SKILLEDTRADES BC

PROGRAM OUTLINE

Glazier

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GLAZIER
PROGRAM OUTLINE

APPROVED BY INDUSTRY

JUNE 2021

BASED ON

RSOS 2020

Developed by
SkilledTradesBC
Province of British Columbia

TABLE OF CONTENTS

Section 1

INTRODUCTION

Glazier

Foreword

This revised Glazier Program Outline is intended as a guide for instructors, apprentices, and employers of apprentices as well as for the use of industry organizations, regulatory bodies, and provincial and federal governments. It reflects standards based on the 2020 Red Seal Occupational Standard (RSOS) as well input from 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.

Competencies are to be evaluated through written exams and practical assessments. A passing grade is achieved by getting an overall mark of 70%. See the Assessment Guidelines for more details. 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 assessment. 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 measurable, 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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SkilledTradesBC would like to acknowledge the dedication and hard work of all the industry and training provider representatives appointed to identify the training requirements of the Glazier occupation.

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	Communicates program length and structure, and all pathways to completion	Illustrates the length and structure of the program	Illustrates the length and structure of the program, and pathway to completion	Illustrates the challenger pathway to Certificate of Qualification
OAC	Communicates the competencies that industry has defined as representing the scope of the occupation	Displays the competencies that an apprentice is expected to demonstrate in order to achieve certification	Displays the competencies apprentices will achieve as a result of program completion	Displays the competencies challengers 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	Shows 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	Shows 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	Shows 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, measurable 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
Assessment Guidelines	Shows the general areas of competency covered in each level of technical training, the theory and practical grading weight, and the calculation method for final percentage marks	Shows the general areas of competency covered in the technical training, the grading weight for each GAC, and the percentage of that time spent on theory versus practical application	Shows the general areas of competency covered in each level of technical training, the theory and practical grading weight, and the calculation method for final percentage marks	Shows the relative weightings of various general areas of competency within the occupation on which assessment is based

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
Appendix – Glossary of Acronyms			Defines program specific acronyms	

Section 2

PROGRAM OVERVIEW

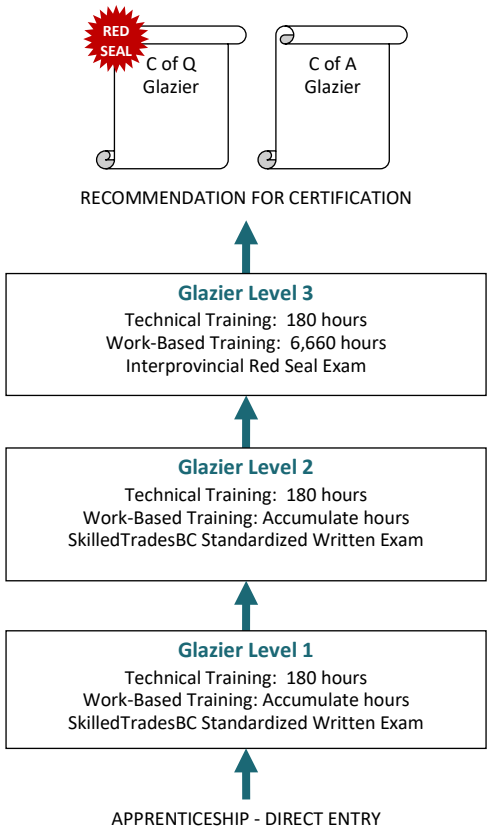
Glazier

Program Credentialing Model

Apprenticeship Pathway

This graphic provides an overview of the Glazier apprenticeship pathway.

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



CROSS-PROGRAM CREDITS

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

None

Occupational Analysis Chart

GLAZIER

Occupation Description: Glaziers measure, handle, cut, prepare, fit, install, replace and repair all types of glass and glass substitutes, typically in industrial, commercial, institutional, and residential applications. In commercial applications, they fabricate, lay out, and install curtain wall framing, aluminum storefront frames and entrances, structural silicone glazing (SSG), skylights and sloped glazing. In residential applications, they install doors and windows. Glaziers also install specialty glass products such as glass railings, smoke baffles, shower enclosures, and glass and mirror walls. Other duties include layout, preparation, fabrication, and replacement of architectural metal components in systems such as entranceways, windows, skylights, and curtain walls.

USE SAFE WORK PRACTICES **A**	Control workplace hazards A1	1					Apply OHS regulations and WorkSafeBC standards A2	1					Use Global Harmonized System 2015 (WHIMIS) Certification A3	1					Use personal protective equipment A4	1					Practice fire prevention A5	1					Apply Level 1 First Aid practices A6	1				
	Use fall protection systems A7	1																																	
ORGANIZE WORK **B**	Interpret drawings and specifications B1	1	2	3			Use codes, regulations, and standards B2	1		3			Apply manufacturer and supplier documentation B3	1		3			Apply trade math B4	1	2	3			Plan sequence of work B5	1		3			Handle materials B6	1				
	Communicate with others B7	1		3																															

USE TOOLS AND EQUIPMENT **C**	Use hand tools C1	Use portable power tools C2	Use stationary power tools C3	Use layout and measuring equipment C4	Use ladders and scaffolds C5	Use rigging and hoisting equipment C6
	1	1	1	1 3	1	1 3
	Operate mobile access equipment C7					
	1					
FABRICATE COMMERCIAL SYSTEMS **D**	Fabricate storefront systems D1	Fabricate window systems D2	Fabricate curtain walls D3	Fabricate skylights and sloped glazing systems D4	Fabricate commercial entrance systems D5	Fabricate guardrail, handrail, and balustrade systems D6
	1 2	1 2	2 3	3	2 3	2 3
	Perform glass cutting and edge treatment D7					
	1 2 3					
INSTALL COMMERCIAL SYSTEMS **E**	Install storefront systems E1	Install strip window systems E2	Install curtain walls E3	Install skylights and sloped glazing systems E4	Install commercial entrance systems E5	Install guardrail, handrail, and balustrade systems E6
	1 2	1 2	1 2 3	3	3	2 3
	Install building envelope membranes E7	Install flashing E8	Use caulking and sealants E9			
	1 3	2 3	1 2 3			

Competency	Line Task	Code	Box 1	Box 2	Box 3	Box 4	Box 5
INSTALL RESIDENTIAL SYSTEMS (F)	Layout residential window and door systems	F1		2			
	Glaze residential windows and doors	F2		2	3		
	Install residential skylights and solariums	F3			3		
	Install shower enclosures, mirrors, and back-painted glass	F4	1	2	3		
	Install guardrail, handrail, and balustrade systems	F5			3		
	Install residential windows, doors, frames, and hardware	F6		2			
INSTALL SPECIALTY GLASS AND PRODUCTS (G)	Layout specialty glass and products	G1		2	3		
	Assemble specialty glass and products	G2			3		
	Install custom glazing systems	G3			3		
SERVICE GLAZING SYSTEMS (H)	Service commercial window and door systems	H1			3		
	Service residential window and door systems	H2		2			

Training Topics and Suggested Time Allocation: Level 1

Glazier – Level 1

			% of Time Allocated to:		
		% of Time	Theory	Practical	Total
Line A	**USE SAFE WORK PRACTICES**	**22%**	**80%**	**20%**	**100%**
A1	Control workplace hazards		✓		
A2	Apply OHS regulations and WorkSafeBC standards		✓		
A3	Use Global Harmonized System 2015 (WHMIS) Certification		✓		
A4	Use personal protective equipment		✓	✓	
A5	Practice fire prevention		✓	✓	
A6	Apply Level 1 First Aid practices		✓	✓	
A7	Use fall protection systems		✓	✓	
Line B	**ORGANIZE WORK**	**11%**	**90%**	**10%**	**100%**
B1	Interpret drawings and specifications		✓		
B2	Use codes, regulations, and standards		✓		
B3	Apply manufacturer and supplier documentation		✓		
B4	Apply trade math		✓	✓	
B5	Plan sequence of work		✓	✓	
B6	Handle materials		✓	✓	
B7	Communicate with others		✓		
Line C	**USE TOOLS AND EQUIPMENT**	**25%**	**60%**	**40%**	**100%**
C1	Use hand tools		✓	✓	
C2	Use portable power tools		✓	✓	
C3	Use stationary power tools		✓	✓	
C4	Use layout and measuring equipment		✓	✓	
C5	Use ladders and scaffolds		✓	✓	
C6	Use rigging and hoisting equipment		✓	✓	
C7	Operate mobile access equipment		✓	✓	
Line D	**FABRICATE COMMERCIAL SYSTEMS**	**15%**	**30%**	**70%**	**100%**
D1	Fabricate storefront systems		✓	✓	
D2	Fabricate window systems		✓		
D7	Perform glass cutting and edge treatment		✓	✓	
Line E	**INSTALL COMMERCIAL SYSTEMS**	**25%**	**25%**	**75%**	**100%**
E1	Install storefront systems		✓	✓	
E2	Install strip window systems		✓		
E3	Install curtain walls		✓	✓	
E7	Install building envelope membranes		✓	✓	
E9	Use caulking and sealants		✓		

			% of Time Allocated to:		
		% of Time	Theory	Practical	Total
Line F	**INSTALL RESIDENTIAL SYSTEMS**	**2%**	**100%**	**0%**	**100%**
F4	Install shower enclosures, mirrors, and back-painted glass		✓		
	Total Percentage for Glazier Level 1	**100%**			

Training Topics and Suggested Time Allocation: Level 2

Glazier – Level 2

			% of Time Allocated to:		
		% of Time	Theory	Practical	Total
Line B	**ORGANIZE WORK**	**10%**	**80%**	**20%**	**100%**
B1	Interpret drawings and specifications		✓	✓	
B4	Apply trade math		✓	✓	
Line D	**FABRICATE COMMERCIAL SYSTEMS**	**30%**	**30%**	**70%**	**100%**
D1	Fabricate storefront systems		✓	✓	
D2	Fabricate window systems		✓	✓	
D3	Fabricate curtain walls			✓	
D5	Fabricate commercial entrance systems		✓	✓	
D6	Fabricate guardrail, handrail, and balustrade systems		✓		
D7	Perform glass cutting and edge treatment		✓	✓	
Line E	**INSTALL COMMERCIAL SYSTEMS**	**40%**	**30%**	**70%**	**100%**
E1	Install storefront systems			✓	
E2	Install strip window systems			✓	
E3	Install curtain walls			✓	
E6	Install guardrail, handrail, and balustrade systems		✓		
E8	Install flashing		✓	✓	
E9	Use caulking and sealants		✓	✓	
Line F	**INSTALL RESIDENTIAL SYSTEMS**	**10%**	**30%**	**70%**	**100%**
F1	Layout residential window and door systems		✓	✓	
F2	Glaze residential windows and doors		✓		
F4	Install shower enclosures, mirrors, and back-painted glass		✓	✓	
F6	Install residential windows, doors, frames, and hardware		✓	✓	
Line G	**INSTALL SPECIALTY GLASS AND PRODUCTS**	**5%**	**100%**	**0%**	**100%**
G1	Layout specialty glass and products		✓		
Line H	**SERVICE GLAZING SYSTEMS**	**5%**	**100%**	**0%**	**100%**
H2	Service residential window and door systems		✓		
	Total Percentage for Glazier Level 2	**100%**			

Training Topics and Suggested Time Allocation: Level 3

Glazier – Level 3

			% of Time Allocated to:		
		% of Time	Theory	Practical	Total
Line B	**ORGANIZE WORK**	**15%**	**70%**	**30%**	**100%**
B1	Interpret drawings and specifications		✓	✓	
B2	Use codes, regulations, and standards		✓		
B3	Apply manufacturer and supplier documentation		✓		
B4	Apply trade math			✓	
B5	Plan sequence of work		✓	✓	
B7	Communicate with others		✓		
Line C	**USE TOOLS AND EQUIPMENT**	**10%**	**50%**	**50%**	**100%**
C4	Use layout and measuring equipment		✓	✓	
C6	Use rigging and hoisting equipment			✓	
Line D	**FABRICATE COMMERCIAL SYSTEMS**	**15%**	**30%**	**70%**	**100%**
D3	Fabricate curtain walls		✓		
D4	Fabricate skylights and sloped glazing systems		✓	✓	
D5	Fabricate commercial entrance systems		✓	✓	
D6	Fabricate guardrail, handrail, and balustrade systems		✓	✓	
D7	Perform glass cutting and edge treatment			✓	
Line E	**INSTALL COMMERCIAL SYSTEMS**	**20%**	**20%**	**80%**	**100%**
E3	Install curtain walls		✓	✓	
E4	Install skylights and sloped glazing systems		✓	✓	
E5	Install commercial entrance systems		✓	✓	
E6	Install guardrail, handrail, and balustrade systems			✓	
E7	Install building envelope membranes		✓		
E8	Install flashing		✓	✓	
E9	Use caulking and sealants			✓	
Line F	**INSTALL RESIDENTIAL SYSTEMS**	**15%**	**40%**	**60%**	**100%**
F2	Glaze residential windows and doors		✓	✓	
F3	Install residential skylights and solariums		✓	✓	
F4	Install shower enclosures, mirrors, and back-painted glass		✓	✓	
F5	Install guardrail, handrail, and balustrade systems			✓	
Line G	**INSTALL SPECIALTY GLASS AND PRODUCTS**	**15%**	**70%**	**30%**	**100%**
G1	Layout specialty glass and products		✓	✓	
G2	Assemble specialty glass and products		✓	✓	
G3	Install custom glazing systems		✓	✓	
Line H	**SERVICE GLAZING SYSTEMS**	**10%**	**70%**	**30%**	**100%**

