Carpenter-joiner

Occupational Analysis Report

March 2011

Commission
de la construction
du Québec

The purpose of this report is to describe as accurately as possible the trade of carpenter-joiner 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 competencies 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 present report does not bind the Commission in any way. It has no legal effect and is meant as a reflection of discussions held on the date of the analysis workshop.

ISBN 978-2-550-68735-1 (printed version)
ISBN 978-2-550-68736-8 (PDF)
Legal deposit – Bibliothèque et Archives nationales du Québec, 2013

PRODUCTION TEAM

The Commission de la construction du Québec wishes to thank the production team for this occupational analysis.

Direction
Jean Mathieu
Section Manager
Commission de la construction du Québec

Coordination
Doris Gagnon
Training Advisor
Commission de la construction du Québec

Thérèse Trudeau
Training Advisor
Commission de la construction du Québec

Conduct of the workshop and production of the report's validated version
Lucie Marchessault
Training Consultant

Note-taking and writing the first draft of the report
Michel Caouette
Training Consultant

Production support
Alyre Thireau
Teacher, Centre de formation Pierre-Dupuy
Marie-Victorin School Board

Yves Rondeau
Training Advisor
Commission de la construction du Québec

Secretarial Work and Page Layout
Sylvie Brien
Commission de la construction du Québec

Translation
Traductions Globe Translations

The masculine gender is used generically in this document to facilitate reading.

ACKNOWLEDGEMENTS

Production of the present report was made possible by the collaboration and participation of many people. The Commission de la construction du Québec (CCQ) is grateful for the quality of the information provided by those consulted, and gives special thanks to the carpenter-joiners who so generously agreed to participate in the analysis workshop regarding their trade. The persons consulted are:

Jean Boulanger
Carpenter-joiner
Société de construction GÉRATEK
Sherbrooke

Pierre Brisson
Carpenter-joiner
Ross & Anglin
Montreal

Serge Caron
Carpenter-joiner
Rénovations RBC
Québec City

Camil Delage
Carpenter-joiner
Hidalgo Construction
Dorval

Yvan Dostie
Carpenter-joiner
Construction Longer
Sherbrooke

Jean-Pierre Filteau
Carpenter-joiner
Construction Longer
Sherbrooke

Paul-Émile Grondin
Carpenter-joiner
Construction Boudreault & Fils
Dolbeau-Mistassini

Jacques Paquin
Carpenter-joiner
Construction Immo 9 & Associés
Laval

Michel Rompré
Carpenter-joiner
La Compagnie de construction et de développement Crie (CCDC)
Dolbeau-Mistassini

Sylvio Sauriol
Carpenter-joiner
Constructions Sylvio

La Minerve

Mario Savard
Carpenter-joiner
Ronam Construction
Saint-Nicolas

Réjean Thomas
Carpenter-joiner
Construction Gilles Paquette
Mont-Laurier

Denis Tremblay
Carpenter-joiner
Moreau Électrique
Rouyn-Noranda

France Turcotte
Carpenter-joiner
Construction Donald Rancourt
Terrebonne

The following persons attended the meeting as observers:

Manon Chiasson
Director of the Training Sector
“Bâtiment et travaux publics”
Ministère de l’Éducation, du Loisir et du Sport

Jonathan Bélair
Competency Eveluation Writer
Commission de la construction du Québec

Yves Rondeau
Training Advisor
Commission de la construction du Québec

The CCQ extends special thanks to the Commission de la santé et de la sécurité du travail as well as ASP Construction and its representative, Ms. Louise Lessard, for their collaboration in producing the occupational health and safety grid appended to the present report.

APPROVAL

This occupational analysis report on the carpenter-joiner trade and its specialties was read and approved by Commission de la construction du Québec authorities and the following persons, on the dates mentioned below:

Carpenter-joiner Professional Subcommittee

March 28, 2012
Approval of the carpenter-joiner analysis report

Paul-André Reinhardt
Jean St-Onge
Association des constructeurs du Québec

Vincent Gagné
Association des constructeurs de routes et grands travaux du Québec

Gérald Picard
Centrale des syndicats démocratiques – Construction

Bertrand Gauthier
Confédération des syndicats nationaux – Construction

Claude Trudeau
Conseil provincial du Québec des métiers de la construction – International

Claude Caron
Fédération des travailleurs et travailleuses du Québec – Construction

Pierre St-Onge
Syndicat québécois de la construction

April 26, 2012
Approval of the three specialties' annexes

Jean St-Onge
Association des constructeurs du Québec

Vincent Gagné
Association des constructeurs de routes et grands travaux du Québec

Stéphane Brien
Association provinciale des constructeurs d'habitations du Québec

Gérald Picard
Centrale des syndicats démocratiques – Construction

Bertrand Gauthier
Confédération des syndicats nationaux – Construction

Claude Trudeau
Conseil provincial du Québec des métiers de la construction – International

Claude Caron
Fédération des travailleurs et travailleuses du Québec – Construction

Pierre St-Onge
Syndicat québécois de la construction

Committee on Vocational Training in the Construction Industry

December 20, 2012

Board of Directors

February 6, 2013

TABLE OF CONTENTS

List of Tables

INTRODUCTION

In early 2009, the CCQ's Direction de la formation professionnelle launched a large-scale operation to review the occupational analyses[1] of all construction industry trades[2].

