SKILLEDTRADESBC

PROGRAM OUTLINE

Concrete Finisher

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CONCRETE FINISHER

HARMONIZED PROGRAM OUTLINE

APPROVED BY INDUSTRY

NOVEMBER 2017

BASED ON

RSOS 2017

Developed by
SkilledTradesBC
Province of British Columbia

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Section 1

INTRODUCTION

Concrete Finisher

Foreword

This Concrete Finisher 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 updated standards based on the 2017 Red Seal Occupational Standard (RSOS) and was developed by British Columbia industry and instructor subject matter experts. This Program Outline will form the basis for further updating of the British Columbia Concrete Finisher Program by SkilledTradesBC.

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 measureable and that they reflect the skills spelled out in the competency as those required of a competent journeyperson. The conditions under which these performances will be observed and measured must be clear to the learner as well as the criteria by which the learner will be evaluated. The learner must also be given the evaluation criteria.

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

SAFETY ADVISORY

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

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SkilledTradesBC would like to acknowledge the dedication and hard work of all the industry and instructor representatives appointed to identify the training requirements of the Concrete Finisher 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	Communicate program length and structure, and all pathways to completion	Understand the length and structure of the program	Understand the length and structure of the program, and pathway to completion	Understand challenger pathway to Certificate of Qualification
OAC	Communicate the competencies that industry has defined as representing the scope of the occupation	Understand the competencies that an apprentice is expected to demonstrate in order to achieve certification	View the competencies they will achieve as a result of program completion	Understand the competencies they must demonstrate in order to challenge the program
Training Topics and Suggested Time Allocation	Shows proportionate representation of general areas of competency (GACs) at each program level, the suggested proportion of time spent on each GAC, and percentage of time spent on theory versus practical application	Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application	Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application	Understand the relative weightings of various competencies of the occupation on which assessment is based
Program Content	Defines the objectives, learning tasks, high level content that must be covered for each competency, as well as defining observable, measureable achievement criteria for objectives with a practical component	Identifies detailed program content and performance expectations for competencies with a practical component; may be used as a checklist prior to signing a recommendation for certification (RFC) for an apprentice	Provides detailed information on program content and performance expectations for demonstrating competency	Allows individual to check program content areas against their own knowledge and performance expectations against their own skill levels
Training Provider Standards	Defines the facility requirements, tools and equipment, reference materials (if any) and instructor requirements for the program	Identifies the tools and equipment an apprentice is expected to have access to; which are supplied by the training provider and which the student is expected to own	Provides information on the training facility, tools and equipment provided by the school and the student, reference materials they may be expected to acquire, and minimum qualification levels of program instructors	Identifies the tools and equipment a tradesperson is expected to be competent in using or operating; which may be used or provided in a practical assessment

Section	Training Providers	Employers/ Sponsors	Apprentices	Challengers
Appendix – Glossary of Acronyms			Defines program specific acronyms	

Section 2

PROGRAM OVERVIEW

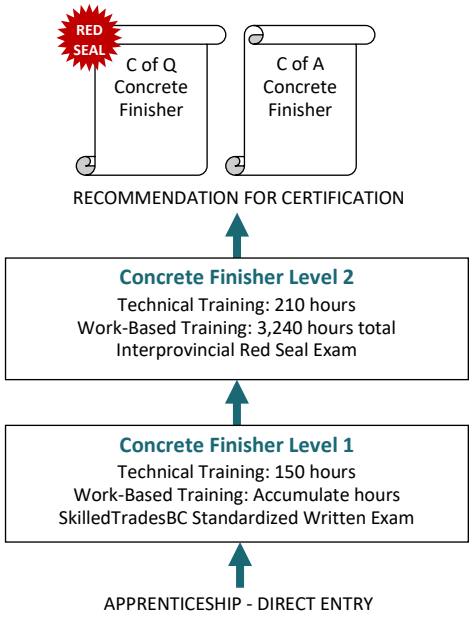
Concrete Finisher

Program Credentialing Model

Apprenticeship Pathway

This graphic provides an overview of the Concrete Finisher apprenticeship pathways.

C of Q = Certificate of Qualification
C of A = Certificate of Apprenticeship
C of C = Certificate of Completion
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

CONCRETE FINISHER

Occupation Description: Concrete finishers place, finish, protect and repair concrete surfaces. They work on a variety of vertical and horizontal surfaces such as concrete floors, walls, sidewalks, stairs, driveways, curbs and gutters, and overlays. They work on many types of structures such as buildings, dams, bridges and tunnels. They also texture, chip, grind and cure finished concrete work and repair and restore damaged concrete. They apply architectural finishes to concrete surfaces such as exposed aggregate, acid-stained, patterned-stamped, broomed, smooth finishes and etched concrete surfaces. They install expansion and contraction joints and install fixtures such as anchor bolts, steel plates and other embedments. They also apply membranes and other waterproofing products to concrete. Concrete finishers must possess a sound knowledge of the properties of various types of concrete mixes and how proportions, additives and curing affect concrete strength and durability. Concrete finishers should have a basic knowledge of constructing formwork, preparing subgrades and installing reinforcement.

PERFORM SAFETY-RELATED FUNCTIONS **A**	Use personal protective equipment (PPE) and safety equipment A1	1					Maintain safe work environment A2	1						
USE TOOLS AND EQUIPMENT **B**	Use hand tools B1	1					Use power tools B2		2				Use measuring equipment B3	1	2			
ORGANIZE WORK **C**	Use documentation C1	1	2				Determine material requirements and quantities C2	1	2				Sequence work procedures C3	1	2			
USE COMMUNICATION AND MENTORING TECHNIQUES **D**	Use communication techniques D1	1	2				Use mentoring techniques D2		2									

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PREPARE SITE **E**	Inspect site E1	1	2				Prepare sub-grade and elevations E2	1	2			
USE FORMWORK **F**	Construct concrete formwork F1	1	2				Install reinforcements F2	1	2				Inspect formwork and reinforcement F3	1	2				Install construction, isolation and expansion joints F4	1					Remove forms F5	1	2			
PLACE CONCRETE **G**	Transport concrete on site G1	1	2				Spread concrete G2	1					Consolidate concrete G3	1	2				Place concrete in vertical formwork G4		2									
LEVEL CONCRETE **H**	Establish elevation H1	1	2				Screed concrete H2	1	2				Bull float concrete H3	1																
FLOAT CONCRETE **I**	Float concrete by hand I1	1					Float concrete by machine I2		2																					
HAND TOOL CONCRETE **J**	Edge perimeter of slab J1	1					Finish extruded concrete surfaces J2		2				Tool contraction joints J3	1																	

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TROWEL CONCRETE **K**	Trowel concrete by hand K1	1			
	Trowel concrete by machine K2		2		
APPLY SURFACE TREATMENTS TO CONCRETE **L**	Apply dry shake aggregate surface hardeners L1		2		
	Apply exposed aggregate finish L2		2		
	Texture concrete surface L3		2		
	Apply stamped concrete surface finish L4		2		
	Apply evaporation reducers L5		2		
CURE CONCRETE **M**	Wet-cure concrete M1	1			
	Chemical cure concrete M2	1			
CREATE CONTRACTION JOINTS **N**	Saw cut contraction joints N1	1			
	Fill joints N2	1			
PROTECT CONCRETE **O**	Protect plastic concrete O1	1			
	Protect hardened concrete O2	1			
REPAIR AND RESTORE CONCRETE **P**	Inspect concrete P1	1	2		
	Remove materials P2	1	2		
	Prepare surface for repair or restoration P3	1	2		
	Install repair materials P4	1	2		

APPLY SURFACE TREATMENT TO HARDENED CONCRETE **Q**	Prepare surface for surface treatments Q1	Abrade surface to achieve architectural finish Q2	Apply seamless systems Q3	Apply bonded and non-bonded toppings to concrete Q4	Parge vertical surfaces Q5	Apply chemical surface treatment Q6
	2	2	2	2	2	2
GROUT **R**	Prepare surface for grouting R1	Install grout R2	Finish exposed grout surface R3			
	2	2	2			
PERFORM CUTTING AND CORING **S**	Perform cutting S1	Perform coring S2				
	2	2				

Training Topics and Suggested Time Allocation: Level 1

CONCRETE FINISHER – LEVEL 1

			% of Time Allocated to:		
		% of Time	Theory	Practical	Total
Line A	**PERFORM SAFETY-RELATED FUNCTIONS**	**12%**	**60%**	**40%**	**100%**
A1	Use personal protective equipment (PPE) and safety equipment		✓		
A2	Maintain safe work environment		✓	✓	
Line B	**USE TOOLS AND EQUIPMENT**	**7%**	**50%**	**50%**	**100%**
B1	Use hand tools		✓		
B3	Use measuring equipment		✓	✓	
Line C	**ORGANIZE WORK**	**14%**	**50%**	**50%**	**100%**
C1	Use documentation		✓		
C2	Determine material requirements and quantities		✓	✓	
C3	Sequence work procedures		✓		
Line D	**USE COMMUNICATION AND MENTORING TECHNIQUES**	**1%**	**75%**	**25%**	**100%**
D1	Use communication techniques		✓		
Line E	**PREPARE SITE**	**5%**	**60%**	**40%**	**100%**
E1	Inspect site		✓		
E2	Prepare sub-grade and elevations		✓	✓	
Line F	**USE FORMWORK**	**8%**	**80%**	**20%**	**100%**
F1	Construct concrete formwork		✓		
F2	Install reinforcements		✓		
F3	Inspect formwork and reinforcement		✓		
F4	Install construction, isolation and expansion joints		✓		
F5	Remove forms		✓		
Line G	**PLACE CONCRETE**	**12%**	**40%**	**60%**	**100%**
G1	Transport concrete on site		✓	✓	
G2	Spread concrete		✓	✓	
G3	Consolidate concrete		✓		
Line H	**LEVEL CONCRETE**	**4%**	**40%**	**60%**	**100%**
H1	Establish elevation		✓		
H2	Screed concrete		✓	✓	
H3	Bull float concrete		✓		
Line I	**FLOAT CONCRETE**	**5%**	**20%**	**80%**	**100%**
I1	Float concrete by hand		✓	✓	

