXPECTED PERFORMANCE

These tasks must be performed to the applicable jurisdictional codes and standards, all health and safety standards must be respected. Work should be done at a high quality and with minimal material waste. At a journeyperson level the tasks should be completed with minimal direction and supervision.

B-9.01 Clean water holding tanks.

Essential Skills	Numeracy

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-9.01.01P	Turn off main water valve	Water is unable to enter the tank
B-9.01.02P	Drain tank	Tank is empty of water
B-9.01.03P	Flush the lines	Lines are clear of water
B-9.01.04P	Visually inspect the tank for ***defects***	***Defects*** are noted and corrective action is taken if required
B-9.01.05P	Using appropriate ***tools*** clean the tank with ***cleaning solution***	No visual buildup on the walls of the tank.
B-9.01.06P	Rinse the tank	Tank is rinsed and free of all water
B-9.01.07P	Disinfect the tank	***Disinfectant*** is left in the tank long enough to be effective
B-9.01.08P	Disinfect the lines	Water is run until the smell of the ***disinfectant*** can be noted
B-9.01.07P	Empty and refill tank	Tank is emptied of all treated water and is replaced with fresh water
B-9.01.07P	Purge lines	Taps are run to ensure disinfectant is no longer in them.
B-9.01.07P	Test the water	Reading are within acceptable limits as defined by AHJ

RANGE OF VARIABLES

Defects include: corrosion, leaks, cracking

Tools include: long handled brush, power washer

Cleaning solution includes: bleach, chorine

Disinfectant includes: bleach, chorine

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-9.01.01L	Demonstrate use of mathematical formulas	Calculate the correct amount of cleaning solution for the volume of a water tank
B-9.01.02L	Demonstrates knowledge of potable water safety	Identifies the consequences of improper maintenance of water holding tanks
		Persuades others of the importance of proper water holding tank maintenance

B-9.02 Preventative maintenance on sewage tanks.

Essential Skills Numeracy, Thinking Skills

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-9.02.01P	inspect equipment	equipment is inspected for ***conditions that require repair***
B-9.02.02P	interpret client's information	client's information is interpreted to assist in the diagnostic process
B-9.02.03P	perform sensory inspection	sensory inspection is performed to detect sewage treatment system for conditions requiring service
B-9.02.04P	select and use tools and equipment	tools and equipment are selected and used according to applications
B-9.02.05P	perform scheduled servicing of systems	scheduled servicing of system is performed according to system specifications and AHJ

B-9.02.06P	determine whether components require replacement or repair	components are determined to be in need of repair or replacement according to industry standard
B-9.02.07P	determine required isolation of system	isolation of system is determined according to service required
B-9.02.08P	notify system owner of need to isolate and execute isolation	owner is notified and isolation is executed
B-9.02.09P	clean components	components are cleaned to prolong life of system and adequate flow
B-9.02.10P	replace components	components are replaced according to manufacturers' specifications
B-9.02.11P	repair components	components are repaired according to manufacturers' specifications
B-9.02.12P	complete required ***documentation***	***documentation*** is completed according to AHJ and company policies
B-9.02.13P	return system to service and verify system operation	system is returned to service and system operation is verified according to system design

RANGE OF VARIABLES

conditions requiring repair include: wear, noise, leaks, corrosion

documentation includes: service reports, maintenance reports

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-9.02.01L	demonstrate knowledge of sewage treatment system, their ***components***, applications and operation	identify ***hazards*** and describe safe work practices pertaining sewage treatment system
		interpret codes and regulations pertaining to sewage treatment system
		interpret information pertaining to sewage treatment system found on drawings and specifications
		identify tools and equipment related to servicing sewage treatment system and describe their applications and procedures for use

		identify types of sewage treatment system, and their ***components*** and describe their characteristics and applications
		identify the ***factors*** to consider when servicing sewage treatment system
B-9.02.02L	demonstrate knowledge of the procedures used to maintain, repair and troubleshoot sewage treatment system	describe the procedures used to replace sewage treatment system and components
		describe the procedures used to protect sewage treatment system
		describe the procedures used to maintain and repair sewage treatment system and components
		describe the procedures used to troubleshoot sewage treatment system and components
		describe the importance of filling out service documentation related to maintenance and repair

RANGE OF VARIABLES

components include: backwater values, leak seals, covers, grates
hazards include: health hazards, environmental hazards, access, confined space
factors include: manufacturers' specifications, condition of sewage treatment system

B-9.03 Monitor sprinkler system

Essential Skills	Thinking Skills, Digital Technology

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-9.03.01P	establish a monitoring schedule	schedule is established in accordance with ahj and in partnership with local protective services
B-9.03.02P	interpret the different ***tones*** for the system	tones are correctly identified

B-9.03.03P	investigate or alert authorities based on tone	proper action is taken depending on the warning the system is transmitting
B-9.03.04P	request system reset when system has been tripped or disrupted	ahj reset system

RANGE OF VARIABLES

Tones include: Signals. Alarm, supervisory and trouble signals shall be distinctly different and shall be automatically transmitted to an approved central station, remote supervising station

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-9.03.01L	be familiar with sprinkler system alerts	identify the different types of warnings and signals that are relayed through an electronic monitoring system

B-9.04 pipe for interior drainage, waste and vent (DWV) systems.

Essential Skills	Numeracy, Document Use, Thinking

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-9.04.01P	identify ***fixtures and equipment***	***fixtures and equipment*** are identified
B-9.04.02P	identify roofs and paved surfaces	roofs and paved surfaces are identified
B-9.04.03P	sanitary drainage system and associated vent piping	sanitary drainage system and associated vent piping
B-9.04.05P	storm drainage system and associated vent piping	storm system and associated vent piping

RANGE OF VARIABLES

fixtures and equipment include: condensate drains, sump pumps, sinks, water closets, lavatories

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-9.04.01L	demonstrate knowledge of DWV systems, their components, applications and operation	identify hazards and describe safe work practices pertaining to DWV systems
		interpret codes and regulations pertaining to DWV systems
		interpret information pertaining to DWV systems found on drawings and specifications
		explain the purpose of DWV systems
		identify the types of DWV systems and describe their characteristics and applications
		identify ***components*** and describe their purpose and applications

RANGE OF VARIABLES

components include: piping, roof drains, area drains

procedures include: conversion factors, code requirements

B-9.05 Cuts Piping

Essential Skills	Numeracy, Document Use, Thinking

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-9.05.01P	identify ***fixtures and equipment***	***fixtures and equipment*** are identified for hydraulic load using blueprint
B-9.05.02P	identify roofs and paved surfaces	roofs and paved surfaces are identified for hydraulic load
B-9.05.03P	calculate total hydraulic load of building	calculations of hydraulic load correspond to tables contained in the NPC

B-9.05.04P	size sanitary drainage system and associated vent piping	sanitary drainage system and associated vent piping are sized by calculating total hydraulic load according to NPC and AHJ
B-9.05.05P	size storm drainage system and associated vent piping	storm system and associated vent piping is sized by calculating total hydraulic load according to NPC and AHJ

RANGE OF VARIABLES

fixtures and equipment include: condensate drains, sump pumps, sinks, water closets, lavatories

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-9.05.01L	demonstrate knowledge of DWV systems, their components, applications and operation	identify hazards and describe safe work practices pertaining to DWV systems
		interpret codes and regulations pertaining to DWV systems
		interpret information pertaining to DWV systems found on drawings and specifications
		explain the purpose of DWV systems
		identify the types of DWV systems and describe their characteristics and applications
		identify ***components*** and describe their purpose and applications
B-9.05.02L	demonstrate knowledge of the procedures used to determine and transfer grade and elevation measurements for DWV systems	describe the ***procedures used to determine hydraulic load*** on sanitary DWV systems
		describe the ***procedures*** used to determine hydraulic load on storm systems
		describe the procedures used to grade piping for DWV systems

RANGE OF VARIABLES

components include: piping, roof drains, area drains

procedures include: conversion factors, code requirements

B-9.06 Solder brass valves

Essential Skills Oral Communication, Document Use, Thinking

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-9.06.01P	Turn off water supply	Water in not flowing
B-9.06.02P	Drain pipe and valve of water	Pipes are free from water
B-9.06.03P	protect equipment and flammable materials while soldering and brazing	flammable materials are protected or removed from vicinity of soldering and brazing work, and equipment is protected
B-9.06.04P	Wear appropriate ***PPE***	PPE is worn according to the stage of work
B-9.06.05P	Assemble ***tools and equipment***	Tools and equipment are on site and available
B-9.06.06P	Cut out the existing valve	Valve is removed with little damage to the surrounding pipe
B-9.06.07P	De-burr the ends of the pipe	Pipe is free from burrs
B-9.06.08P	select ***soldering and brazing equipment and consumables***	***soldering and brazing equipment and consumables*** are appropriate for application and materials
B-9.06.09P	set up soldering and brazing equipment	setup is performed according to application
B-9.06.10P	match alloys to specific components to be soldered or brazed	alloy selected matches quality control requirements
B-9.06.11P	select flux and solder according to application	flux and solder selected meets requirements of weld procedures and quality control requirements
B-9.06.12P	join piping fittings and components	standards for brazed or soldered materials are met through inspection by quality assurance and local AHJ
B-9.06.13P	Inspect the pipe for leaks	Leaks are identified and repaired
B-9.06.14P	Turn the water supply back on	Water supply is on
B-9.06.15P	Valve works	Valve is watertight and works as per manufacturer's instructions

RANGE OF VARIABLES

PPE includes: gloves, eye protection

tools and equipment includes: piper cutter, bucket, wire brush, solder flux, propane torch, lead-free solder

soldering and brazing equipment include: oxy-fuel and air-fuel torches, attachments (strikers, methylacetylene-propadiene propane [MAPP] gas cylinders, torch heads)

soldering and brazing consumables include: silver solder, flux, soft solder, brazing rod, sand cloth, gases (nitrogen, carbon dioxide, oxygen, acetylene, MAPP, propane, argon)

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-9.06.01L	demonstrate knowledge of ***soldering and brazing equipment***, applications and procedures	identify types of ***soldering and brazing equipment***
		identify hazards and safety procedures pertaining to soldering and brazing
		identify different soldering and brazing processes and applications
		identify ***flush and purge procedures*** required for soldering and brazing
		identify ***soldering and brazing consumables***
		perform soldering and brazing procedures according to industry standards

RANGE OF VARIABLES

soldering and brazing equipment includes: oxy-fuel and air-fuel torches, attachments (strikers, MAPP, gas cylinders, torch heads)

flush and purge procedures include: valve isolation, monitoring pressures, monitoring flow rates

soldering and brazing consumables include: silver solder, flux, soft solder, brazing rod, sand cloth, gases (nitrogen, carbon dioxide, oxygen, acetylene, MAPP, propane, argon)

B-9.07 Maintain and repair pressure pumps and expansion tanks.

Essential Skills	Document Use, Thinking Skills, Numeracy

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-9.07.01P	check pressure-trol (also known as *pressure switch)* and valves and adjust to specified settings	Pressure (or lack of) is established
B-9.07.02P	Shut water supply off	Water supply is shut off
B-9.07.03P	Check for ***faults***	***faults*** are correctly identified
B-9.07.04P	Remedy any ***faults***	Replacement parts are installed or repairs are made to existing parts
B-9.07.05P	Clean out tank as required	Tank is free of debris
B-9.07.06P	Return system to working order	System operates as expected

RANGE OF VARIABLES

faults include: waterlogged system, system runs continuously or does not run at all, pump cuts in and out when no water is used, clogged impeller

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-9.07.01L	Determine the correct water pressure for a variety of plumbing installations	Calculate water pressure based on the main water line.
		Demonstrate the use of a pressure gauge to establish PSI
		Explain the variable to consider when repairing an expansion tank or pressure pump

B-9.08 Tests interior drainage, waste and vent (DWV) systems.