The CCQ undertook this operation for many reasons, particularly the following:

- 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 qualification 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 updating the occupational analyses in order to obtain a current and complete provincial profile of the various trades.

The analysis of the carpenter-joiner trade belongs to this context[3]. Its purpose is to describe the trade as currently practiced by journeymen 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 January 19, 20 and 21, 2011 and during the supplementary days dedicated to the specialties (Annex 3).

This analysis aims to draw a portrait (tasks and operations) of the trade and its entry requirements, 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 carpenter-joiners. A special effort was made to include in this report 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 "work situation analyses".
2. The terms "profession" and "trade" are considered synonymous.
3. This occupational analysis was conducted according to 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 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 workforce in the construction industry (Schedule A, section 1), the term “carpenter-joiner” means:

> […] any person who does wood carpentry work, joinery work, work involving the assembly, erection and repair of wood or metal items such as:
>
> a) concrete forms including forms for footings, walls, piers, columns, beams, slabs, stairs, roads, sidewalks and curbs at ground level and form ties;
> b) insect screens, door and window frames, doors, windows, sills, weatherstripping, curtain walls, and clapboard, aluminium or composition siding;
> c) metal partitions;
> d) shingles, unwelded and unhooked sheet metal connected thereto, sandstone tiles;
> e) insulation in batt, roll or panel form, fastened by means of nails, staples or glue;
> f) wallboards;
> g) wood or other composition lathing;
> h) steel studding;
> i) nailing metal corner beads and mouldings;
> j) cupboards, counters and shelving (interchangeable or fixed), including the application of plastic laminates or other analogous coverings;
> k) acoustical tile, including mouldings;
> l) bowling alleys and accessories;
> m) parquet flooring, including sanding and finishing;
> n) synthetic lawn material;
> o) the installation, hoisting and handling of: steel sheet-piling, shoring piles, wales, braces, struts, bearing piles and temporary steel or timber stays driven into the ground.
>
> (…)[4]
>
> Performance of the work described in the first and third paragraphs includes trade-related handling for the purposes of immediate and permanent installation.

The occupational analysis workshop participants question the relevance of including synthetic lawn material in the definition of the trade.

4. The definition of the trade also includes the definition of the flooring-layer-sander specialty described in Annex 3, “Flooring-Layer-Sander.”

1.2 JOB TITLES

The “carpenter-joiner” title is the only one used for describing the trade; so that title is the one used in the present report.

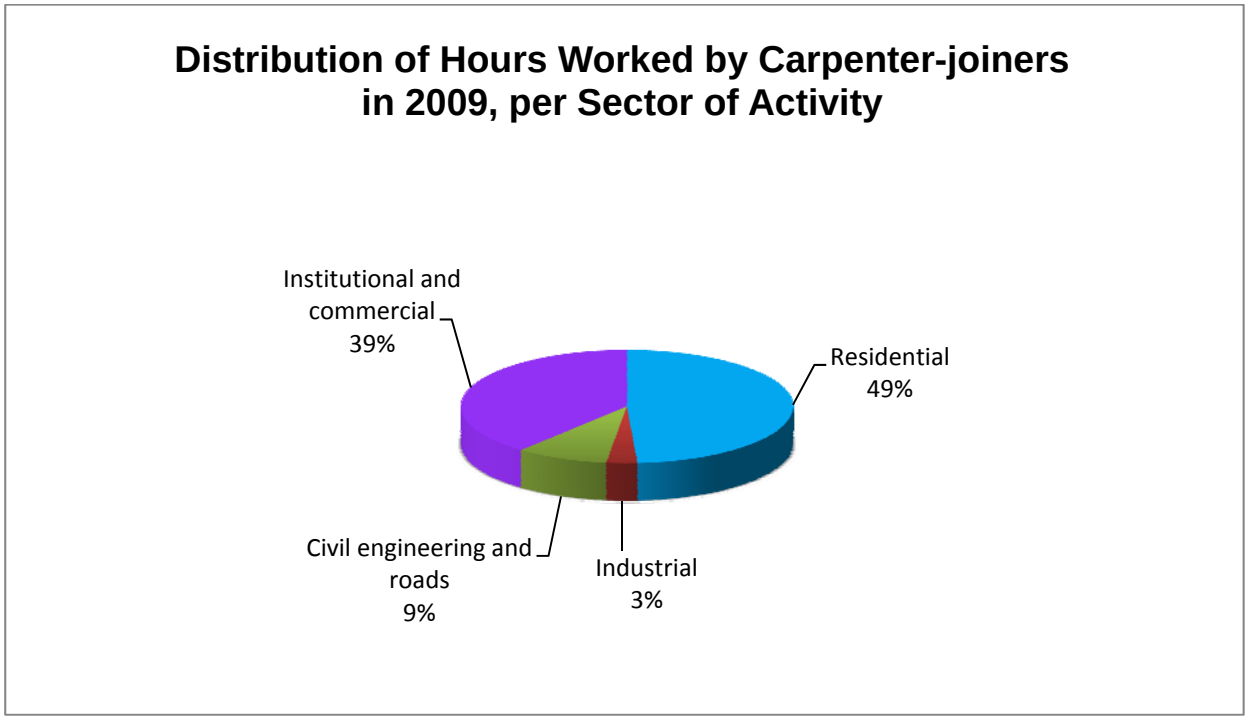
Although the “carpenter-joiner” title is clear and precise, a few occupational analysis workshop participants pointed out that some of their tasks are confused at times with those of cabinetmakers, particularly regarding the installation of integrated furniture. However, that situation is not widespread.

