ita
YOUR TICKET.

PROGRAM OUTLINE

Carpenter

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CARPENTER

PROGRAM OUTLINE

APPROVED BY INDUSTRY

DECEMBER 2014

BASED ON

NOA 2013

Developed by
Industry Training Authority
Province of British Columbia

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Section 1

INTRODUCTION

Carpenter

Foreword

This revised Carpenter Program Outline is intended as a guide for instructors, apprentices, employers of apprentices as well as for the use of industry organizations, regulatory bodies, provincial and federal governments. It reflects updated standards based on the new Carpenter Occupational Analysis (2014) and British Columbia industry and instructor subject matter experts.

Practical instruction by demonstration and student participation should be integrated with classroom sessions. Safe working practices, even though not always specified in each operation or topic, are an implied part of the program and should be stressed throughout the apprenticeship.

This Program Outline includes a list of recommended reference textbooks that are available to support the learning objectives and the minimum shop requirements needed to support instruction.

The Program Outline was prepared with the advice and assistance of the Carpenter Review Committee and will form the basis for further updating of the British Columbia Carpenter Program and learning resources by the Construction Industry Training Organization on behalf of the Industry Training Authority (ITA).

Each competency is to be evaluated through the use of written examination in which the learner must achieve a minimum of 70% in order to receive a passing grade. The types of questions used on these exams must reflect the cognitive level indicated by the learning objectives and the learning tasks listed in the related competencies.

Achievement Criteria are included for those competencies that require a practical component. The intent of including Achievement Criteria in the program outline is to ensure consistency in training across the many training institutions in British Columbia. Their purpose is to reinforce the theory and to provide a mechanism for evaluation of the learner's ability to apply the theory to practice. It is important that these performances be observable and measureable and that they reflect the skills spelled out in the competency as those required of a competent journeyperson. The conditions under which these performances will be observed and measured must be clear to the learner as well as the criteria by which the learner will be evaluated. The learner must also be given the evaluation criteria.

The performance spelled out in the Achievement Criteria is a suggested performance and is not meant to stifle flexibility of delivery. Training providers are welcome to substitute other practical performances that measure similar skills and attainment of the competency. Multiple performances may also be used to replace individual performances where appropriate.

SAFETY ADVISORY

Be advised that references to the WorkSafeBC safety regulations contained within these materials do not/may not reflect the most recent Occupational Health and Safety Regulation the current Standards and Regulation in BC can be obtained on the following website: http://www.worksafebc.com. Please note that it is always the responsibility of any person using these materials to inform him/herself about the Occupational Health and Safety Regulation pertaining to his/her work.

Acknowledgements

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Facilitators (2015):

- Dennis Green — Go2HR
- Colleen Rogan — Industry Training Authority

How to Use this Document

This Program Outline has been developed for the use of individuals from several different audiences. The table below describes how each section can be used by each intended audience.

Section	Training Providers	Employers/ Sponsors	Apprentices	Challengers
Program Credentialing Model	Communicate program length and structure, and all pathways to completion	Understand the length and structure of the program	Understand the length and structure of the program, and pathway to completion	Understand challenger pathway to Certificate of Qualification
OAC	Communicate the competencies that industry has defined as representing the scope of the occupation	Understand the competencies that an apprentice is expected to demonstrate in order to achieve certification	View the competencies they will achieve as a result of program completion	Understand the competencies they must demonstrate in order to challenge the program
Training Topics and Suggested Time Allocation	Shows proportionate representation of general areas of competency (GACs) at each program level, the suggested proportion of time spent on each GAC, and percentage of time spent on theory versus practical application	Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application	Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application	Understand the relative weightings of various competencies of the occupation on which assessment is based
Program Content	Defines the objectives, learning tasks, high level content that must be covered for each competency, as well as defining observable, measureable achievement criteria for objectives with a practical component	Identifies detailed program content and performance expectations for competencies with a practical component; may be used as a checklist prior to signing a recommendation for certification (RFC) for an apprentice	Provides detailed information on program content and performance expectations for demonstrating competency	Allows individual to check program content areas against their own knowledge and performance expectations against their own skill levels

Section	Training Providers	Employers/ Sponsors	Apprentices	Challengers
Training Provider Standards	Defines the facility requirements, tools and equipment, reference materials (if any) and instructor requirements for the program	Identifies the tools and equipment an apprentice is expected to have access to; which are supplied by the training provider and which the student is expected to own	Provides information on the training facility, tools and equipment provided by the school and the student, reference materials they may be expected to acquire, and minimum qualification levels of program instructors	Identifies the tools and equipment a tradesperson is expected to be competent in using or operating; which may be used or provided in a practical assessment

Section 2

PROGRAM OVERVIEW

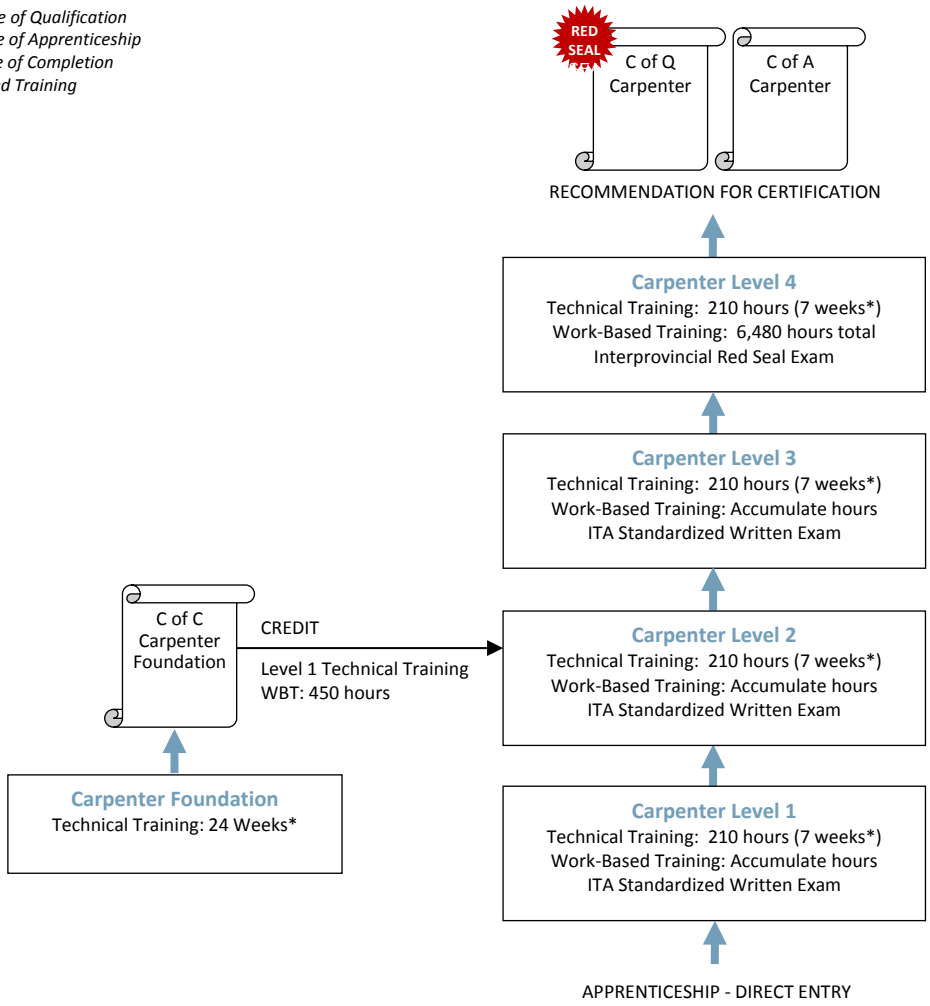
Carpenter

Program Credentialing Model

Apprenticeship Pathway

This graphic provides an overview of the Carpenter apprenticeship pathway.

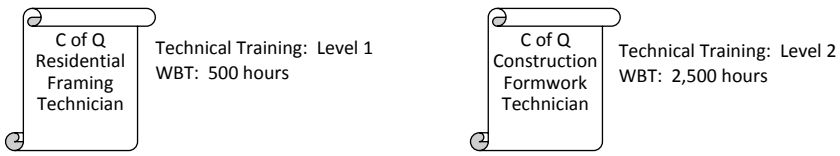
C of Q = Certificate of Qualification
C of A = Certificate of Apprenticeship
C of C = Certificate of Completion
WBT = Work-Based Training



**Suggested Duration based on a 30-hour week*

CROSS-PROGRAM CREDITS

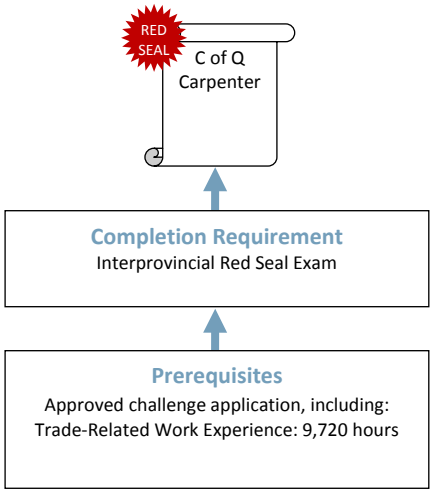
Individuals who hold the credentials listed below are entitled to receive partial credit toward the completion requirements of this program



Challenge Pathway

This graphic provides an overview of the Carpenter challenge pathway.

C of Q = Certificate of Qualification



CREDIT FOR PRIOR LEARNING

Individuals who hold the credentials listed below are entitled to receive partial credit toward the completion requirements of this program

Military certificate in Construction Technician MT #306 / MT #648, QL5 or higher

Work-Based Training: 9,720 hours

Occupational Analysis Chart

CARPENTER

Occupation Description: "Carpenter" means a person who performs all work in connection with the assembly and erection of false work and forms for concrete, wood and metal frame construction, and installs interior and exterior finishing metals for residential, commercial, and industrial projects, while conforming to plans and specifications and local building codes. Other trade skills include: layout, rigging/signalling, cutting/welding and the erection and dismantling of scaffolding.

Safe Work Practices **A**	Apply Shop and Site Safety Practices A1	1	2		
	Apply Personal Safety Practices A2	1			
Documentation and Organizational Skills **B**	Describe Carpentry Trade B1	1			**F**
	Use Construction Drawings and Specifications B2	1	2	3	4
	Interpret Building Codes and Bylaws B3	1	2	3	4
	Plan and Organize Work B4	1			4
	Perform Trade Math B5	1			
Tools and Equipment **C**	Use Hand Tools C1	1		3	
	Use Portable Power Tools C2	1	2	3	
	Use Stationary Power Tools C3	1		3	
	Use Oxy-Fuel Equipment C4		2		
Survey Instruments and Equipment **D**	Use Levelling Instruments and Equipment D1	1	2		
	Use Site Layout Equipment D2		2	3	4

Access, Rigging and Hoisting Equipment (E)	Use Ladders, Scaffolds and Access Equipment	E1	1	2			
	Use Rigging and Hoisting Equipment	E2		2			
Site Layout (F)	Lay Out Building Locations	F1	1	2			
	Prepare Building Site	F2		2		4	
	Apply Excavation and Shoring Practices	F3		2			
Concrete Formwork (G)	Use Concrete Types, Materials, Additives and Treatments	G1	1	2			
	Select Concrete Forming Systems	G2		2			
	Build Footing and Vertical Formwork	G3	1	2			
	Build Slab-On-Grade Forms and Suspended Slab Forms	G4		2			
	Install Reinforcement and Embedded Items	G5		2			
	Build Concrete Stair Forms	G6		2			
	Place and Finish Concrete	G7		2			
	Install Specialized Formwork	G8		2		4	
Wood Frame Construction (H)	Describe Wood Frame Construction	H1	1				
	Select Framing Materials	H2	1				
	Build Floor Systems	H3	1				
	Build Wall Systems	H4	1				
	Build Stair Systems	H5	1		3	4	
	Build Roof Systems	H6	1		3	4	
	Build Specialized Framing Systems	H7				4	
	Perform Renovations and Additions	H8				4	
	Build Timber and Engineered Wood Construction	H9				4	
	Build Decks and Exterior Structures	H10				4	

Finishing Materials	Describe Roofing Materials	Install Doors and Hardware	Install Windows and Hardware	Install Exterior Finishes	Install Interior Finishes	Install Cabinets
I	I1	I2	I3	I4	I5	I6
	4	3	3	3	3 4	3

Install Interior Floor, Ceiling and Wall Systems
I7
4

Building Science	Control the Forces Acting on a Building	Control Heat and Sound Transmission	Control Air and Moisture Movement in Buildings
J	J1	J2	J3
	1 2		
	4	3	3

Training Topics and Suggested Time Allocation

Carpenter – Level 1

			% of Time Allocated to:		
		% of Time	Theory	Practical	Total
Line A	**Safe Work Practices**	**6%**	**80%**	**20%**	**100%**
A1	Apply Shop and Site Safety Practices		✓		
A2	Apply Personal Safety Practices		✓	✓	
Line B	**Documentation and Organizational Skills**	**16%**	**50%**	**50%**	**100%**
B1	Describe Carpentry Trade		✓		
B2	Use Construction Drawings and Specifications		✓	✓	
B3	Interpret Building Codes and Bylaws		✓	✓	
B4	Plan and Organize Work		✓	✓	
B5	Perform Trade Math		✓		
Line C	**Tools and Equipment**	**23%**	**60%**	**40%**	**100%**
C1	Use Hand Tools		✓	✓	
C2	Use Portable Power Tools		✓	✓	
C3	Use Stationary Power Tools		✓	✓	
Line D	**Survey Instruments and Equipment**	**4%**	**50%**	**50%**	**100%**
D1	Use Levelling Instruments and Equipment		✓	✓	
Line E	**Access, Rigging and Hoisting Equipment**	**1%**	**80%**	**20%**	**100%**
E1	Use Ladders, Scaffolds and Access Equipment		✓	✓	
Line F	**Site Layout**	**4%**	**50%**	**50%**	**100%**
F1	Lay Out Building Locations		✓	✓	
Line G	**Concrete Formwork**	**11%**	**50%**	**50%**	**100%**
G1	Use Concrete Types, Materials, Additives and Treatments		✓		
G3	Build Footing and Vertical Formwork		✓	✓	
Line H	**Wood Frame Construction**	**33%**	**60%**	**40%**	**100%**
H1	Describe Wood Frame Construction		✓		
H2	Select Framing Materials		✓		
H3	Build Floor Systems		✓	✓	
H4	Build Wall Systems		✓	✓	
H5	Build Stair Systems		✓	✓	
H6	Build Roof Systems		✓	✓	
Line J	**Building Science**	**2%**	**100%**	**0%**	**100%**
J1	Control the Forces Acting on a Building		✓		
	Total Percentage for Carpenter Level 1	**100%**			

The composite level mark is to consist of 50% theory and 50% practical.
The final level exam will count for 20% of the theory mark.

Training Topics and Suggested Time Allocation

Carpenter – Level 2

			% of Time Allocated to:		
		% of Time	Theory	Practical	Total
Line A	**Safe Work Practices**	**4%**	**100%**	**0%**	**100%**
A1	Apply Shop and Site Safety Practices		✓		
Line B	**Documentation and Organizational Skills**	**13%**	**75%**	**25%**	**100%**
B2	Use Construction Drawings and Specifications		✓	✓	
B3	Interpret Building Codes and Bylaws		✓	✓	
Line C	**Tools and Equipment**	**3%**	**80%**	**20%**	**100%**
C2	Use Portable Power Tools		✓		
C4	Use Oxy-Fuel Equipment		✓	✓	
Line D	**Survey Instruments and Equipment**	**3%**	**50%**	**50%**	**100%**
D1	Use Levelling Instruments and Equipment		✓	✓	
D2	Use Site Layout Equipment		✓	✓	
Line E	**Access, Rigging and Hoisting Equipment**	**11%**	**60%**	**40%**	**100%**
E1	Use Ladders, Scaffolds and Access Equipment		✓	✓	
E2	Use Rigging and Hoisting Equipment		✓	✓	
Line F	**Site Layout**	**4%**	**80%**	**20%**	**100%**
F1	Lay Out Building Locations		✓	✓	
F2	Prepare Building Site		✓		
F3	Apply Excavation and Shoring Practices		✓		
Line G	**Concrete Formwork**	**60%**	**80%**	**20%**	**100%**
G1	Use Concrete Types, Materials, Additives and Treatments		✓		
G2	Select Concrete Forming Systems		✓		
G3	Build Footing and Vertical Formwork		✓	✓	
G4	Build Slab-On-Grade Forms and Suspended Slab Forms		✓	✓	
G5	Install Reinforcement and Embedded Items		✓	✓	
G6	Build Concrete Stair Forms		✓	✓	
G7	Place and Finish Concrete		✓		
G8	Install Specialized Formwork		✓	✓	
Line J	**Building Science**	**2%**	**100%**	**0%**	**100%**
J1	Control the Forces Acting on a Building		✓		
	Total Percentage for Carpenter Level 2	**100%**			

The composite level mark is to consist of 50% theory and 50% practical.
The final level exam will count for 20% of the theory mark.

