

Cement Finisher

Occupational Analysis Report

March 2010



Commission
de la construction
du Québec

The purpose of this report is to describe as accurately as possible the trade of cement finisher as currently practiced in Québec's construction industry. It is a record of discussions held by a group of workers who met for the occasion after industry partners recommended them to the Commission de la construction du Québec for their expertise in the trade.

The vocational analysis is a first step in the definition of the skills required for practicing the trade. This report becomes one of the reference and decision-making tools used by the Commission for teaching and learning purposes.

The Commission is not responsible for the contents of this report. The latter has no legal effect and is meant as a reflection of discussions held on the date of the analysis workshop.

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INTRODUCTION

In early 2009, the Direction de la formation professionnelle of the CCQ launched a major operation to review the occupational analyses¹ of all construction industry trades².

The CCQ undertook this operation mainly for the following reasons:

- the project to reform the construction workforce apprenticeship and management system, and the eventual design of qualitative apprenticeship booklets requiring a detailed description of each trade;
- the fact that most construction occupational analyses had been conducted between 1987 and 1991 and had not been reviewed since;
- updates to vocational qualifying examination question banks;
- implementation of Chapter 7 of the Agreement on Internal Trade (AIT) and of the *Québec-France Understanding on the Mutual Recognition of Professional Qualifications*.

These factors demonstrate the necessity of performing occupational analyses in order to obtain a current and complete provincial profile of the various trades.

The occupational analysis of the cement finishing trade belongs to this context³. Its purpose is to describe the trade as currently practiced in the construction industry. The present report was written in order to collate and organize the information gathered during the occupational analysis workshop held in Laval on September 3 and 4, 2009.

This analysis aims to draw a portrait (tasks and operations) of the trade and its conditions, and to identify the skills and behaviours required. The report of the occupational analysis workshop is an accurate reflection of the consensus reached by a group of experienced cement finishers. A special effort was made to include all the data collected during the workshop and to ensure that the data accurately depict the realities of the trade analysed.

1. Occupational analyses were then called "analyses of the work situation".

2. The terms "profession" and "trade" are considered synonymous herein.

3. This occupational analysis was conducted within the framework of the *Cadre de référence et instrumentation pour l'analyse d'une profession*, produced in 2007 by the ministère de l'Éducation, du Loisir et du Sport (Direction générale de la formation professionnelle et technique) and by the Commission des partenaires du marché du travail, ministère de l'Emploi et de la Solidarité sociale.

1. GENERAL CHARACTERISTICS OF THE TRADE

1.1 DEFINITION OF THE TRADE

According to the Regulation respecting the vocational training of manpower in the construction industry (Schedule A, Section 17), the term “cement finisher” means:

[...] anyone who:

- a) prepares and finishes cement surfaces on floors, walls, sidewalks and pavements;
- b) performs plain or designed cement coating work;
- c) applies hardeners and sealers or does all other similar coating work on floors, sidewalks, pavements and other roadwork inside tunnels;
- d) applies and finishes metallic waterproofing, including the protective coating and the installation of waterproofing membranes.

For the cement finisher, work on walls, following flooring operations, may not exceed the height of the base-board.

1.2 JOB TITLES

Several titles may be used for designating persons who practice the trade, to wit:

- cement carrier;
- concrete finisher or polisher;
- concrete repairer.

Practicing the trade involves several functions, i.e., placing and pouring concrete, finishing and repairing. Many workers specialize in one or another of these functions. This explains the variety of job titles used.

In the view of the participants consulted, the demarcation line between the fields of practice of certain trades similar to that of cement finishers is not clear to all workers in the trade. For example, several think that applying epoxy products interferes with the field of practice of painters, whereas in fact it is a task common to both trades.

1.3 SECTORS OF ACTIVITY

Cement finishers are active in the four sectors of the construction industry:

- the residential sector;
- the institutional and commercial sector;
- the industrial sector;
- the civil engineering and roadwork sector.

According to the participants consulted, their work is done mainly in the industrial, institutional and commercial sectors, whereas it is done least in the residential sector. Moreover, depending on the economic context, civil engineering work and roadwork may be more prevalent.

1.4 FIELD OF PRACTICE

The trade's field of practice is the construction industry. The Act respecting labour relations, vocational training, and manpower management in the construction industry (R.S.Q., c. R-20) defines construction as follows:

[...] the foundation, erection, maintenance, renewal, repair, alteration and demolition work on buildings and civil engineering works carried out on the job site itself and vicinity including the previous preparatory work on the ground;

In addition, the word "construction" includes the installation, repair and maintenance of machinery and equipment, work carried out in part on the job site itself and in part in the shop, moving of buildings, transportation of employees, dredging, turfing, cutting and pruning of trees and shrubs and laying out of golf courses, but solely in the cases determined by regulation.

1.5 LEGISLATION AND REGULATIONS

Cement finishers are subject to a set of legal measures including laws, regulations, codes and standards. Table 1 shows the mandatory laws, regulations and codes. Table 2 shows the standards that are not mandatory but highly recommended.

Table 1 Legislation and Regulations

Designation	Law, Regulation, Code, Agreement	Publisher
R.S.Q., c. R-20	Act respecting Labour relations, vocational training and workforce management in the construction industry	
R-20, r.6.2	Regulation respecting the vocational training of workforce in the construction industry	
	the four sector-based collective agreements for the construction industry	CCQ
NBC	National Building Code	
	Québec Building Code, Chapter I, "Building"	CNRC- IRC
R.S.Q., c. S-2.1, r.6	Safety Code for the construction industry	
R.S.Q., c. S 2.1	Act Respecting Occupational Health and Safety	
S-2.1, r.19.01	Regulation respecting occupational health and safety	

Table 2 Highly Recommended Standards

Designation	Standardizing Body
CAN/CSA	Canadian Standards Association
ACI	American Concrete Institute
ICRI	International Concrete Repair Institute ⁴

The participants consulted suggested the addition of a new American organization whose application is rapidly expanding in the field, i.e., the International Concrete Repair Institute (ICRI). It pertains to repair work, particularly preparing surfaces and applying coatings, levelling mortar, polymer products, etc. Several manufacturers refer to it on their products.

4. Reference suggested by workshop participants.

Technical guides have been published about it. It is use notably for identifying and solving practical problems.

1.6 WORKING CONDITIONS

The following information provides an overview of the conditions and context of the work of cement finishers, as commented by the cement finishers attending the occupational analysis workshop. To obtain up-to-date and complete information with legal effect, it is necessary to refer to the four collective agreements for the construction industry sectors.

Salary⁵

A cement finisher's hourly wage varies according to the construction industry sector where work is done. Under the 2007-2010 collective agreements, the daily hourly wage was established as follows, at April 26, 2009, by sector:

- Industrial, institutional and commercial: \$31.19
- Civil engineering and roadwork: \$31.54
- Residential (light): \$28.44
- Residential (heavy): \$31.26

Vacations and time off⁶

Mandatory annual holidays of four weeks – two weeks in summer and two in winter at periods predetermined in collective agreements – are the general rule in the construction industry. To avoid penalizing employers and employees experiencing special constraints, the industry's four collective agreements allow certain possibilities for changing the vacation periods prescribed by the general rule.

To these vacation periods are added eight not paid statutory holidays, as well as a lump sum for sick leaves not otherwise paid.

5. Salary data are taken from 2007-2010 from the following document, published by the Commission de la construction du Québec: *Carrières construction*, 2008-2009 edition, p. 60.

6. Data on vacations and time off, the pension plan and insurance are taken from the following document, published in 2009 by the Commission de la construction du Québec: *La construction au Québec : c'est bien plus payant!*

Pension plan

Construction industry workers participate in a pension plan. They retain their eligibility for this pension plan throughout their career in construction, even if they change employer, trade or sector.

Insurance

The group insurance plan (medications, illness, disability, death) is fully paid by employers. Workers (and their families, as the case may be) are eligible for it so long as they remain active in the construction industry and work the required number of hours, whether or not they change employer.

Work schedules

A 40-hour work week from Monday to Friday is the general in all construction industry sectors. The daily limit is 8 hours per day, except in light residential construction, where it can reach a maximum of 10 hours within a 40-hour work week.

To avoid penalizing employers and employees experiencing special constraints, the industry's four collective agreements allow many possibilities for changing the vacation periods prescribed by the general rule: compressed schedule, schedule shift, make-up time in light residential construction, etc. These special schedules confer flexibility to the work schedules in effect in the construction industry.

Physical requirements

The work of cement finishers requires:

- very good physical condition;
- endurance, for long working hours that may arise, depending on concrete pours requirements;
- physical strength, notably when placing concrete or carrying heavy loads;
- good psychological balance, to bear the pressure and maintain a high level of concentration;
- absence of vertigo, for working from heights.

In addition:

- the trade is practiced in conditions of heat, humidity or cold depending on the seasons and ambient conditions;
- cement finishers are regularly bent over for long periods, which can cause backache;
- when done in enclosed or confined spaces, the work involves toxic hazards from gas and dust. Accordingly, it is important to reinforce safety measures, particularly by putting in place an adequate ventilation system, wearing a mask suited to the circumstances, ensuring adequate lighting, etc. Machines fuelled by gasoline may also present a hazard, at times insidious (release of carbon monoxide), that must not be underestimated.

Stress factors

Cement is a quick-setting material. "It doesn't wait." Other materials have slower reaction times. Accordingly, it is necessary to adapt so as to synchronize required operations. In those cases, the need for quick decision-making is a serious stress factor.

Cement finishers must react promptly to all unforeseen situations. Thus, they must deal with late cement deliveries, out-of-order machines, work areas that have not been cleared correctly, etc. In addition, in major urban areas, heavy traffic has a direct impact on the regularity of concrete transportation.

Deadlines are at times very tight. As an example, the participants mentioned planned plant outages. Once started, the work must be completed before the planned reopening, which requires work schedule flexibility (evening, night, weekend, etc.). According to participants, the foreman particularly bears the stress of deadlines, but the journeymen feel the effects. However, with experience they become more able to control stress regarding work to be done and decisions to be made under unforeseen circumstances.

Relations with other tradesmen are sometimes stressful, notably when cement finishers take over after others finish. The premises are not always cleared, or the cement finishers' work cannot be done within deadlines.

The trade features peak periods and unemployment periods. It is necessary to bear the resulting insecurity.

Finally, the responsibility of accompanying an apprentice may cause overwork.

1.7 JOB MARKET ENTRY CONDITIONS⁷

To obtain the apprentice competency certificate in the trade, candidates must first present to the CCQ his or her academic transcript attesting that he or she has graduated with a DEP in a program recognize by CCQ, especially Preparing and Finishing Concrete, and an employment guarantee of at least 150 hours worked within a period of not more than three consecutive months, from an employer registered with the CCQ.

Although the construction industry favours graduates for access to the trade, labour shortages may at times make it necessary to give non-graduates access to the cement finisher trade.

Thus, candidates without a diploma are eligible to obtain a competency certificate-apprentice (CCA) only during a labour shortage and must:

- Supply proof that they have the academic prerequisites for the program leading to a vocational studies diploma (DEP) in the trade referred to in the application or pledge, by signing a consent letter, to take the necessary training to obtain those academic prerequisites;
- Present a guarantee of employment registered during a labour-pool opening by an employer registered with the Commission de la construction du Québec (CCQ), for at least 150 hours over a period of at most three consecutive months.

Then, the apprentice cement finisher must have completed two apprenticeship periods of 2,000 hours each (4,000 hours total⁸) in order to be eligible for the provincial qualification examination that leads to obtaining the competency certificate-journeyman for the trade.

7. Other conditions than those listed below may apply, depending on candidates' particular situation, region, etc. For a complete list of the trade's entry conditions, see the Act respecting Labour relations, vocational training and workforce management in the construction industry (R.S.Q., c. R-20). We may also consult :

http://www.ccq.org/E_CertificatsCompetence.aspx?sc_lang=en&profil=DevenirTravailleur

8. The apprenticeship period of candidates holding a diploma in preparing and finishing concrete (DEP 5117) will be reduced by 900 hours, i.e., the duration of training acquired in an educational institution.

Of the 11 participants in the occupation analysis workshop, 3 hold a vocational studies diploma (DEP), 6 were trained by apprenticeship with a journeyman, 1 is an engineer, and another received his training at a manufacturer.

Cement finishers' training is upgraded in the workplace, particularly when they specialize. As an example, the participants cited training in waterproofing and new materials such as carbon fibre or polymers. Skill upgrading may be offered by the CCQ, manufacturers, professional associations such as the Master Roofers Association, or engineers at the employer's workplace.

Nowadays, some employers want to hire people who, in addition to having been trained specifically in the trade, hold a Secondary 5 diploma. Opinion is divided on this subject. Some maintain that strong reading and text comprehension skills are necessary to understand complex documents such as specification sheets and documents about occupational health and safety, and to write reports. Others think that this hiring requirement is superfluous and that learning requirements should be limited to work techniques and the use of machines and tools for performing the trade's tasks. Several participants say they are not required to write reports.