1.3 SECTORS OF ACTIVITY

Carpenter-joiners are active in the in the four sectors of the construction industry:

- civil engineering and roads;
- industrial;
- institutional and commercial;
- residential.

The workload of carpenter-joiners[5] per sector of activity is as follows:



Following the presentation of the above diagram, we asked the participants to estimate the distribution of their working hours in the four sectors of activity, over their entire career as carpenter-joiners in the construction industry. The table below presents the situation described by the carpenter-joiners attending the analysis workshop, in comparison with the situation for all workers in the trade.

Table 1.1 Distribution of Hours Worked in Each Sector of Activity

Sector of Activity	Hours Worked in Each Sector	
	All Carpenter-joiners in Quebec	Carpenter-joiners Attending the Meeting
Residential	49%	34%
Institutional and commercial	39%	42%
Civil engineering and roads	9%	16%
Industrial	3%	8%

5. Commission de la construction du Québec, *Carrières construction*, 2010-2011 edition.

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

Carpenter-joiners in the construction industry are subject to:

- the *Act respecting Labour relations, vocational training and workforce management in the construction industry* (R.S.Q., c. R-20);
- the *Regulation respecting the vocational training of workforce in the construction industry* (R-20, r.6.2*);*
- the four sector-based collective *agreements* for the *construction industry*;
- the *National Building Code – Canada* (NBC);
- the *Quebec Building Code*, Chapter I – Building;
- the *Act Respecting Occupational Health and Safety* (R.S.Q., c.S-2.1);
- the *Safety Code for the construction industry* (R.Q. c. S-2.1, r.6);
- municipal by-laws, if applicable.
- safety standards specific to certain clients.

1.6 WORKING CONDITIONS[6]

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

Salary

In 2009, the average annual salary of a journeyman having worked at least 500 hours was $48,018. During that period, 72% of journeymen had accumulated 500 hours.

A journeyman's hourly wage varies according to the construction industry sector in which the work is done. In October 2010, a journeyman's daytime hourly wage was as follows:

- Industrial, institutional and commercial, civil engineering and roads: $32.86
- Residential (heavy): $32.84
- Residential (light): $29.62

Vacations and time off

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.

6. The general data on working conditions are taken from the 2010-2013 collective agreements of the four construction industry sectors, and from the following document, published by the Commission de la construction du Québec: *Carrières construction*, 2010-2011 edition.

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.

Physical requirements

The work generally requires a good physical condition and the ability to adapt to weather conditions (heat, cold, rain, snow). A carpenter-joiner mainly works upright and often crouched or bent over, which requires endurance and suppleness. The pace of work is sustained, so a carpenter-joiner must be able to maintain it. In addition, because he may have to lift somewhat heavy loads, he must have good physical strength. However, it is pointed out that efficient tools and working methods make it possible to face the various situations encountered. According to the participants, dexterity is important, particularly in doing finishing work.

Finally, it is noted that a carpenter-joiner subject to vertigo would have difficulty working from heights.

Work schedules

A 40-hour work week from Monday to Friday is the general rule in all construction industry sectors. Usually, the daily limit is 8 hours; however, the four sectoral collective agreements provide a specific rule for carpenter-joiners that raises that limit to 10 hours.

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.[7]

Carpenter-joiners generally work in the daytime, for 40 hours a week. However, depending on the types of construction sites and certain times of the year, they may have to work in the evening, at night or overtime if necessary, for example in the evening or at night in stores or institutional centres. At times they may have to work outside their region; such work may last a few days to a few months.

1.7 WORK ORGANIZATION

For construction, repair or renovation work, carpenter-joiners mainly work outdoors on a construction site or indoors, depending on the construction site's development or the nature of the work. In the construction field, many trades work together, and work takes place in an often noisy environment. Carpenter-joiners regularly have to work alongside most trades found on a construction site. They are also occasionally in contact with the contractor and clients. Carpenter-joiners generally work under the supervision of a team leader or foreman.

1.8 JOB MARKET ENTRY CONDITIONS[8]

To obtain the competency certificate-apprentice in the trade, candidates must present to the CCQ the original version of an academic transcript or apprenticeship transcript attesting that they have passed a course of study and obtained a diploma recognized by the CCQ, i.e., the DEP in the carpenter-joiner trade, as well as a guarantee of employment from an employer registered with the CCQ for at least 150 hours within a period of not more than three consecutive months.