		% of Time	% of Time Allocated to: Theory	Practical	Total
H1	Service commercial window and door systems		✓	✓	
	Total Percentage for Glazier Level 3	**100%**			

Section 3

PROGRAM CONTENT

Glazier

Level 1

Glazier

Line (GAC): A USE SAFE WORK PRACTICES

Competency: A1 Control workplace hazards

Objectives

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

- Describe workplace hazards
- Manage workplace hazards
- Describe emergency procedures
- Describe non-emergency injury reporting procedures
- Interpret worksite safety policies

LEARNING TASKS	CONTENT

1. Describe short term hazards in the glazier trade	• Sharp objects
	  o Glass
	  o Metal
	• Overhead hazards
	• Electrical
	• Lockout procedures
	• Explosive material (dust)
	• Lifting techniques
	• Housekeeping
	• Horseplay
	• Falls
	• Respect for other's safety
	• Constant awareness of surroundings
	• Safe attitude
	• Safety line inspections
	• Management of hazards

2. Describe long term hazards in the glazier trade	• Respiratory disease
	  o Volatile Organic Compounds (VOCs)
	  o Silicosis
	• Asbestos
	• Repetitive strain injuries
	• Cleaning products
	  o Solvents
	  o Chemicals
	• Caulking product toxicity
	• Back injuries

3. Describe emergency procedures	• Emergency shutoffs • Fire control systems

LEARNING TASKS	CONTENT
4. Describe non-emergency injury reporting procedures	• Eye wash facilities • Emergency exits • Emergency contact/phone numbers • Outside meeting place • Disaster meeting place • Emergency horn protocol • First aid facilities • Reports • Reports to first aid attendant

5. Interpret worksite safety policies	• Site orientations
	  o Risk and hazard assessment
	  o Safe work procedures
	  o Toolbox meetings
	  o Conditions
	  o Meeting requirements
	  o Reporting hazards and incidents
	  o Investigations
	  o Committees
	  o Joint Occupational Health & Safety
	  o Employee orientation
	  o First aid
	  o Hearing
	  o Records and statistics
	  o Lock-out
	  o Non-compliance procedures
	• Tape identification (red, yellow)
	• Minimum standards
	• Acts and Regulations

Line (GAC): A USE SAFE WORK PRACTICES

Competency: A2 Apply OHS regulations and WorkSafeBC standards

Objectives

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

- Apply Occupational Health and Safety Regulations applicable to the workplace

LEARNING TASKS	CONTENT
1. Locate the Occupational Health and Safety Regulations	• Occupational Health and Safety Regulations • WorkSafeBC • CSA Standards
2. Interpret Occupational Health and Safety information that is relevant to the workplace	• As per documentation

Line (GAC): A USE SAFE WORK PRACTICES

Competency: A3 Use Global Harmonized System 2015 (WHMIS) Certification

Objectives

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

- Describe the purpose of the Global Harmonized System 2015 (GHS 2015) (WHMIS) Regulations
- Interpret material safety data sheets (MSDS)
- Interpret GHS 2015 labels
- Apply GHS 2015 regulations

LEARNING TASKS	CONTENT

1. Describe the key elements and purpose of GHS 2015	• Protection of workers through the provision of information
	• Recognition of rights
	  o Workers
	  o Employers
	  o Suppliers
	  o Regulators
	• Material safety data sheets (MSDSs)
	• Labelling of containers of hazardous materials
	• Worker education programs

2. Describe the responsibilities of suppliers under GHS 2015	• Provide
	  o MSDSs
	  o Labels

3. Describe the responsibilities of employers under GHS 2015	• Provide
	  o MSDSs
	  o Labels
	  o Work education programs in the workplace

4. Describe the responsibilities of employees under GHS 2015	• Create workplace labels
	  o Product info
	  o Safe handling information
	  o Reference to MSDS

5. Describe information to be disclosed on a MSDS	• Hazardous ingredients • Preparation information • Product information • Physical data • Fire or explosion • Reactivity data • Toxicological properties

LEARNING TASKS	CONTENT

6. Identify symbols found on GHS 2015 labels and describe their meaning	• Preventive measures
	• First aid measures
	• Compressed gases
	• Flammable and combustible materials
	• Oxidizing materials
	• Poisonous and infectious materials
	  o Materials causing immediate and serious toxic effects
	  o Materials causing other toxic effects
	  o Biohazardous infectious materials
	• Corrosive materials
	• Dangerously reactive materials

7. Apply GHS 2015 regulations as they apply to hazardous materials used in the shop	• Use, storage and disposal of chemicals

Line (GAC): A USE SAFE WORK PRACTICES

Competency: A4 Use personal protective equipment

Objectives

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

- Describe personal protective equipment requirements for glaziers
- Use personal protective equipment

LEARNING TASKS	CONTENT
1. Describe personal protective equipment requirements	• Safety footwear • Eye and face protection • Ear protection • Head protection • Wrist and arm protection • Knee protection • Hand protection • Respiratory protection • Fall protection • Tool tethers
2. Use personal protective equipment	• Inspection • Maintenance • Storage

Line (GAC): A USE SAFE WORK PRACTICES

Competency: A5 Practice fire prevention

Objectives

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

- Identify various classes of fires
- Apply preventative fire safety precautions
- Describe fire safety procedures

LEARNING TASKS	CONTENT
1. Describe the conditions necessary to support a fire	• Air • Fuel • Heat • Chemical chain reaction
2. Describe the classes of fires according to the materials being burned	• Class A • Class B • Class C • Class D • Symbols and colours

3. Apply fire safety precautions when working near, handling or storing flammable liquids or gases, combustible materials and electrical apparatus	• Fuels
	  o Diesel
	  o Gasoline
	  o Propane
	  o Natural Gas
	• Ventilation
	  o Purging
	• Lubricants
	• Oily rags
	• Combustible metals
	• Aerosols

4. Describe considerations and steps to be taken in case of fire	• Training • Personal method of egress • Contacting fire department immediately • Warning others • Evacuation of others

LEARNING TASKS	CONTENT

5. Describe the procedure for using a fire extinguisher	• Extinguisher selection
	• P.A.S.S.
	  o Pull
	  o Aim
	  o Squeeze
	  o Sweep

Line (GAC): A USE SAFE WORK PRACTICES

Competency: A6 Apply Level 1 First Aid practices

Objectives

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

- Apply Level 1 First Aid practices

LEARNING TASKS	CONTENT
1. Apply Level 1 First Aid practices	• CPR • Bandaging • Airway • Breathing • Circulation

Line (GAC): A USE SAFE WORK PRACTICES

Competency: A7 Use fall protection systems

Objectives

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

- Describe fall protection equipment and systems
- Use fall protection equipment and systems

LEARNING TASKS	CONTENT
1. Describe fall protection equipment	• Fall arrest/restraint/work positioning equipment o Harnesses – Trauma strap o Waist belt limitations o Hardware – Beamer – Lanyard – Carabiner – Shock-absorbing devices – Retractable devices – Vertical and horizontal line grab (fibre and wire) – Cable/nylon tie-off slings o Standards (CSA) • Inspection and maintenance • Worksite awareness • Applicable OHS regulations
2. Describe fall protection systems	• Railings/scaffolds • Nets • Hardware • Anchor points • Assembly • Ladder systems • Vertical and horizontal systems • Applicable OHS Regulations
3. Use fall protection equipment and systems	• Daily inspection • Assembly/disassembly • Fall protection plan o Identify work area and risks o List and choose equipment o Rescue procedures • Fit test

Achievement Criteria

Performance	The learner will perform a fit test.
Conditions	The learner will be given: • Harness • Lanyard • Line grab • Safety lifeline
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • D-ring position (between shoulders) • Snugness of fit • Alignment • Coordination of shock absorber • Coordination of line grab

Line (GAC): B ORGANIZE WORK

Competency: B1 Interpret drawings and specifications

Objectives

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

- Describe architectural, shop, and fabrication drawings

LEARNING TASKS	CONTENT
1. Describe purpose of drawings	• Uses • Types o Architectural, shop, fabrication
2. Describe components of drawings	• Floor plan • Cross section • Elevation • Details • Scale • Schedules • Symbols

Line (GAC): B ORGANIZE WORK

Competency: B2 Use codes, regulations, and standards

Objectives

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

- Identify organizations responsible for codes, regulations, and standards
- Describe codes, regulations, standards, and engineering requirements

LEARNING TASKS	CONTENT
1. Describe how codes, regulations, and standards affect the Glazier trade	• Material selection • Construction and installation methods • Design characteristics
2. Describe codes, regulations, standards, and engineering requirements	• Door lights • Skylights and canopies • Side lights • Guardrails and balustrade • Office divisional to floor • Fire-rated glass • Smoke baffles

Line (GAC): B ORGANIZE WORK

Competency: B3 Apply manufacturer and supplier documentation

Objectives

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

- Interpret manufacturer and supplier documentation

LEARNING TASKS	CONTENT
1. Interpret manufacturer and supplier documentation	• Tool and equipment documentation • System component documentation • Proprietary product documentation • Certification agencies • Installation instructions and requirements • Operation and maintenance manuals • Product specifications • Warranty information

Line (GAC): B ORGANIZE WORK

Competency: B4 Apply trade math

Objectives

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

- Apply mathematical principles to solve problems

LEARNING TASKS	CONTENT
1. Use fractions to solve problems	• Add, subtract, multiply divide • Express in higher terms • Simplify fractions
2. Use decimal fractions to solve problems	• Add, subtract, multiply divide • Convert between decimals and fractions • Decimal notation
3. Solve problems of ratio	• Ratio o Equivalent o Percentage
4. Use metric and imperial measurement	• Convert between metric and imperial o Feet, inches/metres, millimetres o Pounds, kilos, tons

Line (GAC): B ORGANIZE WORK

Competency: B5 Plan sequence of work

Objectives

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

- Describe inspection of the worksite
- Prepare the worksite

LEARNING TASKS	CONTENT

1. Describe inspection of the worksite	• Site orientation
	• Safety requirements
	• Equipment requirements
	  o Storage for tools and materials
	  o Set up areas for equipment and scaffolding
	  o Lifting and hoisting equipment
	• Problem areas
	• Access considerations
	• Utilities

2. Prepare the worksite	• Site trailer
	• Blueprint review
	  o Layout of job materials required for the job
	  o Utilities
	  o Preparation of storage and work areas
	• Delivery and unloading building materials
	  o Controlled site access

Line (GAC): B ORGANIZE WORK

Competency: B6 Handle materials

Objectives

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

- Handle and store glass and aluminum manually
- Use equipment to move glass, sealed units, and aluminum
- Ship and receive glass products and aluminum
- Handle and store flashings manually
- Communicate with others to lift, transport and install glass and other materials

LEARNING TASKS	CONTENT

1. Handle glass, sealed units, and aluminum manually	• Lifting techniques
	• Carrying glass and sealed units
	• Ergonomics
	• Hazards associated with lifting glass
	• Lifting tools
	  o Suction cups
	  o Gloves
	  o Slings

2. Use equipment to move glass, sealed units, and aluminum	• Glass dollies • Glass trucks • Slings and webs • Suction cups
3. Crate glass	• Skeleton crate • Cardboard • Squash board • Metal strapping
4. Un-crate glass	• Proper lean • Wedged safely • Opening correct side • Checking for broken glass
5. Store glass, aluminum, and flashings on the jobsite	• Temporary racks • Bearing walls
6. Store glass and glass units in a shop	• Envelope racks • Glass racks • Glass cases • Protecting the public