Here are a few of the qualities appreciated by employers when hiring cement finishers:

- availability, because they could be assigned to work at any hour of the day or night, any day of the week;
- enjoying manual work;
- very good physical endurance;
- team spirit;
- initiative and resourcefulness;
- aptitude in finding solutions and taking decisions;
- punctuality;
- the capacity to manage stress.

Some participants mentioned that the high turnover of personnel in the trade, partly due to periods of work stoppages, is an important aspect. Many do not return when work resumes. When the employer has difficulty recruiting competent workers, the selection criteria are less strict.

1.8 PLACE OF WOMEN IN THE TRADE

Section 126.0.1 of the Act respecting labour relations, vocational training, and manpower management in the construction industry pertains to women's access to the construction industry: "The Commission, after consultation with the Commission des droits de la personne et des droits de la jeunesse, shall develop measures to favour the access of women to and their maintenance and greater representation on the labour market in the construction industry." According to the CCQ, the proportion of women active in the cement finishing trade is still low⁹.

Although the trade is open to women, the participants consulted confirm that few of them practice it. Reportedly, women are not inclined to practice the trade because of a concern for not meeting the trade's high physical requirements. While the presence of women may lead, in some companies, to task allocation difficulties, there are ways to reach compromises. Women would be particularly apt to do repair work. Unfortunately, few women seek such employment.

1.9 CAREER PROSPECTS

Depending on their fields of interest and skills, cement finishers who want to practice the trade and obtain related employment have occasion to consider several avenues. They may occupy positions such as:

- team leader;
- foreman;
- contractor;
- representative;
- trainer;
- union representative.

9. 10 women were found to work actively in the trade, compared to a total number of 2,296 employees in 2008. This information is taken from *Carrières construction*, 2009-2010 edition.

1.10 DEVELOPMENT OF THE TRADE

According to participants, the trade is undergoing technological advances and offers prospects for renovating existing structures. Among the trends observed, they mentioned:

- the increased importance of structure repairs and modifications (reinforcing concrete slabs to raise loading capacity);
- the arrival on the market of new materials (prepackaged materials, new chemical products such as carbon fibre, epoxy and other pastes, latex products, uncured concrete, etc.);
- the progress of product application techniques and of equipment such as the mechanical concrete pump;
- the arrival on the market of new reinforcing membranes, waterproofing membranes, insulation membranes, etc.;
- the development of material application techniques, for example laying membranes as soon as concrete has been poured;
- the use of new machinery, notably for bridges and viaducts, which has an impact on work techniques and the number of workers required to do the work;
- the implementation of new work methods, such as diamond grinding;
- enthusiasm for new concrete textures, in the residential sector and the commercial sector (polished, stamped, coloured concrete; coatings and false coatings; gravel for terraces; etc.).

It goes without saying that technological progress goes hand in hand with continuous training needs. New products and materials have a direct effect on work techniques. Cement finishers have to acquire new related knowledge and skills.

1.11 IMPACT OF ENVIRONMENTAL STANDARDS ON THE PRACTICE OF THE TRADE

Cement finishers are constantly in contact with chemicals (for example, silica), although more latex products are observed on the market. They also work at times in confined or enclosed spaces. The work area is then exposed to a high percentage of VOCs (volatile organic compounds) and toxic dust. In that context, wearing personal protective equipment is crucial.

On all types of construction sites, it is essential to observe environmental regulations in effect regarding waste recovery, recycling and disposal. More and more sites are obtaining LEED (Leadership in Energy and Environmental Design) certification, which results in new requirements, such as calculating and declaring waste masses.

Containers must be accompanied up to landfills by certificates declaring their contents and means of disposal. Moreover, in the industrial sector, crushed concrete is recycled for later use.

2. WORK DESCRIPTION

2.1 TASKS AND OPERATIONS

Before presenting the tasks performed by cement finishers, it is important to define the terms used in this part of the report.

Definition of terms¹⁰

Tasks: Tasks are actions that correspond to the main activities in the exercise of the profession analyzed. A task is structured, autonomous and observable. It has a definite beginning and end. In the exercise of a profession, whether a product, service or decision is involved, the result of a task must have a specific and significant usefulness.

Operations: Operations are actions that constitute the steps in performing a task and make it possible to determine how to attain the desired outcome. They are related to a task and are linked to one another.

Table of tasks

A list of the elevator mechanic's tasks and operations was first submitted as a working hypothesis to participants in the occupational analysis workshop. The participants were asked to validate the document, complete it, delete erroneous parts, etc., if applicable. According to participants, the tasks that were presented to them reflect well the practice of the trade in 2009. No correction or change was made to Table 3.

It should be noted that the order in which the tasks are presented does not necessarily reflect their importance in the trade. The table presented to participants first contains common, more-general tasks; those tasks are found in the majority of work situations in the trade. Secondly, the table indicates the tasks directly related to the practice of the trade.

10. The terms' definitions are excerpted from the *Cadre de référence et instrumentation pour l'analyse d'une profession* (glossary, p. 4).

Table 3 Cement Finisher Tasks

Common Tasks
A. Organize the work
B. Communicate with other persons
C. Maintain a safe work environment
D. Use tools, equipment, products and materials

Tasks Specific to the Trade
1. Prepare and place concrete on various surfaces
2. Finish concrete on various surfaces
3. Repair concrete on various surfaces
4. Apply different finishes on various surfaces

Table of tasks and operations

Following discussions, minor changes were suggested regarding the operations. Those changes pertain to the formulation, moving or addition of certain operations.

Table 4, presented in the following pages, describes cement finishers' tasks and operations on which participants reached a consensus.

Table 4 Tasks and Operations

Common tasks and their operations

TASKS	OPERATIONS					
A. Organize the work	A.1 Interpret the technical documentation	A.2 Determine material needs and necessary quantities	A.3 Determine needs regarding equipment and tools	A.4 Determine human resources needs	A.5 Plan the work while taking into account other trades and external stresses	A.6 Adapt the work while taking into account environmental and weather conditions
	A.7 Recognize the risks of other trades being present in the work area	A.8 Inquire about the status of work done by the previous team				
B. Communicate with other persons	B.1 Refer to the contractor, the site superintendent and his employer to plan the work to be done	B.2 Communicate with co-workers	B.3 Communicate with workers in other trades	B.4 Communicate with site superintendents, suppliers, manufacturers, technicians representing the concrete company, technicians representing the owner, CCQ inspectors, etc.	B.5 Use various communication devices	B.6 Use crane operator visual, audio and hand signals (in loud noise)

TASKS	OPERATIONS					
C. Maintain a safe work environment	C.1 Apply federal and provincial regulations and workplace rules	C.2 Apply the company's safety policies and procedures	C.3 Use personal and collective equipment of protection	C.4 Detect and report hazardous situations and behaviours	C.5 Maintain protective equipment	C.6 Recognize used, damaged and dangerous protective equipment
	C.7 Take measures required for accessing confined and enclosed spaces, disposing of asbestos, etc.	C.8 Provide first aid in the workplace	C.9 Use WHMIS material data safety sheets	C.10 Store and dispose of hazardous products safely	C.11 Keep work areas clean	
D. Use tools, equipment, products and materials	D.1 Use hand, electric, pneumatic and hydraulic tools	D.2 Use mechanized tools and equipment	D.3 Use measuring instruments	D.4 Maintain tools and equipment	D.5 Troubleshoot the machinery if applicable	D.6 Treat the materials adequately

Tasks specific to the trade and their operations

TASKS	OPERATIONS					
1. Prepare and place concrete on various surfaces	1.1 Prepare to pour	1.2 Take cognizance of plans, specifications and work orders	1.3 Check weather conditions, the ambient temperature, ventilation, lighting, etc.	1.4 Check materials and equipment	1.5 Check the overall condition of the sub-grade or substrate	1.6 Prepare a substrate
	1.7 Check the level of reinforcing steel, mechanical installations (floor drains) and formwork	1.8 Install expansion joints on sidewalks, as well as isolation joints	1.9 Transport concrete	1.10 Protect adjacent surfaces	1.11 Lay concrete	1.12 Validate the types of concrete and their workability according to their characteristics
	1.13 Compact the concrete	1.14 Grade concrete to the specified level	1.15 Clear and clean the work area	1.16 Write reports		
2. Finish concrete on various surfaces	2.1 Inquire about the status of work done by the previous team	2.2 Even out the concrete surface by hand	2.3 Machine float the concrete	2.4 Apply concrete locally by hand	2.5 Trowel the concrete	2.6 Apply surface treatments with plastic and hardened concrete
	2.7 Texture the concrete surface	2.8 Expose aggregate	2.9 Stamp the concrete surface	2.10 Concrete curing humidification	2.11 Use chemicals to cure concrete	2.12 Control concrete cracking
	2.13 Install waterproofing membranes and products	2.14 Protect the concrete	2.15 Clear and clean the work area	2.16 Write reports		

TASKS	OPERATIONS					
3. Repair concrete on various surfaces	3.1 Inspect the concrete to detect defects	3.2 Remove materials	3.3 Prepare the repair surface	3.4 Repair according to the chosen method	3.5 Cure the concrete according to the repair method	3.6 Clear and clean the work area
	3.7 Write reports					
4. Apply different finishes on various surfaces	4.1 Prepare and clean surfaces	4.2 Place parging on vertical surfaces	4.3 Apply surface treatments to hardened concrete	4.4 Abrade a surface to obtain a textured or polished architectural finish	4.5 Apply seamless coatings	4.6 Apply bonded and non-bonded toppings to the concrete
	4.7 Apply acid stain	4.8 Apply grout	4.9 Finish apparent surfaces with mortar	4.10 Do shotcrete work	4.11 Clear and clean the work area	4.12 Write reports

2.2 OPERATIONS, SUB-OPERATIONS AND CLARIFICATIONS

In the following pages are presented the sub-operations related to targeted operations formulated by the participants. Sub-operations are actions included in operations and constitute the details of the work, such as methods and techniques. They are the steps for performing an operation and are thus the sub-steps of tasks.

Table 5 also provides clarifications expressed by participants in the workshop.

Table 5 Operations, Sub-Operations and Clarifications

TASK A ORGANIZE THE WORK		
Operations	Sub-Operations	Clarifications
A.1 Interpret the technical documentation	A.1.1 Search for data sheets A.1.2 Interpret plans and specifications, work orders, WHMIS (Workplace Hazardous Materials Information System) material safety data sheets, manufacturer data, etc.	Search in catalogues and Web sites; collect information on tolerances, slopes, products and their components, cautions, etc.
A.2 Determine material needs and necessary quantities	A.2.1 Make required calculations	Volume, perimeter, area, surface, percentages, etc.
A.3 Determine needs regarding equipment and tools	A.3.1 Ensure the availability of equipment on the site A.3.2 Take necessary measures A.3.3 Notify your supervisor of late deliveries of the concrete pump or concrete mixer	
A.4 Determine human resources needs		

TASK A ORGANIZE THE WORK

Operations	Sub-Operations	Clarifications
A.5 Plan the work while taking into account other trades and external stresses	A.5.1 Make a general inspection of the premises beforehand A.5.2 Recognize situations that could pose a problem	Accessibility of the premises, delivery delays, preliminary work completed or not, presence of personal and collective protective equipment, technical problems, mechanical failures, etc.
A.6 Adapt the work while taking into account environmental and weather conditions	A.6.1 Obtain weather information	
A.7 Recognize the risks of other trades being present in the work area	A.7.1 Recognize danger areas A.7.2 Ensure that the work area is safe and that the caution tape is in place	
A.8 Inquire about the status of work done by the previous team		

TASK B COMMUNICATE WITH OTHER PERSONS

Operations	Sub-Operations	Clarifications
B.1 Refer to the contractor, the site superintendent and his employer to plan the work to be done	B.1.1 Obtain information on the concrete's condition B.1.2 Inquire about specific instructions with regard to pouring, finishing, etc. B.1.3 Ensure that lighting, ventilation, etc. are adequate	
B.2 Communicate with co-workers		
B.3 Communicate with workers in other trades		Carpenter-joiners, electricians, reinforcing steel erectors, concrete pump operators, etc.

TASK B COMMUNICATE WITH OTHER PERSONS

Operations	Sub-Operations	Clarifications
B.4 Communicate with site superintendents, suppliers, manufacturers, technicians representing the concrete company, technicians representing the owner, CCQ inspectors, etc.		
B.5 Use various communication devices		Cell phones, transceivers, pagers, etc.
B.6 Use crane operator visual, audio and hand signals (in loud noise)		Use lights and sirens.

