

Red Seal Occupational Standard

Concrete Finisher



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RED SEAL
OCCUPATIONAL
STANDARD
CONCRETE FINISHER



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FOREWORD

The Canadian Council of Directors of Apprenticeship (CCDA) recognizes this Red Seal Occupational Standard (RSOS) as the Red Seal standard for the Concrete Finisher trade.

Background

The first National Conference on Apprenticeship in Trades and Industries, held in Ottawa in 1952, recommended that the federal government be requested to cooperate with provincial and territorial apprenticeship committees and officials in preparing analyses of a number of skilled occupations. Employment and Social Development Canada (ESDC) sponsors the Red Seal Program, which, under the guidance of the CCDA, develops a national occupational standard for each of the Red Seal trades.

Standards have the following objectives:

- to describe and group the tasks performed by skilled workers;
- to identify which tasks are performed in every province and territory;
- to develop instruments for use in the preparation of Interprovincial Red Seal Examinations and assessment tools for apprenticeship and certification authorities;
- to develop common tools for apprenticeship on-the-job and technical training in Canada;
- to facilitate the mobility of apprentices and skilled workers in Canada;
- to supply employers, employees, associations, industries, training institutions and governments with analyses of occupations.

Any questions, comments, or suggestions for changes, corrections, or revisions to this standard or any of its related products may be forwarded to:

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This standard was prepared by the Apprenticeship and Regulated Occupations Directorate of ESDC. The coordinating, facilitating and processing of this analysis were undertaken by employees of the standards development team of the Trades and Apprenticeship Division and of the Government of Newfoundland and Labrador, the host jurisdiction for this trade.

STRUCTURE OF THE OCCUPATIONAL STANDARD

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

Description of the Concrete Finisher trade: an overview of the trade's duties, work environment, job requirements, similar occupations and career progression

Trends in the Concrete Finisher trade: some of the trends identified by industry as being the most important for workers in this trade

Essential Skills Summary: an overview of how each of the 9 essential skills is applied in this trade

Roles and Opportunities for Skilled Trades in a Sustainable Future: an overarching description of how in the context of climate change, skilled trades play a large role in implementing solutions and adjusting to changes in the world. In addition to highlighting the importance of this awareness, the standard may also contain more details on activities, skills and knowledge elements that are specific to the trade

Industry Expected Performance: description of the expectations regarding the level of performance of the tasks, including information related to specific codes, regulations and standards that must be observed

Language Requirements: description of the language requirements for working and studying in this trade in Canada

Pie Chart: a graph which depicts the national percentages of exam questions assigned to the major work activities

Task Matrix and Examination Weightings: a chart which outlines graphically the major work activities, tasks and sub-tasks of this standard and their respective exam weightings

Major Work Activity (MWA): the largest division within the standard that is comprised of a distinct set of trade activities

Task: distinct actions that describe the activities within a major work activity

Task Descriptor: a general description of the task

Sub-task: distinct actions that describe the activities within a task

Essential Skills: the most relevant essential skills for this sub-task

Skills

Performance Criteria: description of the activities that are done as the sub-task is performed

Evidence of Attainment: proof that the activities of the sub-task meet the expected performance of a tradesperson who has reached journeyman level

Knowledge

Learning Outcomes: describes what should be learned relating to a sub-task while participating in technical or in-school training

Learning Objectives: topics to be covered during technical or in-school training in order to meet the learning outcomes for the sub-task

Range of Variables: elements that provide a more in-depth description of a term used in the performance criteria, evidence of attainment, learning outcomes, or learning objectives

Appendix A – Acronyms: a list of acronyms used in the standard with their full name

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

Appendix C – Glossary: definitions or explanations of selected technical terms used in the standard

DESCRIPTION OF THE CONCRETE FINISHER TRADE

“Concrete Finisher” is this trade’s official Red Seal occupational title approved by the CCDA. This standard covers tasks performed by concrete finishers whose occupational title has been identified by some provinces and territories of Canada under the following names:

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
Concrete Finisher	✓	✓	✓	✓			✓		✓	✓			
Cement Finisher					✓								
Cement (Concrete) Finisher						✓							

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. Materials that concrete finishers work with include concrete, grouts, chemical-curing compounds, exotics, epoxies, polyurethanes and acrylics. Concrete finishers should have a basic knowledge of constructing formwork, preparing subgrades and installing reinforcement.

Much of concrete placing and finishing has become mechanized with power screeds, power trowels, mechanical vibrators and pumps. Hand trowelling is still required for small jobs and to finish hard-to-reach spots in corners, edges, stairs and around obstacles such as pipes.

Concrete finishers work in the construction sector in both indoor and outdoor conditions. Outdoor work is weather-dependant and there may be less work available in the winter. Conversely, overtime is often required when the weather demands it.

Specialization in this trade is common. Concrete finishers specialize in working with specific materials such as coloured concrete, exposed aggregates and various epoxies, or specific techniques such as diamond-polishing concrete, power trowelling, and finishing curbs and gutters.

Key attributes for people entering this trade are stamina, spatial perception and hand-eye coordination. Creative and artistic skills are also helpful in this trade. Some physical activities of this trade are heavy lifting, climbing, balancing, bending, kneeling, crouching, crawling and reaching.

Concrete finishers work with a variety of other tradespeople. Heavy equipment operators may prepare the sub-base for concrete, ironworkers may prepare and place the reinforcing material and carpenters may place the formwork. Concrete finishers inspect this work and ensure that it is suitable for receiving the concrete. They also interact with plumbers and electricians when pipes and conduits are embedded in the concrete.

With experience, concrete finishers may move into supervisory, management or instructing roles.

TRENDS IN THE CONCRETE FINISHER TRADE

Products

There is a trend toward specialty concretes, including high performance concrete.

There is a greater emphasis on safety and the use of personal protective equipment (PPE) when working with materials in this trade.

In the area of vertical repairs, there is an increasing use of high performance repair materials.

There is a growing use of self-levelling underlayments for floor levelling.

The use of superplasticizers increase workability and reduce drying shrinkage. Macro-synthetic and steel fibres in cast-in-place concrete increases durability, and reduces cracking and movement. Concrete finishers may be required to add these materials to the mix on-site and the texture of those materials can cause some difficulties during the placement and finishing processes.

Increasingly, construction specifications are calling for floors with higher floor flatness and levelness (F_F and F_L) numbers. These tolerances mean that concrete finishers must have skills and experience in the installation of these floors.

There is an increase in architectural designs in concrete installation, which involves dyes as a topical application to concrete, similar to acid staining.

Diamond-polished concrete is becoming more common as an interior finish.

Tools and Equipment

Concrete finishers have access to an increasing variety of machines. Some machines spread materials, resulting in more accurate distribution. Laser-guided, mechanically operated screeds increase flatness and levelness of slabs. 3D-imaging equipment has been introduced to scan floor flatness and give instant feedback on tolerances of concrete. Edge machines used to finish edges are reducing the amount of overall handwork necessary. Technological advances in riding equipment have resulted in less physical strain to the concrete finisher and have increased productivity, flatness and improved quality of the finish.

In the field of curb and gutter construction, GPS technology to guide curb extruders has been introduced.

ESSENTIAL SKILLS SUMMARY

Essential skills are needed for work, learning and life. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change.

Through extensive research, the Government of Canada and other national and international agencies have identified and validated nine essential skills. These skills are used in nearly every occupation and throughout daily life in different ways.

A series of CCDA-endorsed tools have been developed to support apprentices in their training and to be better prepared for a career in the trades. The tools can be used independently or with the assistance of a tradesperson, trainer, employer, teacher or mentor to:

- understand how essential skills are used in the trades;
- learn about individual essential skills strengths and areas for improvement; and
- improve essential skills and increase success in an apprenticeship program.

The tools are available online or for order at: <https://www.canada.ca/en/employment-social-development/programs/essential-skills/profiles.html>.

The application of these skills may be described throughout this document within the competency statements which support each subtask of the trade. The following are summaries of the requirements in each of the essential skills, taken from the essential skills profile. A link to the complete essential skills profile can be found at: www.red-seal.ca.

READING

Concrete finishers read instructions on labels for products. They read workplace safety materials as well as manuals, work orders, information sheets and reports. They also read emails and memos from supervisors and co-workers about ongoing work.

DOCUMENT USE

Concrete finishers locate data on documents such as labels, lists, tables and schedules. They use drawings, specifications and information in work orders and manufacturers' instructions to plan and complete work. They use forms and production reports to keep track of information such as amount of concrete used, set-up and finishing times. Safety audit forms are used to identify hazards.

WRITING

Concrete finishers write brief text entries in forms and in logbooks. They may describe project details on estimate sheets. They write notes or emails to supervisors and co-workers about ongoing work, material requirements and equipment malfunctions. They may also complete safety documentation and write incident reports to describe events leading up to a workplace incident.

ORAL COMMUNICATION

Concrete finishers discuss work orders, equipment and job task coordination with co-workers. They also discuss safety, productivity, and procedural and policy changes at meetings with co-workers, supervisors and clients. They inform supervisors about work progress and may seek guidance and approvals from them. They also talk to suppliers about orders and deliveries.

NUMERACY

Concrete finishers measure areas, distances, angles, slopes and volumes. They perform calculations such as volume of concrete and quantities of finishing products for jobs, and set timelines for placing, finishing, curing and protection tasks. They estimate time to complete tasks.

THINKING

Thinking skills are important for concrete finishers. They make decisions about order of tasks and their priorities as well as the selection of tools and equipment, methods and products for concrete finishing and repair. They evaluate the preparedness of job sites for placing and finishing concrete. They problem solve in situations that affect job completion such as insufficient manpower on-site, equipment breakdowns, late or missing deliveries, and job site safety and inaccessibility. They also assess the quality of concrete finishing jobs by checking elevations, observing the appearance and consistency of concrete, and evaluating the aesthetic appearance of decorative concrete work.

DIGITAL TECHNOLOGY

Technologies are transforming the ways in which concrete finishers obtain, analyze and communicate information. They use devices, such as calculators or calculating applications on their personal devices to complete numeracy-related tasks. They use communications software to exchange emails with clients, co-workers and supervisors.

Self-employed concrete finishers may use bookkeeping, accounting and billing software. They may use word processing, spreadsheet or database software to prepare job estimates, calculate costs and retrieve forms and drawings.

WORKING WITH OTHERS

Concrete finishers coordinate job tasks with other finishers and trades to complete jobs. They also coordinate job tasks with drivers, operators, surveyors and other tradespeople on work sites.

CONTINUOUS LEARNING

Concrete finishers are continuously learning new skills relating to evolving technologies and materials. They may learn on the job through mentorship or through formal training.

Roles and Opportunities for Skilled Trades in a Sustainable Future

Climate change affects all of us. Trades play a large role in implementing solutions and adjusting to changes in the world.

Throughout this standard, there may be specific references to tasks, skills and knowledge that clearly show this trade's role in a more sustainable future. Each trade has different roles to play and contributions to make in their own way.

For example:

- Construction tradespeople need to consider the materials they are using, building methods, and improvements to mechanical and electrical installations. There are important changes to codes and standards to help meet the climate change goals and commitments set for 2030 and 2050. Retrofits and new construction of low-energy buildings provide enormous opportunities for workers in this sector. Concepts, such as energy efficiency and regarding buildings as systems are foundational.
- Automotive and mechanical trades are seeing a shift towards the electrification of vehicles and equipment. As a result, new skills and knowledge will be required for tradespeople working in this sector. There are mandates for sales of new light-duty zero-emission vehicles (ZEV) in Canada, with the goal of achieving 100% ZEV sales by 2035. Due to this mandate, the demand for these vehicles is growing quickly among consumers and fleets. With this escalating demand, the need for skilled workers to maintain and repair these vehicles is also increasing.
- In industrial and resource sectors, there is pressure to move towards increased electrification of industrial processes. Many industrial and commercial facilities are also being upgraded to improve energy efficiency in areas such as lighting systems, and new production processes and technologies. There are also opportunities in carbon capture, utilization and storage (CCUS), as well as the production and export of low-carbon hydrogen.
- Trades in the service sector may also need to be aware of responsible sourcing, as well as efficient use of products and materials. New ways of working better are always a part of the job.

There are fast-moving changes in guidelines, codes, regulations and specifications. Many are being implemented for the purpose of energy efficiency and climate change. Those that affect specific trades may be mentioned within the standard. Examples of these guidelines and legislation include:

- The National Energy Code of Canada for Buildings (NECB).
- The Canadian Net-Zero Emissions Accountability Act (CNZEAA).
- programs that encourage sustainable building design and construction such as Leadership in Energy and Environmental Design (LEED) and the Zero Carbon Building (ZCB) standards.
- the Montreal Protocol for phasing out R22 refrigerants.
- energy efficiency programs such as ENERGY STAR.
- principles of the United Nations Declaration for the Rights of Indigenous Peoples pertaining to energy sector development.

Apprentices and tradespeople need to increase their climate literacy and reinforce their own understanding of energy issues and environmental practices. It is important for them to understand why these changes are happening and their effect on trades' work. While individual tradespeople and apprentices may not be able to choose certain elements like; the architectural design of buildings, building material selection, regulatory requirements, use of electric vehicles and technologies, they must understand the impact of using these elements in their work. Impacts include using environmentally friendly products and following requirements related to the disposal and recycling of materials.

In apprenticeship, as well as in ongoing professional development, employers and instructors should encourage learning about these concepts, why they are important, how they are implemented, and the overarching targets they are aiming to achieve.

All in all, it's about doing the work better and building a better world.

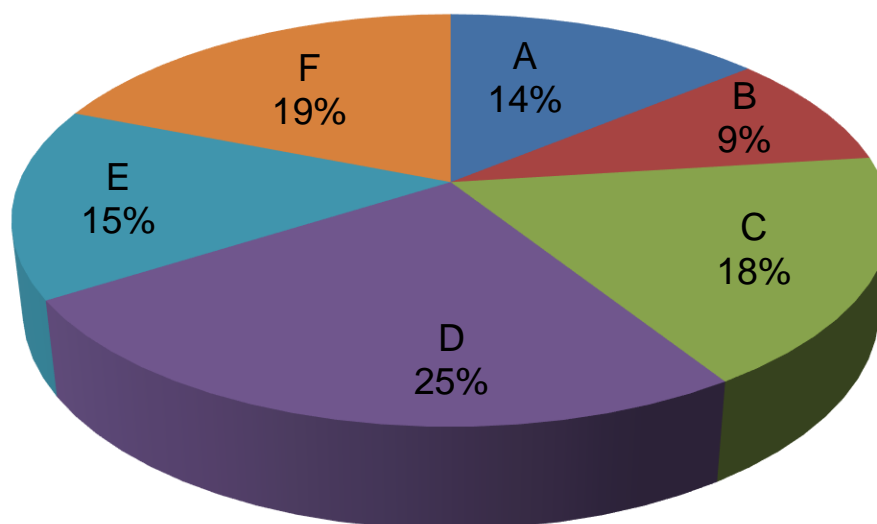
INDUSTRY EXPECTED PERFORMANCE

All tasks must be performed according to the applicable jurisdictional codes and standards. All health and safety standards must be respected and observed. Work should be done efficiently and to a good quality without material waste or environmental damage. All requirements of the manufacturer and client specifications must be met. At a journeyperson level of performance, all tasks must be done with minimal direction and supervision. As a journeyperson progresses in their career there is an expectation they continue to upgrade their skills and knowledge to keep pace with industry and promote continuous learning in their trade through mentoring of apprentices.

LANGUAGE REQUIREMENTS

It is expected that journeypersons are able to understand and communicate in either English or French, which are Canada's official languages. English or French are the common languages of business as well as languages of instruction in apprenticeship programs.