7. However, the regular working hours of any employee assigned to certain types of work in the civil engineering and roads sector are 45 hours a week from Monday to Friday, with a daily limit of 9 or 10 hours from Monday to Thursday and of 5 hours on Friday.
8. For a complete list of trade entry conditions, see the Act Respecting Labour Relations, Vocational Training, and Workforce Management in the Construction Industry (R.S.Q., c. R-20). The CCQ's website can also be consulted, at: http://www.ccq.org/E_CertificatsCompetence.aspx?sc_lang=en&profil=DevenirTravailleur.

Although the construction industry favours graduates for access to the trade, labour shortages may at times make it necessary for the CCQ to admit candidates without a diploma. 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 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.

The apprentice carpenter-joiner must have completed three apprenticeship periods of 2,000 hours each (6,000 hours total) in order to be eligible for the provincial qualification examination that leads to obtaining the competency certificate-journeyman for the trade. Credits are paid into the apprenticeship record book of a carpenter-joiner who has obtained his diploma.

Moreover, certain characteristics are sought by employers hiring new carpenter-joiners. The following list presents the main characteristics, in the order in which they were mentioned by the analysis workshop participants, and not in order of importance:

- work experience;
- versatility;
- patience;
- punctuality;
- autonomy and initiative;
- quick thinking;
- neat personal appearance.

1.9 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[9], the proportion of women active in the carpenter-joiner trade was 0.7% in 2009 (263 women out of 38,396 carpenter-joiners). In the participants' view, the main reason that very few woman practice the trade is the necessity of carrying heavy loads (materials), which requires substantial physical strength. It is noted that physical strength is particularly required in the following situations:

- formwork;
- work in the commercial and industrial sector;
- teamwork to lift or move heavy loads.

However, the participants consulted do not see any reason that would prevent a woman from practicing the trade. The necessary physical strength is not excessive, and the effectiveness of appropriate tools and techniques has been demonstrated.

1.10 CAREER PROSPECTS

The participants emphasize that the residential sector offers the most opportunities for learning the basics of the trade, because that sector is "the basis for everything."

Salaries are uniform from one employer to another, so salary increases are limited to the terms of collective agreements. It is also observed that there is no employment stability for most carpenter-joiners.

9. Commission de la construction du Québec, *Carrières construction*, 2010-2011 edition.

With experience and depending on their skills, carpenter-joiners may be entrusted with greater responsibilities within a company, and may become team leaders, foremen, superintendents, project managers or contractors.

1.11 DEVELOPMENT OF THE TRADE

Like all industrial sectors developing within a social and economic environment, the construction industry has seen changes over the years. For example, while the aging of the population and the low birthrate have major effects on the demand for workers, trade globalization favours competition and productivity, as well as the introduction of new materials and environmental standards. Those transformations have significant effects.

The participants expect changes in the years to come, and they already observe the following ones in the trade:

- the new generation does not prioritize work in the same way, and experienced workers have to adapt to this;
- productivity spurred by competition leads to specialization in certain tasks of the trade, notably regarding integrated furniture;
- new tools have improved productivity. Examples are laser, electric and pneumatic tools;
- prefabricated elements are more widespread, particularly for framing systems and forms. This favours productivity, but reduces the number of hours worked in construction;
- subcontracting is more frequent, which can lead to greater specialization and make it more complicated for beginners to learn the trade;
- in the current context of strong competition, everything centres on productivity – unfortunately, to the detriment of quality, as the participants insisted. This situation could lead to more supervision and inspections;
- new materials appear regularly, notably in interior and exterior finishing;
- new trends tend to replace metal with engineered wood in building structures.

1.12 IMPACT OF ENVIRONMENTAL STANDARDS ON THE PRACTICE OF THE TRADE

Generally, the participants said they were more aware of environmental protection and the application of related standards. In this regard, the participants noted the following:

- with the green shift, carpenter-joiners must pay special attention to debris thrown in containers. Certain waste materials should not be mixed with others;
- new standards such as Novoclimat and the LEED (*Leadership in Energy and Environmental Design*) certification have effects on the materials and methods used.

2. WORK DESCRIPTION

2.1 TASKS AND OPERATIONS

List of tasks

The following list presents the main tasks performed by carpenter-joiners. The order in which the tasks are presented does not necessarily reflect their importance in the specialty.

	Task 1	Lay out a work or building
Concrete former specialty (Annex 3)	Task 2	Build forms for footings
	Task 3	Build forms for concrete walls
	Task 4	Build forms for concrete columns
	Task 5	Build forms for concrete beams, slabs and stairs
	Task 6	Build wood floor framing systems
	Task 7	Build exterior wood or metal wall framing systems
	Task 8	Build roundwood and log walls
	Task 9	Build a roof framing system and cover a pitched roof
	Task 10	Install outer doors and windows
	Task 11	Thermally insulate walls and ceilings
	Task 12	Build fixed interior divisions
	Task 13	Do indoor finishing work
	Task 14	Assemble removable divisions
	Task 15	Build wooden staircases
	Task 16	Install integrated furniture
	Task 17	Do outdoor finishing work
	Task 18	Install suspended ceilings
	Task 19	Do repair work
	Task 20	Do renovation work
	Task 21	Build and erect scaffolds
Flooring-layer-sander specialty (Annex 3)	Task 22	Install wood or composite parquet flooring
	Task 23	Finish wood or composite parquet flooring
Deep foundation layer specialty (Annex 3)	Task 24	Perform pile-driving related activities
	Task 25	Shore up retaining walls[10]
	Task 26	Put a diaphragm or mud wall in place
	Task 27	Put steel sheet piles in place

10. It should be noted that shoring is not an activity reserved for carpenters and is performed by unskilled workers.

Table of tasks and operations

During the workshop, a table of tasks and operations produced by carpenter-joiners was submitted to the participants. Following discussions, changes were made to the table. The final version is presented in the following pages.

