curriculum standard

apprenticeship

NOVA SCOTIA APPRENTICESHIP AGENCY

PLUMBER 2017

Based on the Atlantic Apprenticeship Curriculum Standard

(pg. 12 for Level Structure)

NOVA SCOTIA APPRENTICESHIP AGENCY

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Version 1.0

Atlantic Apprenticeship Curriculum Standard

Plumber

Preface

This Atlantic Apprenticeship Curriculum Standard is intended to assist instructional staff in the design and delivery of technical, in-class training in support of the Plumber program.

This document contains all the technical training elements required to complete the Plumber apprenticeship program and has been developed based on the 2016 Red Seal Occupational Standard (RSOS) and the 2010 Interprovincial Program Guide (IPG). The RSOS and IPG can be found on the Red Seal website (www.red-seal.ca).

Implementation of this AACS for Apprenticeship training is outlined in the following table.

Level	Implementation Effective
Level 1	2017-2018
Level 2	2018-2019
Level 3	2019-2020
Level 4	2020-2021

** *The above implementation schedule was current at time of printing. Please* ***confirm*** *with Apprenticeship Staff prior to commencing training.*

Granting of credit or permission to challenge level examinations for pre-employment or pre-apprenticeship training for the Plumber trade will be based on the content outlined in this standard. Training providers must contact their provincial apprenticeship authority for more information on the process and requirements for determining eligibility for credit towards an apprenticeship program. Programs which have been deemed acceptable by the jurisdictional apprenticeship authority will be identified in transfer credit matrix developed through the Atlantic Apprenticeship Harmonization Project.

Acknowledgements

The development of the Atlantic Apprenticeship Curriculum Standard (AACS) is an initiative of the Atlantic Apprenticeship Council's Atlantic Apprenticeship Harmonization Project (AAHP) through the Atlantic Workforce Partnership and Employment and Social Development Canada.

The Atlantic Apprenticeship Council wishes to acknowledge the contributions of the following industry and instructional representatives on the Atlantic Trade Advisory Committee (ATAC) who participated in the development of this document in September 2016.

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Advisory committees, industry representatives, instructors and apprenticeship staff provided valuable input to the development of this document. Without their dedication to quality apprenticeship training, this document could not have been produced.

Table of Contents

User Guide

Atlantic Apprenticeship Curriculum Standards (AACS) are developed based on the Red Seal Occupational Standard (RSOS) and the Interprovincial Program Guides (IPG), if available, and extensive industry consultation. This document represents the minimum content to be delivered as part of the harmonized Atlantic program for the Plumber trade.

The AACS's are deliberately constructed for ease of use and flexibility of structure in order to adapt to all delivery requirements. They detail units of training, unit outcomes and objectives. They do not impose a delivery model or teaching format.

Jurisdictions and/or training providers will select and develop delivery materials and techniques that accommodate a variety of learning styles and delivery patterns. The AACS does not dictate study materials, textbooks or learning activities to be used in delivery.

The document includes a Level Structure to facilitate mobility for apprentices moving from one jurisdiction to another.

Structure

The content of the AACS is divided into units. Unit codes are used as a means of identification and are not intended to convey the order of delivery. It is at the discretion of the training provider to deliver the content in the required logical sequence of delivery within the level. Jurisdictions are free to deliver units one at a time or concurrently within a level, provided all outcomes are met.

The Learning Outcomes describe what the apprentice should know or be able to do at the end of training. Wording of the Learning Outcomes, "Demonstrate knowledge of…" acknowledges the broad spectrum of ways in which knowledge can be assessed (i.e. practical projects, multiple choice testing, presentations, etc.) by instructional staff within the training.

Summative evaluation will be through a multiple-choice Level Examination administered through the jurisdictional Apprenticeship Authority.

User Guide *(continued)*

The 2016 Red Seal Occupational Standard (RSOS) to AACS Comparison chart outlines the relation between each RSOS sub-task and the AACS units. RSOS References have also been detailed in each unit to highlight the direct link between the unit and relevant sub-tasks in the RSOS.

In the Level Structure section, the document identifies suggested hours in order to provide an indication of the time it should take to cover the material in the unit and is provided as a guide only. Adjustments to the suggested hours for each unit may be required to account for rate of apprentice learning, statutory holidays, storm days, registration and examinations. These suggested hours detailed for each unit will represent both theory and practical training (if relevant) and for consistency will be based on a standard of 30 hours per week of training. The true length of time required to deliver an outcome successfully will depend upon the learning activities and teaching methods used.

There are two types of objectives found in the AACS document: theoretical and practical.

The theoretical objectives represent the material that is to be covered during the technical training in order to convey the required knowledge to the apprentice.

The practical objectives represent the tasks or skills that have been deemed by the Atlantic Trade Advisory Committee as critical for the apprentices to receive exposure to while attending technical training. For example, exposure could be done through instructor demonstration or individual or group performance of the skill or task. Training providers are encouraged to use practical demonstration and opportunities for hands-on learning whenever possible. Practical objectives are not intended to replace the on-the-job training component of the apprentice's program or to mirror or replace the logbook skills that are to be taught and evaluated in the workplace.

Detailed content for each objective has not been developed. Where detail is required for clarity, content has been provided.

Glossary of Terms

These definitions are intended as a guide to how language is used in the document.

ADJUST	To put in good working order; regulate; bring to a proper state or position.
APPLICATION	The use to which something is put and/or the circumstance in which an individual would use it.
CHARACTERISTIC	A feature that helps to identify, tell apart or describe recognizably; a distinguishing mark or trait.
COMPONENT	A part that can be separated from or attached to a system; a segment or unit.
DEFINE	To state the meaning of (a word, phrase, etc.).
DESCRIBE	To give a verbal account of; tell about in detail.
EXPLAIN	To make plain or clear; illustrate; rationalize.
IDENTIFY	To point out or name objectives or types.
INTERPRET	To translate information from observation, charts, tables, graphs and written material.
MAINTAIN	To keep in a condition of good repair or efficiency.
METHOD	A means or manner of doing something that has procedures attached to it.
OPERATE	How an object works; to control or direct the functioning of.
PROCEDURE	A prescribed series of steps taken to accomplish an end.
PURPOSE	The reason for which something exists or is done, made or used.

Glossary of Terms (*continued*)

SERVICE	Routine inspection and replacement of worn or deteriorating parts. An act or business function provided to a customer in the course of an individual's profession (e.g., haircut).
TECHNIQUE	Within a procedure, the manner in which technical skills are applied.
TEST	v. To subject to a procedure that ascertains effectiveness, value, proper function or other quality. n. A way of examining something to determine its characteristics or properties, or to determine whether or not it is working correctly.

Essential Skills Profiles

Through extensive research, the Government of Canada and other national and international agencies have identified and validated key essential skills for the workplace. These skills are used in nearly every job and at different levels of complexity. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change.

Essential Skills Profiles describe how workers in various occupations use each of the key essential skills. They include:

- a brief description of the occupation;
- examples of tasks that illustrate how each essential skill is applied; and,
- complexity ratings that indicate the level of difficulty of the example tasks.

Essential Skills profiles can be found on the Employment and Social Development Canada (ESDC) website at www.esdc.gc.ca/eng/jobs/les/profiles/index.shtml

The development and improvement of these Essential Skills is inherent throughout the apprenticeship training program as apprentices work towards achieving journeyperson status.

Profile Chart

OCCUPATIONAL SKILLS			
PLB-100 Safety	PLB-360 Basic Electricity	PLB-105 Tools and Equipment	PLB-110 Access Equipment
PLB-445 Job Planning and Trade Documentation	PLB-150 Drawings I	PLB-120 Welding, Fuel Brazing and Cutting	
PLB-115 Hoisting, Lifting and Rigging	MENT-700 Mentoring I	PLB-220 Drawings II	
PIPING COMPONENTS			
PLB-130 Copper Pipe Tube and Tubing	PLB-125 Plastic Piping	PLB-135 Steel Piping	PLB-140 Cast Iron Piping
PLB- 425 Cross Connection Control	PLB-205 Specialized Piping	PLB-200 Piping Valves	
DRAINAGE, WASTE AND VENT SYSTEMS			
PLB-145 Drainage, Waste and Venting Systems I	PLB-225 Drainage, Waste and Vent Systems II	PLB-325 Storm and Combination Drainage Systems (Sewers)	PLB-315 Commercial Drainage Systems
PLB-320 Commercial Venting Systems	PLB-420 Commercial Sewage Treatment Systems	PLB-415 Private Sewage Treatment Systems	
WATER SERVICE AND DISTRIBUTION			
PLB-160 Potable Water Distribution I	PLB-215 Hot Water Storage Tanks and Heaters	PLB-310 Potable Water Distribution II	PLB-305 Water Service
PLB-430 Pressure Systems (Rural Water Supply)	PLB-425 Cross Connection Control		

Profile Chart *(continued)*

FIXTURES, APPLIANCES AND WATER TREATMENT SYSTEMS			
PLB-435 Water Treatment Systems	PLB-210 Plumbing Fixtures, Appliances and Accessories	PLB-335 Commercial/Institutional Plumbing Fixtures and Accessories	
HYDRONIC HEATING AND COOLING SYSTEMS			
PLB-230 Hydronic Systems I	PLB-350 Hydronic System Controls	PLB-410 Low Pressure Steam Systems	
SPECIALIZED SYSTEMS			
PLB-400 Gas Piping Systems	PLB-405 Medical Gas Systems	PLB-330 Irrigation Systems	PLB-340 Compressed Air Systems
PLB-345 Single Family Dwelling Fire Protection Systems	PLB-440 Process Piping Systems	PLB-355 Green Technology	

Recommended Atlantic Level Structure

Level 1 - 8 Weeks

Unit Code	Unit Title	Sugg Hrs*	Pg #	Practical Objectives*
PLB-100	Safety	12	27	N/A
PLB-105	Tools and Equipment	18	31	Demonstrate use of tools and equipment according to manufacturers' specifications.
PLB-110	Access Equipment	6	33	N/A
PLB-115	Hoisting, Lifting and Rigging	18	35	N/A
PLB-120	Welding, Fuel Brazing and Cutting	12	39	Demonstrate the use of oxy fuel, brazing and cutting techniques.
PLB-125	Plastic Piping	24	42	Use tools and equipment to measure, cut and join plastic piping.
PLB-130	Copper Pipe Tube and Tubing	24	47	Use tools and equipment to measure, cut, prepare and join copper piping.
PLB-135	Steel Piping	24	51	Use tools and equipment to measure, cut, prepare and join steel piping.
PLB-140	Cast Iron Piping	15	55	Use tools and equipment to measure, cut, prepare and join cast iron piping.
PLB-145	Drainage, Waste and Venting Systems I	42	59	N/A
PLB-150	Drawings I	27	62	Use various drafting tools.
MENT-700	Mentoring I	6	64	N/A
PLB-160	Potable Water Distribution I	12	66	N/A

Level 2 - 6 Weeks

Unit Code	Unit Title	Sugg Hrs*	Pg #	Practical Objectives*
PLB-200	Piping Valves	12	70	N/A
PLB-205	Specialized Piping	9	72	N/A
PLB-210	Plumbing Fixtures, Appliances and Accessories	24	76	Demonstrate how to install, support and test fixtures and accessories.
PLB-215	Hot Water Storage Tanks and Heaters	18	79	N/A
PLB-220	Drawings II	30	82	Use types of layout tools and equipment (builders levels, levels, lasers, Philadelphia/stadia rod).
PLB-225	Drainage, Waste and Venting Systems II	36	84	N/A
PLB-230	Hydronic Systems I	51	88	1. Perform heat loss calculations. 2. Calculate linear and volumetric expansion. 3. Install and diagnose heating/cooling components

Level 3 - 7 Weeks

Unit Code	Unit Title	Sugg Hrs*	Pg #	Practical Objectives*
PLB-300	Hydronic Systems II	30	95	N/A
PLB-305	Water Service	12	99	N/A
PLB-310	Potable Water Distribution II	36	103	N/A
PLB-315	Commercial Drainage Systems	18	108	N/A
PLB-320	Commercial Venting Systems	24	112	N/A
PLB-325	Storm & Combination Drain Sys (Sewers)	24	115	N/A
PLB-330	Irrigation Systems	3	118	N/A
PLB-335	Commercial/Institutional Plumbing Fixtures and Accessories	12	121	N/A
PLB-340	Compressed Air Systems	6	123	N/A
PLB-345	Single Family Dwelling Fire Protection Sys	3	126	N/A
PLB-350	Hydronic System Controls	12	128	N/A
PLB-355	Green Technology	18	130	N/A
PLB-360	Basic Electricity	12	132	Use a multi-meter

Level 4 - 8 Weeks

Unit Code	Unit Title	Sugg Hrs*	Pg #	Practical Objectives*
PLB-400	Gas Piping Systems	60**	135	N/A
PLB-405	Medical Gas Systems	12	137	N/A
PLB-410	Low Pressure Steam Systems	30	140	Perform linear expansion calculations. Perform heat transfer calculations to determine load.
PLB-415	Private Sewage Treatment Systems	12	144	N/A
PLB-420	Commercial Sewage Treatment Systems	6	148	N/A
PLB-425	Cross Connection Control	30	151	N/A
PLB-430	Pressure Systems (Rural Water Supply)	24*	153	Demonstration/video of how to install water pumps, including related components and controls.
PLB-435	Water Treatment Systems	18	157	Use tools and equipment necessary for testing water sample.
PLB-440	Process Piping Systems	6	161	N/A
PLB-445	Job Planning and Trade Documentation	6	164	N/A
MENT-701	Mentoring II	6	166	N/A
PLB-455	Program Review	30	168	N/A

****In Nova Scotia**, Plumbers must complete a course through the Nova Scotia Ground Water Association to obtain and maintain a license to work on pumps. Therefore, 12 hours was moved from PLB-430 to PLB-400 where Nova Scotia requires 60 hours to obtain a G-7 Operator License to work on gas systems.

***Suggested Hours:** The time it should take to cover the unit (a guide only).

***Practical Objectives:** The tasks/skills apprentices must be exposed to during technical training. An individual or group performance of the task/skill is recommended; if not possible, an instructor demonstration is acceptable. Training Providers should use practical, hands-on learning whenever possible, whether identified in the curriculum as a practical objective or not.

Nova Scotia Online Courses

The courses listed below are required technical training in the Nova Scotia Plumber Apprenticeship Program.

Nova Scotia Course No.	Nova Scotia Course Name	Nova Scotia Prerequisites	Atlantic Curriculum Content To Be Covered			
			Atlantic Units		Sugg. Hrs	Page No.
Level 1 (8 weeks)						
MENT-700	Mentoring I	None	MENT-700	Mentoring I	6	64
PLGA-1848	Safety, Tools & Equipment	None	PLB-100	Safety	12	27
			PLB-105	Tools & Equipment	18	31
			PLB-110	Access Equipment	6	33
			PLB-115	Hoisting, Lifting and Rigging	18	35
PLGA-1849	Welding, Fuel Brazing and Cutting	PLGA-1848	PLB-120	Welding, Fuel Brazing and Cutting	12	39
PLGA-1850	Blueprints and Drawings I	None	PLB-150	Drawings I	27	62
PLGA-1851	Ferrous Piping	PLGA-1848	PLB-135	Steel Piping	24	51
			PLB-140	Cast Iron Piping	15	55
PLGA-1852	Non-Ferrous Piping	PLGA-1848	PLB-125	Plastic Piping	24	42
			PLB-130	Copper Pipe Tube and Tubing	24	47
PLGA-1853	Residential Drainage Systems I	PLGA-1848, 1851 & 1852	PLB-145	Drainage, Waste and Venting Systems I *(cover theory on drainage only)*	42	59
PLGA-1854	Residential Venting Systems I	PLGA-1853	PLB-145	Drainage, Waste and Venting Systems I *(cover theory on venting only)*	42	59
PLGA-1855	Introduction to Potable Water	PLGA-1848 & 1852	PLB-160	Potable Water Distribution I	12	67

Level 2 (6 weeks)						
PLGA-1859	Specialty Piping Applications	PLGA-1848, 1849, 1850, 1851, 1852	PLB-200	Piping Valves	10.5	70
			PLB-205	Specialized Piping	10.5	72
PLGA -1860	Hydronic Systems 1	PLGA-1848, 1850, 1851, 1852	PLB-230	Hydronic Systems I	51	88
PLGA-1861	Blueprints and Drawings 2	PLGA- 1848, 1850	PLB-220	Drawings II	30	82
PLGA-1862	Plumbing Fixtures, Appliances, and Accessories	PLGA-1848, 1850, 1851, 1852, 1853, 1854	PLB-210	Plumbing Fixtures, Appliances and Accessories	24	76
PLGA-1863	Drainage, Waste, and Venting System 2	PLGA-1848, 1850, 1851, 1852, 1853, 1854	PLB-225	Drainage, Waste and Venting Systems II	36	84
PLGA-1864	Hot Water Storage Tanks and Heaters	PLGA-1848, 1850, 1851, 1852	PLB-215	Hot Water Storage Tanks and Heaters	18	79
Level 3 (7 weeks)						
PLGA-1865	Water Service, Fixtures and Accessories		PLB-305	Water Service	12	99
			PLB-335	Commercial/ Institutional Plumbing Fixtures and Accessories	12	121
PLGA-1866	Commercial, Storm, and Combined Drainage Systems		PLB-315	Commercial Drainage Systems	21	108
			PLB-325	Storm and Combination Drainage Systems (Sewers)	21	115
PLGA-1867	Commercial Venting		PLB-320	Commercial Venting Systems	24	112
PLGA-1868	Potable Water 2		PLB-310	Potable Water Distribution II	36	103
PLGA-1869	Hydronic Systems 2		PLB-300	Hydronic Systems II	30	95
PLGA-1870	Hydronic Controls		PLB-350	Hydronic System Controls	12	128
			PLB-360	Basic Electricity	12	132
PLGA-1871	Specialty Piping and Green Technology		PLB-330	Irrigation Systems	7.5	118
			PLB-340	Compressed Air Systems	7.5	123

			PLB-345	Single Family Dwelling Fire Protection Systems	7.5	126
			PLB-355	Green Technology	7.5	130
Level 4 (8 weeks, 9 courses)						
PLGA-1872	Gas Piping **2-week course** (previously two separate courses, 1841 and 1843)	PLGA-1852	PLB-400	Gas Piping Systems *(covers Low Pressure and High Pressure)*	60*	135
PLGA-1873	Process Piping and Medical Gas		PLB-405	Medical Gas Systems	9	137
			PLB-440	Process Piping Sys	9	161
PLGA-1874	Rural Water and Waste		PLB-415	Private Sewage Treatment Systems	12	144
			PLB-420	Commercial Sewage Treatment Systems	6	148
			PLB-430	Pressure Systems (Rural Water Supply)	14*	153
PLGA-1875	Water Treatment System		PLB-435	Water Treatment Systems	18	157
PLGA-1876	Low Pressure Steam System		PLB-410	Low Pressure Steam Systems	30	140
PLGA-1877	Cross Connection Control		PLB-425	Cross Connection Control	30	151
PLGA-1878	Job Planning and Documentation and Mentoring	MENT-700	PLB-445	Job Planning and Trade Documentation	6	164
			MENT-701	Mentoring II	6	166
PLGA-1844	Program Review		PLGA-1844	Program Review	30	168
Nova Scotia Plumber Apprenticeship Program: All Courses are Required						

* In Nova Scotia, Plumbers must complete a course through the Nova Scotia Ground Water Association to obtain and maintain a license to work on pumps. Therefore, 12 hours was moved from PLB-430 to PLB-400 where Nova Scotia requires 60 hours to obtain a G-7 Operator License to work on gas systems.