PIE CHART OF RED SEAL EXAMINATION WEIGHTINGS



MWA A	Performs common occupational skills	14%
MWA B	Performs site preparation	9%
MWA C	Places and levels concrete	18%
MWA D	Finishes plastic concrete	25%
MWA E	Cures and protects concrete	15%
MWA F	Modifies and repairs concrete and performs grouting	19%

This pie chart represents a breakdown of the interprovincial Red Seal examination. Percentages are based on the collective input from workers from the trade from across Canada. The Task Matrix on the next pages indicates the breakdown of tasks and sub-tasks within each Major Work Activity and the breakdown of questions assigned to the Tasks. Interprovincial examinations for this trade have 100 questions.

CONCRETE FINISHER

TASK MATRIX

A – PERFORMS COMMON OCCUPATIONAL SKILLS

14%

Task A-1 Performs safety-related functions 24%	A-1.01 Uses personal protective equipment (PPE) and safety equipment	A-1.02 Maintains safe work environment	
Task A-2 Uses tools and equipment 32%	A-2.01 Uses hand tools	A-2.02 Uses power tools	A-2.03 Uses measuring equipment
Task A-3 Organizes work 30%	A-3.01 Uses documentation	A-3.02 Determines material requirements and quantities	A-3.03 Sequences work procedures
Task A-4 Uses communication and mentoring techniques 14%	A-4.01 Uses communication techniques	A-4.02 Uses mentoring techniques	

B – PERFORMS SITE PREPARATION

9%

Task B-5 Prepares site 52%	B-5.01 Inspects site	B-5.02 Prepares sub-grade and elevations	
Task B-6 Uses formwork 48%	B-6.01 Constructs concrete formwork	B-6.02 Installs reinforcements	B-6.03 Inspects formwork and reinforcement
	B-6.04 Installs construction, isolation and expansion joints	B-6.05 Removes forms	

C – PLACES AND LEVELS CONCRETE

18%

Task C-7 Places concrete 45%	C-7.01 Transports concrete on site	C-7.02 Spreads concrete	C-7.03 Consolidates concrete
Task C-8 Levels concrete 55%	C-8.01 Establishes elevation	C-8.02 Screeds concrete	C-8.03 Bull floats concrete

D – FINISHES PLASTIC CONCRETE

25%

Task D-9 Floats concrete 22%	D-9.01 Floats concrete by hand	D-9.02 Floats concrete by machine	
Task D-10 Hand-tools concrete 24%	D-10.01 Edges perimeter of slab	D-10.02 Finishes extruded concrete surfaces	D-10.03 Tools contraction joints
Task D-11 Trowels concrete 30%	D-11.01 Trowels concrete by hand	D-11.02 Trowels concrete by machine	
Task D-12 Applies surface treatments to concrete 24%	D-12.01 Applies dry-shake aggregate surface hardeners	D-12.02 Applies exposed aggregate finish	D-12.03 Textures concrete surface
	D-12.04 Applies stamped concrete surface finish	D-12.05 Applies evaporation reducers	

E – CURES AND PROTECTS CONCRETE

15%

Task E-13 Cures concrete 32%	E-13.01 Wet-cures concrete	E-13.02 Chemical cures concrete
Task E-14 Creates contraction joints 41%	E-14.01 Saw cuts contraction joints	E-14.02 Fills joints
Task E-15 Protects concrete 27%	E-15.01 Protects plastic concrete	E-15.02 Protects hardened concrete

F – MODIFIES AND REPAIRS CONCRETE AND PERFORMS GROUTING

19%

Task F-16 Repairs and restores concrete 37%	F-16.01 Inspects concrete	F-16.02 Removes materials	F-16.03 Prepares surface for repair or restoration
	F-16.04 Installs repair materials		
Task F-17 Applies surface treatments to hardened concrete 23%	F-17.01 Prepares surface for surface treatments	F-17.02 Abrades surface to achieve architectural finish	F-17.03 Applies seamless systems
	F-17.04 Applies bonded and non-bonded toppings to concrete	F-17.05 Parges vertical surfaces	F-17.06 Applies chemical surface treatment

Task F-18
Grouts
27%

F-18.01 Prepares surface for grouting

F-18.02 Mixes grout

F-18.03 Installs grout

F-18.04 Finishes exposed grout surfaces

Task F -19
Performs cutting and coring
13%

F-19.01 Performs cutting

F-19.02 Performs coring

Harmonization of Apprenticeship Training

Provincial and territorial apprenticeship authorities are each responsible for their respective apprenticeship programs. In the spirit of continual improvement, and to facilitate mobility among apprentices in Canada, participating authorities have agreed to work towards harmonizing certain aspects of their programs where possible. After consulting with their stakeholders in the trade, they have reached consensus on the following elements. Note that implementation of these elements may vary from jurisdiction to jurisdiction, depending on their own circumstances. For more information on the implementation in any province and territory, please contact that jurisdiction’s apprenticeship authority.

1. Trade name

The official Red Seal name for this trade is Concrete Finisher.

2. Number of Levels of Apprenticeship

The number of levels of technical training recommended for this trade is 2 (two).

3. Total Training Hours During Apprenticeship Training

The total hours of training, including both on-the-job and in-school training for this trade is 3600.

4. Sequencing Topics and Related Sub-tasks

The topic titles in the table below are placed in a column for each apprenticeship level for technical training. Each topic is accompanied by the sub-tasks and their reference number. The topics in the grey shaded cells represent those that are covered “in context” with other training in the subsequent years.

Level 1	Level 2
	Safety-Related Functions
	Cures Concrete
	Protects Concrete
Safety-Related Functions 1.01 Uses personal protective equipment (PPE) and safety equipment 1.02 Maintains safe work environment	
Tools and Equipment 2.01 Uses hand tools 2.03 Uses measuring equipment	Tools and Equipment 2.02 Uses power tools 2.03 Uses measuring equipment
Organizes Work 3.01 Uses documentation 3.02 Determines material requirements and quantities 3.03 Sequences work procedures	Organizes Work 3.01 Uses documentation 3.02 Determines material requirements and quantities 3.03 Sequences work procedures
Communication 4.01 Uses communication techniques	Communication and Mentoring 4.01 Uses communication techniques 4.02 Uses mentoring techniques

Level 1	Level 2
<p>Prepares Site 5.01 Inspects site 5.02 Prepares sub-grade and elevations</p>	<p>Prepares Site 5.01 Inspects site 5.02 Prepares sub-grade and elevations</p>
<p>Formwork 6.01 Constructs concrete formwork 6.02 Installs reinforcement 6.03 Inspects formwork and reinforcements 6.04 Installs construction, isolation and expansion joints 6.05 Removes forms</p>	<p>Formwork 6.01 Constructs concrete formwork 6.02 Installs reinforcement 6.03 Inspects formwork and reinforcements 6.05 Removes forms</p>
<p>Places Concrete 7.01 Transports concrete onsite 7.02 Spreads concrete 7.03 Consolidates concrete</p>	<p>Places Concrete 7.01 Transports concrete 7.03 Consolidates concrete</p>
<p>Levels Concrete 8.01 Establishes elevation 8.02 Screeds concrete 8.03 Bull floats concrete</p>	<p>Levels Concrete 8.01 Establishes elevation 8.02 Screeds concrete</p>
<p>Floats Concrete 9.01 Floats concrete by hand</p>	<p>Floats Concrete 9.02 Floats concrete by machine</p>
<p>Hand-tools Concrete 10.01 Edges perimeter of slab 10.03 Tools contraction joints</p>	<p>Hand-tools Concrete 10.02 Finishes extruded concrete surfaces</p>
<p>Trowels Concrete 11.01 Trowels concrete by hand</p>	<p>Trowels Concrete 11.02 Trowels concrete by machine</p>
<p>Cures Concrete 13.01 Wet-cures concrete 13.02 Chemical cures concrete</p>	<p>Applies Surface Treatment (Plastic) 12.01 Applies dry-shake aggregate surface hardeners 12.02 Applies exposed aggregate finish 12.03 Textures concrete surface 12.04 Applies stamped concrete surface finish 12.05 Applies evaporation reducers</p>
<p>Creates Contraction Joints 14.01 Saw cuts contraction joints 14.02 Fills joints</p>	
<p>Protects Concrete 15.01 Protects plastic concrete 15.02 Protect hardened concrete</p>	
<p>Repairs Concrete 16.01 Inspects concrete 16.02 Removes materials 16.03 Prepares surface for repair and restoration 16.04 Installs repair materials</p>	<p>Repairs and Restores Concrete 16.01 Inspects concrete 16.02 Removes materials 16.03 Prepares surface for repair and restoration 16.04 Installs repair materials</p>

Level 1

Level 2

Applies Surface Treatment (Hardened Concrete)
17.01 Prepares surface for surface treatments
17.02 Abrades surface to achieve architectural finish
17.03 Applies seamless systems
17.04 Applies bonded and non-bonded toppings to concrete
17.05 Parges vertical surfaces
17.06 Applies chemical surface treatment

Grouts
18.01 Prepares surface for grouting
18.02 Mixes grout
18.03 Installs grout
18.04 Finishes exposed grout surfaces

Cutting and Coring
19.01 Performs cutting
19.02 Performs coring

MAJOR WORK ACTIVITY A

Performs common occupational skills

TASK A-1 Performs safety-related functions

TASK DESCRIPTOR

Concrete finishers are exposed to hazards on a daily basis. Therefore, they must comply with regulations, company policies and manufacturers' instructions regarding personal protective equipment (PPE), safety equipment, and safe work practices to ensure safety of themselves and others.

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

Essential Skills Thinking, Continuous Learning, Oral Communication

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
A-1.01.01P	select and use PPE and safety equipment	PPE and safety equipment is selected and used according to potential hazards, site conditions and manufacturers' instructions
A-1.01.02P	identify company and site policies and regulations, and site hazards requiring the use of PPE and safety equipment	company and site policies and regulations, and site hazards requiring the use of PPE and safety equipment are identified
A-1.01.03P	tag and remove worn, damaged, unsafe and expired PPE and safety equipment	worn, damaged, unsafe and expired PPE and safety equipment are tagged and removed from service according to company policy, manufacturers' instructions and regulations
A-1.01.04P	report and replace damaged or faulty PPE and safety equipment	damaged or faulty PPE and safety equipment is replaced and reported according to company policies, manufacturers' instructions, regulations, and personal judgement
A-1.01.05P	maintain and store PPE and safety equipment	PPE and safety equipment are maintained and stored according to manufacturers' instructions and company policies

RANGE OF VARIABLES

PPE includes: breathing apparatus, air purifiers, eye and ear protection, hard hats, high visibility clothing, safety vests, fall arrest equipment, skin protection, hand protection, foot protection

safety equipment includes: fire extinguishers, first aid kits, eye wash stations, spill kits, gas sensors

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-1.01.01L	demonstrate knowledge of PPE and safety equipment , their applications and procedures for use	identify the types of PPE , their application and procedures for use
		identify types of safety equipment and their location on-site
		identify hazards and safe work practices related to the use of PPE and safety equipment
		describe the potential effects of exposure to concrete materials
		describe the procedures for use of PPE and safety equipment
		identify specific training requirements for the use of PPE and safety equipment

RANGE OF VARIABLES

PPE includes: breathing apparatus, air purifiers, eye and ear protection, hard hats, high visibility clothing, safety vests, fall arrest equipment, skin protection, hand protection, foot protection

safety equipment includes: fire extinguishers, first aid kits, eye wash stations, spill kits, gas sensors

hazards include: silica dust, falling objects, chemical spills, slips, trips, uneven ground, heights, carbon monoxide

effects of exposure include: dermatitis, burns, respiratory damage (e.g. silicosis)

A-1.02 Maintains safe work environment

Essential Skills Thinking, Working with Others, Oral Communication

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
A-1.02.01P	maintain a clean and tidy work site area	a clean and tidy work site is maintained to avoid injuries to self and others
A-1.02.02P	locate safety equipment	safety equipment is located and ready for use according to regulations and company policies

A-1.02.03P	follow safety procedure	safety procedures are followed according to regulations and company policies
A-1.02.04P	identify workplace hazards	workplace hazards are identified according to site conditions
A-1.02.05P	set up perimeter safety barriers and flag persons	perimeter safety barriers are erected around and underneath work area and flag persons are set up according to company policies
A-1.02.06P	ventilate work area and measure air quality	work area is ventilated according to regulations when working with hazardous materials
A-1.02.07P	participates in safety meetings and discussions	safety meetings and discussions are participated in prior to beginning tasks to ensure that information is recorded and distributed to all team members
A-1.02.08P	complete safety-related documentation	safety-related documentation is completed and submitted according to regulations and company policy

RANGE OF VARIABLES

safety equipment includes: fire extinguishers, first aid kits, eye wash stations, spill kits, gas sensors

regulations include: Occupational Health and Safety (OH&S), Workplace Hazardous Materials Information System (WHMIS), jurisdictional regulations

workplace hazards include: embedded objects (e.g. post-tensioning cable, electrical conduits, dowels, rebar), carbon monoxide, inadequate shoring, toxins, falling objects, poor ventilation, vehicular hazards, silica dust

safety-related documentation includes: field risk assessments, job hazard assessments, incident reports, equipment and PPE inspections, tool box/tailgate talk documents, safety meeting minutes, WHMIS documents

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-1.02.01L	demonstrate knowledge of maintaining a safe work environment	identify hazards and safe work practices pertaining to maintaining a safe work environment
		identify types of safety equipment and their location on-site
		identify company safety policies and procedures
A-1.02.02L	demonstrate knowledge of regulations related to a safe work environment	identify safe transportation, storage and disposal procedures for hazardous materials
		interpret and apply regulations
		identify regulations pertaining to worksite issues
		describe procedures used to report incidents and unsafe work environment

RANGE OF VARIABLES

workplace hazards include: embedded objects (e.g. post-tensioning cable, electrical conduits, dowels, rebar), carbon monoxide, inadequate shoring, toxins, falling objects, poor ventilation, vehicular hazards, silica dust

safety equipment includes: fire extinguishers, first aid kits, eye wash stations, spill kits, gas sensors

regulations include: Occupational Health and Safety (OH&S), Workplace Hazardous Materials Information System (WHMIS), jurisdictional regulations

worksite issues include: confined space entry, asbestos removal, fall protection, vehicular traffic

TASK A-2 Uses tools and equipment

TASK DESCRIPTOR

Proper use of tools and equipment is very important to perform the tasks effectively and safely in the concrete industry.