Table 2.1 Tasks and Operations

TASKS	OPERATIONS					
1. **LAY OUT A WORK OR BUILDING**	1.1 Interpret the plans	1.2 Locate survey markers	1.3 Build and install batter boards	1.4 Draw the lines of the building or work	1.5 Place the digging boundaries	1.6 Check excavation and utility levels
2. **BUILD FORMS FOR FOOTINGS**	2.1 Learn about the work to be done	2.2 Draw the footing lines	2.3 Prepare the forms	2.4 Draw the level pour line	2.5 Prepare and fasten templates for the reinforcing steel and anchors	2.6 Prepare the passage of the building's mechanical elements
	2.7 Install keys and gaskets and check the stays	2.8 Monitor the forms during the pour	2.9 Strip the footing forms and store the materials			
3. **BUILD FORMS FOR CONCRETE WALLS**	3.1 Learn about the work to be done	3.2 Draw the wall lines	3.3 Assemble panels, ties and, if applicable, spacers	3.4 Put in place the false frames of openings	3.5 Double the panels	3.6 Install the sill or anchors
	3.7 Align the formwork and shore it up	3.8 Install walkways, railings and accesses, if applicable	3.9 Prepare and fasten anchoring templates	3.10 Check the assemblies	3.11 Monitor the forms during the pour	3.12 Strip the forms and store the materials
4. **BUILD FORMS FOR CONCRETE COLUMNS**	4.1 Learn about the work to be done	4.2 Draw the location of columns on the concrete base/slab	4.3 Install base flanges, if applicable	4.4 Assemble the form panels	4.5 Put the forms in place	4.6 Surround and shore up the forms
	4.7 Check the assemblies	4.8 Make cleaning doors, if applicable	4.9 Monitor the forms during the pour	4.10 Strip the forms and store the materials		

TASKS	OPERATIONS					
5. **BUILD FORMS FOR CONCRETE BEAMS, SLABS AND STAIRS**	5.1 Learn about the work to be done	5.2 Draw the location of beams, slabs, mechanical shafts and stairs on the footing	5.3 Install shoring systems	5.4 Place small beams (stringers and joists)	5.5 Assemble beam and floor panels	5.6 Check the slab bottom's final elevation
	5.7 Complete the formwork at the perimeter of the floor and columns	5.8 Make the final adjustment to the perimeter's shoring and elevation	5.9 Oil the panels, if applicable	5.10 Prepare and install expansion joints (and pour-stop joints)	5.11 Monitor the forms during the pour	5.12 Strip, shore up again and store the materials
6. **BUILD WOOD FLOOR FRAMING SYSTEMS**	6.1 Interpret the plans	6.2 Check the squareness and levels of the foundation wall	6.3 Draw the location of the groundsill, beam or bearing wall	6.4 Erect the beam or bearing wall	6.5 Put the small beams (joists) in place and define the stairwell	6.6 Install the floor underlay
	6.7 Fasten the continuous links (bracings)					
7. **BUILD EXTERIOR WOOD OR METAL WALL FRAMING SYSTEMS**	7.1 Interpret the plans	7.2 Draw the location of exterior walls on the floor	7.3 Assemble the walls	7.4 Square and brace the walls	7.5 Install the gaskets	7.6 Install sheathing
	7.7 Erect, fasten and shore up the walls					

TASKS	OPERATIONS					
8. **BUILD ROUNDWOOD AND LOG WALLS**	8.1 Interpret the plan	8.2 Measure the squareness and draw contour lines	8.3 Install the gasket on the floor perimeter	8.4 Install drip flashing	8.5 Install supports	8.6 Install and anchor the first sole plate
	8.7 Sort the logs by numbering and size	8.8 Erect the walls	8.9 Groove the sides of openings to receive studs	8.10 Complete the last courses	8.11 Caulk between courses	
9. **BUILD A ROOF FRAMING SYSTEM AND COVER A PITCHED ROOF**	9.1 Interpret the plans	9.2 Mark truss locations	9.3 Complete the structure of gable trusses	9.4 Install trusses and bracings	9.5 Add roof overhangs	9.6 Install the floor underlay
	9.7 Install the covering on a pitched roof	9.8 Install parapets, ventilators, skylights and dormers				
10. **INSTALL OUTER DOORS AND WINDOWS**	10.1 Interpret the waybill of doors and windows	10.2 Identify elements according to the waybill	10.3 Place doors and windows in their openings and level them	10.4 Fasten doors and windows	10.5 Insulate the openings	10.6 Install the hardware and accessories
11. **THERMALLY INSULATE WALLS AND CEILINGS**	11.1 Interpret the plan or specifications	11.2 Install insulation between studs and joists (walls, ceilings)	11.3 Caulk the openings	11.4 Install the insulation board and vapour barrier	11.5 Apply furring and strapping	