LEARNING TASKS	CONTENT
7. Ship and receive glass products	• Cut off racks • Securing loose glass on dollies • Detecting flaws in glass products
8. Communicate with others to lift, transport, and install glass and other materials	• Communication protocols • Lifting limitations • Emergency procedures • Developing a safety backup plan for transporting glass

Achievement Criteria

Performance	The learner will transport glass with a partner by using a plate dolly.
Conditions	The learner will be given: • Equipment (dolly, glass, suction cups) • Instructions
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Safe lifting technique and transportation of glass • Communication • Use of cups

Line (GAC): B ORGANIZE WORK

Competency: B7 Communicate with others

Objectives

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

- Participate in toolbox meetings
- Communicate with supervisors
- Convey possible hazards

LEARNING TASKS	CONTENT
1. Use basic trade terminology	• Systems • Materials • Tools • Techniques
2. Participate in toolbox meetings	• Roles and responsibilities • Topics • Safety updates
3. Communicate with supervisors	• Roles and responsibilities • Site and shop
4. Convey possible hazards	• Reporting procedure • Right to refuse • Corrective actions

Line (GAC): C USE TOOLS AND EQUIPMENT

Competency: C1 Use hand tools

Objectives

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

- Use hand tools
- Inspect and maintain hand tools

LEARNING TASKS	CONTENT
1. Describe hand tools	• Hammers and mallets • Saws • Clamps • Chisels • Knives o Bent putty knife • Drills and drill bits • Punch • Glass cutting tools • Caulking gun • Wrenches • Snips • Pliers • Duck bill pliers • Rivet gun • Sanders • Files • Scoring tool • Metal-cutting tools • Hand-pump suction cups • Tap and dies • Vinyl roller *Refer to the tool list at the end of the document for complete listing*
2. Inspect and maintain hand tools	• Storage • Safety • Maintenance procedures • Manufacturer specifications

LEARNING TASKS	CONTENT
3. Use hand tools	• Purpose • Types and sizes • Parts • Operation • Accessories • Safety • Adjustments

Line (GAC): C USE TOOLS AND EQUIPMENT

Competency: C2 Use portable power tools

Objectives

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

- Use portable power tools
- Inspect and maintain portable power tools

LEARNING TASKS	CONTENT
1. Describe portable power tools	• Sanders • Saws • Drill gun • Screw gun • Caulking gun • Nibbler • Shears • Router • Grinders *Refer to the tool list at the end of the document for complete listing*
2. Use portable power tools	• Purpose • Types and sizes • Parts • Operation • Accessories • Safety • Adjustments
3. Inspect and maintain portable power tools	• Storage • Safety • Maintenance procedures • Manufacturer specifications

Achievement Criteria

Performance	The learner will demonstrate safe operating procedures for power tools.
Conditions	The learner will be given: • Power tools • Safety and operation instructions • Materials to work with
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Proper set-up • Handling equipment • According to safety instructions • Proper lubrications • Cut quality and accuracy

Line (GAC): C USE TOOLS AND EQUIPMENT

Competency: C3 Use stationary power tools

Objectives

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

- Use stationary power tools
- Inspect and maintain stationary power tools

LEARNING TASKS	CONTENT

1. Describe stationary power tools	• Sanders
	• Saws
	• Router
	• Grinders
	• Hand brake
	• Polishing machine
	• Milling machine
	• Press
	  o Punch
	  o Drill
	Refer to the tool list at the end of the document for complete listing

2. Use stationary power tools	• Purpose • Safety • Types and sizes • Parts • Operation • Accessories • Adjustments • Lubricants
3. Inspect and maintain stationary power tools	• Storage • Safety • Maintenance procedures • Manufacturer specifications

Achievement Criteria

Performance	The learner will demonstrate safe operating procedures for stationary power tools.
Conditions	The learner will be given: • Power tools • Guidelines and safety protocols • Materials to work with
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Proper set-up • Handling equipment • According to safety instructions • Proper lubrications • Cut quality and accuracy

Line (GAC): C USE TOOLS AND EQUIPMENT

Competency: C4 Use layout and measuring equipment

Objectives

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

- Describe layout and measuring equipment
- Use layout and measuring equipment
- Maintain layout and measuring equipment

LEARNING TASKS	CONTENT

1. Describe layout and measuring equipment	• Levels
	  o Torpedo
	  o Hand
	  o Builder's
	  o Laser
	  o Transit/Theodolite
	• Measurement and Alignment Tools
	  o Tape measure
	  o Metre stick
	  o Plumb bob
	  o Chalk/string line
	  o Straight edges and squares
	  o Protractor
	  o Squares
	  o T bevel square

2. Use layout and measuring equipment	• Purpose • Types and sizes • Parts • Operation • Accessories • Laser safety o Adjustments
3. Maintain layout and measuring equipment	• Storage • Inspection • Maintenance procedures • Manufaturer's specifications

Achievement Criteria

Performance	The learner will use layout and measuring equipment to determine, communicate and draft accurate flashing, glass, and metal profiles.
Conditions	The learner will be given: • Layout and measuring equipment • Instructions • Safety protocols • Materials
Criteria	The learner will be evaluated on: • Proper set-up • Handling equipment • Measurement accuracy • Understanding and following instructions • Transfer of accurate measurements and angles

Line (GAC): C USE TOOLS AND EQUIPMENT

Competency: C5 Use ladders and scaffolds

Objectives

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

- Use ladders and scaffolds

LEARNING TASKS	CONTENT

1. Describe ladders and scaffolds	• Ladders
	  o Extension
	  o Step
	  o Ladder jacks
	• Scaffolds
	  o Tower
	  o Outriggers
	  o Baker
	  o Frame
	  o Sectional
	  o Tubular
	  o Hung
	• Uses
	• Parts
	• Safety
	• Fall arrest equipment
	• Hazard recognition
	• Government regulations

2. Use ladders and scaffolds	• Selection • Operating procedures • Limitations • Securing • Inspection • Maintenance • Storage

Achievement Criteria

Performance	The learner will erect tower scaffold.
Conditions	The learner will be given: • Scaffolding components • Fall protection if required
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Inspection procedure followed • Ladders aligned • Safety pins installed • Cross brace properly installed • Locked wheels • Layout according to site conditions and public safety (control zone)

Line (GAC): C USE TOOLS AND EQUIPMENT

Competency: C6 Use rigging and hoisting equipment

Objectives

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

- Describe hoisting, rigging, and lifting principles and equipment
- Tie knots, bends and hitches

LEARNING TASKS	CONTENT
1. Describe the principles of lifting and hoisting	• Mechanical advantage • Balance point
2. Describe hoisting, lifting, and rigging equipment	• Lifting and Hoisting o Power cups o Cranes o Boom trucks o Engine hoist (Cherry Pick) o Loaders o Turfers o Come-alongs o Tuggers o Chain falls • Accessories
3. Describe lifting and hoisting communication	• Purpose of proper communication • Types o Hand signals o Communication with the operator o Communication with others
4. Tie knots, bends, and hitches	• Types o Half hitch o Clove hitch o Figure of eight o Bowline o Trucker's hitch • Purposes • Limitations

Achievement Criteria

Performance	The learner will tie the appropriate knot for a given application: • Half hitch • Clove hitch • Figure of eight • Bowline • Trucker's hitch
Conditions	The learner will be given: • Rope • Instructions
Criteria	The learner will be evaluated on: • Properly tied knots • Appropriate knot for given application

Line (GAC): C USE TOOLS AND EQUIPMENT

Competency: C7 Operate mobile access equipment

Objectives

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

- Operate mobile access equipment

LEARNING TASKS	CONTENT
1. Describe mobile access equipment	• Aerial work platforms o Boom and scissor lifts • Swing stage • Permanent • Portable • Engineered • Hydromobile work platform • Man basket • Bosun's chair • Uses • Parts • Safety • Fall arrest equipment • Hazard recognition • Government regulations • Manufacturers' specifications *Some of the above equipment requires certification to operate*
2. Operate mobile access equipment	• Selection • Operating procedures • Limitations • Securing • Inspection • Maintenance • Storage

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D1 Fabricate storefront systems

Objectives

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

- Describe storefront profiles
- Describe fastener and screw types
- Describe doors and pivot systems
- Fabricate basic storefront

LEARNING TASKS	CONTENT
1. Describe storefront profiles	• Single glaze • Double glaze • Thermally-broken and non-thermally-broken • Aluminium finishes

2. Describe fasteners, screws, and plugs	• Fasteners
	  o Sheet metal
	  o Machine
	  o Nuts and bolts
	  o Pop rivets
	  o Rivnuts
	• Composition
	  o Stainless
	  o Plated
	  o Nickel cadmium
	  o Aluminum

3. Describe doors and pivot systems	• Single glazed • Double glazed • Glass doors • Sliders • Types of pivots o Offset, butt, continuous hinge, centre hung
4. Fabricate basic storefront	• Shear block or screw spline assembly • Setting block location • Glazing and vinyling

Achievement Criteria

Performance	The learner will screw assemble a small frame.
Conditions	The learner will be given: • Instructions • Materials • Tools
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Overall size • Installation of interior vinyl. • Proper joints • Overall aesthetics

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D2 Fabricate window systems

Objectives

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

- Describe layout for fabrication of commercial window systems
- Describe fabrication of commercial window systems

LEARNING TASKS	CONTENT

1. Describe commercial window systems	• Types of window systems
	  o Strip
	  o Punched opening
	• Types of operable windows
	  o Casement
	  o Awning
	  o Hopper
	  o Tilt turn
	• Components
	  o Spigots
	  o Screw spline
	  o Hardware
	  o Glazing

2. Describe layout for fabrication of commercial window systems	• Confirm rough openings, daylight openings and frame sizes according to site conditions and drawings • Layout fabrication holes

3. Describe fabrication of commercial window systems and vent installations	• Types of sealants
	• Types of finish
	• Types of fasteners
	• Air seals/rainscreen
	• Glazing thickness
	• Thermal breaks
	• Part and component fabrication
	  o Proper milling and stops
	• Assembly techniques for window systems
	• Assembly of components
	  o Jambs, headers and sills
	  o Sealing joints at head and sill and intermediate horizontals
	  o Tapes and gaskets
	  o Setting blocks
	• Material protection

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D7 Perform glass cutting and edge treatment

Objectives

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

- Describe composition of glass
- Describe the types of glass
- Describe specialty tools and cutting equipment
- Apply basic glass cutting
- Perform basic glass edge treatment procedures

LEARNING TASKS	CONTENT
1. Describe composition of glass	• History of glass • Properties • Glass ingredients • Evolution of glass
2. Describe the types of glass	• Float • Laminate • Tempered • Heat-strengthened • GPW • Sealed units • Mirror • Glass coatings • Obscure pattern glass
3. Describe specialty tools and cutting equipment	• Glass cutters • Pliers • Cutting tables • Squares • Circle cutters • Hole cutters • Notching saw • Belt sander • Methyl hydrates • Water jet

4. Apply basic glass cutting theory	• Measuring
	• Straight edges and squares
	• Cutters (sharp and dull)
	• Completing cuts
	  o Pressure points
	  o Running
	  o Snapping
	• Storage and disposal of cut offs

5. Perform basic glass edge treatment procedures	• Arrissing • Grinding and polishing • Bevels • Corners

Achievement Criteria

Performance	The learner will cut glass to a specified size.
Conditions	The learner will be given: • Materials • Tools • Instruction
Criteria	The learner will be evaluated on: • Correct size (+/- 1/16 in.) • Hand arriss

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E1 Install storefront systems

Objectives

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

- Install basic storefront

LEARNING TASKS	CONTENT
1. Prepare rough opening	• Plumb level square • Membranes • L-angle installation
2. Install flashing	• End damns • Drips • High performance • Sealants • Fasteners
3. Install framing	• Shims • Fasteners • Backing plates
4. Glaze frames	• Gaskets • Setting block • Glass • Stops
5. Finish frames	• Backer rod • Insulation • Sealant

Achievement Criteria

Performance	The learner will install and glaze a small frame.
Conditions	The learner will be given: • Instructions • Materials • Tools
Criteria	The learner will be evaluated on: • Plumb • Level • Setting block procedures • Overall aesthetics • Caulking joints • Exterior vinyl installation

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E2 Install strip window systems

Objectives

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

- Describe commercial strip window system installation

LEARNING TASKS	CONTENT

1. Describe installation of commercial strip window systems	• Weather seal membranes
	• Flashing installations
	• Deflection channel and internal angles
	• Assembly methods
	  o Pre-glazed
	  o Sight-glazed
	• Installation procedures
	  o Dividing caulking clearances
	  o Expansion joints
	  o Installing setting blocks
	  o Securing window systems
	  o Installation of on-site glazing
	  o Modifying windows in final locations
	  o Insulating and seal frames
	  o Verifying operation of windows
	  o Rainscreen system
	• Installation of preassembled structures