Essential Skills	Document Use, Thinking, Oral Communication

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-9.08.01P	use ***testing equipment***	***testing equipment*** is used to detect ***faults*** and verify operation
B-9.08.02P	perform systems check	systems check is performed to analyze performance according to system design and AHJ
B-9.08.03P	perform pressure test	pressure test is performed according to NPC and AHJ
B-9.08.04P	perform sensory inspection	sensory inspection is performed to detect DWV system problems
B-9.08.05P	perform ***final test***	***final test*** is performed using required testing equipment

RANGE OF VARIABLES

testing equipment includes: mechanical test plugs, gauge

faults include: leaks, inadequate grade

final tests include: smoke test, ball test, hydrostatic test

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-9.08.01L	demonstrate knowledge of interior DWV systems and their application	identify types of interior DWV systems and describe their characteristics and applications
		identify hazards and describe safe work practices pertaining to DWV systems
B-9.08.02L	demonstrate knowledge of ***testing equipment*** and procedures used for testing interior DWV systems	describe the procedures used to test interior DWV systems
		identify interior DWV system ***testing equipment***

RANGE OF VARIABLES

testing equipment includes: inflatable test balls, mechanical test plugs, gauge, smoke generating machine

B-9.09 Services piping and components for interior drainage, waste and vent (DWV) systems.

Essential Skills Continuous Learning, Thinking, Oral Communication

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-9.09.01P	interpret client's information	client's information is interpreted to assist in the diagnostic process
B-9.09.02P	inspect piping and ***components***	piping and ***components*** are inspected for ***conditions that require service***
B-9.09.03P	perform sensory inspection	sensory inspection is performed to detect ***conditions requiring service***
B-9.09.04P	select and use tools and equipment	tools and equipment are selected and used to service DWV systems
B-9.09.05P	perform scheduled servicing of systems	scheduled servicing of system is performed according to system design and AHJ
B-9.09.06P	verify operation of DWV system	operation of DWV system is verified according to system design
B-9.09.07P	determine whether pipes or components require replacement or repair	pipes or components are determined to be in need of repair or replacement according to industry standard
B-9.09.08P	determine required isolation of system	isolation of system is determined according to service requirements
B-9.09.09P	notify system owner of need to isolate and execute isolation	owner is notified and isolation is executed
B-9.09.10P	clean pipe and components	pipe and components are cleaned to prolong life of system and ensure adequate flow
B-9.09.11P	replace pipe and components	pipe and components are replaced according to manufacturers' specifications
B-9.09.12P	repair pipe and components	pipe and components are repaired according to manufacturers' specifications
B-9.09.13P	complete required ***documentation***	***documentation*** is completed according to AHJ and company policies
B-9.09.14P	return system to service and verify system operation	system is returned to service and system operation is verified according to system design

RANGE OF VARIABLES

components include: fittings, pipe, valves, sewage sumps, sewage lift, expansion joints, wall plates, fire stopping, insulation

conditions requiring service include: wear, noise, leaks, corrosion, blockage

documentation includes: service reports, maintenance reports

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-9.09.01L	demonstrate knowledge of interior DWV system ***equipment and components***, their applications and operation	identify types of interior DWV systems and describe their characteristics and applications
		identify tools and equipment relating to interior DWV systems and describe their applications and procedures for use
		identify interior DWV system ***equipment and components*** and describe their purpose, operation and applications
B-9.09.02L	demonstrate knowledge of the procedures used to service interior DWV systems	interpret codes and regulations pertaining to interior DWV systems
		describe the procedures used to service interior DWV system components
		describe the procedures and ***components used to protect*** interior DWV systems and buildings

RANGE OF VARIABLES

equipment and components include: sewage sumps, sewage lift

components used to protect include: expansion joints, wall plates, fire stopping, insulation

B-9.10 piping and equipment for potable water distribution systems

Essential Skills Document Use, Numeracy, Thinking

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-9.10.01P	identify peak demand flow requirements	peak demand flow requirements are identified according to NPC and AHJ
B-9.10.02P	calculate required peak demand flow for potable water distribution system	peak demand flow is calculated considering fire protection requirements for residential/commercial/industrial applications, and fixtures, ***equipment*** and system demand according to NPC, AHJ and specifications
B-9.10.03P	refer to potable water distribution tables in NPC	potable water distribution tables in NPC are referenced to obtain size of water distribution piping

B-9.10.04P	determine pipe size	pipe size is determined according to ***factors*** to consider for sizing piping, NPC, AHJ and specifications

RANGE OF VARIABLES

equipment includes: pumps, pressure reducing valves, hot water tanks, tempering valves, cross-connection devices, pressure tanks, water treatment equipment

factors include: total number of fixture units, developed length of pipe, most remote outlet, difference in elevation, velocity, available system pressure, individual fixture characteristics

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-9.10.01L	demonstrate knowledge of potable water distribution equipment and components, their applications and operation	interpret codes and regulations pertaining to sizing of potable water distribution
		describe the procedures used to size potable water distribution system components and equipment
		identify ***types of potable water distribution systems*** and describe their characteristics and applications
		identify the ***factors*** *to consider in sizing* piping and ***equipment*** for potable water distribution system
		interpret information pertaining to potable water distribution systems found on drawings and specifications
B-9.10.02L	demonstrate knowledge of procedures used to determine elevation, friction loss and required pressure for potable water distribution systems	describe procedures used to determine elevation, friction loss and required pressure for potable water distribution systems

RANGE OF VARIABLES

types of potable water distribution systems include: public, private, residential

factors include: total number of fixture units, developed length of pipe, most remote outlet, difference in elevation, available system pressure, friction loss

equipment includes: pumps, pressure reducing valves, hot water tanks, tempering valves, cross-connection devices, pressure tanks, water treatment equipment

B-9.11 Installs potable water distribution equipment

Essential Skills Document Use, Thinking, Reading

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-9.11.01P	select piping materials and fittings for potable water distribution system	piping materials are selected according to NPC, AHJ, specifications and site requirements
B-9.11.02P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to applications
B-9.11.03P	design layout and routing	layout and routing is designed ensuring structural integrity
B-9.11.04P	drill, cut or sleeve adequately sized holes for piping	holes for piping are drilled, cut or sleeved according to design requirements
B-9.11.05P	install ***piping components***	***piping components*** are installed according to NPC, AHJ and specifications
B-9.11.06P	install ***supports***	***supports*** are installed according to NPC and AHJ
B-9.11.07P	insulate distribution system	distribution system is insulated according to AHJ, drawings, specifications and site requirements
B-9.11.08P	label and stencil pipe	pipe is labelled and stenciled for pipe identification according to AHJ and site requirements

RANGE OF VARIABLES

tools and equipment include: soldering and brazing equipment, crimping tools, solvents, cutters, expansion tools, compression tools

piping components include: piping, fittings, valves, shock arrestors, recirculating lines, fire stopping, cross-connection devices, expansion tanks

supports include: riser clamps, hangers

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-9.11.01L	demonstrate knowledge of potable water distribution system and ***components***, their applications and operation	identify potable water distribution ***components*** and describe their characteristics and applications
		identify tools and equipment relating to potable water distribution and describe their applications and procedures for use
B-9.11.02L	demonstrate knowledge of the procedures used to install piping and ***components*** for potable water distribution systems	interpret information pertaining to piping for potable water distribution found on drawings and specifications
		interpret codes and regulations pertaining to piping for potable water distribution
		describe the procedures used to rough-in and lay out potable water distribution
		describe the procedures used to install potable water distribution ***components***
		identify locations for potable water distribution ***components***
		describe the ***procedures used to protect*** potable water distribution ***components***

RANGE OF VARIABLES

components includes: pumps, pressure reducing valves, hot water tanks, tempering valves, cross-connection devices, pressure tanks, water treatment equipment

procedures used to protect include: installing water hammer arrestors and expansion joints, insulating

B-9.12 Services potable water distribution systems.

Essential Skills	Thinking, Document Use, Working with Others

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-9.12.01P	interpret client's information	client's information is interpreted to assist in the diagnostic process
B-9.12.02P	inspect potable water distribution system and equipment	potable water distribution system and equipment is inspected for ***conditions requiring service***
B-9.12.03P	select and use ***tools and equipment*** required for repairs	***tools and equipment*** are selected and used according to applications
B-9.12.04P	perform sensory inspection	sensory inspection is performed to detect ***conditions requiring service***
B-9.12.05P	lubricate pumps and bearings	pumps and bearings are lubricated to prevent wear of components
B-9.12.06P	clean and change filters and strainers	filters and strainers are cleaned and changed to maintain water quality, prolong the life of the system and maintain adequate flow
B-9.12.07P	adjust ***components***	***components*** are adjusted according to specifications
B-9.12.08P	determine required isolation of system	isolation of system is determined according to service required
B-9.12.09P	notify system owner of need to isolate and execute isolation	owner is notified and isolation is completed
B-9.12.010P	replace and repair components	components are replaced and repaired
B-9.12.011P	check and adjust pressures	pressures are checked and adjusted to maintain system performance and to detect system problems
B-9.12.012P	check potable ***water conditions***	potable ***water conditions*** are checked according to AHJ
B-9.12.013P	complete checklist	checklist documents status of current system and follow-up actions required
B-9.12.014P	verify operation of temperature and pressure relief valves	operation of temperature and pressure relief valves is verified to ensure operation
B-9.12.015P	perform scheduled maintenance of system	scheduled maintenance of system is performed according to manufacturers' specifications
B-9.12.016P	return system to service and verify system operation	system is returned to service and system operation is verified according to manufacturers' specifications

B-9.12.017P	complete required documentation	documentation is completed according to specifications, AHJ and company policies

RANGE OF VARIABLES

conditions requiring service include: leaks, wear, cleanliness

tools and equipment include: wrenches, freeze packs, pipe cutters, torches

components include: piping, fittings, valves, shock arrestors, recirculating lines and pumps, fire stopping, cross-connection control, expansion tanks, pressure reducing valves

water conditions include: pH, iron content, bacterial content, H2S, total dissolved solids (TDS)

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-9.12.01L	demonstrate knowledge of potable water distribution systems, ***components***, their applications and operation	identify types of potable water distribution systems and describe their characteristics and applications
		identify ***conditions requiring service***
		identify ***tools and equipment*** relating to potable water distribution systems and describe their applications and procedures for use
		identify potable water distribution system ***components*** and describe their purpose, operation and applications
		identify ***water conditions*** of potable water distribution systems that require service
B-9.12.02L	demonstrate knowledge of the procedures used to service potable water distribution systems	interpret codes and regulations pertaining to potable water distribution systems in residential and ICI applications
		describe the procedures used to service potable water distribution system components
		describe the ***procedures used to protect*** potable water distribution systems
B-9.12.03L	demonstrate knowledge of procedures used to service cross-connection control devices	describe the procedures used to service cross-connection control devices

RANGE OF VARIABLES

components include: piping, fittings, valves, shock arrestors, recirculating lines and pumps, fire stopping, cross-connection control devices, expansion tanks, pressure reducing valves

conditions requiring service include: leaks, wear, cleanliness

tools and equipment include: wrenches, freeze packs, pipe cutters, torches

water conditions include: pH, iron content, bacterial content, H2S, TDS

procedures used to protect include: installing recirculation pump, installing frost box, heat tracing, insulation

MAJOR WORK ACTIVITY C Maintain and Repair Unit's Interior

TASK C-10 Paints Interior Surfaces

TASK DESCRIPTOR

Housing Maintainers apply protective finishes in residential, commercial settings. They prepare a variety of surfaces (wood, masonry, drywall, concrete, stucco, metal) prior to the application of materials such as paint, high performance coatings, water proofing, fireproofing, varnish, shellac, wall coverings and specialty finishes.

These materials are applied for a variety of reasons such as protection, decoration, sanitation, identification and safety.

INDUSTRY EXPECTED PERFORMANCE

The task must be performed according to jurisdictional codes and standards. All health and safety standards must be respected. Work should be done efficiently and at high quality without material waste or harm to the environment.

C-10.01 Plans Job

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-10.01.01P	obtains work related ***documentation***	required information about the job is gathered
C-10.01.02P	conduct ***field assessment*** to determine required materials and assess ***deficiencies***	***substrate*** is assessed and measurements are obtained
C-10.01.03P	determine labour and ***materials*** for project	labour and materials are determined according to job specifications
C-10.01.04P	establish and maintain schedule	work is planned and coordinated with other trades and takes into considerations ***unforeseen delays***

RANGE OF VARIABLES

documentation includes: permits, blueprints, manufacturers' specifications, work orders, contracts and safety documentation (MSDS and WHMIS symbols)

field assessment includes: visual inspection of worksite, physical inspection of surfaces to be painted

substrate includes: drywall, lathe and plaster, wood, vinyl siding, masonry, concrete, metal, stucco

materials include**:** cleaning material, paint, drop cloths, scaffolding

deficiencies include: asbestos, epoxy/lead paint, uneven surface, broken/damaged substrate

unforeseen delays include: sickness/injury, weather events, theft or loss of materials

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-10.01.01L	Demonstrates knowledge of proper planning	identifies sources of information relevant to prepare the worksite
		proposes best product based on substrate
		calculates the amount of material required
		identifies the impact of other trades on planned work
		creates work schedules that are achievable
C-10.01.02L	Demonstrates knowledge of common substrate deficiencies	determines substrate using visual and physical inspection
		lists common deficiencies that occur in substrates
		recommends ***remediation options***

RANGE OF VARIABLES

remediation options include: patching, sanding, glazing, repairing, removing

C-10.02 Prepares Paint and Surface.