TASKS	OPERATIONS					
12. **BUILD FIXED INTERIOR DIVISIONS**	12.1 Interpret the plan	12.2 Draw division and opening locations	12.3 Prepare materials	12.4 Assemble the components	12.5 Apply required strapping	12.6 Correct walls and ceilings, if applicable
	12.7 Install an access to the roof space (attic)	12.8 Apply the covering of ceilings and walls				
13. **DO INDOOR FINISHING WORK**	13.1 Interpret the waybill of finishes	13.2 Install inner doors, architraves and accessories	13.3 Thicken the frames of outer doors and windows	13.4 Install mouldings	13.5 Install closet shelves and support bars	
14. **ASSEMBLE REMOVABLE DIVISIONS**	14.1 Interpret the plan	14.2 Draw division locations	14.3 Install supports	14.4 Erect removable panels	14.5 Fasten tie links	14.6 Fasten finish mouldings
15. **BUILD WOODEN STAIRCASES**	15.1 Determine the type of staircase	15.2 Calculate the size of treads and risers	15.3 Draw the stair stringers	15.4 Cut the stringers	15.5 Assemble the staircase components	
16. **INSTALL INTEGRATED FURNITURE**	16.1 Interpret the workshop plan	16.2 Draw module locations on the wall	16.3 Install the modules	16.4 Install counter tops	16.5 Install doors and drawers	16.6 Install finish elements or accessories
	16.7 Complete the installation					
17. **DO OUTDOOR FINISHING WORK**	17.1 Interpret the architectural plan	17.2 Work on balconies and stairs	17.3 Install the exterior siding	17.4 Seal around openings and intersections	17.5 Cover roof overhangs	

TASKS	OPERATIONS					
18. **INSTALL SUSPENDED CEILINGS**	18.1 Interpret the plan	18.2 Define the levels	18.3 Draw perimeter lines on the wall	18.4 Draw squaring lines on the floor and reproduce them on the ceiling	18.5 Install supports	18.6 Adjust the levels
	18.7 Install tiles or other finish materials					
19. **DO REPAIR WORK**	19.1 Learn about the situation	19.2 Diagnose the problem	19.3 Suggest a solution	19.4 Acquire necessary materials, tools and equipment for the work	19.5 Repair, adjust or replace the defective components	19.6 Check the work quality
20. **DO RENOVATION WORK**	20.1 Learn about the plan or guidelines	20.2 Prepare the work area	20.3 Remove the elements to be replaced	20.4 Install new elements	20.5 Put the work area back in order	20.6 Check the work quality
21. **BUILD AND ERECT SCAFFOLDS**	21.1 Interpret the plan	21.2 Prepare the soil and materials	21.3 Install the bases	21.4 Mount the sections	21.5 Check the work quality	21.6 Have the work approved
22. **INSTALL WOOD OR COMPOSITE PARQUET FLOORING**	22.1 Learn about the work to be done	22.2 Check the floor structure and the subfloor	22.3 Prepare the surface to be covered	22.4 Apply felt paper and soundproofing, if applicable	22.5 Install the floor finish covering	
23. **FINISH WOOD OR COMPOSITE PARQUET FLOORING**	23.1 Learn about the work to be done	23.2 Prepare the surface	23.3 Sand the parquets	23.4 Clean the parquets	23.5 Stain or oil the parquets, if applicable	23.6 Varnish the parquets, if applicable

TASKS	OPERATIONS					
24. **PERFORM PILE-DRIVING RELATED ACTIVITIES**	24.1 Prepare the pile-driving equipment	24.2 Learn about the work to be done	24.3 Prepare the work	24.4 Direct pile-driving operations		
25. **SHORE UP RETAINING WALLS**	25.1 Learn about the work to be done	25.2 Direct the excavation	25.3 Place planks between piles already driven	25.4 Complete the retaining walls (soldier-pile walls)		
26. **PUT A DIAPHRAGM OR MUD WALL IN PLACE**	26.1 Control the excavation depth	26.2 Monitor the bentonite trench filling	26.3 Have the reinforcing steel cage lowered			
27. **PUT STEEL SHEET PILES IN PLACE**	27.1 Learn about the work to be done	27.2 Prepare the equipment	27.3 Ensure the positioning of sheet piles	27.4 Install the sheet piles	27.5 Drive the sheet piles	27.6 Support the cross-pieces
	27.7 Install the cross-pieces	27.8 Dismantle the structure when the work is completed				

2.2 OPERATIONS, SUB-OPERATIONS AND CLARIFICATIONS

In the following pages are presented the sub-operations related to most of the operations[11], as well as a few clarifications made by the participants.

Table 2.2 Sub-Operations and Operation Clarifications

TASK 1 LAY OUT A WORK OR BUILDING

Main fields of application

For this task, the participants identified the following main fields of application:

- residential houses;
- apartment buildings;
- industrial, commercial and institutional buildings;
- bridge or overpass (viaduct);
- reservoirs;
- miscellaneous works.