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E3 Install curtain walls

Objectives

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

- Describe curtain wall installation
- Prepare curtain wall
- Glaze curtain wall
- Finish curtain wall

LEARNING TASKS	CONTENT
1. Describe curtain wall installation	• Two and Four sided SSG • Stick built • Unitized • Split mullion • Fastening systems • Toggle system
2. Prepare curtain wall	• Tapes • Gaskets • Toe beads • Angles • Flashing and membranes • Corner blocking and sealants
3. Glaze curtain wall	• Glass installation • Setting blocks • Temporaries (Dutchmen)
4. Finish curtain wall	• Vertical pressure plate installation • Horizontal pressure plate installation (clearance tolerances) • Sealants • Beauty cap • Anti-Rotation

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E7 Install building envelope membranes

Objectives

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

- Describe preparation of materials for installation
- Describe procedures for installing building envelope membranes
- Install building envelope membranes

LEARNING TASKS	CONTENT
1. Describe the purpose and applications of membranes	• Water and air seal o Permeable / non-permeable

2. Describe preparation of materials for installation	• Types of materials
	• Application of materials
	• Selection and use of appropriate tools and equipment
	• Preparation methods for specific materials
	• General preparation of materials
	  o Cleaning
	  o Measuring
	  o Priming
	  o Corner sealing and lapping
	  o Sizes

3. Describe compatibilities of membranes and sealants	• Peel and stick o Permeable / non-permeable • Specifications of compatibility of adjoining membranes and sealants
4. Describe types of substrates	• Metal • Concrete • Wood • Fibre board
5. Describe rain screen principles	• Airtight seal to the interior • Rain barrier weeped to the exterior • Pressure equalization • Pressure differential

LEARNING TASKS

6. Install building envelope membranes

CONTENT

- Tools and equipment
- Materials
  - Fasteners, sealants and primers
  - Product compatibility
  - Manufacturer recommendations
- Installation sequencing of membranes for watershed
- Laying down of membrane
- Install building envelope membranes according to job specifications

Achievement Criteria

Performance — The learner will measure and apply primer and membrane to specifications.

Conditions — The learner will be given:

- Instructions
- Materials
- Tools

Criteria — The learner will be evaluated on:

- Priming
- Lapping coordination (3 in. minimum)
- Shingling
- Adhesion
- Neatness of finish/aesthetics
- Sealant application

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E9 Use caulking and sealants

Objectives

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

- Describe types of sealants and shims

LEARNING TASKS	CONTENT

1. Describe types of sealants	• Classification
	  o High performance
	  o Medium performance
	  o Low performance
	  o Structural
	• Types
	  o Silicone
	  o Oil base
	  o Butyl
	  o Polysulfide
	  o Urethane
	  – One part
	  – Two part
	• Primer
	• Tapes
	• Caulking
	• Gaskets

2. Describe tapes and shims	• Butyl tape • Pre-shim tape • Foam tape • Sponge gaskets • Dense wedge gaskets • Shims

3. Describe backup materials	• Types
	  o Closed-cell polyethylene rod
	  o Open-cell polyethylene rod
	  o Bond breakers
	• Procedures for application
	  o Size
	  o Parallel joint faces
	  o Width-to-depth ratio

Line (GAC): F INSTALL RESIDENTIAL SYSTEMS

Competency: F4 Install shower enclosures, mirrors, and back-painted glass

Objectives

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

- Describe preparation and installation for mirrors and back-painted glass

LEARNING TASKS	CONTENT
1. Describe wall preparation for mirrors and back-painted glass	• Measuring wall • Measuring out of square • Clearance tolerances • Wall plane • Confirmation of surface preparation
2. Describe installation of mirrors and back-painted glass	• Sealants and adhesives compatibility • Safety backing • Vancouver clips/J-molding • Mirror trims • Cut-outs • Edge grips • Standoffs • Butt joint blackout/shadowline • Fasteners • Attachment to wall

Level 2

Glazier

Line (GAC): B ORGANIZE WORK

Competency: B1 Interpret drawings and specifications

Objectives

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

- Identify symbols and abbreviations
- Interpret shop and fabrication drawings
- Describe door and window schedules
- Use a drawing to prepare a material list

LEARNING TASKS	CONTENT
1. Identify symbols and abbreviations	• Legend • Symbols • Abbreviations • Cross Sections • Details • Language of Lines • Grid Lines • Specifications
2. Interpret shop and fabrication drawings	• Glazing-specific • Sizes and dimensions • Flashings and fasteners
3. Describe door and window schedules	• Metal type and finish • Handing • Hardware • Glass type and use
4. Use a drawing to prepare a simple material list	• Quantities (caulking, vinyls, metal) • Overall dimensions • Optimizing • Glass sizes

Achievement Criteria

Performance	The learner will interpret a table of contents and convey information on a blueprint.
Conditions	The learner will be given: • Blueprint(s) (shop or architectural) • Instructions and tasks • Tools
Criteria	The learner will be evaluated on: • Gridlines • Quantities • Locations • Details • Sizes and Dimensions • Specifications

Line (GAC): B ORGANIZE WORK

Competency: B4 Apply trade math

Objectives

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

- Solve geometric problems
- Solve problems using trigonometry
- Use math to optimize materials for specific framing

LEARNING TASKS	CONTENT

1. Solve geometric problems	• Area
	• Perimeter
	• Volume
	• Angles
	• Arc
	• Radius and diameter
	• Formulas for area of
	  o Squares and rectangles
	  o Triangles
	  o Parallelogram
	  o Trapezoid
	  o Circle
	  o Sector
	  o Segment
	  o Other relevant geometric shapes
	  o Simplify fractions

2. Solve problems using trigonometry	• Pythagorean theorem • Sine • Cosine • Tangent

3. Use math to optimize materials for specific framing	• Glass
	• Metal
	• Miscellaneous related materials
	  o Tapes
	  o Gaskets
	  o Sealants

Achievement Criteria

Performance	The learner will determine frame sizes, glass sizes and site dimensions.
Conditions	The learner will be given: • Calculator • Instructions and tasks • Framing specifications • Tools
Criteria	The learner will be evaluated on: • Glass sizes • Framing sizes • Calculations

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D1 Fabricate storefront systems

Objectives

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

- Fabricate door frame and sidelites
- Prepare frame for closers, butt hinges, and hardware
- Perform routering and lock cut-outs
- Fabricate jigs
- Fabricate headers for concealed overhead closers
- Install panic hardware

LEARNING TASKS	CONTENT
1. Fabricate door frame and sidelites	• Screw spline assembling • Setting block applications • Glazing and vinyling • Presses and jigs • Assembly of storefront frame • Installation of offset pivot
2. Prepare frame for closers, butt hinges, and hardware	• Surface mounted closers • Butt hinge cutouts • Layout and installation of cut-outs • Installation of backing plates • Installation of butt hinges • Installation of doors and adjustments
3. Perform routering and lock cut-outs	• Router safety and lubrication • Lock layout • Lock cut-outs using routers
4. Describe jigs	• Types
5. Fabricate jigs	• Screw spline and shear block • Concealed overhead closer • Butt hinge
6. Fabricate headers for concealed overhead closers	• Choice of metal • Layout and installation of cut-out • Installation of closer
7. Install panic hardware	• Layout and installation of panics • Adjustment of panics and flush bolt

Achievement Criteria

Performance	The learner will perform door and sidelite fabrication.
Conditions	The learner will be given: • Tools • Instructions and drawings • Materials
Criteria	The learner will be evaluated on: • Accuracy of frame and door opening size, lock cut-out • Overall aesthetics (no scratches) • Hardware preparation • Door stop installation

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D2 Fabricate window systems

Objectives

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

- Layout for fabrication of commercial window systems
- Fabricate commercial window systems

LEARNING TASKS	CONTENT

1. Describe commercial window systems	• Types of window systems
	  o Strip
	  o Punched opening
	• Types of operable windows
	  o Casement
	  o Awning
	  o Hopper
	  o Tilt turn
	• Components
	  o Spigots
	  o Screw spline
	  o Hardware
	  o Glazing

2. Layout for fabrication of commercial window systems	• Confirm rough openings, daylight openings and frame sizes according to site conditions and drawings • Layout fabrication holes

3. Fabricate commercial window systems and vent installations	• Types of sealants
	• Types of finish
	• Types of fasteners
	• Air seals/rainscreen
	• Glazing thickness
	• Thermal breaks
	• Part and component fabrication
	  o Proper milling and stops
	• Assembly techniques for window systems
	• Assembly of components
	  o Jambs, headers and sills
	  o Sealing joints at head and sill and intermediate horizontals
	  o Tapes and gaskets
	  o Setting blocks
	• Material protection

Achievement Criteria

Performance	The learner will fabricate a strip window assembly.
Conditions	The learner will be given: • Tools • Instructions and drawings • Materials
Criteria	The learner will be evaluated on: • Fabricate to industry standards (1/16 in) • Proper joint sealing • Proper taping, vinyling and heel and toe bead procedures • Air seal • Weep holes • Fabricate for rain screen

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D3 Fabricate curtain walls

Objectives

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

- Fabricate curtain walls

LEARNING TASKS	CONTENT
1. Plan fabrication requirements	• Fabrication sheets • Manufacturer's specifications related to expansion and contraction • As built drawings • Tool selection • Sequence • Organize work area • Material quantity determination and optimization • Quality control • Steel and fastening requirements • Isolation of dissimilar metals
2. Fabricate curtain walls	• Cutting and milling • Labelling material for framing positioning • Layout and spigot drilling • Fabrication process o Cutting curtain wall parts and components from stock length and prefabricated materials. o Spigot application o Assembling and sealing components o Squaring frames o Prepare components for wind load/dead load anchors o Notching head and sill nosings for blue skin application o Thermal breaks o Types of sealants, gaskets and tapes

Achievement Criteria

Performance	The learner will fabricate a curtain wall frame.
Conditions	The learner will be given: • Tools • Instructions and drawings • Materials
Criteria	The learner will be evaluated on: • Fabricate to industry standards (1/16 in.) • Proper joint sealing • Proper taping, vinyling procedures • Thermal breaks • Preparation of pressure plate and cover cap

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D5 Fabricate commercial entrance systems

Objectives

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

- Describe the types and applications of different commercial entrance systems
- Describe the parts required for fabricating commercial entrance systems
- Fabricate entrance systems

LEARNING TASKS	CONTENT

1. Describe the different types and applications of commercial entrance systems	• Types of entrance systems
	  o Swing
	  ▪ Single/double
	  ▪ Centre balance
	  o Sliding
	  o Portals
	  o Vestibule
	• Auto headers
	• Sliding doors
	  o Pocket doors

2. Describe the parts required for fabricating commercial entrance systems	• Parts
	  o Types of hardware
	  o Types of framing material
	  – Flush glaze
	• Compatibility and performance for types of specified hardware for aluminum doors
	• Creating and using templates to prepare doors for hardware
	• Assembly of components
	  o Handles
	  o Closers
	  o Thresholds
	  o Flush
	  o Bolts
	  o Locksets
	• Assembly of entrances
	  o Fastening entrance system components
	• Finger guards
	• Kick plate
	• Thresholds

3. Fabricate entrance systems	• Fabrication and preparation of frames

LEARNING TASKS	CONTENT
	• Lock preparation • Floor mounted pivots • Power transfer hinges • Overhead door stops

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D6 Fabricate guardrail, handrail, and balustrade systems

Objectives

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

- Describe the fabrication of guardrail, handrail and balustrade systems

LEARNING TASKS	CONTENT
1. Describe guardrail, handrail, and balustrade systems	• Channel / Base Shoe • Stanchions • Face Mount

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D7 Perform glass cutting and edge treatment

Objectives

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

- Cut different types of glass
- Describe and install sealed units
- Use specialty tools and cutting equipment
- Perform edge treatment procedures

LEARNING TASKS	CONTENT
1. Describe sealed units	• Low-E coatings • High-performance • Spacer bars / Descecants • Laminated • Triple and quad glazed • Gases • Breather tubes • Heat mirror

2. Cut different types of glass	• Float
	• Laminate
	• GPW
	• Mirror
	  o Obscure pattern glass
	  o Specialty glasses

3. Use specialty tools and cutting equipment	• Glass cutters • Pliers • Cutting tables • Squares • Arrissing sander • Belt sanders • Methylhydrates • Hole saw • Notching saw • Diamond saw • Tube drills • Spear points • Routers • Circle cutter

LEARNING TASKS	CONTENT
4. Perform edge treatments	• Arrissing • Grinding • Polishing