A-2.01 Uses hand tools

Essential Skills Thinking, Continuous Learning, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
A-2.01.01P	clean, maintain and store hand tools	hand tools are cleaned, maintained and stored to extend longevity of tools and ensure they are ready for use
A-2.01.02P	inspect hand tools	hand tools are inspected for damage and defects
A-2.01.03P	remove damaged or defective hand tools from service	hand tools are identified as damaged or defective and removed from service

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-2.01.01L	demonstrate knowledge of hand tools, their use and procedures to clean, maintain and store them	identify types of hand tools and describe their use and application
		describe procedures used to clean, maintain and store hand tools

RANGE OF VARIABLES

types of hand tools: see appendix B

A-2.02 Uses power tools

Essential Skills Oral Communication, Thinking, Continuous Learning

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
A-2.02.01P	perform power tool maintenance	power tool maintenance is performed according to manufacturers' instructions
A-2.02.02P	inspect power tools	power tools are inspected for wear, damage and defects
A-2.02.03P	tag and remove damaged power tools	damaged power tools are tagged and removed from service
A-2.02.04P	repair and replace power tools	power tools removed from service are repaired or replaced
A-2.02.05P	ensure features are in place	features are in place according to manufacturers' instructions

RANGE OF VARIABLES

power tool maintenance includes: checking oil, gas and air filters, cleaning, storing, lubricating, testing
features include: kill switches, machine guards, bolts, electrical cords, handles, ground fault circuit interrupter (GFCI), drive belts

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-2.02.01L	demonstrate knowledge of power tools, their procedures for use, applications, maintenance and storage	identify types of power tools , their applications and features
		describe power tool maintenance
		describe procedures to have power tools tagged, repaired or replaced
		identify storage procedures for power tools
		describe hazards and safe work practices related to power tools and their use

RANGE OF VARIABLES

types of power tools include: electric tools, pneumatic tools, hydraulic tools, gas-powered tools, powder-actuated tools

features include: kill switches, machine guards, bolts, electrical cords, handles, ground fault circuit interrupter (GFCI), drive belts

power tool maintenance includes: checking oil, gas and air filters, cleaning, storing, lubricating, testing

A-2.03 Uses measuring equipment

Essential Skills Numeracy, Thinking, Document Use

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
A-2.03.01P	select measuring equipment	measuring equipment is selected according to application
A-2.03.02P	clean, maintain and store measuring equipment	measuring equipment is cleaned, maintained and stored according to manufacturers' instructions
A-2.03.03P	inspect measuring equipment, and tag and remove damaged equipment	worn, damaged and defective measuring equipment is tagged and removed from service
A-2.03.04P	repair and replace damaged and defective measuring equipment	measuring equipment is repaired or replaced according to manufacturers' instructions
A-2.03.05P	take measurements using measuring equipment and devices	measurements taken with measuring equipment and devices are accurate

RANGE OF VARIABLES

measurements include: weights, volume, elevations, areas, distances, slopes, tolerances, angles

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-2.03.01L	demonstrate knowledge of measuring equipment, their application and procedures for use and maintenance	identify types of measuring equipment and their application
		describe safe work practices pertaining to the use of measuring equipment
		identify imperial and metric measurements

describe procedures to use, test, maintain and store measuring equipment

describe procedures used to replace measuring equipment

RANGE OF VARIABLES

types of measuring equipment include: scales, laser levels, measuring tapes, builder's levels, hand levels, measuring vessels

TASK A-3 Organizes work

TASK DESCRIPTOR

Concrete finishers use organizational skills such as determining materials and scheduling work to perform their tasks as well as advance in their careers. Concrete materials and weather conditions impact the timing of placing, setting and curing of concrete which in turn affects the scheduling of work. Also, concrete finishers must be able to use various types of documentation to perform their tasks.

A-3.01 Uses documentation

Essential Skills Document Use, Reading, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
A-3.01.01P	interpret specifications	specifications are interpreted
A-3.01.02P	interpret product instructions and manufacturers' recommendations	product instructions and manufacturers' recommendations are interpreted
A-3.01.03P	follow work orders and instructions	work orders and instructions are followed
A-3.01.04P	interpret standards documentation	standards documentation is interpreted
A-3.01.05P	interpret drawings	drawings are interpreted

RANGE OF VARIABLES

standards documentation includes: Canadian Standards Association (CSA), American Concrete Institute (ACI), International Concrete Repair Institute (ICRI)

drawings include: as-built, working, shop, blueprints, electronic drawings

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-3.01.01L	demonstrate knowledge of safety documentation and standards documentation	interpret safety documentation and standards documentation
A-3.01.02L	demonstrate knowledge of grade sheets and drawings	interpret grade sheets and drawings
		describe scale rules and legends

RANGE OF VARIABLES

safety documentation includes: safety data sheet (SDS), WHMIS symbols

standards documentation includes: Canadian Standards Association (CSA), American Concrete Institute (ACI), International Concrete Repair Institute (ICRI)

drawings include: as-built, working, shop, blueprints, electronic drawings

A-3.02 Determines material requirements and quantities

Essential Skills Numeracy, Thinking, Document Use

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
A-3.02.01P	perform calculations	calculations are performed to determine material requirements and quantities
A-3.02.02P	apply scale rules	scale rules are applied to establish distances and lengths
A-3.02.03P	select materials	materials are selected according to specifications, calculations , scope of work and factors
A-3.02.04P	adjust technique	techniques are adjusted according to concrete materials, admixture being used, factors and concrete chemistry

RANGE OF VARIABLES

calculations include: weight, volume, area, perimeter, Pythagorean Theorem

materials include: concrete materials, base materials, aggregates, membranes, formwork materials, reinforcement materials, grouts, repair materials, admixtures, cement types, epoxies, supplementary cementitious materials, exotic products, sealers

factors include: cost, down-time, structural/architectural requirements, location of repair, weather conditions, time restrictions

concrete chemistry includes: accelerated concrete setting (hot load), pot life

KNOWLEDGE

Learning Outcomes	Learning Objectives	
A-3.02.01L	demonstrate knowledge of materials used, their application and procedures for use	identify types of concrete materials , their application and procedures for use
		identify concrete mix designs
		identify air entrainment compatibility and adjustments required for placing and finishing concrete
		identify CSA A23.1 national standard pertaining to concrete materials
		identify hazards and safe work practices pertaining to the use of materials
		identify types of base materials , their application and procedures for use
		identify types of membranes , their application and procedures for use
		identify types of reinforcement materials , their application and procedures for use
		identify types of grout , their properties and application
	identify types of formwork material and systems , their application and procedures for use	
A-3.02.02L	demonstrate knowledge of calculations relating to material selection	describe calculations pertaining to material selection
		identify imperial and metric systems of measurement and their conversions

RANGE OF VARIABLES

materials include: concrete materials, base materials, aggregates, membranes, formwork materials, reinforcement materials, grouts, repair materials, admixtures, cement types, epoxies, supplementary cementitious materials, exotic products, sealers

hazards include: respiratory, contaminants, chemical burns, material ingestion and absorption

safe work practices include: adequate ventilation, use of PPE and WHMIS

types of base materials include: gravel, clay, recycled crushed concrete, sand, pea stone, clear stone

types of membranes include: evaporation reducer, polyethylene, insulating, water-stop, vapour retarders

types of reinforcement materials include: rebar, welded wire mesh, synthetic and steel fibres, post-

types of grout include: cementitious, epoxy, polyester

types of formwork material and systems include: dimensional lumber, steel forms, plywood, form liners, decorative liners

calculations include: weight, volume, area, perimeter, Pythagorean Theorem

A-3.03**Sequences work procedures****Essential Skills**

Thinking, Oral Communication, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
A-3.03.01P	determine work procedures and logistics	work procedures and logistics are determined according to project scope and schedule
A-3.03.02P	determine timing of work	timing of work is determined considering factors
A-3.03.03P	adapt work schedule	work schedule is adapted according to factors
A-3.03.04P	coordinate work with other trades	work is coordinated with other trades
A-3.03.05P	develop concrete placement plan	concrete placement is planned according to factors

RANGE OF VARIABLES

factors include: weather conditions, environmental conditions, work of other trades, material properties, public safety, accessibility to work area for conveyance of materials and equipment, pre-construction meetings

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-3.03.01L	demonstrate knowledge of scheduling work procedures	identify the factors that affect scheduling of work
		identify impact of factors on timing and work sequence
		describe sequence of construction operations and timing of procedures

RANGE OF VARIABLES

factors include: weather conditions, environmental conditions, work of other trades, material properties, public safety, accessibility to work area for conveyance of materials and equipment, pre-construction meetings

TASK A-4 Uses communication and mentoring techniques

TASK DESCRIPTOR

Learning in the trades is done primarily in the workplace with tradespeople passing on their skills and knowledge to apprentices, as well as sharing knowledge amongst themselves. Apprenticeship is, and always has been about mentoring – learning workplace skills and passing them on. Because of the importance of this to the trade, this task covers the activities related to communication in the workplace and mentoring skills.

A-4.01 Uses communication techniques

Essential Skills Oral Communication, Working with Others, Continuous Learning

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
A-4.01.01P	demonstrate two-way communication practices individually or in a group	instructions and messages are understood by both parties involved in communication
A-4.01.02P	listen using active listening practices	steps of active listening are used
A-4.01.03P	receive and respond to feedback on work	response to feedback indicates understanding and corrective measures are taken
A-4.01.04P	explain and provide feedback	explanation and feedback is provided and task is carried out as directed
A-4.01.05P	use questioning to improve communication	questions enhance understanding, on-the-job training and goal setting
A-4.01.06P	participate in safety and information meetings	meetings are attended and information is understood and applied
A-4.01.07P	communicate with non-tradespeople	technical information is relayed and understanding is confirmed
A-4.01.08P	communicate with other tradespeople	technical information is relayed and understanding is confirmed

RANGE OF VARIABLES

active listening includes: hearing, interpreting, reflecting, responding, paraphrasing

non-tradespeople include: consultants, engineers, architects, owners, product representatives

tradespeople include: concrete finishers, carpenters, ironworkers, construction craft workers, crane operators, heavy equipment operators, plumbers, construction electricians

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-4.01.01L	demonstrate knowledge of trade terminology	define terminology used in the trade
A-4.01.02L	demonstrate knowledge of effective communication practices	describe the importance of using effective verbal and non-verbal communication with tradespeople and non-tradespeople
		identify sources of information to effectively communicate
		identify communication and learning styles
		describe effective listening and speaking skills
		identify the value of diversity in the workplace
		identify communication that constitutes harassment and discrimination

RANGE OF VARIABLES

non-tradespeople include: consultants, engineers, architects, owners, product representatives

tradespeople include: concrete finishers, carpenters, ironworkers, construction craft workers, crane operators, heavy equipment operators, plumbers, construction electricians

sources of information include: regulations, codes, standards, OH&S requirements, requirements of local authorities, drawings, specifications, company and client documentation, experienced journeypersons

learning styles include: seeing it, hearing it, practicing it

harassment includes: objectionable conduct, comment or display made either on a one-time or continuous basis that demeans, belittles, or causes personal humiliation or embarrassment to the recipient

discrimination includes actions that are prohibited based on race, national or ethnic origin, colour, religion, age, sex, sexual orientation, marital status, family status, disability or conviction for which a pardon has been granted

A-4.02**Uses mentoring techniques****Essential Skills**

Oral Communication, Working with Others, Continuous Learning

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
A-4.02.01P	identify and communicate learning objective and point of the lesson	apprentice or colleague explains the objective and point of the lesson
A-4.02.02P	link lesson to prior learning and the job task	lesson order and unplanned learning opportunities are defined
A-4.02.03P	demonstrate performance of a skill to an apprentice or colleague	steps required to demonstrate a skill are performed
A-4.02.04P	set up conditions required for an apprentice to practice a skill	practice conditions are set up so that the skill can be practiced safely by the apprentice
A-4.02.05P	assess apprentice or colleague's ability to perform tasks with increasing independence	performance improves with practice to a point where skill can be done with little supervision
A-4.02.06P	give supportive and corrective feedback	apprentice adopts best practice after having been given supportive or corrective feedback
A-4.02.07P	support apprentices in pursuing technical training opportunities	technical training is completed within the timeframe prescribed by apprenticeship authority
A-4.02.08P	support diversity in the workplace	workplace is harassment and discrimination-free
A-4.02.09P	implement probationary period to assess suitability to the trade	commitment is demonstrated and more suitable career options are provided if required

RANGE OF VARIABLES

steps required to demonstrate a skill include: understanding the who, what, where, when and why, explaining, showing, giving encouragement, following up to ensure skill is performed correctly

practice conditions means: guided, limited independence, full independence

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-4.02.01L	demonstrate knowledge of strategies for learning skills in the workplace	describe the importance of individual experience
		describe the shared responsibilities for workplace learning

		determine one's own learning preferences and explain how these relate to learning new skills
		describe the importance of different types of skills in the workplace
		describe the importance of essential skills in the workplace
		identify different ways of learning
		identify different learning needs and strategies to meet learning needs
		identify strategies to assist in learning a skill
		identify personal responsibilities and attitudes that contribute to on-the-job success
A-4.02.02L	demonstrate knowledge of strategies for teaching workplace skills	identify different roles played by a workplace mentor
		describe teaching skills
		explain the importance of identifying the point of a lesson
		identify how to choose an effective time to present a lesson
		explain the importance of linking the lessons
		identify the components of the skill (the context)
		describe considerations in setting up opportunities for skill practice
		explain the importance of providing feedback
		identify techniques for giving effective feedback
		describe a skills assessment
		identify methods of assessing progress
		explain how to adjust a lesson to different situations

RANGE OF VARIABLES

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

learning needs include: learning disabilities, learning preferences, language proficiency

strategies to assist in learning a skill include: understanding the basic principles of instruction, developing coaching skills, being mature and patient, providing feedback

personal responsibilities and attitudes include: asking questions, working safely, accepting constructive feedback, time management and punctuality, respect for authority, good stewardship of materials, tools and property, efficient work practices

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

MAJOR WORK ACTIVITY B

Performs site preparation

TASK B-5 Prepares site

TASK DESCRIPTOR

Site conditions are extremely important to concrete finishers. They impact the timing and sequencing of many of the procedures involved in the concrete finishers' work. Concrete finishers may perform site inspections before the preparation of the site can begin. Site preparation could include determining elevations and preparing the sub-grade prior to placing concrete.

B-5.01 Inspects site

Essential Skills Document Use, Oral Communication, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
B-5.01.01P	identify <i>site conditions</i> and <i>site problems</i>	<i>site conditions</i> and <i>site problems</i> are identified according to industry practices and CSA A23.1
B-5.01.02P	assess <i>on-site services</i> requirements	<i>on-site services</i> requirements are assessed to meet the demands of the scope of the work according to the client's instructions
B-5.01.03P	report assessment of <i>site conditions</i>	assessments of <i>site conditions</i> are reported to the client

RANGE OF VARIABLES

site conditions include: access, weather exposure, moisture, temperature

site problems include: poor drainage, obstructions, utilities, rain water leaders

on-site services include: water, electricity, gas, cables (telephone, internet), sewage systems

KNOWLEDGE

	Learning Outcomes	Learning Objectives
B-5.01.01L	demonstrate knowledge of site inspection procedures and factors that impact site preparation	describe site conditions required for site preparation
		describe site problems that affect site preparation
		describe site inspection procedures
		identify reporting procedures

RANGE OF VARIABLES

site conditions include: access, weather exposure, moisture, temperature

site problems include: poor drainage, obstructions, utilities, rain water leaders

B-5.02 Prepares sub-grade and elevations

Essential Skills Numeracy, Thinking, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	no	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
B-5.02.01P	place base materials	base materials are placed to a uniform sub-grade level according to drawings and specifications
B-5.02.02P	compact base	base is compacted according to drawings and specifications using equipment
B-5.02.03P	install moisture and insulation barriers, filter fabric and void forms	moisture and insulation barriers, filter fabric and void forms are installed according to drawings and specifications
B-5.02.04P	check elevation	elevation meets specified level according to drawings and specifications and CSA A23.1

RANGE OF VARIABLES

equipment includes: compaction rollers, plate tampers, jumping jacks

KNOWLEDGE

	Learning Outcomes	Learning Objectives
B-5.02.01L	demonstrate knowledge of sub-grade preparation procedures and requirements	identify types of base materials
		identify equipment used to compact base materials
		describe procedures used to compact base materials

RANGE OF VARIABLES

types of base materials include: gravel, clay, sand, recycled crushed concrete

equipment includes: compaction rollers, plate tampers, jumping jacks

TASK B-6 Uses formwork

TASK DESCRIPTOR

Concrete finishers use formwork to hold and mould concrete or grout in place while the surface is being worked. They may be responsible for the construction of concrete formwork and the removal of formwork once the concrete or grout is set. They will install construction, expansion and isolation joints with formwork as a permanent fixture of the concrete. These joints are often filled with self-levelling caulking or other compounds.