Operations	Sub-Operations	Clarifications
1.1 Interpret the plans	1.1.1 Receive the foreman's instructions 1.1.2 Locate the cardinal points 1.1.3 Find the axes 1.1.4 Locate the corners 1.1.5 Determine the angles and elevations 1.1.6 Note the sizes	
1.2 Locate survey markers	1.2.1 Check with the plan 1.2.2 Locate the surveyor stakes	
1.3 Build and install batter boards	1.3.1 Locate the building's corners 1.3.2 Choose the seat construction method 1.3.3 Apply the chosen construction method 1.3.4 Install the alignment seats away from the excavation	
1.4 Draw the lines of the building or work	1.4.1 Install lines on batter boards	

11. The sequence of operations or sub-operations may varry according to the methods, techniques or products used, or according to the company's organization.

TASK 1	LAY OUT A WORK OR BUILDING			
OPERATIONS		**Sub-Operations**		**Clarifications**
1.5	Place the digging boundaries	1.5.1 1.5.2	Measure the clearance for digging Install digging boundaries according to the nature of the soil and the excavation depth	
1.6	Check excavation and utility levels	1.6.1 1.6.2	Locate utilities (water, sewers, gas, electricity, etc.) Ensure that plan specifications are met according to the benchmark	The benchmark is often called "BM."
TASK 2	**BUILD FORMS FOR FOOTINGS**			
TASK 3	**BUILD FORMS FOR CONCRETE WALLS**			
TASK 4	**BUILD FORMS FOR CONCRETE COLUMNS**			
TASK 5	**BUILD FORMS FOR CONCRETE BEAMS, SLABS AND STAIRS**			

Annex 3, "Concrete Former," lists sub-operations and task clarifications related to formwork.

TASK 6	BUILD WOOD FLOOR FRAMING SYSTEMS			

Main fields of application

For this task, the participants identified the following main fields of application:
- floor with an ordinary structure (joists, small beams, false floors);
- floor with a laminated structure;
- removable false floor (to reduce vibrations, sound, etc.).

Operations		**Sub-Operations**		**Clarifications**
6.1	Interpret the plans	6.1.1 6.1.2	Note the sizes Check the exterior wall's type of finish	
6.2	Check the squareness and levels of the foundation wall	6.2.1	Check the diagonal	
6.3	Draw the location of the groundsill, beam or bearing wall	6.3.1 6.3.2	Locate the beam or bearing wall Draw lines while taking the exterior finish into account	

TASK 6	BUILD WOOD FLOOR FRAMING SYSTEMS			
Operations		**Sub-Operations**		**Clarifications**
6.4	Erect the beam or bearing wall	6.4.1 6.4.2 6.4.3	Draw the bearing wall, if necessary Build the bearing wall, if applicable Prepare, install and level the beam	The beam may be installed manually, but more often by means of the boom truck.
6.5	Put the small beams (joists) in place and define the stairwell	6.5.1 6.5.2 6.5.3 6.5.4 6.5.5 6.5.6 6.5.7 6.5.8	Install joist hangers, if necessary Mark the stairwell Check the position of the lead stub connection for toilet Measure the small beams' length and cut them as necessary Install the contour sill with the gasket Fasten the small beams Place the continuous links (bracings) without fastening them Install the contour belt	
6.6	Install the floor underlay	6.6.1 6.6.2 6.6.3	Draw the plywood start line Put glue on the joists Nail or screw the floor underlay	
6.7	Fasten the continuous links (bracings)			

TASK 7	BUILD EXTERIOR WOOD OR METAL WALL FRAMING SYSTEMS			

Main fields of application

For this task, the participants identified the following main field of application:

– wood or metal platform framing system.

Operations		**Sub-Operations**		**Clarifications**
7.1	Interpret the plans	7.1.1	Check the wall size according to the plan data and materials order	
7.2	Draw the location of exterior walls on the floor	7.2.1 7.2.2 7.2 3	Check the squareness on the floor Draw the lines Determine the location of openings	

TASK 7	BUILD EXTERIOR WOOD OR METAL WALL FRAMING SYSTEMS			
Operations		**Sub-Operations**		**Clarifications**
7.3	Assemble the walls	7.3 1 7.3.2 7.3.3 7.3.4 7.3.5	Draw the location of studs on the sills Mark the location of openings Assemble the studs at the upper and lower sills Install lintels Install the upper double sill	
7.4	Square and brace the walls			
7.5	Install the gaskets			
7.6	Install sheathing			
7.7	Erect, fasten and shore up the walls			

TASK 8	BUILD ROUNDWOOD AND LOG WALLS		

Main fields of application

For this task, the participants identified the following main fields of application:

- log wall framing system;
- roundwood framing system.

Operations		**Sub-Operations**	**Clarifications**
8.1	Interpret the plan		
8.2	Measure the squareness and draw contour lines		
8.3	Install the gasket on the floor perimeter		
8.4	Install drip flashing		
8.5	Install supports		

TASK 8 BUILD ROUNDWOOD AND LOG WALLS		
Operations	**Sub-Operations**	**Clarifications**
8.6 Install and anchor the first sole plate		
8.7 Sort the logs by numbering and size		
8.8 Erect the walls	8.8.1 Put an insulating strip between each course of pieces or logs, and anchor the courses 8.8.2 Level horizontally and vertically between each course 8.8.3 Reserve the location of openings 8.8.4 Make holes and pass ropes to insert electrical or other wiring	Many courses are then anchored, using wooden bolts or dowels, according to manufacturer specifications.
8.9 Groove the sides of openings to receive studs		
8.10 Complete the last courses		
8.11 Caulk between courses		Caulking is done one year after construction or according to the supplier's specifications.