Training Topics and Suggested Time Allocation

Carpenter – Level 3

			% of Time Allocated to:		
		% of Time	Theory	Practical	Total
Line B	**Documentation and Organizational Skills**	**22%**	**50%**	**50%**	**100%**
B2	Use Construction Drawings and Specifications		✓	✓	
B3	Interpret Building Codes and Bylaws		✓	✓	
Line C	**Tools and Equipment**	**6%**	**50%**	**50%**	**100%**
C1	Use Hand Tools		✓	✓	
C2	Use Portable Power Tools		✓	✓	
C3	Use Stationary Power Tools		✓	✓	
Line D	**Survey Instruments and Equipment**	**6%**	**50%**	**50%**	**100%**
D2	Use Site Layout Equipment		✓	✓	
Line H	**Wood Frame Construction**	**24%**	**60%**	**40%**	**100%**
H5	Build Stair Systems		✓	✓	
H6	Build Roof Systems		✓	✓	
Line I	**Finishing Materials**	**32%**	**50%**	**50%**	**100%**
I2	Install Doors and Hardware		✓	✓	
I3	Install Windows and Hardware		✓	✓	
I4	Install Exterior Finishes		✓	✓	
I5	Install Interior Finishes		✓	✓	
I6	Install Cabinets		✓	✓	
Line J	**Building Science**	**10%**	**75%**	**25%**	**100%**
J2	Control Heat and Sound Transmission		✓		
J3	Control Air and Moisture Movement in Buildings		✓	✓	
	Total Percentage for Carpenter Level 3	**100%**			

The composite level mark is to consist of 50% theory and 50% practical.
The final level exam will count for 20% of the theory mark.

Training Topics and Suggested Time Allocation

Carpenter – Level 4

			% of Time Allocated to:		
		% of Time	Theory	Practical	Total
Line B	**Documentation and Organizational Skills**	**24%**	**75%**	**25%**	**100%**
B2	Use Construction Drawings and Specifications		✓	✓	
B3	Interpret Building Codes and Bylaws		✓	✓	
B4	Plan and Organize Work		✓	✓	
Line D	**Survey Instruments and Equipment**	**11%**	**75%**	**25%**	**100%**
D2	Use Site Layout Equipment		✓	✓	
Line F	**Site Layout**	**8%**	**100%**	**0%**	**100%**
F2	Prepare Building Site		✓		
Line G	**Concrete Formwork**	**6%**	**80%**	**20%**	**100%**
G8	Install Specialized Formwork		✓	✓	
Line H	**Wood Frame Construction**	**34%**	**60%**	**40%**	**100%**
H5	Build Stair Systems		✓	✓	
H6	Build Roof Systems		✓	✓	
H7	Build Specialized Framing Systems		✓	✓	
H8	Perform Renovations and Additions		✓		
H9	Build Timber and Engineered Wood Construction		✓		
H10	Build Decks and Exterior Structures		✓		
Line I	**Finishing Materials**	**14%**	**60%**	**40%**	**100%**
I1	Describe Roofing Materials		✓		
I5	Install Interior Finishes		✓		
I7	Install Interior Floor, Ceiling and Wall Systems		✓	✓	
Line J	**Building Science**	**3%**	**100%**	**0%**	**100%**
J1	Control the Forces Acting on a Building		✓		
	Total Percentage for Carpenter Level 4	**100%**			

The composite level mark is to consist of 50% theory and 50% practical.
The final level exam will count for 30% of the theory mark.

Section 3

PROGRAM CONTENT

Carpenter

Level 1

Carpenter

Line (GAC): A Safe Work Practices

Competency: A1 Apply Shop and Site Safety Practices

Objectives

To be competent in this area, the individual must be able to:

- Describe safe work practices used in a shop and on a construction site.
- Apply the safe work practices used in a shop and on a construction site.

LEARNING TASKS	CONTENT

1. Describe Occupational Health and Safety (OHS) regulations and related materials	• OHS Regulation and WorkSafeBC Standards
	• Legal responsibilities
	  o Education and training
	  o Orientation processes
	  o Toolbox meetings
	• Inspections and investigations
	• WorkSafeBC assessment and penalty costs affecting employers

2. Describe safe work practices	• Safety gear • Inspect condition of tools • Use proper tools • Guards and barriers • Operating hazardous equipment • Using hazardous materials and harmful substances • Flammable, explosion, and electrical hazards • Grounding of tools and equipment • Lockout procedures • Housekeeping • Using compressed air • Sound and light signals • Entering confined spaces

3. Use Workplace Hazardous Materials Information System (WHMIS)	• WHMIS • Labelling • MSDS • Symbols • Storage

4. Describe fire safety procedures	• Component and causes of fire
	  o Fuel
	  o Heat
	  o Oxygen
	• Solvent flammability
	  o Flash points
	• Types of fires
	  o Class A, B, C and D fires
	• Use of fire extinguishers
	• Fire prevention equipment
	  o Welding blanket
	  o Emergency fire blanket
	• Precautions when working with flammable substances
	  o Solvent based products
	  o Fuels
	  o Electrical wiring and equipment
	  o Combustible materials
	  o Vapours
	  o Static electricity
	  o Controlling spills
	  o Storage
	• Safe use of temporary heating
	  o Propane heaters
	  o Electric heaters
	  o Fumes
	  o Proximity to combustibles
	  o Pilot lights

5. Apply safe work practices	• Use OHS Regulation and WorkSafeBC Standards • Place of employment • Harmful substances • Health hazards and work environment controls • Personal protective equipment • Powder-actuated tools • Electrical systems • Temporary lighting • Ladders • Scaffolds, swing stages and miscellaneous stages • Construction procedures • Excavation • Demolition • Rigging • Woodworking machinery and processing

Line (GAC): A Safe Work Practices

Competency: A2 Apply Personal Safety Practices

Objectives

To be competent in this area, the individual must be able to:

- Control the stresses on the body caused by physical work.
- List the hazards associated with working in confined spaces.
- Select and use fall protection as outlined by the OHS Regulation and WorkSafeBC Standards.
- Select and use personal protective equipment.
- Apply the concepts of personal safety awareness and practices.

LEARNING TASKS	CONTENT
1. Describe roles and responsibilities related to workplace safety	• Personal safety rules • Responsibilities affecting you and others
2. Describes hazard identification in the workplace	• Hazardous materials • Falls • Working at heights • Overhead dangers • Confined spaces • Excavations • Working around equipment • Uneven ground • Changes in conditions
3. Use personal protective equipment and clothing	• Inspect • Adjust • Maintain • Store • Hand protection • Leg and foot protection • Headgear • Eye protection • Ear protection • Lung protection • Personal apparel

LEARNING TASKS	CONTENT
	• Precautions for weather o Hypothermia o Hyperthermia o Dehydration o Sunstroke o Slippery surfaces o High winds
4. Apply personal safe work practices	• Musculoskeletal Injuries (MSI) • Procedures for using, lifting and carrying objects o Plywood o Planks and beams o Steel pipe o Ladders o Wheelbarrows o Shovels o Barrels and drums o Small pails o Boxes
5. Use fall protection systems	• Fall protection systems o Guardrails o Fall restraint o Fall arrest • Rope grabs and shock-limiting devices • Using safety harness, lanyard, and lifeline • Safety equipment inspection

Achievement Criteria

Performance	The learner will apply proper personal safety practices during all shop activities.
Conditions	The learner will be given: • Workplace Orientation • Access to all personal safety equipment • Clear expectations • Access to OHS regulation and WorkSafeBC standards
Criteria	The learner will start with 100% and a demerit system will deduct a given percentage for safety infractions. A weighting system will be applied to individual safety infractions.

Line (GAC): B Documentation and Organizational Skills

Competency: B1 Describe Carpentry Trade

Objectives

To be competent in this area, the individual must be able to:

- Describe the working environment and a typical carpentry career path.

LEARNING TASKS	CONTENT
1. Describe the apprenticeship system	• History • NOA • Certification • Program Outline • ITA website (Direct Access) • Progression • Diary • Exams • Grants (apprentice/employers) • Tax credits
2. Describe career path	• Apprentice • Journeyperson • Lead hand • Supervisor • Superintendent • Contractor
3. Describe working environment	• Indoor/outdoor • Noise • Heights • Confined space • Physical demands • Workplace/jobsite culture • Quality • Productivity • Sectors (residential/ICI/civil) • Economic cycles

Line (GAC): B Documentation and Organizational Skills

Competency: B2 Use Construction Drawings and Specifications

Objectives

To be competent in this area, the individual must be able to:

- Describe types of drawings.
- Interpret and extract information from a set of construction drawings.
- Use drawing instruments to create working drawings.

LEARNING TASKS	CONTENT
1. Describe the different types and uses of drawings	• Views • Types of drawings
2. Describe the alphabet of lines, symbols and abbreviations used in drawings	• Lines • Symbols • Abbreviations
3. Describe the use of scale in drawings	• Ratio and proportion
4. Describe the use of the parts of drawings	• Plot plan • Foundation plan • Floor plans • Elevations • Sections • Details • Title block • Borders • Revisions • Schedules • Legends • Notes

LEARNING TASKS	CONTENT
5. Use drafting tools and materials	• Drafting board • Drafting table • T square • Set squares • Scales • Drawing pencils • Templates • Compasses • Erasers • Dusting cloth or brush • Drawing paper • Tracing paper • Drafting or masking tape
6. Use architectural drawings	• Building dimensions • Construction type • Room layout • Fixture locations • Finish details

Achievement Criteria

Performance The learner will interpret information from a set of building plans.

Conditions The learner will be given:

- Construction drawings and specifications
- Assignment sheet

Criteria The individual will be evaluated on:

- Correct interpretation of plans

Line (GAC): B Documentation and Organizational Skills

Competency: B3 Interpret Building Codes and Bylaws

Objectives

To be competent in this area, the individual must be able to:

- Identify building codes and bylaws for residential applications.
- Use building codes.

LEARNING TASKS	CONTENT
1. Describe building codes and bylaws	• National Building Code • British Columbia Building Code • Municipal zone bylaws • Vancouver Building Code • National Fire Code
2. Describe the use of municipal permits	• Development of permit application • Building permit application • Demolition permit • Hoarding permit • Gas fitting permit • Plumbing permit • Electrical permit • Fuel tank permit • Sign permit • Water connection permit • Sewer connection permit • Health permit • Occupancy permit

LEARNING TASKS	CONTENT

3. Describe the types and purposes of inspections	• Purpose of inspections
	• Sequence of inspections
	• Work that requires inspections
	  o Foundation and forms
	  o Perimeter drain, rain water leaders and sumps
	  o Rough in plumbing
	  o Foundation insulation and ground seal
	  o Subtrades (gas, electrical, security, sprinkler etc.)
	  o Chimney and fireplace
	  o Framing
	  o Insulation and vapour barrier
	  o Building envelope
	  o Final inspections

4. Use building codes and bylaws	• Foundation • Framing requirements

Achievement Criteria

Performance	The learner will use BC Building Code requirements and hand drafting tools to prepare a set of drawings for a small building, including plan, elevation and section views. The building will be designed to meet the minimum BC Building Code requirements and will include a window and a door.
Conditions	The learner will be given: • Specifications regarding the building • Assignment Sheet
Criteria	The individual will be evaluated on: • Correct drafting procedures • Compliance with building code

Line (GAC): B Documentation and Organizational Skills

Competency: B4 Plan and Organize Work

Objectives

To be competent in this area, the individual must be able to:

- Plan and organize a project.
- Handle and store construction materials.

LEARNING TASKS	CONTENT
1. Describe the construction planning process	• Steps required to construct a building • Consult • Budget • Design • Permits and applications • Schedule project • Build
2. Describe manufacturer and supplier documentation	• Types • Uses • Formats • How to access • Storing and record keeping
3. Prepare work plan for a project	• Time • Materials • Tools
4. Store framing materials properly	• Handling • Storage • Protecting

Achievement Criteria

Performance: The learner will prepare a work plan for a content-related practical project.

Conditions: The learner will be given:

- Drawings for the project

Criteria: The individual will be evaluated based on:

- Completeness of work plan

Line (GAC): B Documentation and Organizational Skills

Competency: B5 Perform Trade Math

Objectives

To be competent in this area, the individual must be able to:

- Use trade mathematics.

LEARNING TASKS	CONTENT
1. Describe trade math concepts	• Mathematical concepts • Application in carpentry trade • Converting between metric and imperial measurements • Use of calculators

2. Use trade math	• Fractions
	• Ratio/proportion
	• Percentage
	• Order of operations (BEDMAS)
	• Geometry
	  o Circle math
	  o Pythagorean theorem
	  o Area and volume calculations
	• Algebra
	• Trigonometry

Line (GAC): C Tools and Equipment

Competency: C1 Use Hand Tools

Objectives

To be competent in this area, the individual must be able to:

- Describe the use of hand tools.
- Use and maintain measuring and layout tools.
- Use, adjust and maintain cutting, boring and alignment tools.
- Use and maintain fastening tools.

LEARNING TASKS	CONTENT

1. Use measuring and layout tools	• Purpose
	• Types
	  o Squares
	  o Rulers
	  o Tape measures
	  o Levels
	  o Plumb bobs
	  o String lines/chalk lines
	• Parts
	• Operation
	• Safety
	• Adjustment
	• Maintenance
	• Storage

LEARNING TASKS	CONTENT

2. Use cutting and boring tools	• Purpose
	• Types
	  o Hand saws
	  o Planes
	  o Chisels
	  o Knives
	  o Drill bits
	• Parts
	• Operation
	• Safety
	• Adjustment
	• Maintenance
	• Storage

3. Use fastening tools	• Purpose
	• Types
	  o Hammers
	  o Screwdrivers
	  o Bars
	  o Pliers and cutters
	  o Wrenches
	• Parts
	• Operation
	• Safety
	• Adjustment
	• Maintenance
	• Storage

Achievement Criteria

Performance — The learner will layout and build a hand tool project.

Conditions — The learner will be given:

- Construction drawings and specifications
- Work space and materials
- Tools

Criteria — The learner will be evaluated on:

- Correct calculations as required
- Accurate layout and cuts
- Proper use of hand tools
- Quality of finished product

Line (GAC): C Tools and Equipment

Competency: C2 Use Portable Power Tools

Objectives

To be competent in this area, the individual must be able to:

- Describe the use of portable power tools.
- Use, adjust, and maintain portable power tools.
- Use, adjust, and maintain pneumatic tools.
- Describe the use of powder actuated tools.
- Describe the use of chain saws.

LEARNING TASKS	CONTENT

1. Describe the safe use of portable power tools	• PPE
	• Operating procedures
	• Following manufacturer's documentation
	• Power supply
	  o Disconnect while assembling
	  o Check cord
	• Grounding
	• Condition of equipment
	  o Guards in place
	  o Attachments secure
	  o Sharp blades
	  o Batteries charged
	• Storage of tools
	• Battery disposal

2. Use portable circular saws	• Purpose
	• Safety
	• Types and sizes
	  o Corded
	  o Cordless
	• Parts
	• Blade types
	• Operations
	• Accessories
	• Adjustments
	• Maintenance

LEARNING TASKS	CONTENT

3. Use portable mitre saws	• Purpose
	• Safety
	• Types, sizes and capacities
	  o Mitre saws
	  o Compound mitre saws
	• Parts
	• Operations
	• Accessories
	• Adjustments
	• Maintenance

4. Use portable drills and drivers	• Purpose
	• Safety
	• Types, sizes and speeds
	  o Corded
	  o Cordless
	• Parts
	• Bit types
	• Fastener types
	• Operations
	• Accessories
	• Adjustments
	• Maintenance

LEARNING TASKS	CONTENT

5. Use portable pneumatic tools	• Supply system
	• Purpose
	• Safety
	• Types and sizes
	  o Nail guns
	  o Staplers
	  o Impact wrenches
	• Parts
	• Fastener types
	• Operations
	• Accessories
	• Adjustments
	• Maintenance

6. Use jigsaws and reciprocating saws	• Purpose
	• Safety
	• Types, sizes and speeds
	  o Jigsaws
	  o Reciprocating saws
	  o Multi tools
	  o Corded/cordless
	• Parts
	• Blade types
	• Operations
	• Accessories
	• Adjustments
	• Maintenance

7. Describe powder-actuated tools	• Purpose • Safety • OHS Regulation and WorkSafeBC Standards • Types and sizes • Hazard recognition
8. Describe the safe operation of chain saws	• Purpose • Safety • OHS Regulation and WorkSafeBC Standards • Types, sizes • Hazard recognition • Protective clothing and equipment

Achievement Criteria

Performance	The learner will layout and build a power tool project that includes cross, mitre and bevel cuts and ripping with a circular saw.
Conditions	The learner will be given: • Construction drawings and specifications • Work space • Materials • Tools
Criteria	The learner will be evaluated on: • Accurate layout and cuts • Proper use of power tools • Quality of finished project

Line (GAC): C Tools and Equipment

Competency: C3 Use Stationary Power Tools

Objectives

To be competent in this area, the individual must be able to:

- Describe the use of a table saw.
- Use, adjust and maintain a table saw.

LEARNING TASKS	CONTENT
1. Use a table saw	• Purpose • Types and sizes • Parts • Blade types and purpose • Accessories • Operations • Types of cuts • Safety • Adjustments • Maintenance • Following manufacturer's documentation
2. Use bench grinders	• Purpose • Wheel types, sizes and speed • Parts • Fastener types • Operations • Accessories • Safety • Adjustments • Maintenance • Following manufacturer's documentation

Achievement Criteria 1

Performance The learner will perform procedures on a table saw including ripping cuts and cross cuts.

Conditions The learner will be given:

- Materials
- Table saw

Criteria The learner will be evaluated on:

- Proper use of tool
- Accurate dimensions

Achievement Criteria 2

Performance The learner will sharpen a chisel or plane iron.

Conditions The learner will be given:

- A chisel or plane iron
- Bench grinder
- Sharpening stones

Criteria The learner will be evaluated on:

- Correct grinding procedure
- Correct whetting procedure
- Sharpness of finished edge

Line (GAC): D Survey Instruments and Equipment

Competency: D1 Use Levelling Instruments and Equipment

Objectives

To be competent in this area, the individual must be able to:

- Use optical levels for residential applications.
- Maintain optical levels.