Achievement Criteria

Performance	The learner will cut glass to specifications.
Conditions	The learner will be given: • Instructions • Material • Tools and PPE
Criteria	The learner will be evaluated on: • Accuracy to 1/32 in. • Proper edge treatment

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E1 Install storefront systems

Objectives

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

- Install door and sidelite framing
- Install door and glazing
- Perform door adjustment
- Finish frame

LEARNING TASKS	CONTENT
1. Install door and sidelite framing	• Flashing • Glaze door (letter slot) • Hardware installation • Plumbing, levelling and squaring • Load door
2. Install glazing to sidelite	• Gaskets • Setting blocks • Glass • Stops
3. Perform door adjustment	• Door clearance adjustment • Closure adjustment • Lock and key adjustment
4. Finish frames	• Backer rod • Insulation • Sealant

Achievement Criteria

Performance	The learner will perform door and sidelite installation.
Conditions	The learner will be given: • Tools and PPE • Materials • Instructions and drawings
Criteria	The learner will be evaluated on: • Plumb • Level • Square • Lock installation and function • Overall aesthetics (no scratches) • Hardware adjustment and installation

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E2 Install strip window systems

Objectives

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

- Layout commercial window systems for installation
- Install commercial window systems

LEARNING TASKS	CONTENT
1. Layout commercial window systems for installation	• Confirm location of roof and wall structural members • Confirm location of benchmarks, gridlines and datum points • Layout of anchoring systems • Transferring lines from floor to ceiling and roof • Confirm opening sizes on site

2. Install commercial window systems	• Weather seal membranes
	• Flashing installations
	• Deflection channel and internal angles
	• Assembly methods
	  o Pre-glazed
	  o Sight-glazed
	• Installation procedures
	  o Dividing caulking clearances
	  o Expansion joints
	  o Installing setting blocks
	  o Securing window systems
	  o Installing on-site glazing
	  o Modifying windows in final locations
	  o Insulating and seal frames
	  o Verifying operation of windows
	• Installation of preassembled structures

Achievement Criteria

Performance	The learner will describe, mill, assemble and glaze a window frame.
Conditions	The learner will be given: • Tools and PPE • Materials • Instructions and drawings
Criteria	The learner will be evaluated on: • Install, plumb, level, square to (1/16 in.) • Stop installation • Air seal • Taping, vinyling and heel and toe bead procedures

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E3 Install curtain walls

Objectives

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

- Install curtain walls
- Glaze curtain walls

LEARNING TASKS	CONTENT

1. Install curtain walls	• Shop and architectural drawings
	• Layout
	• Installation of anchors at proper locations
	• Expansion joints
	• Installation process
	  o Starter track and welded anchors according to layouts
	  o Level and plumb and align frames
	  o Corner blocks for stick built systems
	  o Blue skin applications
	  o Air and vapour barriers
	  o Metal back pans, glazing adapters, insulation corner blocks and glazing gaskets
	  o Bulb vinyl for ventilation escape
	  o Pressure plate equalizing adaptors
	  o Secondary sealing of corner blocks at vertical pressure plate
	• Operable windows

2. Glaze curtain walls	• Glazing process
	  o Setting blocks
	  o Heel bead corners
	  o Install glass
	  o Temporary Dutchman
	  o Secondary flashings
	  o Vertical pressure plate
	  o Horizontal pressure plate
	  o Horizontal pressure plate after applying vertical caps
	• Frames, glass, caps and sealants
	• SSG requirements

Achievement Criteria

Performance The learner will install and glaze a curtain wall frame.

Conditions — The learner will be given:

- Tools and PPE
- Instructions and drawings
- Materials

Criteria — The learner will be evaluated on:

- Install, plumb, level, square to (1/16 in.)
- Joint sealing
- L Angle installation
- Corner block installation
- Membrane installation
- Taping, vinyling procedures
- Toe bead
- Install and seal pressure plate
- Install cover cap
- Glass installation
- Setting block installation

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E6 Install guardrail, handrail, and balustrade systems

Objectives

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

- Describe layout and installation of guardrail, handrail, and balustrade systems

LEARNING TASKS	CONTENT
1. Describe layout and installation of guardrail, handrail, and balustrade systems	• Channel / Base Shoe • Stanchions • Face Mount • Confirm finished floor elevations, sizes according to site conditions and drawings • Installing glass support systems • Verify size and shape of glass • Setting and alignment of glass • Apply final finishes

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E8 Install flashing

Objectives

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

- Describe types of flashing
- Describe shear and break flashing
- Describe the purpose of flashing
- Describe installation considerations
- Install flashing

LEARNING TASKS	CONTENT

1. Describe types of flashing material	• Types
	  o Aluminum
	  o Galvanized steel
	  o Bituminous
	  o Painted steel
	• Thicknesses

2. Select types of flashing	• Types
	  o Head
	  o Sill and parapet
	  o Corner
	  o Column
	  o Splice
	  o Counter

3. Describe purpose of flashing	• Prevention of water entry • Protection for membrane • Continuity of framing • Finishing
4. Describe installation considerations	• Overlap requirements • Seam requirements • Expansion and contraction allowances • Sealant location • Slope and drainage requirements • Plumbing and levelling • Heel beading • Bedding bead • Fastener selection

LEARNING TASKS

5. Install flashing

CONTENT

- Tool selection
  - Snips
  - Rivet gun
  - Combination square
  - Duck bill pliers
  - Power shears
- Procedures
  - Measurement
  - Layout
  - Shear and break
  - Dry fit
  - Fastening
  - Sealing
- Install flashing according to job specifications

Achievement Criteria

Performance	The learner will form and install flashing.
Conditions	The learner will be given: • Instructions and drawings • Material • Tools and PPE
Criteria	The learner will be evaluated on: • Accuracy • Aesthetics • Functionality • Positive slope • Angles • End dams • End caps • Splice joints

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E9 Use caulking and sealants

Objectives

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

- Describe mixing procedures
- Describe sealing methods
- Apply caulking and sealants

LEARNING TASKS	CONTENT

1. Select sealants	• Factors to consider
	  o Movement potential
	  o Adhesion
	  o Weathering
	  o Compatibility with substrate
	  o Structural

2. Describe mixing procedures	• Three-part caulking • Base • Hardener • Colour pack • Follow plate
3. Describe sealing methods	• Dry • Wet • Wet/dry • Dry/dry

4. Apply sealant	• Surface preparation
	  o Priming and cleaning
	• Substrate considerations
	  o Wood
	  o Concrete
	  o Metal
	  o Glass
	• Structural silicone joints
	• Joint design/dimensions
	  o Joint preparation
	• Personal protection equipment
	  o Gloves
	  o Respirator
	  o Eye protection
	• Tools
	• Loading the bulk gun
	  o Applying
	• Cleaning

Achievement Criteria

Performance	The learner will caulk a vertical caulking bead and a silicone butt joint.
Conditions	The learner will be given: • Tools and PPE • Material • Instructions and drawings
Criteria	The learner will be evaluated on: • Joint configuration and preparation • Backer rod or bond breaker installation • Tooling • Masking off • Caulking application • Aesthetics and clean-up

Line (GAC): F INSTALL RESIDENTIAL SYSTEMS

Competency: F1 Layout residential window and door systems

Objectives

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

- Layout window and door systems

LEARNING TASKS	CONTENT

1. Describe types of door and window systems	• Vinyl / PVC
	• Wood / Aluminum Clad
	• Aluminum
	• Composite
	• Steel framed doors
	• Frame Types
	  o Equal leg
	  o Nail on flange
	  o Rebate / Brickmold

2. Layout window and door systems	• Determine rough opening
	• Inside heel dimension
	• Wall thickness
	• Liner depth
	• Determine door handing
	• Determine operable window type
	  o Slider
	  o Awning
	  o Hopper
	  o Casement
	  o Tilt and Turn
	  o Fixed

Line (GAC): F INSTALL RESIDENTIAL SYSTEMS

Competency: F2 Glaze residential windows and doors

Objectives

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

- Describe replacing broken glass
- Describe upgrading existing windows

LEARNING TASKS	CONTENT

1. Describe the different types of residential windows and doors	• Nail-on flange
	• Equal leg
	• Rebate
	  o Tilt and turn
	• Aluminum, PVC, wood, and fibreglass
	• Doors
	  o French, sliding, and double
	  o Mouldings and trim

2. Describe measurement of residential windows	• Inside heel dimension • Exterior rebate o 3/4" and 2” • Shimming and clearance tolerances • Hinging, sliding and fixed abbreviations
3. Describe replacing broken glass	• Removal of broken glass • Measuring of replacement glass • Glass thicknesses • Types of residential stops
4. Describe upgrading of existing windows	• Removing window systems • Installation of new window systems • Installation of trims and mouldings • Sealants and vapour barrier considerations • Caulkings and flashings

Line (GAC): F INSTALL RESIDENTIAL SYSTEMS

Competency: F4 Install shower enclosures, mirrors, and back-painted glass

Objectives

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

- Measure for mirrors and back-painted glass
- Install mirrors and back-painted glass

LEARNING TASKS	CONTENT
1. Prepare wall for mirrors and back-painted glass	• Measuring wall • Measuring out of square • Clearance tolerances • Wall plane • Confirmation of surface preparation
2. Describe installation of mirrors and back-painted glass	• Sealants and adhesives • Vancouver clips • Mirror trims • Cut-outs • Edge grips • Standoffs
3. Install mirror and back-painted glass	• Adhesive and sealant compatibility • Safety backing • Butt joint blackout/shadowline • Fasteners • Attachment to wall

Achievement Criteria

Performance: The learner will create a drawing and cut and install a mirror.

Conditions: The learner will be given:

- Tools and PPE
- Material
- Instructions and drawings

Criteria: The learner will be evaluated on:

- Layout
- Size
- Cut out
- Edgework
- Position of clips or anchors
- Drawing

Line (GAC): F INSTALL RESIDENTIAL SYSTEMS

Competency: F6 Install residential windows, doors, frames, and hardware

Objectives

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

- Layout residential windows, doors, frames and hardware for installation
- Install residential windows, doors, frames and hardware

LEARNING TASKS	CONTENT
1. Layout residential windows, doors, frames, and hardware for installation	• Confirm opening sizes • Fastening requirements
2. Install residential windows, doors, frames, and hardware	• Windows / Doors o Primary Membrane o Install window o Shingle secondary membrane o Flashing o Insulate interior cavity o Interior liners and casings o Caulking

Line (GAC): G INSTALL SPECIALTY GLASS AND PRODUCTS

Competency: G1 Layout specialty glass and products

Objectives

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

- Describe applications of specialty glass and products
- Describe specialty product materials

LEARNING TASKS	CONTENT
1. Describe applications of specialty products	• Pass-through windows • Spider glass walls • Sun shades • Demountable partition • Smoke baffle • Display cases • Glass floors • Bullet-resistant glass

2. Describe specialty product materials	• Types
	  o Plastic
	  o Wood
	  o Vinyl
	  o Aluminum
	  o Stainless steel
	  o Lead
	• Characteristics
	• Properties
	• Applications

3. Describe applications of specialty glass and products	• Multi-laminate • Pattern • Mirrors • Fireproof • Heat-treated (fire-resistant) • High performance coatings • Reflective • Low E (low emissivity) • Insulated units

Line (GAC): H SERVICE GLAZING SYSTEMS

Competency: H2 Service residential window and door systems

Objectives

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

- Describe servicing broken and failed glass
- Describe servicing doors and hardware
- Describe servicing damaged framing components

LEARNING TASKS	CONTENT
1. Describe servicing broken and failed glass	• Type, colour, or coating of glass • Safety concerns • Measure replacement glass • Protection of surrounding areas • Removal and disposal • Installation and clean up
2. Describe servicing doors and vents	• Problem identification • Manufacturer • Accessibility considerations • Replacement parts • Adjustment and verification of function with the customer • Slides, guides, and wheels • Adjustment of operable hardware
3. Describe replacing hinges	• Part identification • Lubrication • Clearances and adjustments • Shimming • Fastening door hinges to frame • Door and window blocking
4. Describe servicing or replacing locks	• Type and manufacturer • Components • Confirmation of problem • Removal/replacement • Lubrication and clearances • Adjustment and verification of function with the customer

LEARNING TASKS	CONTENT
5. Describe replacing damaged components	• Confirmation of damage and the extent of the repair necessary with the customer • Identification of part manufacturer and colour • Duplicate flashing profiles and colour • Tools, jigs, metal, and fasteners • Removal, repair, flash, and caulk • Fastening to existing substrate • Glass installation and clean up • Verification of repair with the customer