TASK C MAINTAIN A SAFE WORK ENVIRONMENT

Operations	Sub-Operations	Clarifications
C.1 Apply federal and provincial regulations and workplace rules		
C.2 Apply the company's safety policies and procedures		Take the company's welcoming course in occupational health and safety.
C.3 Use personal and collective equipment of protection	C.3.1 Ensure the presence of signs, barricades and locks on equipment depending on the premises C.3.2 Make sure to have the necessary ventilation C.3.3 Make sure to have personal protective equipment such as boots, goggles, gloves, mask, etc.	
C.4 Detect and report hazardous situations and behaviours		
C.5 Maintain protective equipment		

TASK C MAINTAIN A SAFE WORK ENVIRONMENT

Operations	Sub-Operations	Clarifications
C.6 Recognize used, damaged and dangerous protective equipment		
C.7 Take measures required for accessing confined and enclosed spaces, disposing of asbestos, etc.		Take the training offered by the company or on the construction site.
C.8 Provide first aid in the workplace	C.8.1 Recognize the limits of the response to be made	Take workplace first aid training.
C.9 Use WHMIS material data safety sheets	C.9.1 Determine relevant material data safety sheets	
C.10 Store and dispose of hazardous products safely	C.10.1 Follow the procedure established by the employer	
C.11 Keep work areas clean	C.11.1 Dispose of waste at appropriate locations	

TASK D USE TOOLS, EQUIPMENT, PRODUCTS AND MATERIALS

Operations	Sub-Operations	Clarifications
D.1 Use hand, electric, pneumatic and hydraulic tools		
D.2 Use mechanized tools and equipment		
D.3 Use measuring instruments	D.3.1 Measure dimensions and calculate surfaces and volumes D.3.2 Measure levels	
D.4 Maintain tools and equipment		

TASK D USE TOOLS, EQUIPMENT, PRODUCTS AND MATERIALS

Operations	Sub-Operations	Clarifications
D.5 Troubleshoot the machinery if applicable		
D.6 Treat the materials adequately	D.6.1 Dose and mix materials according to data sheets D.6.2 Apply the correct materials at appropriate locations	

TASK 1 PREPARE AND PLACE CONCRETE ON VARIOUS SURFACES

Operations	Sub-Operations	Clarifications
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CONTEXT

Cement finishers place concrete to build:

- slabs (slabs on grade, structural slabs, slabs on metal bridging, slabs on Hambro metal structures, slabs on prefabricated structures, etc.);
- floors (in exposed aggregate, Gyp-Crete, Mastic, etc.);
- toppings;
- stairs (gross surfaces, metal stair pits, monolithic structural stairs, etc.);
- sidewalks, pavements;
- roads, tunnels, etc.

1.1 Prepare to pour		
1.2 Take cognizance of plans, specifications and work orders		
1.3 Check weather conditions, the ambient temperature, ventilation, lighting, etc.		
1.4 Check materials and equipment	1.4.1 Check the availability of materials 1.4.2 Check that equipment is in good condition	
1.5 Check the overall condition of the subbase or substrate		
1.6 Prepare a substrate	1.6.1 Install vapour barriers, insulating membranes, etc. 1.6.2 Apply a binding agent as needed	The substrate is prepared using equipment such as a shotblaster or a scarifier and by applying various methods (e.g. SSS) according to the needs and data sheets.
1.7 Check the level of reinforcing steel, mechanical installations (floor drains) and formwork		

TASK 1 PREPARE AND PLACE CONCRETE ON VARIOUS SURFACES

Operations	Sub-Operations	Clarifications
1.8 Install expansion joints on sidewalks, as well as isolation joints		
1.9 Transport concrete	1.9.1 Detect obstacles on the way 1.9.2 Determine the means of transportation	From the truck to the dumping point, if applicable. Wheelbarrow, concrete pump, motorized bin or concrete mixer.
1.10 Protect adjacent surfaces	1.10.1 Apply polyethylene	Walls, beams, columns, etc.
1.11 Lay concrete	1.11.1 Keep rebars and wire mesh in place 1.11.2 Lay concrete with appropriate tools 1.11.3 Report problems to the appropriate persons 1.11.4 Consolidate the concrete	At times, wire mesh is replaced by fibre made of steel, polyester, polypropylene, polyolefin, etc.
1.12 Validate the types of concrete and their workability according to their characteristics		Concrete characteristics: strength, slump, etc.
1.13 Compact the concrete	1.13.1 Determine locations that require vibration 1.13.2 Determine vibration speed, frequency and spacing to prevent defects 1.13.3 Perform the vibration	Defects: segregation and honeycombs.

TASK 2 FINISH CONCRETE ON VARIOUS SURFACES

Operations	Sub-Operations	Clarifications
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CONTEXT

More-complex finishing equipment, such as mechanical trowels, edge machines and hardener spreaders, improves productivity. Moreover, high-performance concrete requires more-precise synchronization during the finishing process. Concrete curing and protection products are also more and more numerous.

NOTES

The table for Task 2 presents various finishing techniques, in no order of importance or chronology.

The participants mentioned that finishing techniques in the institutional and commercial sector and the industrial sector are quite similar; they differ more in the residential sector.

2.1 Inquire about the status of work done by the previous team	2.1.1 Check the concrete's condition 2.1.2 Obtain information from the foreman about the pour and the specific points to pay attention to 2.1.3 Check the condition and availability of necessary finishing equipment 2.1.4 Put the equipment in place on time for the start of finishing work	
2.2 Even out the concrete surface by hand	2.2.1 Prepare the surface 2.2.2 Apply retarders to ensure workability depending on weather conditions 2.2.3 Evaluate the surface's condition	Firmness, presence of bleed water, etc.
2.3 Machine float the concrete	2.3.1 Prepare the surface 2.3.2 Apply surface evaporation retarders to ensure workability depending on weather conditions 2.3.3 Evaluate the surface's condition 2.3.4 Set the machine's parameters 2.3.5 Apply surface hardeners if necessary 2.3.6 Shape joints with an iron according to the type of finish desired	Firmness, presence of bleed water, etc.

TASK 2 FINISH CONCRETE ON VARIOUS SURFACES

Operations	Sub-Operations	Clarifications
2.4 Apply concrete locally by hand	2.4.1 Prepare the surface 2.4.2 Shape the slab perimeter	
2.5 Trowel the concrete	2.5.1 Hand trowel the concrete 2.5.2 Trowel concrete by machine	
2.6 Apply surface treatments with plastic and hardened concrete	2.6.1 Prepare the surface 2.6.2 Spread products on the concrete surface 2.6.3 Evaluate the surface's condition, for example firmness	For certain products, it is important also to ensure their penetration below the surface by using appropriate techniques. Examples of products: concrete retarder, crystallizing agent, colouring agent, liquid hardener, sealant, densifier, etc.
2.7 Texture the concrete surface	2.7.1 Prepare the surface 2.7.2 Use various texturing techniques	Broomed, tyne, wet burlap, swirl, herringbone, etc.
2.8 Expose aggregate	2.8.1 Prepare the surface 2.8.2 Spread coarse aggregate randomly or according to desired patterns (exposed aggregate) 2.8.3 Apply a mix with incorporated aggregate 2.8.4 Embed coarse aggregate completely 2.8.5 Expose the aggregate by washing, stripping or sandblasting	
2.9 Stamp the concrete surface	2.9.1 Prepare the surface 2.9.2 Even out the surface 2.9.3 Apply mould release agents 2.9.4 Use various stamping techniques	Powder or liquid. Cobblestone, random stone, barn board, etc.

TASK 2 FINISH CONCRETE ON VARIOUS SURFACES

Operations	Sub-Operations	Clarifications
2.10 Concrete curing humidification	2.10.1 Cover the concrete with water 2.10.2 Apply wet burlap, polyethylene or another appropriate product	
2.11 Use chemicals to cure concrete		Transparent membranes, quickly vanishing stain, evaporation curing agents, etc.
2.12 Control concrete cracking	2.12.1 Saw the control joints on hardened and plastic concrete 2.12.2 Seal the control joints	
2.13 Install waterproofing membranes and products	2.13.1 Prepare the surface 2.13.2 Put the waterproofing membrane in place 2.13.3 Apply a waterproofing product 2.13.4 Install insulation, protection and drainage panels if necessary	Membranes may be liquid, in sheets, self-adhesive, etc.
2.14 Protect the concrete	2.14.1 Maintain the desired temperature 2.14.2 Put physical protection in place 2.14.3 Prevent public access	Straw, polyethylene, insulated tarps, temporary shelters, heat generators, etc. Sealant such as acrylic and epoxy resins. Install caution tape, safety fences, road marker cone, wooden barricades, etc.
2.15 Clear and clean the work area	2.15.1 Tour the area systematically to that effect	
2.16 Write reports		

TASK 3 REPAIR CONCRETE ON VARIOUS SURFACES

Operations	Sub-Operations	Clarifications
CONTEXT		
<i>Cement finishers must access areas to be repaired, choose materials (grout, epoxy resins, mortar, etc.), prepare and repair damaged surfaces. Repairs must be done safely and economically, in reasonable time.</i>		
3.1 Inspect the concrete to detect defects	3.1.1 Determine the cause of defects 3.1.2 Determine the repair method and materials according to defects, durability and conditions of use 3.1.3 Delimit and mark areas to be repaired	Perform a visual and resonance (audio) inspection. Defects: stress, efflorescence, poor placement or finish defects, etc.
3.2 Remove materials	3.2.1 Determine the area and thickness of materials to be removed 3.2.2 Recognize hazards posed by electricity, machines, systems integrated in the slabs and structure of the area to be repaired 3.2.3 Protect and insulate the concrete removal area 3.2.4 Use removal equipment 3.2.5 Dispose of removed materials	Saw to the perimeter of areas to be repaired. Demolish defective concrete up to sound concrete or to the specified minimum depth. Observe standards, recycle materials.
3.3 Prepare the repair surface	3.3.1 Use surface preparation equipment to obtain the required profile (surface roughness) 3.3.2 Clean the surfaces 3.3.3 Condition surfaces according to the bonding method (SSD ¹¹ , bonding agent, etc.)	Clean the concrete, clean and treat reinforcing steel and other materials, remove debris.

11. SSD: saturated surface dry.

TASK 3 REPAIR CONCRETE ON VARIOUS SURFACES

Operations	Sub-Operations	Clarifications
3.4 Repair according to the chosen method	3.4.1 Mix the repair materials 3.4.2 Apply the repair materials 3.4.3 Finish the surfaces	It is particularly important to mix and apply materials according to manufacturer data sheets.
3.5 Cure the concrete according to the repair method		
3.6 Clear and clean the work area	3.6.1 Tour the area systematically to that effect	
3.7 Write reports		

TASK 4 APPLY DIFFERENT FINISHES ON VARIOUS SURFACES

Operations	Sub-Operations	Clarifications
CONTEXT		
<i>New decorative products, such as acid stain, seamless coatings, polyurethane coatings, vaporized coatings as well as epoxy and acrylic finishes, are appearing on the market and enable cement finishers to modify and protect the finished concrete surface.</i>		
4.1 Prepare and clean surfaces	4.1.1 Calculate and bring the equipment 4.1.2 Mix 4.1.3 Apply the cleaning product 4.1.4 Neutralize the cleaning product, if applicable	Acid washing (rare), pressure washing, degreasing agents, abrasion equipment, concentrated acid cleaners, etc.
4.2 Place parging on vertical surfaces	4.2.1 Calculate and bring the equipment 4.2.2 Mix and stain parging 4.2.3 Determine the setting time 4.2.4 Apply finishing methods 4.2.5 Give texture to parging	Using a mixer. Sponge finishing, etc.

TASK 4 APPLY DIFFERENT FINISHES ON VARIOUS SURFACES

Operations	Sub-Operations	Clarifications
4.3 Apply surface treatments to hardened concrete	4.3.1 Ensure the presence of equipment and products 4.3.2 Clear the work area 4.3.3 Allocate tasks within the team 4.3.4 Install transition joints 4.3.5 Apply the products 4.3.6 Verify work quality	Product examples: polymer mortar, acrylic coating, cement coating, elastomer coating, etc. Quality can be verified by the application thickness and rate, for example.
4.4 Abrade a surface to obtain a textured or polished architectural finish	4.4.1 Check the concrete's condition and bring correctives if necessary 4.4.2 Determine the type of abrasive 4.4.3 Recognize the required degree of finishing	
4.5 Apply seamless coatings	4.5.1 Apply the primer 4.5.2 Mix and stir the product 4.5.3 Apply successive coatings at appropriate times	Concrete may be reinforced with epoxy resin or polyurethane and an antistatic coating. Meet quantity and dosage requirements.
4.6 Apply bonded and non-bonded toppings to the concrete	4.6.1 Determine whether or not the topping needs to be bonded 4.6.2 Apply toppings with grout, premixed coating and concrete 4.6.3 Install concrete toppings reinforced by anchors or bonding agents 4.6.4 Cure the toppings	Polyethylene fibres, rebars and welded wire mesh.
4.7 Apply acid stain	4.7.1 Prepare the surface 4.7.2 Apply acid and neutralize it 4.7.3 Apply protective sealants to acid-stained surfaces	When applying and neutralizing acid, it is important to control the exposure time to obtain the desired colour density.