LEARNING TASKS	CONTENT
1. Describe levelling equipment	• Purpose • Types of levelling instruments • Builder's levels • Electronic levels • Parts • Types of equipment

2. Use levelling equipment	• Instrument set-up
	• Testing level
	• Levelling rods
	  o Parts
	  o Scales
	  o Rod types
	  o Hand signals
	• Electronic and laser levels
	  o Parts
	  o Setting up procedures
	  o Target use
	  o Setting elevations
	  o Measuring elevations
	• Common errors

3. Maintain levelling equipment	• Storage • Transporting • Protection from elements • Cleaning and checking condition of parts

Achievement Criteria

Performance	The learner will transfer elevations.
Conditions	The learner will be given: • Electronic or laser level, receiver and rod • Survey points
Criteria	The learner will be evaluated on: • Accuracy of elevations

Line (GAC): E Access, Rigging, and Hoisting Equipment

Competency: E1 Use Ladders, Scaffolds and Access Equipment

Objectives

To be competent in this area, the individual must be able to:

- Describe ladders.
- Set up and use a ladder.

LEARNING TASKS	CONTENT

1. Describe ladders	• OHS Regulation and WorkSafeBC Standards
	• Ladder ratings
	• Portable ladder safety
	• Ladder types
	  o Access ladder
	  o Performance ladder
	  o Job built ladder
	• Accessories

2. Use ladders	• Safety • Procedure for use • Maintenance • Storage

Achievement Criteria

Performance	The learner will set up and climb an access ladder.
Conditions	The learner will be given: • A ladder • A location
Criteria	The learner will be evaluated on: • Proper use of an access ladder

Line (GAC): F Site Layout

Competency: F1 Lay Out Building Locations

Objectives

To be competent in this area, the individual must be able to:

- Describe excavation and grading procedures.
- Build batter boards.

LEARNING TASKS	CONTENT
1. Describe excavation and grading procedures	• Clearing the site • Excavate • Cut and fill • Contour lines • Grades • Grade line and grade stakes

2. Build batter boards	• Location
	• Construction
	• Locating lines
	• Tying lines
	• Plumbing down from lines
	• Lay out square corners
	  o Measuring diagonals
	  o 3-4-5 Method

Achievement Criteria

Performance: The learner will set up batter boards and string lines for a foundation project.

Conditions: The learner will be given:

- A foundation plan
- Space with reference points
- Materials
- Tools

Criteria: The learner will be evaluated on:

- Setting string lines as per plan
- Correct dimensioning
- Proper construction procedures of the batter boards

Line (GAC): G Concrete Formwork

Competency: G1 Use Concrete Types, Materials, Additives and Treatments

Objectives

To be competent in this area, the individual must be able to:

- Describe concrete and its uses.

LEARNING TASKS	CONTENT

1. Describe concrete	• Safety
	• Purpose
	• Uses
	• Materials
	  o Portland cement
	  o Water
	  o Aggregates
	  o Reinforcing steel
	  o Embedded materials
	• Handling

Line (GAC): G Concrete Formwork

Competency: G3 Build Footing and Vertical Formwork

Objectives

To be competent in this area, the individual must be able to:

- Describe the construction of residential footing and wall forms.
- Construct residential footing and wall forms.

LEARNING TASKS	CONTENT
1. Describe footing forms	• Strip footings • Stepped footings • Column footings

2. Describe wall forms	• Built-in-place forms
	  o Strap tie forms
	  o Easy strip forms
	  o Snap tie forms
	  o Insulated concrete forming (ICF)
	• Form panels
	• Form ties (wedges)
	• Walers
	• Strong backs
	• Bracing
	• Corner construction
	• Pour strip
	• Chamfer strip
	• Bulkheads and door bucks
	• Corbels
	• Pilasters
	• Methods of construction

3. Plan footing and wall forms	• Safety • Code • Select materials • Material handling and storage • Schedule • Access

LEARNING TASKS	CONTENT
4. Calculate footing and wall forms	• Center line perimeter • Contact area • Sheathing and form ply • Studs • Walers • Ties • Wedges • Braces • Concrete volume
5. Build footing and wall forms	• Layout • Assemble • Support • Align • Brace • Concrete placement • Stripping forms

Achievement Criteria

Performance — The learner will build footings and wall forms using simple residential systems.

Conditions — The learner will be given:

- A foundation plan which includes bucks, blockouts and pour strip
- Work space
- Forming material and hardware
- Tools

Criteria — The learner will be evaluated on:

- Proper use of material and hardware
- Plumb and level
- Dimensionally accurate, straight and square
- Proper construction of bucks, blockouts, etc.

Line (GAC): H Wood Frame Construction

Competency: H1 Describe Wood Frame Construction

Objectives

To be competent in this area, the individual must be able to:

- Describe the systems and terminology in wood frame construction.

LEARNING TASKS	CONTENT
1. Describe framing systems	• Platform or Western frame construction • Balloon frame construction • Post beam and plank construction • Heavy timber construction • Preserved wood foundations • Energy efficient framing
2. Describe the terms used in wood frame construction	• Structural terms • Architectural terms
3. Describe framing members	• Floors and ceilings • Walls and partitions • Roofs • Bracing and blocking • Sheathing
4. Describe roof styles	• Flat • Shed • Gable • Hip • Intersecting • Mansard • Gambrel • Butterfly

Line (GAC): H Wood Frame Construction

Competency: H2 Select Framing Materials

Objectives

To be competent in this area, the individual must be able to:

- Select standard sizes, species and grades of wood for framing.
- Select fasteners and hardware for wood framing.

LEARNING TASKS	CONTENT

1. Describe characteristics of wood	• Renewable resource
	• Strong
	• Light in weight
	• Cuts easily
	• Resists corrosive materials
	• Reusable
	• Density
	• Softwood species
	  o Douglas fir
	  o Fir
	  o Larch
	  o Hemlock
	  o Spruce
	  o Pine
	  o Cedar
	• Hardwood species
	  o Maple
	  o Cherry
	  o Oak
	  o Birch
	• Tropical hardwoods

LEARNING TASKS	CONTENT

2. Describe wood production	• Production methods
	  o Sawing
	  o Drying
	  o Moisture content
	  o Planing
	• Sizes
	• Grading
	  o Grade stamps
	  o Board lumber
	  o Light framing
	  o Joists and planks
	  o Beams and stringers
	  o Posts and timbers
	  o Decking
	  o Siding

3. Describe common defects in wood	• Warp • Compression wood • Mechanical defects • Split, check, shake • Knots • Wane • Pitch, streaks, stained wood • Decay • Insect damage • Manufacturing imperfections
4. Describe manufactured products	• Veneers • Cross-banding • Cores • Adhesives • Softwood plywood grades • Plywood veneers and cores • Faces, backs and cores • Standard sizes and thicknesses

5. Select fasteners used in wood frame construction	• Nails • Threaded fasteners • Adhesives • Treated wood fasteners
6. Select hardware used in wood frame construction	• Framing connectors • Treated wood connectors • Seismic connectors

Line (GAC): H Wood Frame Construction

Competency: H3 Build Floor Systems

Objectives

To be competent in this area, the individual must be able to:

- Describe the construction of floors and support systems.
- Build floors and support systems.

LEARNING TASKS	CONTENT

1. Describe floor systems	• Purpose
	• Uses
	• Types of floor systems
	  o Lumber
	  o Engineered
	• Components of a floor system
	  o Pony walls
	  o Posts/columns
	  o Beams
	  o Joists
	  o Sheathing
	  o Bridging

2. Plan floor systems	• Safety
	• Code requirements
	  o Determine materials and sizes
	  o Spacing
	  o Spans
	• Construction drawings
	• Construction sequence
	  o Stairwell openings
	• Interpret engineering documents
	  o Layout
	  o Drilling holes
	  o Hardware
	  o Blocking
	  o Fastener selection
	  o Temporary bracing

LEARNING TASKS	CONTENT

3. Calculate floor systems	• Calculate material quantities
	  o Sill plates and pony walls
	  o Posts
	  o Beams
	  o Joists
	  o Sheathing
	  o Blocking and bridging
	  o Connectors
	  o Fasteners and adhesives
	  o Waste allowance

4. Build posts/columns, beams, and pony walls	• Post/column anchorage • Installing posts/columns and beams • Pony wall construction
5. Build floors	• Layout and installation of sill plates • Layout and installation of joists o Stairwell openings • Nailing requirements • Joists supported by steel beams • Layout and installation of bridging or blocking • Installation of sheathing

Achievement Criteria

Performance	The learner will plan, lay out and build a floor system.
Conditions	The learner will be given: • Construction drawings that include openings and provisions for mechanical services • Work space • Materials
Criteria	The learner will be evaluated on: • Proper joist layout reflecting needs of services • Proper sequencing of joists around openings • Compliance with building code • Dimensionally accurate

Line (GAC): H Wood Frame Construction

Competency: H4 Build Wall Systems

Objectives

To be competent in this area, the individual must be able to:

- Describe the construction of wood frame walls.
- Build wood frame walls.

LEARNING TASKS	CONTENT

1. Describe wall systems	• Purpose
	• Uses
	• Types of wall systems
	  o Exterior
	  o Interior
	  o Load bearing
	  o Point load
	  o Non-load bearing
	  o Party wall
	  o Shear wall
	• Components of wall systems
	  o Plates
	  o Studs
	  o Jacks
	  o Lintels
	  o Blocking
	  o Bracing/sheathing

2. Plan wall systems	• Safety
	• Code requirements
	  o Determine materials and sizes
	  o Spacing
	  o Spans
	• Construction drawings
	• Construction sequence
	• Temporary bracing

3. Calculate wall systems	• Calculate quantities of wall framing materials

4. Build wall systems

- Build exterior walls
  - Layout
  - Assemble
  - Squaring walls
  - Sheathing
  - Standing walls
  - Straightening and bracing walls
- Build interior walls
  - Layout
  - Assemble
  - Standing walls
  - Straightening and bracing walls
  - Air/vapour barrier continuity
  - Fire stops and other backing

Achievement Criteria

Performance — The learner will build walls and partitions.

Conditions — The learner will be given:

- Construction drawings which incorporate door and window openings, and point loads
- Work space
- Materials

Criteria — The learner will be evaluated on:

- Proper stud layout
- Proper framing around openings
- Compliance to building code
- Dimensionally accurate, square, plumb and level

Line (GAC): H Wood Frame Construction

Competency: H5 Build Stair Systems

Objectives

To be competent in this area, the individual must be able to:

- Describe the construction of straight stairs and balustrade.
- Build stairs and balustrade.

LEARNING TASKS	CONTENT
1. Describe stair systems	• Purpose • Uses • Types • Stair terms • Stair components

2. Plan straight stairs	• Safety
	• Code requirements for stairs and balustrades
	  o Maximum and minimum rise
	  o Maximum and minimum run
	  o Headroom requirements
	  o Stringer requirements
	  o Handrail requirements
	  o Width of stairway
	  o Width and thickness of treads
	• Construction drawings
	• Construction sequence

3. Calculate straight stairs	• Calculate stair dimensions
	  o Proportioning rules
	  o Total rise
	  o Rise and number of risers
	  o Run and number of treads
	  o Stairwell opening lengths
	  o Length of stringers
	• Calculate quantities of materials
	  o Components
	  o Waste allowance
	  o Fasteners

4. Build straight stairs	• Layout • Cut • Assemble

Achievement Criteria

Performance — The learner will plan and build straight stairs with a handrail.

Conditions — The learner will be given:

- Work space
- Construction drawings and specifications
- Materials

Criteria — The learner will be evaluated on;

- Compliance to Building Code
- Correct calculations, layout and cuts
- Dimensionally accurate, straight, square and plumb
- Quality of finished project

Line (GAC): H Wood Frame Construction

Competency: H6 Build Roof Systems

Objectives

To be competent in this area, the individual must be able to:

- Describe the construction of ceilings and gable roofs.
- Frame ceilings and gable roofs.
- Erect truss roofs.

LEARNING TASKS	CONTENT
1. Describe gable roof systems	• Purpose • Uses • Types • Describe gable roof components o Roof terms o Common rafter o Roof joists o Collar ties o Purlins o Pony or knee walls o Gable studs o Outriggers o Lookouts o Ledgers o Fascias and barge boards
2. Plan gable roof systems	• Safety • Code requirements o Snow load o Sizes and spacing of rafters o Nailing requirements o Openings o Ventilation requirements • Construction drawings • Construction sequence

LEARNING TASKS	CONTENT

3. Calculate gable roof systems	• Calculate theoretical lengths
	• Calculate quantities of ceiling and roof framing materials
	  o Joists
	  o Rafters
	  o Ridges
	  o Fascias and barge boards
	  o Sheathing surface area
	  o Waste allowance
	  o Fastener calculations

4. Build gable roof systems	• Lay out roof members • Lay out plate • Cut members • Assemble

5. Describe hip roof systems	• Purpose
	• Uses
	• Types
	• Describe hip roof components
	  o Hip rafter
	  o Jack rafter
	  o End common rafter
	  o Working points
	  o Cheek cuts

6. Plan hip roof systems	• Safety
	• Construction drawings
	• Construction sequence
	• Code requirements
	  o Snow load
	  o Sizes and spacing of rafters
	  o Nailing requirements
	  o Openings
	• Ventilation requirements

LEARNING TASKS	CONTENT
7. Calculate hip roof systems	• Calculate theoretical lengths • Calculate quantities of ceiling and roof framing materials o Number of joists o Number of rafters o Ridges o Hips o Fascias o Sheathing surface area o Waste allowance o Fastener calculations
8. Build hip roof systems	• Layout for hip rafters • Layout for jack rafters • Layout plate for hip roof • Cut members for the hip roof • Assemble o Install common rafters and ridge o Install end common rafters o Install hip rafters o Install jack rafters o Install fascias
9. Describe truss roofs	• Safety requirements and WorkSafeBC regulations • Interpret manufacturer's documentation • Layout of trusses • Handling and installation of trusses • Fastening trusses • Bracing requirements o Temporary bracing o Permanent bracing

Achievement Criteria 1

Performance — The learner will build a gable roof with ceiling joists.

Conditions — The learner will be given:

- Construction drawings and specifications
- Working space
- Materials

Criteria — The learner will be evaluated on:

- Correct calculation and layout of ceiling joists, rafters and other roof framing members
- Dimensionally accurate, straight and square
- Accuracy of cuts

Achievement Criteria 2

Performance — The learner will build a hip roof.

Conditions — The learner will be given:

- Construction drawings and specifications
- Working space
- Materials

Criteria — The learner will be evaluated on:

- Correct calculation, layout and spacing of rafters
- Correct layout for sheathing cuts
- Dimensionally accurate, straight and square
- Accuracy of cuts

Line (GAC): J Building Science

Competency: J1 Control the Forces Acting on a Building

Objectives

To be competent in this area, the individual must be able to:

- Describe the forces acting on a building.

LEARNING TASKS	CONTENT
1. Describe forces acting on the building structure	• Dead and live loads • Compression, tension, torsion and shear • Uplift • Gravity

Level 2

Carpenter

Line (GAC): A Safe Work Practices

Competency: A1 Apply Shop and Site Safety Practices

Objectives

To be competent in this area, the individual must be able to:

- Describe safe work practices used in a woodworking shop and on a construction site.
- Apply safe work practices used in a woodworking shop and on a construction site.

LEARNING TASKS	CONTENT

1. Use OHS regulations and related materials	• Safety committees
	  o Purpose
	  o Membership
	  o Role of members
	  o Meetings and minutes
	• Conduct site inspections
	• Conduct toolbox meetings
	  o Purpose
	  o Content
	  o Timing
	• Conduct site inspections
	  o Identification of hazards
	  o Recommendations
	  o Remedies

Line (GAC): B Documentation and Organizational Skills

Competency: B2 Use Construction Drawings and Specifications

Objectives

To be competent in this area, the individual must be able to:

- Interpret and extract information from a set of industrial, commercial, and institutional (ICI) construction drawings.
- Use drawing instruments to create working drawings for formwork details.

LEARNING TASKS	CONTENT

1. Describe ICI drawings and specifications	• Types of drawings
	  o Site
	  o Structural
	  o Architectural
	  o Mechanical
	  o Electrical
	  o Landscape
	  o Shop drawings
	  o As built
	• Schedules
	• Specifications
	• Gridlines

2. Interpret ICI drawings	• Schedules • Specifications • Identify building locations • Building dimensions • Gridlines • Mechanical and electrical systems • Room layout • Fixture locations • Structural steel • Pre-cast units • Finish details • Coordinate with other trades
3. Draw formwork details	• Review drafting technique • Plan view • Section view • Component identifcation

Achievement Criteria

Performance	The learner will draw formwork details, including plan and section views.
Conditions	The learner will be given: • Construction drawings and specifications
Criteria	The learner will be evaluated on: • Required construction details as per drawings • Proper drawing technique

Line (GAC): B Documentation and Organizational Skills

Competency: B3 Interpret Building Codes and Bylaws

Objectives

To be competent in this area, the individual must be able to:

- Use building codes and bylaws related to ICI construction.

LEARNING TASKS	CONTENT
1. Use building codes and bylaws	• Applicable sections of the BC Building Code o Guards o Ramps o Egress o Area of refuge o Hoarding o Demolition o Concrete mixes o Accessibility
2. Describe inspections required in the ICI process	• Safety o WorkSafeBC o Contractor o BC Safety Authority • Architectural o Work completed o Quality of work • Engineering o Geotechnical o Formwork o Reinforcing steel o Embedded materials o Concrete

LEARNING TASKS

CONTENT

- Municipal/Provincial
  - Plumbing
  - Electrical
  - Fire
  - Gas
  - Final/occupancy
  - Elevator
  - Health

Achievement Criteria

Performance — The learner will interpret information from a set of ICI drawings.