Essential Skills	Document Use, Thinking Skills, Numeracy

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-10.02.01P	inspects ***substrate*** for ***deficiencies***	Deficiencies are noted and reported if required.
C-10.02.02P	***remediates*** the ***substrate***	Substrate is either repaired or replaced according to industry standard
C-10.02.03P	Disposes of ***hazardous materials***	***Hazardous materials*** are disposed of safely and in accordance with Authority Having Jurisdiction (AHJ)
C-10.02.04P	Cleans the ***substrate*** using appropriate ***cleaning tool***	Substrate is free from dirt, dust, mildew, ***debris*** and ***chemical contaminants***
C-10.02.05P	Prepares ***materials*** by ***mixing***, thinning, tinting and/or catalyzing	Materials are prepared according to manufactures specifications and ***industry standard***
C-10.02.06P	Selects ***material*** based on substrate type and previous coating	***material*** adheres to surface uniformly
C-10.02.07P	Sets up ***containment products*** as required by	Space to be painted is secured from dust and debris

RANGE OF VARIABLES

Substrate includes: wood, drywall, metal, vinyl, concrete or masonry
Deficiencies include: scaling, rusting, spalling,
Debris: concrete, peeling and cracking paint, mill scale, bird droppings
Hazardous materials include: lead paint, asbestos, bird/bat droppings
Chemical contaminants: Oil, grease, soluble salts, glue,
Remediation includes: removal of asbestos through proper procedures, sanding, mudding, cleaning
Additives include: driers, fungicides, thixotropes, flow agents, emulsion aids, plasticizers
Cleaning tool includes: pressure washer, power tool, chemical cleaner, stripping with heat or chemical, abrasive blasting, steel wool, sandpaper, sponges, abrasive pads, scrapers, putty knives, wire brushes
Mixing includes: stirring by hand, boxing, mechanical mixers
Material includes: primer, paint
Industry Standards include: Society for Protective Coatings (SSPC), the National Association of Corrosion Engineers (NACE) and the International Standards Organization (ISO)
Containment products: tarps, plastic and shrink wrap, temporary enclosures, screens, drapes

	KNOWLEDGE	
	Learning Outcomes	**Learning Objective**
C-10.02.01L	Demonstrate knowledge of cleaning practices for substrate	Identify types of substrate and the appropriate cleaning method
		Interpret ***documentation***
		Predict outcomes of improper cleaning of substrate
C-10.02.02L	Demonstrates knowledge of ***containment systems***	Rates the effectiveness of ***containment systems*** for various tasks
C-10.02.03L	Demonstrates knowledge of ***material*** and ***cleaning tool*** selection	Identifies and classifies types of materials and their use.
		Identifies types of cleaning tools and when use.

RANGE OF VARIABLES

documentation includes, manufacturers' specifications, work orders, contracts, and safety documentation (MSDS and WHMIS symbols)

Cleaning tool includes: pressure washer, power tool, chemical cleaner, stripping with heat or chemical, abrasive blasting, steel wool, sandpaper, sponges, abrasive pads, scrapers, putty knives, wire brushes

Containment products: tarps, plastic and shrink wrap, temporary enclosures, screens, drapes

C-10.03 Paints Surface.

Essential Skills	Thinking Skills, Document Use

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-10.03.01P	Assess ***environmental conditions*** when selecting	Finished application does not have any deficiencies associated with environmental factors.
C-10.03.02P	Selects best available ***application tool*** for ***substrate***	tool selected yields a coating free from ***failures***
C-10.03.03P	***equipment*** to work at heights is properly assembled and secured	All relevant occupational health and safety standards are met
C-10.03.04P	Apply ***coating*** to substrate using most appropriate ***method***	Method selected yields a coating free from ***failures***

C-10.03.05P	Allows for ***coating*** to dry	Drying times are adhered to or ***drying equipment*** is used
C-10.03.06P	Re-applies ***coating***	***Coatings*** are reapplied as per manufacturers specifications

RANGE OF VARIABLES

Environmental Conditions includes: humidity and temperature

Application tools includes: brushes, rollers, sprayers, extension poles

Equipment includes: scaffolding, ladders, stilts

Substrate includes: wood, drywall, metal, vinyl, concrete or masonry

Coating includes: paint, primer, sealers, stains, varnishes, shellac

Method includes: rolling, brushing, spraying

Failures include: sags, runs, curtains, orange peel, overspray, cratering, fish eyes, blushing, uneven gloss, wrinkling, blistering, pinholing, checking, cracking, peeling

Drying equipment includes: fans (air and heat)

	KNOWLEDGE	
	Learning Outcomes	**Learning Objective**
C-10.03.01L	Demonstrate knowledge of painting practices for ***substrate***	Identifies the impact ***environmental conditions*** have on the ***coating***
		Links ***failures*** to causes of ***failure***
		Identifies situations where ***safety equipment*** is needed
		Discusses the benefits and drawbacks of the different application ***methods*** for the various ***substrates***

RANGE OF VARIABLES

Substrate includes: Wood, drywall, metal, vinyl, concrete or masonry

Environmental Conditions includes: humidity and temperature

Safety Equipment includes: personal protective equipment, fall arrest systems, ***containment products*** (environmental safety)

Coating includes: paint, primer, sealers, stains, varnishes, shellac

Containment products: tarps, plastic and shrink wrap, temporary enclosures, screens, drapes

C-10.04 Clean up.

Essential Skills	Thinking Skills, Reading

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-10.04.01P	Drips and spills are cleaned up, according to manufacturer's instructions	Surfaces not to be coated are free from ***coatings*** and substrate is free from drips
C-10.04.02P	***coatings*** are properly sealed	**coatings** are sealed in airtight containers and are properly labelled
C-10.04.03P	***Protective coverings*** are removed	Area is free from ***protective coverings***
C-10.04.04P	**application tools** are cleaned and stored	***Application tools*** are able to be used again
C-10.04.05P	***Coatings*** are properly stored	***coatings*** are stored with consideration to requirements such as explosive-proof cabinets and protection from freezing.
C-10.04.06P	Workspace is restored using ***cleaning equipment***	Area is free from dust and debris

RANGE OF VARIABLES

coatings includes: paint, primer, sealers, stains, varnishes, shellac

protective coverings include: drop cloths, plastic, hoarding and tape

application tools include: paint scrapers, broad knives and combination, scrapers, brushes, rollers, sprayers, extension polls

cleaning equipment including, rags, dust brushes, brooms, vacuums, pressure washers and dust collectors

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-10.04.01L	Demonstrate knowledge of the importance of proper clean-up of ***coatings***	Identifies hazards associated with improper storage of ***coatings***
		Describes the risks associated with using the wrong ***cleaning equipment***.

RANGE OF VARIABLES

coatings includes: paint, primer, sealers, stains, varnishes, shellac

cleaning equipment including, rags, dust brushes, brooms, vacuums, pressure washers and dust collectors

TASK C-11 Repairs and Replaces Kitchen and Bathroom Components

C-11.01 Install prefabricated tub surround

Essential Skills	Document Use, Reading, Thinking Skills

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-11.01.01P	Inspects ***components*** for ***faults***	Faults are identified and assessed
C-11.01.02P	Plans project tasks	See A3.03
C-11.01.03P	Accurately measure rough opening and faucet placement	All trim fits properly
C-11.01.04P	Brace tub surround using ***tools***	Tub surround is properly adhered to substrate
C-11.01.05P	Prepare substrate	Smooth finish on substrate
C-11.01.06P	Apply adhesive and install panels	Installed to manufactures' specification avoiding ***hazards***
C-11.01.07P	Seal seems and joints	Tub is water tight
C-11.01.08P	Clean-up	Tub is free of glue and debris

RANGE OF VARIABLES

Component includes: faucets, surround types

Hazards includes: chemicals and adhesives, cuts,

Faults includes: peeling, cracked, split, loose, falling off wall, water infiltration

Tools includes: hand tools

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-11.01.01L	Demonstrate knowledge of safe work practices	See Task A1
C-11.01.02L	Interpret manufacturer's instructions	Identify components, tools and ***PPE*** required for the job
C-11.01.03L	Demonstrate knowledge of remedial measures for common tub and shower enclosures problems	Able to identify tub and shower enclosures defects
		Able to document ***component*** conditions and recommend repairs or further evaluation.
		Able to determine impact of defects on building and occupant health and safety
C-11.01.04L	Demonstrate knowledge of tub and shower enclosures material and installation	Identify ***components***, materials, and proper installation methods associated with each.

RANGE OF VARIABLES

***PPE*:** respirator mask, gloves, safety boots, glasses
component includes: faucets, surround types
materials includes: fibreglass, acrylics, tile, laminate, plastic

C-11.02 Install and maintain cabinets.

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-11.02.01P	Select appropriate upper and lower cabinets	Cabinet section matches.
C-11.02.02P	Select appropriate **tools**	Tools selected represent the most effective and efficient tools available
C-11.02.03P	Repair cabinetry and countertop **components**	Components are installed according to specifications
C-11.02.04P	Assemble pre-fabricated cabinets, countertops and ***components***	cabinets are assembled according to manufacturer's specifications
C-11.02.05P	Fabricate countertops	Countertop is built to required specifications.
C-11.02.06P	Conduct cosmetic repairs to cabinets and countertops	Fit and finish completed to tenant and supervisor satisfaction
C-11.02.07P	Troubleshoot faults and fitting of cabinets and countertops	Installation is plumb and square
C-11.02.08P	Install cabinets and countertops	Cabinets and countertops are level, and secured properly according to AHJ code**.**

RANGE OF VARIABLES

***Components*:** shelves, brackets, hinges, doors, drawers, lazy-susan, sliders, knobs and pulls, soft close hardware

***Information sources*:** Building Code, manufacturers specifications

***Hazards*:** fall objects, tripping hazards, strains and sprains

***Faults*:** peeling, cracking, alignment issues, swelling form water damage, shipping damage, mould, delamination

***Tools*:** hand tools, power tools, levels, step ladder, chalk line

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-11.02.01L	Demonstrate knowledge of safe work practices	Discusses safe work practices related to lifting
C-11.02.02L	Demonstrate knowledge of building code	Apply the building code to the installation process
C-11.02.03L	Demonstrates knowledge of cabinet assembly	Reproduces the cabinet design indicated in the instructions
		Identifies cabinetry that is complementary when the same pattern is not available
C-11.02.04L	Demonstrates knowledge of countertop installation	Designs a countertop layout
		Identifies ***tools*** and ***materials*** needed to install a countertop

RANGE OF VARIABLES

***Tools*:** hand tools, power tools, levels, step ladder, chalk line, caulking gun, file, clamps, scribing tool, sander

Materials include: caulking, wood glue, polyfil, brackets

C-11.03 C 11.03 Replace plumbing fixtures

Essential Skills	Document Use, Thinking, Continuous Learning

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-11.03.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used to install plumbing fixtures
C-11.03.02P	verify rough-ins of carriers, plumbing connections and fixture dimensions	rough-ins of carriers and plumbing connections are verified to be in appropriate locations, fixture dimensions are matched according to manufacturers' specifications, NPC and AHJ
C-11.03.03P	complete assembly and adjustment of ***fixture*** supports	***fixture*** supports are assembled and adjusted to ensure proper installation (off-site and on-site)
C-11.03.04P	select ***fixture*** and ***trim***	***fixture*** and ***trim*** are selected for specific application according to drawings, NPC, AHJ and specifications
C-11.03.05P	install ***fixture*** and ***trim***	***fixture*** and ***trim*** are installed plumb and level and are secured according to specifications and AHJ
C-11.03.06P	verify proper operation of ***fixture***	operation of ***fixture*** is verified