B-6.01 Constructs concrete formwork

Essential Skills Document Use, Numeracy, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	no	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
B-6.01.01P	perform layout	concrete formwork is laid out according to drawings and specifications
B-6.01.02P	place formwork	formwork is placed according to drawings and specifications
B-6.01.03P	install bracing and shoring	bracing and shoring is installed to achieve plumb, level and square formwork and to secure critical areas according to drawings and specifications

B-6.01.04P	apply products prior to placement of the slab	products are applied to serve as a soil, gas (radon) and vapour barrier according to drawings and specifications, and local codes
B-6.01.05P	install formwork components	formwork components are installed plumb, level, straight and square, and accessible for finishing work according to drawings and specifications
B-6.01.06P	measure for location and install embeds	location is measured and embeds are installed according to drawings and specifications
B-6.01.07P	install formwork for grout	formwork for grout is installed according to manufacturer's instructions
B-6.01.08P	apply form release agents	form release agents are applied according to manufacturer's instructions
B-6.01.09P	apply vertical retarders	vertical retarders are applied to achieve architectural finish according to drawings and specifications

RANGE OF VARIABLES

layout includes: squaring, setting grades, establishing and transferring of elevations, setting perimeters

critical areas include: corners, risers, thickened edges, bulkheads

products include: polyethylene, insulation (rigid foam, spray foam)

formwork components include: reinforcement steel, keyways, water stops, bulkheads, screed level pegs, form liners, miscellaneous inserts, cambers, chamfer strips

embeds include: anchor bolts, sleeves, weld plates

architectural finishes include: exposed, form-lined

KNOWLEDGE

	Learning Outcomes	Learning Objectives
B-6.01.01L	demonstrate knowledge of formwork and its application	identify types of forming systems and their applications
		identify types of structures that require formwork
		identify local codes, building codes, regulation requirements and CSA standards related to formwork
		identify formwork components
		identify form release agents
		describe expansion, control and isolation joint construction pertaining to formwork
		describe the types of forces transmitted during placement of concrete
		identify critical form areas to prevent form failure
		identify type of formwork required for various grout applications

		identify types of vertical architectural finishes
B-6.01.02L	demonstrate knowledge of procedures used to construct formwork	describe procedures used to layout and install formwork and embeds
		describe bracing, shoring and supporting used in constructing formwork
		describe calculations related to constructing formwork
		explain the building and removal sequence of formwork

RANGE OF VARIABLES

forming systems include: snap ties, cam lock and tie rods, slip forms, insulated concrete styrofoam forms, she-bolts, steel forms

types of structures include: slabs-on-grade, curbs, gutters, stairs, walls, columns, suspended slabs, ramps, capitals, piers, pilasters, beams, girders, corbels

formwork components include: reinforcement steel, keyways, water stops, bulkheads, screed level pegs, form liners, miscellaneous inserts, cambers, chamfer strips

architectural finishes include: exposed, form-lined

layout includes: squaring, setting grades, establishing and transferring of elevations, setting perimeters

embeds include: anchor bolts, sleeves, weld plates

calculations include: rise and run, Pythagorean Theorem formula (3-4-5 calculations), form estimations

B-6.02 Installs reinforcement

Essential Skills Numeracy, Thinking, Document Use

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	no	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
B-6.02.01P	identify reinforcement to be used	reinforcement is identified according to drawings and specifications
B-6.02.02P	install reinforcement	reinforcement is installed using proper equipment according to drawings and specifications

RANGE OF VARIABLES

reinforcement includes: rebar (metal, galvanized, epoxy coated, fibreglass), welded wire mesh, synthetic and steel fibres, pre- and post-tensioning cables

equipment includes: drills, rebar cutters, grinders, mixers, tie wire, pliers, twistors, wire cutters, chairs, bar couplers

KNOWLEDGE

	Learning Outcomes	Learning Objectives
B-6.02.01L	demonstrate knowledge of reinforcement installation	describe types of reinforcement
		describe types of reinforcement installment procedures
		identify codes, drawings and specifications related to reinforcement
		identify equipment required for the installation of reinforcement

RANGE OF VARIABLES

reinforcement includes: rebar (metal, galvanized, epoxy coated, fibreglass), welded wire mesh, synthetic and steel fibres, pre- and post-tensioning cables

equipment includes: drills, rebar cutters, grinders, mixers, tie wire, pliers, twistors, wire cutters, chairs, bar couplers

B-6.03 Inspects formwork and reinforcement

Essential Skills Document Use, Oral Communication, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
B-6.03.01P	inspect bracing, shoring and supports	bracing, shoring and supports meet formwork design according to drawings and specifications
B-6.03.02P	identify defects in formwork	defects in formwork are identified and reported or corrected according to industry documents and practices
B-6.03.03P	check formwork finish grade	finish grade of formwork is prepared according to drawings and specifications
B-6.03.04P	inspect reinforcement placement	placement of reinforcement meets specified locations according to drawings and specifications

RANGE OF VARIABLES

defects include: inadequate bracing, crooked or unlevelled formwork, improper grading, form deterioration, splinters

KNOWLEDGE

	Learning Outcomes	Learning Objectives
B-6.03.01L	demonstrate knowledge of formwork inspection procedures	explain camber, deflection and shrinkage as they pertain to the construction of formwork
		identify use of forming systems
		explain codes, specifications and regulations pertaining to formwork
		explain procedures used to install formwork to finish grade
		identify reporting procedures for the inspection of formwork

RANGE OF VARIABLES

forming systems include: girder form systems, structural forming systems, bulkheads, steel forming systems, curb and gutter, insulated concrete forming (ICF) system

B-6.04 Installs construction, isolation and expansion joints

Essential Skills Thinking, Document Use, Numeracy

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	no	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
B-6.04.01P	plan where joints are to be installed	plans for joints are laid out according to industry documents and practices
B-6.04.02P	install joints and joint components	joints and joint components are installed according to type of joint, manufacturers' instructions, drawings and specifications
B-6.04.03P	maintain finished elevation	finished elevation meets requirements according to drawings and specifications

RANGE OF VARIABLES

joint components include: dowels, keyways, expansion materials

KNOWLEDGE

	Learning Outcomes	Learning Objectives
B-6.04.01L	demonstrate knowledge of isolation, construction and expansion joints and their application	describe the types of joints and their applications
		identify codes, specifications and regulations pertaining to the installation of construction, isolation and expansion joints
		describe the types of <i>joint components</i> and their applications
B-6.04.02L	demonstrate knowledge of installation procedures for isolation, construction and expansion joints	describe the installation procedures for isolation, construction and expansion joints
		describe the installation procedures for <i>joint components</i>

RANGE OF VARIABLES

joint components include: dowels, keyways, expansion materials

B-6.05

Removes forms

Essential Skills Thinking, Working with Others, Oral Communication

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	no	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
B-6.05.01P	recognize adequately set concrete	concrete is determined as adequately set according to site conditions and type of finish
B-6.05.02P	execute removal of formwork	removal of formwork is executed according to industry documents and practices
B-6.05.03P	clean, repair and remove foreign objects from forms for re-use	forms are cleaned, repaired and foreign objects removed for re-use according to industry documents and practices

KNOWLEDGE

	Learning Outcomes	Learning Objectives
B-6.05.01L	demonstrate knowledge of procedures used to remove forms	describe form and bracing removal practices
		describe form removal requirements
		explain proper form removal timing as per concrete application
B-6.05.02L	demonstrate knowledge of procedures used for the re-use of forms	describe proper cleaning, repairing and removal of foreign objects procedures for the re-use of forms

MAJOR WORK ACTIVITY C

Places and levels concrete

TASK C-7 Places concrete

TASK DESCRIPTOR

Concrete finishers may transport concrete from the truck to the desired point of discharge. Prior to establishing elevation, they consolidate concrete to remove air pockets that could cause architectural or structural defects. They spread to a rough grade before achieving final elevation.

C-7.01 Transports concrete on-site

Essential Skills Oral Communication, Thinking, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
C-7.01.01P	select and use placement method	placement method is selected and used according to accessibility to location and size of job
C-7.01.02P	determine starting point of concrete placement	starting point for concrete placement is determined according to industry practices
C-7.01.03P	verify concrete type	concrete type is verified by matching concrete delivery ticket to drawings and specifications
C-7.01.04P	confirm slump and consistency	slump and consistency are confirmed according to slump test, drawings and specifications
C-7.01.05P	operate discharge hose	discharge hose is operated according to site conditions and industry documents and practices
C-7.01.06P	operate power buggy	power buggy is operated according to site conditions, manufacturers' instructions, and industry documents and practices
C-7.01.07P	operate crane bucket discharge handle	crane bucket discharge handle is operated according to site conditions and industry documents and practices

C-7.01.08P	convey concrete	concrete is conveyed using conveying equipment according to site conditions and industry documents and practices
C-7.01.09P	operate wheelbarrow	wheelbarrow is operated according to site conditions and industry practices
C-7.01.10P	deposit concrete	concrete is deposited at rough grade according to industry practices

RANGE OF VARIABLES

placement method includes: using concrete pump, crane and bucket, wheelbarrow, chute, tremies

site conditions include: weather conditions, location of equipment, starting point, sequence of placement, rate of placement and drop

conveying equipment includes: tele-belt truck, ready-mix truck mounted conveyor, trailers

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-7.01.01L	demonstrate knowledge of the tools and equipment and the procedures used to transport concrete	describe conveying equipment , their application and procedures for use
		describe the cause of segregation and use of related tools and equipment
		identify transportation methods for moving and placing concrete
		identify regulations pertaining to the transportation of concrete
		describe time restriction and CSA A23.1 requirements for transporting of concrete
		identify site preparation for the placement of concrete
		describe slump and consistency testing methods

RANGE OF VARIABLES

conveying equipment includes: tele-belt truck, ready-mix truck mounted conveyor, trailers

related tools and equipment includes: chutes, vibrators, pumps

transportation methods include: pumping, using conveyors, power buggy, crane bucket, wheelbarrow and pails

C-7.02**Spreads concrete****Essential Skills**

Oral Communication, Working with Others, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
C-7.02.01P	determine width of screed (strips/lanes)	width of screed (strips/lanes) is determined according to size of the pour, screeding method and site conditions
C-7.02.02P	identify locations of related mechanical installations	locations of related mechanical installations are identified and visibly marked to avoid damage and being covered during placement according to industry practices
C-7.02.03P	maintain location of embedded reinforcements	location of embedded reinforcements is maintained according to drawings and specifications
C-7.02.04P	distribute concrete	concrete is distributed evenly at rough grade

RANGE OF VARIABLES

related mechanical installations include: floor drains, clean-outs, electrical boxes, catch basins

embedded reinforcements include: synthetic and steel fibre, dowels, welded wire mesh, rebar, post-tensioning cables

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-7.02.01L	demonstrate knowledge of the procedures used to spread concrete	identify tools for spreading concrete and describe their procedures for use
		identify types of embedded reinforcement , their applications and procedures for use
		identify the effects of embedded reinforcement on handling of concrete
		explain the concept of distributing concrete starting from the nearest known level of elevation

RANGE OF VARIABLES

embedded reinforcements include: synthetic and steel fibre, dowels, welded wire mesh, rebar, post-tensioning cables

C-7.03**Consolidates concrete****Essential Skills**

Thinking, Working with Others, Oral Communication

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
C-7.03.01P	determine consolidation technique	consolidation technique is determined according to site conditions and industry practices
C-7.03.02P	select and use tools and equipment	tools and equipment are selected and used according to consolidation technique and CSA A23.1
C-7.03.03P	determine and adhere to field and frequency of vibration	field and frequency of vibration is determined and adhered to according to CSA A23.1 and to prevent defects
C-7.03.04P	check after concrete is consolidated for straightness and dimensions of formwork	straightness and dimensions of formwork are determined by drawings and specifications

RANGE OF VARIABLES

consolidation techniques include: internal vibration, external vibration, vibrating screeds

tools and equipment include: immersion vibrator, external vibrator, surface vibrator, vibrating tables, hammers, rods, spades

defects include: segregation, honeycombs, pin holes, delamination

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-7.03.01L	demonstrate knowledge of the tools and equipment , and procedures used to consolidate concrete	identify tools and equipment used to consolidate concrete
		identify types and sizes of vibrators, their application and procedures for use
		identify consolidation techniques , their applications and procedures
C-7.03.02L	demonstrate knowledge of the various effects and outcomes of consolidating procedures	describe the effect of vibration on forms
		describe defects and how to avoid them
		describe effects of over-vibrating on aggregate, embedded reinforcement and slump consistency

RANGE OF VARIABLES

tools and equipment include: immersion vibrator, external vibrator, surface vibrator, vibrating tables, hammers, rods, spades

consolidation techniques include: internal vibration, external vibration, vibrating screeds

defects include: segregation, honeycombs, pin holes, delamination

TASK C-8 Levels concrete

TASK DESCRIPTOR

Concrete finishers level concrete and establish elevations using wet screeds, screeds, bull floats and related tools to achieve required tolerances.

C-8.01 Establishes elevation

Essential Skills Numeracy, Document Use, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
C-8.01.01P	identify benchmarks	benchmarks are identified according to drawings and specifications
C-8.01.02P	determine elevation tools used for establishing elevations	elevation tools are identified according to industry practices
C-8.01.03P	perform calculations	calculations are performed to establish elevations and slopes according to drawings and specifications
C-8.01.04P	transfer benchmark elevation	benchmark elevation is transferred to work area according to drawings and specifications
C-8.01.05P	place wet screeds	wet screeds are placed according to the predetermined size of the placement strips
C-8.01.06P	check and confirm finish grade	finish grade is checked periodically during placement according to industry practices

RANGE OF VARIABLES

elevation tools include: string lines, gauges, laser levels, hand levels, builder's levels, water levels

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-8.01.01L	demonstrate knowledge of the tools and equipment and the procedures used to establish elevations	describe procedures for establishing elevation
		explain slope and fall to achieve varying elevations
		describe calculations performed to establish elevation
		describe placement of screed guides when levelling concrete

C-8.02 Screeds concrete

Essential Skills Thinking, Working with Others, Oral Communication

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
C-8.02.01P	select screeding tools and equipment	screeding tools and equipment are selected according to tolerances and drawings and specifications
C-8.02.03P	screed concrete	screed concrete according to screed guides, elevation heights or existing formwork, drawings and specifications

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-8.02.01L	demonstrate knowledge of the tools and equipment, and the techniques used to screed concrete	identify manual and mechanical screeds and their applications
		describe techniques for screeding concrete
		explain the purpose of screeding concrete
		explain tolerances and describe their purpose as it pertains to levelling concrete
		describe methods used to achieve tolerances (F _L and F _F)

RANGE OF VARIABLES

manual and mechanical screeds include: screed rods – single/double (straightedge), truss screed, roller screed, screed rail, power screed, laser screed

C-8.03 Bull floats concrete

Essential Skills Thinking, Oral Communication, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
C-8.03.01P	select type of bull float and length of handle	type of bull float and length of handle are selected according to size of pour and type of concrete
C-8.03.02P	adjust pitch	pitch is adjusted according to slump of concrete
C-8.03.03P	smooth surface of concrete to finished grade	surface of concrete is smoothed according to industry practices

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-8.03.01L	demonstrate knowledge of the tools and the techniques used to bull float concrete	identify the tools used to bull float concrete
		explain when to begin bull floating
		describe the purpose of bull floating the concrete
		describe the procedure of bull floating the concrete

MAJOR WORK ACTIVITY D

Finishes plastic concrete

TASK D-9 Floats concrete

TASK DESCRIPTOR

Concrete finishers float the surface to prepare for final finishing or to produce a final non-slip finish. At this stage, irregularities are removed and broadcast materials may be embedded. This is the important first step in the finishing process. Timing is critical. Hand floating is commonly used at slab edges, vertical pipes, and walls, in preparation for trowelling.