2016 RSOS Sub-task to AACS Unit Comparison

RSOS Sub-task		AACS Unit	
Task 1 - Performs Safety-Related Functions.			
1.01	Maintains Safe work environment.	PLB-100	Safety
1.02	Uses personal protective equipment and Safety.	PLB-100	Safety
1.03	Performs lock-out and tag-out procedures	PLB-100	Safety
Task 2 - Uses and maintains tools and equipment.			
2.01	Uses common tools and equipment.	PLB-105	Tools and Equipment
2.02	Uses access equipment.	PLB-110	Access Equipment
2.03	Uses rigging, hoisting, lifting and positioning equipment.	PLB-115	Hoisting, Lifting and Rigging
2.04	Rigs loads for cranes.	PLB-115	Hoisting, Lifting and Rigging
2.05	Uses welding equipment.	PLB-120	Welding, Fuel Brazing and Cutting
2.06	Uses soldering and brazing equipment.	PLB-120	Welding, Fuel Brazing and Cutting
2.07	Uses oxy-fuel equipment.	PLB-120	Welding, Fuel Brazing and Cutting
Task 3 - Organizes work.			
3.01	Organizes project tasks and procedures.	PLB-150	Drawings I
		PLB-220	Drawings II
		PLB-445	Job Planning and Trade Documentation
3.02	Organizes materials and supplies.	PLB-150	Drawings I
		PLB-220	Drawings II
		PLB-445	Job Planning and Trade Documentation
Task 4 - Performs routine trade activities.			
4.01	Performs piping system layout.	PLB-145	Drainage, Waste and Venting Systems I
		PLB-150	Drawings I
		PLB-210	Plumbing Fixtures, Appliances and Accessories
		PLB-215	Hot Water Storage Tanks and Heaters
		PLB-220	Drawings II
		PLB-225	Drainage, Waste and Venting Systems II
		PLB-305	Water Service
		PLB-310	Potable Water Distribution II
		PLB-315	Commercial Drainage Systems
		PLB-325	Storm and Combination Drainage Systems (Sewers)
4.02	Calculates pipe, tube and tubing lengths.	PLB-125	Plastic Piping
		PLB-130	Copper Pipe Tube and Tubing
		PLB-135	Steel Piping
		PLB-140	Cast Iron Piping

RSOS Sub-task		AACS Unit	
		PLB-205	Specialized Piping
4.03	Calculates piping offsets.	PLB-125	Plastic Piping
		PLB-130	Copper Pipe Tube and Tubing
		PLB-135	Steel Piping
		PLB-140	Cast Iron Piping
		PLB-205	Specialized Piping
4.04	Installs piping supports.	PLB-125	Plastic Piping
		PLB-130	Copper Pipe Tube and Tubing
		PLB-135	Steel Piping
		PLB-140	Cast Iron Piping
		PLB-205	Specialized Piping
4.05	Installs sleeves.	PLB-125	Plastic Piping
		PLB-130	Copper Pipe Tube and Tubing
		PLB-135	Steel Piping
		PLB-140	Cast Iron Piping
		PLB-205	Specialized Piping
4.06	Commissions Systems.	PLB-145	Drainage, Waste and Venting Systems I
		PLB-210	Plumbing Fixtures, Appliances and Accessories
		PLB-215	Hot Water Storage Tanks and Heaters
		PLB-225	Drainage, Waste and Venting Systems II
		PLB-230	Hydronic Systems I
		PLB-305	Water Service
		PLB-310	Potable Water Distribution II
		PLB-315	Commercial Drainage Systems
		PLB-325	Storm and Combination Drainage Systems (Sewers)
		PLB-330	Irrigation Systems
		PLB-335	Commercial/Institutional Plumbing Fixtures and Accessories
		PLB-340	Compressed Air Systems
		PLB-345	Single Family Dwelling Fire Protections Systems
		PLB-350	Hydronic Systems Controls
		PLB-410	Low Pressure Steam Systems
		PLB-415	Private Sewage Treatment Systems
		PLB-420	Commercial Sewage Treatment Systems
		PLB-430	Pressure Systems (Rural Water Supply)
		PLB-435	Water Treatment Systems
		PLB-440	Process Piping Systems
4.07		PLB-125	Plastic Piping

RSOS Sub-task		AACS Unit	
	Protects piping systems, equipment and structure from damage.	PLB-130	Copper Tube and Tubing
		PLB-135	Steel Piping
		PLB-140	Cast Iron Piping
		PLB-205	Specialized Piping
		PLB-145	Drainage, Waste and Venting Systems I
		PLB-215	Hot Water Storage Tanks and Heaters
		PLB-225	Drainage, Waste and Venting Systems II
		PLB-230	Hydronic Systems I
		PLB-310	Potable Water Distribution II
		PLB-315	Commercial Drainage Systems
		PLB-325	Storm and Combination Drainage Systems (Sewers)
		PLB-330	Irrigation Systems
		PLB-340	Compressed Air Systems
		PLB-345	Single Family Dwelling Fire Protections Systems
		PLB-350	Hydronic Systems Controls
		PLB-410	Low Pressure Steam Systems
		PLB-415	Private Sewage Treatment Systems
		PLB-420	Commercial Sewage Treatment Systems
		PLB-435	Water Treatment Systems
		PLB-440	Process Piping Systems
4.08	Coordinates excavation and backfilling of trenches.	PLB-305	Water Service
		PLB-310	Potable Water Distribution II
		PLB-315	Commercial Drainage Systems
		PLB-325	Storm and Combination Drainage Systems (Sewers)
		PLB-415	Private Sewage Treatment Systems
		PLB-420	Commercial Sewage Treatment Systems
		PLB-430	Pressure Systems (Rural Water Supply)
4.09	Installs fire stopping devices and materials.	PLB-145	Drainage, Waste and Venting Systems I
		PLB-225	Drainage, Waste and Venting Systems II
		PLB-315	Commercial Drainage Systems
		PLB-320	Commercial Venting Systems
		PLB-325	Storm and Combination Drainage Systems (Sewers)

Task 5 - Uses communication and mentoring techniques.			
5.01	Uses communication techniques.	PLB-100	Safety
5.02	Uses mentoring techniques.	MENT-700	Mentoring I
Task 6 - Prepares pipe.			
6.01	Inspects tube, tubing, pipe and fittings before installation.	PLB-125	Plastic Piping
		PLB-130	Copper Pipe Tube and Tubing
		PLB-135	Steel Piping
		PLB-140	Cast Iron Piping
		PLB-205	Specialized Piping
6.02	Cuts tube, tubing and pipe.	PLB-125	Plastic Piping
		PLB-130	Copper Pipe Tube and Tubing
		PLB-135	Steel Piping
		PLB-140	Cast Iron Piping
		PLB-205	Specialized Piping
6.03	Bends tube, tubing and pipe.	PLB-125	Plastic Piping
		PLB-130	Copper Pipe Tube and Tubing
		PLB-135	Steel Piping
		PLB-205	Specialized Piping
6.04	Prepares tube, tubing and pipe connections.	PLB-125	Plastic Piping
		PLB-130	Copper Pipe Tube and Tubing
		PLB-135	Steel Piping
		PLB-140	Cast Iron Piping
		PLB-205	Specialized Piping
Task 7 - Joins tube, tubing and pipe.			
7.01	Joins copper tube, tubing and pipe.	PLB-130	Copper Pipe Tube and Tubing
7.02	Joins plastic pipe and tubing.	PLB-125	Plastic Piping
7.03	Joins steel pipe.	PLB-135	Steel Piping
7.04	Joins cast iron pipe.	PLB-140	Cast Iron Piping
7.05	Joins specialized pipe.	PLB-205	Specialized Piping
Task 8 - Installs, tests and services sewers.			
8.01	Sizes pipe for sewers.	PLB-325	Storm and Combination Drainage Systems (Sewers)
8.02	Installs manholes and catch basins.	PLB-325	Storm and Combination Drainage Systems (Sewers)
8.03	Installs piping for sewers.	PLB-325	Storm and Combination Drainage Systems (Sewers)
8.04	Tests manholes, catch basins and piping for sewers.	PLB-325	Storm and Combination Drainage Systems (Sewers)
8.05	Services manholes, catch basins and piping for sewers.	PLB-325	Storm and Combination Drainage Systems (Sewers)
Task 9 - Installs, tests and services sewage treatment systems.			
9.01	Plans installation of sewage treatment systems.	PLB-415	Private Sewage Treatment Systems
		PLB-420	Commercial Sewage Treatment Systems
9.02		PLB-415	Private Sewage Treatment Systems

	Installs sewage treatment systems components.	PLB-420	Commercial Sewage Treatment Systems
9.03	Tests sewage treatment systems and components.	PLB-415	Private Sewage Treatment Systems
		PLB-420	Commercial Sewage Treatment Systems
9.04	Services sewage treatment systems and components.	PLB-415	Private Sewage Treatment Systems
		PLB-420	Commercial Sewage Treatment Systems
Task 10 - Installs, tests and services interior drainage waste and vent (DWV) systems.			
10.01	Sizes pipe for interior drainage, waste and vent (DWV) systems.	PLB-145	Drainage, Waste and Venting Systems I
		PLB-225	Drainage, Waste and Venting Systems II
		PLB-315	Commercial Drainage Systems
		PLB-320	Commercial Venting Systems
10.02	Installs underground piping and components for interior drainage, waste and vent systems (DWV).	PLB-145	Drainage, Waste and Venting Systems I
		PLB-225	Drainage, Waste and Venting Systems II
		PLB-315	Commercial Drainage Systems
10.03	Installs piping and components for interior drainage, waste and vent (DWV) systems above-ground.	PLB-145	Drainage, Waste and Venting Systems I
		PLB-225	Drainage, Waste and Venting Systems II
		PLB-315	Commercial Drainage Systems
		PLB-320	Commercial Venting Systems
10.04	Tests interior drainage, waste and vent (DWV) systems.	PLB-225	Drainage, Waste and Venting Systems II
		PLB-315	Commercial Drainage Systems
		PLB-320	Commercial Venting Systems
10.05	Services piping and components for interior drainage, waste and vents (DWV) systems.	PLB-225	Drainage, Waste and Venting Systems II
		PLB-315	Commercial Drainage Systems
		PLB-320	Commercial Venting Systems
Task 11 - Installs , tests and services water services.			
11.01	Sizes pipe for water services.	PLB-160	Potable Water Distribution I
		PLB-305	Water Service
11.02	Installs piping for water services.	PLB-160	Potable Water Distribution I
		PLB-305	Water Service
11.03	Installs water service equipment.	PLB-160	Potable Water Distribution I
		PLB-305	Water Service
11.04	Tests water service piping and components.	PLB-305	Water Service
11.05	Service water services.	PLB-305	Water Service
Task 12 - Installs, tests, and services potable water distribution systems.			
12.01		PLB-160	Potable Water Distribution I

	Sizes piping and equipment for potable water distribution systems.	PLB-215	Hot Water Storage Tanks and Heaters
		PLB-310	Potable Water Distribution II
12.02	Installs piping for potable water distribution systems.	PLB-160	Potable Water Distribution I
		PLB-310	Potable Water Distribution II
12.03	Installs potable water distribution systems equipment.	PLB-160	Potable Water Distribution I
		PLB-215	Hot Water Storage Tanks and Heaters
		PLB-310	Potable Water Distribution II
12.04	Installs cross-connection controls devices and methods.	PLB-160	Potable Water Distribution I
		PLB-310	Potable Water Distribution II
		PLB-425	Cross Connection Control
12.05	Tests potable water distribution systems.	PLB-215	Hot Water Storage Tanks and Heaters
		PLB-310	Potable Water Distribution II
12.06	Services potable water distribution systems.	PLB-215	Hot Water Storage Tanks and Heaters
		PLB-310	Potable Water Distribution II
Task 13 - Installs tests and services pressure systems.			
13.01	Sizes pressure systems.	PLB-430	Pressure Systems (Rural Water Supply)
13.02	Installs piping for pressure systems.	PLB-430	Pressure Systems (Rural Water Supply)
13.03	Installs equipment and components for pressure systems.	PLB-430	Pressure Systems (Rural Water Supply)
13.04	Tests pressure systems.	PLB-430	Pressure Systems (Rural Water Supply)
13.05	Services pressure systems.	PLB-430	Pressure Systems (Rural Water Supply)
Task 14 - Installs, tests and services plumbing fixtures and appliances.			
14.01	Installs fixture supports.	PLB-210	Plumbing Fixtures, Appliances and Accessories
		PLB-335	Commercial/Institutional Plumbing Fixtures and Accessories
14.02	Installs plumbing fixtures and appliances.	PLB-210	Plumbing Fixtures, Appliances and Accessories
		PLB-335	Commercial/Institutional Plumbing Fixtures and Accessories
14.03	Tests plumbing fixtures and appliances.	PLB-210	Plumbing Fixtures, Appliances and Accessories
		PLB-335	Commercial/Institutional Plumbing Fixtures and Accessories
14.04	Services plumbing fixtures and appliances.	PLB-210	Plumbing Fixtures, Appliances and Accessories
		PLB-335	Commercial/Institutional Plumbing Fixtures and Accessories
Task 15 - Installs , tests and services water treatment equipment.			
15.01	Sizes water treatment equipment.	PLB-435	Water Treatment Systems
15.02	Installs water treatment equipment.	PLB-435	Water Treatment Systems

15.03	Tests water treatment equipment.	PLB-435	Water Treatment Systems
15.04	Service water treatment equipment.	PLB-435	Water Treatment Systems
Task 16 - Installs, tests and services low pressure steam systems.			
16.01	Sizes piping and components for low pressure steam systems.	PLB-410	Low Pressure Steam Systems
16.02	Installs piping and components for low pressure steam systems.	PLB-410	Low Pressure Steam Systems
16.03	Tests piping and components for low pressure steam systems.	PLB-410	Low Pressure Steam Systems
16.04	Services piping and components for low pressure steam systems.	PLB-410	Low Pressure Steam Systems
Task 17 - Installs, tests and services hydronic heating and cooling piping systems.			
17.01	Sizes piping and components for hydronic systems.	PLB-230	Hydronic Systems I
17.02	Installs piping and components for hydronic systems.	PLB-230	Hydronic Systems I
17.03	Testing piping and components for hydronic systems.	PLB-300	Hydronic Systems II
17.04	Services piping and components for hydronic systems.	PLB-300	Hydronic Systems II
Task 18 - Installs, tests and services hydronic heating and cooling generating systems.			
18.01	Installs hydronic heating generating systems.	PLB-230	Hydronic Systems I
18.02	Installs hydronic cooling generating systems.	PLB-230	Hydronic Systems I
18.03	Tests hydronic heating and cooling generating systems.	PLB-300	Hydronic Systems II
18.04	Services hydronic heating and cooling generating systems.	PLB-300	Hydronic Systems II
Task 19 - Installs, tests and services hydronic systems controls and transfer units.			
19.01	Installs hydronic system controls.	PLB-350	Hydronic Systems Controls
19.02	Installs hydronic transfer units.	PLB-230	Hydronic Systems I
19.03	Tests hydronic system controls and transfer units.	PLB-300	Hydronic Systems II
		PLB-350	Hydronic Systems Controls
19.04	Services hydronic system controls and transfer units.	PLB-300	Hydronic Systems II
		PLB-350	Hydronic Systems Controls
Task 20 - Installs, tests and services flow-through fire protection systems (not common core).			
20.01	Installs flow-through fire protection systems(Not Common Core).	PLB-345	Single Family Dwelling Fire Protections Systems
20.02	Tests flow-through fire protection systems (Not Common Core).	PLB-345	Single Family Dwelling Fire Protections Systems
20.03	Services flow-through fire protection systems(Not Common Core).	PLB-345	Single Family Dwelling Fire Protections Systems

Task 21 - Installs, tests and service standpipe systems (not common core).			
21.01	Installs piping and equipment for standpipe systems (Not Common Core).		
21.02	Tests standpipe systems (Not Common Core).		
21.03	Services standpipe systems (Not Common core).		
Task 22 - Installs, tests and services specialized systems.			
22.01	Installs piping for specialized systems.	PLB-330	Irrigation Systems
		PLB-340	Compressed Air Systems
		PLB-355	Green Technology
		PLB-400	Gas Piping Systems
		PLB-405	Medical Gas Systems
22.02	Installs equipment and components for specialized systems.	PLB-330	Irrigation Systems
		PLB-340	Compressed Air Systems
		PLB-355	Green Technology
		PLB-400	Gas Piping Systems
		PLB-405	Medical Gas Systems
22.03	Tests specialized systems.	PLB-330	Irrigation Systems
		PLB-340	Compressed Air Systems
		PLB-355	Green Technology
		PLB-400	Gas Piping Systems
		PLB-405	Medical Gas Systems
22.04	Services specialized systems.	PLB-330	Irrigation Systems
		PLB-340	Compressed Air Systems
		PLB-355	Green Technology
		PLB-400	Gas Piping Systems
		PLB-405	Medical Gas Systems
Task 23 - Installs, tests and services process piping systems.			
23.01	Installs piping for process piping systems.	PLB-440	Process Piping Systems
23.02	Installs equipment and components for process piping systems.	PLB-440	Process Piping Systems
23.03	Tests process piping systems.	PLB-440	Process Piping Systems
23.04	Services process piping systems.	PLB-440	Process Piping Systems

Level 1

PLB-100 Safety

Learning Outcomes:

- Demonstrate knowledge of safe work practices.
- Demonstrate knowledge of regulatory requirements pertaining to workplace safety.
- Demonstrate knowledge of PPE and safety equipment, its applications, maintenance and procedures for use.
- Demonstrate knowledge of regulatory requirements pertaining to PPE and safety equipment.
- Demonstrate knowledge of regulations, applications and procedures for locking out equipment.

2016 Red Seal Occupational Standard Reference:

1.01 Maintains safe work environment.
1.02 Uses personal protective equipment (PPE) and safety equipment.
1.03 Performs lock-out and tag-out procedures.
5.01 Uses communication techniques.