RANGE OF VARIABLES

tools and equipment include: strap, spud, basin wrenches

fixtures include: showers, water closets, lavatories, urinals, sinks, water storage tanks

trim include: chrome traps, shower heads, grab bars

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-11.03.01L	demonstrate knowledge of ***plumbing fixtures*** their applications and operation	identify types of ***plumbing fixtures***, and supports, and describe their characteristics and applications
		Identify ***plumbing fixture*** and describe their characteristics and applications
		interpret information pertaining to ***plumbing fixtures*** found on drawings and specifications
		interpret codes and regulations pertaining to ***plumbing fixtures***
		identify tools and equipment relating to ***plumbing fixtures*** and describe their applications and procedures for use

C-11.03.02L	demonstrate knowledge of the procedures used to install ***plumbing fixtures***	describe the procedures used to install ***plumbing fixtures***, appliances supports and accessories
		identify tools and equipment required to install ***plumbing fixtures***,
		describe hazards and safe work practices relating to installation of ***plumbing fixtures***

RANGE OF VARIABLES

plumbing fixtures include: showers, water closets, lavatories, urinals, sinks, water storage tanks

C-11.04 Repair or replace fixtures and appliances

Essential Skills Thinking, Document Use, Oral Communication

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-11.04.01P	interpret client's information	client's information is interpreted to assist in the diagnostic process
C-11.04.02P	inspect plumbing fixtures and appliances	fixtures and appliances are inspected for ***conditions that require repair***
C-11.04.03P	perform sensory inspection	sensory inspection is performed to detect plumbing fixtures and appliances for conditions requiring service
C-11.04.04P	select and use tools and equipment	tools and equipment are selected and used according to applications
C-11.04.05P	perform scheduled servicing of plumbing fixtures and appliances	servicing of plumbing fixtures and appliances is performed according to service requirements
C-11.04.06P	verify operation of plumbing fixtures and appliances	operation of plumbing fixtures and appliances is verified according to manufacturers' specifications
C-11.04.07P	determine whether components require replacement or repair	components are determined to be in need of repair or replacement according to industry standard
C-11.04.08P	determine required isolation of plumbing fixtures and appliances	isolation of plumbing fixtures and appliances is determined according to service requirements and NPC

C-11.04.09P	notify owner of need to isolate and execute isolation	owner is notified and isolation is executed
C-11.04.10P	clean components	components are cleaned to prolong life of system and maintain adequate flow
C-11.04.11P	replace components	components are replaced according to manufacturers' specifications
C-11.04.12P	repair components	components are repaired according to manufacturers' specifications
C-11.04.13P	complete required ***documentation***	***documentation*** is completed according to company policies and AHJ
C-11.04.14P	return plumbing fixtures and appliances to service and verify system operation	plumbing fixtures and appliances are returned to service and system operation is verified

RANGE OF VARIABLES

conditions requiring repair include: wear, noise, leaks, corrosion
documentation includes: service reports, maintenance reports

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-11.04.01L	demonstrate knowledge of plumbing fixtures and appliances, their applications and operation	identify types of plumbing fixtures and appliances and describe their characteristics and applications
		identify trim and accessories for plumbing fixtures and appliances and describe their characteristics and applications
		interpret codes and regulations pertaining to plumbing fixtures and appliances
C-11.04.02L	demonstrate knowledge of the procedures used to maintain plumbing fixtures and appliances	describe the procedures used to troubleshoot and diagnose problems with plumbing fixtures and appliances
		describe the procedures used to maintain plumbing fixtures and appliances
		describe the procedures used to repair and replace plumbing fixtures and appliances

TASK C-12 Repairs and Replaces Walls and Flooring

C-12.01 Repair Drywall

Essential Skills	Thinking Skills, Reading

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-12.01.01P	inspect and prepare wall to ensure quality of substrate	Substrate is inspected for condition and is prepared according to industry standard
C-12.01.02P	ensure that the vapour barrier is intact (for exterior walls)	Vapour barrier is intact or has been repaired prior to drywall repair
C-12.01.03P	select, use, and maintain taping tools, in accordance with manufacturers' instructions and industry practice.	Tools selected represent the most efficient and effective means of completing the task
C-12.01.04P	smooth or cut away rough edges of the damaged area	Substrate is ready for the repair
C-12.01.05P	apply reinforcement such as backing or mesh	Reinforcement selected is consistent with the repair requirement
C-12.01.06P	Select and mix fast-setting ***compound***, using ***tools*** to mix	***tools*** and ***compound*** selected based on quantity required and in accordance with manufacturers' instructions
C-12.01.07P	***Repair*** holes up to 4 cm (1 5/8")	hole is repaired to industry standards
C-12.01.08P	***Repair*** holes 4 to 15 cm (1 5/8" to 5 7/8")	hole is repaired to industry standards
C-12.01.09P	***Repair*** holes larger than 15 cm (5 7/8")	hole is repaired to industry standards
C-12.01.10P	Complete ***repair***	sand, prime and paint the drywall
C-12.01.11P	Clean up materials	Work area is left free of debris and dust

RANGE OF VARIABLES

tools include- hawk, trowel, putty knife, or electrical mixer

repair includes- squaring off hole; screwing backing behind wallboard; cutting wallboard to size of hole; taping and covering with taping filler or with fast-setting compound; wiping the edges and floating them out with the same mix; and applying second and skim coat, after allowing previous coat to set or dry, in accordance with industry practice.

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-12.01.01L	Demonstrate knowledge of ***drywall components and materials***	Describe drywall materials
		Identify tools and equipment use for drywall applications
C-12.01.02L	Demonstrate knowledge of drywall procedures	Identify safety concerns when working with drywall and drywall compounds
		Asses the wall for ***deficiencies***.
		Determine what technique should be used for the repair.
		Predict outcomes of improperly mixing the mudding compound
		Estimate the amount of time and materials various repairs would take

RANGE OF VARIABLES

drywall components and materials includes: corner beads, tape, drywall compound, sheet rock, drywall screws, mesh
deficiencies include- holes, uneven surface, cracking or splitting of seams

C-12.02 Repair Interior Walls and ceiling.

Essential Skills	Thinking Skills, Numeracy

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-12.02.01P	Identify ***faults***	Faults in ***materials*** are accurate identified
C-12.02.02P	Remediate cause of ***fault***	Root cause of ***fault*** is identified and rectified
C-12.02.03P	prepare wall/ceiling	Wall/ceiling is clean and free from ***faults***
C-12.02.04P	handle ***material***	***Materials*** are handled according to manufacturer's instructions

C-12.02.05P	measure and cut the ceiling material as required	Accurate cuts and measurements lead to little waste in materials
C-12.02.06P	install the ceiling material using ***tools***	***Material*** is properly affixed
C-12.02.07P	Mud and sand drywall	Smooth finish is obtained
C-12.02.8P	Prime and paint ***material***	Two even coats are applied, and no seems visible

RANGE OF VARIABLES

***Material*:** drywall, sheet rock, ceiling panels, ceiling tiles, wall panels

Faults: peeling, cracked, split, loose, drywall falling off ceiling, water damage, deflection

Tools: Hand tools, drywall drill, step ladder, T-square, drywall tools

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-12.02.01L	Demonstrate knowledge of safe work practices	Uses PPE appropriately
		Identify flammable finishes
C-12.02.02L	Demonstrate knowledge of mathematical calculations	Describe and apply trigonometry.
		Calculate measurements in both imperial and metric units
C-12.02.03L	Demonstrate knowledge of material repair processes	Identify the ***concerns*** and requirements for the removal of materials
C-12.02.04L	Demonstrate knowledge of party wall and fire separation wall requirements for multiple dwellings	Identifies considerations when working on different types of walls

RANGE OF VARIABLES

PPE: respirator mask, gloves, safety boots, glasses

***Hazards*:** falling, eye protection, respirator, asbestos, strains and sprains

Concerns: asbestos tiles, dust

C-12.03 Install and repair flooring.

Essential Skills	Reading, Thinking Skills, Numeracy

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-12.03.01P	floor ***material*** is inspected for ***faults*** or ***defects***	***faults*** identified
C-12.03.02P	remove existing flooring ***material***	flooring is removed to subfloor and subfloor is exposed.
C-12.03.03P	clean work surface	surface is cleaned in a safe manner with ***hazards*** identified and no remaining adhesive or fasteners left on the surface.
C-12.03.04P	inspect sub floor	subfloor is in good condition.
C-12.03.05P	prepare floor for new installation	the floor is level.
C-12.03.06P	plan installation according to ***material***	layout is designed to minimize waste and is symmetrical.
C-12.03.07P	install flooring using appropriate ***tools***	floors are installed with tight seems, no air pockets, no loose tiles and according to manufacturer's specification.
C-12.03.08P	seal flooring (tile)	uniform coat of sealer applied.

RANGE OF VARIABLES

Materials include: sheet flooring, adhesive tile, laminate, plywood

Hazards include: glue, cuts, burns, chemical stripper

Faults include: peeling, cracking, alignment issues, swelling from water damage, mould, permeability

Defects include: improper framing methods, improper supports, improper joist spacing, over-spanning, rot, deflection

Tools include: hand tools, power tools, levels, chalk line, heat gun, tile cutter, scrapers

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-12.03.01L	demonstrate knowledge of safe work practices	recognizes and uses mds and whmis
C-12.03.02L	demonstrate knowledge of layout design	identifies floor components such as joists, subfloor, blocking etc.
		calculate the layout to achieve a symmetrical installation
		draw layout designs that minimize waste and integrate with other flooring
C-12.03.03L	demonstrates knowledge of leveling techniques	applies leveling compound to achieve level.

C-12.04 Replace and install insulation

Essential Skills	Document use

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-12.04.01P	select appropriate ***specialized PPE***	***PPE*** selected meets industry standards for work performed
C-12.04.02P	select ***insulation type*** for the task	Insulation type is in keeping with National Building Code
C-12.04.03P	select and use ***tools and equipment***	***tools and equipment*** selected allow for work to be done in an efficient and effective manner
C-12.04.04P	cut the insulation to fit the full width and length of the space	Minimal waste of the selected ***insulation type***
C-12.04.05P	ensure that the insulation fits perfectly	no gaps or overlaps making sure not compress it into the space
C-12.04.06P	cut out areas required for ***services***	***services*** are not covered
C-12.04.07P	fill gaps with insulation	there are no visible gaps

RANGE OF VARIABLES

specialized PPE includes: dust mask with filtration, work gloves

insulation type includes: mineral wool roof insulation board; thermal insulation: phenolic, faced, polystyrene, loose fill, polystyrene boards; mineral fibre thermal insulation for buildings; cellulose fibre insulation for buildings; polyurethane and polyisocyanurate, boards, faced; spray applied rigid polyurethane foam, medium density – material specification; wood fibre insulating boards for buildings

tools and equipment includes: tape measure, straight edge, utility knife, fasteners

services include: electrical, phone, cable

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-12.04.01L	demonstrate knowledge of relevant sections of codes/legislation e.g. building code	interpret codes and regulations pertaining to building envelope in national building code
C-12.04.02L	Demonstrate knowledge of energy-efficient construction methods	Describe the purpose of energy-efficient construction
		Describe signs of inadequate building envelope
		Explain thermal resistance value by type such as fiberglass, cellulose, rigid and blown in foam products, etc.
C-12.04.03L	Demonstrate knowledge of building envelope components	Describe air and vapour barriers
		Describe insulation
		Identify remedial measures for common air/vapour barrier problems
		Discuss impact of defects on building and occupant health and safety

C-12.05 Repair and Install finishing trim.