			% of Time Allocated to:		
		% of Time	Theory	Practical	Total
Line J	**HAND TOOL CONCRETE**	**3%**	**25%**	**75%**	**100%**
J1	Edge perimeter of slab		✓		
J3	Tool contraction joints		✓		
Line K	**TROWEL CONCRETE**	**8%**	**25%**	**75%**	**100%**
K1	Trowel concrete by hand		✓	✓	
Line M	**CURE CONCRETE**	**3%**	**75%**	**25%**	**100%**
M1	Wet-cure concrete		✓		
M2	Chemical cure concrete		✓		
Line N	**CREATE CONTRACTION JOINTS**	**2%**	**25%**	**75%**	**100%**
N1	Saw cut contraction joints		✓		
N2	Fill joints		✓		
Line O	**PROTECT CONCRETE**	**4%**	**65%**	**35%**	**100%**
O1	Protect plastic concrete		✓		
O2	Protect hardened concrete		✓		
Line P	**REPAIR AND RESTORE CONCRETE**	**12%**	**50%**	**50%**	**100%**
P1	Inspect concrete		✓	✓	
P2	Remove materials		✓	✓	
P3	Prepare surface for repair or restoration		✓	✓	
P4	Install repair materials		✓	✓	
	Total Percentage for Concrete Finisher Level 1	**100%**			

Training Topics and Suggested Time Allocation: Level 2

CONCRETE FINISHER – LEVEL 2

			% of Time Allocated to:		
		% of Time	Theory	Practical	Total
Line B	**USE TOOLS AND EQUIPMENT**	**10%**	**40%**	**60%**	**100%**
B2	Use power tools		✓		
B3	Use measuring equipment		✓	✓	
Line C	**ORGANIZE WORK**	**9%**	**75%**	**25%**	**100%**
C1	Use documentation		✓		
C2	Determine material requirements and quantities		✓		
C3	Sequence work procedures		✓		
Line D	**USE COMMUNICATION AND MENTORING TECHNIQUES**	**2%**	**75%**	**25%**	**100%**
D1	Use communication techniques		✓		
D2	Use mentoring techniques		✓		
Line E	**PREPARE SITE**	**3%**	**30%**	**70%**	**100%**
E1	Inspect site		✓		
E2	Prepare sub-grade and elevations		✓		
Line F	**USE FORMWORK**	**6%**	**30%**	**70%**	**100%**
F1	Construct concrete formwork		✓		
F2	Install reinforcements		✓		
F3	Inspect formwork and reinforcement		✓		
F5	Remove forms		✓		
Line G	**PLACE CONCRETE**	**5%**	**50%**	**50%**	**100%**
G1	Transport concrete on site		✓		
G3	Consolidate concrete		✓		
G4	Place concrete in vertical formwork		✓		
Line H	**LEVEL CONCRETE**	**9%**	**40%**	**60%**	**100%**
H1	Establish elevation		✓	✓	
H2	Screed concrete		✓	✓	
Line I	**FLOAT CONCRETE**	**3%**	**40%**	**60%**	**100%**
I2	Float concrete by machine		✓	✓	
Line J	**HAND TOOL CONCRETE**	**1%**	**60%**	**40%**	**100%**
J2	Finish extruded concrete surfaces		✓		
Line K	**TROWEL CONCRETE**	**3%**	**40%**	**60%**	**100%**
K2	Trowel concrete by machine		✓	✓	

			% of Time Allocated to:		
		% of Time	Theory	Practical	Total
Line L	**APPLY SURFACE TREATMENTS TO CONCRETE**	**11%**	**30%**	**70%**	**100%**
L1	Apply dry shake aggregate surface hardeners		✓	✓	
L2	Apply exposed aggregate finish		✓	✓	
L3	Texture concrete surface		✓		
L4	Apply stamped concrete surface finish		✓	✓	
L5	Apply evaporation reducers		✓		
Line P	**REPAIR AND RESTORE CONCRETE**	**13%**	**30%**	**70%**	**100%**
P1	Inspect concrete		✓	✓	
P2	Remove materials		✓	✓	
P3	Prepare surface for repair or restoration		✓	✓	
P4	Install repair materials		✓	✓	
Line Q	**APPLY SURFACE TREATMENT TO HARDENED CONCRETE**	**13%**	**40%**	**60%**	**100%**
Q1	Prepare surface for surface treatments		✓	✓	
Q2	Abrade surface to achieve architectural finish		✓		
Q3	Apply seamless systems		✓	✓	
Q4	Apply bonded and non-bonded toppings to concrete		✓		
Q5	Parge vertical surfaces		✓		
Q6	Apply chemical surface treatment		✓	✓	
Line R	**GROUT**	**8%**	**40%**	**60%**	**100%**
R1	Prepare surface for grouting		✓	✓	
R2	Install grout		✓	✓	
R3	Finish exposed grout surface		✓	✓	
Line S	**PERFORM CUTTING AND CORING**	**4%**	**50%**	**50%**	**100%**
S1	Perform cutting		✓	✓	
S2	Perform coring		✓		
	Total Percentage for Concrete Finisher Level 2	**100%**			

Section 3

PROGRAM CONTENT

Concrete Finisher

Level 1

Concrete Finisher

Line (GAC): A PERFORM SAFETY-RELATED FUNCTIONS

Competency: A1 Use personal protective equipment (PPE) and safety equipment

Objectives

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

- Use PPE and safety equipment.

LEARNING TASKS

1. Describe PPE

CONTENT

- WorkSafeBC regulations
- Fall protection
  - Fall restraint
  - Fall arrest
  - Harnesses, lanyards, lifelines
- Safety footwear
  - Canadian Standards Association (CSA)
- Eye protection
  - Glasses
  - Goggles
  - Face shields
- Hearing protection
  - Hearing testing
  - Earplugs and canal caps
  - Earmuffs
  - Class/grade selection based on exposure level
- Head protection
  - CSA and American National Standards Institute (ANSI) types
  - Expiry and condition
- Clothing
  - High visibility
  - Fire retardant
  - Hazard/product specific
- Hand protection
  - Gloves
  - Barrier creams
- Skin protection
  - Protection from caustic materials
  - Preventing dermatitis
- Knee protection

LEARNING TASKS	CONTENT
2. Use respiratory protection	• Dust control measures • Respirator types • Protection factors • Fit testing • Positive and negative seal checks • Filters and cartridges • Hazard/product specific • Air monitoring equipment ○ Environments • Procedure
3. Identify warning signs of respiratory failure	• Types of respiratory illnesses ○ Acute • Chronic
4. Use fall protection systems	• Guardrails and toeboards • Fall restraint • Fall arrest • Rope grabs and shock limiting devices • Safety harness, lanyard, lifeline and accessories • Safety equipment inspection • Safety monitor • Control zones • Life preservers

Line (GAC): A PERFORM SAFETY-RELATED FUNCTIONS

Competency: A2 Maintain safe work environment

Objectives

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

- Describe safe work practices and procedures.
- Maintain safe work environment.

LEARNING TASKS	CONTENT

1. Explain applicable parts of the Workers Compensation Act	• Jurisdiction of WorkSafeBC
	  ○ Make regulations
	  ○ Inspect workplaces
	  ○ Issue orders
	  ○ Impose penalties
	• Compensation to workers and dependants

2. Describe general core requirements of the WorkSafeBC Regulation	• Building and equipment safety • Emergency preparedness • Preventing violence • Working alone • Ergonomics • Illumination and indoor air quality

3. Describe rights and responsibilities	• Employer
	  ○ Provide a safe worksite
	  ○ Provide training
	  ○ Provide safety equipment
	  ○ Perform job hazard analysis
	  ○ Provide Safety Data Sheets (SDS)
	  ○ Reporting incidents and accidents
	  ○ Perform safety meetings
	  ○ Implement Occupation Health and Safety (OHS) Program
	• Supervisor
	  ○ Communicate with workers to ensure a safe environment
	  ○ Ensure the health and safety of all workers under their direct supervision
	  ○ Reporting incidents and accidents
	  ○ Safety meetings
	• Worker

LEARNING TASKS	CONTENT
	○ Right to receive safety training ○ New worker orientation ○ Right to refuse unsafe work ○ Protection of other workers ○ Must follow WorkSafeBC Regulations ○ Right to compensation for workplace accidents ○ Reporting unsafe conditions ○ Reporting incidents and accidents ○ Field Level Risk Assessment (FLRA) • Attend safety meetings
4. Describe hazards and precautions	• Types of hazards ○ Loose clothing and jewellery ○ Mobile equipment ○ Energized power lines ○ Electrical ○ Asbestos ○ Silica ○ Carbon monoxide ○ Confined space ○ Flammable and explosive environments ○ Heights ○ Vehicular traffic ○ Other trade workers onsite ○ Weather ○ Slips, trips and falls ○ Heavy lifting • Safety attitude ○ Housekeeping ○ Awareness of potential hazards of jobsite • Precautions ○ Inspecting condition of tools ○ Guards and barriers ○ Dust control measures ○ Worksite illumination ○ Lockout procedures ○ Traffic control ○ Signage - Overhead hazard

LEARNING TASKS	CONTENT
	- Tapes (yellow, red)-associated hazards
5. Lift and move objects safely	• Procedures for lifting and moving objects ○ Manual and mechanically moving and handling • Common signals for moving and handling materials

6. Apply Workplace Hazardous Materials Information System (WHMIS)	• Purpose
	• Responsibilities
	• SDS
	  ○ Information disclosed
	  ○ Symbols
	• First aid measures

7. Describe fire safety	• Types of fires
	• Prevention
	  ○ Types of fuels
	  ○ Material storage and use
	• Fire suppression equipment
	• Response

8. Use portable and fixed ladder	• Ladder types • Carrying, erection, and use of ladders • Job-built ladders

9. Use scaffolding	• Scaffold types and use
	  ○ Steel frame
	  ○ Tube and clamp
	  ○ Baker's scaffold
	• Components
	  ○ Mud sills
	  ○ Guardrails and toe-boards
	  ○ Scaffold planks
	  ○ Work platforms
	  ○ Plank support
	  ○ Braces
	  ○ Accessories
	• Erection
	  ○ Members plumb and level
	  ○ Stability
	  ○ Ladder access to scaffolds
	  ○ Scaffold load limits
	  ○ Tagging systems
	  ○ Restrict access to work area

LEARNING TASKS	CONTENT
	○ Daily inspection ○ Housekeeping
10. Describe suspended work platforms	• Training and certification requirements • Types ○ Swing stage ○ Spider • Use of suspended work platforms • Components • Inspection
11. Describe aerial work platforms	• Training and certification requirements • Types ○ Scissor lifts ○ Boom lifts ○ Boseman chair • Use of aerial work platforms • Components • Inspection

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B1 Use hand tools

Objectives

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

- Use hand tools.