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Identify work site hazards and describe safe work practices.
    i) personal
    ii) workplace
        - trenching hazards
        - shoring hazards
        - electrical hazards
        - chemical hazards
        - hazardous materials
        - environmental hazards
        - temperature extremes

- tag-out/lock-out
- poor housekeeping
- overhead hazards
- tripping hazards
- vibration hazards
- air quality hazards
- falling hazards
- confined space hazards
- hot work hazards
- silica and asbestos hazards
- noise hazards

2. Identify responsibilities regarding site specific safety policies and procedures.

3. Identify types of PPE and safety equipment and describe their applications, limitations and procedures for use.
   i) PPE
      - fall-arrest systems
      - respirators
      - steel toed boots
      - hardhats
      - safety glasses
      - hearing protection
      - gloves
      - face shields
      - protective wristlets
      - fire-retardant clothing
      - high-visibility clothing
   ii) equipment
      - fire extinguishers
      - first aid kits
      - smoke and fume extractors

4. Identify training required by jurisdictional codes and regulations, and site-specific regulations.
   i) lock-out and tag-out regulations
   ii) jurisdictional safety and health regulations
   iii) site-specific regulations

5. Identify regulations and safety documentation pertaining to the use of PPE and safety equipment.

6. Identify situations and system equipment and components that require lock-out/tag- out.
   - i) equipment
     - lock and key
     - chains and tags
     - lock-out scissor clamps
     - lock-box
   - ii) components
     - pumps
     - valves
     - electrical panels

7. Identify safety regulations pertaining to locking out electrical equipment, piping equipment and piping.

8. Describe federal, jurisdictional and local safety and health laws and requirements.
   - i) federal
     - Workplace Hazardous Material Information System (WHMIS)
       - SDS
       - labels
       - hazardous materials
         - pipe dope
         - cutting oil
         - glycol
         - solvents
         - compressed gas cylinders
         - Transportation of Dangerous Goods (TDG)
   - ii) provincial/territorial
   - iii) municipal

9. Describe company or jurisdictional procedures for emergency response.

10. Describe isolation methods, procedures and documentation for locking out/tagging out equipment and piping.
    - i) tag-in and tag-out
    - ii) sign-in and sign-out

iii) company-specific policies
iv) isolation methods
- double-block-and-bleed
- blinding
- breaker locks
- opening low point valves
- checking gauges and switches
- inspecting sight glasses

v) documentation
- lock-out and tag-out permits
- tool box meeting reports
- sign-in and sign-out sheets

11. Describe procedures used to care for, maintain and store PPE and safety equipment.

12. Describe components of professional conduct.
i) no horseplay or rough housing
ii) no drug and alcohol use (either at work or prior to coming to work)
iii) no harassment
iv) appropriate work attire

Practical Objectives

N/A

PLB-105 Tools and Equipment

Learning Outcomes:

- Demonstrate knowledge of tools and equipment, their applications, maintenance and procedures for use.

2016 Red Seal Occupational Standard Reference:

2.01 Uses common tools and equipment.

Suggested Hours:

18 Hours

Objectives and Content:

Theoretical Objectives

1. Identify hazards and describe safe work practices pertaining to the use of tools and equipment.
   - i) worn
   - ii) bent
   - iii) broken
   - iv) damaged
   - v) inoperable

2. Identify training and certification required by AHJ related to the use of tools and equipment.

3. Identify types of hand tools and describe their applications and procedures for use.
   - i) pipe wrenches
   - ii) combination wrenches
   - iii) spacers
   - iv) wedges
   - v) squares
   - vi) levels

4. Identify types of power tools and describe their applications and procedures for use.
   i) electrical
   ii) pneumatic
   iii) hydraulic

5. Identify types of measuring tools and equipment and describe their applications and procedures for use.
   i) measuring tape
   ii) ruler
   iii) manometer
   iv) digital measuring devices

6. Identify types of powder-actuated tools and describe their applications.

7. Identify types of pipe cutting and joining equipment and describe their applications and procedures for use.

8. Describe the procedures used to inspect, maintain and store tools and equipment.

Practical Objectives

1. Use of tools and equipment according to manufacturers' specifications.

PLB-110 Access Equipment

Learning Outcomes:

- Demonstrate knowledge of ladders and aerial work platforms, their applications, limitations and procedures for use.

2016 Red Seal Occupational Standard Reference:

2.02 Uses access equipment.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Identify hazards and describe safe work practices pertaining to ladders and aerial work platform.

2. Identify jurisdictional regulations and site specific requirements pertaining to ladders and aerial work platforms.
   i) personnel training/certification
   ii) equipment certification requirements
   iii) proper use and limitations of equipment

3. Identify types of ladders and describe their characteristics and applications.
   i) step ladders
   ii) extension ladders
   iii) platform ladders

4. Identify types of aerial work platforms and describe their characteristics and applications.
   i) scaffolds
   ii) motorized work platforms

5. Identify types of motorized aerial work platforms and describe their characteristics and applications.
   i) scissor lift
   ii) articulated boom
   iii) personnel basket

6. Describe the procedures used to erect and dismantle ladders and aerial work platforms.

Practical Objectives

N/A

PLB-115 Hoisting, Lifting and Rigging

Learning Outcomes:

- Demonstrate knowledge of rigging, hoisting, lifting and positioning equipment, their applications, limitations and procedures for use.
- Demonstrate knowledge of calculations required when performing hoisting and lifting and positioning operations.
- Demonstrate knowledge of inspection for rigging, hoisting, lifting and positioning equipment.

2016 Red Seal Occupational Standard Reference:

2.03 Uses rigging, hoisting, lifting and positioning equipment.
2.04 Rigs loads for cranes.

Suggested Hours:

18 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with rigging, hoisting, lifting and positioning.

2. Identify types of rigging, hoisting, lifting and positioning equipment and accessories and describe their applications and load capacity.
   - i) block and tackle
   - ii) chain blocks
   - iii) come alongs
   - iv) snatch blocks
   - v) pallet jacks
   - vi) tugger (power)
   - vii) winches
   - viii) fork lifts
   - ix) grip hoists
   - x) wire ropes
   - xi) shackles

xii) nylon slings
xiii) softeners
xiv) rope
xv) tag line
xvi) boom trucks
xvii) overhead cranes
xviii) telescopic forklifts
xix) mobile cranes
xx) tower cranes
xxi) load requirements
- WLL
- final location of load

3. Identify jurisdictional regulations and site requirements pertaining to the lifting of material, equipment and personnel for crane hoisting.
i) personnel training/certification
ii) equipment certification requirements
iii) use and limitations of equipment

4. Identify hazards and describe safe work practices pertaining to hoisting, lifting, rigging and positioning.
i) blind spots
ii) power lines
iii) overhead piping
iv) live equipment
v) site-specific hazards

5. Identify types of equipment used to secure the lift area.

6. Identify types of knots, hitches and bends and describe their applications and the procedures used to tie and inspect.
i) bowline
ii) cat's paw
iii) clove hitch
iv) half hitch

7. Describe the procedures used to ensure the work area is safe for rigging, hoisting, lifting and positioning.

8. Describe the procedures used to rig material/equipment for lifting, hoisting and positioning.

9. Describe procedures used to communicate during rigging, hoisting, lifting and positioning operations.
   i) using hand signals
   ii) radio communication and a signaler

10. Describe the procedures used for attaching rigging equipment to the load.
   i) bolting
   ii) lashing
   iii) site specific methods

11. Identify procedures used to calculate load weights.

12. Explain sling angle when preparing for hoisting and lifting operation.

13. Explain correlation of sling angles to sling capacities.

14. Identify the factors to consider when selecting rigging, hoisting, lifting and positioning equipment.

15. Describe the procedures used to inspect, maintain and store rigging, hoisting, lifting and positioning equipment.
   i) equipment faults
      - rips
      - tears
      - cracks
      - bird-caging
      - frayed wire rope
      - frayed synthetic slings
      - worn shackles
      - hydraulic oil leaks
      - missing rating tags
      - non-CSA approved equipment

16. Calculate equipment de-rating criteria to specifications.

Practical Objectives

N/A

PLB-120 Welding, Fuel Brazing and Cutting

Learning Outcomes:

- Demonstrate knowledge of welding equipment, applications and procedures for not-pressure and non-structural welds.
- Demonstrate knowledge of soldering and brazing equipment, applications and procedures.
- Demonstrate knowledge of disarming the work area location within the fire monitoring system.
- Demonstrate knowledge of oxy-fuel equipment, applications and procedures.

2016 Red Seal Occupational Standard Reference:

2.05 Uses welding equipment.
2.06 Uses soldering and brazing equipment.
2.07 Uses oxy-fuel equipment.

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Identify types of welding, soldering and brazing, and oxy-fuel equipment.
    i) welding
        - Shielded Metal Arc Welding (SMAW)
        - Gas Tungsten Arc Welding (GMAW)
        - heat fusion welding
        - plasma welding
    ii) soldering and brazing
        - oxy-fuel and air-fuel torches
        - attachments
            - strikers
            - methylacetylene-propadiene propane [MAPP] gas cylinders
            - torch heads
            - flashback arrestors

- regulators
- hoses

2. Identify hazards and safety practices pertaining to welding, soldering and brazing oxy-fuel and cutting.

3. Identify different welding, soldering and brazing, and oxy-fuel processes and applications.
   i) welding
      - SMAW
      - GTAW
      - GMAW
   ii) soldering and brazing
      - silver solder
      - flux
      - soft solder
      - brazing rod
      - sand cloth
      - gases
         - nitrogen
         - carbon dioxide
         - oxygen
         - acetylene
         - MAPP
         - propane
         - argon

4. Identify welding, soldering and brazing, and oxy-fuel consumables.
   i) welding rods
   ii) flux
   iii) grinding discs
   iv) shielding gases

5. Describe the use of welding equipment their applications and procedures for use.

6. Describe oxy-fuel brazing and cutting procedures.

7. Explain the procedure on how to isolate specific area of the fire monitoring system.
   i) assisting to locate a fire hazard

ii) alerting first responders

8. Identify flush and purge procedures required for soldering and brazing
   i) valve isolation
   ii) monitoring pressures
   iii) monitoring flow rates

9. Describe the procedures used to inspect, maintain and store welding and soldering and brazing equipment and consumables.

10. Describe the procedures used to inspect, maintain, store and shut down oxy-fuel equipment.

Practical Objectives

1. Use oxy fuel, brazing and cutting techniques.

PLB-125 Plastic Piping

Learning Outcomes:

- Demonstrate knowledge of the procedures to calculate plastic pipe and tubing length.
- Demonstrate knowledge of mathematical calculations of plastic pipe and tubing offsets.
- Demonstrate knowledge of the procedures used to measure plastic pipe and tubing and fitting allowance.
- Demonstrate knowledge of the procedures used to bend plastic pipe and tubing.
- Demonstrate knowledge of the techniques for preparing plastic pipe and tubing connections.
- Demonstrate knowledge of the procedures used to measure, cut and join plastic pipe and tubing.
- Demonstrate knowledge of plastic pipe and tubing, and associated fittings and accessories.

2016 Red Seal Occupational Standard Reference:

4.02 Calculates pipe, tube and tube lengths.
4.03 Calculates piping offsets.
4.04 Installs piping supports.
4.05 Installs sleeves.
4.07 Protects piping systems, equipment and structure from damage.
6.01 Inspects tube, tubing, pipe and fittings before installation.
6.02 Cuts tube, tubing and pipe.
6.03 Bends tube, tubing and pipe.
6.04 Prepares tube, tubing and pipe connections.
7.02 Joins plastic pipe and tubing.

Suggested Hours:

24 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with plastic pipe and tubing.

2. Interpret codes and regulations pertaining to plastic pipe and tubing.

3. Interpret information pertaining to plastic pipe and tubing found on drawings and specifications.
   i) engineered drawings
   ii) manufacturers' requirements
   iii) job specifications
   iv) shop drawings

4. Identify tools and equipment relating to plastic pipe and tubing and describe their applications and procedures for use.
   i) crimping tools
   ii) expanders
   iii) heat plates and timer
   iv) cutters
   v) hot-air tools
   vi) threading machines
   vii) chamfer tools
   viii) reaming tools
   ix) cut groovers
   x) torque ratchets
   xi) electrofusion machines
   xii) coring drills
   xiii) tin snips
   xiv) grinders
   xv) hole saws
   xvi) tape measures
   xvii) scale rulers
   xviii) calculators

5. Identify hazards and describe safe work practices pertaining to plastic pipe and tubing.

6. Identify plastic pipe and tubing system applications and describe their characteristics and requirements.

7. Identify types of plastic pipe and tubing and describe their properties and characteristics.

i) PVC
ii) chlorinated polyvinyl chloride (CPVC)
iii) acrylonitrile-Butadiene-Styrene (ABS)
iv) high-density polyethylene (HDPE)
v) PEX
vi) PEX-Aluminum-PEX (PEX-AL-PEX)
vii) Polyethylene (PE)

8. Identify fittings used with plastic pipe and tubing and describe their purpose and applications.

9. Identify plastic pipe and tubing accessories and describe their purpose and applications.
   i) supports
      - anchors
      - guides
   ii) expansion joints
   iii) hangers
   iv) sleeves

10. Identify the methods used to cut and join plastic pipe and tubing and describe their associated procedures.
   i) welded
      - solvent welding
      - hot-air welding
      - socket fusion
      - butt fusion
   ii) threaded
   iii) tapping
   iv) flanged
   v) cut-grooved
   vi) crimped
   vii) expanded
   viii) push-fit
   ix) compression
   x) mechanical
   xi) gasket
   xii) transition

11. Identify adaptors required for transitions.

i) male
ii) female
iii) mechanical joints

12. Describe the procedures used to install fittings and accessories for plastic pipe and tubing.

13. Describe the identification systems and methods for plastic pipe and tubing.

14. Describe the procedures used to measure plastic pipe and tubing.

15. Describe the procedures used to test, inspect and commission plastic pipe and tubing.

16. Interpret linear expansion and contraction tables in NPC and specifications for plastic pipe and tubing.

17. Explain the systems of measurement for plastic pipe and tubing.
    i) allowance
    ii) dimension
    iii) length
    iv) wall thickness/schedule

18. Perform calculations to determine tube, tubing and piping measurements for plastic pipe and tubing.
    i) fitting allowances
        - center-to-center
        - end-to-end
        - center to end
        - offsets
            - rolling
            - jumper
            - equal spread
19. Calculate offset using both imperial and metric units for spread offsets for plastic pipe and tubing.

20. Calculate offsets in plastic pipe and tubing for various changes in direction.

Practical Objectives

1. Use tools and equipment to measure, cut and join plastic piping.

PLB-130 Copper Pipe Tube and Tubing

Learning Outcomes:

- Demonstrate knowledge of the procedures to calculate, cut and join copper pipe tube and tubing length.
- Demonstrate knowledge of mathematical calculations of copper pipe tube and tubing offsets.
- Demonstrate knowledge of the procedures used to measure copper pipe tube and tubing and fitting allowance.
- Demonstrate knowledge of the procedures used to bend copper pipe tube and tubing.
- Demonstrate knowledge of the techniques for preparing copper pipe tube and tubing connections.
- Demonstrate knowledge of the procedures used to measure, cut and join copper pipe tube and tubing.
- Demonstrate knowledge of copper tube, tubing and pipe, and associated fittings and accessories.

2016 Red Seal Occupational Standard Reference:

4.02 Calculates pipe, tube and tube lengths.
4.03 Calculates piping offsets.
4.04 Installs piping supports.
4.05 Installs sleeves.
4.07 Protects piping systems, equipment and structure from damage.
6.01 Inspects tube, tubing, pipe and fittings before installation.
6.02 Cuts tube, tubing and pipe.
6.03 Bends tube, tubing and pipe.
6.04 Prepares tube, tubing and pipe connections.
7.01 Joins copper tube, tubing and pipe.

Suggested Hours:

24 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with copper tube, tubing and pipe.

2. Identify hazards and describe safe work practices pertaining to copper tube, tubing and pipe.

3. Interpret codes, regulations and standards pertaining to copper tube, tubing and pipe.

4. Interpret information pertaining to copper tube, tubing and pipe found on drawings and specifications.
   i) engineered drawings
   ii) manufacturers' requirements
   iii) job specifications
   iv) shop drawings

5. Identify adaptors required to join dissimilar materials to prevent galvanic action.
   i) dielectric unions

6. Identify tools and equipment relating to copper tube, tubing and pipe and describe their applications and procedures for use.
   i) pipe and tubing cutters
   ii) flaring tools
   iii) grooving tools
   iv) soldering and brazing equipment
   v) swaging tools
   vi) press-fit

7. Identify types of copper tube, tubing and pipe and describe their properties and characteristics.

8. Identify fittings used with copper tube, tubing and pipe and describe their purpose and applications.

9. Identify pipe and tubing accessories and describe their purpose and applications.
   i) supports
      - anchors
      - guides
   ii) expansion joints

iii) hangers
iv) sleeves

10. Identify the methods used to cut and join copper tube, tubing and pipe and describe their associated procedures.
    i) press-fit
    ii) soldered
    iii) brazed
    iv) grooved
    v) flanged
    vi) flared
    vii) compression
    viii) swaged
    ix) corporation
    x) push-fit

11. Describe the procedures used to install fittings and accessories for copper tube, tubing and pipe.

12. Describe the identification systems and methods for copper tube, tubing and pipe.

13. Describe the procedures used to measure copper tube, tubing and pipe.

14. Describe the procedures used to test, inspect and commission copper tube, tubing and pipe.

15. Describe the procedures used to bend copper tube, tubing and pipe.
    i) types
        - soft
        - semi-soft (partially annealed)
        - rigid
    ii) distortions
        - kinks
        - ripples

16. Interpret linear expansion and contraction tables in NPC and specifications for copper tube, tubing and pipe.

17. Explain the systems of measurement for copper tube, tubing, pipe and fittings.

i) allowance
ii) dimension
iii) length
iv) wall thickness/schedule

18. Perform calculations to determine copper tube, tubing and pipe measurements.
    i) fitting allowances
        - center-to-center
        - end-to-end
        - center to end
        - offsets
            - rolling
            - jumper
            - equal spread
    ii) offsets

19. Calculate offset using both imperial and metric units for spread offsets for copper tube, tubing and pipe.

20. Calculate offsets in piping for various changes in direction for copper tube, tubing and pipe.

Practical Objectives

1. Use tools and equipment to measure, cut, prepare and join copper piping.

PLB-135 Steel Piping

Learning Outcomes:

- Demonstrate knowledge of the procedures to calculate steel piping length.
- Demonstrate knowledge of mathematical calculations of steel piping offsets.
- Demonstrate knowledge of the procedures used to measure steel piping and fitting allowance.
- Demonstrate knowledge of the procedures used to bend steel piping.
- Demonstrate knowledge of the techniques for preparing steel piping connections.
- Demonstrate knowledge of the procedures used to measure, cut and join steel piping.
- Demonstrate knowledge of steel piping and associated fittings and accessories.