Essential Skills	Numeracy

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-12.05.01P	Evaluates substrate for faults	Substrate is only worked on when in good condition.
C-12.05.02P	Remove damaged ***components***	***Components*** are removed and safely stored
C-12.05.03P	Plans and organizes work to minimize waste and minimizing ***hazards***	Layout is designed to minimize waste
C-12.05.04P	Accurately measures ***components*** and cutting angles	All ***components*** fit properly
C-12.05.05P	Adjust drywall for proper fit	Components are flush and smooth.
C-12.05.06P	Install components using ***tools***	All components fit properly
C-12.05.07P	Fill and seal imperfections	Appearance is uniform

RANGE OF VARIABLES

Component: baseboards, chair rail, door and window casing, crown moulding, quarter round

Information sources: manufacturers' specifications

Hazards: glue, cuts, burns, chemical stripper, pneumatic tools

Faults: peeling, cracking, alignment issues, swelling from water damage, mould

Tools: power saws, nail gun, hand tools, mitre saw

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-12.05.01L	Demonstrate knowledge of safe work practices	identifies which ***PPE*** to use when working with components
C-12.05.02L	Demonstrates knowledge of trigonometry	determines appropriate angles
		solves calculations related to angles
C-12.05.03L	Demonstrates knowledge of proper angle cutting for coping	makes seamless joint
C-12.05.04L	Demonstrates knowledge of proper nailing techniques	create secure components on top of substrate

RANGE OF VARIABLES

PPE- see list in Appendix A

C-12.06 Replace Interior Wall Finishes

Essential Skills	Document Use

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-12.06.01P	inspect wall for ***faults***	cause of a ***fault*** is determined
C-12.06.02P	remove wall finish using appropriate ***tools***	wall finishing is removed by minimizing damage to surrounding finish
C-12.06.03P	prepare the wall for finishes	wall is clean and free of debris
C-12.06.04P	match the material with the existing wall covering	material selected blends into or matches the current wall finish
C-12.06.05P	install backing if necessary	wall finishing has enough backing to be properly secured
C-12.06.06P	attach wall finishing following manufacturer specifications	wall covering is mounted with no faults

RANGE OF VARIABLES

faults include: tears, stains, water damage, blistering, mildew, mould, cracking, holes

tools include: scrapper, razor blades, roller, straight edge, yardstick, level, power tools, hand tools

wall finishing: drywall and vinyl-coated drywall, wood paneling, wall paper, primer, paint

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-12.06.01L	demonstrate knowledge of interior ***wall finishing components and materials***	describe interior wall coverings
		identify characteristics of wall finishes
		assess the types of pastes and their benefits and concerns in residential units
C-12.06.02L	demonstrate knowledge of applied math	calculate coverage of wall finishes for a room with windows
		calculate pattern matching for large and small repeating patterns
C-12.06.03L	demonstrate knowledge of interior wall covering repair and installation procedures	describe the proper procedures of interior wall covering repair and installation

RANGE OF VARIABLES

wall finishing includes: drywall and vinyl-coated drywall, wood paneling, wall paper, primer, paint

components and materials includes: fasteners, corner beads, tape, drywall compound, sheet rock

TASK C-13 Performs Basic Plumbing

TASK DESCRIPTOR

Housing Maintainers need to be able to install, maintain, and make basic repairs pipes and fixtures associated with heating, cooling, water distribution, and sanitation systems in residential and commercial structures. They will need to make minor repairs on domestic appliances, such as dishwashers and gas stoves.

INDUSTRY EXPECTED PERFORMANCE

The task must be performed according to jurisdictional codes and standards. All health and safety standards must be respected. Work should be done efficiently and at high quality without material waste or harm to the environment.

C-13.01 Inspects tube, tubing, pipe and fittings before installation

Essential Skills	Document Use, Thinking, Numeracy

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-13.01.01P	perform sensory inspection	sensory inspection is performed to detect ***faults***
C-13.01.02P	confirm certification	required certifications are confirmed to meet codes, AHJ, specifications and site requirements and approval markings are recorded
C-13.01.03P	perform ***manual test***	***manual test*** is performed

RANGE OF VARIABLES

faults include: damage, cracks, debris

manual test includes: checking threads, confirming groove depth

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-13.01.01L	demonstrate knowledge of tube, tubing, piping, fittings and accessories	define terminology associated with tube, tubing, piping, fittings and accessories
		identify hazards and describe safe work practices pertaining to tube, tubing, piping, fittings and accessories
		interpret codes and regulations pertaining to tube, tubing, piping, fittings and accessories
		interpret information pertaining to tube, tubing, piping, fittings and accessories found on drawings and specifications
		describe the identification systems and methods for tube, tubing, piping, fittings and accessories
		identify tools and equipment relating to tube, tubing, piping, fittings and accessories and describe their applications and procedures for use
		identify ***types of, tube, tubing and piping*** and describe their properties and characteristics
		identify fittings used with tube, tubing and piping and describe their purpose and applications
		identify ***tube, tubing and piping accessories*** and describe their purpose and applications
C-13.01.02L	demonstrate knowledge of the procedures used to measure tube, tubing and piping, and fitting allowance	explain the ***systems of measurement*** for tube, tubing and piping, and fitting allowance
		describe the procedures used to measure tube, tubing and piping
		perform ***calculations*** to determine tube, tubing and piping measurements
		describe the procedures used to inspect tube, tubing and piping

RANGE OF VARIABLES

types of tube, tubing and piping include: steel, copper, plastic, cast iron, asbestos-cement

tube, tubing and piping accessories include: supports, hangers, sleeves

systems of measurement include: dimension, length, wall thickness/schedule

calculations include: fitting allowances, center-to-center, end-to-end, offsets

C-13.02 Bends tube, tubing and pipe

Essential Skills Thinking, Document Use, Numeracy

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-13.02.01P	identify types of ***tube, tubing and pipe***	***tube***, ***tubing and pipe*** are identified according to NPC, AHJ, specifications and site requirements
C-13.02.02P	select and use tube, tubing and pipe bender	tube, tubing and pipe bender is selected according to type and size
C-13.02.03P	tube, tubing and pipe bender is selected according to type and size	location and angle of required offsets or bends are determined according to site requirements
C-13.02.04P	measure and calculate distances	distances between offsets and bends are measured and calculated
C-13.02.05P	determine increments on bending tool	increments on bending tools are determined to achieve required angle
C-13.02.06P	inspect tube, tubing and pipe	tube, tubing and pipe are inspected after bending for ***distortions***

RANGE OF VARIABLES

tube, tubing and pipe include: soft, semi-soft (partially annealed), rigid

distortions include: kinks, ripples

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-13.02.01L	demonstrate knowledge of tube, tubing and pipe	define terminology associated with tube, tubing and piping
		identify manual benders used to bend tube, tubing and pipe
		identify hazards and describe safe work practices pertaining to bending tube, tubing and piping
		interpret codes and regulations pertaining to bending tube, tubing and piping
		interpret information pertaining to bending tube, tubing and piping found on drawings and specifications

C-13.02.02L	demonstrate knowledge of the procedures used to bend tube, tubing and pipe	describe the procedures used to bend tube, tubing and pipe

C-13.03 Prepares tube, tubing and pipe connections

Essential Skills Thinking, Document Use, Numeracy

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-13.03.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to application and material
C-13.03.02P	ream and thread pipe	pipe is reamed and threaded according to pipe specifications and standards
C-13.03.03P	flare tube, tubing and pipe	tube, tubing and pipe is flared according to specifications and application
C-13.03.04P	sand and clean tube, tubing and pipe	tube, tubing and pipe is sanded and cleaned according to code requirements and specifications
C-13.03.05P	bevel pipe	pipe is beveled according to pipe specification and application
C-13.03.06P	inspect tube, tubing and pipe for damage	tube, tubing and pipe are inspected for damage prior to connection

RANGE OF VARIABLES

tools and equipment include: threading, beveling, cutting tools

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-13.03.01L	demonstrate knowledge of tube, tubing, piping, fittings and ***accessories***	define terminology associated with tube, tubing, piping, fittings and ***accessories***
		identify hazards and describe safe work practices pertaining to preparing pipe connections
		interpret codes, standards and regulations pertaining to preparing pipe connections
		interpret information pertaining to tube, tubing and pipe connections found in specifications

		describe the identification systems and methods for tube, tubing and pipe connections
		identify ***tools and equipment*** relating to tube, tubing and pipe connections and describe their applications and procedures for use
		identify fittings used to prepare tube, tubing and pipe connections and describe their purpose and applications
C-13.03.02L	demonstrate knowledge of the ***techniques*** for preparing tube, tubing and pipe connections	identify ***techniques*** for preparing tube, tubing and pipe connections and describe the applications and procedure for use
C-13.03.03L	demonstrate knowledge of the procedures used to measure tube, tubing and pipe	explain the ***systems of measurement*** for tube, tubing and pipe
		describe the procedures used to measure tube, tubing and pipe connections
		perform calculations to determine tube, tubing and pipe connections
		describe the procedures used to inspect tube, tubing and pipe connections

RANGE OF VARIABLES

accessories include: lubricants, sealants, cleaners, primers

tools and equipment include: threading, beveling, cutting tools

techniques include: reaming, beveling, filing, grinding, cleaning, sanding, priming, flaring

systems of measurement include: dimension, length, wall thickness (schedule), grades

C-13.04 Joins copper tube, tubing and pipe.

Essential Skills Numeracy, Document Use

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-13.04.01P	determine types of fittings and ***joining methods*** and materials to be used	types of fittings, ***joining methods*** and materials are determined according to NPC, AHJ, standards, specifications and site requirements
C-13.04.02P	select and use ***tools and equipment*** for copper tube, tubing and pipe	***tools and equipment*** are selected and used according to fittings and joining methods

C-13.04.03P	connect flared tube and tubing ends	flared tube and tubing ends are connected and tightened according to specifications to ensure proper seal on fitting
C-13.04.04P	connect swaged pipe ends	swaged pipe ends are connected according to specifications
C-13.04.05P	clean and lubricate grooved mechanical joints	grooved mechanical joints are cleaned and lubricated to avoid pinching and to allow for proper tightening to specifications
C-13.04.06P	select soldering and brazing materials	soldering and brazing materials are selected according to application
C-13.04.07P	purge pipe	brazed piping systems are purged with inert gas during brazing process to prevent oxidization of interior of pipe according to procedure
C-13.04.08P	solder assembly	adequate temperature is provided to soldered and brazed joints to achieve required flow and capillary action of filler metal
C-13.04.09P	assemble and install corporation, compression or push-fit fittings	corporation, compression or push-fit fittings are assembled and installed according to required depth and to specifications

RANGE OF VARIABLES

joining methods include: press-fit, soldered, brazed, grooved, flanged, flared, compression, swaged, corporation, push-fit
tools and equipment include: pipe and tubing cutters, flaring tools, soldering and brazing equipment, swaging tools, press-fit

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-13.04.01L	demonstrate knowledge of copper tube, tubing and pipe, and associated fittings and accessories	define terminology associated with copper tube, tubing and pipe
		identify hazards and describe safe work practices pertaining to copper tube, tubing and pipe
		interpret codes, regulations and standards pertaining to copper tube, tubing and pipe
		interpret information pertaining to copper tube, tubing and pipe found on drawings and specifications
		describe the identification systems and methods for copper tube, tubing and pipe
		identify tools and equipment relating to copper tube, tubing and pipe and describe their applications and procedures for use

		identify types of copper tube, tubing and pipe and describe their properties and characteristics
		identify fittings used with copper tube, tubing and pipe and describe their purpose and applications
		identify ***pipe and tubing accessories*** and describe their purpose and applications
C-13.04.02L	demonstrate knowledge of the procedures used to join copper tube, tubing and pipe	identify the ***methods*** used to join copper tube, tubing and pipe and describe their associated procedures
		describe the procedures used to install fittings and accessories for copper tube, tubing and pipe
		identify ***adaptors*** required to join dissimilar materials to prevent galvanic action

RANGE OF VARIABLES

pipe and tubing accessories include: supports, expansion joints, hangers and sleeves
methods include: press-fit, soldered, brazed, flanged, flared, compression, swaged, corporation, push-fit
adaptors are dielectric unions

C-13.05 Joins plastic pipe and tubing.