D-9.01 Floats concrete by hand

Essential Skills Oral Communication, Thinking, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
D-9.01.01P	assess surface conditions	surface conditions are assessed according to the concrete materials used, ambient conditions, and CSA A23.1
D-9.01.02P	apply hand float to prepare for trowelling	hand float is applied to eliminate holes and produce a consolidated surface paste to prepare for trowelling
D-9.01.03P	apply hand float as a final spin-float or swirl finish	hand float is applied to produce a final finish that has a non-slip texture and uniform appearance

RANGE OF VARIABLES

surface conditions include: firmness, presence of bleed water, setting of concrete materials

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-9.01.01L	demonstrate knowledge of techniques and tools used to float concrete by hand	identify tools and floating techniques used to float concrete by hand
		identify surface conditions and describe their effects on timing and floating process

explain the effect of weather conditions during floating of concrete by hand

explain the effect of admixtures in the concrete

RANGE OF VARIABLES

floating techniques include: pressure application, angle of float, pattern of floating

surface conditions include: firmness, presence of bleed water, setting of concrete materials

D-9.02 Floats concrete by machine

Essential Skills

Oral Communication, Thinking, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
D-9.02.01P	assess surface conditions	surface conditions are assessed according to the concrete materials used, ambient conditions, and CSA A23.1
D-9.02.02P	assess work area for fresh air ventilation	work area is assessed for fresh air ventilation according to provincial/territorial safety regulations
D-9.02.03P	apply single machine float or double-pan machine float to prepare for trowelling	machine float is applied to eliminate holes and produce a consolidated surface paste to prepare for trowelling
D-9.02.04P	apply single machine float	single machine float is applied to produce a final finish that has a rough non-slip texture
D-9.02.05P	apply double-pan machine float	double-pan machine float is applied to produce a final finish that has a fine non-slip texture and improved flatness compared to a single machine float
D-9.02.06P	identify defects in blades and machine	defects in blades and machine are identified according to uneven wear or damage
D-9.02.07P	check emergency shut-off switch	emergency shut-off switch is checked and operating correctly
D-9.02.08P	apply machine float in an overlapping pattern and with different blade angles	each pass of the machine is applied at 90 degrees to the prior machine float pass, and the blade angles and machine speed are adjusted according to the set of the concrete

RANGE OF VARIABLES

surface conditions include: firmness, presence of bleed water, setting of concrete materials

KNOWLEDGE		
	Learning Outcomes	Learning Objectives
D-9.02.01L	demonstrate knowledge of the equipment and procedures used to float concrete by machine	identify types of floating machines their operation and procedures for use
		identify types of blades their application and procedures for use
		explain the effect of blade speed and pitch on concrete surfaces
D-9.02.02L	demonstrate knowledge of admixtures in concrete, their applications and effects on floating concrete by machine	explain the effect of admixtures in the concrete

RANGE OF VARIABLES

types of floating machines include: walk-behind single machine, double-pan ride-on machine, edge machine

types of blades include: float, combination, pan

TASK D-10 Hand-tools concrete

TASK DESCRIPTOR

Concrete finishers hand-tool plastic concrete to control cracking, produce finished edges, provide decorative borders and aid in the removal of formwork. Extruded surfaces are hand-tooled to complete the contoured finish.

D-10.01 Edges perimeter of slab

Essential Skills Oral Communication, Document Use, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS		
	Performance Criteria	Evidence of Attainment
D-10.01.01P	assess surface conditions	surface conditions are assessed according to ambient conditions and concrete materials set
D-10.01.02P	clean adjacent surfaces	adjacent surfaces are cleaned from cement paste

D-10.01.03P	apply edging techniques	edging techniques are applied to ensure a smooth and flat surface
D-10.01.04P	select edger radius	edger radius is selected according to project specifications and drawings

RANGE OF VARIABLES

surface conditions include: firmness, presence of bleed water, concrete materials

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-10.01.01L	demonstrate knowledge of tools and equipment used to edge concrete, their application and procedures for use	identify types of edgers , their application and procedures for use
		identify surface conditions that affect edging

RANGE OF VARIABLES

types of edgers include: tread, safety, walk-along, curb, bullnose

surface conditions include: firmness, presence of bleed water, concrete materials

D-10.02 Finishes extruded concrete surfaces

Essential Skills Oral Communication, Document Use, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
D-10.02.01P	select and use specialized tools	specialized tools are selected and used according to application
D-10.02.02P	determine finishing technique	finishing technique is determined according to project requirements
D-10.02.03P	apply finishing techniques	finishing techniques are applied to maintain the contour of the surface and meet project requirements

RANGE OF VARIABLES

specialized tools include: moulds, hand mule, long-handled curb edgers, jointers

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-10.02.01L	demonstrate knowledge of extruded concrete surfaces and the tools and equipment and procedures used to finish them	identify types of extruded surfaces and the techniques used to produce them
		identify specialized tools and the procedures used to finish extruded surfaces
		describe characteristics of extruded concrete

RANGE OF VARIABLES

types of extruded surfaces include: curb and gutter, sidewalk, highway, slip form

specialized tools include: moulds, hand mule, long-handled curb edgers, jointers

characteristics include: slump, air content, mix design

D-10.03 Tools contraction joints

Essential Skills Document Use, Numeracy, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
D-10.03.01P	assess surface conditions	surface conditions are assessed according to the concrete materials used, ambient conditions, and CSA A23.1
D-10.03.02P	calculate depth and spacing of contraction joints	contraction joints depth and spacing is calculated according to drawings and specifications and CSA A23.1
D-10.03.03P	ensure joint straightness	joints are straight according to use of lines and straightedges
D-10.03.04P	apply tooling techniques	tooling techniques are applied according to site conditions

RANGE OF VARIABLES

surface conditions include: firmness, presence of bleed water, concrete materials

tooling techniques include: pressure application, angle of tool, depth of groove, location of joints

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-10.03.01L	demonstrate knowledge of the tools and techniques used to tool contraction joints	identify tools required for tooling contraction joints
		explain depth and spacing as it pertains to hand-tooling concrete
		describe tooling techniques and their application

RANGE OF VARIABLES

tooling techniques include: pressure application, angle of tool, depth of groove, location of joints

TASK D-11 Trowels concrete

TASK DESCRIPTOR

Concrete finishers trowel concrete to increase the density of the surface and to achieve the final finish. Timing is critical.

D-11.01 Trowels concrete by hand

Essential Skills Document Use, Working with Others, Oral Communication

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
D-11.01.01P	assess surface conditions	surface conditions are assessed according to the concrete materials used, ambient conditions, and CSA A23.1
D-11.01.02P	apply hand trowel to concrete	hand trowel is applied to small areas, slab edges, and areas inaccessible to finishing machines, to achieve a smooth finish without surface imperfections

RANGE OF VARIABLES

surface conditions include: firmness, concrete materials

surface imperfections include: pin holes, ridges, chatter marks, wash boarding, blisters

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-11.01.01L	demonstrate knowledge of techniques used to apply hand trowel to concrete without surface imperfections	identify tools and their usage to apply hand trowel to concrete
		identify surface imperfections their causes and techniques for correction
D-11.01.02L	demonstrate knowledge of the effects of various factors on the procedures used to trowel concrete by hand	describe the effects of trowel pitch and force
		describe the procedures used to trowel concrete by hand

RANGE OF VARIABLES

surface imperfections include: pin holes, ridges, chatter marks, wash boarding, blisters

D-11.02 Trowels concrete by machine

Essential Skills Document Use, Working with Others, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
D-11.02.01P	assess surface conditions	surface conditions are assessed according to the concrete materials used, ambient conditions, and CSA A23.1
D-11.02.02P	assess work area for fresh air ventilation	work area is assessed for fresh air ventilation according to provincial/territorial safety regulations
D-11.02.03P	apply various trowelling techniques	trowelling techniques are applied according to the set of the concrete, ambient conditions, and project plans and specifications
D-11.02.04P	identify defects in trowel blades	defects in trowel blades are identified and blades are replaced
D-11.02.05P	check emergency shut-off switch	emergency shut-off switch is checked and operating correctly
D-11.02.06P	use power trowel	power trowel is used to achieve a smooth finish without surface imperfections and according to project plans and specifications

RANGE OF VARIABLES

surface conditions include: firmness, concrete materials

trowelling techniques include: finishing at construction joints, patterns for each pass of the trowel machine should be at 90 degree to the prior machine trowel pass, adjusting blade pitch and speed, addressing cold joints

surface imperfections include: pin holes, ridges, chatter marks, wash boarding

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-11.02.01L	demonstrate knowledge of the tools and equipment and techniques used to trowel concrete by machine	identify types of machines used for troweling and their procedures for use
		identify the effects of types of blades on concrete surface
		identify trowelling techniques used to trowel concrete by machine
D-11.02.02L	demonstrate knowledge of the effects of various factors on procedures used to trowel concrete by machine	describe the effects of weather conditions on the concrete
		describe the effects of admixtures in the concrete
		describe the effects of poor ventilation on slab surface (for health and safety and carbonation)

RANGE OF VARIABLES

types of machines include: walk-behind single machine, double-trowel ride-on machine

types of blades include: steel blades, combination blades, plastic blades

trowelling techniques include: finishing at construction joints, patterns for each pass of the trowel machine should be at 90 degree to the prior machine trowel pass, adjusting blade pitch and speed, addressing cold joints

TASK D-12 Applies surface treatments to concrete

TASK DESCRIPTOR

Concrete finishers apply surface treatments to plastic concrete to achieve specified surface finishes. It is critical that surface treatments be performed at the right time.

D-12.01 Applies dry-shake aggregate surface hardeners

Essential Skills Document Use, Thinking, Numeracy

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
D-12.01.01P	assess surface conditions	surface conditions are assessed according to the concrete materials used, ambient conditions and manufacturers' instructions
D-12.01.02P	calculate quantity of materials to be applied	materials are calculated according to placement size, drawings and specifications
D-12.01.03P	select and use tools and equipment	tools and equipment are selected and used according to application rate
D-12.01.04P	apply techniques	techniques are applied to achieve surface finish according to drawings and specifications
D-12.01.05P	installs dry-shake hardeners	dry-shake hardeners are installed evenly and in specified quantity according to drawings and specifications, and manufacturers' instructions
D-12.01.06P	float product into the concrete surface	product is floated into the concrete surface according to site conditions and manufacturers' instructions

RANGE OF VARIABLES

surface conditions include: firmness, presence of bleed water, concrete materials

techniques include: broadcasting by hand and machine

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-12.01.01L	demonstrate knowledge of products and the techniques used to broadcast them on concrete surface	identify types of dry-shake hardeners and their application procedures
D-12.01.02L	demonstrate knowledge of the factors that affect dry-shake aggregate surface hardeners on concrete	explain the effect of improper application and finishing of dry-shake aggregate surface hardeners
		explain the effects of surface conditions on dry-shake aggregate surface hardeners

RANGE OF VARIABLES

types of dry-shake hardeners include: mineral or metallic aggregates, natural or pigmented

surface conditions include: firmness, presence of bleed water, concrete materials

D-12.02 Applies exposed aggregate finish

Essential Skills Numeracy, Document Use, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
D-12.02.01P	assess surface conditions	surface conditions are assessed according to the concrete materials used, and ambient conditions
D-12.02.02P	determine requirement for and amount of surface retarder	requirement and amount of surface retarder is determined according to drawings and specifications, and manufacturers' instructions
D-12.02.03P	select and use tools and equipment	tools and equipment are selected and used according to manufacturers' instructions
D-12.02.04P	apply surface retarder	surface retarder is applied according to ambient conditions and manufacturers' instructions

RANGE OF VARIABLES

surface conditions include: firmness, presence of bleed water, concrete materials

tools and equipment include: spray equipment (pressure washer, pressure spray can), push broom, darby float, magnesium float, hoses

surface retarders are water-based

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-12.02.01L	demonstrate knowledge of exposed aggregate finish and the procedures used for application	identify types of exposed aggregate finish and the procedures used to expose the aggregate
		identify tools and equipment used to apply surface retarder
		explain how to broadcast aggregate uniformly or in desired pattern
		explain the saturated surface-dry (SSD) requirements for aggregate
D-12.02.02L	demonstrate knowledge of the factors that affect applying retarders	explain how surface conditions affect the application of surface retarders

RANGE OF VARIABLES

types of exposed aggregate finishes are ready-mixed and broadcast

tools and equipment include: spray equipment (pressure washer, pressure spray can), push broom, darby float, magnesium float, hoses

surface conditions include: firmness, presence of bleed water, concrete materials

D-12.03 Textures concrete surface

Essential Skills Document Use, Thinking, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
D-12.03.01P	assess surface conditions	surface conditions are assessed according to the concrete materials used, and ambient conditions
D-12.03.02P	select and use tools and equipment	tools and equipment are selected and used to produce the desired texture
D-12.03.03P	apply texturing techniques	texturing techniques are applied to achieve patterns according to drawings and specifications

RANGE OF VARIABLES

surface conditions include: firmness, presence of bleed water, concrete materials

tools and equipment include: broom, flat wire texture broom (tyne), hand float

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-12.03.01L	demonstrate knowledge of the requirements and techniques for texturing concrete surfaces	identify types of textured surfaces and the techniques required to achieve them
		identify tools and equipment used for texturing surfaces
D-12.03.02L	demonstrate knowledge of the factors that affect texturing concrete	explain how surface conditions affect the texturing process

RANGE OF VARIABLES

types of textured surfaces include: broomed, tyne finish, swirl, herringbone

tools and equipment include: broom, flat wire texture broom (tyne), hand float

surface conditions include: firmness, presence of bleed water, concrete materials

D-12.04 Applies stamped concrete surface finish

Essential Skills Thinking, Working with Others, Numeracy

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
D-12.04.01P	assess surface conditions	surface conditions are assessed according to the concrete materials used, and ambient conditions
D-12.04.02P	protect surrounding area	surrounding area is protected from broadcast products
D-12.04.03P	apply release agents	release agents are applied according to manufacturers' instructions
D-12.04.04P	lay out pattern	pattern is laid out according to manufacturers' instructions
D-12.04.05P	stamp pattern	pattern is stamped consistently for location and depth

RANGE OF VARIABLES

surface conditions include: firmness, presence of bleed water, concrete materials

release agents are powder or liquid

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-12.04.01L	demonstrate knowledge of stamps, patterns, designs and the procedures used to stamp concrete	identify types of patterns for stamping concrete surfaces and the procedures for use
		identify different types of stamping tools for stamping concrete surfaces
		identify mix design required to accommodate pattern
D-12.04.02L	demonstrate knowledge of the factors that affect stamping of concrete	identify stamp compositions
		describe the effects of broadcast products on setting time prior to stamping
		describe the effects of weather conditions on stamping procedures
		identify the use of evaporation reducers prior to stamping concrete surfaces

RANGE OF VARIABLES

types of patterns include: grouted (cobblestone, random stone, barn board), seamless

stamping tools include: textured mats, stencils, stamp roller, chisels, tamper, touch-up roller

mix design includes: 10 mm aggregate size, C-2, aggregate shape

stamp compositions include: flexible urethane, paper, metal

D-12.05 Applies evaporation reducers

Essential Skills Numeracy, Document Use, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
D-12.05.01P	assess surface conditions	surface conditions are assessed according to the concrete materials used and ambient conditions
D-12.05.02P	determine requirement for and amount of evaporation reducer	requirement and amount of evaporation reducer is determined according to manufacturers' instructions
D-12.05.03P	select and use tools and equipment	tools and equipment are selected and used to ensure even coverage
D-12.05.04P	apply surface evaporation reducers	surface evaporation reducers are applied to maintain surface plasticity and minimize concrete mix water evaporation

RANGE OF VARIABLES

surface conditions include: presence of bleed water, concrete materials

tools and equipment are hand or power sprayers

KNOWLEDGE		
	Learning Outcomes	Learning Objectives
D-12.05.01L	demonstrate knowledge of evaporation reducers and the procedures used for application	identify evaporation reducers and their applications
		identify tools and equipment used to apply evaporation reducers
		identify procedures used to apply evaporation reducers
		explain mixing procedures for evaporation reducers
D-12.05.02L	demonstrate knowledge of the factors that affect applying evaporation reducers	explain how surface conditions affect the application of evaporation reducers

RANGE OF VARIABLES

tools and equipment are hand or power sprayers

surface conditions include: presence of bleed water, concrete materials

MAJOR WORK ACTIVITY E

Cures and protects concrete

TASK E-13 Cures concrete

TASK DESCRIPTOR

Concrete finishers cure concrete to maximize its strength and increase its durability. Correct temperature and moisture retention is important to the curing process.