2016 Red Seal Occupational Standard Reference:

4.02 Calculates pipe, tube and tube lengths.
4.03 Calculates piping offsets.
4.04 Installs piping supports.
4.05 Installs sleeves.
4.07 Protects piping systems, equipment and structure from damage.
6.01 Inspects tube, tubing, pipe and fittings before installation.
6.02 Cuts tube, tubing and pipe.
6.03 Bends tube, tubing and pipe.
6.04 Prepares tube, tubing and pipe connections.
7.03 Joins steel pipe.

Suggested Hours:

24 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with steel piping.

2. Identify hazards and describe safe work practices pertaining to steel piping.

3. Interpret codes and regulations pertaining to steel piping.

4. Interpret information pertaining to steel piping found on drawings and specifications.
   i) engineered drawings
   ii) manufacturers' requirements
   iii) job specifications
   iv) shop drawings

5. Identify the methods used to cut and join steel piping and describe their associated procedures.
   i) welded
   ii) threaded
   iii) flanged
   iv) cut-grooved
   v) roll-grooved
   vi) press-fit
   vii) mechanical

6. Identify tools and equipment related to steel piping and describe their applications and procedures for use.
   i) grinders
   ii) threaders
   iii) press-fit tools
   iv) cutters
   v) cut-groovers
   vi) roll-groovers
   vii) wrenches

7. Identify steel piping systems and describe their characteristics and applications.
   i) carbon steel
   ii) galvanized
   iii) stainless steel

8. Identify types of steel piping and describe their properties and characteristics.

9. Identify fittings used with steel piping and describe their purpose and applications.

10. Identify steel piping accessories and describe their purpose and applications.
    i) supports
        - anchors
        - guides
    ii) expansion joints
    iii) hangers

11. Describe the identification systems and methods used for steel piping.

12. Describe the procedures used to install fittings and accessories for steel piping.

13. Describe the procedures used to measure steel piping.

14. Describe the procedures used to test, inspect and commission steel piping.

15. Describe the procedures used to bend steel piping.

16. Interpret linear expansion and contraction tables in NPC and specifications for steel piping.

17. Explain the systems of measurement for steel piping and fittings.
    i) allowance
    ii) dimension
    iii) length
    iv) wall thickness/schedule

18. Perform calculations to determine steel piping measurements.
    i) fitting allowances
        - center-to-center
        - end-to-end
        - center to end
        - offsets
            - rolling
            - jumper
            - equal spread
    ii) offsets

19. Calculate offset using both imperial and metric units for spread offsets for steel piping.

20. Calculate offsets in piping for various changes in direction for steel piping.

Practical Objectives

1. Use tools and equipment to measure, cut, prepare and join steel piping.

PLB-140 Cast Iron Piping

Learning Outcomes:

- Demonstrate knowledge of the procedures to calculate cast iron piping length.
- Demonstrate knowledge of mathematical calculations of cast iron piping offsets.
- Demonstrate knowledge of the procedures used to measure cast iron piping and fitting allowance.
- Demonstrate knowledge of the procedures used to bend cast iron piping.
- Demonstrate knowledge of the techniques for preparing cast iron piping connections.
- Demonstrate knowledge of the procedures used to measure, cut and join cast iron piping.
- Demonstrate knowledge of cast iron piping and associated fittings and accessories.
- Demonstrate knowledge of the procedures used to cut and join cast iron piping.

2016 Red Seal Occupational Standard Reference:

4.02 Calculates pipe, tube and tube lengths.
4.03 Calculates piping offsets.
4.04 Installs piping supports.
4.05 Installs sleeves.
4.07 Protects piping systems, equipment and structure from damage.
6.01 Inspects tube, tubing, pipe and fittings before installation.
6.02 Cuts tube, tubing and pipe.
6.04 Prepares tube, tubing and pipe connections.
7.04 Joins cast iron pipe.

Suggested Hours:

15 Hours

Objectives and Content:

Theoretical Objective

1. Define terminology associated with cast iron piping.

2. Identify hazards and describe safe work practices pertaining to cast iron piping.

3. Interpret codes and regulations pertaining to cast iron piping.

4. Interpret information pertaining to cast iron piping found on drawings and specifications.
   i) engineered drawings
   ii) manufacturers' requirements
   iii) job specifications
   iv) shop drawings

5. Identify tools and equipment relating to cast iron piping and describe their applications and procedures for use.
   i) snap cutters
   ii) nut drivers
   iii) come alongs
   iv) ratchets
   v) sockets

6. Identify types of cast iron piping and describe their properties and characteristics.
   i) soil
   ii) duriron
   iii) ductile iron

7. Identify fittings used with cast iron piping and describe their purpose and applications.

8. Identify cast iron piping accessories and describe their purpose and applications.
   i) supports
   ii) hangers and sleeves
   iii) flanges
   iv) thrust blocks
   v) pipe restraints

9. Identify the methods used to cut and join cast iron piping and describe their associated procedures.
   i) joints

ii) mechanical joint clamps
iii) hub and spigot
iv) oakum and cold caulking compound
v) lead and oakum
vi) gasket joints
vii) mechanical restraints
viii) riser clamps
ix) thrust blocks

10. Describe the identification systems and methods for cast iron piping.

11. Describe the procedures used to install fittings and accessories for cast iron piping.

12. Describe the procedures used to measure cast iron piping.

13. Describe the procedures used to test, inspect and commission cast iron piping.

14. Interpret linear expansion and contraction tables in NPC and specifications for cast iron piping.

15. Explain the systems of measurement for cast iron piping and fittings.
    i) allowance
    ii) dimension
    iii) length
    iv) wall thickness/schedule

16. Perform calculations to determine cast iron piping measurements.
    i) fitting allowances
        - center-to-center
        - end-to-end
        - center to end
        - offsets
            - rolling
            - jumper
            - equal spread
    ii) offsets

17. Calculate offset using both imperial and metric units for spread offsets for cast iron piping.

18. Calculate offsets in piping for various changes in direction for cast iron piping.

Practical Objectives

1. Use tools and equipment to measure, cut, prepare and join cast iron piping.

PLB-145 Drainage, Waste and Venting Systems I

Learning Outcomes:

- Demonstrate basic knowledge of residential drainage, waste and vent systems, their components, applications and operation.
- Demonstrate basic of the procedures used to layout and install residential drainage, waste and vent systems.
- Demonstrate basic knowledge of residential drainage, waste and vent system equipment and components, their applications and operation.
- Demonstrate basic knowledge of the procedures to install fire stopping devices and materials.

2016 Red Seal Occupational Standard Reference:

4.01 Performs piping system layout.
4.06 Commissions systems.
4.07 Protects piping systems, equipment and structure from damage.
4.09 Installs fire stopping devices and materials.
10.01 Sizes pipe for interior drainage, waste and vent (DWV) systems.
10.02 Installs underground piping and components for interior drainage, waste and vent (DWV) systems.
10.03 Installs piping and components for interior drainage, waste and vent (DWV) systems above-ground.

Suggested Hours:

42 Hours

Objectives and Content:

Theoretical Objectives

1. Identify hazards and describe safe work practices pertaining to residential drainage, waste and vent systems.

2. Interpret codes and regulations pertaining to residential drainage, waste and vent systems.

3. Interpret information pertaining to residential drainage, waste and vent systems found on drawings and specifications.

4. Identify tools and equipment relating to residential drainage, waste and vent systems and describe their applications and procedures for use.

5. Identify types of residential drainage, waste and vent systems and explain their purpose and applications.

6. Identify residential drainage, waste and vent systems equipment and components and describe their purpose, operation and applications.
   i) fittings
   ii) pipe
   iii) valves
   iv) sewage sumps
   v) sewage lift
   vi) interceptors
   vii) specialty traps
   viii) expansion joints
   ix) wall plates
   x) fire stopping
   xi) insulation

7. Identify types of hangers and supports used to install residential drainage, waste and vent systems and describe their procedures for installation.

8. Identify the factors to consider when installing residential drainage, waste and vent systems components.
   i) hydraulic load
   ii) grading
   iii) code requirements

9. Describe the procedures used to install residential drainage, waste and vent systems in trenches.
   i) protection
   ii) support
   iii) safety considerations

10. Identify components used to protect residential drainage, waste and vent systems, components and buildings and describe their installation procedures.

i) expansion joints
ii) wall plates
iii) fire stopping
iv) insulation

11. Identify fire stopping devices and materials and describe their purpose and application.

12. Describe the procedures to install fire stopping devices and materials.

13. Identify the methods of backflow protection used in residential drainage, waste and vent systems.
    i) backwater valves
    ii) gate valves

14. Identify storm system components and describe their purpose and applications.

15. Identify the factors to consider when sizing residential drainage, waste and vent systems components.
    i) hydraulic load
    ii) code requirements

16. Describe the procedures used to determine hydraulic load on sanitary residential drainage, waste and vent systems.
    i) sizing
        - residential

Practical Objectives

N/A

PLB-150 Drawings I

Learning Outcomes:

- Demonstrate knowledge of drawings and specifications.
- Demonstrate knowledge of various piping and equipment layouts and applications.
- Demonstrate knowledge of layout tools and equipment.

2016 Red Seal Occupational Standard Reference:

3.01 Organizes project tasks and procedures.
3.02 Organizes materials and supplies.
4.01 Performs piping system layout.

Suggested Hours:

27 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with drawings, sketches and specifications.

2. Describe metric and imperial systems of measurement and the procedures used to perform conversions.

3. Identify the types of drawings and specifications and describe their application and procedure for use.
   i) engineered drawings
   ii) manufacturers' requirements
   iii) job specifications
   iv) standards
   v) shop drawings and sketches

4. Identify types of symbols and describe their characteristics and applications used on drawings, sketches and specifications.

5. Identify drawing views and describe their applications.
   i) plan
   ii) section
   iii) detail
   iv) elevation
   v) cross section

6. Describe the use of scales.

7. Interpret blueprints, specification documentation and job site instructions.

8. Describe the procedures used for the care, handling and storage of drawings, sketches and specifications.

9. Identify various piping systems and applications on drawings, sketches and specifications.
   i) appliances
   ii) fixtures
   iii) control devices

10. Describe types of layout tools and equipment and their procedures for use.
   i) builder levels
   ii) levels
   iii) tape measures
   iv) lasers
   v) marking tools
   vi) wraparounds
   vii) Philadelphia /stadia rod

Practical Objectives

1. Use various drafting tools.

MENT-700 Mentoring

Learning Outcomes:

- Demonstrate knowledge of effective communication practices as a learner.
- Demonstrate knowledge of strategies for learning skills in the workplace.

Red Seal Occupational Standard Reference:

5.01 Uses communication techniques
5.02 Uses mentoring techniques

Suggested Hours:

6 hours

Theoretical Objectives:

1. Describe the importance of one's own individual experiences.
2. Identify behaviours that demonstrate positive learning experiences.
3. Identify the benefits of workplace mentoring for the apprentice, mentor, and employer.
4. Identify the partners involved in apprenticeship training.
5. Describe the shared responsibilities for workplace learning in apprenticeship.
6. Identify different learning needs and strategies to address challenges or barriers in the workplace.
   i) learning disabilities
   ii) language
   iii) underrepresentation
7. Identify the components that create a positive and inclusive workplace culture.
   i) workplace characteristics
   ii) individual behaviours
8. Identify various learning styles and determine one’s own learning preferences.

9. Explain how learning preferences impact learning new skills.

10. Identify different learning strategies to meet individual learning needs.

11. Describe the importance of adapting to a variety of teaching and learning methods in the workplace.

12. Identify techniques for effective communication as a learner.
    i) verbal and non-verbal
    ii) active listening

13. Identify and describe personal responsibilities and attitudes that contribute to on-the-job success.
    i) self advocating
    ii) asking questions
    iii) accepting constructive feedback
    iv) working safely
    v) employing time management techniques and being punctual

Practical Objectives:

N/A

PLB-160 Potable Water Distribution I

Learning Outcomes:

- Demonstrate basic knowledge of potable water distribution equipment and components, their applications and operation.
- Demonstrate basic knowledge of the procedures used to install, potable water distribution systems.

2016 Red Seal Occupational Standard Reference:

11.01 Sizes pipe for water services.
11.02 Installs piping for water services.
11.03 Installs water service equipment.
12.01 Sizes piping and equipment for potable water distribution systems.
12.02 Installs piping for potable water distribution systems.
12.03 Installs potable water distribution equipment.
12.04 Installs and uses cross-connection control devices and methods.

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Interpret codes and regulations pertaining to water service and water distribution systems.
   i) simplified method for residential water lines

2. Interpret information pertaining to potable water distribution and water service systems found on drawings and specifications.

3. Explain back siphonage and back pressure and their causes.

4. Explain water hammer, its causes and methods of prevention or control.

5. Identify hazards and describe safe work practices pertaining to water distribution and water service servicing.

6. Identify the factors to consider in determining depth for water service piping.

7. Identify tools and equipment relating to water distribution and water service systems and describe their applications and procedures for use.
   i) wrenches
   ii) saws
   iii) pipe cutters
   iv) excavation equipment
   v) brazing equipment
   vi) level

8. Identify potable water distribution systems and components and describe their characteristics and applications.

9. Identify types of water service and water distribution piping, equipment and components and describe their characteristics and applications.
   i) public
   ii) private
   iii) residential
   iv) ICI

10. Identify testing equipment for potable water distribution and water service systems.

11. Describe the procedures used to protect potable water distribution and water service system piping, equipment and components.
   i) freeze protection
   ii) electrolysis
   iii) water hammer

12. Describe the procedures used to size potable water lines for residential potable water distribution systems.
   i) simplified method

Practical Objectives

N/A

Level 2

PLB-200 Piping Valves

Learning Outcomes:

- Demonstrate knowledge of piping valves, their applications and operation.
- Demonstrate knowledge of the procedures used to install, maintain, repair, test and troubleshoot piping valves.

2016 Red Seal Occupational Standard Reference:

Valves are embedded throughout entire RSOS and are addressed as applied concepts and taught in context throughout applicable units in the AACS.

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with piping valves.

2. Identify hazards and describe safe work practices pertaining to piping valves.

3. Interpret codes, regulations and standards pertaining to piping valves.

4. Interpret information found on drawings and specifications pertaining to piping valves.

5. Identify tools and equipment relating to piping valves and describe their applications and procedures for use.

6. Identify types of piping valves and describe their characteristics, operation and applications.
   i) gate
   ii) globe
   iii) ball
   iv) plug

v) butterfly
vi) check
vii) relief
viii) pop safety
ix) pressure reducing
x) float operated
xi) diaphragm
xii) mixing

7. Identify types of valve actuators and describe their purpose.
   i) electric
   ii) pneumatic
   iii) manual
   iv) thermal expansion

8. Explain piping valve rating systems.
   i) pressure
   ii) temperature

9. Identify the methods used to join piping valves and describe their associated procedures.

10. Describe the procedures used to install piping valves.
    i) position
    ii) location
    iii) accessibility

11. Describe the procedures used to maintain and repair piping valves.
    i) disassembly/reassembly
    ii) replacement of parts
    iii) re-packing
    iv) tools

12. Describe the procedures used to test and troubleshoot piping valves.

Practical Objectives

N/A

PLB-205 Specialized Piping

Learning Outcomes:

- Demonstrate knowledge of the procedures to calculate specialized piping length.
- Demonstrate knowledge of mathematical calculations of specialized piping offsets.
- Demonstrate knowledge of the procedures used to measure specialized piping and fitting allowance.
- Demonstrate knowledge of the procedures used to bend specialized piping.
- Demonstrate knowledge of the techniques for preparing specialized piping connections.
- Demonstrate knowledge of the procedures used to measure, cut and join specialized piping.
- Demonstrate knowledge of specialized piping, fittings and accessories.

2016 Red Seal Occupational Standard Reference:

4.02 Calculates pipe, tube and tube lengths.
4.03 Calculates piping offsets.
4.04 Installs piping supports.
4.05 Installs sleeves.
4.07 Protects piping systems, equipment and structure from damage.
6.01 Inspects tube, tubing, pipe and fittings before installation.
6.02 Cuts tube, tubing and pipe.
6.03 Bends tube, tubing and pipe.
6.04 Prepares tube, tubing and pipe connections.
7.05 Joins specialized pipe.

Suggested Hours:

9 Hours

Objectives and Content:

Theoretical Objective

1. Define terminology associated with specialized piping.

2. Identify types of specialized piping and their applications.
   i) glass
   ii) concrete
   iii) fiberglass
   iv) stainless steel
   v) brass

3. Describe and identify types of historical piping.
   i) asbestos-cement
   ii) lead
   iii) clay
   iv) bituminized fibre

4. Identify hazards and describe safe work practices pertaining to specialized piping.

5. Interpret codes, standards and regulations pertaining to specialized piping.

6. Interpret information pertaining to specialized piping found on drawings and specifications.
   i) engineered drawings
   ii) manufacturers' requirements
   iii) job specifications
   iv) shop drawings

7. Identify specialized piping systems and describe their characteristics and applications.

8. Identify types of specialized piping and describe their properties, purpose, applications and characteristics.

9. Identify fittings used with specialized piping and describe their purpose and applications.

10. Identify the methods used to join specialized piping and describe their associated procedures.
    i) compression joints
    ii) mechanical joint clamps
    iii) welded
    iv) threaded

v) flanged
vi) cut-grooved
vii) roll-grooved
viii) press-fit
ix) heat fusion welding
x) solvent welding
xi) gasket
xii) crimped and expansion
xiii) push-fit
xiv) transition
xv) brazing
xvi) soldering
xvii) flaring
xviii) swaged
xix) corporation

11. Describe the procedures used to install specialized piping fittings and accessories.
    i) supports
        - anchors
        - guides
    ii) expansion joints
    iii) hangers
    iv) sleeves

12. Describe the procedures used to measure specialized piping.

13. Describe the procedures used to inspect, test and commission specialized piping.

14. Describe the process used to cut specialized piping.

15. Describe the procedures used to bend specialized piping.

16. Interpret linear expansion and contraction tables in NPC and specifications for specialized piping.

17. Explain the systems of measurement for specialized piping.
    i) allowance
    ii) dimension
    iii) length

iv) wall thickness/schedule

18. Describe the procedures used to calculate measurements for specialized piping.
    i) fitting allowances
        - center-to-centre
        - end-to-end
        - center to end
        - offsets
            - rolling
            - jumper
            - equal spread

19. Identify offsets using both imperial and metric units for spread offsets specialized piping.

20. Identify offsets in piping for various changes in direction for specialized piping.

Practical Objectives

N/A

PLB-210 Plumbing Fixtures, Appliances and Accessories

Learning Outcomes:

- Demonstrate knowledge of plumbing fixtures, supports and accessories, their applications and operation.
- Demonstrate knowledge of the procedures used to install plumbing fixtures, supports, appliances and accessories.
- Demonstrate knowledge of procedures used for testing plumbing fixtures and appliances.
- Demonstrate knowledge of the procedures used to maintain plumbing fixtures and appliances.