Essential Skills Reading, Thinking, Document Use

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-13.05.01P	determine types of fittings and ***joining methods*** and materials to be used	types of fittings, ***joining methods*** and materials are determined according to NPC, AHJ, standards, specifications and site requirements
C-13.05.02P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to application
C-13.05.03P	select solvents and primers	solvents and primers are selected according to specifications
C-13.05.04P	solvent weld plastic pipe and tubing joints	plastic pipe and tubing joints are solvent welded according to type of pipe and specifications

C-13.05.05P	connect and tighten mechanical joints	mechanical joints are connected and tightened to required rating
C-13.05.06P	crimp or expand cross-linked polyethylene (PEX) pipe and tubing	PEX pipe and tubing are crimped or expanded to create a joint according to specifications
C-13.05.07P	prepare hub and spigot joints	hub and spigot joints are prepared by chamfering pipe ends and applying lubricant on pipe and gasket according to specifications
C-13.05.08P	assemble hub and spigot joints	hub and spigot joints are assembled for pressure water and drainage systems according to specifications
C-13.05.09P	assemble and install compression and push-fit fittings	compression and push-fit fittings are assembled and installed according to required depth and to specifications
C-13.05.010P	select appropriate pipe for threading	pipe for threading is selected according to specifications
C-13.05.011P	assemble components for flanged connections	components for flanged connections are assembled according to specifications

RANGE OF VARIABLES

joining methods include: welded, threaded, flanged, crimped, expanded, push-fit, compression, mechanical, gasket, transition

tools and equipment include: crimping tools, expanders, heat plates and timer, cutters, hot-air tools, threading machines, chamfer tools, reaming tools, torque ratchets, electrofusion machines

plastic welding techniques include: solvent welding, hot-air welding, socket fusion, butt fusion

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-13.05.01L	demonstrate knowledge of plastic pipe and tubing, and associated fittings and accessories	define terminology associated with plastic pipe and tubing
		identify hazards and describe safe work practices pertaining to plastic pipe and tubing
		interpret codes and regulations pertaining to plastic pipe and tubing
		interpret information pertaining to plastic pipe and tubing found on drawings and specifications
		describe the identification systems and methods for plastic pipe and tubing

		identify tools and equipment relating to plastic pipe and tubing and describe their applications and procedures for use
		identify plastic pipe and tubing system applications and describe their characteristics and requirements
		identify ***types of plastic pipe and tubing*** and describe their properties and characteristics
		identify fittings used with plastic pipe and tubing and describe their purpose and applications
		identify ***plastic pipe and tubing accessories*** and describe their purpose and applications
C-13.05.02L	demonstrate knowledge of the procedures used to join plastic pipe and tubing	identify the ***methods*** used to join plastic pipe and tubing and describe their associated procedures
		describe the procedures used to install fittings and accessories for plastic pipe and tubing
		identify ***adaptors*** required for transitions

RANGE OF VARIABLES

types of plastic pipe and tubing include: PVC, chlorinated polyvinyl chloride (CPVC), acrylonitrile-Butadiene-Styrene (ABS), high-density polyethylene (HDPE), PEX, PEX-Aluminum-PEX (PEX-AL-PEX), Polyethylene (PE)
plastic pipe and tubing accessories include: supports, expansion joints, hangers, sleeves
methods include: threading, tapping, solvent welding, compression fittings and mechanical joints, gaskets, flanged, crimped and expansion, cut-grooved, push-fit
adaptors include: male, female, mechanical joints

C-13.06 Joins cast iron or galvanized pipes.

Essential Skills Reading, Thinking, Document Use

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-13.06.01P	determine types of ***joints*** and fittings, method of joining and materials to be used	types of ***joints*** and fittings, method of joining and materials are determined according to NPC, AHJ, standards, specifications and site requirements
C-13.06.02P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to fittings and joining methods

C-13.06.03P	align pipe and fittings	pipe and fittings are aligned and assembled using ***joints*** according to specifications
C-13.06.04P	identify locations	locations are identified where mechanical restraints are required
C-13.06.05P	install ***mechanical restraints***	***mechanical restraints*** are installed for cast iron pipe
C-13.06.06P	torque mechanical coupling	mechanical coupling is torqued to specifications

RANGE OF VARIABLES

joints include: mechanical joint clamps, oakum and cold caulking compound,
tools and equipment include: snap cutters, nut drivers, come-along, ratchets, sockets
mechanical restraints include: riser clamps, thrust blocks

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-13.06.01L	demonstrate knowledge of cast iron piping and associated fittings and accessories	define terminology associated with cast iron piping
		identify hazards and describe safe work practices pertaining to cast iron piping
		interpret codes and regulations pertaining to cast iron piping
		interpret information pertaining to cast iron piping found on drawings and specifications
		describe the identification systems and methods used for cast iron piping
		identify tools and equipment related to cast iron piping and describe their applications and procedures for use
		identify cast iron piping systems and describe their characteristics and applications
		identify ***types of cast iron piping*** and describe their properties and characteristics
		identify fittings used with cast iron piping and describe their purpose and applications

		identify ***cast iron piping accessories*** and describe their purpose and applications
C-13.06.02L	demonstrate knowledge of the procedures used to join cast iron piping	identify the ***methods*** used to join cast iron piping and describe their associated procedures
		describe the procedures used to install fittings and accessories for cast iron piping

RANGE OF VARIABLES

types of cast iron piping include: soil, duriron, ductile iron

cast iron piping accessories include: supports, hangers and sleeves, flanges, thrust blocks, pipe restraints

methods include: mechanical joints, hub and spigot, oakum and cold caulking compound

C-13.07 Joins Pipe, Carbon Steel and Stainless Steel

Essential Skills Reading, Thinking, Document Use

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-13.07.01P	determine types of fittings and, ***joining methods*** and materials to be used	types of fittings, ***joining methods*** and materials are determined according to NPC, AHJ, standards, specifications and site requirements
C-13.07.02P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to type of materials, fittings and joining methods
C-13.07.03P	support and align pipe and fittings	pipe and fittings are supported and aligned prior to connection
C-13.07.04P	thread steel pipe	steel pipe is threaded using lubricants as required, ensuring proper taper and length of threads
C-13.07.05P	connect and tighten mechanical joints	mechanical joints are connected and tightened to required specifications
C-13.07.06P	fabricate gaskets	gaskets are fabricated for flanged joints
C-13.07.07P	install gaskets and tighten bolts	gasket and bolt tightening pattern is used for flanged joints according to specifications

RANGE OF VARIABLES

tools and equipment include: grinders, threaders, press-fit tools, cutters, wrenches

joining methods include: welded, threaded, flanged, press-fit, mechanical

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-13.07.01L	demonstrate knowledge of steel piping and associated fittings and accessories	define terminology associated with steel piping
		identify hazards and describe safe work practices pertaining to steel piping
		interpret codes and regulations pertaining to steel piping
		interpret information pertaining to steel piping found on drawings and specifications
		describe the identification systems and methods used for steel piping
		identify tools and equipment related to steel piping and describe their applications and procedures for use
		identify steel piping systems and describe their characteristics and applications
		identify ***types of steel piping*** and describe their properties and characteristics
		identify fittings used with steel piping and describe their purpose and applications
		identify ***steel piping accessories*** and describe their purpose and applications
C-13.07.02L	demonstrate knowledge of the procedures used to join steel piping	identify the ***methods*** used to join steel piping and describe their associated procedures
		describe the procedures used to install fittings and accessories for steel piping

RANGE OF VARIABLES

types of steel piping include: carbon steel, galvanized, stainless steel

steel piping accessories include: supports, hangers, sleeves

methods include: threading, grooving, welding, flanged, gasket, mechanical joints

TASK C-14 Repair Household Appliances

TASK DESCRIPTOR

Housing Maintainers need to assist the units' residents in troubleshooting, making minor repairs or replacing home appliances.

INDUSTRY EXPECTED PERFORMANCE

The task must be performed according to jurisdictional codes and standards. All health and safety standards must be respected.

C-14.01 Repair or replace appliances.

Essential Skills Thinking, Document Use, Oral Communication

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-14.01.01P	interpret client's information	client's information is interpreted to assist in the diagnostic process
C-14.01.02P	inspect plumbing ***appliances***	***appliances*** are inspected for ***conditions that require repair***
C-14.01.03P	perform sensory inspection	sensory inspection is performed to determine if ***appliances*** condition requires service
C-14.01.04P	select and use tools and equipment	tools and equipment are selected and used according to applications
C-14.01.05P	perform scheduled servicing of ***appliances***	servicing of ***appliances*** is performed according to service requirements
C-14.01.06P	verify operation of plumbing fixtures and ***appliances***	operation of plumbing fixtures and ***appliances*** is verified according to manufacturers' specifications
C-14.01.07P	determine whether components require replacement or repair	components are determined to be in need of repair or replacement according to industry standard
C-14.01.08P	determine required isolation of plumbing fixtures and appliances	isolation of plumbing fixtures and ***appliances*** is determined according to service requirements and NPC
C-14.01.09P	notify owner of need to isolate and execute isolation	owner is notified and isolation is executed
C-14.01.10P	clean components	components are cleaned to prolong life of system
C-14.01.11P	replace components	components are replaced according to manufacturers' specifications

C-14.01.12P	repair components	components are repaired according to manufacturers' specifications
C-14.01.13P	complete required ***documentation***	***documentation*** is completed according to company policies and AHJ
C-14.01.14P	return ***appliances*** to service and verify system operation	***appliances*** are returned to service and system operation is verified

RANGE OF VARIABLES

Appliances include: refrigerator, stove, cook top, washer, dryer
conditions requiring repair include: wear, noise, leaks, corrosion
documentation includes: service reports, maintenance reports

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-14.01.01L	demonstrate knowledge of appliances, their applications and operation	identify types of appliances and describe their characteristics and applications
		identify trim and accessories for appliances and describe their characteristics and applications
		interpret codes and regulations pertaining to plumbing fixtures and appliances
C-14.01.02L	demonstrate knowledge of the procedures used to maintain appliances	describe the procedures used to troubleshoot and diagnose problems with appliances
		describe the procedures used to maintain appliances
		describe the procedures used to repair and replace appliances

MAJOR WORK ACTIVITY D Maintain and Repair Unit's Exterior

TASK D-15 Maintain and Repair Unit's Exterior

TASK DESCRIPTOR

Housing Maintainers are required to maintain the exterior of residential units as well as some smaller commercial or industrial buildings. They need to be aware of materials required to secure such structures against a northern climate.

D-15.01 Repair and Maintain Foundation Systems

Essential Skills	Numeracy, Document Use

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-15.01.01P	Visually inspect **foundation system** and their **components**	Visual evidence recorded and reported to supervisor.
D-15.01.02P	Repair for leveling purposes	Leveling approved by supervisor
D-15.01.03P	Repair wooden pads, wedges, cribbing, and screw jacks	Meets requirements of AHJ code and permit inspection.

RANGE OF VARIABLES

Foundation systems: multi-point space frames, cribbing and wedges, piles concrete foundation, concrete footings with preserved wood foundation (PWF) walls

Components: gravel pads, pads, cribbing, wedges, screw jacks, space frames, piles, foundation tie downs, mud sill

Information sources: National Building Code, Engineered drawings, manufacturers 'specifications

Hazards: pinch points, trip hazards, scrapes, overhead obstacles, biohazards

Faults: Cracks, out of level, deterioration of materials

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-15.01.01P	Demonstrate the ability to understand the relationship between various documents in order to form a plan of maintenance	Create a maintenance plan based on documentation

RANGE OF VARIABLES

Documentation: blueprints (drawings), specifications, schematics, working drawings, code books, shop drawing, constructions

D-15.02 15.02 Repair and replace skirting

Essential Skills	Numeracy

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-15.02.01P	Visually inspect skirting for **deficiencies**	Exterior ***skirting material*** has been assessed and deficiencies noted in documentation
D-15.02.02P	Order replacement ***skirting materials***	***skirting materials*** match existing materials
	construct skirting frame while maintaining minimum distance from the ground as per ***standards***	Skirting frame meets ***standards***
D-15.02.03P	attach the ***skirting material*** to the frame	Skirting material is firmly secured to frame
D-15.02.04P	Insulate skirting as required	Correct insulation is chosen ***for skirting material***
D-15.02.05P	install access hatches	Access hatches operate as expected
D-15.02.06P	ensure that the skirting is level	Skirting is assessed for being level

RANGE OF VARIABLES

Deficiencies include: missing sections, punctures, holes, gaps, loose skirting, buckling

skirting material includes: lumber, plywood, house wrap, siding materials, insulation materials, poly wrap

standards include: manufacturers and AHJ building codes

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-15.02.01L	Demonstrate knowledge of ***skirting components and materials***	Describe skirting components and materials
D-15.02.02L	Demonstrate knowledge of skirting construction procedures	Describe common construction techniques for replacing or repairs skirting

RANGE OF VARIABLES

skirting components and materials includes: lumber, plywood, house wrap, siding materials, insulation materials, poly wrap, vinyl skirting