Level 3

Glazier

Line (GAC): B ORGANIZE WORK

Competency: B1 Interpret drawings and specifications

Objectives

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

- Interpret architectural drawings and specifications
- Use door and window schedules
- Use a drawing to prepare a complex material list

LEARNING TASKS	CONTENT
1. Interpret architectural drawings and specifications to confirm shop and fabrication drawings	• Glazing specifications • Sizes and dimensions
2. Use door and window schedules	• Metal type and finish • Handing • Hardware • Glass type and use
3. Use a drawing to prepare a complex material list	• Quantities (caulking, vinyls, metal) • Overall dimensions • Optimizing • Glass sizes

Achievement Criteria

Performance	The learner will use architectural drawings to create quantity lists, shop drawings, and solve installation problems.
Conditions	The learner will be given: • Instructions and drawings • Tools
Criteria	The learner will be evaluated on: • Accuracy of quantity lists • Material requirements • Find locations in relation to grids and benchmarks • Interpret details • Confirm information

Line (GAC): B ORGANIZE WORK

Competency: B2 Use codes, regulations, and standards

Objectives

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

- Identify organizations responsible for codes, regulations, and standards
- Apply codes, regulations, standards, and engineering requirements

LEARNING TASKS	CONTENT
1. Identify organizations responsible for codes, regulations, and standards	• National Fire Protection Association (NFPA) • National Building Code and British Columbia Building Code (NBC and BCBC) • Municipal Bylaws • Canadian Standards Association (CSA) • Underwriters Laboratories of Canada (ULC)
2. Describe how codes, regulations, and standards affect the Glazier trade	• Material selection • Construction and installation methods • Design characteristics
3. Interpret and apply codes, regulations, standards, and engineering requirements	• Door lights • Skylights and canopies • Side lights • Guardrails and balustrade • Office divisional to floor • Fire-rated glass • Smoke baffles

Line (GAC): B ORGANIZE WORK

Competency: B3 Apply manufacturer and supplier documentation

Objectives

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

- Apply manufacturer and supplier documentation

LEARNING TASKS	CONTENT
1. Interpret manufacturer and supplier documentation	• Tool and equipment documentation • System component documentation • Proprietary product documentation • Certification agencies • Installation instructions and requirements • Operation and maintenance manuals • Product specifications • Warranty information
2. Apply manufacturer and supplier documentation for installation purposes	• Hardware • Windows • Doors • Skylights • Curtain walls • Point fixed • Guard rails, hand rails, and balustrade • Specialty glazing • Operable vents • Automotive

Line (GAC): B ORGANIZE WORK

Competency: B4 Apply trade math

Objectives

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

- Calculate material quantities
- Use math to optimize materials for entire project

LEARNING TASKS	CONTENT
1. Calculate material quantities	• Material list

2. Use math to optimize materials for entire project	• Glass
	• Metal
	• Miscellaneous related materials
	  o Tapes
	  o Gaskets
	  o Sealants

Line (GAC): B ORGANIZE WORK

Competency: B5 Plan sequence of work

Objectives

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

- Assess specific job requirements
- Prepare tool and material list
- Determine building envelope specifications
- Copy a fabrication list
- Determine installation priorities

LEARNING TASKS	CONTENT
1. Assess specific job requirements	• Blueprints detail analysis • Safety requirements
2. Prepare tool and material list	• Primers and membranes • Caulking and cleaners • Fastener specifications • Flashing specifications • Ladders and elevated platforms • Job-specific tools • Personal tools
3. Determine building envelope specifications	• Drawing details • Coordination with general contractor o Coordinate with building envelop specialist
4. Coordinate with the fabricating department	• Copy a fabrication list o Acquire fabrication drawings and cutting lists o Identify available pre-fabricated materials o Jigs and fabricating screws
5. Determine installation priorities	• Coordination with general contractor • Review installation details • Review shop drawing • Coordinate access of job site • Confirm rough openings and frame sizes

Line (GAC): B ORGANIZE WORK

Competency: B7 Communicate with others

Objectives

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

- Lead toolbox meeting
- Coordinate work with other trades
- Participate in site-specific JOHS meeting
- Communicate with engineers and architects
- Communicate with clients
- Describe mentorship

LEARNING TASKS	CONTENT
1. Use advanced trade terminology	• Systems • Materials • Tools • Techniques
2. Lead toolbox meetings	• Roles and responsibilities • Topics • Safety updates
3. Participate in site-specific JOHS meeting	• Roles and responsiblities
4. Communicate with engineers and architects	• Roles and responsibilities • Understanding audience • Generational differences • Applying discretion • Specifications
5. Communicate with clients	• Understanding audience • Generational differences • Applying discretion • Company representation
6. Describe mentorship	• Roles and responsibilities

Line (GAC): C USE TOOLS AND EQUIPMENT

Competency: C4 Use layout and measuring equipment

Objectives

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

- Perform on site measuring off gridlines and benchmarks
- Layout of radius frame
- Transpose rough openings (ROs), frame sizes, and flashing to drawings

LEARNING TASKS	CONTENT
1. Describe advanced layout tools	• Total station and data collectors • 3D scanners
2. Perform on site measuring off gridlines and benchmarks	• Interpretation of architectural drawings o Frame locations • Laser and level equipment
3. Layout of radius frame	• Interpretation of shop drawings • Application of geometry and trigonometry
4. Transpose RO's, frame sizes, and flashing to drawings	• Mathematical proficiency • Clearance tolerances

Achievement Criteria

Performance	The learner will perform: • Differential levelling • Layout of angles • Setting up of instrumentation
Conditions	The learner will be given: • Instructions and drawings • Tools and PPE • Materials
Criteria	The learner will be evaluated on the accuracy of: • Measurement • Layout • Trigonometry

Line (GAC): C USE TOOLS AND EQUIPMENT

Competency: C6 Use rigging and hoisting equipment

Objectives

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

- Use rigging, hoisting, and lifting equipment

LEARNING TASKS	CONTENT

1. Use rigging, hoisting, and lifting equipment	• Equipment
	  o Power cups
	  o Engine hoist (Cherry Pick)
	  o Turfers
	  o Come-alongs
	  o Chain falls
	• Accessories
	• Safety
	• Certification requirements
	• Estimation of weights
	• Equipment capacities
	• Equipment selection
	• Lifting location
	• Operating procedures
	• Securing of loads
	• Equipment inspection
	• Equipment maintenance
	• Equipment storage
	• Removal from service

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D3 Fabricate curtain walls

Objectives

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

- Describe curtain wall types and components
- Describe curtain wall fabrication
- Describe anchor systems

LEARNING TASKS	CONTENT

1. Describe curtain wall	• Curtain wall components
	  o Pressure plate
	  o SSG
	  o Vertical and horizontal mullion
	  o Slip brackets
	  o Static and non-static anchors
	  o Beauty caps
	  o Corner mullions
	  o Two part screw spline curtain wall

2. Describe curtain wall fabrication	• Taping and vinyling pressure plate and curtain wall • Drilling or punching vent and drain holes • Installing pressure plates • Back pans • Thermal requirements

3. Describe anchor systems	• Aluminum angles
	• Slip brackets
	• Static anchors
	  o Deadload
	• Dynamic anchors
	  o Windload
	• Embeds

4. Describe rain screen	• Watershed • Pressure equalized chamber • Air seal

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D4 Fabricate skylights and sloped glazing systems

Objectives

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

- Describe the purpose, function and components of complex skylights
- Fabricate complex skylights

LEARNING TASKS	CONTENT

1. Describe the purpose, function, and components of complex skylights	• Types of skylights
	  o Ridge
	  o Hip
	  o Pyramid
	  o Barrel vault
	  o T Bar
	  o Pressure cap
	• Components
	  o Rafters
	  o Purlins
	  o Spigots
	  o Splice plates
	  o Pressure plates
	  o Gutters
	  o Sleeve anchors
	• Weather seal materials
	  o Tapes
	  o Sealants
	  o Flashings
	  o Rubber gaskets
	• Types of anchors
	• Types of flashings
	  o Primary, secondary
	• Types of membranes
	  o EPDM rubber, peel-and-stick
	• Glazing, safety and performance

2. Fabricate complex skylights	• Assembly o Notching, cutting, and assembling components • Steel-aluminum separation requirements • Determining the degree of required slope

Achievement Criteria

Performance	The learner will measure and fabricate skylights and flashings.
Conditions	The learner will be given: • Tools • Material • Instructions and drawings
Criteria	The learner will be evaluated on: • Appearance • Rafter notching • Rafter size • Flashing size

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D5 Fabricate commercial entrance systems

Objectives

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

- Describe the types and applications of different commercial entrance systems
- Describe the parts required for fabricating commercial entrance systems
- Fabricate entrance systems

LEARNING TASKS	CONTENT

1. Describe the types and applications of different commercial entrance systems	• Types of entrance systems
	  o Swing
	  o Bifold
	  o Revolving
	  o Sliding
	  o Portals
	  o Vestibule
	  o Total Vision System
	• Types of automatic operators
	  o Mag locks
	  o Handicap panels
	  o Card readers
	  o Key pad operators
	  o Automatic mats
	  o Auto sensors
	• Auto headers
	• Sliding doors
	  o Pocket doors
	  o Bypass doors

2. Describe the parts required for fabricating commercial entrance systems	• Parts
	  o Types of hardware
	  o Types of framing material
	  – Flush glaze
	  – Curtain wall with door adaptor
	• Compatibility and performance for types of specified hardware for aluminum doors
	• Creating and using templates to prepare doors for hardware
	• Assembly of components
	  o Handles

LEARNING TASKS	CONTENT
	o Closers o Thresholds o Flush o Bolts o Locksets o Electric strikes o Panic hardware • Assembly of entrances o Fastening entrance system components • Running feed wires and pass holes • Finger guards • Kick plate • Thresholds • Astragals and coordinators
3. Fabricate entrance systems	• Fabrication and preparation of frames • Concealed overhead closers • Floor closers • Lock preparation • Panic hardware • Floor mounted pivots • Walking beam pivot • Power gear hinges • Power transfer hinges • Overhead door stops • Custom hardware • Single and multi-track slider hardware

Achievement Criteria

Performance — The learner will build jigs and will ensure that the door closer panic and butts work.

Conditions — The learner will be given:

- Tools
- Material
- Instructions (and divided into groups)

Criteria — The learner will be evaluated on:

- Accuracy of fit to 1/16 in.

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D6 Fabricate guardrail, handrail, and balustrade systems

Objectives

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

- Layout for fabrication of guardrail, hand rail and balustrade systems
- Fabricate guardrail, handrail and balustrade systems

LEARNING TASKS	CONTENT
1. Describe guardrail, handrail, and balustrade systems	• Channel / Base Shoe • Stanchions • Face Mount
2. Layout for fabrication of guardrail, handrail, and balustrade systems	• Confirm finished floor elevations and sizes according to site conditions and drawings • Layout for fabrication • Material Optimization • Templates if required • Interpretation of drawings • Minimum depth into U-channel • Height and Spacing (refer to BCBC code)
3. Fabricate guardrail, handrail, and balustrade systems	• Channel / Base Shoe • Stanchions • Face Mount

Achievement Criteria

Performance	The learner will assemble a guardrail or handrail system.
Conditions	The learner will be given: • Tools • Material • Instructions
Criteria	The learner will be evaluated on: • Accuracy of fit to 1/16 in. • Plumb, level and alignment

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D7 Perform glass cutting and edge treatment

Objectives

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

- Cut different shapes of glass
- Use specialty tools and cutting equipement

LEARNING TASKS	CONTENT
1. Cut different shapes of glass	• Mail slot • Speak hole • Holes – 2 in., 4 in. • Arcs • Templates • Plug outlets • Notches • Island (for large plug outlets) • Circles
2. Use specialty tools and cutting equipment	• Polishing wheels • Scratch removal systems • Scratch wheels • Sandblasting

Achievement Criteria

Performance: The learner will fabricate cut outs to specifications.