2016 Red Seal Occupational Standard Reference:

4.01 Performs piping system layout.
4.06 Commissions systems.
14.01 Installs fixture supports.
14.02 Installs plumbing fixtures and appliances.
14.03 Tests plumbing fixtures and appliances.
14.04 Services plumbing fixtures and appliances.

Suggested Hours:

24 Hours

Objectives and Content:

Theoretical Objectives

1. Interpret information pertaining to plumbing fixtures, supports, and accessories found on drawings and specifications.

2. Interpret codes and regulations pertaining to plumbing fixtures, appliances supports and accessories.

3. Identify types of plumbing fixtures and appliances and describe their characteristics and applications.
   i) fixtures

- showers
- water closets
- lavatories
- urinals
- sinks

ii) appliances
- water heaters
- coffee machines
- ice makers
- dishwashers

iii) supports
- brackets
- carriers
- wood backing

4. Identify trim and accessories for plumbing fixtures and appliances and describe their characteristics and applications.
   i) chrome traps
   ii) shower heads
   iii) grab bars

5. Identify agencies that approve fixtures, appliances and accessories that are accepted by the Authority Having Jurisdiction (AHJ).
   i) National Plumbing Code (NPC)
   ii) National Building Code (NBC)
   iii) Canada Standards Association (CSA)

6. Identify and describe hazards and describe safe work practices pertaining to plumbing fixtures, supports and appliances.

7. Identify tools and equipment relating to plumbing fixtures, appliances and accessories and describe their applications and procedures for use.
   i) hammer drills
   ii) cordless drills
   iii) torpedo levels
   iv) chop saws
   v) wrenches
   vi) strap wrenches
   vii) spud wrenches
   viii) basin wrenches

ix) thermometers
x) voltmeters
xi) pressure meters

8. Describe the procedures used to test plumbing fixtures and appliances.

9. Describe the procedures used to install plumbing fixtures, supports and accessories.

10. Describe the procedures used to troubleshoot and diagnose problems with plumbing fixtures and appliances.
    i) leaks
    ii) inadequate operation
    iii) cracks
    iv) wear
    v) noise
    vi) leaks
    vii) corrosion

11. Describe the procedures used to repair, maintain and replace plumbing fixtures and appliances.
    i) service reports
    ii) maintenance reports

Practical Objectives

1. Install, support and test fixtures and accessories.

PLB-215 Hot Water Storage Tanks and Heaters

Learning Outcomes:

- Demonstrate knowledge of hot water storage tanks and heaters, their components, applications and operation.
- Demonstrate knowledge of the procedures used to install, maintain, repair, test and troubleshoot hot water storage tanks and heaters.

2016 Red Seal Occupational Standard Reference:

4.01 Performs piping system layout.
4.06 Commissions systems.
4.07 Protects piping systems, equipment and structure from damage.
12.01 Sizes piping and equipment for potable water distribution systems.
12.03 Installs potable water distribution equipment.
12.05 Tests potable water distribution systems.
12.06 Services potable water distribution systems.

Suggested Hours:

18 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with hot water storage tanks and heaters.

2. Identify hazards and describe safe work practices pertaining to hot water storage tanks and heaters.

3. Interpret codes and regulations pertaining to hot water storage tanks and heaters.

4. Interpret information pertaining to hot water storage tanks and heaters found on drawings and specifications.

5. Identify tools and equipment relating to hot water storage tanks and heaters and describe their applications and procedures for use.

6. Identify types of hot water storage tanks and describe their characteristics and applications.

7. Identify hot water storage tank components and describe their purpose and operation.
   i) vacuum relief
   ii) temperature/pressure relief valve
   iii) expansion tanks
   iv) drain pans

8. Identify types of hot water heaters and describe their characteristics and applications.
   i) direct
   ii) indirect

9. Identify heat sources for hot water heaters and describe their characteristics and applications.
   i) oil
   ii) gas
   iii) electric
   iv) solar
   v) solid fuel

10. Identify hot water heater components and describe their purpose and operation.

11. Identify the factors to consider for sizing hot water storage tanks and heaters, their components and equipment.

12. Describe the procedures used to size hot water storage tanks and heaters, their components and equipment.

13. Describe the procedures used to install and protect hot water tanks and their components.

14. Describe the procedures used to maintain and repair hot water tanks and their components.

15. Describe the procedures used to test and troubleshoot hot water tanks and their components.

16. Describe the procedures used to install hot water heaters and their components

Practical Objectives

N/A

PLB-220 Drawings II

Learning Outcomes:

- Demonstrate knowledge of drawings and specifications.
- Demonstrate knowledge of various piping and equipment layouts and applications.
- Demonstrate knowledge of layout tools and equipment.

2016 Red Seal Occupational Standard Reference:

3.01 Organizes project tasks and procedures.
3.02 Organizes materials and supplies.
4.01 Performs piping system layout.

Suggested Hours:

30 Hours

Objectives and Content:

Theoretical Objectives

1. Interpret types of metric and imperial systems of measurement and the procedures used to perform conversions.

2. Interpret types of drawings and specifications and describe their application and procedure for use.
   i) engineered drawings
   ii) manufacturers' requirements
   iii) job specifications
   iv) standards
   v) shop drawings and sketches

3. Interpret types of symbols and describe their characteristics and applications used on drawings, sketches and specifications.

4. Interpret drawing views and describe their applications.
   i) plan

ii) section
iii) detail
iv) elevation
v) cross section

5. Describe the use of scales.

6. Interpret blueprints, specification documentation and job site instructions.

7. Describe the procedures used for the care, handling and storage of drawings, sketches and specifications.

8. Identify equipment used for various piping systems.

9. Interpret the requirements of various piping systems and applications.
   i) appliances
   ii) fixtures
   iii) control devices

Practical Objectives

1. Use types of layout tools and equipment.
   i) builders levels
   ii) levels
   iii) lasers
   iv) Philadelphia /stadia rod

PLB-225 Drainage, Waste and Venting Systems II

Learning Outcomes:

- Demonstrate knowledge of residential drainage, waste and vent systems, their components, applications and operation.
- Demonstrate knowledge of the procedures used to determine and transfer grade and elevation measurements for residential drainage, waste and vent systems.
- Demonstrate of the procedures used to layout and install residential drainage, waste and vent systems.
- Demonstrate knowledge of testing equipment and procedures used for testing interior residential drainage, waste and vent systems.
- Demonstrate knowledge of residential interior drainage, waste and vent (DWV) system equipment and components, their applications and operation.
- Demonstrate knowledge of the procedures used to service residential interior DWV systems.
- Demonstrate knowledge of the procedures to install fire stopping devices and materials.

2016 Red Seal Occupational Standard Reference:

4.01 Performs piping system layout.
4.06 Commissions systems.
4.07 Protects piping systems, equipment and structure from damage.
4.09 Installs fire stopping systems.
10.01 Sizes pipe for interior drainage, waste and vent (DWV) systems.
10.02 Installs underground piping and components for interior drainage, waste and vent (DWV) systems.
10.03 Installs piping and components for interior drainage, waste and vent (DWV) systems above-ground.
10.04 Tests interior drainage, waste and vent (DWV) systems.
10.05 Services piping and components for interior drainage, waste and vent residential venting systems.

Suggested Hours:

36 Hours

Objectives and Content:

Theoretical Objectives

1. Identify hazards and describe safe work practices pertaining to residential drainage, waste and vent systems.

2. Interpret codes and regulations pertaining to residential drainage, waste and vent systems.
   i) fixed homes
   ii) mobile homes

3. Interpret information pertaining to residential drainage, waste and vent systems found on drawings and specifications.

4. Identify the factors to consider when sizing residential drainage, waste and vent system components.
   i) hydraulic load
   ii) code requirements

5. Identify tools and equipment relating to residential drainage, waste and vent systems and describe their applications and procedures for use.
   i) tampers
   ii) jackhammers
   iii) levels
   iv) excavation equipment
   v) torches
   vi) tubing cutters
   vii) hand and power saws
   viii) testing equipment
      - inflatable test balls
      - mechanical test plugs
      - gauge
      - smoke generating machine

6. Identify types of residential venting systems and describe their characteristics and applications.
   i) stack vent
   ii) individual vent
   iii) branch vent

iv) dual vent
v) vent header
vi) continuous vent
vii) wet vent
viii) air admittance valve

7. Identify and describe fire stopping devices and materials and describe their purpose and application for residential drainage, waste and vent systems.

8. Explain the purpose and applications of residential drainage, waste and vent systems.

9. Identify the methods of backflow protection used in residential drainage, waste and vent systems.
   i) backwater valves
   ii) gate valves

10. Identify interior residential drainage, waste and vent system equipment and components and describe their purpose, operation and applications
   i) piping
   ii) fixtures
   iii) traps
   iv) cleanouts
   v) joints and connections
   vi) fire stopping

11. Determine and transfer grade and elevation for piping in residential drainage, waste and vent systems.

12. Identify the factors to consider when installing residential drainage, waste and vent system components
   i) safety considerations
   ii) support
   iii) protection

13. Identify types of hangers and supports used for residential drainage, waste and vent systems and describe their procedures for installation.

14. Describe the procedures used to install and protect residential drainage, waste and vent systems and buildings.

15. Describe the procedures used to determine hydraulic load on sanitary residential drainage, waste and vent systems and storm systems.

16. Describe the procedures grade piping for residential drainage, waste and vent systems.

17. Describe the procedures to test and commission interior residential drainage, waste and vent systems.
    i) smoke test
    ii) ball test
    iii) hydrostatic test
    iv) pneumatic test

18. Identify interior residential drainage, waste and vent system testing equipment.

19. Identify and describe faults and conditions requiring service to interior residential drainage, waste and vent systems.
    i) leaks
    ii) inadequate grade
    iii) wear
    iv) noise
    v) leaks
    vi) corrosion
    vii) blockage

20. Describe the procedures used to troubleshoot and service interior residential drainage, waste and vent system components.

21. Identify required documentation pertaining to servicing interior residential drainage, waste and vent systems.
    i) service reports
    ii) maintenance reports

Practical Objectives

N/A

PLB-230 Hydronic Systems I

Learning Outcomes:

- Demonstrate knowledge of the principles of hydronic heating and cooling generating system operation.
- Demonstrate knowledge of factors that impact the design of hydronic systems.
- Demonstrate knowledge of fluid fundamentals.
- Demonstrate knowledge of sizing and installing pipe and components for hydronic systems.
- Demonstrate knowledge of hydronic cooling and heating sources and their operation.
- Demonstrate knowledge of principles of heat transfer.
- Demonstrate knowledge of the procedures used to install hydronic transfer units, their applications and operation.

2016 Red Seal Occupational Standard Reference:

4.06 Commissions systems.
4.07 Protects piping systems, equipment and structure from damage.
17.01 Sizes piping and components for hydronic systems.
17.02 Installs piping and components for hydronic systems.
18.01 Installs hydronic heating generating systems.
18.02 Installs hydronic cooling generating systems.
19.02 Installs hydronic transfer units.

Suggested hours:

51 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with hydronic heat and cooling generating systems.

2. Identify tools and equipment relating to hydronic heat and cooling generating systems and describe their applications and procedures for use.

i) come-alongs
ii) chain falls
iii) forklifts
iv) pallet jacks
v) slings
vi) cranes
vii) testing equipment
- multimeter with thermal attachments
- manometer
- thermal scanner
- combustion analysis equipment

3. Identify hazards and describe safe work practices pertaining to hydronic heat and cooling generating systems.

4. Describe procedures for lock-out and tag-out of hydronic heating and cooling generating systems.

5. Identify and interpret codes, manufacturers' specifications, drawings and regulations pertaining to hydronic heat and cooling generating systems.

6. Identify types of hydronic cooling and heating systems and describe their characteristics and operation.
i) systems
- high pressure
- low pressure
ii) heat sources
- high and low mass boilers
- heat pumps
- solar thermal panels
- bio-mass boilers
iii) cooling sources
- heat pumps
- cooling towers
- fluid coolers
- chillers

7. Identify sources of energy used by hydronic heat and cooling.
i) oil
ii) gas

iii) solid fuel
iv) geothermal
v) solar

8. Explain the principles of heat transfer.
   i) radiation
   ii) conduction
   iii) convection

9. Identify hydronic heat and cooling generating system components and describe their purpose and operation.
   i) valves
   ii) flanges
   iii) unions
   iv) blanks
   v) air removal devices
      - manual vents
      - automatic vents
      - scoops
      - separators
      - scrubbers
      - circulators
      - gauges and thermometers
      - heat transfer units
      - dirt elimination devices
   vi) boiler trim
      - low water cutoffs
      - safety relief devices
      - flow switches
      - operating controls
      - heat pumps
      - expansion tanks
      - heat exchangers
      - circulating pumps
      - mixing components

10. Identify fluids and additives used in hydronic heating and cooling generating systems and describe their characteristics and applications.
   i) fluids
      - water

- chemical
- air and brine solutions

ii) additives
- treatment chemicals
- rust inhibitors
- glycol
- methyl hydrate

11. Describe the effects of viscosity for various fluids through temperature range.

12. Explain volumetric coefficient differences between various fluids.

13. Describe the difference between laminar and turbulent flow.

14. Describe how velocity affects flow characteristics.

15. Identify how piping design strategies affect pipe sizing.
    i) one pipe
    ii) two pipe
    iii) three pipe
    iv) four pipe
    v) reverse return
    vi) direct return
    vii) primary/secondary
    viii) injection

16. Identify and describe expansion devices their purpose and operation.
    i) bladder
    ii) diaphragm
    iii) conventional air cushion
    iv) open tank

17. Identify zoning and control strategies and how they impact piping.

18. Identify hydronic system controls and describe their purpose and operation.

19. Describe the procedures used to install and protect piping and components for hydronic heating and cooling generating systems.

20. Describe the types of auxiliary equipment used with hydronic heating and cooling generating systems.
    i) indirect fired hot water tanks
    ii) heat exchangers
    iii) make-up tanks

21. Describe procedures for selecting and sizing auxiliary equipment.

22. Explain the point of no pressure change and the importance of its location within the piping system.

23. Explain variables that impact on pipe and tubing in hydronic heating and cooling generating systems and their associated calculations.
    i) thermal expansion, thermal contraction
    ii) weight
    iii) friction loss
    iv) turbulence
    v) galvanic action

24. Describe and explain the effects trapped air in a hydronic system will have on testing and describe the procedures to prevent or correct it.

25. Identify heat transfer units and describe their characteristics and operation.

26. Describe procedures for sizing heat transfer units.

27. Describe the procedures used to install, protect, set and adjust hydronic transfer units.
    i) protection
        - vibration isolation
        - insulating
        - installation of cover plates

28. Identify types of hydronic transfer units their components and describe their purpose and operation.
    i) fan coil units
    ii) radiators
    iii) radiant panels
    iv) unit heaters
    v) termination heat pumps

29. Describe the procedures used to join hydronic transfer units to the system.
    i) threading
    ii) soldering
    iii) grooving
    iv) welding

Practical Objectives

1. Calculate linear and volumetric expansion.

2. Perform heat loss calculations.

3. Install and diagnose heating/cooling components and sources.

Level 3

PLB-300 Hydronic Systems II

Learning Outcomes:

- Demonstrate knowledge of the principles of hydronic system operation.
- Demonstrate knowledge of procedures used for testing and servicing piping and components for hydronic systems.
- Demonstrate knowledge of testing and servicing hydronic heating and cooling sources and their operation.
- Demonstrate knowledge of testing and servicing procedures for hydronic system transfer units and equipment.
- Demonstrate knowledge of interpreting manufacturers' data pertaining to hydronic systems.
- Demonstrate knowledge of documenting the service for hydronic heating and cooling generating systems and associated piping and components.

2016 Red Seal Occupational Standard Reference:

17.03 Tests piping and components for hydronic systems.
17.04 Services piping and components for hydronic systems.
18.03 Tests hydronic heating and cooling generating systems.
18.04 Services hydronic heating and cooling generating systems.
19.03 Tests hydronic system controls and transfer units.
19.04 Services hydronic system controls and transfer units.

Suggested Hours:

30 Hours

Objectives and Content:

Theoretical Objectives

1. Identify tools and equipment used to test and service hydronic heating and cooling generating systems.
   i) thermal scanner
   ii) combustion analysis equipment
   iii) control modules
   iv) scopes

v) gauges

2. Interpret drawings, specifications, manufacturers' data and equipment manuals pertaining to hydronic heating and cooling generating systems and service.

3. Identify required documentation pertaining to servicing hydronic heating and cooling generating systems.
   i) service reports
   ii) maintenance reports
   iii) building logbooks

4. Identify hazards pertaining testing and servicing pertaining to hydronic heating and cooling generating systems.
   i) high temperature
   ii) high pressure
   iii) cross-contamination
   iv) electrical
   v) spillage

5. Describe the importance to complete a sensory inspection.
   i) visual
   ii) auditory
   iii) tactile testing

6. Describe procedures for lock-out and tag-out of hydronic heating and cooling generating systems.

7. Describe the function of safeties and the operation of controls pertaining to heating and cooling generating systems.
   i) electronic
   ii) mechanical

8. Identify system conditions requiring servicing in hydronic heating and cooling generating systems.
   i) wear
   ii) noise
   iii) leaks
   iv) corrosion
   vi) cracks
   vii) inadequate flow

viii) air lock
ix) no heat
x) no cooling
xi) adverse effects of low return temperature
xii) manufacturers' defects
xiii) blockage

9. Identify strategy for isolation when testing and servicing hydronic heating and cooling generating systems.
   i) sensitive equipment
      - safety valves
      - air vents
      - gauges

10. Describe procedures used to test and diagnose problems with hydronic heating and cooling generating equipment and associated piping and components.
   i) tests
      - hydrostatic
      - pneumatic
      - pH
      - TDS
      - glycol strength
      - return temperature
   ii) components
      - valves
      - air removal devices
      - circulators
      - gauges and thermometers
      - heat transfer units
      - dirt elimination devices

11. Interpret performance data and specifications pertaining to servicing hydronic system transfer unit equipment and components.
   i) documentation
   ii) system requirements

12. Describe the procedures used to test and service hydronic system transfer units.

13. 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.

14. Describe procedures for reinstating system to operating condition and verifying repair.

15. Describe program of scheduled service for hydronic heating and cooling generating equipment and associated piping and components.

Practical Objectives

N/A

PLB-305 Water Service

Learning Outcomes:

- Demonstrate knowledge of water service piping, components, their applications and operation.
- Demonstrate knowledge of procedures used to determine elevation, friction loss and required pressure for water service.
- Demonstrate knowledge of the procedures used to size and install water service equipment and components.
- Demonstrate knowledge of water service equipment, their applications and operation.
- Demonstrate knowledge of procedures used for testing and maintaining water service equipment, piping and components.

2016 Red Seal Occupational Standard Reference:

4.01 Performs piping system layout.
4.06 Commissions systems.
4.08 Coordinates excavation and backfilling of trenches. In context
11.01 Sizes pipe for water services.
11.02 Installs piping for water services.
11.03 Installs water service equipment.
11.04 Tests water service piping and components.
11.05 Services water services.