TASK 4 APPLY DIFFERENT FINISHES ON VARIOUS SURFACES

Operations	Sub-Operations	Clarifications
4.8 Apply grout	4.8.1 Choose the type of grout and the application method 4.8.2 Prepare the surface to receive grout 4.8.3 Mix the grout, stain it and perform tests 4.8.4 Apply various types of grout	The application method may be by pouring, rodding or injection. Non-shrink, expandable, etc.
4.9 Finish apparent surfaces with mortar	4.9.1 Complete the contour and ensure the desired finish 4.9.2 Shape the surfaces as required	
4.10 Do shotcrete work	4.10.1 Install the wire mesh, vapour barrier and insulation, if applicable 4.10.2 Spray the concrete up to the required thickness 4.10.3 Finish the surface according to technical characteristics 4.10.4 Cure the concrete	
4.11 Clear and clean the work area	4.11.1 Tour the area systematically to that effect	
4.12 Write reports		

2.3 WORKING PROCESS

The working process consists of a sequence of steps that generally applies when most of the trade's tasks are performed. The participants agreed on the following process:

- Organize the work
- Take individual and collective safety measures
- Prepare the surfaces
- Perform placing, finishing, repair and texturing work
- Verify the quality of work done and correct if applicable
- Store and clean

2.4 ACHIEVEMENT CONDITIONS AND PERFORMANCE CRITERIA

2.4.1 Achievement conditions

Although data on achievement conditions were obtained from participants for each task of the trade, this information has been grouped in a single report for the purposes of this report. We recall that achievement conditions¹² are the modalities and circumstances that have a determining impact on the execution of a task and that pertain notably to the work environment, occupational health and safety hazards, equipment, materials and reference documents used in performing a task.

Table 6 describes those conditions in the following pages.

12. The definition is taken from the *Cadre de référence et instrumentation pour l'analyse d'une profession* (glossary, p. 3).

Table 6 Achievement conditions

ACHIEVEMENT CONDITIONS
<p>Work organization</p> <p>Most of the time, the work teams comprise apprentice and journeymen cement finishers as well as specialized labourer. To perform the tasks related to work organization, use of tools and equipment, and concrete preparation, placement, repair and texturing, cement finishers may be assigned to collaborate with other people, such as suppliers, site superintendents, architects and engineers.</p>
<p>Degree of autonomy</p> <p>Generally, cement finishers enjoy considerable autonomy when doing minor work, when concrete pours are less substantial, or when ensuring work environment safety. Their work is supervised during major work, on regulated construction sites such as government or industrial sites. It appears that tasks performed in spaces that are enclosed or difficult to access also require supervision. According to the workshop participants, supervision is usually the responsibility of contractors, construction superintendents or technicians.</p> <p>Cement finishers have little margin of manoeuvre in making decisions about work to be done, particularly in large-scale construction.</p> <p>However, they occasionally have to make personal decisions about their work organization, choice of materials, equipment, working methods or the continuation of work in poor conditions. Given companies' responsibility to establish safety measures on a construction site, cement finishers may refuse a task when those measures are absent or insufficient. The cement finisher is responsible for ensuring his own safety.</p>
<p>Workplaces</p> <p>The workshop participants work most of the time on construction sites of the industrial and institutional and the commercial sectors; less frequently in the residential sector. The scale and frequency of work in the civil engineering and roadwork sector depend on the economic context.</p> <p>In civil engineering and roadwork, cement finishers work on bridges, tunnels, viaducts, roads, dams, notably on large hydro-electrical sites such as James Bay, etc. In the residential sector, renovation takes up a large part of the market.</p> <p>Several participants mentioned that a large part of the work of cement finishers takes place on existing structures or buildings. They occasionally work in places difficult to access, such as reservoirs, sewers and furnaces. Finally, there may be work from heights, on exterior walls and balconies.</p>

ACHIEVEMENT CONDITIONS

References used

The work is based on work orders, on verbal instructions from the employer, supervisor or other authority on the site, and on clients' special requests.

Plans, specifications, diagrams, graphics, data sheets, manufacturer guides and WHMIS material safety data sheets are used in performing cement finisher tasks.

Cement finishers must also refer to construction laws, codes and standards, municipal by-laws, regulations in effect at companies where they work, etc.

Other references are documents such as various report forms, time sheets, equipment use recommendations and product use instructions.

Stress factors

Work quality, client satisfaction, decisions with long-term consequences, the obligation to work of members of other trades, and a work environment that poses safety hazards constitute, in the participants' view, prevalent stress factors.

Deadlines are very tight most of the time, due to quick setting materials. It is important to prepare before the concrete mixer arrives, because it must be emptied on time. In addition, a project's poor management may cause great concern when preliminary work is not done correctly or is not completed before the cement finisher works.

Product and equipment delivery times also add pressure. Of course, planning the work well helps reduce stress and increase productivity.

The insecurity experienced during unemployment periods is a significant stress factor.

Environmental attributes

Cement finishers are required to work outdoors in various difficult weather conditions such as cold, heat and humidity. The use of tools and equipment is often noisy. The workplace may be cluttered.

The trade is often practiced on construction sites, with all their hazards.

The work is often done from a height, on structures, in various postures (crouching, kneeling, balancing, etc.).

The indoor environment poses specific hazards. The noise level is higher. There are hazardous and toxic products (silica, resins, epoxy, etc.), dust and volatile organic compounds (VOCs). The participants emphasized poor air quality. Ventilation is often ineffective or nonexistent, and the mask is not always worn when it should be. Who is responsible in those cases? The question was raised.

The work is done with specific equipment and tools, notably concrete pumps, concrete grinders, rotating brushes and saws. Instructions for use should be followed and maintenance should be done well.

ACHIEVEMENT CONDITIONS

Equipment, tools, instruments and materials

During the trade analysis workshop, the participants were shown basic lists of personal protective equipment, measuring equipment, manual and mechanical tools used by cement finishers, and were asked to adapt the lists to each task of the trade. Those lists are presented in Annex 1.

The participants also mentioned means of communication such as hand and visual signals as well as transceivers and pagers.

Cement finishers work particularly with the following materials and equipment:

- set accelerators;
- crystallizing agents;
- mould release agents;
- a variety of concrete;
- glues;
- colouring agents;
- grout;
- parging;
- hardeners;
- reinforcing materials;
- caulking materials;
- concrete curing and protection membranes and products;
- membranes and other waterproofing products;
- mortars;
- cleaning and degreasing products;
- resins (epoxy, acrylic, etc.);
- jointless, polyurethane, vaporized coatings;
- sealants and solvents;
- acid stains.

Health and safety hazards

Annex 2 of the present report contains a list of the main hazards involved in the tasks and operations of the cement finishing trade, as well as applicable preventive measures.

2.4.2 PERFORMANCE CRITERIA

Performance criteria were gathered for each task. They are used for assessing whether the tasks were performed satisfactorily. The criteria pertain to aspects such as the quantity and quality of work done, the observance of a work procedure, the attitudes adopted, etc. Table 7 describes those criteria for each of the cement finisher's tasks.

Table 7 Performance Criteria

Task A Organize the work	
Performance Criteria	
For the observance of standards, rules or procedures	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Following instructions • Observance of regulations (laws, regulations, codes, standards, etc.) • Observance of health and safety rules 	
For autonomy	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Initiative • Resourcefulness and ingenuity • Problem-solving ability • Ability to manage unforeseen situations 	
For communication and customer service	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Verbal communication skills • Quality of written communication • Using appropriate terminology • Ability to resolve interpersonal conflicts • Teamwork ability 	
For work organization	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Good planning • Methodical work • Access to everything necessary for the work • Meeting schedules and deadlines 	
For using equipment, tools and materials	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Good working techniques • Ability to operate the equipment 	To be able to organize the work well, a journeyman must have a good knowledge of the equipment and tools and their operation, as well as the materials.

Task A Organize the work	
Performance Criteria	
For displaying certain attitudes and behaviours	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Sense of responsibility • Awareness of the impact of actions taken • Vigilance, attention • Ability to perceive dangers • Ability to adapt to changes • Discipline • Punctuality • Respect for others • Respect for the environment • Good physical shape 	
Task B Communicate with other persons	
Performance Criteria	
For the expected outcomes	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Safety of the premises 	Indicate to team members the places that pose hazards.
For the observance of standards, rules or procedures	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Observance of regulations (laws, regulations, codes, standards, etc.) • Observance of tolerances 	Inform the team of regulations specific to the construction site. Communicate tolerance information.
For autonomy	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Initiative • Resourcefulness and ingenuity • Problem-solving ability • Ability to manage unforeseen situations 	
For communication and customer service	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Verbal communication skills • Ability to resolve interpersonal conflicts • Teamwork ability 	Be able to discuss the various problems that arise.
For work organization	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Good planning • Methodical work • Good space perception 	Use proven techniques and be able to exchange related information.

Task B Communicate with other persons	
Performance Criteria	
For using equipment, tools and materials	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Good working techniques 	
For displaying certain attitudes and behaviours	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Sense of responsibility • Respect for others • Respect for the environment • Good physical and mental shape 	Communicate the status of work done to subsequent teams on the site. For example, indicate placement defects to the team that will do the finishing.
Task C Maintain a safe work environment	
Performance Criteria	
For the observance of standards, rules or procedures	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Following instructions • Observance of regulations (laws, regulations, codes, standards, etc.) • Observance of health and safety rules • Observance of tolerances • Professional ethics 	
For autonomy	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Ability to manage unforeseen situations 	
For communication and customer service	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Verbal communication skills 	
For work organization	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Good planning • Good working methods • Methodical work • Good space perception • Access to everything necessary for the work 	Ensure the presence of personal and collective protective equipment.

Task C Maintain a safe work environment	
Performance Criteria	
For displaying certain attitudes and behaviours	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Sense of responsibility • Awareness of the impact of actions taken • Vigilance, attention • Ability to perceive dangers • Ability to adapt to changes • Discipline • Respect for others • Respect for the environment • Good physical shape 	Keep informed about cautions regarding new equipment or materials.
Task D Use tools, equipment, products and materials	
Performance Criteria	
For the expected outcomes	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Safety of the premises • Careful finishing 	Ensure that the work is not damaged by inappropriate equipment.
For the observance of standards, rules or procedures	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Following instructions • Observance of regulations (laws, regulations, codes, standards, etc.) • Observance of health and safety rules • Observance of tolerances • Professional ethics 	
For autonomy	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Initiative • Resourcefulness and ingenuity • Problem-solving ability • Ability to manage unforeseen situations 	The cement finisher must be able to adjust and troubleshoot tools and equipment.
For communication and customer service	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Verbal communication skills • Quality of written communication • Using appropriate terminology • Ability to resolve interpersonal conflicts • Teamwork ability 	The cement finisher is required to give advice about the use of tools and equipment.

Task D Use tools, equipment, products and materials	
Performance Criteria	
For work organization	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Good planning • Methodical work • Access to everything necessary for the work • Meeting schedules and deadlines 	
For using equipment, tools and materials	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Dexterity • Good eye-hand coordination • Agility • Good working techniques • Ability to operate the equipment 	<p>Some of the manual work is done traditionally.</p> <p>Take care of tools and equipment.</p>
For displaying certain attitudes and behaviours	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Sense of responsibility • Awareness of the impact of actions taken • Vigilance, attention • Ability to perceive dangers • Ability to adapt to changes • Discipline • Punctuality • Respect for others • Respect for the environment • Good physical shape 	<p>The trade is in constant development, particularly due to the arrival on the market of new tools and equipment. The cement finisher's level or responsibility is thereby enhanced.</p>

Task 1 Prepare and place concrete on various surfaces	
Performance Criteria	
For the expected outcomes	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Placement compliance with requirements 	Remember that placement quality has an impact on subsequent finishing work.
For the observance of standards, rules or procedures	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Following instructions • Observance of regulations (laws, regulations, codes, standards, etc.) • Observance of health and safety rules • Observance of tolerances • Professional ethics 	
For autonomy	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Initiative • Resourcefulness and ingenuity • Problem-solving ability • Ability to manage unforeseen situations 	
For communication and customer service	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Verbal communication skills • Ability to resolve interpersonal conflicts • Teamwork ability 	
For work organization	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Good planning • Methodical work • Good space perception • Access to everything necessary for the work • Meeting schedules and deadlines 	
For using equipment, tools and materials	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Dexterity • Good eye-hand coordination • Agility • Good working techniques 	

Task 1 Prepare and place concrete on various surfaces	
Performance Criteria	
For displaying certain attitudes and behaviours	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Sense of responsibility • Awareness of the impact of actions taken • Vigilance, attention • Ability to perceive dangers • Ability to adapt to changes • Discipline • Punctuality • Respect for others • Respect for the environment • Good physical shape 	
Task 2 Finish concrete on various surfaces	
Performance Criteria	
For the expected outcomes	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Careful finishing 	Aesthetic finish, optimal evenness, edges without spalling.
For autonomy	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Resourcefulness and ingenuity • Ability to manage unforeseen situations 	The cement finisher must be able to adjust and troubleshoot tools and equipment.
For communication and customer service	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Ability to resolve interpersonal conflicts • Teamwork ability 	Conflictual situations arise more easily after long hours of intensive work.
For work organization	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Good planning • Methodical work 	
For using equipment, tools and materials	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Dexterity • Good eye-hand coordination 	

Task 2 Finish concrete on various surfaces	
Performance Criteria	
For displaying certain attitudes and behaviours	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Sense of responsibility • Awareness of the impact of actions taken • Ability to adapt to changes 	
Task 3 Repair concrete on various surfaces	
Performance Criteria	
For the expected outcomes	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Sturdiness of the structure • Safety of the structure • Careful finishing 	Use the resonance technique to check the quality of repairs.
For the observance of standards, rules or procedures	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Following instructions • Observance of regulations (laws, standards, regulations, etc.) • Observance of health and safety rules • Observance of tolerances • Professional ethics 	A basic rule is to present a positive and favourable image of one's company and trade.
For autonomy	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Initiative • Resourcefulness and ingenuity • Problem-solving ability • Ability to manage unforeseen situations 	The work of cement finishers is highly varied; they have to be adaptable. Those who perform more-specialized tasks have developed related expertise.
For communication and customer service	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Verbal communication skills • Quality of written communication • Using appropriate terminology • Ability to resolve interpersonal conflicts • Teamwork ability 	Writing clear and precise reports for signing ¹³ .