E-13.01 Wet-cures concrete

Essential Skills Thinking, Document Use, Digital Technology

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
E-13.01.01P	select and use tools and equipment	tools and equipment are selected and used according to application
E-13.01.02P	pond (flood) concrete	concrete is ponded according to ACI guides, and drawings and specifications
E-13.01.03P	apply water using sprinklers	sprinklers are set up to continuously apply water onto hardened concrete to maintain moisture and control temperature according to drawings and specifications
E-13.01.04P	fog or mist air space surrounding concrete	fog or mist is applied to increase humidity level according to drawings and specifications
E-13.01.05P	cover concrete with materials	materials are used according to ACI guides, and drawings and specifications to maintain required temperature and retain moisture
E-13.01.06P	check concrete during curing	concrete is checked for temperature and moisture of concrete to ensure the curing process takes place according to CSA A23.1, ACI guides, and drawings and specifications

RANGE OF VARIABLES

tools and equipment includes: sprinklers, soaker hose, fogging and misting systems

materials include: wet burlap, curing blankets, polyethylene sheeting

KNOWLEDGE

	Learning Outcomes	Learning Objectives
E-13.01.01L	demonstrate knowledge of the processes, requirements and techniques used in wet-curing concrete	identify the tools and equipment and materials used in the process of wet-curing concrete
		explain the requirements for proper hydration of concrete during the wet-curing process
		explain the requirements for proper temperature of concrete during the wet-curing process
		describe the process and techniques of wet-curing concrete
		identify types of cement and timings related to curing
		explain the consequences of improper curing

RANGE OF VARIABLES

tools and equipment includes: sprinklers, soaker hose, fogging and misting systems

materials include: wet burlap, curing blankets, polyethylene sheeting

E-13.02 Chemical cures concrete

Essential Skills Document Use, Thinking, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
E-13.02.01P	select curing compound	curing compound is selected according to drawings and specifications
E-13.02.02P	select and use tools and equipment	tools and equipment are selected and used according to application
E-13.02.03P	apply curing compound	curing compound is applied to ensure complete and uniform coverage

RANGE OF VARIABLES

curing compounds include: clear membrane, fugitive dye, dissipating curing compound, water-based, solvent-based

tools and equipment include: roller, spray can, PPE

KNOWLEDGE		
	Learning Outcomes	Learning Objectives
E-13.02.01L	demonstrate knowledge of applications and procedures used in chemical curing	identify types of curing compounds
		identify types of cement and timings related to curing
		describe the effects of curing compounds on the curing process
		identify the risks associated with and the safe work practices of applying curing compounds
		describe application procedure of curing compounds
		identify timing for the application of curing compounds
		describe safe work practices pertaining to the use of seamless systems

RANGE OF VARIABLES

curing compounds include: clear membrane, fugitive dye, dissipating curing compound, water-based, solvent-based

TASK E-14 Creates contraction joints

TASK DESCRIPTOR

Contraction joints are placed in green concrete in pre-determined locations in an effort to control cracking caused by drying shrinkage.

E-14.01 Saw cuts contraction joints

Essential Skills Document Use, Numeracy, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
E-14.01.01P	identify location, spacing and depth of contraction joints	location, spacing and depth of contraction joints are identified according to drawings and specifications, CSA A23.1 and industry practices
E-14.01.02P	install contraction joints in green concrete	contraction joints are installed in designated locations to promote controlled cracking

KNOWLEDGE

	Learning Outcomes	Learning Objectives
E-14.01.01L	demonstrate knowledge of tools and equipment and procedures to saw cut contraction joints	identify tools and equipment required for wet and early entry cutting
		describe procedures for saw cutting contraction joints

RANGE OF VARIABLES

tools and equipment include: string line, measuring tape, chalk line, wet saw, early entry saw, cut-off saw (quick cut)

E-14.02 Fills joints

Essential Skills

Thinking, Document Use, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
E-14.02.01P	clean joints	joints are cleaned to remove contaminants and promote bonding
E-14.02.02P	place a backing rod in joints	a backing rod is placed to control joint filler depth and surface profile finish according to drawings and specifications
E-14.02.03P	mix <i>joint sealant or joint filler</i>	<i>joint sealant or joint filler</i> is mixed according to manufacturers' instructions
E-14.02.04P	install <i>joint sealant or joint filler</i>	<i>joint sealant</i> is installed to keep joint clean, and <i>joint filler</i> is installed to protect joint edges from solid tire traffic according to manufacturers' instructions

RANGE OF VARIABLES

joint sealant or joint filler include: self-levelling, non-sag

KNOWLEDGE

	Learning Outcomes	Learning Objectives
E-14.02.01L	demonstrate knowledge of tools and equipment and procedures to fill contraction joints	identify tools and equipment required for filling joints
		describe procedures for filling contraction joints
		identify timing and conditions for application of joint filling

TASK E-15 Protects concrete

TASK DESCRIPTOR

Concrete finishers need to physically protect concrete from the surrounding elements, temperature variations and access during its setting and hardening. This helps to improve durability of the concrete and protect it from damage.

E-15.01 Protects plastic concrete

Essential Skills Document Use, Digital Technology, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
E-15.01.01P	insulate surface of concrete	surface of concrete is insulated with materials for heat retention
E-15.01.02P	identify concrete temperature	concrete's temperature is identified
E-15.01.03P	wet sub-base, formwork and other contact surfaces	sub-base, formwork and other contact surfaces are wet to avoid wicking and maintain moisture of concrete
E-15.01.04P	set up hoarding and heaters	hoarding and heaters are set up to prevent concrete from freezing
E-15.01.05P	set up wind breaks and shade	wind breaks and shade are set up to prevent concrete from freezing and protect from surface drying and hot weather
E-15.01.06P	apply evaporation reducers	evaporation reducers are applied to prevent surface moisture loss
E-15.01.07P	restrict access using barricades	barricades are used to restrict access

RANGE OF VARIABLES

materials include: straw and polyethylene, insulated tarps, electric blankets

barricades include: caution tape, ribbon, safety fence, pylons, wooden barricades

KNOWLEDGE

	Learning Outcomes	Learning Objectives
E-15.01.01L	demonstrate knowledge of how temperature affects concrete	describe the effects of ground and air temperature on concrete
		identify temperature of concrete and its effect on set
		identify temperature ranges for curing processes

identify plan to control the **weather variables**

identify the effects of water, ice and warm water on the concrete mix

RANGE OF VARIABLES

weather variables include: wind, sun, rain, snow, humidity, temperature

E-15.02 Protects hardened concrete

Essential Skills Document Use, Numeracy, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

Performance Criteria

Evidence of Attainment

E-15.02.01P	insulate work area	work area is insulated with materials for heat retention
E-15.02.02P	set up hoarding and heaters	hoarding and heaters are set up to prevent concrete from freezing
E-15.02.03P	restrict access using barricades	barricades are used to restrict access
E-15.02.04P	set up reshoring	reshoring is set in correct location

RANGE OF VARIABLES

materials include: straw and polyethylene, insulated tarps, electric blankets, reshoring

barricades include: caution tape, ribbon, safety fence, pylons, wooden barricades

KNOWLEDGE

Learning Outcomes

Learning Objectives

E-15.02.01L	demonstrate knowledge of how temperature affects concrete	describe the effects of ground and air temperature on concrete
		identify temperature ranges for curing processes
		identify plan to control the weather variables

RANGE OF VARIABLES

weather variables include: wind, sun, rain, snow, humidity, temperature

MAJOR WORK ACTIVITY F

Modifies and repairs concrete and performs grouting

TASK F-16 Repairs and restores concrete

TASK DESCRIPTOR

Concrete finishers must access areas to be repaired, decide on repair methods, prepare surfaces to be repaired or restored and install repair materials in a safe, cost-effective and timely manner.

F-16.01 Inspects concrete

Essential Skills Oral Communication, Document Use, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
F-16.01.01P	access affected area	affected area is accessed to perform inspection
F-16.01.02P	check concrete	concrete is visually and audibly checked for defects
F-16.01.03P	identify cause of defect	cause of defect is identified to determine repair required
F-16.01.04P	determine if non-destructive or destructive testing is required	need for testing is determined according to the defect

RANGE OF VARIABLES

defects include: scaling, spalling, honeycombs, cracks

cause of defects include: stress, efflorescence, improper placing or finishing, environmental (acid rain, carbonation), corrosion

KNOWLEDGE

	Learning Outcomes	Learning Objectives
F-16.01.01L	demonstrate knowledge of concrete defects and their causes	identify types of defects that require repair identify cause of defects that require repair

F-16.01.02L	demonstrate knowledge of testing tools and equipment, and procedures used to inspect concrete	identify the requirements for non-destructive and destructive testing
		identify the tools and equipment used to test concrete
		describe procedures used to inspect concrete

RANGE OF VARIABLES

defects include: scaling, spalling, honeycombs, cracks

cause of defects include: stress, efflorescence, improper placing or finishing, environmental (acid rain, carbonation), corrosion

procedures include: visual, chain dragging, hammer sounding, copper-copper sulfate test, core sample

F-16.02 Removes materials

Essential Skills Thinking, Working with Others, Oral Communication

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
F-16.02.01P	determine the removal procedure	removal procedure is determined according to inspection results and industry documents
F-16.02.02P	protect and isolate area of removal	area of removal is protected and isolated with barriers
F-16.02.03P	determine area and depth of material to be removed	area and depth of material to be removed is determined according to the inspection results and ACI guides
F-16.02.04P	determine if an electrical and mechanical inspector is required	inspectors are contacted to locate embedded electrical or mechanical hazards
F-16.02.05P	operate removal equipment	removal equipment is operated according to manufacturers' instructions
F-16.02.06P	dispose of debris	debris is disposed of according to jurisdictional specifications

RANGE OF VARIABLES

barriers include: caution tape, barricades, temporary fencing, tarps

removal equipment includes: grinders, chipping hammers, scarifiers, scabblers, sandblasters, vacuums

KNOWLEDGE

	Learning Outcomes	Learning Objectives
F-16.02.01L	demonstrate knowledge of material removal equipment and procedures for use	identify types of removal equipment identify hazards and safe work practices pertaining to removal of materials describe the procedures used for the removal of materials
F-16.02.02L	demonstrate knowledge of disposal methods	identify regulations and safe work practices pertaining to disposal of materials identify methods used to dispose of materials

RANGE OF VARIABLES

removal equipment includes: grinders, chipping hammers, scarifiers, scabblers, sandblasters, vacuums

F-16.03 Prepares surface for repair or restoration

Essential Skills Document Use, Numeracy, Oral Communication

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
F-16.03.01P	select profiling equipment	profiling equipment is selected to determine depth of surface profile according to manufacturers' instructions
F-16.03.02P	operate profiling equipment	profiling equipment is operated according to manufacturers' instructions
F-16.03.03P	clean surface	surface is cleaned free of debris according to scope of work
F-16.03.04P	pre-soak surfaces	surfaces are pre-soaked to SSD state using pre-soak methods
F-16.03.05P	prepare and apply bonding agents	bonding agents are applied according to manufacturers' instructions

RANGE OF VARIABLES

profiling equipment includes: grinders, scabblers, sand blasters, shot blasters, scarifiers, bush hammers, chipping gun

pre-soak methods include: using wet burlap, spraying, ponding, misting

bonding agents include: latex modified, slurry mix, epoxy

KNOWLEDGE

	Learning Outcomes	Learning Objectives
F-16.03.01L	demonstrate knowledge of procedures and materials used for preparing the surface for repair or restoration	describe surface preparation procedures and material
		identify profiling equipment , their applications and the procedures used
		identify bonding agents , their application and the procedures used
		describe the SSD requirements for concrete
		identify pre-soak methods

RANGE OF VARIABLES

profiling equipment includes: grinders, scabblers, sand blasters, shot blasters, scarifiers, bush hammers, chipping gun

bonding agents include: latex modified, slurry mix, epoxy

pre-soak methods include: using wet burlap, spraying, ponding, misting

F-16.04 Install repair materials

Essential Skills Document Use, Thinking, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
F-16.04.01P	select repair materials	repair materials are selected according to required repair and assessed conditions
F-16.04.02P	determine if aggregate fillers are required	need for aggregate fillers is determined according to depth of repair area, repair material selected and manufacturers' instructions

F-16.04.03P	select curing procedure	curing procedures are selected according to repair material and manufacturers' instructions
F-16.04.04P	use repair procedures	repair procedures are used according to repair material and manufacturers' instructions

RANGE OF VARIABLES

repair material includes: epoxies, mortar, modified patching materials, concrete, shot-crete/gunite

conditions include: moisture content, temperature, visible contaminants, time restraints

repair procedures include: drypacking, hand patching, pouring back, injecting, shot-creting

KNOWLEDGE

	Learning Outcomes	Learning Objectives
F-16.04.01L	demonstrate knowledge of repair materials and procedures used to repair and restore concrete	identify hazards and safe work practices pertaining to repairing and restoring concrete
		identify repair materials and their applications
		describe procedures used for repairing and restoring concrete

RANGE OF VARIABLES

repair material includes: epoxies, mortar, modified patching materials, concrete, shot-crete/gunite

repair procedures include: drypacking, hand patching, pouring back, injecting, shot-creting

hazards include: vapours, contaminants, chemical burns

TASK F-17 Applies surface treatment to hardened concrete

TASK DESCRIPTOR

Concrete finishers apply surface treatments to hardened concrete. They must clean and prepare existing concrete surfaces using abrading or washing equipment to ensure that seamless coatings, toppings, parging or chemical surface treatments can be applied.