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Interpret codes and regulations pertaining to water service in residential and industrial/commercial/institutional (ICI) applications.
   i) residential
      - single family dwelling homes
      - mobile homes

ii) commercial/institutional

2. Interpret information pertaining to water service found on drawings and specifications.
   i) total number of fixture units
   ii) developed length of pipe
   iii) most remote outlet
   iv) difference in elevation
   v) available system pressure
   vi) flow velocity

3. Identify hazards and describe safe work practices pertaining to water service servicing.

4. Identify the factors to consider in determining depth for water service piping.

5. Identify the factors to consider in sizing piping for water service.
   i) number of fixture units
   ii) developed length of pipe
   iii) most remote outlet
   iv) difference in elevation
   v) available system pressure
   vi) flow velocity
   vii) elevation

6. Identify tools and equipment relating to water service systems and describe their applications and procedures for use.
   i) corporation main stop
   ii) expansion loop
   iii) curb stop
   iv) piping and fittings
   v) main shut-off

7. Identify types of water service and describe their characteristics and applications.
   i) rural
   ii) residential
   iii) commercial
   iv) industrial

8. Identify types of water service piping, equipment and components and describe their characteristics and applications.
   i) corporation main stop
   ii) expansion loop
   iii) curb stop
   iv) piping and fittings
   v) main shut-off

9. Describe the procedures used to determine piping size requirements for water service based on peak flow demand.
   i) total number of fixture units
   ii) developed length of pipe
   iii) most remote outlet
   iv) difference in elevation
   v) velocity
   vi) available system pressure
   vii) individual fixture characteristics

10. Describe the procedures used to maintain water service piping, equipment and components.
   i) frost box installation
   ii) backfilling
   iii) shoring
   iv) heat tracing
   v) insulating

11. Describe the procedures used to determine elevation, friction loss, velocity and required pressure for water service.

12. Describe the procedures used to lay out and install water service piping, equipment and components.

13. Describe the procedures used to protect water service piping, equipment and components.
   i) insulating
   ii) supporting
   iii) backfilling
   iv) heat tracing

14. Describe the procedures used to test water service piping, equipment and components.

Practical Objectives

N/A

PLB-310 Potable Water Distribution II

Learning Outcomes:

- Demonstrate knowledge of procedures used to determine elevation, friction loss and required pressure for potable water distribution systems.
- Demonstrate knowledge of potable water distribution system and components, their applications and operation.
- Demonstrate knowledge of volumetric expansion calculations.
- Demonstrate knowledge of cross-connection control devices and methods.
- Demonstrate knowledge of the procedures used to test and service potable water distribution systems.

2016 Red Seal Occupational Standard Reference:

4.01 Performs piping system layout.
4.06 Commissions systems.
4.07 Protects piping systems, equipment and structure from damage.
4.08 Coordinates excavation and backfilling of trenches. In context.
12.01 Sizes piping and equipment for potable water distribution systems.
12.02 Installs piping for potable water distribution systems.
12.03 Installs potable water distribution equipment.
12.04 Installs cross-connection control devices.
12.05 Tests potable water distribution systems.
12.06 Services potable water distribution systems.

Suggested Hours:

36 Hours

Objectives and Content:

Theoretical Objectives

1. Interpret codes and regulations pertaining to potable water distribution systems and testing.
   i) NPC
   ii) CSA B64

2. Interpret information pertaining to potable water distribution systems and components found on drawings and specifications.

3. Explain back siphonage and back pressure and their causes.

4. Explain water hammer, its causes and methods of prevention or control.

5. Identify potable water distribution systems, equipment, piping, supports and components and describe their characteristics and applications.
   - i) systems
     - public
     - private
     - residential
     - ICI
   - ii) piping
   - iii) fittings
   - iv) couplings
   - v) unions
   - vi) flanges
   - vii) expansion joints (bellows)
   - viii) valves
     - pressure reducing
     - tempering
     - isolation
     - check
   - ix) shock arrestors (hammer)
   - x) recirculating lines and pumps
   - xi) fire stopping
   - xii) cross-connection control devices
   - xiii) expansion tanks
   - xiv) water treatment equipment
   - xv) supports
     - riser clamps
     - hangers

6. Identify locations for potable water distribution components.

7. Identify hazards and describe safe work practices pertaining to potable water distribution systems.

8. Identify the factors to consider in sizing piping and equipment for potable water distribution systems.
   i) total number of fixture units
   ii) developed length of pipe
   iii) most remote outlet
   iv) difference in elevation
   v) velocity
   vi) available system pressure
   vii) individual fixture characteristics

9. Identify tools and equipment relating to potable water distribution systems and describe characteristics and applications.
   i) wrenches
   ii) freeze packs
   iii) pipe cutters
   iv) torches
   v) soldering and brazing equipment
   vi) crimping tools
   vii) solvents
   viii) expansion tools
   ix) compression tools
   x) rigging and hoisting equipment

10. Identify levels of hazard related to cross-connection control devices and methods.
   i) low (minor)
   ii) moderate
   iii) severe

11. Identify types of cross-connection control devices and methods.
   i) reduced pressure backflow preventer (RPBP)
   ii) double check valve assembly
   iii) pressure vacuum breaker
   iv) dual check valve
   v) air break

vi) air gap

12. Identify components of potable water distribution systems that require testing.

13. Identify testing equipment for potable water distribution systems.
    i) gauges
    ii) pumps
    iii) air compressors

14. Describe the procedures used to size potable water distribution systems and components.
    i) small commercial method

15. Describe the procedures used to rough-in and lay out potable water distribution systems and components.

16. Describe the procedures used to install potable water distribution systems components.

17. Describe the procedures used to protect potable water distribution systems and components.
    i) installing recirculation pump
    ii) installing frost box
    iii) heat tracing
    iv) insulation
    v) expansion joints

18. Identify faults in potable water distribution systems.
    i) faults
        - ruptures
        - leaks
        - manufacturers' imperfections

19. Describe the procedures used to test and service potable water distribution systems and components.

20. Perform volumetric calculations.

Practical Objectives

N/A

PLB-315 Commercial Drainage Systems

Learning Outcomes:

- Demonstrate knowledge of commercial sanitary drainage their components, applications and operation.
- Demonstrate knowledge of troubleshooting, testing, servicing and repair equipment.
- Demonstrate knowledge of the procedures used to determine and transfer grade and elevation measurements for commercial sanitary drainage systems.
- Demonstrate knowledge of the procedures used to layout and install piping for commercial sanitary drainage systems.
- Demonstrate knowledge of the procedures used to troubleshoot, test, service and repair and commercial sanitary drainage systems.

2016 Red Seal Occupational Standard Reference:

4.01 Performs piping system layout.
4.06 Commissions systems.
4.07 Protects piping systems, equipment and structure from damage.
4.08 Coordinates excavation and back filling of trenches.
4.09 Installs fire stopping systems.
10.01 Sizes pipe for interior drainage, waste and vent (DWV) systems.
10.02 Installs underground piping and components for interior drainage, waste and vent (DWV) systems.
10.03 Installs piping and components for interior drainage, waste and vent (DWV) systems above-ground.
10.04 Tests interior drainage, waste and vent (DWV) systems.
10.05 Services piping and components for interior drainage, waste and vent (DWV) systems.

Suggested Hours:

18 Hours

Objectives and Content:

Theoretical Objectives

1. Interpret codes and regulations pertaining to commercial sanitary drainage systems.

2. Interpret information pertaining to commercial sanitary drainage systems found on drawings and specifications

3. Explain the purpose of commercial sanitary drainage systems.

4. Identify hazards and describe safe work practices pertaining to commercial sanitary drainage systems.
   i) trenching
   ii) confined spaces
   iii) pinch points
   iv) hoists
   v) oxygen quality

5. Identify equipment and components for commercial sanitary drainage systems and describe their characteristics and applications
   i) piping
   ii) fixtures
   iii) drains
   iv) traps
   v) cleanouts
   vi) joints and connections
   vii) backwater valves
   viii) fire stopping
   ix) sewage sumps
   x) macerating toilet systems
   xi) expansion joints
   xii) sump pumps

6. Identify testing equipment for commercial sanitary drainage systems and describe their characteristics and applications.

7. Identify piping for commercial sanitary drainage systems.

8. Identify potential problems and faults with commercial sanitary drainage systems.

9. Identify the factors to consider when installing commercial sanitary drainage systems.

10. Identify the factors to consider when servicing commercial sanitary drainage systems.

11. Identify the factors to consider when sizing commercial sanitary drainage systems.

12. Identify the methods of backflow protection used in commercial sanitary drainage systems.

13. Identify the types of commercial sanitary drainage systems and describe their characteristics and applications.

14. Identify tools and equipment relating to commercial sanitary drainage systems and describe their characteristics and procedures for use.

15. Identify types of hangers and supports used to install commercial sanitary drainage systems.

16. Identify and describe the procedures used to protect commercial sanitary drainage systems.
    i) insulating
    ii) supporting
    iii) backfilling

17. Describe the procedures used to size commercial sanitary drainage systems.
    i) conversion factors
    ii) code requirements

18. Describe the procedures used to grade piping calculate elevations for commercial sanitary drainage systems.

19. Describe the procedures used to install commercial sanitary drainage systems.

20. Describe the procedures used to install hangers and supports commercial sanitary drainage systems.

21. Describe the procedures used to service and repair commercial sanitary drainage systems.

22. Describe the procedures used to rough in piping commercial sanitary drainage systems.

23. Describe the procedures used to test and troubleshoot commercial sanitary drainage systems.

Practical Objectives

N/A

PLB-320 Commercial Venting Systems

Learning Outcomes:

- Demonstrate knowledge of commercial venting systems, their components, applications and operation.
- Demonstrate knowledge of the procedures used to determine and transfer grade and elevation measurements for commercial venting systems.
- Demonstrate knowledge of testing equipment and procedures used for testing commercial venting systems.
- Demonstrate knowledge of the procedures used to service commercial venting systems.

2016 Red Seal Occupational Standard Reference:

4.09 Installs fire stopping systems.
10.01 Sizes pipe for interior drainage, waste and vent (DWV) systems.
10.03 Installs piping and components for interior drainage, waste and vent (DWV) systems above-ground.
10.04 Tests interior drainage, waste and vent (DWV) systems.
10.05 Services piping and components for interior drainage, waste and vent (DWV) systems.

Suggested Hours:

24 Hours

Objectives and Content:

Theoretical Objectives

1. Interpret codes and regulations pertaining to commercial venting systems.

2. Interpret information pertaining to commercial venting systems found on drawings and specifications.

3. Explain the purpose of commercial venting systems.

4. Identify hazards and describe safe work practices pertaining to commercial venting systems.

5. Identify tools and equipment relating to commercial venting systems and describe their applications and procedures for use.

6. Identify types of commercial venting systems and describe their characteristics and applications.
   i) stack vent
   ii) vent stack
   iii) individual vent
   iv) branch vent
   v) dual vent
   vi) vent header
   vii) continuous vent
   viii) wet vent
   ix) relief vent
   x) circuit vent
   xi) yoke vent
   xii) offset relief vent
   xiii) additional circuit vent
   xiv) miscellaneous vents

7. Identify commercial venting system equipment and components and describe their characteristics and applications.
   i) piping
   ii) fixtures
   iii) traps
   iv) cleanouts
   v) joints and connections
   vi) fire stopping
   vii) air admittance valve

8. Describe the procedures used to size commercial venting systems.
   i) conversion factors
   ii) code requirements

9. Describe the procedures used to install commercial venting systems.

10. Describe the procedures used to install hangers and supports for commercial venting systems.

11. Describe the procedures used to protect commercial venting systems.

12. Describe the procedures used to test and service commercial venting systems components.

Practical Objectives

N/A

PLB-325 Storm and Combination Drainage Systems (Sewers)

Learning Outcomes:

- Demonstrate knowledge of storm and combination drainage systems, their components, applications and operation.
- Demonstrate knowledge of testing equipment and procedures used for testing storm and combination drainage systems.
- Demonstrate knowledge of the procedures used to determine and transfer grade and elevation measurements for storm and combination drainage systems.
- Demonstrate knowledge of the procedures used to layout and install piping for storm and combination drainage systems.
- Demonstrate knowledge of the procedures used to service, repair and troubleshoot storm and combination drainage systems.

2016 Red Seal Occupational Standard Reference:

4.01 Performs piping system layout.
4.06 Commissions systems.
4.07 Protects piping systems, equipment and structure from damage.
4.08 Coordinates excavation and backfilling of trenches.
4.09 Installs fire stopping systems.
8.01 Sizes pipe for sewers.
8.02 Installs manholes and catch basins.
8.03 Installs piping for sewers.
8.04 Tests manholes, catch basins and piping for sewers.
8.05 Services manholes, catch basins and piping for sewers.

Suggested Hours:

24 Hours

Objectives and Content:

Theoretical Objectives

1. Interpret codes and regulations pertaining to storm and combination drainage systems.

2. Interpret information pertaining to storm and combination drainage systems found on drawings and specifications.
   i) sizing

3. Explain the purpose and functionality of storm and combination drainage systems.

4. Identify hazards and describe safe work practices pertaining to storm and combination drainage systems.

5. Identify equipment and components for storm and combination drainage systems and describe their characteristics and applications.
   i) piping
   ii) roof drains
   iii) area drains
   iv) fire stopping
   v) expansion joints
   vi) storm water management devices

6. Identify testing equipment for storm and combination drainage systems and describe their characteristics and applications.

7. Identify piping for storm and combination drainage systems.

8. Identify potential problems and faults with storm and combination drainage systems.

9. Identify the factors to consider when installing storm and combination drainage systems.

10. Identify the factors to consider when servicing storm and combination drainage systems.

11. Identify the factors to consider when sizing storm and combination drainage systems.

12. Identify the methods of backflow protection used in storm and combination drainage systems.

13. Describe the procedures used to size storm and combination drainage systems.

14. Identify the types of storm and combination drainage systems and describe their characteristics and applications.

15. Identify tools and equipment relating to storm and combination drainage systems and describe their characteristics and procedures for use.

16. Identify types of hangers and supports used to install storm and combination drainage systems.

17. Describe the procedures used to protect storm and combination drainage systems.
    i) insulating
    ii) supporting
    iii) identification
    iv) per mechanical specifications

18. Identify and describe the procedures used to determine hydraulic load on storm and combination drainage systems.

19. Describe the procedures used to grade piping and calculate elevations for storm and combination drainage systems.
    i) conversion factors
    ii) code requirements

20. Describe the procedures used to install storm and combination drainage systems, hangers and supports.

21. Describe the procedures used to service and repair storm and combination drainage systems.

22. Describe the procedures used to rough in piping for storm and combination drainage systems.

23. Describe the procedures used to test and troubleshoot storm and combination drainage systems.

Practical Objectives

N/A

PLB-330 Irrigation Systems

Learning Outcomes:

- Demonstrate knowledge of piping for irrigation systems, their applications and operation.
- Demonstrate knowledge of the procedures used to install piping for irrigation systems.
- Demonstrate knowledge of equipment and components for irrigation systems and their applications and operation.
- Demonstrate knowledge of procedures used to test and service irrigation systems.

2016 Red Seal Occupational Standard Reference:

4.06 Commissions systems
4.07 Protects piping systems, equipment and structure from damage.
22.01 Installs piping for specialized systems.
22.02 Installs equipment and components for specialized systems.
22.03 Tests specialized systems.
22.04 Services specialized systems.

Suggested Hours:

3 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with equipment and components for irrigation systems.

2. Interpret codes and regulations pertaining to piping, equipment and components and servicing of irrigation systems.

3. Interpret information pertaining to irrigation systems, equipment and components found on drawing and specifications.

4. Identify equipment and components of irrigation systems and describe their characteristics and applications.
   i) piping
   ii) valves
   iii) sprinkler heads
   iv) timers
   v) pumps
   vi) cross connection control devices

5. Identify handling, storage and transportation of equipment and components for irrigation systems.

6. Identify hazards and describe safe work practices pertaining to equipment and components of irrigation systems.

7. Identify potential problems and faults with irrigation system.

8. Identify testing equipment for each irrigation system and describe their applications and procedures for use.

9. Identify the factors to consider for determining pipe sizing in irrigation systems.

10. Identify tools and equipment for installing and servicing irrigation systems and describe their applications and procedures for use.

11. Identify types of piping for irrigation systems and describe their properties, characteristics and applications.
   i) residential
   ii) commercial

12. Identify types of potential damage for irrigation systems.

13. Describe the procedures used to install equipment and components of irrigation systems.

14. Describe the procedures used to install piping and piping components for irrigation systems.

15. Describe the procedures used to test and service irrigation systems and their equipment and components.

Practical Objectives

N/A

PLB-335 Commercial/Institutional Plumbing Fixtures and Accessories

Learning Outcomes:

- Demonstrate knowledge of commercial/institutional plumbing fixtures, supports and accessories, their applications and operation.
- Demonstrate knowledge of the procedures used to install commercial/institutional plumbing fixtures, supports and accessories.
- Demonstrate knowledge of procedures used for testing commercial/institutional plumbing fixtures and appliances.
- Demonstrate knowledge of the procedures used to maintain commercial/institutional plumbing fixtures and appliances.

2016 Red Seal Occupational Standard Reference:

4.06 Commissions systems
14.01 Installs fixture supports.
14.02 Installs plumbing fixtures and appliances.
14.03 Tests plumbing fixtures and appliances.
14.04 Services plumbing fixtures and appliances.

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Identify commercial/institutional plumbing fixture and appliance accessories and describe their characteristics and applications.

2. Identify agencies that approve fixtures, appliances and accessories that are accepted by the Authority Having Jurisdiction (AHJ).
   i) National Plumbing Code (NPC)
   ii) National Building Code (NBC)
   iii) Canada Standards Association (CSA)

3. Identify hazards and describe safe work practices pertaining to commercial/institutional plumbing fixtures and appliances.

4. Identify tools and equipment relating to commercial/institutional plumbing fixtures and appliances and describe their applications and procedures for use.

5. Identify trim and accessories for commercial/institutional plumbing fixtures and appliances and describe their characteristics and applications.

6. Identify types of commercial/institutional plumbing fixtures and appliances and describe their characteristics and applications.

7. Identify types of supports for commercial/institutional plumbing fixtures and appliances and describe their characteristics and applications.

8. Interpret codes and regulations pertaining to commercial/institutional plumbing fixtures, appliances and supports.
   i) barrier-free design

9. Interpret information pertaining to commercial/institutional plumbing fixtures, appliances and supports found on drawings and specifications.

10. Describe hazards and safe work practices relating to installation of commercial/institutional plumbing fixtures and appliances their supports and accessories.

11. Describe the procedures used to install commercial/institutional plumbing fixtures, appliances supports and accessories.