13. Note of the writing team: The production of reports does not depend on the nature of tasks, but rather on the internal policy of companies. Accordingly, in some companies, report writing may be integrated to all the trade's tasks.

Task 3 Repair concrete on various surfaces	
Performance Criteria	
For work organization	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Good planning • Methodical work • Good space perception • Having everything necessary to work • Meeting schedules and deadlines 	The work organization is more complex for repair work.
For using equipment, tools and materials	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Dexterity • Good eye-hand coordination • Agility • Good working techniques 	Some of the manual work is done traditionally. The work is physically strenuous; it requires moving heavy loads.
For displaying certain attitudes and behaviours	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Sense of responsibility • Awareness of the impact of actions taken • Vigilance, attention • Ability to perceive dangers • Ability to adapt to changes • Discipline • Punctuality • Respect for others • Respect for the environment • Good physical shape 	It is necessary to keep apprised of the constant technological progress.
Task 4 Apply different finishes on various surfaces	
Performance Criteria	
For the expected outcomes	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Sturdiness of the structure • Safety of the structure • Careful finishing 	
For the observance of standards, rules or procedures	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Following instructions • Observance of regulations (laws, standards, regulations, etc.) • Observance of health and safety rules • Observance of tolerances • Respect of specification sheets • Professional ethics 	Essential for obtaining a good result.

Task 4 Apply different finishes on various surfaces	
Performance Criteria	
For autonomy	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Initiative • Resourcefulness and ingenuity • Problem-solving ability • Ability to manage unforeseen situations 	The cement finisher is expected to be available to work during evenings and weekends.
For communication and customer service	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Verbal communication skills • Quality of written communication • Using appropriate terminology • Ability to resolve interpersonal conflicts • Teamwork ability 	
For work organization	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Good planning • Methodical work • Access to everything necessary for the work • Meeting schedules and deadlines 	
For using equipment, tools and materials	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Dexterity • Good eye-hand coordination • Agility • Good working techniques 	
For displaying certain attitudes and behaviours	Clarifications regarding the criteria listed
<ul style="list-style-type: none"> • Sense of responsibility • Awareness of the impact of actions taken • Vigilance, attention • Ability to perceive dangers • Ability to adapt to changes • Discipline • Punctuality • Respect for others • Respect for the environment • Good physical shape 	

2.5 FUNCTIONS

Functions correspond to a set of related tasks. That set of tasks may be defined by the work's results or by a procedure.

Although the participants did not have time to express themselves on this subject, four functions may be identified regarding the cement finishing trade, to wit:

- a function pertaining to **placement**, related to the task "Prepare and place concrete on various surfaces";
- a function pertaining to **finishing**, related to the task "Finish concrete on various surfaces";
- a function pertaining to **repairs**, related to the task "Repair concrete on various surfaces";
- a function pertaining to **texturing**, related to the task "Apply different finishes on various surfaces".

3. QUANTITATIVE DATA ON TASKS

3.1 TASK DIFFICULTY

A task's difficulty is assessed according to the following scale:

1. Very easy: The task involves little risk of error; it requires no notable physical or mental effort. Performing the task is less difficult than average.

2. Easy: The task involves a few risks of error; it requires minimal physical or mental effort.

3. Difficult: The task involves many risks of error; it requires a good physical or mental effort. Performing the task is more difficult than average.

4. Very difficult: The task involves a high risk of error; it requires substantial physical or mental effort. The task is among the most difficult in the trade.

The participants were asked to estimate the level of difficulty involved in exercising each task of the cement finishing trade, for each sector of the construction industry. The average of their estimates and the average of the four sectors are presented in Table 8 on the next page.

Table 8 Task Difficulty

Task	Construction Industry Sectors				Average for the Four Sectors
	<i>Industrial</i>	<i>Institutional and Commercial</i>	<i>Civil Engineering and Roadwork</i>	<i>Residential</i>	
A Organize the work	2.8	2.3	3	1.5	2.4
B Communicate with other persons	2.1	1.6	1.8	1.3	1.7
C Maintain a safe work environment	2.4	2	1.5	1.3	1.8
D Use tools, equipment, products and materials	2.4	2.1	1.8	1.3	1.9
1 Prepare and place concrete on various surfaces	2.6	2.2	3	1.3	2.3
2 Finish concrete on various surfaces	2.8	2.9	2.3	1.7	2.4
3 Repair concrete on various surfaces	3.1	2.7	2.5	1.7	2.5
4 Apply different finishes on various surfaces	2.8	2.6	2.5	2	2.5

Difficulty: The number 1 indicates the least difficult task; the number 4, the most difficult.

Interpretation of the results

The table's quantitative data should be read as an indication only. They are the estimates of an ad hoc working group whose scope cannot be compared to proven statistics.

However, compiling the data yields the following findings:

- Tasks 1 to 4, directly related to the trade, and Task A, which pertains to work organization, have the highest difficulty rating.
- It appears that all the tasks are easier in the residential sector. This should be taken into account in reading the average for the four sectors: the residential sector data lower the difficulty rating.

4. KNOWLEDGE, SKILLS AND ATTITUDES

The analysis of the trade enabled us to specify some of the knowledge, skills and attitudes necessary for performing the tasks. Those qualities are transferable, i.e., applicable to a variety of tasks and situations.

The following pages present the knowledge, skills and attitudes that, according to the workshop participants, are considered essential for performing the tasks.

4.1 KNOWLEDGE

Applied mathematics

- Knowledge of basic mathematical operations, with or without fractions
- Applying the rule of three;
- Calculating percentages;
- Concepts of geometry regarding dimensions, areas and volumes;
- International and imperial measuring systems¹⁴.

Applied chemistry and physics regarding materials and products

- Knowledge of concreting materials (cement, aggregate, admixtures, grout, etc.);
- Knowledge of the various types of concrete (composition, mixes, textures, proportions, admixtures) and their properties (firmness, strength, durability, drying, etc.);
- Knowledge of other materials and tools (plastic, solvents, sealants, powder mould release agents, set accelerators, glues, acids, caulking materials, mortar, parging agents, etc.);
- Knowledge of epoxy resins, polyurethane, acrylic, etc.;
- Composition of materials constituting the tools;

14. While the international system is more widespread, it remains necessary to use the imperial system quite frequently. The latter is particularly used in existing structural plans, for products, machinery, etc. It is also necessary to communicate with older colleagues who only use the imperial system.

- Knowledge of reinforcing materials (reinforcing bars, welded wire mesh, polyethylene fibre, etc.);
- Knowledge of concrete defects (spalling, crumbling, crazing, honeycombs, air holes, roughness, etc.) and their causes.

Computers

According to the participants, the use of computers and the electronic highway is not currently widespread. However, there is a trend in that direction. Accordingly, cement finishers should learn about the most common applications, such as information searches (materials, plans, etc.) and document sending and receiving.

Reading and interpreting plans and specifications

- Architectural – particularly structural – plans and specifications;
- Reading plans (technical data, symbols, abbreviations), exploded views, orthogonal projections, types of lines, etc.;
- Tracing dimensioned sketches.

Regulations and documentation

- Workplace Hazardous Materials Information System (WHMIS);
- Federal and provincial regulations, codes and standards;
- Technical characteristics indicated by manufacturers;
- Production of written and verbal reports according to the type of construction (forms, goods receipt reports, etc.).

Occupational health and safety

The knowledge and application of occupational health and safety rules is essential for practicing the trade. Cement finishers must be knowledgeable about:

- risks of accident, injury, illness or allergy;
- risks related to concrete dust;
- risks related to using hazardous products;

- risks related to working in confined and enclosed spaces;
- individual and collective means of protection for countering risk factors;
- the necessity of behaving safely by changing inadequate work habits and adopting ergonomic postures.

The participants recalled that companies offer safety training sessions adapted to the type of construction and the nature of tasks to be performed.

Hand tools, power tools, measuring equipment and instruments

The participants were asked to draw a list of hand and power tools, equipment and measuring instruments used for performing each of their tasks. This list is presented in Annex 1 of the present report, under the heading “Raw Materials, Tools and Equipment”.

With regard to that list, the participants confirmed that they use electric, hydraulic, pneumatic and gasoline equipment, which they also inspect and maintain.

Work techniques

- Concrete mixing, spreading and consolidating, concrete cleaning, pouring, injection and projection, floating, shaping, trowelling, adjusting, tamping, curing, drilling, anchoring, cutting, sanding, abrasion, grinding, bush hammering, finishing, drying, texturing and stamping;
- Techniques for establishing the elevation, slope, drainage, flatness, levelling and reinforcement of structures;
- Knowledge of texturing patterns (cobblestone, random gross aggregate, herringbones, etc.).

Work organization

- Knowledge of the construction industry;
- Knowledge of construction site organization;
- Knowledge of procedures;
- Knowledge of the effects of environmental conditions on concrete;
- Knowledge of concrete transportation methods (by pumping, conveyor, power buggy, grabbing crane, etc.).

Communication

- Knowledge of the trade's terminology;
- Knowledge and use of hand and visual signals;
- Use of communication devices, notably transceivers;
- Teamwork;
- Interpersonal relations techniques, particularly conflict-resolution.

4.2 SKILLS

Skills are types of know-how. They are divided into three categories: cognitive, motor and perceptual.

Cognitive skills

Cognitive skills involve intellectual strategies applied in working. Among the necessary cognitive skills for the cement finishing trade, the participants mentioned:

- problem-resolution (finding solutions to technical problems or constraints).

Motor skills

Motor skills involve gestures and movements. The main motor skills necessary to the cement finishing trade are the following:

- manual dexterity;
- hand-eye coordination or synchronizing movements;
- working quickly, due to quick-setting concrete.

Perceptual skills

Perceptual skills are sensory skills enabling a person to perceive by his senses what is happening in his environment. The main perceptual skills necessary to the cement finishing trade are the following:

- space perception, which is the ability to perceive the functional relation of things in space, to use drawings for representing volumes, and to imagine geometrical figures;
- visual acuity and sense of observation;
- perception of odours, particularly in the presence of toxic products and machinery;
- perception of hazards.

4.3 ATTITUDES

Attitudes are a way of acting, reacting and relating with others or with one's environment. They express personal skills. The main attitudes that cement finishers must have are the following¹⁵:

- autonomy;
- self-control and self-confidence;
- perseverance;
- sense of organization;
- initiative and ingenuity;
- open to technological developments;
- sense of responsibility;
- discipline;
- concern for occupational health and safety, individually and collectively;
- accurate execution of tasks;
- cleanliness in executing and finishing the work;
- aesthetic sense;
- observance of time constraints, standards, limits;
- punctuality, diligence and availability, given atypical work schedules;
- sobriety.

15. The attitudes are not necessarily listed in order of importance.

5. TRAINING SUGGESTIONS

During the trade analysis workshop, the participants made a number of training suggestions. They are reproduced below, in no particular order.