LEARNING TASKS	CONTENT
1. Describe cutting and fastening tools	• Hand saws • Utility knives • Pliers • Bolt cutters • Claw hammers
2. Describe striking and prying tools	• Nail puller • Sledge hammer • Goose-neck bar
3. Describe abrading tools	• Cold chisel • Chipping hammer • Hand stone
4. Describe conveying and spreading tools	• Spade • Concrete rake/come-along • Square-ended shovel
5. Describe consolidating tools	• Rods • Spades • Jitterbug
6. Describe striking tools	• Aluminum screed board • Wood screed board
7. Describe floats	• Bull float • Channel float • Magnesium hand float • Darby • Wood float • Resin float • Rubber float

8. Describe concrete finishing tools	• Trowels
	  ○ Sweep trowels
	  ○ Margin trowels
	  ○ Swimming pool trowels
	  ○ Pointer trowels

LEARNING TASKS	CONTENT
9. Use hand tools	○ Steel finishing trowels ○ Bull trowel/Fresno ○ Mule ○ Cove tool • Edgers ○ Bull-nose edgers ○ Safety step edgers ○ Cylinder edgers • Jointers/skates • Finishing brooms • Procedures • Maintenance

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B3 Use measuring equipment

Objectives

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

- Use measuring and layout tools.

LEARNING TASKS	CONTENT

1. Describe measuring and layout tools	• Measuring devices
	  ○ Scale
	  ○ Measuring vessel
	  ○ Measuring wheel
	  ○ Measuring tape
	  ○ Laser range meter
	  ○ Slump test cone
	• Levels
	  ○ Spirit/torpedo level
	• Grading rod
	• String and chalk line
	• Framing square
	• Calculator

2. Use measuring and layout tools	• Procedures • Accuracy and precision when measuring • Maintenance

Line (GAC): C ORGANIZE WORK

Competency: C1 Use documentation

Objectives

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

- Interpret building code.
- Interpret safety documentaion.

LEARNING TASKS	CONTENT
1. Interpret documentation relating to concrete standards and building code	• CSA Concrete Standards (A23.1)
2. Interpret safety documentation	• OHS Regulations • WHMIS • SDS • Site specific safety documentation ○ FLRA

Line (GAC): C ORGANIZE WORK

Competency: C2 Determine material requirements and quantities

Objectives

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

- Describe the characteristics of concrete.
- Describe concrete mix design.
- Perform slump test.

LEARNING TASKS	CONTENT
1. Describe history of cement production	• Origin • Evolution • Impact on humanity • Environmental impact

2. Describe the Concrete Finisher trade	• History
	  ○ Evolution of cement masonry
	• Restoration
	• Scope
	  ○ Industrial
	  ○ Commercial
	• Residential

3. Describe Portland cements	• Production
	• Types
	  ○ GU (General use)
	  ○ MS (Moderate sulfate resistant)
	  ○ HE (High early)
	  ○ LH (Low heat of hydration)
	  ○ HS (High sulfate resistant)
	• Characteristics
	• Applications

4. Describe common types of concrete and applications	• Types
	  ○ Regular weight
	  ○ Light weight
	  ○ Self-consolidating
	  ○ Cellular
	  ○ Pervious
	  ○ Roller compact
	  ○ Non-shrink concrete
	• Functions
	• Properties
	• Applications

LEARNING TASKS	CONTENT
	○ Industrial ○ Commercial/Institutional ○ Residential • Advantages and disadvantages
5. Describe water/cement ratios and concrete mix design	• Purpose and effect of mix water • Importance of the water/cement ratio • Hydration • Measure procedures • Mixing procedures • Batching procedures • Timeline ○ Wet delivery ○ Dry delivery
6. Describe aggregates	• Types ○ Characteristics ○ Advantages and disadvantages • Importance of gradation • Desirable properties for specific applications • Aggregate effects on concrete quality and workablity
7. Describe admixtures	• Types ○ Fly ash ○ Silica fume ○ Blast furnace slag ○ Super plasticizers ○ Accelerators ○ Retarders ○ Air entrainers ○ Corrosion inhibitors ○ Integral hardeners ○ Integral colours ○ Fibres ○ Metal shards (for increased tensile strength) • Selection and application
8. Describe batching concrete	• Proportioning ○ Cements ○ Admixtures ○ Aggregates ○ Water • Batching methods

LEARNING TASKS	CONTENT
	○ Redi-mix plants ○ Portable redi-mix plants ○ Small mechanical mixer • Hand mix
9. Describe quality control tests.	• Purpose and importance of quality control tests • Types of tests ○ Slump ○ Cylinder ○ Flexural ○ Entrained air content • Temperature
10. Perform slump test.	• Purpose • Equipment • Procedure • Measurement

Achievement Criteria

Performance	The learner will perform a slump test.
Conditions	The learner will be given: • Instructions • Concrete • Equipment
Criteria	The learner will be evaluated on: • Procedure • Accuracy of measurement

Line (GAC): C ORGANIZE WORK

Competency: C3 Sequence work procedures

Objectives

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

- Adjust concreting and curing procedures according to environmental conditions.
- Describe the sequence of work.

LEARNING TASKS	CONTENT
1. Describe time limitations of concrete	• Time batched • Admixtures • Properties of mix design

2. Adjust concreting and curing procedures according to environmental conditions	• Adverse weather conditions
	  ○ Hot/cold
	  ○ Sunlight/shade
	  ○ Windy/rainy
	  ○ Humidity
	• Monitoring
	• Special procedures
	• Curing

3. Describe the sequence of work for plastic concrete	• Tool selection • Inspect formwork • Install vapour barrier when required • Install/inspect reinforcement when required • Transporting • Placing • Consolidation • Strike off • Floating • Finishing • Curing

Line (GAC): D USE COMMUNICATION AND MENTORING TECHNIQUES

Competency: D1 Use communication techniques

Objectives

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

- Describe communication methods.

LEARNING TASKS	CONTENT

1. Describe communication methods	• Trade terminology
	• Hand signals
	• Eye contact
	• Listening/ talking
	• Written communication
	• Interpersonal skills
	  ○ Other trades
	  ○ Clients
	  ○ Public
	  ○ Suppliers and manufacturers
	  ○ Apprentices (mentoring)

Line (GAC): E PREPARE SITE

Competency: E1 Inspect site

Objectives

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

- Describe site inspection before site preparation.

LEARNING TASKS	CONTENT

1. Describe site inspection before site preparation	• Site conditions
	  ○ Drainage
	  ○ Vegetation
	  ○ Grade
	• On-site services
	  ○ Water
	• Power

Line (GAC): E PREPARE SITE

Competency: E2 Prepare sub-grade and elevations

Objectives

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

- Describe preparation of sub-grade and elevations.

LEARNING TASKS	CONTENT
1. Describe basic layout	• Importance of precise layout • Surveying and layout terms • Layout tools • Levelling methods to set batter boards, edge forms and screeds • Measuring tools
2. Perform calculations	• Pythagorean theorem (3-4-5) calculations • Slope calculations • Volume calculations

Line (GAC): F USE FORMWORK

Competency: F1 Construct concrete formwork

Objectives

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

- Describe concrete formwork.

LEARNING TASKS	CONTENT

1. Describe concrete formwork	• Types
	  ○ Slab on grade
	  ○ Suspended slab
	  ○ Vertical formwork
	  ○ Slip form
	  ○ Curb and gutter
	  ○ Insulated concrete forming (ICF)
	  ○ Steel
	  ○ Dimensional lumber
	• Shotcrete walls

Line (GAC): F USE FORMWORK

Competency: F2 Install reinforcements

Objectives

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

- Describe the purpose of concrete reinforcements.

LEARNING TASKS	CONTENT
1. Describe the purpose of concrete reinforcements	• Increasing tensile strength • Deflection

Line (GAC): F USE FORMWORK

Competency: F3 Inspect formwork and reinforcement

Objectives

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

- Inspect formwork for defects prior to concrete placement.

LEARNING TASKS	CONTENT

1. Identify defects in formwork	• Defects
	  ○ Inadequate bracing
	  ○ Crooked/unlevel formwork
	  ○ Improper grading
	  ○ Deterioration
	  ○ Splinters
	  ○ Debris
	• Supports/shoring
	• Keyway location

2. Check the finish grade of formwork	• Ensure correct slope • Drainage/runoff

Line (GAC): F USE FORMWORK

Competency: F4 Install construction, isolation and expansion joints

Objectives

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

- Describe construction and isolation/expansion joints.

LEARNING TASKS	CONTENT

1. Describe construction and isolation/expansion joints	• Requirements
	• Installation
	• Locations
	• Construction
	  ○ Keyed
	  ○ Doweled
	• Isolation/expansion

Line (GAC): F USE FORMWORK

Competency: F5 Remove forms

Objectives

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

- Describe form removal.

LEARNING TASKS	CONTENT

1. Describe form removal from hardened concrete	• Considerations during construction
	• Process for wood form removal
	  ○ Reverse construction sequence
	  ○ Wedged removal
	  ○ Denail
	• Process for steel form removal

2. Describe form removal from green or plastic concrete	• Determine concrete set point • Considerations during construction
3. Describe housekeeping related to removal of formwork	• Scrape formwork • Denail • Storage • Disposal

Line (GAC): G PLACE CONCRETE

Competency: G1 Transport concrete on site

Objectives

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

- Transport concrete for small projects.

LEARNING TASKS

1. Transport concrete for small projects

CONTENT

- Applications and methods
  - Chain gang (pails)
- Equipment
  - Truck and chute
  - Wheelbarrows
  - Power buggies
- Line pumps

Line (GAC): G PLACE CONCRETE

Competency: G2 Spread concrete

Objectives

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

- Place and spread concrete.

LEARNING TASKS	CONTENT

1. Place and spread concrete	• Determining starting location of placement
	• Distribution of concrete
	• Establishing rough elevations
	• Methods
	  ○ Shoveling
	  ○ Raking
	• Avoiding segregation and cold joints
	• Continuous placement/ timeliness

Line (GAC): G PLACE CONCRETE

Competency: G3 Consolidate concrete

Objectives

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

- Describe consolidating concrete by hand methods.

LEARNING TASKS	CONTENT

1. Describe consolidation	• Purpose
	  ○ Trapped air removal
	  ○ Densification
	• Methods
	  ○ Hand
	  – Jitterbug
	  – Spading
	  – Rodding
	• Mechanical

2. Describe consolidating concrete by hand methods	• Spading form edges • Tapping forms • Hand rodding • Limitations of hand consolidation ○ Size of project • Depth

Line (GAC): H LEVEL CONCRETE

Competency: H1 Establish elevation

Objectives

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

- Describe establishing elevations.

LEARNING TASKS

1. Describe establishing elevations

CONTENT

- Benchmarks
- Set screeds
  - Wet screed
  - Screed rails
  - Monuments
  - Bulkhead
- Equipment
  - Laser transit
  - Builder's level
  - Chalk lines
  - Stakes and string lines
  - Screed pipe
- Story pole

Line (GAC): H LEVEL CONCRETE

Competency: H2 Screed concrete

Objectives

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

- Screed concrete by hand.