F-17.01 Prepares surface for surface treatments

Essential Skills Document Use, Working with Others, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
F-17.01.01P	protect surrounding areas	surrounding areas are protected from splatter and foreign debris according to industry practices
F-17.01.02P	identify presence of surface resists and excessive moisture transmission	surface resists and excessive moisture transmission are identified using industry practices
F-17.01.03P	use degreasing agents and concentrated acid cleaners	degreasing agents and concentrated acid cleaners are used according to manufacturers' instructions
F-17.01.04P	operate profiling equipment	profiling equipment is operated according to manufacturers' instructions
F-17.01.05P	determine structural soundness	structural soundness is determined by conducting a patch test
F-17.01.06P	install zinc strips	zinc strips are installed according to design, material used and manufacturers' instructions
F-17.01.07P	use cleaning products and equipment	cleaning products and equipment are used according to manufacturers' instructions
F-17.01.08P	remove fine debris	fine debris is removed using surface cleaning equipment

RANGE OF VARIABLES

surface resists include: sealers, oils, paints

degreasing agents include: caustic soda, citrus-based cleaners, chemical strippers

profiling equipment includes: sand/shot blasters, power grinders, concrete shavers

surface cleaning equipment includes: pressure washers, steam cleaners, wet/dry vacuums

KNOWLEDGE

	Learning Outcomes	Learning Objectives
F-17.01.01L	demonstrate knowledge of equipment and the procedures used to prepare surfaces	identify types of profiling equipment , their application and procedures for use
		identify surface cleaning equipment and describe surface cleaning procedures
F-17.01.02L	demonstrate knowledge of products used to prepare surfaces	describe the effects of products on the preparation of surfaces
		identify degreasing agents and describe their application

RANGE OF VARIABLES

profiling equipment includes: sand/shot blasters, power grinders, concrete shavers

surface cleaning equipment includes: pressure washers, steam cleaners, wet/dry vacuums

surface cleaning procedures include: acid washing, pressure washing

degreasing agents include: caustic soda, citrus-based cleaners, chemical strippers

F-17.02 Abrades surface to achieve architectural finish

Essential Skills Document Use, Reading, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
F-17.02.01P	apply methods to achieve architectural finishes	methods are applied to achieve architectural finishes according to drawings and specifications, and manufacturers' recommendations
F-17.02.02P	determine depth of abrasion	depth of abrasion is determined according to architectural finishes
F-17.02.03P	operate profiling equipment	profiling equipment is operated to achieve architectural finishes according to drawings and specifications
F-17.02.04P	contain and dispose of dispelled material	material dispelled during abrading process is contained according to scope of work and disposed of according to jurisdictional requirements

RANGE OF VARIABLES

methods include: sand blasting, grinding, bush hammering, wash coating, form treatments

architectural finishes include: textured, polished, wash-coated, exposed aggregate, bush hammered, antiquing

profiling equipment includes: sand blasters, grinders, bush hammers

KNOWLEDGE

	Learning Outcomes	Learning Objectives
F-17.02.01L	demonstrate knowledge of the equipment and procedures used to abrade concrete surfaces	identify types of profiling equipment , their application and procedures for use
		identify types of architectural finishes and the methods used to achieve them
		describe regulations pertaining to disposing of dispelled material
F-17.02.02L	demonstrate knowledge of the effects of abrading concrete	identify safe work practices related to abrading concrete
		describe the environmental impact of abrading concrete

RANGE OF VARIABLES

profiling equipment includes: sand blasters, grinders, bush hammers

architectural finishes include: textured, polished, wash-coated, exposed aggregate, bush hammered, antiquing

methods include: sand blasting, grinding, bush hammering, wash coating, form treatments

F-17.03 Applies seamless systems

Essential Skills Working with Others, Thinking, Numeracy

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
F-17.03.01P	select and use epoxy tools	epoxy tools are selected and used according to application
F-17.03.02P	select anchoring/keyways	anchoring/keyways is selected according to seamless coating being used, manufacturers' instructions, and drawings and specifications
F-17.03.03P	set up mix station	mix station is set up in accessible location to work area

F-17.03.04P	verify suitability of concrete surface	hardness and moisture condition of concrete is verified as suitable for the application
F-17.03.05P	mix and apply primer	primer is mixed and applied according to manufacturers' instructions
F-17.03.06P	mix and install seamless systems	seamless systems are mixed and installed according to manufacturers' instructions
F-17.03.07P	apply grout and top coats	grout and top coats are applied according to manufacturers' instructions and industry practices
F-17.03.08P	dispose of toxic waste material	toxic waste material is disposed of according to jurisdictional requirements

RANGE OF VARIABLES

epoxy tools include: trowels, spiked rollers, gauged squeegees, screed box, mixing equipment

seamless systems include: coating, broadcast systems, trowel-down systems, epoxy, non-static floor coating, terrazzo

KNOWLEDGE

	Learning Outcomes	Learning Objectives
F-17.03.01L	demonstrate knowledge of the application of seamless systems	identify types of seamless systems and mixing techniques and their application
F-17.03.02L	demonstrate knowledge of the epoxy tools and the procedures used to apply seamless systems	describe epoxy tools , their application and procedures for use
		describe the procedures used to apply seamless systems
F-17.03.03L	demonstrate knowledge of various factors that affect the application of seamless systems	explain moisture content of substrate and how it affects seamless systems
		describe safe work practices pertaining to the use of seamless systems

RANGE OF VARIABLES

seamless systems include: coating, broadcast systems, trowel-down systems, epoxy, non-static floor coating, terrazzo

epoxy tools include: trowels, spiked rollers, gauged squeegees, screed box, mixing equipment

F-17.04**Applies bonded and non-bonded toppings to concrete****Essential Skills**

Working with Others, Thinking, Document Use

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
F-17.04.01P	determine if topping needs to be bonded or non-bonded	topping need is determined to be bonded or non-bonded according to drawings and specifications
F-17.04.02P	select bonding method	bonding method is selected according to topping being used and drawings and specifications
F-17.04.03P	check existing surface	existing surface is ready to receive bonding agent according to manufacturers' instructions
F-17.04.04P	apply bonding agent	bonding agent is applied according to manufacturers' instructions
F-17.04.05P	use separation product on non-bonded areas	separation product on non-bonded areas is used to create an un-bonded topping
F-17.04.06P	install topping	topping is installed according to drawings and specifications
F-17.04.07P	cure toppings	toppings are cured according to topping material used and according to manufacturers' instructions

RANGE OF VARIABLES

bonding methods include: installing studs, installing rebar, applying latex, scrubbing slurry into surface

bonding agents include: latex modified, cement slurry mix, epoxy (high and low viscosity)

KNOWLEDGE

	Learning Outcomes	Learning Objectives
F-17.04.01L	demonstrate knowledge of bonded and non-bonded toppings and their applications and procedures for use	identify types of toppings for concrete
		identify bonding agents , their application and procedures for use
F-17.04.02L	demonstrate knowledge of the application and procedure used to apply bonded and non-bonded toppings	identify topping reinforcements and describe their application
		identify bonding methods

describe curing methods for bonded and non-bonded toppings

describe safe work practices pertaining to the use of seamless systems

RANGE OF VARIABLES

types of toppings include: pre-mixed topping, modified concrete, grout

bonding agents include: latex modified, cement slurry mix, epoxy (high and low viscosity)

topping reinforcement includes: synthetic or steel fibre, rebar, welded wire mesh

bonding methods include: installing studs, installing rebar, applying latex, scrubbing slurry into surface

F-17.05 Parges vertical surfaces

Essential Skills

Thinking, Document Use, Continuous Learning

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

Performance Criteria

Evidence of Attainment

F-17.05.01P	select parging material	parging material is selected according to client and drawings and specifications
F-17.05.02P	select application method	application method is selected according to client and manufacturers' instructions
F-17.05.03P	mix parging material	parging material is mixed according to manufacturers' instructions
F-17.05.04P	apply finishing and texturing methods	finishing and texturing methods are applied according to desired design

RANGE OF VARIABLES

finishing and texturing methods include: trowelling, stencilling, combing, sponging, grinding, dry sacking, adding colour, darbying

KNOWLEDGE

Learning Outcomes

Learning Objectives

F-17.05.01L	demonstrate knowledge of parging, the materials, application and procedures used	identify types of parging materials
		explain mixing methods for parging materials
		describe parging procedures

identify *finishing and texturing methods*

describe the use of colours, their application and procedures for use

RANGE OF VARIABLES

finishing and texturing methods include: trowelling, stencilling, combing, sponging, grinding, dry sacking, adding colour, darbying

F-17.06 Applies chemical surface treatment

Essential Skills

Continuous Learning, Thinking, Document Use

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
F-17.06.01P	determine type of chemical surface treatment	chemical surface treatment is determined according to client instructions, and drawings and specifications
F-17.06.02P	select and use tools and equipment	tools and equipment are selected and used according to scope of work
F-17.06.03P	verify the surface	surface is verified for the hardness and moisture condition of the concrete according to manufacturers' instructions
F-17.06.04P	grind surface	surface is ground to take off cement laitance according to manufacturers' instructions
F-17.06.05P	select and use acid stains or dyes	acid stains or dyes are selected according to client instructions and used according to manufacturers' specifications
F-17.06.06P	remove acid residue	acid residue is removed according to manufacturers' instructions to neutralize the floor prior to applying top coats
F-17.06.07P	check pH level	pH level is checked by performing litmus test
F-17.06.08P	apply protective coating to acid stained surfaces	protective coating is applied to acid-stained surfaces according to manufacturers' instructions and drawings and specifications
F-17.06.09P	apply chemical surface treatment	chemical surface treatment is applied according to manufacturers' instructions
F-17.06.10P	dispose of toxic waste material	toxic waste material is disposed of according to jurisdictional requirements

RANGE OF VARIABLES

chemical surface treatments include: dyes, acid stains, silane, siloxane, oxides, silicate densifiers

KNOWLEDGE

	Learning Outcomes	Learning Objectives
F-17.06.01L	demonstrate knowledge of the application of <i>chemical surface treatment</i>	identify types of <i>chemical surface treatment</i> and mixing techniques and procedures for use
		identify <i>types of protective coatings</i> and their application
		describe hazards related to chemical surface treatment products and the safe work practices pertaining to their application
F-17.06.02L	demonstrate knowledge of various factors that affect the use of <i>chemical surface treatments</i>	explain moisture content of substrate and how it affects <i>chemical surface treatments</i>
		identify application time and drying time requirements for <i>chemical surface treatments</i>
		describe the effects of temperature on <i>chemical surface treatments</i>
		describe how the concrete mix design affects the <i>chemical surface treatments</i>
		describe safe work practices pertaining to the use of <i>chemical surface treatments</i>

RANGE OF VARIABLES

chemical surface treatments include: dyes, acid stains, silane, siloxane, oxides, silicate densifiers

types of protective coatings include: epoxies, urethanes, acrylics

TASK F-18 Grouts

TASK DESCRIPTOR

Concrete finishers install grouts to transfer loads to concrete foundations and to fill voids between concrete elements.

F-18.01 Prepares surface for grouting

Essential Skills Thinking, Oral Communication, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
F-18.01.01P	profile surfaces	surfaces are profiled to meet concrete surface profile (CSP) according to industry documents and practices, and manufacturers' instructions
F-18.01.02P	clean surfaces	surfaces are cleaned according to industry practices and manufacturers' instructions
F-18.01.03P	check forms	forms are checked for leaks according to industry practices
F-18.01.04P	pre-soak surfaces for cementitious grout	surfaces are pre-soaked for cementitious grout using methods according to manufacturers' instructions
F-18.01.05P	apply bonding agents	bonding agents are applied according to manufacturers' instructions

RANGE OF VARIABLES

methods include: applying wet burlap, spraying, misting, fogging

KNOWLEDGE

	Learning Outcomes	Learning Objectives
E-18.01.01L	demonstrate knowledge of grouts , surface preparation and application methods	describe surface preparation requirements for specific grouts
		identify surface preparation techniques
		identify methods for achieving SSD

RANGE OF VARIABLES

grouts include: cementitious, epoxy, polymeric

surface preparation includes: removing existing sealers, dirt, oil, cement laitance, chemicals

methods include: applying wet burlap, spraying, misting, fogging

F-18.02 Mixes grout

Essential Skills Document Use, Numeracy, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
F-18.02.01P	determine volume of material required	volume of material required is determined according to desired consistency and manufacturers' instructions
F-18.02.02P	clean mixing area and tools	mixing area and tools are cleaned according to manufacturers' instructions
F-18.02.03P	add water and other additives	water and other additives are added according to type of grout being used and manufacturers' instructions
F-18.02.04P	apply mixing techniques	mixing techniques are applied according to manufacturers' instructions

RANGE OF VARIABLES

other additives include: aggregates, plasticizers, retarders, accelerators

KNOWLEDGE

	Learning Outcomes	Learning Objectives
F-18.02.01L	demonstrate knowledge of application and procedures for mixing grout	identify types of grouts , their application and mixing equipment
		identify mixing hazards and safe work practices pertaining to mixing grouts
		explain ratios as they pertain to mixing grout
		describe other additives pertaining to mixing grout

RANGE OF VARIABLES

types of grout include: cementitious, epoxy, polymeric

mixing equipment include: paddle mixer, shovel and wheelbarrow, drum mixer

mixing hazards include: solvent fumes, grout dust

other additives include: aggregates, plasticizers, retarders, accelerators

F-18.03 Installs grout

Essential Skills

Document Use, Thinking, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
F-18.03.01P	determine <i>installation methods</i>	<i>installation methods</i> are determined according to scope of work and manufacturers' instructions
F-18.03.02P	select and use tools and equipment	tools and equipment are used according to scope of work
F-18.03.03P	operate <i>installation equipment</i>	<i>installation equipment</i> is operated according to manufacturers' instructions
F-18.03.04P	drypack grout	drypack grout is compacted to consolidate according to industry practices
F-18.03.05P	apply <i>installation methods</i>	<i>installation methods</i> are applied according to scope of work and manufacturers' instructions
F-18.03.06P	grout machine bases	machine bases are grouted to meet seating requirements according to drawings and specifications, and industry practices
F-18.03.07P	grout pre-cast joints	pre-cast joints are grouted according to drawings and specifications
F-18.03.08P	inject grout	grout is injected according to manufacturers' instructions

RANGE OF VARIABLES

installation methods include: injecting, pouring, strapping, rodding, vibrating, head boxing, pumping, chaining

installation equipment includes: vibrators, injection guns, grout pumps, metal straps, head box

KNOWLEDGE

	Learning Outcomes	Learning Objectives
F-18.03.01L	demonstrates knowledge of grout and installation methods used	identify types of grout , their applications and properties
		identify safe work practices and procedures pertaining to installing grout
		describe installation methods for grout
		identify installation equipment used for installing grout
		explain injection systems, their application and procedures for use
		explain pot life as it pertains to installation of grout

RANGE OF VARIABLES

installation methods include: injecting, pouring, strapping, rodding, vibrating, head boxing, pumping, chaining

types of grout include: cementitious, epoxy, polymeric

installation equipment includes: vibrators, injection guns, grout pumps, metal straps, head box

F-18.04 Finishes exposed grout surfaces

Essential Skills Document Use, Thinking, Reading

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
F-18.04.01P	select and use tools and equipment	tools and equipment are selected and used according to scope of work
F-18.04.02P	determine hydration timing	hydration timing is determined according to cementitious grout and surrounding conditions
F-18.04.03P	remove forms	forms are removed to access and finish edges
F-18.04.04P	tool surfaces	surfaces are tooled into required shape to achieve desired finish
F-18.04.05P	select and apply curing method	curing method is selected and applied according to engineers' specifications and manufacturers' instructions

KNOWLEDGE

	Learning Outcomes	Learning Objectives
F-18.04.01L	demonstrate knowledge of grout and procedures to finish exposed surfaces	identify types of grout and their application and properties
		describe procedures used to finish and contour grout surfaces
		identify timing required for removing forms, finishing and curing exposed grout surfaces
		describe safe work practices and procedures pertaining to finishing exposed grout surfaces

RANGE OF VARIABLES

types of grout include: cementitious, epoxy, polymeric, chemical

TASK F-19 Performs cutting and coring

TASK DESCRIPTOR

Concrete finishers cut and core concrete to modify, repair, restore, inspect and test hardened concrete materials.