- Young DEP graduates should take a four-week stage in the workplace. Hope was expressed that agreements with the various stakeholders would be reached to that effect.
- The 4,000 apprenticeship hours are insufficient and more should be added. “The trade has evolved... We do more than lay concrete.”
- Young people’s awareness should be raised about the insidious dangers of intoxications by, among other things, carbon monoxide. This awareness would lead young people to take charge of their own safety by insisting on necessary ventilation conditions and systematically wearing a mask.
- Generally, it is important that training be updated and follow technological trends closely. In that vein, employers should be aware that their workers need to take professional development courses that correspond with the tasks assigned to them or with those to which they aspire.
- On expert raised the difficulties he has encountered to obtain a place at professional development courses dispensed through the CCQ’s training fund. Although he understands that a minimum number of registrations are required to dispense such training, he hopes that the issue will be examined in order to find solutions.
- As is well known, training budgets have limits. It is hoped that there will be more agreements with suppliers to obtain the necessary materials and equipment for quality practical training.
- Employers and journeymen should clearly understand that a beginner in the trade is an apprentice. It is normal that concepts or techniques acquired early in his training may have been forgotten momentarily. In addition, a student enjoys ideal conditions with little stress. An apprentice needs time to adapt to the more-demanding conditions of the workplace, and to continue developing the skills he acquired in training.

Annexes

Annex 1
TOOLS AND EQUIPMENT

During the occupational analysis workshop, the participants were presented with a basic list of equipment, tools and instrumentation used by cement finishers, and were asked to adapt the list to each task of the trade.

Accordingly, the participants added, corrected and withdrew items from the list, depending on the work to be done. The information gathered from this exercise is presented in the tables below.

A table has been produced for each of the tasks directly related to practicing the trade, i.e., concrete placement, finishing, protection, repair and texturing.

Table A1 Tools and Equipment

TASK 1 PREPARE AND PLACE CONCRETE ON VARIOUS SURFACES	
Personal Protective Equipment	
<ul style="list-style-type: none"> • rubber boots • safety boots • hard hat • gloves 	<ul style="list-style-type: none"> • kneeling pad • fluorescent vest • safety glasses • hearing protection
Measuring Equipment	
<ul style="list-style-type: none"> • calculator • hand level • laser level 	<ul style="list-style-type: none"> • tape measure • thermometer

TASK 1 PREPARE AND PLACE CONCRETE ON VARIOUS SURFACES	
Hand Tools	
<ul style="list-style-type: none"> • darby (wooden, magnesium, bull, etc.) • broom • finishing broom • water hose • hand brush • wheelbarrow • lifting hook • edger • handled border edger • jointer • rubbing stone • rake • concrete rake 	<ul style="list-style-type: none"> • straightedge • highway straightedge • cove base tool • square nose shovel • round nose shovel • roller bug • stamp roller • bucket • pointer trowel • margin trowel • spin trowel • sprayer
Power Tools	
<ul style="list-style-type: none"> • power buggy • conveyor • mechanical spreader 	<ul style="list-style-type: none"> • power drill /mixer • vibrator • power screed
Personal Protective Equipment	
<ul style="list-style-type: none"> • breathing apparatus (dust mask respirator) • rubber boots • safety boots • hard hat • gloves 	<ul style="list-style-type: none"> • kneeling pad • luorescent vest • safety glasses • knee board and pad • hearing protection
Hand Tools	
<ul style="list-style-type: none"> • darby (wooden, magnesium, bull, etc.) • broom • finishing broom • whitewash brush • water hose • edger 	<ul style="list-style-type: none"> • handled border edger • jointer • bucket • pointer trowel • margin trowel • spin trowel • sprayer

TASK 3 REPAIR CONCRETE ON VARIOUS SURFACES	
Power Tools	
<ul style="list-style-type: none"> • light • power planer • power trowel 	
Personal Protective Equipment	
<ul style="list-style-type: none"> • breathing apparatus (dust mask respirator) • safety boots • hard hat • fall arrest equipment • face shield 	<ul style="list-style-type: none"> • gloves • kneeling pad • fluorescent vest • safety glasses • knee board and pad • hearing protection
Measuring Equipment	
<ul style="list-style-type: none"> • laser level • builder's level 	<ul style="list-style-type: none"> • tape measure • thermometer
Hand Tools	
<ul style="list-style-type: none"> • darby (wooden, magnesium, bull, etc.) • broom and finishing broom • bush hammer • water hose • wheelbarrow • chain 	<ul style="list-style-type: none"> • sponge/rubber float • epoxy injection gun • mason's hammer • concrete rake • straightedge • hand saw • steel rod • trowel • sprayer
Power Tools	
<ul style="list-style-type: none"> • wet/dry vacuum • power bush hammer • power buggy • compressor • electric cutter • generator • high-pressure water jet with rotary nozzle • core drill and bits • wire brush grinder 	<ul style="list-style-type: none"> • steam cleaner • power washer • power drill/mixer • power grinder • sand/shot blaster • scarifier • power saw and blades • power trowel • vibrator

TASK 4 APPLY DIFFERENT FINISHES ON VARIOUS SURFACES	
Personal Protective Equipment	
<ul style="list-style-type: none"> • breathing apparatus (dust mask respirator) • rubber boots • safety boots • hard hat • disposable coveralls • fall arrest equipment • face shield 	<ul style="list-style-type: none"> • gloves • kneeling pad • fluorescent vest • rain suit • safety glasses • knee board and pad • hearing protection
TASK 4 APPLY DIFFERENT FINISHES ON VARIOUS SURFACES	
Measuring Equipment	
<ul style="list-style-type: none"> • calculator • string line • chalk line • level 	<ul style="list-style-type: none"> • laser level • builder's level • tape measure
Hand Tools	
<ul style="list-style-type: none"> • darby (wooden, magnesium, bull, etc.) • broom • finishing broom • water brush • bush hammer • water hose • wheelbarrow • hand brush • wheelbarrow • cold chisel • utility knife • lifting hook • sponge/rubber float • edger • handled border edger 	<ul style="list-style-type: none"> • jointer • epoxy injection gun • highway straightedge • socket set • chipping hammer • claw hammer • tyning tools • round nose shovel • concrete rake • rake • straightedge • spiked roller • hand saw • margin trowel • sprayer
Power Tools	
<ul style="list-style-type: none"> • wet/dry vacuum • power bush hammer 	<ul style="list-style-type: none"> • plaster mixer • power drill/mixer • texture gun

OCCUPATIONAL HEALTH AND SAFETY GRIDS

Produced by **Jacques Plante**, Prevention Consultant
ASP Construction

Table A2 Description of Sources of Danger

N°	Sources of Danger	Effects on Health and Safety	Means of Prevention
1	<p>Ground Fall Hazards</p> <ul style="list-style-type: none"> • Housekeeping (clutter, waste, debris) • Slippery surfaces (rain, ice, snow, residues, dust, oil) • Obstacles (extension cord, hose, materials) • Holes 	<ul style="list-style-type: none"> • Collisions • Contusions • Bruises • Fractures • Sprains 	<ul style="list-style-type: none"> • Clean the workplace (picking up debris). • Level the ground. • Apply abrasives to make the surface less slippery. • Absorb oils, recover water. • Hang up any equipment that might constitute an obstacle 2.1 m high or protect the walking area. • Plug holes (install plating).
2 2 a)	<p>Fall-from-Height Hazards</p> <ul style="list-style-type: none"> • Using a stepladder 	<ul style="list-style-type: none"> • Collisions • Contusions • Bruises • Fractures • Sprains • Internal injuries • Psychological and physical after-effects • Paralysis • Death 	<ul style="list-style-type: none"> • Use a class 1 stepladder with a nominal capacity of 113 kg (250 lb.) and: <ul style="list-style-type: none"> - open the spreader bars completely; - install on a firm level surface; - choose a model according to the required height.
2 b)	<ul style="list-style-type: none"> • Using a ladder 	<ul style="list-style-type: none"> • Collisions • Contusions • Bruises • Fractures • Sprains • Internal injuries • Psychological and physical after-effects • Paralysis • Death 	<ul style="list-style-type: none"> • Use a class 1 stepladder. • Position and maintain a slope of 1/4 to 1/3 from the height of the bearing point. • Climbing up and down a ladder: <ul style="list-style-type: none"> - always with three support points; - hold the bars and not the side rails; - remain between the side rails; - do not hold anything in the hands; - face the ladder.

N°	Sources of Danger	Effects on Health and Safety	Means of Prevention
2 c)	<ul style="list-style-type: none"> • Using a small mobile scaffold (Baker) 	<ul style="list-style-type: none"> • Collisions • Contusions • Bruises • Fractures • Sprains • Internal injuries • Psychological and physical after-effects • Paralysis • Death 	<ul style="list-style-type: none"> • Apply stability principles: <ul style="list-style-type: none"> - Never exceed three times the smallest support base; - Always use the wheel locking mechanism; - Climb down mobile scaffolding to move it.
2 d)	<ul style="list-style-type: none"> • Using metal frame scaffolding or tubular, socket and rosette scaffolding 	<ul style="list-style-type: none"> • Collisions • Contusions • Bruises • Fractures • Sprains • Internal injuries • Psychological and physical after-effects • Paralysis • Death 	<ul style="list-style-type: none"> • Stabilizing the scaffolding: <ul style="list-style-type: none"> - use stabilizers on the ground; - tie it to the building; - use guys; - place the two side rails side by side and fasten them by wind bracing. • When there is a risk of falling more than 3 metres: <ul style="list-style-type: none"> - install a railing system of the type developed by the Association des entrepreneurs en maçonnerie du Québec (AEMQ); or - wear a shock-absorbing harness, with an anchor that has a breaking strength of 18 kN; or - be attached to a vertical lifeline complying with the specifications in the <i>Safety Code for the construction industry</i>. • Check the bearing capacity of the ground and install beds and jack screws if the ground is sloped. • For each scaffolding section, install vertical locks. • Use safe means of access. • Install anchors to the structure at intervals not exceeding 3 times the minimum scaffolding width. • Make sure that the planks carry the NLGA seal of approval, that the floor is wide enough (min. 470 mm) and that the distance between the structure and the floor is less than 350 mm.

N°	Sources of Danger	Effects on Health and Safety	Means of Prevention
2 e)	<ul style="list-style-type: none"> • Using an aerial automotive work platform 	<ul style="list-style-type: none"> • Collisions • Contusions • Bruises • Fractures • Sprains • Internal injuries • Psychological and physical after-effects • Paralysis • Death 	<ul style="list-style-type: none"> • Take the training required by safety standards. • Wear an energy-absorbing harness for the jib boom platform. • Delimit the work area to avoid the risk of collision. • Keep the feet on the platform floor. • Climb up and down facing the equipment, with 3 support points. • Keep the platform access and floor clean.
2 f)	<ul style="list-style-type: none"> • Using tower or platform scaffolding (Fraco or other) 	<ul style="list-style-type: none"> • Collisions • Contusions • Bruises • Fractures • Sprains • Internal injuries • Psychological and physical after-effects • Paralysis • Death 	<ul style="list-style-type: none"> • Comply with standards, capacities and an installation plan provided by an engineer.
3	<p>Ergonomic hazards</p> <ul style="list-style-type: none"> • Posture constraints / statis • Repeated movements • Handling • Difficulty of the task • Vibrations (hand-arm system) 	<ul style="list-style-type: none"> • Musculoskeletal lesions • Sprains • Hernias • Fatigue, discomfort, pain • Tendinitis, etc. 	<ul style="list-style-type: none"> • Rotate tasks if the situation allows it. • Favour the purchase of tools limiting vibrations to a minimum. • Use handling equipment. • Know handling techniques.
4	<p>Chemical Hazards – Gases and Fumes</p> <ul style="list-style-type: none"> • Use of propane • Motor producing carbon monoxide • Fumes emanating from product mixes 	<ul style="list-style-type: none"> • Carbon monoxide poisoning • Corrosive burns • Respiratory illnesses 	<ul style="list-style-type: none"> • Take WHMIS training. • Keep the specification sheets of products used. • Carry respiratory protection and filters appropriate to contaminants. • Ensure mechanical or natural ventilation. • Wear personal protective equipment (gloves, coveralls). • Wear safety glasses or a visor. • Use a tile saw or a dust vacuum system. • Use tools equipped with a vacuum system including a HEPA filter. • Have emergency equipment at hand (eye-wash station, fire extinguisher, etc.).

N°	Sources of Danger	Effects on Health and Safety	Means of Prevention
5	<p>Chemical Hazards – Liquids and Fog</p> <ul style="list-style-type: none"> • Corrosive effects of cement and mortar • Liquid and grout mixes • Acid-based products • Acid fog 	<ul style="list-style-type: none"> • Corrosive burns • Respiratory illnesses • Skin problems (dermatosis) • Chemical burns • Irritations, redness, rashes • Suffocation due to respiratory illnesses 	<ul style="list-style-type: none"> • Take WHMIS training. • Keep the specification sheets of products used. • Carry respiratory protection and filters appropriate to contaminants. • Ensure mechanical or natural ventilation. • Wear personal protective equipment (gloves, coveralls). • Wear safety glasses or a visor. • Use a tile saw or a dust vacuum system. • Use tools equipped with a vacuum system including a HEPA filter. • Have emergency equipment at hand (eye-wash station, fire extinguisher, etc.).
6	<p>Chemical Hazards – Dust and Smoke</p> <ul style="list-style-type: none"> • Hypoxic cement Hypoxic cement mixes • Silica dust • Mill sanding • Drilling anchoring holes 	<ul style="list-style-type: none"> • Corrosive burns • Respiratory illnesses • Skin problems (dermatosis) 	<ul style="list-style-type: none"> • Take WHMIS training. • Keep the specification sheets of products used. • Carry respiratory protection and filters appropriate to contaminants. • Ensure mechanical or natural ventilation. • Wear personal protective equipment (gloves, coveralls). • Wear safety glasses or a visor. • Use a tile saw or a dust vacuum system. • Use tools equipped with a vacuum system including a HEPA filter. • Have emergency equipment at hand (eye-wash station, fire extinguisher, etc.).