LEARNING TASKS	CONTENT

1. Screed concrete by hand	• Purposes
	  ○ Surface elevation
	  ○ Surface contour
	• Procedure
	  ○ Grasp screed board
	  ○ Slice concrete
	• Reverse pulling method

Line (GAC): H LEVEL CONCRETE

Competency: H3 Bull float concrete

Objectives

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

- Describe bull floating concrete.

LEARNING TASKS

1. Describe bull floating concrete

CONTENT

- Types of bull floats
  - Magnesium
  - Wooden
  - Resin
- Purposes
  - Flatten surface
  - Seal surface paste
- Procedure
  - Working perpendicular to screeded surface
  - Push, then pull with pitch
  - Overlapping
  - Embed larger aggregates

Line (GAC): I FLOAT CONCRETE

Competency: I1 Float concrete by hand

Objectives

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

- Float concrete by hand.

LEARNING TASKS

1. Float concrete by hand

CONTENT

- Types of floats
  - Magnesium
  - Wood
  - Resin
  - Darby
- Purposes
  - Flatten surface
  - Seal surface paste
  - Consolidate concrete surface
  - Embed larger aggregates
- Procedure
  - Assessing surface conditions
  - Arching pattern
  - Float position
- Direction of work

Achievement Criteria

Performance: The learner will float concrete by hand.

Conditions: The learner will be given:

- Instructions
- Tools
- Materials

Criteria: The learner will be evaluated on:

- Technique
- Quality

Line (GAC): J HAND TOOL CONCRETE

Competency: J1 Edge perimeter of slab

Objectives

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

- Edge perimeter of slab.

LEARNING TASKS

1. Finish concrete with hand tools

CONTENT

- Types of edging tools
  - Safety step
  - Bull nose
  - Walking edger
- Purposes
  - Establish edges
  - Contour edges
  - Decorative edges
  - Densifying
  - Aids in formwork removal
- Procedures
  - Individual preferences (art form)
  - Order of movements
  - Application of force
  - Direction of work
  - Deficiencies

Line (GAC): J HAND TOOL CONCRETE

Competency: J3 Tool contraction joints

Objectives

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

- Locate and install control/contraction joints.

LEARNING TASKS

1. Perform concrete jointing

CONTENT

- Types of jointing tools
  - Hand groover
  - Pole groover
  - Skate attachment
- Purposes
  - Controlling location of cracking
  - Architectural
- Methods of installation
  - Location and depth
  - Zip strips
  - Zinc strips
- Tooled

Line (GAC): K TROWEL CONCRETE

Competency: K1 Trowel concrete by hand

Objectives

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

- Trowel concrete to specified finish.

LEARNING TASKS

1. Finish concrete with hand tools

CONTENT

- Types of trowels
  - Steel
    - Blue
    - Conventional
  - Plastic (epoxy trowel)
  - Swimming pool
  - Fresno/bull
  - Sweep/funny
- Purposes
  - Seal and smooth finish
  - Densification
  - Architectural
- Methods/ procedures
  - Assessing surface condition
  - Tool/method selection
    - Hand
    - Pole
    - Pitch and timing

Achievement Criteria (Note: This is a capstone project that contains elements of many competencies)

Performance — The learner will build forms and place concrete to a specified finish.

Conditions — The learner will be given:

- Specifications
- Instruction sheet
- Materials
- Tools and Equipment
- PPE

Criteria — The learner will be evaluated on:

- Safety procedures and use of PPE
- Selection and correct use of tools
- Quality of finish
- Proper sequence of forming, placing and finishing
- Completed within specified time
- Cleanup of work area and tools

Line (GAC): M CURE CONCRETE

Competency: M1 Wet-cure concrete

Objectives

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

- Describe wet-curing concrete.

LEARNING TASKS	CONTENT
1. Describe the process of curing concrete	• Cycle of cement hydration • Maintaining temperature and moisture retention
2. Describe the purpose of curing concrete	• Preventing shrinkage and curling • Strengthens • Increases durability

3. Describe the main curing methods	• With water
	  ○ Specialty curing paper
	  ○ Wet burlap
	  ○ Fogging
	  ○ Ponding
	  ○ Sprinklers/soaker hose
	• Without water
	  ○ Polyethylene sheeting
	• Waterproof paper

Line (GAC): M CURE CONCRETE

Competency: M2 Chemical cure concrete

Objectives

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

- Describe chemical curing of concrete.

LEARNING TASKS	CONTENT
1. Describe the purpose of curing concrete	• Preventing shrinkage and curling • Strengthens • Increases durability
2. Describe the process of curing concrete	• Cycle of cement hydration • Maintaining temperature and moisture retention • Timing and application objective • Overlapping
3. Describe the tools and equipment for chemical curing	• Spray cans • Airless sprayers • Rollers

4. Describe chemical curing methods of application	• PPE and safety considerations
	  ○ SDS/WHMIS
	• Selection of material
	• Liquid membrane
	  ○ Fugitive dye
	  ○ Dissipating
	  ○ Water-based
	• Solvent-based

Line (GAC): N CREATE CONTRACTION JOINTS

Competency: N1 Saw cut contraction joints

Objectives

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

- Describe saw cut contraction joints installation procedures.

LEARNING TASKS

1. Describe saw cut contraction joints installation procedures

CONTENT

- Tools and equipment
  - Saws
    - Walk behind
    - Cut-off
    - Wet
    - Early entry
    - Grinders
  - Lines
    - Chalk
    - String
- Purposes
  - Controlling cracking caused by drying shrinkage
  - Architectural
- Methods and procedures
  - Locations
  - Depth
- Spacing

Line (GAC): N CREATE CONTRACTION JOINTS

Competency: N2 Fill joints

Objectives

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

- Describe installation of joint filling materials.

LEARNING TASKS	CONTENT

1. Describe installation of joint filling materials	• Tools, equipment and materials
	  ○ Caulking gun
	  ○ Compressed air
	  ○ Backing rod
	  ○ Joint filler
	  ○ Joint sealant
	• Purposes
	  ○ Keeping joints clean
	  ○ Protecting joint edges
	• Methods/procedures
	  ○ PPE and safety considerations
	  ○ Assess environmental conditions
	  ○ Clean out joint
	  ○ Install backer rod if needed
	  ○ Mix filler/sealant according to manufacturers' specifications
	  ○ Fill joint
	• Disposal

Line (GAC): O PROTECT CONCRETE

Competency: O1 Protect plastic concrete

Objectives

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

- Describe methods of protecting plastic concrete.

LEARNING TASKS	CONTENT

1. Describe purpose of protecting concrete	• Purpose
	  ○ Protecting concrete from damage during setting and curing
	  ○ Improve durability
	• Environmental conditions
	  ○ Precipitation
	  ○ Humidity
	  ○ Solar radiation
	  ○ Adverse weather (temperature variations)
	  ○ Wind velocity
	• Physical damage

2. Describe methods of protecting concrete	• Tenting/hoarding
	  ○ Fans
	  ○ Sun shades
	  ○ Misters/fogging
	• Heating/cooling
	  ○ Safety considerations
	  – Exhaust
	  – Ventilation
	  ○ Insulated blankets
	  ○ Hay
	  ○ Electrical
	  ○ Glycol
	  ○ Water/crushed ice
	  ○ Surface evaporation reducer
	  ○ Heaters
	  – Propane
	  – Diesel
	  – LNG
	• Barriers/barricades
	  ○ Caution tape
	  ○ Delineators
	  ○ Fencing

3. Protect and cure concrete	• According to specifications

Line (GAC): O PROTECT CONCRETE

Competency: O2 Protect hardened concrete

Objectives

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

- Describe methods of protecting hardened concrete.

LEARNING TASKS	CONTENT

1. Describe purpose of protecting hardened concrete	• Purpose
	  ○ Protecting concrete from damage during curing
	  ○ Improve durability
	• Environmental conditions
	  ○ Humidity
	  ○ Adverse weather (temperature variations)
	• Physical damage

2. Describe methods of protecting hardened concrete	• Tenting/hoarding
	• Heating/cooling
	  ○ Safety considerations
	  – Exhaust
	  – Ventilation
	  ○ Insulated blankets
	  ○ Hay
	  ○ Electrical
	  ○ Glycol
	  ○ Heaters
	  – Propane
	  – Diesel
	  – LNG
	• Barriers/barricades
	  ○ Caution tape
	  ○ Delineators
	• Fencing

3. Protect and cure concrete	• According to specifications

Line (GAC): P REPAIR AND RESTORE CONCRETE

Competency: P1 Inspect concrete

Objectives

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

- Describe concrete defects and their causes.

LEARNING TASKS	CONTENT

1. Describe defects	• Construction defects
	  ○ Honeycomb
	  ○ Formwork deficiencies
	  ○ Efflorescence
	• Forces defects
	  ○ Impact
	  ○ Seismic
	  ○ Steel corrosion
	• Deterioration defects
	  ○ Spalling
	  ○ Delamination
	  ○ Scaling
	  ○ Dusting
	• Cracking

Line (GAC): P REPAIR AND RESTORE CONCRETE

Competency: P2 Remove materials

Objectives

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

- Perform removal for minor repair.

LEARNING TASKS	CONTENT

1. Describe types of repairs	• Minor
	  ○ Snap tie
	  ○ Bug holes
	  ○ Minimal honeycomb
	• Extensive
	  ○ Segragation
	  ○ Cracks
	• Delamination

2. Determine removal method for minor repairs	• Hand
	  ○ Hammer
	  ○ Chisel
	• Sledge hammer

3. Perform removal for minor repairs	• Removal of unsound materials • Disposal

Line (GAC): P REPAIR AND RESTORE CONCRETE

Competency: P3 Prepare surface for repair or restoration

Objectives

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

- Prepare surface for minor repair, including profile requirement.

LEARNING TASKS	CONTENT

1. Prepare surface for minor repairs	• Dust removal
	  ○ Water
	  ○ Wet/dry Vacuum
	• Construction practices/manufacturers' recommendations
	  ○ Profile requirements
	  ○ Bonding agents
	• Pre-soaking to surface saturated dry (SSD)

Line (GAC): P REPAIR AND RESTORE CONCRETE

Competency: P4 Install repair materials

Objectives

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

- Install repair materials for minor repairs.