Conditions — The learner will be given:

- ICI construction drawings
- Question sheets

Criteria — The individual will be evaluated on:

- Correct interpretation of drawings

Line (GAC): C Tools and Equipment

Competency: C2 Use Portable Power Tools

Objectives

To be competent in this area, the individual must be able to:

- Describe the use and maintenance of concrete drilling, chipping and grinding tools.

LEARNING TASKS	CONTENT
1. Describe hammer drills, rotary hammers and demolition hammers	• Purpose • Safety • Types and sizes • Parts • Operations • Accessories • Bit types • Adjustments • Maintenance
2. Describe angle grinders	• Purpose • Safety • Types and sizes • Parts • Operations • Accessories • Abrasive types and speeds • Adjustment • Maintenance
3. Describe cut-off saws	• Purpose • Safety • Types and sizes • Parts • Operations • Accessories • Adjustment • Maintenance

4. Describe portable grinders	• Purpose • Safety • Types and sizes • Parts • Operations • Accessories • Abrasive types and speeds • Adjustment • Maintenance

Line (GAC): C Tools and Equipment

Competency: C4 Use Oxy-Fuel Equipment

Objectives

To be competent in this area, the individual must be able to:

- Describe the use of oxy-fuel equipment.
- Use, adjust and maintain oxy-fuel equipment.

LEARNING TASKS	CONTENT
1. Describe the safe use of oxy-fuel equipment	• PPE • Operating procedures • Following manufacturer's documentation • Fuel supply • Condition of equipment • Storage
2. Use oxy-fuel equipment	• Purpose • Safety • Parts • Assembly • Operations • Accessories • Adjustments • Maintenance

Achievement Criteria

Performance: The learner will perform basic cutting operations with oxy-fuel equipment.

Conditions: The learner will be given:

- Construction drawings and specifications
- Materials
- Working space

Criteria: The learner will be evaluated on:

- Proper use of equipment

Line (GAC): D Survey Instruments and Equipment

Competency: D1 Use Levelling Instruments and Equipment

Objectives

To be competent in this area, the individual must be able to:

- Use and maintain levelling equipment.

LEARNING TASKS	CONTENT
1. Use levelling equipment	• Grade • Depth of cut • Instrument set-up • Testing level • Levelling rods and measuring chains and tapes • Record elevations • Electronic and laser levels • Common errors • Maintenance • Storage

Achievement Criteria

Performance	The learner will complete a survey circuit identifying elevations at various locations including a turning point.
Conditions	The learner will be given: • Builders level and rod • Site plan including survey points • Field book
Criteria	The learner will be evaluated on: • Accuracy of rod readings • Correct process for field book recordings • Proper set up of instrument

Line (GAC): D Survey Instruments and Equipment

Competency: D2 Use Site Layout Equipment

Objectives

To be competent in this area, the individual must be able to:

- Describe and use theodolites.

LEARNING TASKS	CONTENT
1. Describe site layout equipment	• Purpose • Types o Theodolites • Parts
2. Use layout equipment	• Calculations • Introduction to trigonometry • Angles • Site plans • Building plans
3. Maintain site layout equipment	• Storage • Transporting • Protection from elements • Cleaning and checking condition of parts

Achievement Criteria

Performance: The learner will lay out building corners using a theodolite.

Conditions: The learner will be given:

- Construction drawings
- Theodolite
- Work space

Criteria: The learner will be evaluated on:

- Correct calculation of angles and lengths to locate corners
- Proper use of instrument
- Accurate location of corner stakes

Line (GAC): E Access, Rigging and Hoisting Equipment

Competency: E1 Use Ladders, Scaffolds and Access Equipment

Objectives

To be competent in this area, the individual must be able to:

- Describe construction access equipment.
- Use construction access equipment.
- Build construction access equipment.

LEARNING TASKS	CONTENT

1. Describe scaffolds and temporary access structures	• OHS Regulation and WorkSafeBC Standards
	• General requirements
	• Construction and use
	• Scaffold types
	  o Wooden
	  o Frame and brace
	  o All round
	  o Tube and clamp
	  o Cuplok
	• Uses of wooden scaffolds
	• Parts of wooden scaffolds
	  o Single pole scaffolds
	  o Double pole scaffolds
	  o Lumber specifications
	• Assembly procedures
	• Dismantling procedures
	• Temporary ramps, walkways and stairs
	  o Slope regulations
	  o Guards

2. Plan scaffolds	• Safety • OHS Regulation and WorkSafeBC Standards • Scaffold design • Scaffold loads • Select scaffold type • Location and access

LEARNING TASKS	CONTENT

3. Build scaffolds	• Assembly
	  o Mud sills
	  o Members plumb and level
	  o Stability
	  o Guardrails and toe-boards
	  o Work platform
	  o Ladder access to scaffolds
	• Tagging systems
	• Dismantling

4. Describe access equipment	• OHS Regulation and WorkSafeBC Standards • Swing stages • Suspended power platform • Scissor lifts • Aerial lift

Achievement Criteria

Performance	The learner will assemble and dismantle a scaffolding system.
Conditions	The learner will be given: • Working space • A scaffolding plan • Materials
Criteria	The learner will be evaluated on: • Compliance with OHS Regulation and WorkSafeBC Standards

Line (GAC): E Access, Rigging and Hoisting Equipment

Competency: E2 Use Rigging and Hoisting Equipment

Objectives

To be competent in this area, the individual must be able to:

- Describe the safe use and maintenance of hoisting equipment.
- Use hoisting equipment.
- Use hand signals to communicate with the hoist operator.

LEARNING TASKS	CONTENT

1. Describe ropes	• Purpose
	• Rope types
	  o Fibre
	  o Wire
	  o Stranding
	• Use of ropes
	• Rope terms
	  o Breaking strength
	  o Working Load Limits (WLL)
	• Knots, bends and hitches
	  o Bowline
	  o Figure eight
	  o Reef or square knot
	  o Sheet bend
	  o Round turn and two half-hitches
	  o Clove hitch
	  o Timber hitch
	  o Trucker's knot
	• General rules for tying knots, bends and hitches

LEARNING TASKS	CONTENT
2. Describe rigging equipment	• Slings • Web slings • Turnbuckles • Eyes • Shackles • Cable clips and thimbles • Hooks • Spreader bars • Tag lines

3. Describe cranes and hoists	• Purpose
	• Use
	• Types of cranes
	  o Tower
	  o Self erect
	  o Mobile
	  o Boom truck
	  o Overhead gantry
	• Types of hoists
	  o Forklifts
	  o Telehandler
	  o Power ladder
	  o Come-along
	  o Wire rope winch
	  o Rollers

4. Describe safe methods of lifting loads with cranes and hoists	• OHS Regulation and WorkSafeBC Standards
	• Certification
	• Training
	• Lift plan
	• High voltage line clearance
	• Overhead hazards
	• Load stability
	• Centre of gravity
	• Sling locations
	• Use of tag lines
	  o OHS Regulation and WorkSafeBC Standards
	  o Rope for tag lines
	  o Length of rope
	  o Use of two tag lines
	  o Location of attachment for tag lines
	• Use of hand signals
	• Other means of communication
	  o Sound signals
	  o Radio communication
	  o Video systems

5. Use rigging equipment	• OHS Regulation and WorkSafeBC Standards • Safe rigging practices • Unsafe practices • Calculate weight of load • Calculate sling angle and working load limit • Rigging structural shapes • Rigging complex shapes • Blocking and stacking
6. Use hoisting equipment	• OHS Regulation and WorkSafeBC Standards • Follow lift plan • Ground stability • Move and place load

7. Maintain and store rigging and hoisting equipment	• OHS Regulation and WorkSafeBC Standards • Care of slings and wire rope • Wire rope safety • Damages in wire rope • Hook safety • Safety of other hardware • Rings, links and swivels • Eye bolts and ring bolts • Turnbuckles • Shackles • Synthetic web slings • Inspection

Achievement Criteria 1

Performance The learner will use proper hand signals for communication with a Mobile Crane Operator.

Conditions The learner will be given:

- A series of crane operations to be signaled by the learner

Criteria The learner will be evaluated on:

- Proper hand signal for the application

Achievement Criteria 2

Performance The learner will select and tie knots, bends and/or hitches.

Conditions The learner will be given:

- Work space
- Rope and materials

Criteria The learner will be evaluated on:

- Correct tying techniques

Line (GAC): F Site Layout

Competency: F1 Lay Out Building Locations

Objectives

To be competent in this area, the individual must be able to:

- Describe the layout of commercial buildings.
- Lay out commercial buildings.

LEARNING TASKS	CONTENT
1. Identify survey markers	• Iron pin • Lead plug • Survey point • Hub • Corner stake • Witness stake • Benchmark • Datum point • Monument • Locate correct plot plans
2. Describe building locations	• Legal descriptions • Survey plans • Subdivision plans • Surveyor's Certificate • Terms
3. Lay out building locations	• Square corners • Trigonometry • Grade stakes • Gridlines • Slope

Achievement Criteria

Performance The learner will set a series of grades stakes for a given slope.

Conditions The learner will be given:

- Site plan
- Builder's level and rod
- Bench mark elevation

Criteria The learner will be evaluated on:

- Accuracy of grade stake elevations

Line (GAC): F Site Layout

Competency: F2 Prepare Building Site

Objectives

To be competent in this area, the individual must be able to:

- Describe building site considerations.
- Describe site preparation.
- Describe types and methods of constructing hoardings.

LEARNING TASKS	CONTENT

1. Describe building site considerations	• Building location
	• Temporary facilities
	  o First Aid
	  o Tool storage
	  o Site offices
	  o Fuel storage
	  o Muster station
	  o Parking
	  o Wheel wash
	  o Sediment control
	• Temporary services
	• Water
	• Gas
	• Electrical
	• Material lay down services
	• Delivery areas
	• Temporary road ways
	• Demobilization

LEARNING TASKS	CONTENT
2. Describe items to be completed before excavation	• Site layout • Permits • Environmental plan • Clearing the site • Tree protection • Sediment and erosion control • Geotechnical reports • BC One Call • Weather considerations • Identify and remove hazardous materials • Site services • Perimeter protection • Hoarding • Dump site
3. Describe hoardings	• Building codes and bylaws • Methods of construction • Scaffold and plywood barricades • Vertical braced barricades • Covered walkways • Shored hoardings • Access lighting and signage
4. Describe drainage systems	• Dewatering system • Perimeter draining systems • Granular drainage layer systems • Drainage disposal • Rainwater leader system • Sumps

Line (GAC): F Site Layout

Competency: F3 Apply Excavation and Shoring Practices

Objectives

To be competent in this area, the individual must be able to:

- Describe excavations and shoring.
- Plan excavations and shoring.
- Calculate excavation.

LEARNING TASKS	CONTENT

1. Describe excavations	• Safety
	  o Describe precautions
	  o Describe blasting signals
	  o OHS regulation and WorkSafeBC standards
	• Bulk excavations
	• Trench excavations
	• Deep excavations
	• Soil conditions
	• Soil types
	• Bearing capacities of soils
	• Underpinning

2. Describe shoring	• Types of shoring
	  o Trench shoring
	  o Combined sloping and shoring
	  o Sheet piling
	  o Soldiers and planking
	  o Shotcrete
	  o Rock anchors
	  o Raker struts
	• Engineered slope stabilization

LEARNING TASKS	CONTENT

3. Plan excavations and shoring	• Sloping, benching and shoring requirements
	  o WorkSafeBC
	  o Access to excavations
	• Weather conditions
	• Site survey
	• Grading
	• Grid lines and grade stakes
	• Excavation planning
	• Describe backfilling
	  o Preparation for backfilling
	  o Interior/exterior membranes
	  o Backfill material
	  o Placing backfill
	  o Compaction
	  o Lifts
	  o Interior backfill

4. Calculate excavations	• Estimate volume of excavated material

Line (GAC): G Concrete Formwork

Competency: G1 Use Concrete Types, Materials, Additives and Treatments

Objectives

To be competent in this area, the individual must be able to:

- Describe concrete types, materials and additives.

LEARNING TASKS	CONTENT
1. Describe the uses for concrete	• Structural • Architectural • Fire proofing • Insulating • Conduits • Pavements
2. Describe concrete mix designs	• Strength • Durability • Water tightness • Finishing ability
3. Describe the types of admixtures and treatments for concrete	• Air-entraining • Water-reducing • Plasticizers • Retardants • Accelerators • Colours • Dampproofing and permeability-reducing agents • Bonding agents • Release agents • Grouting • Gas-forming agents • Pozzolans

Line (GAC): G Concrete Formwork

Competency: G2 Select Concrete Forming Systems

Objectives

To be competent in this area, the individual must be able to:

- Describe the design of concrete construction.
- Describe the construction of concrete formwork systems.

LEARNING TASKS	CONTENT

1. Describe concrete formwork and falsework	• Safety
	• Efficiency
	• Architectural considerations
	• Glossary of terms
	• Interpret WorkSafeBC regulations and standards for concrete formwork
	• Definitions
	  o Responsibility of employer
	  o Responsibility of formwork designer
	  o Construction requirements
	  o Inspection requirements
	  o Concrete pre-stressing

2. Describe the factors affecting form design	• Safety • Architectural design • Concrete members • Efficiency • Environmental conditions • Form pressures • Slump • Temperature • Vibration • Placement method • Form size • Cantilever formwork • Concrete design mix

LEARNING TASKS	CONTENT
3. Describe formwork material and hardware	• Lumber • Plywood • Metal forms • Plywood forms • Ties • Wedges and brackets • Walers, strong backs and bracing • Reglets and inserts

4. Describe specialized formwork	• Specialized formwork
	• Sandblasted and tooled concrete
	• Rustication and form liners
	• Architectural
	• Engineered systems
	• Describe manufactured wall form panels
	  o Form design
	  o Steel forming systems
	  o Composite forming systems

5. Describe concrete joints	• Types
	  o Contraction
	  o Control
	  o Expansion
	  o Isolation
	  o Construction
	  o Cold
	• Methods of construction

Line (GAC): G Concrete Formwork

Competency: G3 Build Footing and Vertical Formwork

Objectives

To be competent in this area, the individual must be able to:

- Describe the construction of commercial concrete forming systems.
- Construct commercial concrete forming systems.

LEARNING TASKS	CONTENT

1. Describe footing forms for ICI construction	• Types
	  o Wall footings
	  o Column footings

2. Describe pile foundations	• Types • Parts • Grade beams • Uses • Designs

3. Describe wall forms for ICI construction	• Wall forms
	• Built-in-place forms
	• Prefab forms
	• Single walers
	• Double walers
	• Engineered wall system
	  o Proprietary forms
	• Gang forms
	  o Prefabricated wall form panels
	  o Form construction
	  o Lifting procedures
	  o Anchoring
	  o Core forming
	• Construction procedures
	• Form details
	  o Types of bucks
	  o Keys
	  o Blockouts
	  o Bulkheads
	  o Corbels
	  o Pilasters
	  o Levelling strips
	  o Chamfer strips
	  o Rustication strips

LEARNING TASKS	CONTENT
4. Describe insulated concrete forms	• Components and hardware • ICF foundation walls • Above ground flat ICF walls

5. Describe column forms	• Types
	  o Fibre tubes
	  o Engineered column
	  o Job built
	  o Capital
	• Assembly of forms

6. Plan footing and vertical formwork	• Safety
	• Contract drawings
	• Engineered drawings
	• Procedures
	  o Form system
	  o Lift plan
	  o Pour sequencing
	• Material handling and storage
	• Schedule
	• Access

7. Calculate materials and concrete volume for footing and vertical formwork	• Contact area
	• Centerline perimeter
	• Concrete wall volume
	  o Battered
	  o Circular
	  o Octagonal
	  o Polygons
	• Sheathing and form ply
	• Walers and strongbacks
	• Hardware
	• Bracing
	• Form details

LEARNING TASKS	CONTENT

8. Construct vertical formwork	• Layout
	• Assemble
	• Support system
	• Form details
	  o Bucks
	  o Keys
	  o Blockouts
	  o Bulkheads
	  o Corbels
	  o Pilasters
	  o Levelling strips
	  o Chamfer strips
	  o Rustication strips
	• Brace
	• Align
	• Concrete placement
	• Stripping forms

Achievement Criteria 1

Performance — The learner will build footings and vertical forms.

Conditions — The learner will be given:

- A foundation plan which includes bucks, blockouts and keyways
- Working space
- Forming material and hardware

Criteria — The learner will be evaluated on:

- Proper use of forms and hardware
- Plumb and level
- Dimensionally accurate, straight and square
- Proper construction of door-bucks, blockouts, etc.

Achievement Criteria 2

Performance — The learner will install chamfer strip on inside and outside corners on vertical and horizontal applications, including mitres and 3-way corners.

Conditions — The learner will be given:

- Materials
- Location to install chamfer strip

Criteria — The learner will be evaluated on:

- Correct installation
- Fit

Line (GAC): G Concrete Formwork

Competency: G4 Build Slab-On-Grade Forms and Suspended Slab Forms

Objectives

To be competent in this area, the individual must be able to:

- Describe how to build suspended concrete slabs and slabs-on-grade.
- Build suspended concrete slabs.