N°	Sources of Danger	Effects on Health and Safety	Means of Prevention
7	<p>Electrical hazards</p> <ul style="list-style-type: none"> • Contact with an overhead electric line • Electric tools • Contact with electric wires or outlets 	<ul style="list-style-type: none"> • Electrification • Fibrillation • Burns • Amputation • Paralysis • Electrocution • Death 	<ul style="list-style-type: none"> • Maintain the minimum distances of approach prescribed by the <i>Safety Code for the construction industry</i>. • Establish and comply with the agreement entitled <i>Intervention près des lignes électriques</i> with the operating company (ex. Hydro-Québec). • Use tools featuring double insulation or grounding. • Use extension cords in good condition and ground protections. • Cut the energy source, and then lock out and identify the components. • Took the compulsory training for working near electric lines.
8	<p>Noise hazards</p> <ul style="list-style-type: none"> • Tools • Anchoring in an angle iron • Cement mixer • Handling scaffoldings 	<ul style="list-style-type: none"> • Hearing loss • Occupational deafness 	<ul style="list-style-type: none"> • Choose the most silent equipment possible. • Do required preventive maintenance. • Wear hearing protection (plugs or shells).
9	<p>Mechanical hazards</p> <ul style="list-style-type: none"> • Moving parts • Broken blade, drill bit or tool 	<ul style="list-style-type: none"> • Contusions • Fractures • Crushing • Amputation • Cuts 	<ul style="list-style-type: none"> • Ensure that all moving parts are covered by a guard. • Close the guard screens. • Do preventive maintenance. • Collect information and take training in the use of new tools.
10	<p>Environmental Hazards</p> <ul style="list-style-type: none"> • Extreme temperature (hot or cold) • Enclosed space 	<ul style="list-style-type: none"> • Discomfort due to cold • Hypothermia • Chilblains • Heat constraints • Heatstroke 	<ul style="list-style-type: none"> • Comply with health and safety rules. • Ensure adequate ventilation of work areas. • Do preventive maintenance of gas equipment. • Take training in the hazards of carbon monoxide and nitrogen dioxide. • Alternate work and rest periods. • Drink water.

N°	Sources of Danger	Effects on Health and Safety	Means of Prevention
11	Stress-Related Hazards <ul style="list-style-type: none"> • Quality of the finish • Application time • Application productivity • Mix reactions 	<ul style="list-style-type: none"> • Health problems • Hypertension • Eczema 	<ul style="list-style-type: none"> • Plan the work. • Limit work done under pressure. • Avoid rush hours when performing tasks near road traffic.
12	Fire Hazards <ul style="list-style-type: none"> • Smoke • Fire 	<ul style="list-style-type: none"> • Cough • Irritations • Intoxication • Burns 	<ul style="list-style-type: none"> • Clean the work area appropriately. • Store flammable products appropriately. • Have a fire extinguisher available.

Table A3 Risk Sources Related to Cement Finishers' Tasks and Operations

Legend

0	The risk is nil
+	The risk is low
++	The risk is average
+++	The risk is high

Risk levels are noted according to exposure to risk sources, not according to the gravity of effects on personal health and safety.

No.	Tasks and Operations	Ground Fall Hazards	Fall-from-Height Hazards	Ergonomic Hazards	Chemical Hazards – Gases and Fumes	Chemical Hazards – Liquids and Fog	Chemical Hazards – Dust and Smoke	Electrical Hazards	Noise Hazards	Mechanical Hazards	Environmental Hazards	Stress-Related Hazards	Fire Hazards
Task 1 – Prepare and place concrete on various surfaces													
1.1	Prepare to pour	+	+	+	0	0	0	0	+	+	+	0	0
1.2	Take cognizance of plans, specifications and work orders	0	0	0	0	0	0	0	0	0	0	+	0
1.3	Check weather conditions, the ambient temperature, ventilation, lighting, etc.	++	++	++	0	0	0	0	0	0	0	+	++
1.4	Check materials and equipment												
1.4.1	Check the availability of materials	++	++	++	0	0	0	0	0	+	+	+	0
1.4.2	Check that equipment is in good condition	++	++	++	0	0	0	+	+	+	+	+	0
1.5	Check the overall condition of the sub-grade or substrate	++	+	++	+	0	+	0	+	+	+	+	0
1.6	Prepare a substrate												
1.6.1	Install vapour barriers, insulating membranes, etc.	+	++	++	++	0	+	0	+	+	+	+	++
1.6.2	Apply a bonding agent if necessary	+	++	++	++	++	0	0	0	0	+	+	++
1.7	Check the level of reinforcing steel, mechanical installations (floor drains) and formwork	++	++	++	0	0	0	0	++	++	+	+	0
1.8	Install expansion joints on sidewalks, as well as isolation joints	++	+	++	0	0	0	0	0	+	+	+	0

No.	Tasks and Operations	Ground Fall Hazards	Fall-from-Height Hazards	Ergonomic Hazards	Chemical Hazards – Gases and Fumes	Chemical Hazards – Liquids and Fog	Chemical Hazards – Dust and Smoke	Electrical Hazards	Noise Hazards	Mechanical Hazards	Environmental Hazards	Stress-Related Hazards	Fire Hazards
1.9	Transport concrete												
1.9.1	Detect obstacles on the way	++	++	+	0	0	0	0	0	0	0	0	0
1.9.2	Determine the means of transportation	++	++	+++	0	0	0	0	+	0	0	0	0
1.10	Protect adjacent surfaces												
1.10.1	Apply polyethylene	++	++	+	0	0	0	0	0	+	+	+	0
1.11	Lay concrete												
1.11.1	Keep rebars and wire mesh in place	+++	+++	+++	0	0	0	0	+	+	+	0	0
1.11.2	Lay concrete with appropriate tools	++	+++	+++	0	++	0	++	++	++	++	+	0
1.11.3	Report problems to the appropriate persons	0	0	0	0	0	0	0	0	0	0	++	0
1.11.4	Consolidate the concrete	++	++	++	0	+	0	+	++	++	+	++	0
1.12	Validate the types of concrete and their workability according to their characteristics	++	++	++	0	++	0	0	0	0	0	0	0
1.13	Compact the concrete												
1.13.1	Determine locations that require vibration	++	++	+++	0	0	0	+	+	+	+	++	0
1.13.2	Determine vibration speed, frequency and spacing to prevent defects	++	++	++	+	0	0	+	+	+	+	+	0
1.13.3	Perform the vibration	+++	++	+++	+	0	0	++	++	++	+	+	0
1.14	Grade concrete to the specified level	+	++	+++	+	0	0	+++	++	+++	+	++	0
1.14.1	Identify markers	+	+	+	0	0	0	0	0	0	0	++	0
1.14.2	Transfer markers to the work area	++	++	+++	0	0	0	0	0	0	0	++	0
1.14.3	Perform necessary calculations	++	+	+	0	0	0	0	0	0	0	++	0
1.14.4	Choose the screeding according to the type of concrete and the slumping	+	+	+	+	0	+	0	0	0	0	++	0
1.14.5	Choose adjustment methods according to the size of the surface to be concreted, the concrete properties and the requested evenness	+	+	+	+	0	+	+	+	+	0	++	0
1.14.6	Apply surface evaporation retarders to ensure workability depending on weather conditions	++	++	++	0	++	+	+	+	+	++	++	0
1.14.7	Grade the concrete to the specified level	++	++	+++	+	++	+	+	++	+++	++	++	0

No.	Tasks and Operations	Ground Fall Hazards	Fall-from-Height Hazards	Ergonomic Hazards	Chemical Hazards – Gases and Fumes	Chemical Hazards – Liquids and Fog	Chemical Hazards – Dust and Smoke	Electrical Hazards	Noise Hazards	Mechanical Hazards	Environmental Hazards	Stress-Related Hazards	Fire Hazards
1.14.8	Obtain the desired tolerances	++	++	++	+	+	+	+	++	++	++	++ +	0
1.15	Clear and clean the work area												
1.15.1	Tour the area systematically to that effect	++	++	++	++	+	+	+	+	+	+	++	0
1.16	Write reports												
	Task 2 – Finish concrete on various surfaces												
2.1	Inquire about the status of work done by the previous team												
2.1.1	Check the concrete's condition	++	++	++	+	+	+	+	+	+	+	++	0
2.1.2	Obtain information from the foreman about the pour and the specific points to pay attention to	+	+	+	+	+	+	+	+	+	++	++ +	0
2.1.3	Check the condition and availability of necessary finishing equipment	++	++	++	+	+	+	+	+	+	+	++ +	0
2.1.4	Put the equipment in place on time for the start of finishing work	+++	+++	+++	++	+	+	+	+	+	+	++ +	0
2.2	Even out the concrete surface by hand												
2.2.1	Prepare the surface	++	++	+++	+	++	++	+	+	+	++	++	0
2.2.2	Apply surface evaporation retarders to ensure workability depending on weather conditions	++	++	+++	+	+++	+	+	+	+	+	++ +	0
2.2.3	Evaluate the surface's condition	++	++	++	+	++	++	+	+	+	+	++	0
2.3	Machine float the concrete												
2.3.1	Prepare the surface	+	+	+++	++	+	+	+	++	++	++	++	0
2.3.2	Apply surface evaporation retarders to ensure workability depending on weather conditions	++	++	+++	+	+++	+	+	+	+	+	++ +	0
2.3.3	Evaluate the surface's condition	+	+	++	++	++	++	+	++	++	++	++ +	0
2.3.4	Set the machine's parameters	+	+	+++	++	++	++	0	++	++	++	++ +	0
2.3.5	Apply surface hardeners if necessary	++	++	++	++	++	++	+	+	++	++	++ +	0
2.3.6	Use a jointer to shape joints according to the type of finish desired	++	++	+++	++	++	++	+	++	++	++	++	0

No.	Tasks and Operations	Ground Fall Hazards	Fall-from-Height Hazards	Ergonomic Hazards	Chemical Hazards – Gases and Fumes	Chemical Hazards – Liquids and Fog	Chemical Hazards – Dust and Smoke	Electrical Hazards	Noise Hazards	Mechanical Hazards	Environmental Hazards	Stress-Related Hazards	Fire Hazards
2.4	Apply concrete locally by hand												
2.4.1	Prepare the surface	++	++	+++	+	++	+	+	+	+	+	++	0
2.4.2	Shape the slab perimeter	++	++	+++	+	++	+	+	+	+	+	++	0
2.5	Trowel the concrete												
2.5.1	Hand trowel the concrete	++	++	+++	+	++	+	+	+	+	+	++	0
2.5.2	Trowel concrete by machine	++	++	+++	++	++	+	+	++	++	+	++	0
2.6	Apply surface treatments with plastic and hardened concrete												
2.6.1	Prepare the surface	++	++	++	++	++	+	+	+	+	++	++	0
2.6.2	Spread products on the concrete surface	++	++	++	++	++	+	+	++	++	++	++	0
2.6.3	Evaluate the surface's condition, for example firmness	++	++	++	++	++	+	+	+	++	++	++	0
2.7	Texture the concrete surface												
2.7.1	Prepare the surface	++	++	+++	+	+	+	+	+	+++	++	++	0
2.7.2	Use various texturing techniques	+++	+++	+++	+	+	+	++	++	+++	++	++	0
2.8	Expose aggregate												
2.8.1	Prepare the surface	++	++	+++	+	++	++	+	++	++	++	++	0
2.8.2	Spread coarse aggregate randomly or according to desired patterns (exposed aggregate)	++	++	+++	0	0	+	+	++	++	++	++	0
2.8.3	Apply a mix with incorporated aggregate	++	++	+++	+	+	++	+	+	++	++	++	0
2.8.4	Embed coarse aggregate completely	++	++	+++	+	++	++	+	++	++	++	++	0
2.8.5	Expose the aggregate by washing, stripping or sandblasting	+++	+++	+++	+	++	++	++	+++	++	++	++	0
2.9	Stamp the concrete surface												
2.9.1	Prepare the surface	++	++	++	+	+	+	+	++	++	++	++	0
2.9.2	Even out the surface	++	++	+++	+	+	+	+	++	++	++	++	0
2.9.3	Apply mould release agents	++	++	+++	+	++	++	++	++	+++	++	++	0
2.9.4	Use various stamping techniques	++	++	+++	+	++	++	++	+++	++	++	++	0
2.10	Concrete curing humidification												
2.10.1	Cover the concrete with water	++	+++	+++	0	+	0	+	+	+	+	++	0
2.10.2	Apply wet burlap, polyethylene or another appropriate product	++	+++	+++	0	+	0	+	+	+	+	++	0