LEARNING TASKS	CONTENT

1. Describe repair materials for minor repairs	• Non-shrink
	  ○ Cementitious
	  ○ Acrylic-based
	• Polymer-modified

2. Describe installing repair materials for minor repairs	• Mixing
	  ○ Manufacturers' instructions
	  ○ Required amounts for task
	• Bonding agents application if required

3. Install repair materials for minor repairs	• Procedures
	  ○ Dry-packing
	  ○ Hand-patching
	  – Tooling
	  – Finishing
	  – Curing if required
	  ○ Clean up

Achievement Criteria (Note: this is a capstone project for Line P)

Performance — The learner will perform a minor patch for repair, including:

- Assessment of defect
- Removal of materials
- Surface preparation
- Installation of repair materials

Conditions — The learner will be given:

- Instructions
- Tools and materials

Criteria — The learner will be evaluated on:

- Safety
- Proficiency
- Quality
- Time line
- Cleanliness

Level 2

Concrete Finisher

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B2 Use power tools

Objectives

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

- Use and maintain power tools.

LEARNING TASKS	CONTENT

1. Use and maintain electrical/cordless tools	• Types
	  ○ Portable mixers
	  ○ Grinders
	  – Hand held
	  – Ceiling
	  ○ Chipping guns
	  ○ Drills
	  – Hammer
	  – Mixing
	  ○ Saws
	  ○ Vibrators
	  ○ Power trowels
	• Ground fault circuit interrupters (GFCIs)
	• Double insulated
	• Correct gauge extension cords

2. Use and maintain gas/diesel powered equipment	• Types
	  ○ Pressure washers
	  ○ Generators
	  ○ Power trowels
	  ○ Scarifiers
	  ○ Floor grinders
	  ○ Concrete saws
	  ○ Vibrating screeds
	  ○ Backpack vibrators
	• Safety precautions
	• Applications
	• Operation of 2-stroke, 4-stroke cycle and diesel engines
	• Operating procedures

3. Use and maintain pneumatic tools	• Types
	  ○ Drills
	  ○ Saws
	  ○ Jack hammers
	  ○ Chipping hammers

LEARNING TASKS	CONTENT
	○ Vibrators ○ Scarifiers ○ Grinders ○ Scabblers ○ Compressors • Safety precautions • Applications • Adjustments • Operating procedures
4. Use and maintain compressors	• Safety precautions and set up ○ Wheel chocks ○ Spill kit • Inspection and maintenance ○ Fuel, oil and coolant monitoring ○ Condition of hoses and fittings ○ Oiling ○ Securing hose connections – Whip checks – Wire fittings • Operation ○ Air pressure ○ Size and lengths of hoses ○ Avoiding damage of hoses • Shut down procedures ○ Removal of charged air • Storage
5. Describe hydraulic tools and equipment	• Types ○ Roller screeds ○ Laser screeds ○ Wall saws ○ Power trowels ○ Coring • Safety precautions • Applications • Operating procedures

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B3 Use measuring equipment

Objectives

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

- Use measuring and layout tools.

LEARNING TASKS	CONTENT
1. Describe the purpose and applications of measuring equipment	• Precise measurements • Concrete placement and finishing procedures • Establishing high tolerance slabs

2. Use measuring and layout tools	• Types of measuring devices
	  ○ Laser level
	  ○ Builder's level
	  ○ Grading rod
	• String and chalk line

3. Describe tolerance of slab surfaces	• Specifications • Floor profilemeter

4. Establish string line location and elevation	• Interpretation
	  ○ Specifications
	  ○ Blueprint drawings
	  ○ Cut and fill sheets
	• Flat work
	• Extruder machines
	• Hub stations
	• Global positioning system (GPS)

Line (GAC): C ORGANIZE WORK

Competency: C1 Use documentation

Objectives

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

- Interpret reference materials and drawings for flat work and road building.

LEARNING TASKS	CONTENT
1. Interpret reference material and documentation	• Canadian Standards Association (CSA) • American Concrete Institute (ACI) • American Society for Testing and Materials (ASTM) • Portland Cement Association (PCA) • Manufactures documentation • Job-specific specifications

2. Interpret drawings	• Types
	  ○ Plot plans
	  ○ Dimension
	  ○ Section
	  ○ Cut/fill sheets
	• Lines
	• Symbols
	• Abbreviations
	• Scales
	  ○ Architect's
	  ○ Metric
	  ○ Engineer's
	• Parts
	  ○ Title block
	  ○ Revisions
	  ○ Elevations
	  ○ Schedules
	  ○ Legends

3. Interpret information found in curb and gutter prints	• Cut/fill sheets
	  ○ Elevation
	  ○ Location
	  – Set backs
	  – Catch basins
	  – Let down

Line (GAC): C ORGANIZE WORK

Competency: C2 Determine material requirements and quantities

Objectives

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

- Estimate concrete costs.

LEARNING TASKS	CONTENT
1. Describe design mix requirements	• Type of cement • Size and quantity of aggregate • Slump • Admixtures

2. Estimate concrete costs	• Calculations
	  ○ Area
	  ○ Volume
	  ○ Linear measurement
	  ○ Metric and imperial
	• Materials
	  ○ Concrete types
	  ○ Admixtures
	• Delivery
	  ○ Standby
	  ○ Wash out
	  ○ Small load
	  ○ Expiry
	• Surcharges and levies

Achievement Criteria

Performance	The learner will estimate concrete costs.
Conditions	The learner will be given: • Specifications • Calculator
Criteria	The learner will be evaluated on: • Accuracy

Line (GAC): C ORGANIZE WORK

Competency: C3 Sequence work procedures

Objectives

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

- Describe sequencing work for self-levelling overlayment installation.

LEARNING TASKS	CONTENT

1. Describe the sequence of work for self-levelling overlayment installation	• Evaluating task
	  ○ Material selection and estimation
	• Surface preparation
	  ○ Clean
	  ○ Profile
	• Tool and equipment selection
	• Mixing station set up
	• Mixing materials
	• Installation
	• Protection
	• Clean up and disposal

Line (GAC): D USE COMMUNICATION AND MENTORING TECHNIQUES

Competency: D1 Use communication techniques

Objectives

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

- Demonstrate effective communication.

LEARNING TASKS	CONTENT

1. Demonstrate two-way communication	• Verbal and written
	• Record keeping
	  ○ Daily journal
	  ○ FLRA

2. Use active listening	• Open-ended questions • Clarification

Line (GAC): D USE COMMUNICATION AND MENTORING TECHNIQUES

Competency: D2 Use mentoring techniques

Objectives

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

- Describe mentoring techniques.

LEARNING TASKS

1. Describe mentoring techniques

CONTENT

- Teaching methods
  - Case studies
  - Explaning objective
  - Demonstrating
  - Encouragement
  - Providing practice
    - Guided
    - Limited independence
    - Full independence
  - Assessment
  - Feedback
- Personal responsibilities and attitudes
  - Working safely
  - Accepting constructive feedback
  - Respect for authority
  - Asking questions
  - Stewardship of materials, tools and property
  - Time management and punctuality
  - Efficient work practices
- Learning needs
  - Learning disabilities
  - Learning preferences
  - Language proficiencies

Line (GAC): E PREPARE SITE

Competency: E1 Inspect site

Objectives

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

- Report on site conditions.

LEARNING TASKS

1. Report on site conditions

CONTENT

- Authorities having jurisdiction
  - Property owners/management
  - Engineering
  - Fish and wildlife
- Utility companies

Line (GAC): E PREPARE SITE

Competency: E2 Prepare sub-grade and elevations

Objectives

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

- Describe layout for flat work.
- Describe preparing layout for hand-formed curbs and gutter.

LEARNING TASKS	CONTENT
1. Describe basic layout for flat work	• Benchmarks • Measuring and setting elevations • Setting stakes to finish elevation • Establishing base lines • Establishing corners • Erecting batter boards • Check final grade of sub-base • Cut or fill sub-base according to elevation requirements
2. Describe preparation and compaction for sub-base	• Grading the sub-base to achieve slab elevation and uniform thickness • Compacting to specifications • Installing vapour barriers when required
3. Describe layout for hand-formed curb and gutter	• Cut/fill sheets • Take offs • Set pins according to offset • Set and adjust string line according to elevation requirements • Check final grade of sub-base • Cut or fill sub-base according to elevation requirements

Line (GAC): F USE FORMWORK

Competency: F1 Construct concrete formwork

Objectives

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

- Describe the construction of concrete formwork, their uses and components.

LEARNING TASKS	CONTENT
1. Describe the construction and applications of concrete formwork	• Slip form • Slip forms for silos • Gang forms • Falsework • Vertical
2. Describe concrete structures	• High rise • Bridge • Tunnel • Dam • Q-deck • Pre-cast • Segmental • Tilt-up • Stairs • Curbs and gutters • Walls • Columns

3. Describe concrete formwork systems	• Functions
	  ○ Bracing
	  ○ Shoring
	  ○ Supports
	• Components
	  ○ Bulkheads
	  ○ Walers
	  ○ Strong backs
	  ○ Snap ties
	  ○ Wedges
	  ○ Shebolts (taper ties)
	  ○ Coil rod
	  ○ Turnbuckles
	  ○ Cleats
	  ○ Sheathing
	  ○ Jack

LEARNING TASKS	CONTENT
	○ Architectural form liners

Line (GAC): F USE FORMWORK

Competency: F2 Install reinforcements

Objectives

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

- Describe types and advantages of reinforcements.
- Describe installation of reinforcements.

LEARNING TASKS	CONTENT

1. Describe types of reinforcements and their advantages	• Rebar
	  ○ Metal
	  ○ Galvanized
	  ○ Epoxy-coated
	  ○ Carbon fiber
	  ○ Stainless steel
	• Welded wire mesh
	• Synthetic fibers
	• Steel fibers
	• Post tension cable
	• Pre-stressed cable

2. Describe installation of reinforcements	• Code requirements and specifications
	• Equipment
	• Specified locations
	• Prevention of corrosion
	  ○ Zinc anoids
	  ○ Cathodic protection

Line (GAC): F USE FORMWORK

Competency: F3 Inspect formwork and reinforcement

Objectives

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

- Inspect reinforcement for defects prior to concrete placement.

LEARNING TASKS	CONTENT
1. Inspect reinforcements	• Adequate concrete coverage • Chair placement • Spacing • Height

Line (GAC): F USE FORMWORK

Competency: F5 Remove forms

Objectives

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

- Describe the preparation of used forms for reuse.

LEARNING TASKS

1. Describe the preparation of used forms for reuse

CONTENT

- Remove foreign materials
  - Nails
  - Chamfer strips
  - Leftover concrete
  - Keyways
- Clean
- Repair
  - Spalls
  - Surface damage
  - Broken pieces
- Application of form release
  - Form oil
  - Lithium grease
  - Wax
  - Environmentally safe products
- Housekeeping

Line (GAC): G PLACE CONCRETE

Competency: G1 Transport concrete on site

Objectives

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

- Describe transporting concrete for larger projects.