LEARNING TASKS	CONTENT
1. Describe slab-on-grade	• Types of slabs • Ground preparation • Strength and durability • Reinforcement • Form system
2. Describe suspended slab	• Types of slabs o Flat o Flat plate o Ribbed o Waffle o Precast o Pre-stressed • Slab components o Girder and beam forms o Spandrel beams forms o Slab soffit o Drop panels o Delay strips • Suspended slab forming products o Pans, domes and voids o Slab types o Materials o Stay-in-place forms o Proprietary slab forms • Interpret manufacturers' or engineers' specifications for suspended slab forming systems o Size and spacing of components o Flyforms - Construction - Releasing, lowering, moving and relocating o Location of tie-backs o Place infill panels and backer rods, deck covers and sleeve voids

LEARNING TASKS	CONTENT
3. Describe shoring and re-shoring for false work systems	• Safety • Installation drawings • Re-shoring requirements • Re-shoring systems

4. Plan suspended slab formwork	• Safety
	  o Fall protection
	• OHS regulation and WorkSafeBC standards
	• Contract drawings
	• Engineered drawings
	• Procedures
	  o Form system
	  o Lift plan
	  o Pour sequencing
	• Material handling and storage
	• Schedule
	• Sub-trades
	• Access

5. Calculate materials and concrete volume for suspended slab formwork	• Contact area • Soffit • Edgeform • Concrete volume • Slab • Girder • Beam • Blockouts • Form ply • Stringers and joists • Shoring • Hardware • Bracing • Form details • Reshoring
6. Construct suspended slabs	• Layout • Assemble • Support system o Shoring • Falsework • Form ply and lumber formwork • Brace

LEARNING TASKS	CONTENT

	• Align
	• Form details
	  o Keys
	  o Blockouts
	  o Bulkheads or edgeforms
	  o Screeds
	  o Chamfer strips
	  o Rustication strips
	• Concrete placement
	• Stripping forms
	• Reshore

Achievement Criteria

Performance — The learner will build suspended slab forms including a change in elevation, such as a slab band, and a slab bulkhead with keyway.

Conditions — The learner will be given:

- Construction drawings and specifications
- Formwork materials
- Working space

Criteria — The learner will be evaluated on:

- Proper use of forms and hardware
- Plumb and level
- Dimensionally accurate, straight and square

Line (GAC): G Concrete Formwork

Competency: G5 Install Reinforcement and Embedded Items

Objectives

To be competent in this area, the individual must be able to:

- Describe the installation of reinforcing bar in concrete.
- Describe imbedded metals and plastics.
- Install anchor bolts.

LEARNING TASKS	CONTENT
1. Describe reinforcing for concrete	• Purpose • Deformed bar • Smooth bar • Sheet or rolled mesh • Size and spacing • Cutting • Splicing • Tying

2. Describe embedded materials	• Anchor bolts
	• Machine base bolts
	• Sleeves
	• Reglets
	• Dowels
	• Miscellaneous inserts
	  o Terminators
	  o Ferrule loops
	  o Break out bars
	• Manhole cover frames
	• Grates, catch basins and drain troughs or trenches
	• Types of dock levellers
	• Water stops
	  o Uses
	  o Materials
	  o Size and configuration
	  o Joining methods

LEARNING TASKS	CONTENT
3. Describe types of door frames used in concrete and masonry walls	• Wooden door frames • Metal door frames • Methods of bracing frames • Nailing blocks
4. Describe concrete fastening systems	• Screws • Bolts • Metal anchors • Grout • Adhesive anchors • Epoxy anchor • Powder actuated fasteners • Join new concrete to existing

Achievement Criteria

Performance — The learner will layout and install an anchor bolt template complete with anchor bolts.

Conditions — The learner will be given:

- Construction drawings and specifications
- Materials

Criteria — The learner will be evaluated on:

- Correct installation as per drawings

Line (GAC): G Concrete Formwork

Competency: G6 Build Concrete Stair Forms

Objectives

To be competent in this area, the individual must be able to:

- Describe the methods used to build concrete stairs.
- Build concrete stair forms.

LEARNING TASKS	CONTENT
1. Describe concrete stair forms	• Cast-in-place stairs • Concrete forms • Residential stairs • Commercial stairs • Reverse stringer • Concrete finishes and nosings • Pre-cast stairs • Stair details • Straight flight stairs • Stairs with landings
2. Plan concrete stair form	• Safety • OHS regulation and WorkSafeBC standards • Building Code • Contract drawings • Engineered drawings • Procedures • Form system • Pour sequencing • Material handling and storage • Schedule • Sub-trades • Access • Reshore

3. Calculate concrete stairs	• Proportioning rules • Rise and run calculations • Stairwell opening calculations • Headroom requirements • Concrete volume • Soffit • Edgeform • Form ply • Stringers and risers • Shoring • Hardware • Bracing • Form details • Reshoring

4. Construct concrete stairs	• Lay out
	• Assemble
	• Support system
	  o Shoring
	• Falsework
	• Form ply and lumber formwork
	• Brace
	• Align
	• Form details
	  o Bulkheads or edgeforms
	  o Chamfer strips
	  o Embedded items
	• Concrete placement
	• Stripping forms
	• Tread protection
	• Reshore

Achievement Criteria

Performance — The learner will build multi-flight concrete stair forms incorporating a landing.

Conditions — The learner will be given:

- Construction drawings and specifications
- Working space
- Materials

Criteria — The learner will be evaluated on:

- Correct calculations and layout
- Proper use of forms and hardware
- Plumb and level
- Dimensionally accurate, straight and square
- Compliance with Building Code

Line (GAC): G Concrete Formwork

Competency: G7 Place and Finish Concrete

Objectives

To be competent in this area, the individual must be able to:

- Describe methods of placing, finishing and curing concrete.
- Place, finish and cure concrete.
- Describe concrete treatments and sealers.

LEARNING TASKS

1. Describe the delivery and placement of concrete

CONTENT

- Safety
- Manufacture and delivery
- Placement methods
  - Concrete pumps
  - Chutes
  - Buggies
  - Wheelbarrow
  - Concrete bucket
  - Placement boom
  - Underwater placement
- Guidelines for placing concrete
  - Consolidation
  - Discharge
  - Weather considerations
  - Segregation
  - Rate of pour
  - Environmental considerations
- Screed
- Tools and equipment
  - Power trowels

LEARNING TASKS	CONTENT

2. Describe concrete finishing	• Tools and equipment
	  o Floats and trowels
	  o Accessories
	  - Edgers
	  - Dividers
	  - Stamps
	  - Cutters
	  - Brooms
	  o Power trowels
	• Walls
	• Flatwork
	• Finishing procedure
	  o Exposed aggregate
	  o Broom finished
	  o Colour
	  o Stamped
	  o Sand blasting
	  o Joints
	• Surface treatments
	  o Safety
	  o Environment
	  o Protective treatments
	  o Curing compounds
	  o Hardeners
	  o Damp and water proofing

3. Describe the process of concrete curing	• Hydration • Curing • Sealers and hardners • Adjusting for weather conditions

LEARNING TASKS	CONTENT
4. Strip concrete forms	• Safety • Concrete design strength • OHS regulation and WorkSafeBC standards • Form removal o Edge protector • Re-shoring

5. Describe concrete defects	• Causes of defects
	  o Construction practices
	  o Materials
	  o Design
	• Surface defects
	  o Cold joints
	  o Segregation
	  o Honeycomb
	  o Crazing and map cracking
	  o Dusting
	  o Spalling
	  o Efflorescence
	• Concrete defects
	  o Patching materials
	  o Patching procedures

6. Describe structural grout	• Purpose • Types • Procedures • Applications

Line (GAC): G Concrete Formwork

Competency: G8 Install Specialized Formwork

Objectives

To be competent in this area, the individual must be able to:

- Describe pre-cast concrete.
- Describe tilt-up construction.
- Describe pre-stressed concrete.
- Describe slip-forming.
- Describe mass concrete.
- Layout a tilt-up wall panel.

LEARNING TASKS	CONTENT
1. Describe tilt-up construction	• OHS regulation and WorkSafeBC standards • Tilt-up drawings • Uses of tilt-up construction • Formwork procedures • Lifting sequence • Lifting and bracing procedures

2. Describe pre-cast concrete	• Purpose
	• Types
	  o Girders
	  o Columns
	  o Tees
	  o Hollow core
	  o Stairs
	  o Vaults
	• Order of assembly
	• Handling and storage
	• Construction methods

3. Describe pre-stressed concrete	• Pre-tensioning • Post-tensioning

LEARNING TASKS	CONTENT

4. Describe slip-form construction	• Planning
	• Types
	  o Vertical
	  o Horizontal
	• Construction procedures
	• Jacks and yokes
	• Concrete placement
	• Concrete finishing
	• Dismantling procedures

5. Describe mass concrete	• Heat of hydration
	• Types
	  o Dams
	  o Retaining walls
	  o Locks
	  o Caissons
	• Placement methods

6. Describe sealing joints	• Types of caulking compounds • Backer rods • Sealers and primers
7. Layout tilt-up construction	• Construction drawings • Locations of hardware and accessories

Achievement Criteria

Performance — The learner will layout a tilt up panel.

Conditions — The learner will be given:

- Construction drawings and specifications
- Working space

Criteria — The learner will be evaluated on:

- Correct dimensioning of panel
- Correct location of hardware and accessories as per drawings

Line (GAC): J Building Science

Competency: J1 Control the Forces Acting on a Building

Objectives

To be competent in this area, the individual must be able to:

- Describe the forces acting on a building.
- Describe the construction details for wood frame seismic applications.

LEARNING TASKS	CONTENT
1. Describe seismic applications in ICI and civil construction	• Purpose o Code o Design o Geographical considerations • Types o Concrete o Steel o Wood • Describe seismic hardware o Anchors - Mechanical - Hydraulic - Chemical o Straps o Tensioning straps o Shear/sole plates o Bolts o Dowels

Level 3

Carpenter

Line (GAC): B Documentation and Organizational Skills

Competency: B2 Use Construction Drawings and Specifications

Objectives

To be competent in this area, the individual must be able to:

- Describe ICI architectural drawings.
- Describe schedules, detail and shop drawings.
- Use schedules and detail and shop drawings.
- Draw finishing components.

LEARNING TASKS	CONTENT
1. Describe ICI architectural drawings	• Building dimensions • Room layout • Fixture locations • Finish details • Interior elevations • Exterior elevations • Finishes
2. Describe schedules	• Door schedules • Window schedules • Room finish schedules • Hardware schedules
3. Describe shop drawings	• Interior elevations • Millwork drawings
4. Use architectural drawings	• Building dimensions • Construction type • Room layout • Fixture locations • Finish details
5. Draw finishing details	• Review drafting technique • Plan view, section view and component identification

Achievement Criteria 1

Performance The learner will interpret information from a set of ICI construction drawings.

Conditions The learner will be given:

- Construction drawings and specifications
- Assignment sheet

Criteria The individual will be evaluated on:

- Correct interpretation of plans

Achievement Criteria 2

Performance The learner will draw plans for finishing components, such as the shop drawing for a door.

Conditions The learner will be given:

- Project specifications

Criteria The learner will be evaluated on:

- Correct use of standard construction drawing standards and techniques, such as scale and line weight
- Complete and correct content

Line (GAC): B Documentation and Organizational Skills

Competency: B3 Interpret Building Codes and Bylaws

Objectives

To be competent in this area, the individual must be able to:

- Use building codes.
- Describe the Homeowner Protection Office (HPO).

LEARNING TASKS	CONTENT
1. Use the building code	• Windows • Doors • Stairs • Building envelope • Intersecting roof • Interior finish • Exterior finish • Access and egress
2. Describe the Homeowner Protection Office (HPO)	• Definition • Purpose • Licencing/warranty • Research

Achievement Criteria

Performance The learner will interpret information from the building code.

Conditions The learner will be given:

- Assignment sheet

Criteria The individual will be evaluated on:

- Correct interpretation of building code

Line (GAC): C Tools and Equipment

Competency: C1 Use Hand Tools

Objectives

To be competent in this area, the individual must be able to:

- Describe the use of hand tools for finished work.
- Use and maintain hand tools for finished work.

LEARNING TASKS	CONTENT

1. Describe finishing tools	• Purpose
	• Types
	  o Marking tools
	  o Squares
	  o Chisels
	  o Smoothing tools
	  o Scrapers
	  o Clamps
	  o Coping saws
	• Parts
	• Sandpaper
	  o Types
	  o Materials
	  o Grits
	• Operation
	• Adjustment
	• Maintenance
	• Storage

2. Use finishing tools	• Purpose • Types • Parts • Operation • Safety • Adjustment • Maintenance • Storage

Achievement Criteria

Performance	The learner will use and maintain hand tools in the construction of a cabinet project (This skill may be combined with the project in Competency I-5).
Conditions	The learner will be given: • Construction drawings and specifications • Hand tools
Criteria	The learner will be evaluated on: • Proper use and maintenance of hand tools

Line (GAC): C Tools and Equipment

Competency: C2 Use Portable Power Tools

Objectives

To be competent in this area, the individual must be able to:

- Describe the use of power tools for finished work.
- Use and maintain portable power tools for finished work.

LEARNING TASKS	CONTENT
1. Describe portable routers	• Purpose • Types • Parts • Bit types • Tables
2. Use and maintain portable routers	• Safety • Operation • Maintenance • Storage
3. Describe portable sanders	• Purpose • Types • Parts
4. Use and maintain portable sanders	• Abrasive types • Safety • Operation • Maintenance • Storage
5. Describe mitre saws for finishing	• Purpose • Types • Parts • Blade types

LEARNING TASKS	CONTENT
6. Use and maintain mitre saws for finishing	• Safety • Operation • Adjustment • Compound mitres • Maintenance • Storage
7. Describe portable power planes	• Purpose • Types • Parts • Blades
8. Use and maintain portable power planes	• Safety • Operation • Maintenance • Storage
9. Describe portable biscuit (plate) joiners	• Purpose • Types • Parts • Biscuits
10. Use and maintain portable biscuit (plate) joiners	• Safety • Operation • Maintenance • Storage

Achievement Criteria

Performance — The learner will use and maintain portable power tools.

Conditions — The learner will be given:

- Construction drawings and specifications
- Portable power tools

Criteria — The learner will be evaluated on:

- Proper selection, use and maintenance of portable power tools

Line (GAC): C Tools and Equipment

Competency: C3 Use Stationary Power Tools

Objectives

To be competent in this area, the individual must be able to:

- Describe stationary power tools.
- Use and maintain shop equipment.

LEARNING TASKS	CONTENT
1. Describe the use of a table saw for finishing	• Purpose • Types and sizes • Parts • Blade types and purpose • Accessories
2. Use and maintain a table saw	• Safety • Operations • Types of cuts • Adjustments • Maintenance
3. Describe the use of a band saw	• Purpose • Types • Parts • Blade types
4. Use and maintain band saws	• Adjustments • Safety • Operations • Accessories • Maintenance
5. Describe the use of a drill press	• Purpose • Types • Parts • Bit types

LEARNING TASKS	CONTENT
6. Use and maintain a drill press	• Safety • Operations • Accessories • Maintenance
7. Describe the use of a jointer	• Purpose • Types • Parts • Accessories • Knives
8. Use and maintain a jointer	• Safety • Adjustments • Operations • Maintenance
9. Describe the use of a thickness planer	• Purpose • Types • Parts • Accessories • Knives
10. Use and maintain a thickness planer	• Safety • Operations • Adjustments • Maintenance
11. Describe the use of sanding machines	• Purpose • Types • Parts • Abrasive types • Accessories
12. Use and maintain sanding machines	• Safety • Operations • Adjustments • Maintenance

Achievement Criteria

Performance	The learner will use and maintain shop equipment.
Conditions	The learner will be given: • Construction drawings and specifications • Shop equipment
Criteria	The learner will be evaluated on: • Proper selection, use and maintenance shop equipment • Selection of proper cutting blades, bits and abrasives • Proper use of jigs and accessories

Line (GAC): D Survey Instruments and Equipment

Competency: D2 Use Site Layout Equipment

Objectives

To be competent in this area, the individual must be able to:

- Describe the use of transits and theodolites.
- Calculate angles used in site layout.
- Use theodolites.

LEARNING TASKS	CONTENT

1. Describe the use of transits and theodolites	• Purpose
	• Types
	  o Theodolites
	  o Autocad
	  o Total stations
	• Parts

2. Calculate angles used in site layout	• Calculations
	  o Trigonometry
	  o Angles
	  o Lengths (distances)
	• Site plans
	• Building plans
	• Sloped site layout

3. Use theodolites	• Set-up • Adjustment • Readings • Layout • Maintenance • Storage

Achievement Criteria

Performance	The learner will lay out building corners using the theodolite.
Conditions	The learner will be given: • Site plan • Theodolite • Work space
Criteria	The learner will be evaluated on: • Correct calculation of angles and lengths to locate corners • Proper set up and use of instrument • Accurate location of corner stakes

Line (GAC): H Wood Frame Construction

Competency: H5 Build Stair Systems

Objectives

To be competent in this area, the individual must be able to:

- Describe the construction of finished staircases.
- Install a finished staircase.

LEARNING TASKS	CONTENT
1. Describe stairs with landings and balustrades	• Types • Stair terms • Stair components • Balustrade components
2. Plan stairs with landings and balustrades	• Code considerations • Construction drawings and specifications • Design considerations o Change directions

3. Calculate stairs with landings and balustrades	• Rise and number of risers
	• Run and number of treads
	• Stairwell opening lengths
	• Length of stringers
	• Balustrade layout
	• Calculate quantities of materials
	  o Components
	  o Waste allowance
	  o Fasteners

4. Build stairs and balustrades	• Framing the floor opening • Stringer layout • Assembly • Handrails and balustrades

Achievement Criteria

Performance The learner will build a finished stair and balustrade.