12. Describe the procedures used to test commercial/institutional plumbing fixtures and appliances.

13. Describe the procedures used to troubleshoot and diagnose problems with commercial/institutional plumbing fixtures and appliances.

14. Describe the procedures used to maintain, repair and replace commercial /institutional plumbing fixtures and appliances.

Practical Objectives

N/A

PLB-340 Compressed Air Systems

Learning Outcomes:

- Demonstrate knowledge of piping for compressed air, their applications and operation.
- Demonstrate knowledge of the procedures used to install piping for compressed air.
- Demonstrate knowledge of equipment and components for compressed air systems and their applications and operation.
- Demonstrate knowledge of the procedures used to install equipment and components of compressed air.
- Demonstrate knowledge of procedures used to test and service compressed air systems.

2016 Red Seal Occupational Standard Reference:

4.06 Commissions systems.
4.07 Protects piping systems, equipment and structure from damage.
22.01 Installs piping for specialized systems.
22.02 Installs equipment for specialized systems.
22.03 Tests specialized systems.
22.04 Services specialized systems.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with equipment and components for compressed air systems.

2. Interpret codes and regulations pertaining to equipment, components and servicing of compressed air systems.
   i) NPC
   ii) CSA B149

iii) American Society of Mechanical Engineers (ASME)
iv) manufacturers' certification requirements

3. Interpret information pertaining to compressed air systems, equipment and components found on drawing and specifications.
   i) engineered drawings
   ii) manufacturers' requirements
   iii) system requirements
   iv) job specifications
   v) shop drawings

4. Identify types of compressed air systems and describe their characteristics and applications.
   i) instrument
   ii) utility
   iii) process
   iv) make up/breathable

5. Identify equipment and components of compressed air systems and describe their characteristics and applications.
   i) threading equipment
   ii) cutters
   iii) compressors
   iv) piping
   v) valves
   vi) controls
   vii) supports
   viii) receivers/tanks
   ix) flex connectors
   x) auto drains

6. Identify handling, storage and transportation of equipment and components for compressed air systems.

7. Identify hazards and describe safe work practices pertaining to equipment and components of compressed air systems.

8. Describe the methods of air treatment in compressed air systems.
   i) filters
   ii) driers

iii) after-coolers
iv) de-icers

9. Identify potential problems and faults with compressed air system.

10. Identify testing equipment for each compressed air system and describe their applications and procedures for use.

11. Identify the factors to consider for determining pipe sizing in compressed air systems.

12. Identify tools and equipment used to install and service compressed air systems equipment and components and describe their applications and procedures for use.

13. Identify types of piping for compressed air systems and describe their properties, characteristics and applications.

14. Identify types of potential damage for compressed air systems.

15. Describe the procedures used to install equipment, piping and components of compressed air systems.

16. Describe the procedures used to test and service compressed air systems and their equipment and components.

Practical Objectives

N/A

PLB-345 Single Family Dwelling Fire Protection Systems

Learning Outcomes:

- Demonstrate knowledge of flow-through fire protection systems, their components, applications and operation.
- Demonstrate knowledge of the procedures used to install flow-through fire protection systems.
- Demonstrate knowledge of the procedures used to test, maintain and repair flow-through fire protection systems.

2016 Red Seal Occupational Standard Reference:

4.06 Commissions systems.
4.07 Protects piping systems, equipment and structure from damage.
20.01 Installs flow-through fire protection systems.
20.02 Tests flow-through fire protection systems.
20.03 Services flow-through fire protection systems.

Suggested Hours:

3 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with flow-through fire protection systems according to specifications

2. Identify hazards and describe safe work practices pertaining to flow-through fire protection systems.

3. Identify types of flow-through fire protection systems and describe their characteristics and applications.
   i) flow through
   ii) partial flow through

4. Interpret codes and regulations pertaining to flow-through fire protection systems.

5. Interpret information pertaining to flow-through fire protection systems found on drawings and specifications.

6. Identify tools and equipment relating to flow-through fire protection systems and describe their applications and procedures for use.

7. Determine size of pipe required for flow-through fire protection systems according to manufacturer specifications.

8. Identify flow-through fire protection systems components and describe their purpose and operation.
   i) sprinkler heads
      - concealed
      - sidewall
      - pendant
      - upright
   ii) cross connection control
   iii) piping
   iv) supervisory valves

9. Describe the procedures used to install flow-through fire protection systems.

10. Describe the procedures used to test fire protection systems and components.
    i) pneumatic
    ii) hydrostatic

11. Describe the procedures used to repair flow-through fire protection systems.

Practical Objectives

N/A

PLB-350 Hydronic System Controls

Learning Outcomes:

- Demonstrate knowledge of hydronic system control components and accessories, their applications and operation.
- Demonstrate knowledge of types of hydronic system controls and related equipment and components, their applications and operation.
- Demonstrate knowledge of the procedures used to install hydronic system controls.
- Demonstrate knowledge of testing hydronic system controls and their procedures and equipment.
- Demonstrate knowledge of the procedures used to service hydronic system controls.

2016 Red Seal Occupational Standard Reference:

4.06 Commissions systems.
4.07 Protects piping systems, equipment and structure from damage.
19.01 Installs hydronic system controls.
19.03 Tests hydronic system controls and transfer units.
19.04 Services hydronic system controls and transfer units.

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Interpret information pertaining to hydronic system controls found on drawings and specifications.

2. Identify hazards and describe safe work practices pertaining to hydronic system control.

3. Interpret codes and regulations pertaining to hydronic system controls.

4. Identify tools and equipment relating to hydronic system controls and describe their applications and procedures for use.

5. Identify types of hydronic system controls and describe their characteristics, applications and operation.
   i) operating and temperature controls

6. Identify hydronic system control components and accessories and describe their purpose and operation.
   i) control modules
   ii) thermostats
   iii) supply sensors
   iv) circulator sensors
   v) outdoor temperature sensors
   vi) safety devices

7. Describe the procedures used to install, set and adjust hydronic system control components and accessories.

8. Describe the procedures used to protect hydronic system control components.

9. Identify system conditions requiring servicing in hydronic system controls.
   i) wear
   ii) noise
   iii) leaks
   iv) no flow
   v) air lock

10. Describe the procedures used to test and service hydronic system controls.

11. Interpret performance data and specifications pertaining to servicing hydronic system controls.

Practical Objectives

N/A

PLB-355 Green Technology

Learning Outcomes:

- Demonstrate knowledge of piping for specialized systems, their applications and operation.
- Demonstrate knowledge of the procedures used to install piping for specialized systems.
- Demonstrate knowledge of equipment and components for specialized systems and their applications and operation.
- Demonstrate knowledge of the procedures used to install and test equipment and components of specialized systems.
- Demonstrate knowledge of the procedures used to service specialized systems.

2016 Red Seal Occupational Standard Reference:

22.01 Installs piping for specialized systems.
22.02 Installs equipment for specialized systems.
22.03 Tests specialized systems.
22.04 Services specialized systems.

Suggested Hours:

18 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with equipment and components for green technology systems.

2. Interpret codes and regulations pertaining to piping, equipment, components and servicing of green technology systems.

3. Identify hazards and describe safe work practices pertaining to equipment and components of green technology systems.

4. Identify tools and equipment for installing, testing and servicing of green technology systems and piping and describe their applications and procedures for use.

5. Identify the factors to consider for determining pipe sizing in green technology systems.

6. Identify equipment and components of green technology systems and describe their characteristics and applications.

7. Identify handling, storage and transportation of equipment and components for green technology systems.

8. Identify potential problems and faults with green technology system.

9. Identify testing equipment for each green technology system and describe their applications and procedures for use.

10. Identify types of piping for green technology systems and describe their properties, characteristics and applications.

11. Identify types of potential damage for green technology systems.

12. Describe the procedures used to install piping, equipment and components of green technology systems.

13. Describe the procedures used to test and service green technology systems and their equipment and components.

Practical Objectives

N/A

PLB-360 Basic Electricity

Learning Outcomes:

- Demonstrate knowledge of the basic concepts of electricity.

2016 Red Seal Occupational Standard Reference:

N/A

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with electricity as related to the trade.

2. Identify hazards and describe safe work practices pertaining to electricity.

3. Interpret electrical related information found on drawings and specifications.

4. Identify tools and equipment used to test electrical circuits and describe their applications and procedures for use.

5. Explain Ohm's law and describe its applications and associated calculations.

6. Identify types of current and describe their characteristics and applications.
   i) direct current (DC)
   ii) alternating current (AC)

7. Identify types of electrical circuits and describe their characteristics and, operation.
   i) series
   ii) parallel

8. Identify types of related electrical equipment and components and describe their characteristics, operation and applications.

Practical Objectives

1. Use a multi-meter.

Level 4

PLB-400 Gas Piping Systems

Learning Outcomes:

- Demonstrate knowledge of piping for gas fuel systems, their applications and operation.
- Demonstrate knowledge of the procedures used to install piping, equipment and components for gas fuel systems.
- Demonstrate knowledge of equipment and components for gas fuel systems and their applications and operation.
- Demonstrate knowledge of procedures used to test and service gas fuel systems.

2016 Red Seal Occupational Standard Reference:

22.01 Installs piping for specialized systems.
22.02 Installs equipment for specialized systems.
22.03 Tests specialized systems.
22.04 Services specialized systems.

Suggested Hours:

60 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with equipment and components for gas fuel systems.

2. Interpret codes and regulations pertaining to equipment piping and components of gas fuel systems.
   i) NPC
   ii) CSA B149
   iii) ASME

3. Interpret information pertaining to gas fuel systems, equipment and components found on drawing and specifications.

4. Identify types of gas fuel systems and describe their applications and operation.
   i) natural gas
   ii) propane

5. Identify gas fuel systems, equipment and components of fuel systems and describe their characteristics and applications.

6. Identify handling, storage and transportation of equipment and components for gas fuel systems.

7. Identify hazards and describe safe work practices pertaining to equipment and components of gas fuel systems.

8. Identify potential problems and faults with gas fuel system.

9. Identify the factors to consider for determining pipe sizing in gas fuel systems.

10. Identify the tools and equipment used to install, test and service gas fuel systems equipment, piping and components.

11. Identify types of piping for gas fuel systems and describe their properties, characteristics and applications.

12. Identify types of potential damage for gas fuel systems.

13. Describe the procedures used to install piping equipment and components of gas fuel systems.

14. Describe the procedures used to test each gas fuel system.

Practical Objectives

N/A

PLB-405 Medical Gas Systems

Learning Outcomes:

- Demonstrate knowledge of piping for medical gas systems, their applications and operation.
- Demonstrate knowledge of the procedures used to install piping, equipment and components for medical gas systems.
- Demonstrate knowledge of equipment and components for medical gas systems and their applications and operation.
- Demonstrate knowledge of procedures used to test and service medical gas systems.

2016 Red Seal Occupational Standard Reference:

22.01 Installs piping for specialized systems.
22.02 Installs equipment for specialized systems.
22.03 Tests specialized systems.
22.04 Services specialized systems.

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with equipment and components for medical gas systems.

2. Interpret codes and regulations pertaining to piping, equipment and components for medical gas systems.
   i) Diameter Index Safety System (DISS)
   ii) pin indexing system

3. Interpret information pertaining to medical gas systems, equipment and components found on drawing and specifications.
   i) engineered drawings

ii) manufacturers requirements
iii) system requirements
iv) job specifications
v) shop drawings
vi) standards

4. Identify types of medical gases and describe their characteristics.
   i) oxygen
   ii) nitrogen
   iii) nitrous oxide/anesthetic
   iv) medical air
   v) vacuum

5. Identify codes and regulations pertaining to medical gas systems.

6. Identify equipment and components of medical gas systems and describe their characteristics and applications.
   i) vacuum pumps
   ii) medical air compressors
   iii) piping
   iv) valves
   v) alarms
   vi) sensors

7. Identify handling, storage and transportation of equipment and components for medical gas systems.

8. Identify hazards and describe safe work practices pertaining to equipment and components of medical gas systems.

9. Identify potential problems and faults with medical gas system.
   i) cracks
   ii) corrosion
   iii) inadequate flow
   iv) poor workmanship

10. Identify testing equipment for each medical gas system and describe their applications and procedures for use.
    i) inflatable test ball
    ii) test plugs

iii) mandrels
iv) compressors
v) hydrostatic pumps

11. Identify tools and equipment for installing and serving piping of medical gas systems and describe their applications and procedures for use.
    i) vacuum pumps
    ii) medical air compressors
    iii) piping
    iv) valves
    v) alarms
    vi) sensors

12. Identify types of piping for medical gas systems and describe their properties, characteristics and applications.

13. Identify types of potential damage for medical gas systems.
    i) cracks
    ii) corrosion

14. Describe the procedures used to install equipment and components of medical gas systems.

15. Describe the procedures used to install piping for medical gas systems

16. Describe the procedures used to test and service medical gas systems and their equipment and components.

Practical Objectives

N/A

PLB-410 Low Pressure Steam Systems

Learning Outcomes:

- Demonstrate knowledge of low pressure steam system operation.
- Demonstrate knowledge of the principles of low pressure steam system operation.
- Demonstrate knowledge of sizing pipe and components for low pressure steam systems.
- Demonstrate knowledge of installing pipe and components for low pressure steam systems.
- Demonstrate knowledge of testing and servicing piping and components for low pressure steam systems.
- Demonstrate knowledge of documenting the service for the low pressure steam system.

2016 Red Seal Occupational Standard Reference:

4.06 Commissions systems.
4.07 Protects piping systems, equipment and structure from damage.
16.01 Sizes piping and components for low pressure steam systems.
16.02 Installs piping and components for low pressure steam systems.
16.03 Tests piping and components for low pressure steam systems.
16.04 Services piping and components for low pressure steam systems.

Suggested Hours:

30 Hours

Objectives and Content:

Theoretical Objectives

1. Interpret codes and regulations related to low pressure steam systems.

2. Interpret drawings, specifications and equipment manuals required for system service.

3. Interpret drawings and determine the path for piping providing allowance for interferences, grade, insulation and fire stopping.
   i) interferences
   ii) duct
   iii) structural
   iv) electrical
   v) other piping

4. Identify types of piping and components and describe their characteristics and applications.
   i) traps
   ii) strainers
   iii) drip legs
   iv) valves
   v) heat transfer equipment
   vi) low water cut-off
   vii) converters and exchangers
   viii) gauges
   ix) pig tail

5. Identify the tools and equipment used to install, test and service low pressure steam systems equipment, piping and components.

6. Describe procedures for lock-out and tag-out of low pressure steam systems.

7. Identify the pipe and joining methods for low pressure steam systems.

8. Identify why steam traps, drip legs and condensate pumps are required.

9. Describe procedures used to diagnose problems with piping and components.

10. Identify strategy for isolation for low pressure steam systems.

11. Identify required documentation pertaining to servicing low pressure steam systems.
   i) service reports
   ii) maintenance reports
   iii) building logbook

12. Identify inspection requirements for low pressure steam piping and components in order to meet design specifications.
    i) visual
    ii) auditory
    iii) tactile testing

13. Identify procedure for monitoring the system for performance deficiencies.

14. Identify potential problems and faults with piping and components.
    i) cracks
    ii) corrosion
    iii) water hammer
    iv) inadequate flow
    v) leaks
    vi) wear
    vii) noise

15. Describe program of scheduled service.

16. Describe the procedures used to test piping and components.

17. 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.

18. Describe procedures for reinstating system to operating condition and verifying repair.

19. Describe the purpose and procedure for documenting pipe heat numbers according to AHJ and quality control procedures.

20. Determine where provisions for expansion are required.
    i) bellows
    ii) pistons
    iii) loops
    iv) swing joints
    v) offsets

Practical Objectives

1. Perform linear expansion calculations.

2. Perform heat transfer calculations to determine load.
    i) domestic water heating
    ii) space heating
    iii) cooling

PLB-415 Private Sewage Treatment Systems

Learning Outcomes:

- Demonstrate knowledge of private sewage treatment systems, their components, applications and operation.
- Demonstrate knowledge of the procedures used to install, maintain, repair and troubleshoot private sewage treatment systems.
- Demonstrate knowledge of testing equipment and procedures used for testing private sewage treatment systems.

2016 Red Seal Occupational Standard Reference:

4.06 Commissions systems.
4.07 Protects piping systems, equipment and structure from damage.
4.08 Coordinates excavation and back filling of trenches.
9.01 Plans installation of sewage treatment systems.
9.02 Installs sewage treatment system components.
9.03 Tests sewage treatment systems and components.
9.04 Services sewage treatment systems and components.

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Interpret codes and regulations pertaining to private sewage treatment system.

2. Interpret information pertaining to private sewage treatment system found on drawings and specifications.

3. Identify hazards and describe safe work practices pertaining private sewage treatment system.
   i) health hazards
   ii) environmental hazards
   iii) access

iv) confined space

4. Identify private sewage treatment systems components and describe their purpose and applications.
   i) pumps
   ii) septic tanks
   iii) absorption fields
   iv) leaching chambers
   v) distribution box
   vi) holding tanks
   vii) effluent filter
   viii) siphons
   ix) ejectors
   x) controls
   xi) rubber O-rings
   xii) butyl rubber seals

5. Identify private sewage treatment systems testing equipment.
   i) balloons
   ii) inflatable test balls
   iii) test plugs
   iv) mandrels

6. Identify the factors to consider when planning and installing private sewage treatment systems.
   i) location
      - system position
      - clearances
      - relation to water table
      - sensitive areas
      - limiting layer
   ii) soil conditions/properties
      - percolation test
      - soil test
   iii) available space
   iv) expected daily volume

7. Identify the factors to consider when servicing private sewage treatment systems and the conditions requiring repair.

i) factors
   - manufacturers' specifications
   - condition of sewage treatment system
ii) wear
iii) noise
iv) leaks
v) corrosion

8. Identify the factors to consider when sizing private sewage treatment system components.

9. Identify tools and equipment relating to private sewage treatment systems and describe their applications and procedures for use.
   i) rigging
   ii) hoisting and lifting
   iii) excavation

10. Identify types of private sewage treatment systems and describe their characteristics and applications.
   i) raised
   ii) slope and sand
   iii) pumped

11. Describe the procedures used to fill out service documentation related to maintenance and repair of private sewage treatment system.
   i) service report
   ii) maintenance reports

12. Describe the procedures used to determine grade and elevation for piping and components of private sewage treatment system.

13. Describe the procedures used to install private sewage treatment systems

14. Describe the procedures used to maintain and repair private sewage treatment system and components.
   i) backwater valves
   ii) leak seals
   iii) covers

iv) grates

15. Describe the procedures used to protect private sewage treatment systems.

16. Describe the procedures used to replace private sewage treatment system and/or components.

17. Describe the procedures used to size private sewage treatment system components.

18. Describe the procedures used to test private sewage treatment systems.
    i) balloons
    ii) inflatable test balls
    iii) test plugs
    iv) mandrels

19. Describe the procedures used to troubleshoot private sewage treatment system and components.

Practical Objectives

N/A

PLB-420 Commercial Sewage Treatment Systems

Learning Outcomes:

- Demonstrate knowledge of commercial sewage treatment systems, their components, applications and operation.
- Demonstrate knowledge of the procedures used to install, maintain, repair and troubleshoot commercial sewage treatment systems.
- Demonstrate knowledge of testing equipment and procedures used for testing commercial sewage treatment systems.