LEARNING TASKS	CONTENT

1. Describe transporting concrete for larger projects	• Applications and methods
	• Equipment
	  ○ Crane and bucket
	  ○ Boom pumps
	  ○ Line pumps
	  ○ Placing booms
	  ○ Conveyors
	  ○ Dump truck
	  ○ Helicopter/bucket

Line (GAC): G PLACE CONCRETE

Competency: G3 Consolidate concrete

Objectives

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

- Consolidate concrete by mechanical methods.

LEARNING TASKS

1. Describe consolidating concrete by mechanical methods

CONTENT

- Mechanical methods
  - Immersion-type vibrator
  - External-type vibrator
  - Vibra-screed
  - Vibrating tables
- Operation of equipment
  - Rate of insertion/extraction
  - Depth and spacing of penetration
  - Frequency of vibration
  - Field/radius of action
- Defects
  - Form blow out
  - Segregation
  - Honeycomb

Line (GAC): G PLACE CONCRETE

Competency: G4 Place concrete in vertical formwork

Objectives

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

- Describe concrete placement and consolidation in vertical formwork.
- Describe concrete placement and consolidation in concrete stairs.

LEARNING TASKS	CONTENT

1. Describe concrete placement in vertical formwork	• Considerations
	  ○ Mix design
	  ○ Slump
	  ○ Delivery rate
	  – Interruptions
	  – Cold joints
	  – Weather
	  ○ Pour
	  – Rate/speed
	  – Sequence/lifts

2. Describe consolidation methods	• Immersion-type • External • Rodding • Hand tapping

3. Describe strike off and finishing	• Formwork inspection
	  ○ Alignment
	  ○ Plumb
	  ○ Level
	  ○ Defects
	• Tools
	  ○ Hand floats
	  ○ Bull-nose edgers
	  ○ Trowels
	• Chamfer strips
	• Pour strips
	• Nails
	• Cleanliness

4. Describe concrete stair placement and finishing	• Considerations
	  ○ Formwork
	  – Inspection
	  – Construction
	  ○ Mix design
	  ○ Slump

LEARNING TASKS	CONTENT
	○ Sequence of placement ○ Cleanliness • Consolidating • Striking, floating and finishing • Tools ○ Hand floats ○ Hammers ○ Margin trowels ○ Edgers ○ Hand trowels • Curing requirements • Protection of surface

Line (GAC): H LEVEL CONCRETE

Competency: H1 Establish elevation

Objectives

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

- Establish elevations and location using cut sheet.

LEARNING TASKS	CONTENT

1. Establish elevations	• Benchmarks
	• Set screeds
	  ○ Wet screed
	  ○ Screed rails
	  ○ Monuments (hub stations)
	  ○ Bulkhead
	• Equipment
	  ○ Laser transit
	  ○ Builder's level
	  ○ Chalk lines
	  ○ Stakes and string lines
	  ○ Screed pipe
	  ○ Story pole

2. Prepare for concrete placing and finishing	• Tools and equipment required
	• Selecting and aligning placing equipment
	• Setting up elevation/screeds if applicable
	  ○ GPS
	  ○ Builder's level
	  ○ Laser level
	  ○ Set screeds
	• Stakes and string lines

3. Layout and construct forms for curb and gutters	• Setting elevations and establish location
	  ○ String line
	  ○ Existing curb
	• Selecting form material
	  ○ Steel
	  ○ Plywood
	  ○ Plastic
	• Setting forms to specifications (cut sheet)
	• Layout of isolation joints
	• Setting of catch basins and other objects in curb

LEARNING TASKS	CONTENT
	• Lay out of letdowns • Curb extruder (Gomaco)

Achievement Criteria

Performance	The learner will set string line for an extruded curb.
Conditions	The learner will be given: • Specifications • Instruction sheet (cut sheet) • Material • Tools and equipment • PPE
Criteria	The learner will be evaluated on • Following safety procedures • Use of PPE • Accuracy of string line according to plans • Completed within specified time

Line (GAC): H LEVEL CONCRETE

Competency: H2 Screed concrete

Objectives

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

- Screed concrete with roller screed.

LEARNING TASKS	CONTENT

1. Screed concrete	• Rodding off according to elevations
	• Vibra screed
	• Operating screeding equipment
	  ○ Laser
	  ○ Power/Truss
	• Roller

2. Describe installing a high tolerance slab	• Definition • Skill level required • Special methods of placement • Low slump • Frequent rechecking of elevation and flatness • Restraightening when required ○ Highway screed • Curing requirements • Protection of surface

Line (GAC): I FLOAT CONCRETE

Competency: I2 Float concrete by machine

Objectives

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

- Operate machines to float concrete.

LEARNING TASKS	CONTENT

1. Describe machines for floating concrete	• Types of machines
	  ○ Singles/walk-behinds
	  ○ Double ride-ons
	• Types of attachments
	  ○ Float blades/shoes
	  ○ Pans
	• Maintenance
	  ○ Troubleshooting
	  ○ Cleaning
	• Inspection
	  ○ Fluids
	  ○ Kill switch
	• Blade/pan condition

2. Operate machines to float concrete flatwork	• Regulations
	  ○ Noise bylaws
	  ○ Timelines
	• Safety considerations
	  ○ Carbon monoxide
	  ○ Protrusions
	  ○ Site illumination
	  ○ Elevation changes
	• Purposes
	  ○ Flatten surface
	  ○ Seal surface paste
	  ○ Consolidate concrete surface
	  ○ Embed larger aggregates
	  ○ Apply finish
	  – Textured
	  – Congealed
	• Procedure
	  ○ Assessing surface conditions
	  ○ Direction of work
	  ○ Pattern
	  ○ Blade pitch

LEARNING TASKS	CONTENT
	○ Machine speed

Line (GAC): J HAND TOOL CONCRETE

Competency: J2 Finish extruded concrete surfaces

Objectives

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

- Describe finishing procedures for extruded concrete.

LEARNING TASKS	CONTENT

1. Describe finishing procedures for extruded concrete	• Types
	  ○ Curb and gutter
	  ○ Parapet
	  ○ Sidewalk
	  ○ Highway
	• Tools and equipment
	  ○ Curb extruders (Gamaco)
	  ○ Hand mules
	  ○ Walking tools
	  ○ Long-handled mules
	• Awareness of slump and timelines
	• Installations
	  ○ Catch basins
	  ○ Control/expansion joints
	• Let downs
	• Curing requirements
	• Protection of surface

Line (GAC): K TROWEL CONCRETE

Competency: K2 Trowel concrete by machine

Objectives

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

- Operate machines to trowel concrete flatwork.

LEARNING TASKS	CONTENT

1. Describe machines for troweling concrete flatwork	• Types of machines
	  ○ Singles/walk-behinds
	  ○ Double ride-ons
	• Types of blades
	  ○ Finishing
	  ○ Combination
	  ○ Plastic
	• Maintenance
	  ○ Troubleshooting
	  ○ Cleaning
	• Inspection
	  ○ Fluids
	  ○ Kill switch
	  ○ Blade condition

2. Operate machines to trowel concrete flatwork	• Regulations
	  ○ Noise bylaws
	  ○ Timelines
	• Safety considerations
	  ○ Carbon monoxide
	  ○ Protrusions
	  ○ Site illumination
	  ○ Elevation changes
	• Purposes
	  ○ Seal surface paste
	  ○ Densify surface paste
	  ○ Applying finish
	  – Textured
	  – Smooth
	• Procedure
	  ○ Assessing surface conditions
	  ○ Direction of work/ pattern
	  ○ Blade pitch
	  ○ Machine speed

Line (GAC): L APPLY SURFACE TREATMENTS TO CONCRETE

Competency: L1 Apply dry shake aggregate surface hardeners

Objectives

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

- Apply dry shake aggregate surface hardeners.

LEARNING TASKS	CONTENT

1. Describe dry shake aggregate surface hardeners	• Types
	  ○ Mineral
	  ○ Metallic
	  ○ Blended
	  ○ Natural
	  ○ Pigmented
	• Purpose
	  ○ Structural surface/ wear resistance
	• Architectural

2. Describe the application of surface hardeners	• Safety considerations
	  ○ PPE
	• Application methods
	  ○ Integrally mixed
	  ○ Broadcast by hand
	• Broadcast mechanically

3. Describe installation of surface hardeners	• Hand float • Bull float • Power float/pan

4. Describe factors to consider before dry shake broadcasting	• Environmental
	  ○ Sun
	  ○ Wind
	  ○ Rain
	• Surface bleeding
	• Concrete set
	  ○ Early
	  ○ Late (Evaporation reducers)

5. Describe the factors effecting the installation of dry shake aggregate	• Surface conditions
	• Improper application
	  ○ Inconsistent quantity (shading)
	  ○ Surface delamination
	• Improper finishing
	• Surface blistering

LEARNING TASKS	CONTENT
6. Describe curing procedures	• Liquid curing membrane
7. Apply dry shake aggregate surface hardeners	• Hand application techniques

Line (GAC): L APPLY SURFACE TREATMENTS TO CONCRETE

Competency: L2 Apply exposed aggregate finish

Objectives

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

- Create exposed aggregate finish.

LEARNING TASKS	CONTENT

1. Describe exposed aggregate finish	• Purpose
	  ○ Architectural
	  ○ Green cutting (structural bonding)
	• Types
	  ○ Seeded
	  ○ Integral
	  ○ Colour
	• Size

2. Describe application of exposed aggregate	• Vertical ○ Surface form retarders • Horizontal • Surface spray

3. Describe placing of concrete for exposed aggregate finishes	• Mix design
	  ○ Specialized aggregate gradation and selection
	• Placing and finishing procedures
	  ○ Planning
	  ○ Vertical
	• Horizontal

4. Describe washing concrete surface	• Washing methods
	  ○ Hose and nozzle
	  ○ Power washer
	  ○ Push broom
	• Timing
	  ○ Firmness/set
	  ○ Bleed water
	  ○ Colouration
	  ○ Consistency of exposure
	• Disposal of surface residue

5. Describe preparation exposed surface for sealant	• Pre-wet • Acid wash • Rinse

LEARNING TASKS	CONTENT
6. Create exposed aggregate finish	• Place • Finish • Tooling • Wash

Line (GAC): L APPLY SURFACE TREATMENTS TO CONCRETE

Competency: L3 Texture concrete surface

Objectives

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

- Describe techniques to achieve surface textures.

LEARNING TASKS	CONTENT

1. Describe surface textures	• Types
	  ○ Smooth
	  ○ Broom
	  ○ Tyne
	  ○ Exposed
	  ○ Swirl
	  ○ Stamped
	  ○ Herringbone
	• Purpose
	  ○ Architectural
	• Safety

2. Describe finishing techniques to achieve different types of textures	• Material • Texture requirement • Timing • Tool selection and use

Line (GAC): L APPLY SURFACE TREATMENTS TO CONCRETE

Competency: L4 Apply stamped concrete surface finish

Objectives

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

- Apply stamped concrete finishes.