F-19.01 Performs cutting

Essential Skills Thinking, Numeracy, Oral Communication

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	yes	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
F-19.01.01P	determine cut locations	cut locations are determined according to CSA A23.1, drawings and specifications using measuring devices , and industry standards
F-19.01.02P	identify hazards	hazards are identified according to site conditions and equipment used
F-19.01.03P	install barriers	barriers are installed to isolate work and mitigate hazards
F-19.01.04P	select wet or dry cut	wet or dry cut is selected according to work area requirements and drawings and specifications

F-19.01.05P	select cutting equipment	cutting equipment is selected according to depth of cut and choice of wet or dry cut
F-19.01.06P	select saw blade	saw blade is selected according to concrete consistency and depth of cut
F-19.01.07P	cut concrete	concrete is cut according to determined cut and to manufacturers' instructions
F-19.01.08P	remove and dispose of debris	debris is removed according to industry practices and disposed of according to jurisdictional regulations

RANGE OF VARIABLES

measuring devices include: tape measures, chalk lines, measuring wheels

hazards include: falling concrete, uncontrolled force, dust and debris, noise, slips, rotating equipment, embedded items, segment loss

cutting equipment include: floor saw, cut-off saw, chain saws, wire saw

KNOWLEDGE

	Learning Outcomes	Learning Objectives
F-19.01.01L	demonstrate knowledge of cutting concrete, the equipment and procedures used	identify types of cutting equipment , their applications and procedures for use
		identify types of saw blades, their applications and procedures for use
		identify measuring devices , and describe their applications and procedures for use
		identify hazards and safe work practices pertaining to cutting concrete
		describe barriers, their application and procedures for use

RANGE OF VARIABLES

cutting equipment include: floor saw, cut-off saw, chain saws, wire saw

measuring devices include: tape measures, chalk lines, measuring wheels

hazards include: falling concrete, uncontrolled force, dust and debris, noise, slips, rotating equipment, embedded items, segment loss

F-19.02 Performs coring

Essential Skills Thinking, Numeracy, Oral Communication

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	NV	NV	NV	yes	yes	yes	ND	NV	no	ND	ND	ND

SKILLS

	Performance Criteria	Evidence of Attainment
F-19.02.01P	determine coring locations	coring locations are determined according to drawings and specifications using measuring devices
F-19.02.02P	identify hazards	hazards are identified based on equipment used and site conditions
F-19.02.03P	install barriers	barriers are installed to isolate work and mitigate hazards
F-19.02.04P	select wet or dry core bit	wet or dry core bit is selected according to manufacturers' instructions
F-19.02.05P	select coring equipment	coring equipment is selected according to depth of cut and choice of wet or dry core bit and concrete hardness
F-19.02.06P	select drill bit	drill bit is selected according to concrete hardness and depth and diameter of cut
F-19.02.07P	core concrete	concrete is cored according to drawings and specifications

RANGE OF VARIABLES

measuring devices include: tape measures, measuring wheels, chalk lines, depth gauges

hazards include: falling concrete, uncontrolled force, dust and debris, noise, slips, rotating equipment, embedded items, segment loss

coring equipment includes: electric, pneumatic, hydraulic, hammer drill, expansion anchors and eye bolts

KNOWLEDGE

	Learning Outcomes	Learning Objectives
F-19.02.01L	demonstrate knowledge of coring concrete, the equipment and procedures used	identify types of coring equipment , their applications and procedures for use
		identify types of drill bits, their applications and procedures for use
		identify measuring devices , and describe their applications and procedures for use

identify **hazards** and safe work practices pertaining to coring concrete

describe barriers, their application and procedures for use

RANGE OF VARIABLES

coring equipment includes: electric, pneumatic, hydraulic, hammer drill, expansion anchors and eye bolts

measuring devices include: tape measures, measuring wheels, chalk lines, depth gauges

hazards include: falling concrete, uncontrolled force, dust and debris, noise, slips, rotating equipment, embedded items, segment loss

APPENDIX A

ACRONYMS

ACI	American Concrete Institute
CSA	Canadian Standards Association
CSP	concrete surface profile
F _F	floor flatness
F _L	floor levelness
GFCI	ground fault circuit interrupter
GPS	global positioning system
ICF	insulated concrete forming
ICRI	International Concrete Repair Institute
OH&S	Occupational Health and Safety
PPE	personal protective equipment
SDS	safety data sheets
SSD	saturated surface-dry
WHMIS	Workplace Hazardous Materials Information System

APPENDIX B

TOOLS AND EQUIPMENT / OUTILS ET ÉQUIPEMENT

Hand Tools / Outils à main

bull float (wood, magnesium, fibreglass, channel)	aplanissoire à long manche (en bois, en magnésium, en fibre de verre, à caniveau)
broom	balai
brush	brosse
bucket/pail	benne et chaudière
bush hammer	boucharde
caulking gun	pistolet de calfeutrage
carborundum brick (hand stone)	pierre à polir
centre edger	fer à rainurer
chalk line	cordeau traceur
check rod	applicateur à chaud
chisel	ciseau
come-along	treuil manuel
cone wrench	clé à cône
cove base tool	outil à plinthe
crowbar	barre à clous
darby	règle à araser
edger	fer à bordure
finishing broom	balai de finition
fresno trowels	truelles fresno
groover	rainureuse
hammer	marteau
hand float (magnesium, wood, plastic, resin, sponge/rubber)	taloche (en magnésium, en bois, en plastique, en résine, en caoutchouc)
hand level	niveau à main
hand saw	scie
hand screed	règle à araser manuelle
hand trowel	truelle manuelles
highway straightedge (bump cutter)	grande règle
jitterbug/buggy roller	ponceuse à sautellement
kneeboard and slider	planche à genoux et coulisseau
lifting hook	crochet de levage
margin trowel	truelle carrée
pointing trowel	truelle à joints
pry bar	levier
rake	râteau
roller applicator	rouleau applicateur
scraper	racloir
skate	patin
sprayer	vaporisateur
string line	cordeau
square shovel	pelle à bout carré

Hand Tools / Outils à main (*continued / suite*)

squeegee	raclette
tamper	dame
texturing stamp	étampe pour texturer
tining tool	outils à peignes
touch-up roller	rouleau pour retouche
water hose	boyau d'arrosage
watering can	arrosoir
wheelbarrow	brouette

Power Tools / Outils mécaniques

air compressor	compresseur d'air
angle grinder	meuleuse d'angle
chipping hammer and bit	marteau burineur et mèche
conveyor	convoyeur
coring machine and bit	machine à évider et mèche
drill with mixing paddle	perceuse pourvue d'une palette à mélanger
floor grinder	meuleuse pour plancher en béton
generator	générateur
hammer drill	marteau perforateur
hot-pour applicator	appliqueur de béton coulé à chaud
laser-guided screed	règle à araser au laser
light	lampe
mechanical spreader	épandeuse mécanique
mortar mixer	malaxeur de plâtre
power buggy	chariot à moteur
power bush hammer	boucharde mécanique
power saw and blades (quick-cut, walk-behind and early entry saws)	scie mécanique et lames (à coupe rapide, poussées, à béton frais)
power screed (roller, truss, vibratory)	règle à araser mécanique
power sprayer	vaporisateur mécanique
power trowel and blades (finishing blades and float attachments)	truelle mécanique et lames (lames de finition, accessoires pour aplanissoire)
pressure washer	laveuse à pression
sand/shot blaster	décapeuse au jet de sable et grenailleuse
scabbler	marteau de carrier
scarifier/planer	scarificateur
vented heater	radiateur soufflant
vibrator	vibrateur

Measuring and Testing Equipment / Outils de mesure et d'essai

air meter	aéromètre à béton
builders' level	niveau à lunette
calculator	calculatrice
flow cone	cône distributeur
inclinometer	inclinomètre
laser level	niveau laser
spirit level	niveau à bulle d'air
slump cone and rod	cône d'Abrams et tige

Measuring and Testing Equipment / Outils de mesure et d'essai (*continued / suite*)

square	équerre
straightedge	règle de précision
tape measure	ruban à mesurer
thermometer	thermomètre
total station	station totale
transit	théodolite

Personal Protective Equipment (PPE) and Safety Equipment / Équipement de sécurité et de protection individuelle

barrier cream	crème protectrice
breathing apparatus (SCBA, air purifying equipment)	appareil respiratoire (appareil de protection respiratoire autonome, équipement de purification d'air)
eye wash stations	douche oculaire
face shields	écran facial
fall protection	dispositif de protection contre les chutes
fire extinguisher	extincteur
first aid kit	trousse de premiers soins
gloves	gants
hard hat	casque de sécurité
hearing protection	protecteur d'oreilles
high visibility vest and clothing	gilet fluorescent
knee pad	coussin pour genoux
personal gas monitors	moniteur de gaz personnel
rain suit	imperméable
rubber boots	bottes de caoutchouc
safety boots	bottes de protection
safety glasses/goggles/smoggles	lunettes de protection
spiked footwear	chaussures à crampons
ventilation equipment	équipement de ventilation
wrist protection	bracelets de protection

APPENDIX C

GLOSSARY

admixture	material other than water, aggregates and cement that is used as an ingredient of concrete and is added to the mix to adjust the plastic and hardened properties of the concrete	adjuvant	matériau autre que l'eau, les granulats et le ciment qui est ajouté au mélange de béton pour ajuster les matières plastiques et les propriétés durcies du béton
aggregate	granular material, such as sand, gravel, crushed stone or recycled concrete aggregates used with cement to produce concrete	granulat	matériau granulaire comme le sable, le gravier, la pierre concassée ou des granulats de béton recyclé pour fabriquer du béton
bleed water	excess water which rises to the surface of concrete	eau de ressuage	eau en excès qui ressort de la surface du béton
bull float	a tool comprising a large, flat, rectangular piece of wood or magnesium attached with a long handle used to smooth unformed surfaces of freshly placed concrete	aplanissoire à long manche	outil équipé d'une large pièce plate et rectangulaire, en bois ou en magnésium, à axe rotatif, attachée à un manche et qui sert à rendre uniforme les surfaces de béton fraîchement mis en place
burlap	a coarse fabric of jute, hemp, or less commonly flax, for use as a water-retaining cover for curing concrete surfaces	toile de jute	tissu rugueux fait de jute, de chanvre ou moins communément de lin, utilisé comme couverture qui retient l'eau pour la cure des surfaces de béton
cement	binder of aggregate particles	ciment	liant pour particules de granulats
cementitious material	substances that have cementing properties (set and harden in the presence of water)	matériau cimentaire	substance qui a des propriétés de cimentation (fait sa prise et durcit en présence d'eau)

concrete	composition of a binding medium and aggregate; commonly consists of a mixture of cement, aggregate, water and admixtures in varying proportions; mixture is worked into a plastic state and gains hardness through the hydration of water with the cement	béton	composition fait d'un agent liant et de granulats, généralement constitué d'un mélange de ciment, de granulats et d'eau en proportions variables; le mélange est travaillé jusqu'à l'obtention d'une consistance de plastique et se durcit ensuite lors du processus d'hydratation qui se produit entre l'eau et le ciment
consolidate	compaction usually accomplished by vibration of newly placed concrete to minimum practical volume, to mould it within form shapes or around embedded parts and reinforcement, and to reduce void content to a practical minimum	consolider	Compactage par vibration du béton fraîchement coulé pour obtenir un volume minimal de béton afin de le mouler dans les coffrages ou autour d'éléments noyés ou d'armatures, et effectué pour réduire les vides au minimum
construction joint	the junction of two successive placements of concrete, typically with a keyway or reinforcement across the joint	joint de construction	jonction de deux mises en place successives de béton, généralement avec une clé de construction ou une armature à travers le joint
contraction/ control joint	a joint cut to control cracking in concrete	joint de retrait ou de contrôle	joint coupé pour contrôler les fissures dans le béton
crazing	small cracks in a concrete surface caused by uneven contraction during hydration	faiçonnage	petites fissures sur la surface du béton causées par un retrait non uniforme lors de l'étape d'hydratation
curing	the maintenance of a satisfactory moisture content and temperature in concrete during its early stages so that desired properties may develop	cure	conservation d'un niveau satisfaisant d'humidité et de température du béton à jeune âge pour lui permettre de développer les propriétés voulues
darby float	a hand manipulated straight edge usually 3-5 feet long used in the early stage leveling operation of concrete	règle à araser	règle droite manuelle habituellement de 3 à 5 pieds de longueur, utilisée dans les opérations d'aplanissement du béton jeune
expansion joint	an isolation joint that allows for expansion and contraction	joint de dilatation	joint de rupture qui permet l'expansion et le retrait

exposed aggregate	surface texture where cement paste is washed away from concrete slab surface to expose durable aggregates for the surface	béton à granulats exposés	texture de surface obtenue en enlevant une couche de pâte de ciment de la surface de la dalle de béton pour exposer les granulats durables
floating	process of using a tool, usually wood or magnesium, in finishing operations to create a relatively even but still open texture to a fresh concrete surface	aplanissage	procédé utilisant un outil, habituellement fait de bois ou de magnésium, pour les opérations de finition afin d'obtenir une surface relativement uniforme, mais grossière, du béton frais
formwork	a temporary structure or mould for the support of concrete while it is setting and gaining sufficient strength to be self-supporting	coffrage	structure ou moule temporaire dans lequel le béton est mis en place à son emplacement final; il supporte le béton pendant qu'il fait sa prise et développe suffisamment de résistance pour être autoportant
grade sheet	a table that provides cut and fill elevations for finished grading	feuille de note	tableau qui donne les élévations de déblais et remblais du niveau définitif du sol
green concrete	concrete that has undergone final setting but not hardened appreciably	béton jeune	béton ayant subi la prise finale, mais qui n'a pas complètement durci
grout	a mixture of cementitious material or other binding material with or without water or aggregate, proportioned to produce a pourable consistency without segregation of the constituents	coulis	mélange de matériaux à base de ciment et d'eau, avec ou sans granulats, dosé pour produire un mélange fluide sans ségrégation
hardener	a material applied to concrete floors to reduce wearing and dusting	durcisseur	matériau appliqué sur les sols en béton pour réduire la poussière et diminuer l'usure
high performance concrete	contains cementitious materials such as fly ash, silica fume, blast furnace slag and super plasticizer	béton de haute performance	béton qui contient des matériaux cimentaires comme les cendres volantes, la fumée de silice, le laitier de haut fourneau et les superplastifiants

honeycomb	concrete that, due to lack of the proper consolidation, contains interconnected large voids or cavities	nid d'abeille	béton qui, dû à un manque de consolidation, contient de larges vides ou cavités interconnectés
isolation joint	a joint that prevents bonding of surfaces	joint de rupture	joint de chaussée qui évite que les surfaces ne se joignent
overlay	the addition of a new material layer onto an existing surface	resurfaçage	ajout d'une couche de nouveau matériau sur une surface existante
plastic	a condition of freshly mixed concrete such that it is readily remoldable, workable and cohesive	plastique	consistance du béton frais qui est facilement maniable et cohésif
retarder	a product that delays the setting of concrete	retardateur de prise	produit qui retarde la prise du béton
saturated surface dry (SSD)	condition of an aggregate particle or other porous solid when the permeable voids are filled with water but there is no water on the exposed surface	saturé et superficiellement sec (SSS)	état d'un granulat ou tout autre solide poreux lorsque les vides sont remplis d'eau, mais qu'il n'y a pas d'eau sur les surfaces apparentes
saw cut	a cut in hardened concrete utilizing diamond or silicone-carbide blades or discs	trait de scie	coupure dans le béton durci effectuée avec des lames ou disques diamantés ou au carbure de silicone
scaling	surface flaking of concrete	écaillage	effritement du béton en surface
screeding	the operation of forming a surface by the use of screed guides or a strike off	arasage	finition d'une surface en effectuant l'arasage avec une règle à araser
segregation	separation of various ingredients within a concrete mix	ségrégation	séparation des divers ingrédients à l'intérieur du mélange de béton
slump	a measure of consistency of freshly mixed concrete	affaissement	mesure de la consistance du béton fraîchement malaxé
spalling	pieces of concrete that have broken away	effritement	présence de morceaux de béton s'étant détachés
topping	a layer of concrete placed to form a floor surface on a concrete base	chape	couche de béton mise en place sur un sol de béton existant pour former un plancher
wet screed	placing concrete on finish grade across two known points of elevation (called wet screeds)	araser	étendre du béton au niveau définitif à l'aide de deux repères de hauteur