Conditions: The learner will be given:

- Instructions
- Material
- Tools

Criteria: The learner will be evaluated on:

- Accuracy
- Trueness to 1/32 in.
- Proper edge treatment
- Use of PPE (particulate mask and safety glasses)
- Safety precautions

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E3 Install curtain walls

Objectives

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

- Describe installation and glazing of curtain walls
- Analyze and troubleshoot problems with envelope performance integrity

LEARNING TASKS	CONTENT

1. Describe installation of curtain walls	• Shop and architectural drawings
	• Layout
	• Installation of anchors at proper locations
	• Expansion joints
	• Installation process
	  o Starter track and welded anchors according to layouts
	  o Level and plumb and align frames
	  o Corner blocks for stick built systems
	  o Blue skin applications
	  o Air and vapour barriers
	  o Metal back pans, glazing adapters, insulation corner blocks and glazing gaskets
	  o Bulb vinyl for ventilation escape
	  o Pressure plate equalizing adaptors
	  o Secondary sealing of corner blocks at vertical pressure plate
	• Operable windows

LEARNING TASKS	CONTENT

2. Describe glazing curtain walls	• Glazing process
	  o Setting blocks
	  o Heel bead corners
	  o Install glass
	  o Temporary Dutchman
	  o Secondary flashings
	  o Vertical pressure plate
	  o Horizontal pressure plate
	  o Horizontal pressure plate after applying vertical caps
	• Frames, glass, caps and sealants
	• SSG requirements

3. Analyze and troubleshoot problems with envelope performance integrity	• Perimeter seal
	• Inner joint seal
	• Corner blocking
	• Associated glazing components
	• Weep holes
	  o Orientation
	  o Blockage

Achievement Criteria

Performance	The learner will analyze and troubleshoot problems with envelope performance integrity.
Conditions	The learner will be given: • Tools and PPE • Materials • Instructions and drawings
Criteria	The learner will be evaluated on: • Successful analysis of problem

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E4 Install skylights and sloped glazing systems

Objectives

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

- Install complex skylights
- Install complex sloped glazing systems

LEARNING TASKS	CONTENT
1. Install sloped glazing and skylight systems	• Preparing skylights and glazing systems for flashings and roof membrane tie-ins • Types of sealant applications • Placement of purlins • Location and placement of anchors for skylights • Securing anchors • Placement and assembly of condensation gutters and frame members • Squaring skylights • Confirming measurements for skylights • Modifying skylights in final location • Securing anchors using fasteners • Installing insulation between primary and secondary flashing • Installing on-sight glazing, pressure plates and caps
2. Install complex sloped glazing and skylight systems	• Pyramid • Ridge • Barrel vault • Atrium

Achievement Criteria

Performance	The learner will install and glaze skylights and flashings.
Conditions	The learner will be given: • Tools and PPE • Materials • Instructions and drawings
Criteria	The learner will be evaluated on: • Square and alignment • Weatherproofing • Membrane • Pressure plate cap • Purlin cover • Fasteners • Flashing • Glass considerations • Appearance

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E5 Install commercial entrance systems

Objectives

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

- Install entrance systems

LEARNING TASKS	CONTENT

1. Install entrance systems	• Sliders and track
	  o Stacking doors
	  o Bi-fold
	  o Bi-pass
	• Swing doors
	• Revolving doors
	• Total vision system
	• Automatic doors

2. Install recessed floor closer	• Sub-trade preparation confirmation • Layout and clearances • Installation and adjustments

Achievement Criteria

Performance	The learner will install a door frame complete with closer, panic hardware and butt hinges.
Conditions	The learner will be given: • Tools • Material • Instructions
Criteria	The learner will be evaluated on: • Accuracy of fit to industry standards (1/16 in.) • Plumb • Level • Square • Hardware functions

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E6 Install guardrail, handrail, and balustrade systems

Objectives

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

- Layout for installation of guardrail, handrail, and balustrade systems
- Install guardrail, handrail, and balustrade systems

LEARNING TASKS	CONTENT
1. Layout for installation of guardrail, handrail, and balustrade systems	• Channel / Base Shoe • Stanchions • Face Mount
2. Install guardrail, handrail, and balustrade systems	• Confirm finished floor elevations, sizes according to site conditions and drawings • Installing Glass Support Systems • Verify size and shape of glass • Setting and alignment of glass • Apply final finishes

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E7 Install building envelope membranes

Objectives

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

- Describe purpose and types of building envelope membranes

LEARNING TASKS

1. Describe the purpose of membranes
2. Describe different types of membranes

CONTENT

- Water and air seal
- Types of materials
  - Foil back
  - Permeable/non-permeable
- Application of materials
- Preparation methods for specific materials
- General preparation of materials
  - Cleaning
  - Measuring
  - Priming
  - Corner sealing and lapping
  - Sizes

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E8 Install flashing

Objectives

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

- Install flashing

LEARNING TASKS	CONTENT

1. Describe types of flashing material	• Types
	  o Aluminum
	  o Galvanized steel
	  o Bituminous
	  o Painted steel
	• Thicknesses

2. Select types of flashing	• Types
	  o Head
	  o Sill and parapet
	  o Corner
	  o Column
	  o Splice
	  o Counter

3. Describe purpose of flashing	• Prevention of water entry • Protection for membrane • Continuity of framing • Finishing

4. Describe installation considerations	• Overlap requirements
	• Seam requirements
	  o Standing seam
	  o Splice
	  o Overlap
	• Expansion and contraction allowances
	• Sealant location
	• Slope and drainage requirements
	• Plumbing and levelling
	• Heel beading
	• Bedding bead
	• Fastener selection

LEARNING TASKS	CONTENT

5. Install flashing	• Tool selection
	  o Snips
	  o Rivet gun
	  o Combination square
	  o Bevel square
	  o Protractor
	  o Duck bill pliers
	  o Power shears
	  o Caulking gun
	• Procedures
	  o Measurement
	  o Layout
	  o Shear and break
	  o Dry fit
	  o Sealing
	  o Fastening
	• Install flashing according to job specifications

Achievement Criteria

Performance	The learner will build a flashing mock-up.
Conditions	The learner will be given: • Tools • Materials • Instructions • Drawing
Criteria	The learner will be evaluated on: • Accuracy of fit to within 1/16 in. tolerance • Aesthetics • Shingling / lapping accuracy of fit • Sealant placement

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E9 Use caulking and sealants

Objectives

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

- Apply structural silicone glazing (SSG)

LEARNING TASKS	CONTENT
1. Prepare surface	• Clean and prepare surface • Priming • Protection of adjacent surfaces
2. Apply silicone	• Taping • Freehand • Tooling • Backer rod • Bond breaker • Finish bead • Structural bead

Line (GAC): F INSTALL RESIDENTIAL SYSTEMS

Competency: F2 Glaze residential windows and doors

Objectives

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

- Install a residential nail-on flange

LEARNING TASKS	CONTENT

1. Install a residential nail-on flange	• Nail-on flange
	• Equal leg
	• Rebate
	  o Tilt and turn
	• Aluminum, PVC, wood, and fibreglass
	• Doors
	  o French, sliding, and double
	  o Mouldings and trim

Achievement Criteria

Performance	The learner will install a residential nail-on flange window.
Conditions	The learner will be given: • Tools • Material • Instructions
Criteria	The learner will be evaluated on: • Accuracy of fit to industry standards (1/16”) • Plumb • Level • Square • Proper shimming • Proper membrane and building-paper overlap

Line (GAC): F INSTALL RESIDENTIAL SYSTEMS

Competency: F3 Install residential skylights and solariums

Objectives

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

- Measure for solariums
- Install solariums

LEARNING TASKS	CONTENT
1. Measure for solariums	• Review opening • Clearance tolerances • Residential codes
2. Describe installation of solariums	• Sealants and adhesives • U-channels
3. Install solarium	• Measuring • Caulking • Flashing • Fasteners • Anchoring • Glazing • Finishing

Line (GAC): F INSTALL RESIDENTIAL SYSTEMS

Competency: F4 Install shower enclosures, mirrors, and back-painted glass

Objectives

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

- Measure for shower enclosures
- Install shower enclosures

LEARNING TASKS	CONTENT
1. Measure for shower enclosures	• Layout and measurement • Clearance tolerances
2. Describe installation of shower enclosures	• Sealants and adhesives • Hinges and hardware • U-channels • Cut-outs
3. Install shower enclosures	• Measuring • Fasteners • Attachment to wall • Drilling substrate • Masking and caulking • Door adjustment • Mildew/lime resistance coating • Cleaning

Achievement Criteria

Performance	The learner will install a shower door and sidelite.
Conditions	The learner will be given: • Tools • Material • Instructions
Criteria	The learner will be evaluated on: • Accuracy of fit to industry standards (1/16”) • Plumb • Level • Square • Proper shimming

Line (GAC): F INSTALL RESIDENTIAL SYSTEMS

Competency: F5 Install guardrail, handrail, and balustrade systems

Objectives

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

- Layout guardrail, handrail, and balustrade systems for installation
- Install guardrail, handrail, and balustrade systems

LEARNING TASKS	CONTENT
1. Layout guardrail, handrail, and balustrade systems for installation	• Channel / Base Shoe • Stanchions • Face Mount
2. Install guardrail, handrail, and balustrade systems	• Confirm finished floor elevations, sizes according to site conditions and drawings • Installing Glass Support Systems • Verify size and shape of glass • Setting and alignment of glass • Apply final finishes

Line (GAC): G INSTALL SPECIALTY GLASS AND PRODUCTS

Competency: G1 Layout specialty glass and products

Objectives

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

- Describe specialty product materials
- Describe applications of specialty glass and products
- Layout specialty glass and products

LEARNING TASKS	CONTENT

1. Describe specialty product materials	• Types
	  o Plastic
	  o Wood
	  o Vinyl
	  o Aluminum
	  o Stainless steel
	  o Lead
	• Characteristics
	• Properties
	• Applications

2. Describe applications of specialty glass and products	• Curved • Multi-coloured • Multi-laminate • Pattern • Sandblast • Fireproof • Low iron • Heat-treated (fire-resistant) • High performance coatings • Filming • Reflective • X-ray • Low E (low emissivity)

LEARNING TASKS	CONTENT

3. Describe applications of specialty products	• Pass-through windows
	• Spider glass walls
	  o Cable stayed systems
	• Sun shades
	  o Cable stayed systems
	• Demountable partition
	• Smoke baffle
	• Display cases
	• Glass floors
	• Bullet-resistant glass

4. Layout specialty glass and products	• Templates • Procedures • Benchmarks and gridlines • Measurements • Anchoring systems • Hardware and patch fittings • Sealants • Silicone butt joints • Total vision installations • Spider glazing • Office dividers • Smoke baffles • Tools and equipment • Safety

Line (GAC): G INSTALL SPECIALTY GLASS AND PRODUCTS

Competency: G2 Assemble specialty glass and products

Objectives

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

- Select materials required for assembly
- Assemble specialty glass and products
- Describe service procedures

LEARNING TASKS	CONTENT

1. Select materials required for assembly	• Hardware
	  o Patch fittings
	  o Closers
	  o Pivots
	  o Gussets
	• Fasteners
	  o Screws
	  o Clips
	  o Spigots
	  o Anchors
	• Mouldings
	  o Base shoes
	  o U-channels
	• Gaskets
	  o Vinyl
	  o Rubber
	  o Weather-stripping
	• Sealants, adhesives, quick-set cement

2. Assemble glass and specialty products	• Tools
	• Manufacturer specifications
	• Assembly procedures
	  o Cut and measure materials
	  o Level and square materials
	  o Fasten materials
	  o Torque patch fittings and cables to accurate tensions

3. Describe service procedures	• Specialized tools and equipment • Custom installation and service requirements

Line (GAC): G INSTALL SPECIALTY GLASS AND PRODUCTS

Competency: G3 Install custom glazing systems

Objectives

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

- Install Spider glazing, smoke baffles, canopies, sunshades, auto headers, automotive and commercial machinery glass

LEARNING TASKS	CONTENT
1. Describe Spider glazing installation process	• Physical properties • Components • Layout and measurement procedures • Structural steel relative to brackets
2. Install Spider glazing	• Layout brackets • Glass measurement • Tools for installation • Glass installation • Structural silicon joints
3. Install smoke baffles	• Describe the purpose • Apply fastening hardware • Measuring and templating • Installing and siliconing
4. Install canopies	• Measuring and templating • Fasteners and structural tape • Hoisting and placement • Glass and steel separation
5. Install sunshades	• Description and purpose of application • Fabrication of sunshade arms • Alignment of installation • Installation and fastening

Line (GAC): H SERVICE GLAZING SYSTEMS

Competency: H1 Service commercial window and door systems

Objectives

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

- Service broken and failed glass
- Service doors and hardware
- Service damaged framing components

LEARNING TASKS	CONTENT
1. Service broken and failed glass	• Type, colour, or coating of glass • Safety factors • Measure replacement glass • Safety access (public) • Removal and disposal • Installation and clean up
2. Service doors and vents	• Problem identification • Manufacturer • Accessibility considerations • Replacement parts • Public access control • Adjustment and verification of function with the customer • Adjust operable hardware • Slides, guides, wheels
3. Replace hinges and pivots	• Part identification • Bushing replacement • Lubrication • Clearances and adjustments • Shimming and reinforcing back plates (custom backing plates) • Fastening door hinges to building structure • Door and window blocking
4. Service or replace locks	• Type and manufacturer • Manufacturer component and installation sheet • components • Confirmation of problem • Removal and adjustments