No.	Tasks and Operations	Ground Fall Hazards	Fall-from-Height Hazards	Ergonomic Hazards	Chemical Hazards – Gases and Fumes	Chemical Hazards – Liquids and Fog	Chemical Hazards – Dust and Smoke	Electrical Hazards	Noise Hazards	Mechanical Hazards	Environmental Hazards	Stress-Related Hazards	Fire Hazards
2.11	Use chemicals to cure concrete	++	++	++	++	+++	++	++	0	++	++	++ +	0
2.12	Control concrete cracking												
2.12.1	Saw the control joints on hardened and plastic concrete	++	++	+++	++ +	+++	++ +	+	++	++	++	++	0
2.12.2	Seal the control joints	++	++	+++	++	+++	++	+	++	++	++	++	0
2.13	Install waterproofing membranes and products												
2.13.1	Prepare the surface	++	++	++	+	0	++	0	+	++	++	+	++
2.13.2	Put the waterproofing membrane in place	+++	+++	+++	+	+	+	0	++	++	++	+	++ +
2.13.3	Apply a waterproofing product	++	++	+++	+	+	+	0	++	++	++	+	++
2.13.4	Install insulation, protection and drainage panels if necessary	+++	+++	+++	+	+	+	0	++	++	++	+	++
2.14	Protect the concrete												
2.14.1	Maintain the desired temperature	+	+	+	++ +	+	+	+	++	+	++ +	++	++ +
2.14.2	Put physical protection in place	+++	+++	+++	+	0	+	0	++	++	++	++	0
2.14.3	Prevent public access	++	++	+++	+	0	0	0	0	0	0	+	0
2.15	Clear and clean the work area												
2.15.1	Tour the area systematically to that effect	++	++	++	+	+	+	+	+	+	+	+	+
2.16	Write reports	0	0	0	0	0	0	0	0	0	0	++	0
Task 3 – Repair concrete on various surfaces													
3.1	Inspect the concrete to detect defects												
3.1.1	Determine the cause of defects	++	++	++	0	0	+	+	++	++	+	+	0
3.1.2	Determine the repair method and materials according to stresses, durability and conditions of use	++	++	++	0	0	+	+	++	++	+	++	0
3.1.3	Delimit and mark areas to be repaired	++	++	++	0	0	++	+	++	++	+	++	0
3.2	Remove materials												
3.2.1	Determine the area and thickness of materials to be removed	++	++	++	0	0	+	+	++	++	+	++	0
3.2.2	Recognize hazards posed by electricity, machines, systems integrated in the slabs and structure of the area to be repaired	0	0	0	0	0	0	++	+	++	+	+	0

No.	Tasks and Operations	Ground Fall Hazards	Fall-from-Height Hazards	Ergonomic Hazards	Chemical Hazards – Gases and Fumes	Chemical Hazards – Liquids and Fog	Chemical Hazards – Dust and Smoke	Electrical Hazards	Noise Hazards	Mechanical Hazards	Environmental Hazards	Stress-Related Hazards	Fire Hazards
3.2.3	Protect and insulate the concrete removal area	++	++	++	0	0	+	+	+	++	+	+	0
3.2.4	Use removal equipment	++	++	++	0	0	++	++	++	++	+	++	0
3.2.5	Dispose of removed materials	++	++	+++	0	0	++	+	++	++	+	0	0
3.3	Prepare the repair surface												
3.3.1	Use surface preparation equipment to obtain the required profile (surface roughness)	++	++	+++	+	+	++	+	++	++	+	+	0
3.3.2	Clean the surfaces	++	++	++	0	0	++	0	+	+	+	0	0
3.3.3	Condition surfaces according to the bonding method (SSD ¹⁶ , bonding agent, etc.)	++	++	++	+	+	++	0	+	+	+	+	0
3.4	Repair according to the chosen method												
3.4.1	Mix the repair materials	+	+	+	+	+	++	+	++	++	+	0	0
3.4.2	Apply the repair materials	++	++	++	+	+	++	+	++	++	+	0	0
3.4.3	Finish the surfaces	++	++	++	+	+	++	+	++	++	+	0	0
3.5	Cure the concrete according to the repair method												
3.5		0	0	0	+	+	+	0	0	0	0	0	0
3.6	Clear and clean the work area												
3.6.1	Tour the area systematically to that effect	++	++	++	0	0	0	0	0	0	0	0	0
3.7	Write reports												
3.7		0	0	0	0	0	0	0	0	0	0	0	0
Task 4 – Apply different finishes on various surfaces													
4.1	Prepare and clean surfaces												
4.1.1	Calculate and bring the equipment	++	++	++	0	0	+	+	++	++	+	0	0
4.1.2	Mix	++	++	++	+	+	+	+	++	++	+	+	0
4.1.3	Apply the cleaning product	++	++	++	+	+	+	+	++	++	++	++	0
4.1.4	Neutralize the cleaning product, if applicable	++	++	++	+	+	+	+	+	++	++	++	0
4.2	Place parging on vertical surfaces												
4.2.1	Calculate and bring the equipment	++	++	++	0	+	+	+	+	+	+	+	0
4.2.2	Mix and stain parging	++	++	+++	+	++	+	+	++	++	+	+	0
4.2.3	Determine the setting time	0	0	0	0	0	0	+	0	+	+	++	0
4.2.4	Apply finishing methods	++	++	++	+	+	+	+	+	++	++	++	0
4.2.5	Give texture to parging	++	++	++	+	0	+	+	++	++	+	++	0

20. SSD: saturated surface dry.

No.	Tasks and Operations	Ground Fall Hazards	Fall-from-Height Hazards	Ergonomic Hazards	Chemical Hazards – Gases and Fumes	Chemical Hazards – Liquids and Fog	Chemical Hazards – Dust and Smoke	Electrical Hazards	Noise Hazards	Mechanical Hazards	Environmental Hazards	Stress-Related Hazards	Fire Hazards
4.3	Apply surface treatments to hardened concrete												
4.3.1	Ensure the presence of equipment and products	++	++	++	0	0	0	+	+	+	+	+	0
4.3.2	Clear the work area	++	++	++	0	0	0	+	++	++	+	0	0
4.3.3	Allocate tasks within the team	++	++	++	0	0	0	0	0	0	0	0	0
4.3.4	Install transition joints	++	++	++	0	0	0	+	+	+	+	0	0
4.3.5	Apply the products	++	++	++	+	+	+	+	++	++	+	+	0
4.3.6	Verify work quality	++	++	++	0	+	+	+	+	+	+	+	0
4.4	Abrade a surface to obtain a textured or polished architectural finish												
4.4.1	Check the concrete's condition and bring correctives if necessary	++	++	++	+	+	+	+	++	++	+	+	0
4.4.2	Determine the type of abrasive	++	++	++	+	+	+	0	+	+	+	0	0
4.4.3	Recognize the required degree of finishing	+	+	+	+	+	+	0	+	+	+	++	0
4.5	Apply seamless coatings												
4.5.1	Apply the primer	++	++	++	+	++	++	+	++	++	+	+	0
4.5.2	Mix and stir the product	++	++	++	+	++	++	+	++	++	++	++	0
4.5.3	Apply successive coatings at appropriate times	++	++	+++	+	0	++	+	++	++	++	++	0
4.6	Apply bonded and non-bonded toppings to the concrete												
4.6.1	Determine whether or not the topping needs to be bonded	++	++	++	+	+	+	0	0	0	+	+	0
4.6.2	Apply toppings with grout, premixed coating and concrete	++	++	++	+	++	++	0	+	+	+	+	0
4.6.3	Install concrete toppings reinforced by anchors or bonding agents	++	+++	+++	+	+	+	+	++	++	+	+	0
4.6.4	Cure the toppings	+	+	+	+	+	+	0	+	+	+	+	0
4.7	Apply acid stain												
4.7.1	Prepare the surface	+	+	+	+	++	+	+	+	++	+	++	0
4.7.2	Apply acid and neutralize it	+	+	+	++	++	++	+	+	++	+	++	0
4.7.3	Apply protective sealants to acid-stained surfaces	++	++	++	++	++	++	+	+	++	+	++	0
4.8	Apply grout												
4.8.1	Choose the type of grout and the application method	+	+	+	+	+	++	+	+	+	+	+	0
4.8.2	Prepare the surface to receive grout	++	++	++	+	++	++	++	++	++	+	++	0

No.	Tasks and Operations	Ground Fall Hazards	Fall-from-Height Hazards	Ergonomic Hazards	Chemical Hazards – Gases and Fumes	Chemical Hazards – Liquids and Fog	Chemical Hazards – Dust and Smoke	Electrical Hazards	Noise Hazards	Mechanical Hazards	Environmental Hazards	Stress-Related Hazards	Fire Hazards
4.8.3	Mix the grout, stain it and perform tests	++	++	++	+	++	++	+	++	++	++	++	0
4.8.4	Apply various types of grout	++	++	++	+	++	++	++	++	++	++	++	0
4.9	Finish apparent surfaces with mortar												
4.9.1	Complete the contour and ensure the desired finish	++	++	++	+	+	+	+	+	++	+	++	0
4.9.2	Shape the surfaces as required	++	++	++	+	+	+	+	+	++	+	++	0
4.10	Do shotcrete work												
4.10.1	Install the wire mesh, vapour barrier and insulation, if applicable	++	++	+++	+	+	+	++	++	++	+	+	0
4.10.2	Spray the concrete up to the required thickness	++	++	++	++	++	++	++	++	++	++	+	0
4.10.3	Finish the surface according to technical characteristics	++	++	++	+	++	++	++	++	++	++	+	0
4.10.4	Cure the concrete	+	+	+	+	+	+	+	+	+	+	++	0
4.11	Clear and clean the work area												
4.11.1	Tour the area systematically to that effect	++	++	+	+	+	+	+	+	+	+	+	0
4.12	Write reports	0	0	0	0	0	0	0	0	0	0	++	0

admixture

material other than water, aggregates and portland cement that is used as an ingredient of concrete and is added to the mix.

aggregate

granular material, such as sand, gravel, crushed stone or recycled concrete aggregates used with cement to produce concrete.

bleed water

excess water which rises to the surface of concrete.

bull float

a tool comprising a large, flat, rectangular piece of wood or magnesium attached with a rotating pivot to a long handle used to smooth unformed surfaces of freshly placed concrete.

burlap

a coarse fabric of jute, hemp, or less commonly flax, for use as a water-retaining cover for curing concrete surfaces.

cementitious materials

substances that have cementing properties (set and harden in the presence of water).

concrete

composition of a binding medium and aggregate; commonly consists of a mixture of cement, aggregate and water in varying proportions; mixture is worked into a plastic state and gains hardness through the hydration of water with the cement.

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.

17. Human Resources and Skills Development Canada, *Occupational Analyses Series: Concrete Finisher*, Ottawa, 2006.

construction joint

the junction of two successive placements of concrete, typically with a keyway or reinforcement across the joint.

control joint

a joint cut to control cracking in concrete.

crazing

small cracks in a concrete surface caused by uneven contraction during hydration.

curing

the maintenance of a satisfactory moisture content and temperature in concrete during its early stages so that desired properties may develop.

expansion joint

an isolation joint that allows for expansion and contraction.

exposed aggregate

surface texture where cement paste is washed away from concrete slab surface to expose durable aggregates for the riding surface.

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.

form

a temporary structure or mould for the support of concrete while it is setting and gaining sufficient strength to be self-supporting.

grout

a mixture of cementitious material and water, with or without aggregate, proportioned to produce a pourable consistency without segregation of the constituents.

hardener

a material applied to concrete floors to reduce wearing and dusting.

honeycomb

concrete that, due to lack of the proper amount of fines or vibration, contains abundant interconnected large voids or cavities.

isolation joint

a pavement joint that prevents bonding of surfaces.

overlay

the addition of a new material layer onto an existing pavement surface.

plastic

a condition of freshly mixed concrete such that it is readily remoldable, workable and cohesive.

retarder

a product that delays the setting of concrete.

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.

saw cut

a cut in hardened concrete utilizing diamond or silicone-carbide blades or discs.

screeding

the operation of forming a surface by the use of screed guides or a strike off.

segregation

separation of various ingredients within a concrete mix.

slump

a measure of consistency of freshly mixed concrete.

spalling

surface spalling and chipping of concrete.

topping

a layer of concrete placed to form a floor surface on a concrete base.

wet screed

placing concrete on finish grade across two known points of elevation (called wet screeds).