LEARNING TASKS	CONTENT

1. Describe stamped finishes	• Types
	  ○ Seamless
	  ○ Defined
	  ○ Grouted
	  ○ Stenciled
	• Purpose
	• Architectural

2. Apply stamped concrete finishes	• Concrete mixture
	  ○ Aggregate size
	• Surface design
	  ○ Flexible
	  ○ Urethane
	  ○ Paper
	  ○ Metal
	• Colour options/ releases
	  ○ Powdered
	  ○ Liquid
	• Timing
	• Tools and equipment
	  ○ Tampers
	  ○ Roller
	  ○ Touch up tools

Line (GAC): L APPLY SURFACE TREATMENTS TO CONCRETE

Competency: L5 Apply evaporation reducers

Objectives

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

- Describe the application of evaporation reducers.

LEARNING TASKS	CONTENT

1. Describe the application of evaporation reducers	• Conditions
	  ○ Solar radiation
	  ○ Wind velocity
	  ○ Low slump
	  ○ Absence of water bleeding
	• Purpose
	  ○ Prevention of plastic shrinkage cracking
	  ○ Prevention of crusting of the surface
	• Application
	• Spray

Line (GAC): P REPAIR AND RESTORE CONCRETE

Competency: P1 Inspect concrete

Objectives

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

- Identify defects and repair/removal options.

LEARNING TASKS	CONTENT

1. Describe assessment techniques	• Non-destructive
	  ○ Visually
	  ○ Audibly
	  ○ Chain dragging
	  ○ X-ray
	  ○ Impact rebound hammer
	• Destructive
	  ○ Core sample
	  ○ Exploratory removal
	• Copper-copper-sulfate test

2. Identify options for removal or repair	• Types of repairs • Repairable vs. removable defects • Cost and time • Project-specific considerations

Line (GAC): P REPAIR AND RESTORE CONCRETE

Competency: P2 Remove materials

Objectives

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

- Describe removal procedures for extensive repairs.

LEARNING TASKS	CONTENT

1. Determine removal methods for extensive repair	• Hand
	  ○ Hammer
	  ○ Chisel
	  ○ Sledge hammer
	• Mechanical
	  ○ Chipping gun
	  ○ Bush hammer
	  ○ Scarifier
	  ○ Scabbler
	  ○ Media-blasting
	• Chemical
	  ○ Acid solution
	• Non-explosive demolition agent

2. Remove materials for extensive repair	• Locating embedded items
	  ○ Electrical conduit
	  ○ Post-tension cables
	  ○ Mechanical
	• Protection and isolation of area of demolition
	• Operation of removal equipment
	• Air compressor
	• Skid steer
	• Back hoe
	• Jack hammer
	• Power buggies
	• Disposal of debris

Line (GAC): P REPAIR AND RESTORE CONCRETE

Competency: P3 Prepare surface for repair or restoration

Objectives

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

- Prepare surface for extensive structural repairs.
- Prepare surface for extensive architectural resurfacing.

LEARNING TASKS	CONTENT

1. Describe extensive repairs	• Structural
	  ○ Dry pack
	  ○ Pour back
	  ○ Epoxy injection
	  ○ Shotcrete/gunite
	• Surface/ architectural
	  ○ Plycap/skimcoat
	• Parging

2. Prepare surface for extensive structural repairs	• Cleaning
	  ○ Degreasing
	  ○ Steam
	• Profiling
	  ○ Grinding
	  ○ Chipping
	  ○ Abrading
	  ○ Scarifying
	  ○ Sand blasting
	• Pre-soaking to SSD when required
	• Bonding agent application
	  ○ Latex/acrylic
	  ○ Cementitious slurry
	• Epoxy

3. Prepare surface for concrete architectural resurfacing	• Cleaning and assessing
	• Measuring substrate moisture transmission
	  ○ Calcium chloride moisture test
	• Profiling
	  ○ Abrading
	  ○ Shot blasting
	  ○ Bush hammering
	  ○ Scarifying
	• Applying bonding agents

Line (GAC): P REPAIR AND RESTORE CONCRETE

Competency: P4 Install repair materials

Objectives

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

- Install repair materials for extensive repairs.

LEARNING TASKS	CONTENT

1. Describe methods of extensive repair	• Architectural
	  ○ Patching
	  ○ Parging/sacking
	• Structural
	  ○ Patching
	  ○ Dry pack
	  ○ Pour back
	  ○ Epoxy injection
	  ○ Polyurethane injection
	• Pressure grouting

2. Install repair material	• Safety considerations
	  ○ PPE
	  ○ SDS
	• Tools and equipment
	• Mix material to manufacturers' specifications
	• Bonding agents application if required
	• Placing procedures
	• Finishing requirements
	• Curing requirements
	• Protection of surface
	• Disposal

Achievement Criteria (Note: this is a capstone project for Line P)

Performance The learner will perform an extensive repair, including:

- Assessment of defect
- Removal of materials
- Surface preparation
- Installation of repair materials

Conditions — The learner will be given:

- PPE
- Instructions
- SDS
- Tools and equipment
- Materials

Criteria — The learner will be evaluated on:

- Safety
- Proficiency
- Quality
- Time line
- Cleanliness
- Disposal of waste materials according to regulations

Line (GAC): Q APPLY SURFACE TREATMENT TO HARDENED CONCRETE

Competency: Q1 Prepare surface for surface treatments

Objectives

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

- Describe methods of remediation for surface defects.
- Describe methods of surface preparation for surface treatments.
- Profile hardened concrete surface.

LEARNING TASKS	CONTENT
1. Describe surface defects	• Scaling • Spalling • Dusting • Delamination • Cracks • Curling • Uneven surface

2. Describe remediation techniques	• Overlayments
	• Repour
	• Seamless coatings
	• Toppings
	  ○ Bonded
	  ○ Un-bonded
	• Parging
	• Chemical surface treatments

3. Identify surface resists and removal options	• Oils • Grease • Sealers • Waxes • Paints • Dust
4. Profile surface	• Sandblast/shotblast • Bush hammer • Grind • Scarify • Vacuum

Line (GAC): Q APPLY SURFACE TREATMENT TO HARDENED CONCRETE

Competency: Q2 Abrade surface to achieve architectural finish

Objectives

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

- Describe the procedures to abrade concrete surfaces to achieve an architectural finish.

LEARNING TASKS	CONTENT

1. Describe architectural concrete finishes	• Types
	  ○ Terrazzo
	  ○ Cementitious
	  ○ Epoxy
	  ○ Polished concrete
	  ○ Sandblasted
	  ○ Bush hammered

2. Describe abrading methods to achieve architectural concrete finishes	• Methods
	  ○ Sandblasting
	  ○ Grinding/honing/polishing
	  ○ Bush hammering
	  ○ Wash-coating (pressure washing)
	• Equipment selection

3. Describe the effects of abrading concrete	• Safety considerations • Environmental • Disposal

Line (GAC): Q APPLY SURFACE TREATMENT TO HARDENED CONCRETE

Competency: Q3 Apply seamless systems

Objectives

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

- Install seamless systems for hardened concrete.

LEARNING TASKS	CONTENT

1. Describe seamless systems for hardened concrete	• Types
	  ○ Coating
	  ○ Self-levelling
	  ○ Broadcast systems
	  ○ Trowel-down systems
	  ○ Epoxy
	  ○ Non-static floor coating
	• Terrazzo

2. Describe requirements for bonding	• Bonding requirements
	  ○ Primer
	  ○ Slurry
	  ○ Epoxy

3. Install seamless systems for hardened concrete	• Methods
	  ○ Trowel-down
	  ○ Bucket
	  ○ Pump
	• Equipment selection

4. Describe the functions of seamless floor systems	• Architectural • Remedial

Line (GAC): Q APPLY SURFACE TREATMENT TO HARDENED CONCRETE

Competency: Q4 Apply bonded and non-bonded toppings to concrete

Objectives

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

- Describe application of bonded and non-bonded toppings to concrete.

LEARNING TASKS	CONTENT
1. Describe types of bonded and non-bonded toppings	• Pre-blended • Modified concrete • Grout/mortar

2. Describe application procedures	• Bonded (Permanent)
	  ○ Primers
	• Non-bonded (Non-permanent)
	  ○ Slip sheet

Line (GAC): Q APPLY SURFACE TREATMENT TO HARDENED CONCRETE

Competency: Q5 Parge vertical surfaces

Objectives

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

- Describe application of surface mortar to a vertical concrete surface.

LEARNING TASKS	CONTENT

1. Describe application of surface mortar to a vertical concrete surface	• Purpose
	• Types
	  ○ Cementitious
	  ○ Acrylic
	• Surface preparation
	• Application/finish methods
	  ○ Trowel
	  ○ Knock down
	  ○ Dash
	  ○ Sponge
	  ○ Stencil

Line (GAC): Q APPLY SURFACE TREATMENT TO HARDENED CONCRETE

Competency: Q6 Apply chemical surface treatment

Objectives

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

- Apply chemical surface treatments for architectural applications.

LEARNING TASKS	CONTENT

1. Apply chemical surface treatments for architectural applications	• Types
	  ○ Reactive stain
	  ○ Dye
	• Surface prep and precautions
	• Application procedure
	• Disposal

2. Describe chemical surface treatments for structural applications	• Types
	  ○ Penetrating
	  – Silane
	  – Siloxane
	  ○ Topical
	  – Acrylic
	  – Urethane
	  – Epoxy
	• Surface prep and precautions
	• Application procedure
	• Disposal

Line (GAC): R GROUT

Competency: R1 Prepare surface for grouting

Objectives

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

- Prepare surface for grout installation.

LEARNING TASKS	CONTENT

1. Describe the purpose of grout usage	• Purpose
	  ○ To fill voids
	  ○ To transfer loads to concrete foundations
	  – Column base
	  – Machine base

2. Identify types of grouts	• Cementitious
	  ○ Dry pack
	  ○ Flowable grout
	  ○ Polymeric grouts
	  ○ Expanding
	  ○ Non shrinking
	• Epoxy
	• Polymeric

3. Prepare surfaces for grout installation	• Abrading • Clean • Construct formwork ○ Apply form release agent • Water saturation to SSD • Bonding agent requirements

Line (GAC): R GROUT

Competency: R2 Install grout

Objectives

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

- Mix grout.
- Install dry pack grout.