D-15.03 Mix Concrete

Essential Skills	Numeracy, Reading

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-15.03.01P	use potable water that is free from oil and contaminants	Concrete bonds evenly with no voids
D-15.03.02P	measure the components of the mix	Correct amounts are measured and there is little or no waste
D-15.03.03P	Blend components using mixer or by hand	Concrete has a smooth and even consistency
D-15.03.04P	Transport concrete	Transportation is via the most efficient and safe method

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-15.03.01L	Demonstrate knowledge of concrete components and materials	Describe concrete terms and materials
D-15.03.02L	Demonstrates knowledge of ***faults*** in concrete mixing	Identifies ***faults*** and their causes.
D-15.03.03L	Demonstrate knowledge of concrete mixing procedures	Describes the concrete mixing process

RANGE OF VARIABLES

Faults include: air loss, bug holes, honeycombing, scaling, discolouration, crackling, curling

D-15.04 Make Minor Concrete Repairs

Essential Skills	Thinking Skills, Numeracy

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-15.04.01P	Identify cause of ***fault***	Root cause of ***fault*** is identified and recorded/reported
D-15.04.02P	Mix concrete to create a grout	See 15.03 for mix concrete standard
D-15.04.03P	use solvents and abrasives to remove stains from concrete	Solvent selected is appropriate for the material and the environment
D-15.04.04P	patch holes in concrete using grout	Patch protects against ingress and moisture
D-15.04.05P	repair cracks in concrete using bonding agents and grout	Repair protects against ingress and moisture
D-15.04.06P	repair spalling using bonding agents and grout	Spalling repair protects against ingress and moisture

RANGE OF VARIABLES

Fault includes: mechanical, chemical, physical, reinforcement corrosion

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-15.04.01L	Demonstrates understanding of ***faults*** in concrete work	Analyzes concrete work to determine faults
		Recommends actions to be taken to safeguard concrete
D-15.04.02L	Demonstrates knowledge in repair of concrete	Calculates the amount of concrete needed for repair

RANGE OF VARIABLES

Fault includes: mechanical, chemical, physical, reinforcement corrosion

D-15.05 Pour Small Concrete Pad

Essential Skills	Oral Communication, Document Use

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-15.05.01P	Plan layout of pad according to code and direction from AHJ	Layout is effective follows overall site plan
D-15.05.02P	Prepare ground for pour	Ground is level and free from debris
D-15.05.03P	Build form and layout supports (rebar or wire mesh)	Forms are square and plumb
D-15.05.04P	Secure form to ground	Forms are stable and ready for use
D-15.05.05P	Prepare concrete	See 15.03
D-15.05.06P	Pour concrete	Concrete is level with no visible faults
D-15.05.07P	Finish concrete	Concrete is properly cured and sealed

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-15.05.01L	Demonstrate knowledge of concrete components and materials	Describe concrete formwork
		Lists site specifications for a concrete pad

D-15.06 Repair and Replace Exterior Wall Coverings

Essential Skills	Thinking Skills, Numeracy

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-15.06.02P	Visually inspects condition of ***exterior wall coverings*** and ***finishes***	Faults requiring repair are detected
D-15.06.03P	documents component conditions	recommends repairs or further evaluation
D-15.06.04P	order ***exterior wall coverings***	***exterior wall coverings*** ordered match the existing covering

D-15.06.05P	replace strapping and house wrap if required	Strapping and house wrap are tightly secured
D-15.06.06P	replace outside or inside corners and flashings as required	***finishe***s are tightly secured and match existing ***finishes***
D-15.06.07P	ensure a weather tight seal	Structure is sealed tightly and moisture cannot enter

RANGE OF VARIABLES

Exterior Wall covering materials include: wood, vinyl, metal, fibre cement siding

Finishes includes: paint, stains, flashing, caulking

components include: siding, starter strips, inside and outside corner mouldings, and J-moulding, J channel, F channel, trim, window and door casings

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-15.06.01L	Demonstrate knowledge of exterior wall ***components and materials***	Describe ***exterior wall coverings***
D-15.06.02L	Knowledge of basic building science principles related to air movement, pressure, infiltration, exfiltration etc.	Demonstrates ability to identify cladding and finish defects due to poor installation, aging, buckling, separation, spalling etc.
		Demonstrate ability to determine the impact of defects on building and occupant health and safety
D-15.06.03L	Demonstrate knowledge of exterior wall repair procedures	Identifies remedial measures for cladding and finish problems

RANGE OF VARIABLES

Exterior Wall coverings: wood, vinyl, metal, fibre cement siding,

Components and materials include: fasteners e.g. nails, screws, clips, staples, construction adhesive.

D-15.07 Perform emergency repairs of housing wraps.

Essential Skills	Thinking skills, Working with others

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-15.07.01P	Assess damaged house wrap	Determines roughly how long the substrate has been exposed to the elements.
D-15.07.02P	Remediates substrate if required	Removes and replaces substrate to avoid potential mould problems later
D-15.07.03P	select and use ***tools and equipment***	Appropriate ***tools and equipment*** are selected
D-15.07.04P	Prepare area for house wrap	Area is free from debris
D-15.07.05P	Staple house wrap to plywood exterior overlapping the wrap as specified in the building code	Wraps is secured to substrate
D-15.07.06P	Seal with tape to prevent water from entering the structure	A water-resistant barrier is created.
D-15.07.07P	Records actions in maintenance log	Action is noted in log.

RANGE OF VARIABLES

tools and equipment includes: tape measure, straight edge, utility knife, stapler, sealing tape

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-15.07.01L	demonstrate Knowledge of relevant sections of codes/legislation e.g. building code	interpret codes and regulations pertaining to building envelope in national building code
D-15.07.02L	Demonstrate knowledge of energy-efficient construction methods	Describe the purpose of energy-efficient construction
		Describe signs of inadequate building envelope
D-15.07.03L	Demonstrate knowledge of building envelope components	Describe air and vapour barriers
		Describe insulation

D-15.08 Repair Roof Covering.

Essential Skills	Oral Communication, Working with others

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-15.08.01P	visually inspect **roof covering**	inspection is complete as per condition rating system
D-15.08.05P	select fall arrest equipment appropriate for work conditions, regulations and company policies	fall arrest system is in accordance with ahj
D-15.08.02P	identify root cause of problem via physical inspection	using **ppe** and access equipment
D-15.08.03P	determine if a permit is required for the repair	obtains permit when required
D-15.08.04P	repair ***roof covering*** and replace ***components*** with **tools and equipment**	roof is watertight
D-15.08.05P	log repair in maintenance log	repair is noted and can be monitored

RANGE OF VARIABLES

Roof Coverings: shingles, metal, fascia, roll roofing

Components: collar tie, rafter, ceiling joist, H-clips, ridge board, roof soffit, roof truss, sheathing, strapping, flashing

Tools & Equipment: caulking, flashing, tin snips, left-handed hammer, cordless drill and bits, basic hand tools

PPE: Fall arrest system

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-15.08.01L	demonstrates knowledge of the correct the ppe and procedures for working at heights	safety requirements such as fall protection (toe boards on scaffolding and 3-point contact on ladders)
D-15.08.02L	demonstrates knowledge of the impact of water on roof	describe the impact of water/ice on roof components
D-15.08.03L	demonstrates knowledge of the types of **components** and their applications	describe and identify components of a roof system.
D-15.08.04L	demonstrates knowledge of the sequence of installation	explain the process of installing a roof.

RANGE OF VARIABLES

Components: vents, flashings and underlayment, fasteners

D-15.09 Construct exterior stairs and ramps.

Essential Skills Working with Others, Numeracy

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-15.09.01P	Determine layout and location	Layout and location allow for an acceptable incline and do not impede access or egress to or from the structure
D-15.09.02P	Attain required permits and authorization.	Where required a building permit is secured and AHJ are informed.
D-15.09.03P	Determine Tools and ***materials*** required	Materials selected are appropriate for climate and durability
D-15.09.04P	Measure and cut materials	Materials are cut to the correct length and there is little wasted material
D-15.09.05P	Dig holes for posts or set in footings	Posts are secured
D-15.09.06P	Mix and pour batches of concrete for footings	See standard on mixing concrete
D-15.09.07P	Ensure sufficient slope while constructing ramp/stairs	Ramp is no less than a ratio of 1:12 Stairs the rise plus the run should equal approximately 17.5 inches.
D-15.09.08P	Landings and railing are correctly assembled	Landing has enough space to turn, and rails are at a height of not higher than 34 inches.
D-15.09.09P	Secure ramp /stairs to the structure	Ramp/stairs are tied into the structure
D-15.09.10P	Finish ramp/stairs with anti-skid sealant	Ramp has sufficient grip to reduce the chance of slips

RANGE OF VARIABLES

materials include: dimensional lumber, plywood and composite, railings, posts, concrete mix, concrete footings, screws, wood glue,

Tools include: saws, post hole digger, shovel, concrete mixer, drills, paint rollers

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-15.09.01L	Demonstrate knowledge of mathematical formulas	Calculate rise and run of stairs and ramps in various layout patterns
		Calculate the most cost efficient layout option for stairs and ramps
D-15.09.02L	Demonstrate knowledge of accessibility requirements	Discuss the importance of accessible building for local residents
		Determine the accessibility criteria for a new set of stairs or ramp

D-15.10 Repair or replace windows and doors

Essential Skills Oral Communication, Numeracy

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-15.10.01P	inspect and assess window / door repair or replacement	select and use appropriate **tools** and equipment.
D-15.10.02P	determine all components required to replace window or door	components requiring repair or replacement are correctly identified
D-15.10.03P	assess and adjust rough openings for existing ***conditions***	openings are adjusted to conditions
D-15.10.04P	install door/window frame to ensure plumb and square with adequate support	all openings are plumb and square
D-15.10.05P	ensure adjacent jambs or frames are aligned with each other	proper alignment is obtained
D-15.10.06P	level head jamb and plumb side jambs	jambs are plumb
D-15.10.07P	secure jambs/frames by shimming and fastening to steel, wood and masonry	jambs are secure
D-15.10.08P	insulate cavity around jambs/frames to create a thermal break	opening is properly insulated
D-15.10.09P	install membrane and flashing around outside exterior jamb's trim	openings are properly sealed ***for seasonal conditions***

D-15.10.10P	select door/window type and size, and determine swing/opening according to schedule and project drawings	door/window selected for replacement matches drawings and specifications
D-15.10.11P	mark door slab/window and jamb for hinge location	hinge locations are properly marked
D-15.10.12P	mortise hinge gains on slab and jambs	
D-15.10.13P	secure door/window to jamb using fasteners such as screws and hinges	correct fasteners are selected
D-15.10.14P	install weather protection devices such as weather stripping and door sweeps	weather protection devices are appropriate for ***seasonal conditions***
D-15.10.15P	install window/door accessories such as astragals, kick plates and stops, screens and cranks	accessories are securely attached
D-15.10.16P	verify proper installation and operation of window or door	window/door operates as per manufacturers specifications

RANGE OF VARIABLES

Tools include: levels, tape measures, hammers, cordless drills, chisels, hole saws, square, Screwdrivers, drill bits and routers with templates screws, glass cutter

Components include: brick mold, flashing, weather stripping, insulation, hardware (i.e., doorknobs, window cranks, deadbolts, panic hardware, door closure), storm door, screen door, hinges and bolt, shims, and fasteners

Conditions include: as out-of-square, out-of-level and wrong size or location

Seasonal conditions include: snow, rain, extreme cold, long exposure to sun

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-15.10.01L	demonstrate knowledge of windows, doors and components, their applications and their use	identify work practices relating to window and door installation
		identify and describe tools and equipment required
		identify styles, sizes including door swings, window types and related components.
D-15.10.01L	demonstrate knowledge of the procedures used to install windows/doors and their components	identify and describe procedures to install windows/doors and their components
		identify and describe insulating techniques used in installing doors and windows.

D-15.11 Performs servicing and maintenance of residential and commercial building lots.

Essential Skills	Oral Communication, Working with Others

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-15.11.01P	obtain detailed description of ***concern*** from client or manager	***concerns*** are identified and recorded
D-15.11.02P	conduct ***field assessment***	***field assessments*** are conducted and assessed against ***concerns***
D-15.11.03P	determine root cause of concern based on ***field assessment***	Root cause is identified
D-15.11.04P	determine ***course of action***	course of action for the type of ***concern*** is identified and sources of information are consulted.
D-15.11.05P	Remediate the concern using appropriate ***equipment***	Concern is alleviated and site is safe
D-15.11.06P	update maintenance log	maintenance log is updated to reflect servicing and maintenance tasks performed

RANGE OF VARIABLES

concerns include: uneven walkways, erosion, overgrowth, damaged or diseased tree limbs, animals burrowing or nesting, garbage or hazardous materials present

field assessments include: sensory inspections, technical inspections

Course of action includes: securing the site**,** contacting wildlife specialists, mowing, trimming, pruning, leveling, removing debris/waste, repairing, or replacing concrete

Sources of information includes: regulations, codes, occupational health and safety, AHJ requirements, prints, drawings, specifications, client and client documentation.