2016 Red Seal Occupational Standard Reference:

4.06 Commissions systems.
4.07 Protects piping systems, equipment and structure from damage.
4.08 Coordinates excavation and back filling of trenches.
9.01 Plans installation of sewage treatment systems.
9.02 Installs sewage treatment system components.
9.03 Tests sewage treatment systems and components.
9.04 Services sewage treatment systems and components.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Interpret codes and regulations pertaining to commercial sewage treatment system.

2. Interpret information pertaining to commercial sewage treatment system found on drawings and specifications.

3. Identify hazards and describe safe work practices pertaining commercial sewage treatment system.
   i) health hazards
   ii) environmental hazards

iii) access
iv) confined space

4. Identify commercial sewage treatment systems components and describe their purpose and applications.
   i) sewage pumps
   ii) receiving tanks
   iii) interceptors
   iv) sewage sump
   v) piping connections
   vi) drains
   vii) strainers
   viii) lift stations
   ix) vents
   x) piping

5. Identify commercial sewage treatment systems testing equipment.
   i) balloons
   ii) inflatable test balls
   iii) test plugs
   iv) mandrels

6. Identify the factors to consider when planning and installing commercial sewage treatment systems.

7. Identify the factors to consider when servicing commercial sewage treatment system.

8. Identify the factors to consider when sizing commercial sewage treatment system components.

9. Identify tools and equipment relating to commercial sewage treatment systems and describe their applications and procedures for use.

10. Identify types of commercial sewage treatment systems and describe their characteristics and applications.
    i) municipal sewage systems
    ii) waste water treatment plants
    iii) corrosive waste systems
    iv) indirect waste systems

11. Describe the procedures used to fill out service documentation related to maintenance and repair of commercial sewage treatment system.
    i) service report
    ii) maintenance reports

12. Describe the procedures used to determine grade and elevation for piping and components of commercial sewage treatment system.

13. Describe the procedures used to install, maintain, repair and replace commercial sewage treatment system and components.

14. Describe the procedures used to protect commercial sewage treatment systems.
    i) high temperature
    ii) corrosive waste
    iii) bio-waste

15. Describe the procedures used to size commercial sewage treatment system components.

16. Describe the procedures used to test and troubleshoot commercial sewage treatment systems.

Practical Objectives

N/A

PLB-425 Cross Connection Control

Learning Outcomes:

- Demonstrate knowledge of cross connection control devices and methods, their applications and operation.
- Demonstrate knowledge of information pertaining to cross-connection control devices and methods.
- Demonstrate knowledge of the procedures used to install cross-connection control devices.

2016 Red Seal Occupational Standard:

12.04 Installs cross-connection control devices.

Suggested Hours:

30 Hours

Objectives and Content:

Theoretical Objectives

1. Identify types of cross-connection control devices and methods and describe their characteristics, operation and applications.
   - i) RPBP
   - ii) double check valve assembly
   - iii) pressure vacuum breaker
   - iv) barometric loop
   - v) dual check valve
   - vi) air break
   - vii) air gap

2. Identify levels of hazard related to cross-connection control devices and methods.
   - i) low (minor)
   - ii) moderate
   - iii) severe

3. Identify tools and equipment relating to cross-connection control devices and describe their applications and procedures for use.
    i) water meters
    ii) isolation valves
    iii) check valves
    iv) expansion devices
    v) pumps

4. Explain back siphonage and back pressure and their causes.

5. Interpret information pertaining to cross-connection control devices and methods found on drawings, specifications and AHJ.

6. Interpret codes and regulations pertaining to cross-connection control.
    i) training and certification requirements
    ii) NPC
    iii) CSA B64

7. Describe the procedures used to install cross-connection control devices and methods.

Practical Objectives

N/A

PLB-430 Pressure Systems (Rural Water Supply)

Learning Outcomes:

- Demonstrate knowledge of installing pumps for pressure systems and their application and operation.
- Demonstrate knowledge of testing pressure systems, their procedures and equipment.
- Demonstrate knowledge of the basic concepts of electricity.
- Demonstrate knowledge of the procedures used to service pressure systems.
- Demonstrate knowledge of types of pressure systems, related equipment and components, their applications and operation.
- Demonstrate knowledge of the procedures used to install pressure system piping, equipment and components.

2016 Red Seal Occupational Standard:

4.06 Commissions systems.
4.08 Coordinates excavation and backfilling of trenches.
13.01 Sizes pressure systems.
13.02 Installs piping for pressure systems.
13.03 Installs equipment and components for pressure systems.
13.04 Tests pressure systems.
13.05 Services pressure systems.

Suggested Hours:

24 Hours

Objectives and Content:

Theoretical Objectives

1. Interpret codes and regulations pertaining to pressure systems.

2. Interpret information pertaining to pressure systems found on drawings and specifications.

3. Interpret performance data and manufacturers' specifications pertaining to servicing pressure systems.

4. Explain the characteristics and applications of electricity related to pumps and controls.

5. Identify pressure system equipment and components and describe their purpose, operation and applications.
   - i) piping
   - ii) connections
   - iii) valves
   - iv) controls
   - v) tanks
     - galvanized
     - diaphragm
     - bladder
     - floated
     - in-line
   - vi) adapters
   - vii) arresters
   - viii) cable guards
   - ix) clamps
   - x) pitless adapters
   - xi) traps
     - mechanical
     - thermostatic
     - thermodynamic
   - xii) pumps
     - variable displacement pumps
     - positive displacement pumps
   - xiii) heat transfer equipment

6. Identify testing equipment used for pressure system.

7. Identify the water source factors to consider for sizing pressure system components and equipment.
   - i) drawdown
   - ii) yield
   - iii) depth

8. Identify tools and equipment relating to pressure systems and describe their applications and procedures for use.
   i) pumps
   ii) pressure tanks
   iii) controls
   iv) wrenches
   v) soldering and brazing equipment
   vi) cutters
   vii) nut drivers

9. Identify tools and equipment used to test electrical circuits and describe their applications and procedures for use.

10. Identify types of pressure systems, related equipment and components and describe their characteristics and applications.
   i) shallow well
   ii) deep well
   iii) dug
   iv) bored
   v) driven
   vi) drilled
   vii) boosted system

11. Identify types of pumps and describe their characteristics and applications.
   i) submersible
   ii) jet
   iii) booster
   iv) piston

12. Describe the procedures used to size pressure system components and equipment.

13. Describe the procedures used to install pressure system piping, equipment and components.
   i) safety considerations
   ii) supporting
   iii) pumps
   iv) pressure tanks
   v) pressure reducing valve

14. Describe the procedures used to protect piping for pressure systems.
    i) backfilling
    ii) insulating
    iii) sleeving
    iv) heat tracing

15. Describe the procedures used to test pressure systems components and equipment.

16. Describe the procedures used to service pressure systems equipment and components.

Practical Objectives

1. Demonstration/video of how to install water pumps, including related components and controls.

PLB-435 Water Treatment Systems

Learning Outcomes:

- Demonstrate knowledge of water treatment systems, their components, applications and operation.
- Demonstrate knowledge of the procedures used to size and install water treatment systems.
- Demonstrate knowledge of water treatment systems, their components, applications and operation.
- Demonstrate knowledge of the procedures used to test and service water treatment systems.

2016 Red Seal Occupational Standard Reference:

4.06 Commissions systems.
4.07 Protects piping systems, equipment and structure from damage.
15.01 Sizes water treatment equipment.
15.02 Installs water treatment equipment.
15.03 Tests water treatment equipment.
15.04 Services water treatment equipment.

Suggested Hours:

18 Hours

Objectives and Content:

Theoretical Objectives

1. Interpret information pertaining to water treatment systems found on drawings and specifications.

2. Interpret codes and regulations pertaining to water treatment equipment.

3. Interpret information pertaining to water treatment systems found on drawings and specifications.

4. Interpret results of water tests to determine water treatment requirements.

5. Identify tools and equipment relating to water treatment systems and describe their applications and procedures for use.
   i) wrenches
   ii) tubing cutters
   iii) soldering and brazing equipment

6. Identify types of water quality problems and describe their characteristics and causes.
   i) hardness
   ii) minerals
   iii) contamination/pollution
   iv) pH
   v) taste/odor
   vi) turbidity

7. Identify methods of water treatment and describe their characteristics and applications.
   i) filters
   ii) softeners
   iii) purifiers
   iv) chemical feeders
   v) sterilizers
   vi) reverse osmosis
   vii) de-ionizers
   viii) neutralizers
   ix) distillers

8. Identify water treatment equipment and components and describe their characteristics, applications and operation.

9. Identify hazards and describe safe work practices pertaining to water treatment equipment.

10. Identify testing equipment for water treatment systems.
   i) pH kits
   ii) mineral kits

11. Identify tools and equipment relating to water treatment systems and describe their applications and procedures for use.

i) brine tanks
ii) cylinders
iii) UV treatment bulbs

12. Identify types of water quality problems and describe their characteristics and causes.
    i) hardness
    ii) minerals
    iii) contamination/pollution
    iv) pH
    v) taste/odour
    vi) turbidity

13. Describe the procedures used to test, troubleshoot, maintain and repair water treatment systems and components.
    i) faults
        - leaks
        - inadequate operation
        - cracks
    ii) repair
        - wear
        - noise
        - leaks
        - corrosion
        - contamination
        - blockage
        - loss of pressure
    iii) documentation
        - service reports
        - maintenance reports

14. Describe the procedures used to install and protect water treatment systems and components.

15. Describe sequence of installation of multiple water treatment systems and its importance.

16. Describe the equipment used (backflow prevention) to protect the potable water system from water treatment equipment.

17. Describe the procedures used to size water treatment systems and components.

Practical Objectives

1. Use tools and equipment necessary for testing a water sample.

PLB-440 Process Piping Systems

Learning Outcomes:

- Demonstrate knowledge of process piping systems, their applications and operation.
- Demonstrate knowledge of the procedures used to install piping, equipment and components for process piping systems.
- Demonstrate knowledge of types of process piping systems, equipment and components and their applications and operation.
- Demonstrate knowledge of the procedures used to test and service process piping systems.

2016 Red Seal Occupational Standard Reference:

4.06 Commissions systems.
4.07 Protects piping systems, equipment and structure from damage.
23.01 Installs piping for process piping systems.
23.02 Installs equipment and components for process piping systems.
23.03 Tests process piping systems.
23.04 Services process piping systems.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with process piping equipment and components.

2. Interpret codes, specifications and regulations pertaining to process piping equipment, piping and components.
   i) NPC
   ii) CSA
   iii) Canadian Food and Drugs Act (CFDA)
   iv) ASME
   v) engineered drawings

vi) manufacturers' requirements
vii) system requirements
viii) job specifications
ix) show drawings
x) standards

3. Interpret information found in specifications for process piping equipment and components and servicing.

4. Identify tools and equipment pertaining to process piping systems and describe their applications and procedures for use.
   i) threading equipment
   ii) cutters
   iii) torches
   iv) grooving equipment
   v) flaring tools
   vi) welding equipment

5. Identify testing equipment relating to process piping systems and describe their application.
   i) inflatable test balls
   ii) test plugs
   iii) compressors

6. Identify potential problems and faults with each process piping system.
   i) cracks
   ii) corrosion
   iii) inadequate flow
   iv) poor workmanship

7. Identify hazards and describe safe work practices pertaining to process piping equipment and components.

8. Identify proper handling, storage and transportation of process piping equipment and components.

9. Identify process piping equipment and components and describe their purpose and operation.
   i) flexible connectors
   ii) vibration isolators

iii) expansion joints

10. Identify types of process piping systems and describe their properties, characteristics and applications.
    i) food processing
        - food grade
        - non-food grade
    ii) reverse-osmosis
    iii) high purity water
    iv) water treatment plant
    v) waste water treatment plant
    vi) non-potable water
        - reclaim

11. Describe the procedures used to install and protect piping for process piping systems.
    i) installing guards
    ii) installing anchor points
    iii) installing expansion joints

12. Describe the procedures used to test, troubleshoot and service process piping systems and their equipment and components.

Practical Objectives

N/A

PLB-445 Job Planning and Trade Documentation

Learning Outcomes:

- Demonstrate knowledge of the procedures used to plan and organize work.
- Demonstrate knowledge of project costs and efficient trade practices.
- Demonstrate knowledge of job specific technology.
- Demonstrate knowledge of procedures used to organize and maintain materials.

2016 Red Seal Occupational Standard:

3.01 Organizes project tasks and procedures.
3.02 Organizes materials and supplies.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Identify and describe the procedures to use digital devices to plan and organize tasks and schedules.

2. Identify sources of information relevant to work planning and organizing materials and supplies.
   i) documentation
   ii) drawings
   iii) related professionals
   iv) clients
   v) scheduling
   vi) estimating

3. Identify work methods and planning to maximize practices that are most efficient while maintaining commitment to safety.

4. Describe calculations for determining material and labour requirements.

5. Describe considerations for determining material and supply requirements.

6. Describe procedures to organize and maintain inventory.

7. Describe the procedures used to plan work.

Practical Objectives

N/A

MENT-701 Mentoring II

Learning Outcomes:

- Demonstrate knowledge of effective communication practices as a mentor.
- Demonstrate knowledge of strategies for teaching workplace skills.

Red Seal Occupational Standard Reference:

5.01 Uses communication techniques
5.02 Uses mentoring techniques

Suggested Hours:

6 hours

Theoretical Objectives:

1. Identify the different roles played by a workplace mentor.

2. Identify strategies to create a supportive learning environment.

3. Identify techniques for effective communication as a mentor.
   i) constructive feedback
   ii) active listening
   iii) leading meetings and one-on-one sessions

4. Describe the steps in teaching a skill.
   i) identifying the point of lesson
   ii) linking the lesson
   iii) demonstrating the skill
   iv) providing practice
   v) giving feedback
   vi) assessing skill and progress

5. Identify strategies to assist in teaching a skill while meeting individual learning needs.
   i) principles of instruction
   ii) coaching skills

6. Explain how to adjust a lesson for various situations.

PLB-455 Program Review

Learning Outcomes:

- Demonstrate knowledge of the Red Seal Occupational Standard and its relationship to the Interprovincial Examination.
- Demonstrate knowledge of overall comprehension of the trade in preparation for the Interprovincial Examination.

Entire Red Seal Occupational Standard (RSOS)

Suggested Hours:

30 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with an RSOS.
   i) blocks
   ii) tasks
   iii) sub-tasks

2. Explain how an RSOS is developed and the link it has with the Interprovincial Red Seal Examination.
   i) development
   ii) validation
   iii) block and task weighting
   iv) examination breakdown (pie-chart)

3. Identify Red Seal products and describe their use for preparing for the Interprovincial Red Seal Examination.
   i) Red Seal website
   ii) examination preparation guide
   iii) sample questions
   iv) examination counselling sheets

4. Explain the relationship between the RSOS and the AACS.

5. Review Common Occupational Skills for the Plumber trade as identified in the RSOS.
   i) safety-related functions
   ii) tools and equipment
   iii) organizes work
   iv) routine trade activities
   v) communication and mentoring techniques

6. Review Process to prepare and assemble pipe for the Plumber trade as identified in the RSOS.
   i) pipe
   ii) joins tube, tubing and pipe

7. Review process to install, test and service sewers, sewage treatment systems and drainage, waste and vent systems for the Plumber trade as identified in the RSOS.
   i) sewers
   ii) sewage
   iii) interior drainage, waste and vent systems

8. Review process to install, test and service water services and distribution systems for the Plumber trade as identified in the RSOS.
   i) water service
   ii) potable water distribution systems
   iii) pressure systems

9. Review process to install, test and service fixtures, appliances and water treatment systems for the Plumber trade as identified in the RSOS.
   i) fixtures and appliances
   ii) water treatment equipment

10. Review process to install, test and service low pressure steam and hydronic heating and cooling systems for the Plumber trade as identified in the RSOS.
   i) low pressure steam systems
   ii) hydronic heating and cooling piping systems
   iii) hydronic heating and cooling generating systems
   iv) hydronic system controls and transfer units

11. Review process to install, test and service fire protection systems for the Plumber trade as identified in the RSOS.
    i) flow through fire protection systems
    ii) standpipe

12. Review process to install, test and service specialized plumbing systems for the Plumber trade as identified in the RSOS.
    i) specialized systems
    ii) process piping systems

Practical Objectives

N/A

Suggested Learning Activities:

1. Conduct a mock certification exam to be used for diagnostic purposes.
2. Review the National Occupational Analysis.
3. Review the Apprentice Logbook.
4. Review the Exam Preparation information found on https://www.nsapprenticeship.ca/
5. Conduct a final mock certification exam.

Resources:

These are the recommended resources to use in the delivery of this unit:

- Exam Preparation information, including occupational analyses, exam counseling sheets, practice exams and sample questions, and other study materials and resources, can be found on https://www.nsapprenticeship.ca/
- Apprentice's personal logbook
- Applicable codes and regulations
- Program texts

Evaluation: pass/fail

Feedback and Revisions

This AACS will be amended periodically; comments or suggestions for improvements should be directed to:

New Brunswick:
Apprenticeship and Occupational Certification
Post-Secondary Education, Training and Labour
470 York St., Rm. 110, PO Box 6000
Fredericton, NB E3B 5H1
Tel: 506-453-2260
Toll Free in NB: 1-855-453-2260
www.gnb.ca

Prince Edward Island:
Apprenticeship, Training and Certification
Atlantic Technology Centre
212-176 Great George St.,
PO Box 2000
Charlottetown, PE C1A 7N8
Tel: 902-368-4460
www.apprenticeship.pe.ca

Newfoundland and Labrador:
Apprenticeship and Trades Certification
Immigration, Population Growth & Skills
Confederation Bldg., West Block
Prince Philip Dr., PO Box 8700
St. John's, NL A1B 4J6
Toll Free: 877-771-3737
www.gov.nl.ca/atcd

Nova Scotia:
Nova Scotia Apprenticeship Agency
1256 Barrington Street, 3rd Floor
PO Box 578
Halifax, NS B3J 2S9
Tel: 902-424-5651
Toll Free in NS: 1-800-494-5651
www.nsapprenticeship.ca

Any comments or suggestions received will be reviewed and considered to determine the course of action required. If the changes are deemed to be minor, they will be held for implementation during the next review cycle. If immediate change is deemed appropriate and approved by the Atlantic Trade Advisory Committee, it will result in a revision to this version of the AACS and will be detailed in the following section.

Version Changes

Revision Date	Affected Section	Description of Change
May 2024	Levels 1 & 4	Integration of MENT-700 Mentoring I and MENT-701 Mentoring II