LEARNING TASKS	CONTENT
	• Lubrication and clearances • Door adjustments • Adjustment and verification of function with the customer
5. Service closers	• Identification of problem with customer • Re-tapping, drilling and mounting • Adjustment of door and closure, verification of function with the customer
6. Service or replace damaged framing components	• Confirmation of damage and the extent of the repair necessary with the customer • Identification part manufacturer and colour • Duplicate flashing profiles and colour • Tools, jigs, metal, and fasteners • Public access control • Glass removal and storage • Removal, repair, flash, and caulk • Fastening to existing (spigots and fasteners) • Glass installation and clean up • Verification of repair with the customer • Recording repair time

Section 4

ASSESSMENT GUIDELINES

Assessment Guidelines – Level 1

Level 1 Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING:	GLAZIER LEVEL 1		
LINE	**SUBJECT COMPETENCIES**	**THEORY WEIGHTING**	**PRACTICAL WEIGHTING**
A	USE SAFE WORK PRACTICES	25%	10%
B	ORGANIZE WORK	20%	15%
C	USE TOOLS AND EQUIPMENT	20%	15%
D	FABRICATE COMMERCIAL SYSTEMS	18%	30%
E	INSTALL COMMERCIAL SYSTEMS	17%	30%
F	INSTALL RESIDENTIAL SYSTEMS	0%	0%
	Total	100%	100%
In-school theory / practical subject competency weighting		70%	30%
Final in-school mark Apprentices must achieve a minimum 70% for the final in-school mark to be eligible to write the Glazier Standardized Level exam		IN-SCHOOL %	

In-school Mark Combined theory and practical subject competency multiplied by	80%
Standard Level Exam Mark The exam score is multiplied by	20%
Final Level Mark	FINAL%

Assessment Guidelines – Level 2

Level 2 Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING:	GLAZIER LEVEL 2		
LINE	**SUBJECT COMPETENCIES**	**THEORY WEIGHTING**	**PRACTICAL WEIGHTING**
B	ORGANIZE WORK	15%	20%
D	FABRICATE COMMERCIAL SYSTEMS	30%	35%
E	INSTALL COMMERCIAL SYSTEMS	30%	35%
F	INSTALL RESIDENTIAL SYSTEMS	21%	10%
G	INSTALL SPECIALTY GLASS AND PRODUCTS	2%	0%
H	SERVICE GLAZING SYSTEMS	2%	0%
	Total	100%	100%
In-school theory / practical subject competency weighting		50%	50%
Final in-school mark Apprentices must achieve a minimum 70% for the final in-school mark to be eligible to write the Glazier Standardized Level exam		IN-SCHOOL %	

In-school Mark Combined theory and practical subject competency multiplied by	80%
Standard Level Exam Mark The exam score is multiplied by	20%
Final Level Mark	FINAL%

Assessment Guidelines – Level 3

Level 3 Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING:	GLAZIER LEVEL 3		
LINE	**SUBJECT COMPETENCIES**	**THEORY WEIGHTING**	**PRACTICAL WEIGHTING**
B	ORGANIZE WORK	10%	15%
C	USE TOOLS AND EQUIPMENT	10%	15%
D	FABRICATE COMMERCIAL SYSTEMS	22%	28%
E	INSTALL COMMERCIAL SYSTEMS	20%	28%
F	INSTALL RESIDENTIAL SYSTEMS	10%	14%
G	INSTALL SPECIALTY GLASS AND PRODUCTS	20%	0%
H	SERVICE GLAZING SYSTEMS	8%	0%
	Total	100%	100%
In-school theory / practical subject competency weighting		50%	50%
Final in-school mark Apprentices must achieve a minimum 70% for the final in-school mark to be eligible to write the Interprovincial Red Seal exam		IN-SCHOOL %	

All apprentices who complete Level 3 of the Glazier program with a FINAL level percentage score of 70% or greater will write the Interprovincial Red Seal examination as their final assessment.

SkilledTradesBC will enter the apprentices' Glazier Interprovincial Red Seal examination percentage score into SkilledTradesBC Portal.

A minimum percentage score of 70% on the examination is required for a pass.

Section 5

TRAINING PROVIDER STANDARDS

Facility Requirements

Classroom Areas

- 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
- Classroom space with internet access
- Library with reference material and installation manuals for student and instructor use

Shop Areas

- 10000 square foot mock-up/storage area which includes:
    - 20 feet high workshop
    - Classroom: 25 sq.ft. per student, based on 16 students
    - Tool crib
    - Lockers
- Adequate lighting and lighting control
- Ventilation as per WorkSafeBC standards
- Refuse and recycling bins for used shop materials
- First aid facilities as per WorkSafeBC regulations
- Hand and eye wash stations as per WorkSafeBC regulations
- Fire prevention equipment as per WorkSafeBC regulations

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

Hand Tools

- Allen keys
- angle finder
- bulk caulking gun
- caulking gun
- C-clamp
- centre punch
- chalk line
- chisel – cold
- chisel – wood
- combination square
- core tool
- countersinks (# 8, 10, 12)
- dead-blow hammer
- drill bits – high speed steel
- fibre stick
- files – bastard
- files – half moon
- files – round
- glass cup
- glass cutter
- glass pliers
- glass wedge
- hand cutters
- glazing bar
- hack-out knife
- hacksaw
- hammer – claw
- levels
- locking pliers
- locking pliers – duck-billed
- nail set
- nut driver set (imperial and metric)
- ofal knife
- open end wrenches (imperial and metric)
- paint brush
- pens, pencils, markers
- pouch/apron
- protractor (degree finder)
- pry bars
- putty knife – bent, straight
- ratchet set
- rivet tool
- mallet (plastic, rubber)
- running glass pliers
- scoring tool
- screwdrivers – flat
- screwdrivers – Philips
- screwdrivers – Robertson
- side cutters
- standard pliers
- string line
- taps and dies
- tin snips – straight, left, right
- tool box
- utility knife
- vinyl glazing roller
- wrench – adjustable

Portable Power Tools

- belt sander
- chop saw
- circular saw
- cordless drill
- electric drill
- electric nibbler (shears)
- glass drilling machine and drill bits
- grinders
- hammer drill
- hole drill
- tube drill
- jig saw
- notch saw
- portable glass notching saw
- portable mitre saw
- reciprocating saw
- router
- screw gun
- wet sander

Stationary Power Tools

- cutting table
- production cutter
- band saw
- bench grinder
- drill press
- flashing brake
- flashing shear
- glass cutting table
- radial arm saw
- table saw
- upright belt sanders

Measuring and Layout Equipment

- builder's level
- calculator
- laser distance measurer
- laser level
- measuring tape
- plumb bob
- sliding T bevel
- squares – combination
- squares – steel

Specialty Tools

- calipers
- glass clamp
- offset drill
- offset hook tool
- plate running pliers
- point driver
- Circle cutter
- Riv-nut tool
- Step drill

Scaffolding and Access Equipment

- Boom lift (rental)
- ladder jacks
- ladders (extension and step
- scaffolding (baker, frame, sectional, tubular)
- Swing Scissor lift (rental)
- stage (rental)

Rigging, Hoisting and Lifting Equipment

- block and tackle
- gator dolly
- glass dolly
- ropes (fibre and synthetic)
- winches

Personal Protective Equipment

- ear protection
- fall arrest equipment
- gloves
- hard hat
- respirator (particulate mask)
- rubber gloves
- safety footwear
- safety glasses
- safety vest

Reference Materials

Required Reference Materials

- None

Recommended Resources

- https://collection.bccampus.ca/subjects/trades/

Suggested Texts

- None

Instructor Requirements

Occupation Qualification

The instructor must possess:

- A BC Certificate of Qualification with a Red Seal Endorsement, or Certificate of Qualification from another Canadian jurisdiction complete with Red Seal Endorsement only.
- A minimum of 5 years of 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 Instructor's Diploma or equivalent, or a Bachelor's Degree in Education

Appendices

Appendix A
Summary of Achievement Criteria

Achievement Criteria are included for competencies that require a practical assessment. 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 measurable and that they reflect the skills spelled out in the competency. 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.

The following tables summarize the practical assessments for each level. **For details, please refer to the Achievement Criteria following the competency in the Program Content section.**

GLAZIER – LEVEL 1 SUMMARY OF ACHIEVEMENT CRITERIA	
SUBJECT COMPETENCY	**ACHIEVEMENT CRITERIA TASK**
A7 Use fall protection systems	The learner will perform a fit test.
B6 Handle materials	The learner will transport glass with a partner by using a plate dolly.
C2 Use portable power tools	The learner will demonstrate safe operating procedures for power tools.
C3 Use stationary power tools	The learner will demonstrate safe operating procedures for stationary power tools.
C4 Use layout and measuring equipment	The learner will use layout and measuring equipment to determine, communicate and draft accurate flashing, glass, and metal profiles.
C5 Use ladders and scaffolds	The learner will erect tower scaffold.
C6 Use rigging and hoisting equipment	The learner will tie the appropriate knot for a given application: • Half hitch • Clove hitch • Figure of eight • Bowline • Trucker's hitch
D1 Fabricate storefront systems	The learner will screw assemble a small frame.
D7 Perform glass cutting and edge treatment	The learner will cut glass to a specified size.
E1 Install storefront systems	The learner will install and glaze a small frame.
E7 Install building envelope membranes	The learner will measure and apply primer and membrane to specifications.

GLAZIER – LEVEL 2 SUMMARY OF ACHIEVEMENT CRITERIA	
SUBJECT COMPETENCY	**ACHIEVEMENT CRITERIA TASK**
B1 Interpret drawings and specifications	The learner will interpret a table of contents and convey information on a blueprint.
B4 Apply trade math	The learner will determine frame sizes, glass sizes and site dimensions.
D1 Fabricate storefront systems	The learner will perform door and sidelite fabrication.
D2 Fabricate window systems	The learner will fabricate a strip window assembly.
D3 Fabricate curtain walls	The learner will fabricate a curtain wall frame.
D7 Perform glass cutting and edge treatment	The learner will cut glass to specifications.
E1 Install storefront systems	The learner will perform door and sidelite installation.
E2 Install strip window systems	The learner will describe, mill, assemble and glaze a window frame.
E3 Install curtain walls	The learner will install and glaze a curtain wall frame.
E8 Install flashing	The learner will form and install flashing.
E9 Use caulking and sealants	The learner will caulk a vertical caulking bead and a silicone butt joint.
F4 Install shower enclosures, mirrors, and back-painted glass	The learner will create a drawing and cut and install a mirror.

GLAZIER – LEVEL 3 SUMMARY OF ACHIEVEMENT CRITERIA	
SUBJECT COMPETENCY	**ACHIEVEMENT CRITERIA TASK**
B1 Interpret drawings and specifications	The learner will use architectural drawings to create quantity lists, shop drawings, and solve installation problems.
C4 Use layout and measuring equipment	The learner will perform: • Differential levelling • Layout of angles • Setting up of instrumentation
D4 Fabricate skylights and sloped glazing systems	The learner will measure and fabricate skylights and flashings.
D5 Fabricate commercial entrance systems	The learner will build jigs and will ensure that the door closer panic and butts work.
D6 Fabricate guardrail, handrail, and balustrade systems	The learner will assemble a guardrail or handrail system.
D7 Perform glass cutting and edge treatment	The learner will fabricate cut outs to specifications.
E3 Install curtain walls	The learner will analyze and troubleshoot problems with envelope performance integrity.
E4 Install skylights and sloped glazing systems	The learner will install and glaze skylights and flashings.
E5 Install commercial entrance systems	The learner will install a door frame complete with closer, panic hardware and butt hinges.
E8 Install flashing	The learner will build a flashing mock-up.
F2 Glaze residential windows and doors	The learner will install a residential nail-on flange window.
F4 Install shower enclosures, mirrors, and back-painted glass	The learner will install a shower door and sidelite.

Appendix B
Previous Contributors

Industry Subject Matter Experts retained to assist in the development of the Program Outline (2017):

- JP Schmidt — Flynn Canada
- Len McCroary — All-West Glass
- Mark Frampton — Excalibur Glass
- Randall Herd — Northview Glass Ltd.
- Patrick Byrne — Finishing Trades Institute
- Mark Longmore — Finishing Trades Institute
- Dave Newbold — Fenestration Association of BC

SkilledTradesBC would like to acknowledge the dedication and hard work of all the industry and training provider representatives appointed to identify the training requirements of the Glazier occupation.