Equipment includes: telehandlers, genie lift, scissor lift, trimmer, lawn mower, live traps, jackhammer

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-15.11.01L	demonstrate knowledge of landscape maintenance principles	Identifies appropriate times to remove animals or cut back vegetation
		Identifies concerns found on residential and building lots and their impact on human health

Appendix A

Carpenter – Tools and Equipment
Hand Tools
· adjustable wrench
· aviation snip
· bars (pry, wrecking, aligning)
· brad driver
· broom
· brushes
· bull float
· butt gauge
· carpenter's apron
· caulking gun
· chalk line
· circle cutter
· clamps
· cold chisel
· concrete edgers
· cone/tie wrench
· dry line
· drywall t-square
· file
· finish trowel
· framing square
· hammers (framing, finishing, dead blow, rubber mallet, wood mallet, sledge, roofing, drywall)
· hand float
· hand level (24", 48", 6-ft., 8-ft., torpedo, line)
· hand saws (pull, hack, keyhole, drywall, coping, rip, hole, cross cut, back, pruning)
· hatchet
· knives (utility, drywall)
· measuring tape (various)
· multi-driver screwdriver
· nail puller
· nail set
· pencil/marking instrument
· pipe wrench
· planes (various)
· pliers and side cutters
· plumb bob
· rakes
· rasps
· rollers
· scrapers (cabinet, floor, form)
· screwdrivers (Robertson, Phillips, straight, Torx, hexagonal)
· shovels
· siding shears
· slide hammer
· sliding t-bevel
· spud wrench
· staplers (hammer, hand, electric)
· string lines
· tarps
· tile cutter
· tin snips

- trowels
- wall jack
- wheelbarrow
- wood chisels

Portable Power Tools and Accessories

- biscuit joiner
- calculator
- chainsaw
- circular saw
- cordless drill
- coring drill and bits
- cut-off saw (metal)
- cut-out tools
- concrete bits
- concrete cutting saw
- concrete vibrators
- construction heaters
- drywall gun
- electric chipping hammer
- electric drill and bits
- electric shears
- extension cords
- fan-forced heater
- fuel cell nailer
- generator
- grinders
- hammer drill
- hydraulic jacks
- jackhammer
- jigsaw
- laminate trimmer
- mini-grinder
- mitre saw
- oscillating multi tool
- planer
- porta power
- powder-actuated tools
- reciprocating saw
- router and bits
- sanders (palm, belt, random, detail)
- staplers
- tiger torch
- tile wet saw
- wet/dry vacuum
- wood boring bits
- wood spade bit set

Stationary Power Tools

- band saw
- disk sander/drum sander
- drill press
- dust collection equipment
- grinder
- jointer
- mortiser
- power feeder
- radial arm saw
- router table
- shaper
- table saw
- thickness planer

Pneumatic Tools and Equipment

- air compressor
- air dryers
- drills
- fittings
- gauges
- hoses
- impact gun
- nailers
- sandblasters
- shears
- wrenches

Hoisting, Rigging and Access Tools and Equipment

- aerial work platforms
- beam trolleys
- block and tackles
- boom truck
- bridles
- cables
- chokers
- chain block hoist (endless chain)
- come-along and grip hoist
- crane
- dolly
- equalizer beam
- forklifts (variable reach forklifts)
- guardrails
- ladders
- ladder hoist
- ladder jacks
- lifting beam
- pinch bar
- pulleys
- scaffolding
- ropes
- skid ramps
- skid steers
- slings
- spreader bar
- synthetic lifting straps
- tag lines
- turnbuckles
- lifting eyes
- man/material lift (manual and power)
- pallet jack
- rope/cable
- scissor lifts
- shackles (varying sizes)
- skid steer loader
- slings and chokers
- snatch blocks
- stair cart
- telescopic forklift
- tuggers (power)
- winches
- wire rope or nylon (synthetic)

Layout Instruments

- builder’s levels
- chalk lines
- combination squares
- dividers
- drawing instruments

· dry lines
· framing squares
· jigs
· laser levels
· laser measuring systems
· measuring tapes
· plumb bobs
· scale rulers
· scribers
· scribing compasses
· sliding T-bevels
· speed squares
· stair gauges
· templates
· transits
· Tri squares
Personal Protective Equipment (PPE) and Safety Equipment
· air quality tester
· arc flash protection
· barricades and caution tape
· eye wash kit
· fire resistant clothing
· first aid kit
· gloves (industrial, rubber)
· ground fault circuit interrupter
· health care and infectious control equipment
· kneepads
· lock-out/tag out devices
· reflective vests
· respiratory mask

· rubber boots (CSA)
· safety boots (CSA)
· safety glasses/goggles (CSA)
· safety harness, lanyard and life line (CSA)
· tripod
· fall arrest anchor points
· fall protection equipment
· full body harness
· hard hat
· hearing protection
· respiratory equipment, dust mask and respirators
· confined space equipment
· coveralls (fire retardant)
· ear plugs and muffs
· eye wash facilities
· fire blanket
· fire extinguisher
· first aid equipment
· fume and toxic gas detector
· goggles
· grounding straps
· insulated gloves
· life line
· lock-out kit
· portable GFCI
· portable light
· pylons
· respirator
· restraint device
· self-contained breathing apparatus

· signage
· ventilation equipment
· warning tape
Standard Tools
· cable cutter
· camera
· centre punch
· combination square
· combination wrench set
· crimping pliers
· crowbar
· drill bits
· files
· fish tape
· flashlight
· fuse puller
· hack saw
· hammers
· hex key set
· keyhole saw
· knives
· knockout punch set
· level
· lineman pliers
· measuring tape
· needle nose pliers
· nut drivers
· pipe benders
· pipe cutters
· pipe threader
· reamers

· screwdrivers – Robertson, Phillips, torx, flat, tamper-proof
· side/diagonal cutters
· slip joint pliers
· socket set
· speed wrench
· tap and die set
· tool belt
· tool bucket
· triple tap
· trouble light
· vise
· wire strippers
· wood chisel
· arc flash equipment
Access Equipment
· articulated boom lift
· boom lifts
· construction elevator
· ladders (extension, fixed, step)
· lift table
· scaffolds (rolling, mechanical, stationary, ladder jack)
· man basket
· scissor lift
· swing stage
Power Tools And Equipment
· band saws
· battery/rechargeable drill
· bench grinder
· cable puller
· chop saw

· core drill
· heat gun
· hole saw kit
· power crimper
· jig saw
· knock-out punch (powered)
· magnetic drill
· pneumatic hammer drill
· power cable feeders
· power drill
· power pipe bender
· power pipe cutters
· power pipe threader
· power puller
· power reel lift
· PVC bender
· sump pump
· vacuum
Specialty Tools And Equipment
· chain falls
· come-along
· communication devices (cellphones and 2-way radio)
· creepers and crawlers
· grip hoist
· hot stick
· inverters
· laser level
· manual hoist
· picks
· pneumatic hoist

· portable generator
· reel jacks
· rope
· shackles
· sledgehammer
· soldering apparatus
· thermit (thermal) welder
· torque wrench
· wire rack
Measuring Equipment
· ammeter
· cable locator
· clamp ammeter
· fault locator
· frequency meter
· inductive voltage detector (non-contact voltage detector)
· insulation resistance tester
· jumpers
· LAN meter (cable analyzer)
· light meter
· megohmmeter (insulation tester)
· multimeter
· optical time-domain reflectometer (OTDR)
· ohmmeter
· phase/motor rotation meter
· power quality analyzer
· recording meter (watts, volts and amps)
· tachometer
· thermometer (infra-red and electronic)
· voltage tester

· voltmeter
· watt meter
Plumber - Hand Tools
· ball-peen hammer
· basin wrench
· bolt cutter
· chisel
· cistern pump (hand operated-diaphragm)
· claw hammer
· combination wrench
· diaphragm pump (hand operated)
· drywall saw
· faucet seat wrench
· hacksaw
· hand saw
· transfer pump (hand-operated)
· tri square
· hand threader
· hex keys (set)
· hole saws
· knife
· locking pliers
· pick
· pipe wrenches
· pliers (lineman, needle nose, water pump, groove lock)
· pry bars
· punch
· ratchet
· reamer
· rubber mallet

· scratch awl
· T square
· tap and die sets
· tin snips (set)
· utility brushes
· wire brushes
· air compressor and accessories
· booster pump
· chain saw
· compaction equipment
· concrete cutter
· coring machines
· cryogenic equipment
· die grinder
· drain cleaning equipment
· heat lamp
· impact wrench
· inspection cameras
· mini-excavator
· portable band saw (hack saw)
· power hole saw
· rotary hammer
· steamer
· task lighting equipment
· telescopic boom
· transfer pump (electric and pneumatic)
Pipe Cutting and Joining Equipment
· copper tube cutter
· crimpers
· files (set)
· flaring tools

· fusion tools
· gas cylinders, and soldering and brazing equipment
· gas powered cut-off
· grooving machine
· hand-operated oiler
· hot air gun (welder)
· hot tap equipment
· plastic tube cutters (set)
· power vise
· torch
· ratchet cutter
· snap cutter
· hydraulic pipe cutter
· mechanical crimper
· PEX crimper
· PEX pipe expander (manual and power)
· pipe cutter
· pipe groover
· pipe reamer
· pipe roller
· pipe stand
· pipe vise
· specialized assembly tools and equipment
· T-extracting tool
· tube bender
· tube cutter
· welding equipment
Testing, Measuring and Communication Equipment
· builder's level
· calliper

· communication devices
· computer
· crimp gauge
· drafting equipment
· electronic leak detector
· groove depth tape
· hand pump and accessories (bicycle pump)
· hydrostatic pump and gauge (manual and power)
· infrared thermometer
· laser layout tools
· manometer
· markers
· micrometer
· pipe locator
· refractometer
· scale rule
· scanning equipment
· test strips and kits
· thermal imager
· thermometer
· two way radios
Painter – Tools and Equipment
· adjustable wrenches (various sizes)
· air hose repair kits
· aluminium rollers
· Allen keys
· aprons
· broad knives
· brooms
· brush and roller spinners

· brush extenders
· brushes (various types of natural and synthetic bristle brushes and various types of handles)
· can hooks
· caulking guns
· chisels
· cheese cloths
· cutters
· drop sheets
· duct tape
· dust pans
· dusters
· extension poles
· hand masking machine
· hawk
· leather chamois
· levels (carpenter's, laser)
· masking tape
· mop
· nail punch
· pails
· paint pads
· paint strainers
· pencils
· pliers
· pole sanders
· putty knives
· rags
· razor blades
· roller cages
· roller grids

· roller sleeves
· sanding blocks
· sanding sponges
· sandpaper
· scrapers
· screwdrivers
· shovel
· sponges
· squeegees
· steel wool
· stir sticks
· straight edge
· tack cloths
· tape holders
· tarps/containments
· trays
· utility knives
· wrench sets
Power Tools and Pneumatic Tools
· air chisels/scrapers
· compressors
· computer/colour matching software
· dehumidifiers
· dust collectors
· fans
· grinders (angle grinder, die grinder)
· heat guns
· lighting (explosion-proof, halogen)
· paint agitators
· pneumatic caulking guns
· pneumatic mixers

· printers
· sanders
· vacuum cleaners
Measuring and Testing Equipment
· adhesion tester
· air monitoring equipment
· architectural rule
· blotter test kit
· clear tape (contaminant tester)
· digital temperature gun
· dry film thickness gauge
· humidity meter
· lead test kit
· measuring cup
· yard stick
Access Equipment and Rigging, Hoisting and Lifting Equipment
· aerial platforms (boom and scissor lifts)
· mechanical scaffolds
· planks (aluminium, wood)
· platforms
· rigging components (straps, slings, chains and shackles)
· rolling scaffolds
· stationary scaffolds
· swing stages
· transfer chains