LEARNING TASKS	CONTENT
1. Describe procedures to grout	• Select product • Estimate quantity • Set up mixing station • Mix • Install
2. Mix grout	• Assemble tools and equipment • Measure materials ○ Manufacturers instructions • Mix to ratio to required consistency
3. Install dry pack grout	• Bonding agent • Apply grout • Tightly pack the material • Level edge surface

4. Describe procedure to install liquid grout	• Bonding agent
	• Install grout
	  ○ Head box
	  ○ Pump
	• Strap/chain

5. Describe quality control tests for grout	• Flow test • Cube test

Line (GAC): R GROUT

Competency: R3 Finish exposed grout surface

Objectives

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

- Finish exposed grout surfaces.

LEARNING TASKS	CONTENT

1. Determine grout set	• Strip required formwork
	• Tool surface
	• Select cure method
	• Apply cure
	  ○ Wet burlap
	  ○ Misting
	  ○ Spraying
	  ○ Chemical curing compound
	• Disposal

Achievement Criteria: (note: This is a capstone project for R Line)

Performance: The learner will mix and install drypack grout.

Conditions: The learner will be given:

- Specifications
- Instruction sheet
- Material
- Tools and equipment
- PPE

Criteria: The learner be evaluated on:

- Following safety procedures
- Use of PPE
- Consistency of mix
- Installation
- Quality of finish
- Curing procedures
- Completed within specified time
- Housekeeping

Line (GAC): S PERFORM CUTTING AND CORING

Competency: S1 Perform cutting

Objectives

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

- Perform cutting.

LEARNING TASKS

1. Perform cutting

CONTENT

- Determine location/depth
- Hazard assessment
  - Conduits
  - Post-tension cables
  - Uncontrolled force
- Cordoning off/barricades
- Wet or dry cut
- Equipment required
  - Cut-off saw
  - Conventional floor saw
  - Early entry saw
  - Wall saw
- Clean up/disposal

Line (GAC): S PERFORM CUTTING AND CORING

Competency: S2 Perform coring

Objectives

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

- Describe coring procedures.

LEARNING TASKS

1. Describe coring procedures

CONTENT

- Determine location/depth/diameter
- Hazards
  - Conduits
  - Post-tension cables
  - Uncontrolled force
  - Rotating equipment
  - Dust, debris, slurry
- Cordoning off/barricades
- Wet or dry cut
- Equipment required
  - Coring machine
  - Hammer drill
  - Tooling
- Clean up/disposal

Section 4

ASSESSMENT GUIDELINES

Assessment Guidelines – Level 1

Level 1 Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING:	CONCRETE FINISHER LEVEL 1		
LINE	**SUBJECT COMPETENCIES**	**THEORY WEIGHTING**	**PRACTICAL WEIGHTING**
A	PERFORM SAFETY-RELATED FUNCTIONS	10%	0%
B	USE TOOLS AND EQUIPMENT	7%	0%
C	ORGANIZE WORK	5%	20%
D	USE COMMUNICATION AND MENTORING TECHNIQUES	2%	0%
E	PREPARE SITE	5%	0%
F	USE FORMWORK	5%	0%
G	PLACE CONCRETE	7%	0%
H	LEVEL CONCRETE	8%	0%
I	FLOAT CONCRETE	8%	25%
J	HAND TOOL CONCRETE	8%	0%
K	TROWEL CONCRETE	10%	25%
M	CURE CONCRETE	5%	0%
N	CREATE CONTRACTION JOINTS	5%	0%
O	PROTECT CONCRETE	5%	0%
P	REPAIR AND RESTORE CONCRETE	10%	30%
	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 Concrete Finisher Standardized Level exam		IN-SCHOOL %	

In-school Mark Combined theory and practical subject competency multiplied by	80%
Standardized 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:	CONCRETE FINISHER LEVEL 2		
LINE	**SUBJECT COMPETENCIES**	**THEORY WEIGHTING**	**PRACTICAL WEIGHTING**
B	USE TOOLS AND EQUIPMENT	5%	0%
C	ORGANIZE WORK	5%	20%
D	USE COMMUNICATION AND MENTORING TECHNIQUES	3%	0%
E	PREPARE SITE	5%	0%
F	USE FORMWORK	5%	0%
G	PLACE CONCRETE	8%	0%
H	LEVEL CONCRETE	10%	10%
I	FLOAT CONCRETE	10%	0%
J	HAND TOOL CONCRETE	7%	0%
K	TROWEL CONCRETE	10%	0%
L	APPLY SURFACE TREATMENTS TO CONCRETE	7%	0%
P	REPAIR AND RESTORE CONCRETE	10%	35%
Q	APPLY SURFACE TREATMENT TO HARDENED CONCRETE	7%	0%
R	GROUT	5%	35%
S	PERFORM CUTTING AND CORING	3%	0%
	Total	100%	100%
In-school theory / practical subject competency weighting		45%	65%
Final in-school mark		IN-SCHOOL %	

All apprentices who complete Level 2 of the Concrete Finisher program with a FINAL level percentage score of 70% or greater will write the Interprovincial Red Seal examination as their final assessment. A minimum percentage score of 70% on the examination is required for a pass.

Section 5

TRAINING PROVIDER STANDARDS

Facility Requirements

Classroom Area

- Comfortable seating and tables suitable for learning
- Compliance with the local and national fire code and occupational safety requirements
- Overhead and multimedia projectors with a projection screen
- 700 square feet classroom space per class of 16 students
- Whiteboard with marking pens and erasers
- Lighting controls to allow easy visibility of the projection screen while allowing students to take notes
- 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

Shop Area

- Compliance with all local and national codes and occupational safety requirements
- Space for a tool crib
- Exterior material storage area including practical training area
- Adequate lighting and lighting control
- Ventilation as per WorkSafeBC standards
- Refuse and recycling bins for used shop materials
- First-aid facilities

Lab Requirements

- N/A

Student Facilities

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

Instructor's Office Space

- Desk and filing space
- Computer

Other

- N/A

Tools and Equipment

Recommended numbers indicated are based on a class of 16 students.

Personal Protective Equipment (PPE) and Safety Equipment– Both Levels

	Disposable hearing protection
2	Eye wash station
4	Fire extinguisher
3	First aid kit
16	Gloves
16	Knee pad
16	Safety glasses/goggles/smoggles
4	Spiked footwear

Hand Tools – Both Levels

	Aluminum handles
3	Broom, push
16	Brush, water
16	Bucket
	Bull float (wood, magnesium)
2	Chalk line
8	Cold chisels
8	Come along
2	Crowbar
4	Darby
16	Edger
12	Extension cords
4	Finishing broom
16	Hammer, claw
16	Hand float, magnesium
8	Hand float, resin
4	Hand level
4	Hand saw
2	Lifting hook
16	Margin trowel
16	Pointing trowel
2	Pry bar
8	Rake
4	Roller applicator
2	Scraper
8	Square shovel
1	Squeegee
8	String line
4	Water hose
1	Wet/dry vacuum
4	Wheelbarrow

Hand Tools –Level 1 Only

4	Carborundum brick (hand stone)
16	Centre edger
2	Cone wrench
4	Fresno trowel
16	Groover
16	Hand screed
1	Jitterbug/ buggy roller
8	Kneeboard and slider
4	Skate (attachment)
1	Tining tool

Hand Tools – Level 2 Only

4	Bush hammer
2	Caulking gun
1	Check rod
4	Cove base tool
16	Hand float, sponge
16	Hand trowel
2	Handled smoothers
1	Highway straightedge (bump cutter)
1	Spiked roller
3	Sprayer bottle
2	Tamper
18	Texturing stamp
4	Touch-up roller
3	Watering can

Power Tools – Both Levels

8	Angle grinder	1	Generator
8	Chipping hammer and bit	6	Portable light
3	Drill with mixing paddle	8	Power bush hammer
2	Floor grinder	1	Pressure washer

Power Tools – Level 1 Only

2 Mortar mixer

Power Tools – Level 2 Only

1	Air compressor	3	Power trowel and blades (finishing blades and float attachments)
4	Hammer drill	1	Sand/shot blaster
1	Power buggy	1	Scarifier/planer
2	Power saw and blades (quick-cut, walk behind, early entry saws)	1	Vibrator
2	Power screed (roller, truss, vibratory)		

Measuring and Testing Equipment – Both Levels

1	Air meter	4	Straight edge
16	Builders' level	16	Tape measure
2	Laser level	4	Thermometer
1	Slump cone and rod	1	Transit
16	Square		

Reference Materials

Required Reference Materials

Kosmatka, S. H., & Wilson, M. L. (2002). *Design and control of concrete mixtures*. Skokie, IL: Portland Cement Association. 7th Canadian edition.

Recommended Resources

Concrete materials and methods of concrete construction: test methods and standard practices for concrete. (2014). Mississauga, Ontario, Canada: CSA Group. A23.1 /A23.2-14

Harris, B. (2004). *Bob Harris guide to stamped concrete.* Douglasville, GA: Decorative Concrete Institute.

Harris, B. (2005). *Bob Harris guide to concrete overlays and toppings*. Douglasville, GA: Decorative Concrete Institute.

Tarr, S. M., & Farny, J. A. (2008). *Concrete floors on ground*. Skokie, IL: Portland Cement Association.

Other Resources

ACI Certification: Specialty Commercial/Industrial Concrete Flatwork Finisher

Occupational Health and Safety Regulation. WorkSafeBC. https://www.worksafebc.com/en/law-policy/occupational-health-safety/searchable-ohs-regulation/ohs-regulation

Instructor Requirements

Occupation Qualification

The instructor must possess:

- A Concrete Finisher BC Certificate of Qualification with Red Seal Endorsement, or
- A Concrete Finisher Certificate of Qualification from another Canadian jurisdiction with Red Seal Endorsement.

Work Experience

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

Instructional Experience and Education

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

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

Appendices

Appendix A
Glossary of Acronyms

ANSI	American National Standards Institute
CSA	Canadian Standards Association
FLRA	Field Level Risk Assessment
GFCI	Ground fault circuit interrupters
GPS	Global positioning system
GU	General use (cement)
HE	High early (cement)
HS	High sulfate resistant (cement)
ICF	Insulated concrete forming
LH	Low heat of hydration (cement)
LNG	Liquefied natural gas
MS	Moderate sulfate resistant (cement)
OHS	Occupational Health and Safety
PPE	Personal Protective Equipment
SDS	Safety Data Sheet(s)
SSD	Surface saturated dry
WHMIS	Workplace Hazardous Materials Information System

Appendix B
Previous Contributors

The previous Program Outline (2010) was prepared with the advice and direction of an industry steering committee. Members included:

- Ron Adamson
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- Fred Boonstra
- Daryl Bowers
- Dan Bruno
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- Alex Musso
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- Josh Towsley