Conditions The learner will be given:

- Construction drawings and specifications
- Materials
- Work space

Criteria The learner will be evaluated on:

- Compliance with building code
- Correct calculations, layout and cuts
- Dimensionally accurate, straight, square and plumb
- Quality of finished project

Line (GAC): H Wood Frame Construction

Competency: H6 Build Roof Systems

Objectives

To be competent in this area, the individual must be able to:

- Describe intersecting roofs.
- Build an intersecting roof.

LEARNING TASKS	CONTENT

1. Describe an intersecting roof	• Purpose
	• Types
	• Terms
	  o Valleys
	  o Valley jacks
	  o Valley cripples

2. Plan an intersecting roof	• Safety • Working at heights • Code considerations • Construction drawings and specifications • Construction sequence

3. Calculate an intersecting roof	• Calculate theoretical lengths
	  o Joists
	  o Rafters
	  o Ridges
	  o Hips and valleys
	  o Jacks
	  o Cripples
	• Calculate quantities of framing materials
	  o Joists
	  o Rafters
	  o Fascias and bargeboards
	  o Sheathing surface area
	  o Waste allowance
	  o Fastener calculations

4. Build an intersecting roof	• Layout roof members • Layout plates • Cut members • Assemble

Achievement Criteria

Performance — The learner will build an intersecting roof.

Conditions — The learner will be given:

- Construction drawings and specifications
- Working space
- Materials

Criteria — The learner will be evaluated on:

- Correct calculation, layout and spacing of rafters and roof framing members
- Dimensionally accurate, straight and square
- Accuracy of cuts

Line (GAC): I Finishing Materials

Competency: I2 Install Doors and Hardware

Objectives

To be competent in this area, the individual must be able to:

- Describe doors.
- Install doors.

LEARNING TASKS	CONTENT

1. Describe doors	• Common types
	• Special types
	• Construction
	  o Frame and panel
	  o Slab
	  o Stile and rail
	• Purpose
	• Terminology
	• Code and security requirements
	• Weather and air sealing
	  o Energy efficiency
	• Storage during construction
	• Swing / hand of door

2. Describe door jambs	• Types • Construction • Purpose

3. Describe door hardware	• Types
	  o Hinges
	  o Passage sets
	  o Lock sets
	  o Panic hardware
	  o Door closures
	  o Sweeps
	  o Thresholds
	  o Flushbolts
	• Purpose
	• Storage
	• Labelling

4. Install doors and jambs	• Rough openings • Hanging and fitting o Margin

	o Reveal
5. Install door hardware	• Types • Operation • Fitting • Templates

Achievement Criteria

Performance	The learner will hang and install a door.
Conditions	The learner will be given: • Construction drawings an specifications • Materials • Working space
Criteria	The learner will be evaluated on: • Proper installation of door to specified tolerances • Proper installation of hardware • Trimming of door

Line (GAC): I Finishing Materials

Competency: I3 Install Windows and Hardware

Objectives

To be competent in this area, the individual must be able to:

- Describe windows.
- Install windows.

LEARNING TASKS	CONTENT

1. Describe windows and hardware	• Purpose
	• Code and security requirements
	• Types
	• Components
	  o Frames
	  o Hardware
	• Construction
	• Energy efficiency
	• Storage
	• Operation

2. Plan window installation	• Drawings and specifications o Window schedule • Manufacturers' specifications • Delivery • Storage • Access • Installation • Protection
3. Install windows	• Fitting • Plumb • Level • Shimming • Fastening • Sealing • Suplemental hardware (security bars, etc.) o Flashing

Achievement Criteria

Performance	The learner will install a window, complete with flashing.
Conditions	The learner will be given: • A rough opening • A window • Weather proofing membrane material (building paper, self-adhesive membrane) • Flashing material
Criteria	The learner will be evaluated on: • Correct preparation of opening • Correct positioning of window in rough opening • Correct installation of flashing and membranes as per Building Code and manufacturer's specifications

Line (GAC): I Finishing Materials

Competency: I4 Install Exterior Finishes

Objectives

To be competent in this area, the individual must be able to:

- Describe building envelope requirements.
- Describe exterior finishing materials.
- Describe the installation of exterior finishes.
- Install exterior finishing materials.

LEARNING TASKS	CONTENT

1. Describe building envelope	• Purpose
	• Terminology
	• Types of moisture barriers
	  o Sheathing paper
	  o House wrap
	  o Self adhesive membrane
	  o Rigid isulation
	  o Liquid applied barriers
	• Rainscreen
	  o Drainage cavity
	  o Moisture barrier
	• BC Building Code and bylaws
	• National Home Warranty Best Practices Book
	• Energy efficiency

2. Describe exterior finish materials	• Purpose
	• Types of cladding
	• Trim and accessories
	  o Fascia
	  o Soffit and venting
	  o Gutters
	  o Down spouts
	• Code requirements
	• Types
	• Fasteners

3. Plan exterior finish installation	• Drawings and specifications o Exterior finish schedules • Sequence of installation • Delivery • Storage • Access • Installation • Protection

4. Calculate exterior finish materials	• Material estimates
	  o Envelope
	  o Strapping
	  o Wall finish
	  o Trim
	  o Fasteners
	  o Accessories

5. Install exterior finishes	• Layout
	• Install
	• Envelope
	  o Vertical/horizontal laps
	  o Taping
	• Strapping
	  o Code/manufacturer's requirement
	  o Spacing
	  o Fastening
	• Wall finish
	  o Code/manufacturer's requirement
	  o Fastening
	• Trim
	  o Joint preparation

Achievement Criteria

Performance — The learner will install exterior siding materials including flashing.

Conditions — The learner will be given:

- Framed wall with building envelope penetrations and cornice
- Siding and soffit material
- Flashing and air barrier material

Criteria — The learner will be evaluated on:

- Properly installed details for building envelope penetrations
- Installation of flashing and siding as per code requirements and manufacturers' specifications

Line (GAC): I Finishing Materials

Competency: I5 Install Interior Finishes

Objectives

To be competent in this area, the individual must be able to:

- Describe interior wall finishes and trims.
- Install interior wall finishes and trims.

LEARNING TASKS	CONTENT

1. Describe interior wall finishes and trims	• Purpose
	• Types
	  o Wall board
	  o Panel products
	• Mouldings
	  o Casing
	  o Baseboard
	  o Cornice/crown
	  o Wainscotting
	• Fasteners
	  o Finish nails
	  o Brad nails
	  o Staples
	  o Screws
	  o Adhesives

2. Plan wall finishes and trims	• Drawings and specifications o Interior finish schedules • Sequence of installation • Delivery • Storage • Access • Installation • Protection

3. Calculate interior finish materials	• Material estimates
	  o Wall finish
	  o Trim
	  o Fasteners

4. Install wall interior finishes and trims

- Layout
- Install
  - Surface preparation
  - Fitting
- Fastening
  - Finish nails
  - Brad nails
  - Staples
  - Screws
  - Adhesives
- Protection

Achievement Criteria 1

Performance: The learner will scribe fit paneling.

Conditions: The learner will be given:

- Working space
- Materials
- Scriber

Criteria: The learner will be evaluated on:

- Fit and finish

Achievement Criteria 2

Performance: The learner will install casing and crown moulding.

Conditions: The learner will be given:

- Wall with door and partial ceiling
- Casing and crown moulding.

Criteria: The learner will be evaluated on:

- Quality of mitre and coped joints
- Dimensional accuracy
- Fit and finish

Line (GAC): I Finishing Materials

Competency: I6 Install Cabinets

Objectives

To be competent in this area, the individual must be able to:

- Describe the construction and installation of cabinets, countertops and hardware.
- Construct and install cabinets, countertops and hardware.

LEARNING TASKS	CONTENT
1. Describe cabinets	• Purpose • Types • Components • Construction methods • Finishes • Hardware

2. Describe countertops	• Purpose
	• Types
	  o Plastic laminate
	  o Solid surface
	  o Stone
	  o Concrete
	• Construction procedure

3. Plan the building of cabinets and countertops	• Drawings and specifications
	• Calculation of materials
	• Fixture locations
	  o Plumbing
	  o Electrical
	• Sequence of installation
	• Delivery
	• Storage

4. Build cabinets	• Materials • Components • Cutting list • Layout • Milling and assembly • Install hardware

5. Plan the installation of prefinished cabinets and countertops	• Types
	• Components
	• Sequence of installation
	• Methods
	  o Leveling
	  o Scribing
	  o Fastening
	• Storage
	• Protection

6. Install countertops	• Techniques

Achievement Criteria

Performance — The learner will build a cabinet, complete with plastic laminate counter top.

Conditions — The learner will be given:

- Construction drawings and specifications
- Materials and hardware
- Work space

Criteria — The learner will be evaluated on:

- Accurate dimensioning
- Fit and finish
- Proper installation of hardware
- Proper lamination procedure

Line (GAC): J Building Science

Competency: J2 Control Heat and Sound Transmission

Objectives

To be competent in this area, the individual must be able to:

- Explain methods of controlling heat and sound transmission.
- Describe energy efficient framing.
- Control heat and sound transmission.

LEARNING TASKS	CONTENT
1. Describe heat transmission	• Principles • Code requirements • Methods of controlling • Materials
2. Describe sound transmission	• Principles • Code requirements • Methods of controlling • Materials
3. Describe insulating materials	• Types • Purpose • Calculation of materials • Operation • Framing to accommodate insulation • Installation • Insulating value • Increase energy efficiency

Line (GAC): J Building Science

Competency: J3 Control Air and Moisture Movement in Buildings

Objectives

To be competent in this area, the individual must be able to:

- Explain methods of controlling air, moisture and vapour movement.
- Install air, moisture and vapour control products.

LEARNING TASKS	CONTENT

1. Describe air movement	• Purpose
	• Principles
	  o Intake
	  o Exhaust
	• Code requirements
	• Methods of controlling
	  o Materials
	• Gas and smoke barriers
	  o Radon
	  o Carbon monoxide

2. Describe moisture movement	• Purpose • Principles • Code requirements • Methods of controlling o Materials

3. Describe vapour movement	• Purpose
	• Principles
	• Code requirements
	• Methods of controlling
	  o Materials
	• Methods of controlling
	  o Code requirements

4. Install air, moisture and vapour control products	• Drawings and specifications
	• Manufacturers' specifications
	• Materials
	  o Selection
	  o Calculation of materials
	• Methods

Achievement Criteria

Performance	The learner will apply rainscreen installation techniques for exterior cladding.
Conditions	The learner will be given: • Framed wall section with a window • Materials
Criteria	The learner will be evaluated on: • Accurate detailing • Proper drainage plane detail

Level 4

Carpenter

Line (GAC): B Documentation and Organizational Skills

Competency: B2 Use Construction Drawings and Specifications

Objectives

To be competent in this area, the individual must be able to:

- Describe schedules and detail drawings.
- Use schedules and detail drawings.
- Interpret interior and exterior elevations.
- Interpret reflected ceiling plans.

LEARNING TASKS	CONTENT
1. Interpret architectural drawings	• Room layout • Fixture locations • Finish details • Door schedules • Window schedules • Room finish schedules • Interior elevations
2. Interpret reflected ceiling plans	• Reflected ceiling plans • Specialties • Hardware
3. Draw finishing details	• Scales • Views

Achievement Criteria

Performance	The learner will draw a reflected ceiling plan, including items such as lighting fixtures and bulkheads.
Conditions	The learner will be given: • Construction drawings and specifications
Criteria	The learner will be evaluated on: • Required construction details as per construction drawings and specifications • Proper drawing technique

Line (GAC): B Documentation and Organizational Skills

Competency: B3 Interpret Building Codes and Bylaws

Objectives

To be competent in this area, the individual must be able to:

- Describe building codes and bylaws.
- Interpret building codes and bylaws.

LEARNING TASKS	CONTENT
1. Interpret building codes and bylaws	• Geometric stairs • Unequally pitched roofs • Access and egress • Fire separations • Interior finishes • Wall types • Air, vapour and insulated assemblies
2. Describe warranties and inspections	• Role • Warranty providers • Homeowner Protection Office (HPO) • Inspections

Achievement Criteria 1

Performance: The learner will apply the building code to a planning of building details.

Conditions: The learner will be given:

- Constructional drawings and specifications to plan such as:
  - Geometric stair
  - Fire separation
- Access and egress detail

Criteria: The learner will be evaluated on:

- Correct interpretation of building code

Achievement Criteria 2

Performance: The learner will take a proposed building project through the permit approval process.

Conditions: The learner will be given:

- Municipal bylaws and regulations
- Construction drawings and specifications

Criteria: The learner will be evaluated on:

- Correct interpretation of bylaws, regulations, and permit processes

Line (GAC): B Documentation and Organizational Skills

Competency: B4 Plan and Organize Work

Objectives

To be competent in this area, the individual must be able to:

- Describe contract documents and use of construction specifications.
- Use contract documents and construction specifications.
- Use plans and drawings.
- Estimate costs from construction drawings.

LEARNING TASKS	CONTENT
1. Describe contract documents	• Types • Articles of agreement • Definitions • General conditions • Supplementary conditions • General requirements • Specifications • Drawings • Addenda
2. Describe the bidding process	• Invitation to tender • Instruction to bidders • Tender form
3. Describe estimating	• Rough estimate • Detailed estimate • Partial estimate • Sub trades • Quote pricing • Target pricing • Cost plus pricing • Unit pricing • Change orders • Allowances

4. Describe financial considerations	• Payment schedule • Bonds • Liens • Penalties/bonuses • Contingency funds
5. Plan work sequence	• Construction sequence • Material delivery sequence • Coordination with sub-trades • Time estimates
6. Estimate the cost of a job	• Spreadsheets o Labour o Material o Equipment o Subtrades o Overheads o Profit margin

Achievement Criteria

Performance	The learner will estimate, schedule and sequence a small project.
Conditions	The learner will be given: • Construction drawings and specifications • Published cost guides
Criteria	The learner will be evaluated on: • Proper project schedule • Proper documentation • Accuracy of cost estimate

Line (GAC): D Survey Instruments and Equipment

Competency: D2 Use Site Layout Equipment

Objectives

To be competent in this area, the individual must be able to:

- Describe the use of electronic instruments.
- Use electronic instruments.

LEARNING TASKS	CONTENT
1. Describe electronic instruments	• Types • Purpose • Parts
2. Use electronic instruments	• Calculations • Set-up • Adjustment • Readings • Layout • Maintenance • Storage

Achievement Criteria

Performance: The learner will layout a curved shape.

Conditions: The learner will be given:

- Drawing and specifications

Criteria: The learner will be evaluated on:

- Safety
- Tool use
- Calculation and layout
- Accuracy

Line (GAC): F Site Layout

Competency: F2 Prepare Building Site

Objectives

To be competent in this area, the individual must be able to:

- Describe site processes.
- Describe drainage systems and backfilling procedures.

LEARNING TASKS	CONTENT

1. Describe items to be completed before excavation	• Environmental impact assessment
	• Planning
	• Locate services
	  o Water
	  o Sewers
	  o Gas
	  o Electricity
	  o Telephone and cable TV
	  o Data
	• Building elevations
	• Disconnect services
	• Demolition
	• Access to site
	• Location of temporary buildings
	• Location of excavated materials
	• Build hoardings and barricades
	• Location of building materials

2. Describe sumps, catch basins and septic tanks	• Code regulations • De-watering systems • Sumps • Trapping hoods • Catch basins • Backwater valves • Septic tanks • Perimeter drains • Rainwater leader hook-ups

LEARNING TASKS	CONTENT
3. Review backfilling	• Requirements • Procedures • Parging • Foundation protection • Water/damproofing • Compaction methods • Backfilling concrete foundations • Backfilling preserved wood foundations • Backfilling service trenches

Line (GAC): G Concrete Formwork

Competency: G8 Install Specialized Formwork

Objectives

To be competent in this area, the individual must be able to:

- Identify the requirements for architectural formwork.
- Build architectural formwork.

LEARNING TASKS	CONTENT

1. Describe architectural formwork	• Purpose
	• Specialty form ply
	• Types of exposed concrete surfaces
	  o Curved walls
	  o Arches
	  o Floors
	  o Walls
	  o Ceilings
	  o Landscape features

2. Plan architectural formwork	• Drawings and specifications
	• Application
	• Materials
	  o Concrete mix design
	  o Specialty form ply
	  o Hardware
	• Sequencing
	• Embedded metals

3. Calculate architectural formwork	• Center line perimeter • Contact area • Specialty form ply • Studs • Walers • Ties • Wedges • Braces • Concrete volume

LEARNING TASKS	CONTENT
4. Build architectural formwork	• Layout • Tie location • Architectural inlays • Reveals • Assemble • Support • Align • Brace • Concrete placement • Stripping forms

Achievement Criteria

Performance	The learner will construct specialized formwork such as frustums and curved walls.
Conditions	The learner will be given: • Construction drawings and specifications • Work space • Materials
Criteria	The learner will be evaluated on: • Correct calculations • Accurate dimensioning • Proper construction technique

Line (GAC): H Wood Frame Construction

Competency: H5 Build Stair Systems

Objectives

To be competent in this area, the individual must be able to:

- Describe the construction of winder and circular stairs.
- Build finished staircases.

LEARNING TASKS	CONTENT
1. Describe stairs with winders	• Stringer types • Tread shapes
2. Plan stairs with winders	• Building Code requirements • Stringer types • Skirt boards
3. Calculate stairs with winders	• Rise and number of risers • Run and number of treads • Stairwell opening lengths • Length of stringers • Balustrade layout • Calculate quantities of materials o Components o Waste allowance o Fasteners
4. Build stairs with winders	• Layout of stringers • Layout of winders • Layout of treads • Assembly
5. Describe circular stairs	• Stringers types • Jigs for laminated stringers • Handrails • Treads and risers
6. Plan circular stairs	• Building Code requirements • Stringer types • Skirt boards

7. Calculate circular stairs	• Rise and number of risers • Run and number of treads • Stairwell opening lengths • Length of stringers • Balustrade layout • Calculate quantities of materials • Components • Waste allowance • Fasteners
8. Build circular stairs	• Layout • Pattern • Templates • Jig • Laminating stringers and handrail • Assembly • Finishing, housing and mitering stringers

Achievement Criteria 1

Performance The learner will build winder stairs.

Conditions The learner will be given:

- Construction drawings and specifications
- Materials
- Work space

Criteria The learner will be evaluated on:

- Compliance with Building Code
- Correct calculations, layout and cuts
- Dimensionally accurate, straight, square and plumb
- Quality of finished project

Achievement Criteria 2

Performance The learner will build circular stairs.

Conditions The learner will be given:

- Construction drawings and specifications
- Materials
- Work space

Criteria The learner will be evaluated on:

- Compliance with Building Code
- Correct calculations, layout and cuts
- Dimensionally accurate, straight, square and plumb
- Proper use of templates and jigs
- Laminations of stringers and handrail
- Proper assembly techniques
- Quality of finished project

Line (GAC): H Wood Frame Construction

Competency: H6 Build Roof Systems

Objectives

To be competent in this area, the individual must be able to:

- Describe the construction methods for unequally sloped intersecting roofs.
- Build unequally sloped intersecting roofs.

LEARNING TASKS	CONTENT
1. Describe unequally sloped roofs	• Purpose • Types • Components • Spans • Projections
2. Plan unequally sloped roofs	• Safety o Working at heights • Code considerations • Scale drawing • Construction sequence

3. Calculate unequally sloped roofs	• Calculate theoretical lengths
	  o Joists
	  o Rafters
	  o Ridges
	  o Hips and valleys
	  o Jacks
	  o Cripples
	• Calculate quantities of framing materials
	  o Joists
	  o Rafters
	  o Fascias and bargeboards
	  o Sheathing surface area
	  o Waste allowance
	  o Fastener calculations
	• Difference in plate heights
	• Distance of offset from corner

4. Build unequally sloped roofs	• Lay out plates • Lay out roof members • Cut members • Assembly

Achievement Criteria

Performance	The learner will build an unequally sloped intersecting roof.
Conditions	The learner will be given: • Construction drawings and specifications • Working space • Materials
Criteria	The learner will be evaluated on: • Correct calculation, layout and spacing of rafters and roof framing members • Dimensionally accurate, straight and square • Accuracy of cuts • Proper framing technique

Line (GAC): H Wood Frame Construction

Competency: H7 Build Specialized Framing Systems

Objectives

To be competent in this area, the individual must be able to:

- Describe methods of framing features.
- Build architectural framing features.

LEARNING TASKS	CONTENT
1. Describe specialized floor and wall systems	• Types • Bay windows • Bow windows • Window boxes • Drop ceiling • Valences • Pony walls • Bulkheads • Cornices • Access floors • Purpose • Styles

2. Describe specialized roof systems	• Types
	  o Polygon roofs
	  o Gambrel
	  o Mansard
	  o Flat
	  o Dormer
	  o Cupola
	  o Turret
	  o Canopy
	  o Spire
	  o Saw tooth
	  o Butterfly roof
	• Components
	  o False gable
	  o Cricket/saddle
	  o Parapet
	  o Cant strip
	  o Hidden gutters

- Methods of construction
  - Openings
  - Wall frame
  - Roof frame
  - Curbs
  - Vaulted ceilings
  - Ridge beams

3. Plan specialized roof systems

- Safety
  - Working at heights
- Code considerations
- Scale drawing
- Construction sequence

4. Calculate specialized roof systems

- Calculate theoretical lengths
  - Joists
  - Rafters
  - Ridges
  - Hips and valleys
  - Jacks
  - Cripples
- Calculate quantities of framing materials
  - Joists
  - Rafters
  - Fascias and bargeboards
  - Sheathing surface area
  - Waste allowance
  - Fastener calculations

5. Build specialized roof systems

- Lay out plates
- Lay out roof members
- Cut members
- Assemble

Achievement Criteria

Performance — The learner will build a dormer or cupola.

Conditions — The learner will be given:

- Construction drawings and specifications
- Work space
- Materials

Criteria — The learner will be evaluated on:

- Correct calculation, layout and spacing of rafters and roof framing members
- Dimensionally accurate, straight and square
- Accuracy of cuts
- Proper framing technique
- Framing technique

Line (GAC): H Wood Frame Construction

Competency: H8 Perform Renovations and Additions

Objectives

To be competent in this area, the individual must be able to:

- Describe renovations and additions.

LEARNING TASKS	CONTENT
1. Describe renovations and additions	• Purpose • Types • Design considerations

2. Plan renovations and additions	• Safety
	• OHS regulation and WorkSafeBC standards
	• Code requirements
	• Building permit
	• Construction drawings
	• Construction sequence
	• Demolition
	  o Permits
	  o Temporary support
	  o Services
	  o Protect finishes
	  o Housekeeping
	  o Disposal
	• Hazardous materials
	  o Asbestos
	  o Mold
	  o Lead
	  o Mercury
	  o PCB
	  o Infestation
	  o Biohazards
	  o Silica
	  o Dust
	• Reclaim material
	• Hoarding

3. Add and alter existing structure	• Select materials
	• Support existing structure
	• Connecting structural components
	  o Concrete-to-concrete
	  o Wood-to-wood
	  o Steel-to-wood
	• Removal of temporary supports and hoardings
	• Install finishes

Line (GAC): H Wood Frame Construction

Competency: H9 Build Timber and Engineered Wood Construction

Objectives

To be competent in this area, the individual must be able to:

- Describe timber and engineered wood construction.

LEARNING TASKS	CONTENT
1. Describe timber construction	• Purpose • Types • Traditional post and beam • Heavy timber • Engineered • Logs • Uses • Fasteners • Hardware • Tools • Connections

Line (GAC): H Wood Frame Construction

Competency: H10 Build Decks and Exterior Structures

Objectives

To be competent in this area, the individual must be able to:

- Describe deck systems and exterior structures.
- Plan deck systems and exterior structures.

LEARNING TASKS	CONTENT
1. Describe deck systems	• Purpose • Types • Components • Methods

2. Describe exterior structures	• Purpose
	• Types
	  o Fences
	  o Gazebos
	  o Playhouses
	  o Privacy screens
	  o Garden sheds
	• Components
	• Methods

3. Plan deck systems and exterior structures	• Safety • Code requirements • Construction drawings • Construction sequence

Line (GAC): I Finishing Materials

Competency: I1 Describe Roofing Materials

Objectives

To be competent in this area, the individual must be able to:

- Describe roofing materials.
- Describe the installation of roofing materials.

LEARNING TASKS	CONTENT
1. Describe roofing materials	• Purpose • Types • Wood • Ashphalt • Fibreglass • Torch-on • Metal • Slate • Concrete • Clay • Re-roofing • Flashing • Underlay • Vents • Accessories • Gravel and snow stop • Plumbing boots • Scuppers

2. Plan for the installation of roofing materials	• Safety
	  o WorkSafe BC Regulations
	  o Working at heights
	• Building Code requirements
	• Tools
	• Protect existing surfaces
	• Eaves troughs, gardens below
	• Stripping existing roofing materials
	• Underlay
	• Flashing
	• Accessories

3. Calculate roofing materials	• Material estimates • Roofing material • Accessories • Flashing • Area of roof • Coverage of roofing materials • Waste factors

Line (GAC): I Finishing Materials

Competency: I5 Install Interior Finishes

Objectives

To be competent in this area, the individual must be able to:

- Describe finished floors.
- Describe wallboard.

LEARNING TASKS	CONTENT
1. Describe finished floors	• Types • Wood • Laminated • Vinyl Composite (VC) • Tile • Carpet
2. Plan the installation of finished floors	• Storage and handling • Acclimatization • Subfloor preparation • Installation of sleepers • Layout procedures • Fasteners • Adhesives • Sanding/finishing • Material calculations
3. Describe wallboard	• Types • Purpose • Hardware and trim • Fasteners • Taping and finishing • Sealants and gaskets • Tools
4. Plan installation of wallboard	• Code considerations
5. Calculate wallboard	• Scheduling o Area o Direction of installation

Line (GAC): I Finishing Materials

Competency: I7 Install Interior Floor, Ceiling and Wall Systems

Objectives

To be competent in this area, the individual must be able to:

- Describe interior floor, wall and ceiling systems.
- Install steel stud walls and partitions.
- Install suspended ceilings.

LEARNING TASKS	CONTENT
1. Describe specialized floor systems	• Access flooring • Sports surfaces • Computer floors
2. Describe demountable partitions	• Tools • Framing components • Assembly techniques
3. Describe special fixtures and accessories	• Washroom fixtures • Toilet partitions • Dispensers • Lockers • Kitchen accessories • Classroom accessories • Barrier free accessories • Mounting heights • Seamless baseboard • Internal and external corners • Adhesives
4. Describe the installation of steel studs systems	• Types • Purpose • Tools • Framing components • Assembly techniques

5. Plan installation of steel stud systems	• Code considerations • Load bearing • Fire rated • Construction drawings • Calculate quantities of materials
6. Install steel studs	• Lay out • Cut • Assemble
7. Describe interior ceiling systems	• Purpose • Types • Suspended ceilings • Non-suspended ceilings • Drop ceilings • Framing components • Methods • Material calculations
8. Plan installation of interior ceiling systems	• Code considerations • Construction dawings • Reflected ceiling pans
9. Calculate ceiling systems	• Numbers of tiles • Borders • Lineal footage of T bar
10. Install interior ceiling systems	• Tools • Layout • Methods

Achievement Criteria 1

Performance	The learner will build steel stud walls with openings.
Conditions	The learner will be given: • Construction drawings and specifications • Steel stud materials • Work space
Criteria	The learner will be evaluated on: • Plumb and square • Proper cutting and fastening technique • Dimensional accuracy

Achievement Criteria 2

Performance	The learner will build a suspended ceiling.
Conditions	The learner will be given: • Reflected ceiling plan • Tools and materials • Work space
Criteria	The learner will be evaluated on: • Correct calculations and layout • Accurate dimensioning • Proper installation technique

Line (GAC): J Building Science

Competency: J1 Control the Forces Acting on a Building

Objectives

To be competent in this area, the individual must be able to:

- Describe the forces acting on a building.
- Describe the construction details for wood frame seismic applications.
- Determine construction practices based on design loads and bearing capacities of soils.

LEARNING TASKS	CONTENT

1. Describe forces acting on the building structure	• Types of loads
	• Dead
	• Live
	• Environmental
	• Dynamic
	• Types of stresses
	• Compression
	• Tension
	• Torsion
	• Shear
	• Gravity
	• Uplift
	• Bearing capacities of soil
	  o Test hole site
	  o Soil test log
	  o Soil classifications
	  o Testing and identification

2. Describe forces acting on the building envelope	• Weather/climate • Temperature • Wind • Water • Building orientation • Ultra violet radiation/sun • Relative humidity • Hydrostatic forces • Atmospheric pressure • Pressure differentia
3. Describe seismic applications	• Code considerations • Brace wall panels • Brace wall bands • Sheathing types • Nailing patterns • Nail types • Blocking and backing • Bracing • Floor diaphragms
4. Describe seismic hardware and steel frames	• Hold down anchors • Straps • Bolts • Nails • Drag struts • Steel moment frames
5. Calculate live and dead loads	• Building types • Tributary area • Soil bearing capacities • Footing sizes

Section 4

TRAINING PROVIDER STANDARDS

Facility Requirements

Classroom Area

- Comfortable seating and tables suitable for learning
- Compliance with the local and national fire code and occupational safety requirements
- Overhead and multimedia projectors with a projection screen
- Whiteboard with marking pens and erasers
- Lighting controls to allow easy visibility of the projection screen while allowing students to take notes
- Windows must have shades or blinds to adjust sunlight
- Heating/air conditioning for comfort all year round
- In-room temperature control to ensure comfortable room temperature
- Acoustics in the room must allow audibility of the instructor
- Computer lab complete with 16 computers and internet access
- Library complete with reference material for student and instructor use

Shop Area

- 2,400 square feet of workshop space per class of 16 students with a minimum ceiling height of 16 feet
    - This includes space for a tool crib
- Adequate lighting and lighting control
- Ventilation as per WorkSafeBC standards
- Refuse and recycling bins for used shop materials
- First-aid facilities

Lab Requirements

- N/A

Student Facilities

- Adequate lunch room as per WorkSafeBC requirements
- Adequate washroom facilities as per WorkSafeBC requirements
- Personal Storage lockers

Instructor’s Office Space

- Desk and filing space
- Computer

Tools and Equipment

Shop Equipment

Required

All Levels:

Standard Safety Equipment

- Breathing apparatus
- Cutting goggles
- Dust mask
- First aid kit
- Gloves
- Hard hat
- Hearing protection
- Safety boots
- Safety glasses and goggles

Stationary Equipment

- Dust collection equipment
- Table saw

Level-Specific:

Survey Instruments

1	•	Laser level	3	• Transit
1,2	•	Optical levels	1	• Water level
4	•	Theodolite		

Standard Safety Equipment

2	•	Fall protection	2	• Rope grab
2	•	Lanyard	2	• Safety lifeline
1,2	•	Reflective vest		

Rigging and Hoisting Equipment

2	•	Chokers	2	• Ropes
2	•	Come-alongs	2	• Skid ramps
2	•	Eyebolts	2	• Tirfors
2	•	Nylon lifting straps	2	• Turnbuckles
2	•	Pinch bar		

Stationary Equipment

3	•	Band saw	3	•	Jointer
3	•	Disk sander	1,2	•	Radial arm saw
3	•	Drill press	3	•	Router table
1	•	Grinder	3	•	Thickness planer

Shop (Facility) Tools

Standard Tools

All Levels:

Hand tools

- Adjustable wrench
- Allen wrenches
- Carpenter's apron
- Chalk line
- Clamps
- Combination square
- Cordless drill
- Drawing instruments
- Dry line
- Framing square
- Hammers (framing, finishing)
- Hand level – 24" and 48"
- Hand saws
- High speed drill set
- Knives
- Levels
- Measuring tape
- Multi-driver screwdriver
- Nail puller
- Nail set
- Pencil/marking instrument
- Pliers and side cutter
- Plumb bob
- Pry bars
- Scale rulers
- Screwdrivers (Robertson, Phillips, straight)
- Sliding T-bevel
- Stair gauges
- Speed square
- Tape measure 25 ft.
- Torpedo level
- Try square
- Wrecking bar

Portable Power Tools and Portable Equipment

- Calculator
- Circular saw
- Cordless drill and bits
- Electric drill
- Extension cords
- Grinder
- Ladders
- Mitre saw
- Portable power tool accessories
- Power nailer/fastener
- Reciprocating saw
- Step ladders
- Wet/dry vacuum

Level-Specific:

Hand tools

3,4	•	Angle divider
1,3,4	•	Aviation snips
1,3	•	Back saw
1,2	•	Builder’s level
3	•	Butt gauge
3	•	Caulking gun
3,4	•	Circle cutter
1,2	•	Concrete bits
2	•	Cone/tie wrench
3	•	Coping saw
3,4	•	Dividers
4	•	Drywall T-square
1,3,4	•	File
1	•	Hack saw
3	•	Hinge gain template
3	•	Hole saw
3	•	Keyhole saw
3	•	J rollers
3	•	Laminate knives
1,3	•	Plane (bench)
1,3	•	Plane (block)
1,3	•	Plane (compass)
1,3	•	Plane (fore)
1,3	•	Plane (jack)
1,3	•	Plane (jointer)
1,3	•	Plane (rabbet)
1,3	•	Plane (router)
1,3	•	Plane (smooth)
1,3	•	Plane (universal)
3	•	Putty knife
1,3	•	Rasp
3	•	Scriber
1,3	•	Scribing compass
1,3,4	•	Set of chisels
3,4	•	Stapler
1,3	•	Stones (oil and water)
2	•	Tape measure 100 ft.
3	•	Trammel points
1,3,4	•	Wood boring bits
1,3,4	•	Wood chisels
1,3,4	•	Wood spade bit set

Portable Power Tools and Portable Equipment

1,3	•	Air compressor
3	•	Belt sander
3	•	Biscuit joiner
1	•	Chainsaw
1,3	•	Compressor
2	•	Concrete cutting saw
2	•	Concrete vibrator
2	•	Construction heaters
2	•	Cut-off saw
4	•	Drywall gun
2	•	Electric chipping hammer
3	•	Electric shears
2	•	Generator
1,2	•	Hammer drill
2	•	Jackhammer
1,3,4	•	Jigsaw
1	•	Ladder jacks
3	•	Laminate trimmer
2	•	Metal cut-off saw
2	•	Mini-grinder
3	•	Mortise machine
1,3,4	•	Palm sander
3	•	Planer
1,3,4	•	Pneumatic tools
1,2	•	Powder actuated tools
3	•	Roof jack
3	•	Router and bits
1,3,4	•	Sander
2	•	Scaffold
2	•	Screed
3,4	•	Stapler
1	•	Wall jack
2	•	Wheelbarrow

Student Tools (supplied by student)

Required

- Contact training facility for required tools and equipment

Recommended

- Steel toed boots
- Safety glasses
- Scientific calculator with trigonometry functions
- Weather appropriate clothing
- Carpenter's apron
- Hammer
- Finishing and framing hammers (Level 3)
- Metric and imperial tape measures
- Chisels (Level 3)
- Planes (Level 3)
- Scriber (general) (Level 3)
- Small geometry set
- Drafting supplies – drawing pencils, metric and imperial scales, T-square, set-squares.

Reference Materials

Required Reference Materials

- Contact training facility for required reference material

Level 1:

- Carpenter Apprenticeship Program: Year 1: (2 Binder Set) – BC Trade Modules (www.crownpub.bc.ca)
- Carpentry: Second Canadian Edition by Floyd Vogt and Michael Nauth
- British Columbia Building Code

Level 2:

- Carpenter Apprenticeship Program: Year 2: (2 Binder Set) – BC Trade Modules (www.crownpub.bc.ca)
- British Columbia Building Code

Level 3:

- Carpenter Apprenticeship Program: Year 3: (2 Binder Set) – BC Trade Modules (www.crownpub.bc.ca)
- Carpentry: Second Canadian Edition by Floyd Vogt and Michael Nauth
- British Columbia Building Code

Level 4:

- Carpenter Apprenticeship Program: Year 4: (2 Binder Set) – BC Trade Modules (www.crownpub.bc.ca)
- Carpentry: Second Canadian Edition by Floyd Vogt and Michael Nauth
- British Columbia Building Code

Recommended Resources

- *Concrete Formwork* by Leonard Koel 4th Edition
- *Principles and Practices of Commercial Concrete*
- *Understanding Construction Drawings* by Tom Stephenson
- Workplace Hazardous Materials Information System (WHMIS) and First Aid http://www.hc-sc.gc.ca/ewh-semt/occup-travail/whmis-simdut/index-eng.php
- WorkSafeBC www.worksafebc.com
- Codes
- National Fire Code of Canada http://www.nrc-cnrc.gc.ca/eng/ibp/irc/codes/2010-national-fire-code.html

- BC Ministry of Housing www.housing.gov.bc.ca/building Queen's Printer for BC Code books http://www.bccodes.ca/default.htm
  - BC Building Code
  - BC Fire Code
  - BC Electrical Code
- National Fire Protection Association www.nfpa.org
  - NFPA 80 – Standards for Fire Doors and Fire Windows
  - NFPA 101 – Life Safety Code
- Canadian National Building Code http://www.nrc-cnrc.gc.ca/eng/ibp/irc/codes/2010-national-building-code.html

Suggested Texts

- *Building Trades Blueprint Reading* Sandberg – Copp Clark (1982)
  ISBN 0-7730-2900-1

This text is required to complete the technical training component of the carpentry apprenticeship program. It describes blueprint-reading techniques for the construction of residential buildings.

- *Principles and Practices of Commercial Construction* Smith – Prentice-Hall (2000)
  ISBN 0-13-026162-9

This text is required to complete the technical training component of the carpentry apprenticeship program. It covers construction techniques for the construction of large buildings.

- *British Columbia Building Code*

The BC Building Code is the building regulation text for all buildings built in BC except for those built in the city of Vancouver. Building inspectors in BC use this text. All carpenters should have a copy of this text when working in British Columbia. This text is available at public libraries and is also available on CD-ROM.

- *Occupational Health & Safety Regulation* Worker's Compensation Board (1989)
  ISBN 0-8269-0403-3

All carpenters in British Columbia are required to have this regulation. It is available free from WorkSafeBC. The OHS Regulation is always changing to meet the needs of the construction industry. Use the WorkSafeBC website to keep up-to-date with changes to the regulation and to be informed of new workplace hazards. www.worksafe.bc

- *Building Trades Dictionary* Toenjes – American Technical Publishers (1989)
  ISBN 0-8269-0403-3

The Building Trades Dictionary explains the meaning of many construction terms. The text makes good use of diagrams. It is useful as an auxiliary reference text that may be available at the public library.

- *Practical Problems in Mathematics* Huth – Delmar (1991)
  ISBN 0-8273-4579-8

Harry Huth, the author of this text, uses many diagrams and sample problems to lead the learner through the methods used to solve carpentry related math problems. The text is useful as an auxiliary reference text that may be available at the public library.

- *Permanent Wood Foundations* Canadian Wood Council (1992)
  ISBN 0-921628-19-6

The Canadian Wood Council publishes this text. It includes many diagrams and does an excellent job of describing wood foundations. It is useful as an auxiliary reference text that may be available at the public library.

- *Formwork for Concrete* Hurd – American Concrete Institute SP-4 (1989)
  LCC 89-81442

Formwork for Concrete, Principals and Practices of Commercial Construction is the definitive text on the construction of formwork. The explanations and diagrams are excellent. It is useful as an auxiliary reference text that may be available at the public library.

- *Concrete Technology* White – Delmar (1991)
  ISBN 0-8273-3635-7

Concrete Technology is a simplified version of Design and Control of Concrete Mixtures. It is useful as an auxiliary reference text that may be available at the public library.

- *Hand Woodworking Tools* McDonnell – Delmar (1978)
  ISBN 0-8273-1098-6

Hand Woodworking Tools gives a wonderful description of the traditional hand woodworking tools used in carpentry. It is an older text that may be out of print but is listed here because of the quality of the diagrams used in the text. It is useful as an auxiliary reference text that may be available at the public library.

- *Design and Control of Concrete Mixtures* Canadian Portland Cement Association (1991)
  ISBN 0-89312-094-4

The Design and Control of Concrete Mixtures gives a thorough description of the components of concrete and how they work together. It is useful as an auxiliary reference text that may be available at the public library.

- *Understanding Wood* Hoadley – Taunton Press (2000)
  ISBN 1-56158-358-8

Understanding Wood is a very well written text on the properties of wood. It describes how the properties of wood can be predicted and controlled. It is useful as an auxiliary reference text that may be available at the public library.

- *Canadian Woodframe House Construction* CMHC (1997)
  ISBN 0-660-16699-2

The Central Mortgage and Housing Corporation (CMHC) publish this useful book. It describes all aspects of wood frame construction. It is useful as an auxiliary reference text that may be available at the public library and is also available on CD-ROM.

- *National Building Code of Canada*

The National Building Code (NBC) is the main building regulation text for Canada. Local Building Codes are based on this text. When working in British Columbia it is useful to be aware of the difference between the BC Code and the NBC. This text is available at public libraries and at the college library and is also available on CD-ROM.

- *Construction* Spence – Delmar
  ISBN 0-314-20537-3

This text does an excellent job of describing the properties of construction materials. It is useful as an auxiliary reference text that may be available at the public library or at the college library.

- *Why Buildings Stand Up* Salvadori – Norton (1990)
  ISBN 0-393-30676-3

Why Buildings Stand Up does a great job of describing the physics of building construction. It uses many historical references and truly simplifies the forces acting on a building. It is useful as an auxiliary reference text that may be available at the public library or at the college library.

- *Architectural and Graphic Standards* Ramsey – American Institute of Architects (1981)
  ISBN 0-471-04683-3

The construction details shown in this text are wonderful. Both residential and commercial construction details are shown. It is useful as an auxiliary reference text that may be available at the public library or at the college library.

- *Rigging Manual* Dickie – Construction Safety Association of Ontario (1981)

The Ontario Safety Association published this manual. It provides a good description of safe rigging practices. It is useful as an auxiliary reference text that may be available at the public library or at the college library.

NOTE:

This list of Reference Materials is for training providers. Apprentices should contact their preferred training provider for a list of recommended or required texts for this program.

Instructor Requirements

Occupation Qualification

The instructor must possess one of the following:

- Carpenter Certificate of Qualification from BC, preferably with an Interprovincial Red Seal Endorsement
- Carpenter Certificate of Qualification from another Canadian jurisdiction, complete with the Interprovincial Red Seal Endorsement

Work Experience

- A minimum of 5 years' experience working in the industry as a journeyperson.

Instructional Experience and Education

It is preferred that the instructor also possesses one of the following:

- An Instructors Diploma or equivalent
- A Bachelor's Degree in Education
- A Master's Degree in Education

Appendices

Appendix A

Assessment Guidelines

Appendix A
Assessment Guidelines

Program: **Carpenter**

Training providers delivering Carpenter apprenticeship in-school technical training are required to enter the following information in ITA Direct Access (ITADA) for each apprentice:

- An in-school mark in the form of a percentage

Training Provider Component: **In-School Technical Training**

The in-school mark for each level is derived from a combination of theory and practical assessments. This mark is then combined with the ITA Standard Level Examination to determine a final mark for the level.

Calculation tables showing the subject competencies, level percentage weightings and level examination weightings are shown in the Grading Sheet: “Subject Competencies and Weightings” section of this document.

Carpenter Level 1, 2 & 3 in-school marks are calculated by:

- Totaling the level *theory* competency results as noted in the competencies and weightings tables and multiplying the total by 50% for Level 1, 2 & 3 to produce a weighted theory result;
- Totaling the level *practical* competency results as noted in the competencies and weightings tables and multiplying the total by 50% for Level 1, 2 & 3 to produce a weighted practical result;
- Adding the theory and practical competency results together to determine the final in-school result.

Successful completion of the in-school training for each level is defined as an in-school mark of 70% or greater.

ITA Component: **ITA Standardized Level Examinations - Level 1, 2 & 3**

ITA Direct Access (ITADA) automatically calculates the final mark for a level once the in-school training and standard level exam marks are entered into the system. This mark is calculated by blending the standardized exam percentage score and the in-school technical training percentage score to determine the final mark for the level.

In-school technical training (combined theory & practical) is weighted at 80% and the ITA standardized level exam is weighted at 20%. These two scores are combined to determine the final level mark. This result is the final mark that is recorded in ITA Direct Access.

- A mark of 70% or greater is required to pass the level when combining the final in-school percentage score and the final ITA standardized level exam percentage score.

Component: **Level 4 - Proprietary Examinations**

Until further notice, Training Providers delivering the Carpenter program will continue using their institution's proprietary examination in the calculation of the apprentices' achievement for Level 4. The percentage weighting of this exam is 30% of the final in-school technical training mark.

Refer to the Grading Sheet Subject Competencies and Weightings Table to determine the calculation process for completing a final Level 4 percentage. The final blended mark for Level 4 is to be reported to ITA and must be 70% or greater to pass the level.

Interprovincial Red Seal Exam

In order to achieve certification, Carpenter apprentices are required to write the Carpenter Interprovincial Red Seal exam after completing all levels of in-school technical training. Apprentices must have passed all levels of in-school technical training or be approved challengers to sit the exam. A score of 70% or greater is required for a pass.

Interprovincial Red Seal exams should be requested by training providers via the usual ITA procedure.

The ITA will administer and invigilate Interprovincial Red Seal exams and score and record exam results in ITA Direct Access.

Grading Sheet:Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING: ITA DIRECT ACCESS CODE:	CARPENTER LEVEL 1 0004CA01		
LINE	**SUBJECT COMPETENCIES**	**THEORY WEIGHTING**	**PRACTICAL WEIGHTING**
A	Safe Work Practices	6%	3%
B	Documentation and Organizational Skills	18%	15%
C	Tools and Equipment	15%	20%
D	Survey Instruments and Equipment	7%	9%
E	Access, Rigging and Hoisting Equipment	1%	1%
F	Site Layout	7%	6%
G	Concrete Formwork	11%	12%
H	Wood Frame Construction	33%	34%
J	Building Science	2%	0%
	Total	100%	100%

Calculated by the Training Provider (Carpenter in-school theory & practical subject competency weighting)	50%	50%
Training Provider enters final in-school mark into ITA Direct Access	IN-SCHOOL %	

Calculated by ITA: In-school Mark ITA Direct Access calculates the percentage weighting once the in-school mark is entered. Combined theory and practical subject competency multiplied by	80%
Calculated by ITA: Standard Level Exam Mark ITA Direct Access will calculate the percentage weighting once the standard level exam marks have been entered. The exam score is multiplied by	20%
Calculated by ITA: Final Mark The final mark for determining credit is calculated by ITA Direct Access.	FINAL%

PROGRAM: IN-SCHOOL TRAINING: ITA DIRECT ACCESS CODE:	CARPENTER LEVEL 2 0004CA02

LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
A	Safe Work Practices	4%	0%
B	Documentation and Organizational Skills	13%	15%
C	Tools and Equipment	2%	3%
D	Survey Instruments and Equipment	6%	9%
E	Access, Rigging, and Hoisting Equipment	9%	12%
F	Site Layout	5%	6%
G	Concrete Formwork	60%	55%
J	Building Science	1%	0%
	Total	100%	100%
Calculated by the Training Provider (Carpenter in-school theory & practical subject competency weighting)		50%	50%
Training Provider enters final in-school mark into ITA Direct Access		IN-SCHOOL %	

Calculated by ITA: In-school Mark ITA Direct Access calculates the percentage weighting once the in-school mark is entered. Combined theory and practical subject competency multiplied by	80%
Calculated by ITA: Standard Level Exam Mark ITA Direct Access will calculate the percentage weighting once the standard level exam marks have been entered. The exam score is multiplied by	20%
Calculated by ITA: Final Mark The final mark for determining credit is calculated by ITA Direct Access.	FINAL%

PROGRAM: IN-SCHOOL TRAINING: ITA DIRECT ACCESS CODE:	CARPENTER LEVEL 3 0004CA03

LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
B	Documentation and Organizational Skills	18%	18%
C	Tools and Equipment	6%	7%
D	Survey Instruments and Equipment	8%	12%
H	Wood Frame Construction	28%	29%
I	Finishing Materials	30%	29%
J	Building Science	10%	5%
	Total	100%	100%
Calculated by the Training Provider (Carpenter in-school theory & practical subject competency weighting)		50%	50%
Training Provider enters final in-school mark into ITA Direct Access		IN-SCHOOL %	

Calculated by ITA: In-school Mark ITA Direct Access calculates the percentage weighting once the in-school mark is entered. Combined theory and practical subject competency multiplied by	80%
Calculated by ITA: Standard Level Exam Mark ITA Direct Access will calculate the percentage weighting once the standard level exam marks have been entered. The exam score is multiplied by	20%
Calculated by ITA: Final Mark The final mark for determining credit is calculated by ITA Direct Access.	FINAL%

PROGRAM: IN-SCHOOL TRAINING: ITA DIRECT ACCESS CODE:	CARPENTER LEVEL 4 0004CA04

LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
B	Documentation and Organizational Skills	18%	20%
D	Survey Instruments and Equipment	10%	14%
F	Site Layout	8%	0%
G	Concrete Formwork	6%	2%
H	Wood Frame Construction	37%	55%
I	Finishing Materials	15%	9%
J	Building Science	6%	0%
	Total	100%	100%

Calculated by the Training Provider:		
(Carpenter in-school theory & practical subject competency weighting)	50%	50%
In-school Mark Combined theory and practical subject competency multiplied by	70%	
Proprietary Exam Mark The exam score is multiplied by	30%	
Training Provider enters final in-school mark into ITA Direct Access A score of 70% or greater is required for a pass.	FINAL %	

All apprentices who complete Level 4 of the Carpenter program with a FINAL level mark of 70% or greater will write the Interprovincial Red Seal examination as their final assessment.

ITA will enter the apprentices' Carpenter Interprovincial examination mark in ITADA. A minimum mark of 70% on the examination is required for a pass.

Appendix B

Glossary

Appendix B
Glossary

Describe; to explain or give an account of an item or concept. This means an introduction to a topic area that will include terminology, safety as it pertains to the topic, types and uses of the item. For example, describing roofs will include terminology such as rise and run, slope, rafter, fascia; discussion regarding working at heights; types of roofs such as gable and hip.

Plan; an intention or decision about what one is going to do; to decide on and arrange in advance. Planning includes all aspects of reading and interpreting construction drawings and documentation; Any reference to WorkSafeBC, building codes and bylaws; consultation with architects, engineers, sub trades, owners occurs as part of planning. There is overlap between planning and calculating, primarily in terms of estimating time and materials.

Calculate; determine the amount or number of something mathematically.
Calculating includes all aspects of estimating labour and materials (some overlap with Plan), calculation of volumes, centreline perimeter, theory lengths of rafters, rise and run of stairs, etc.

Build; to make something by putting together parts or materials; construct; erect. This includes layout and assembly techniques; cutting, fitting, fastening, and joinery.

Interpret; to explain or understand the meaning of something. This primarily means using construction drawings. Given the alphabet of lines and numerous symbols and formats, construction drawings are a language of their own. The carpenter must interpret two dimensional drawings to build three dimensional objects.

Use; the act of using something. This typically involves the safe and proper operation of a tool.

Consult; to ask for the professional opinion of someone or to talk with someone, or look up information in a document, in order to make a decision.

Maintain; to keep a tool in good condition by performing regular maintenance such as lubrication or cleaning, as well as making repairs and correcting problems.

Adjust; to change something in a minor way so that it works better, such as changing the mitre angle on a compound mitre saw.

Install; to make ready to be used in a certain place, such as installing door or window hardware.

Prepare; to work out the details of or plan in advance; to make something ready for some activity or purpose, such as preparing the site for construction activities.

Construction Drawings and Specifications; blueprints, plans, instructions, information

Correct; having no errors or mistakes. Calculations should be done correctly.

Proper; in a thorough manner; suitable for some purpose or situation. Tools are used properly.

Appendix C

Previous Contributors

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The Program Outline was prepared with the advice and direction of an industry steering committee convened initially by the Construction Industry Training Organization (CITO) Members include:

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