TASK 9 BUILD A ROOF FRAMING SYSTEM AND COVER A PITCHED ROOF		

Main fields of application

For this task, the participants identified the following main fields of application:

- shed roof;
- two- or four-sided roof;
- mansard roof;
- unevenly pitched roof;
- hip roof;
- flat, round, removable roof;
- ponded roof;
- green roof.

Operations	**Sub-Operations**	**Clarifications**
9.1 Interpret the plans	9.1.1 Note relevant data (type of rafters, pitches, sizes, truss arrangement, etc.) 9.1.2 Make sure all parts are present	

TASK 9	BUILD A ROOF FRAMING SYSTEM AND COVER A PITCHED ROOF			
Operations		**Sub-Operations**		**Clarifications**
9.2	Mark truss locations	9.2.1 9.2.2	Check with the plan Mark on the wall plate	
9.3	Complete the structure of gable trusses	9.3.1 9.3.2	Install sheathing or an air barrier Install furring as necessary to allow the exterior finish application	
9.4	Install trusses and bracings	9.4.1 9.4.2 9.4.3 9.4.4	Pre-assemble the trusses, if applicable Level the first truss Position the trusses according to the plan while shoring them up progressively Install bracings	
9.5	Add roof overhangs	9.5.1	Install fascia boards	
9.6	Install the floor underlay	9.6.1 9.6.2	Determine the starting point Lay the plywood or support boards for the finish	
9.7	Install the covering on a pitched roof	9.7.1 9.7.2 9.7.3 9.7.4 9.7.5 9.7.6 9.7.7	Check the squareness of roof slopes Fasten starter strips (drips), the roof overhang protective membrane, and any membrane that precedes the final covering Fasten the flashing Cut and install the covering material Seal the covering in valleys, at intersections, and at the junction of accessories (ventilator, plumbing vent, etc.) Finish covering the peak and hips Install decorative elements, if applicable	
9.8	Install parapets, ventilators, skylights and dormers	9.8.1 9.8.2	Cut the underlay to receive ventilators and skylights Build and install parapets	

TASK 10 INSTALL OUTER DOORS AND WINDOWS

Main fields of application

For this task, the participants identified the following main fields of application:

- pre-assembled and pre-mounted door;
- wood and metal door;
- French window;
- garage door;
- wood and metal frame;
- wood, metal or other window;
- skylight;
- glass wall.

Operations	Sub-Operations	Clarifications
10.1 Interpret the waybill of doors and windows	10.1.1 Note relevant data (types, quantities, sizes)	
10.2 Identify elements according to the waybill	10.2.1 Check compliance with the plan and available information (type, glazing system, hardware, etc.)	
10.3 Place doors and windows in their openings and level them	10.3.1 Install the doors according to plan data (left or right opening, double doors, etc.) 10.3.2 Check the horizontal and vertical levels 10.3.3 Adjust according to the interior and exterior wall finish	
10.4 Fasten doors and windows	10.4.1 Install shims 10.4.2 Apply urethane on the perimeter, if applicable 10.4.3 Keep level and in line with wall finishes	Although it can be used for insulation, urethane may also be used to fasten the door or window.
10.5 Insulate the openings	10.5.1 Caulk the openings	If applicable, insulation may be done at the same time as that of walls. Buildings that meet the Novoclimat standard are an example of this.
10.6 Install the hardware and accessories	10.6.1 Check the type of hardware according to the plan and waybill 10.6.2 Make necessary preparations and install the hardware and accessories	

TASK 11 THERMALLY INSULATE WALLS AND CEILINGS

Main fields of application

For this task, the participants identified the following main fields of application:
- rigid, batt and loose insulation;
- insulating board;
- vapour barrier;
- sprayed insulation.

Operations	Sub-Operations	Clarifications
11.1 Interpret the plan or specifications	11.1.1 Check insulation types and quantities with plan data	
11.2 Install insulation between studs and joists (walls, ceilings)	11.2.1 Install the insulation without leaving spaces between studs 11.2.2 Install soundproofing, if applicable	
11.3 Caulk the openings	11.3.1 Ensure the continuity of the vapour/air barrier	
11.4 Install the insulation board and vapour barrier	11.4.1 Install inside or outside according to the plan 11.4.2 Install the vapour barrier 11.4.3 Seal the joints and the contour of electrical outlets	
11.5 Apply furring and strapping	11.5.1 Check locations on the plan 11.5.2 Mark strapping and furring locations 11.5.3 Fasten furring and strapping	

TASK 12 BUILD FIXED INTERIOR DIVISIONS

Main fields of application

For this task, the participants identified the following main fields of application:
- bearing wall;
- non-bearing partition;
- wood or metal stud division;
- sleeper wall;
- firewall;
- soundproof wall.

Operations	Sub-Operations	Clarifications
12.1 Interpret the plan	12.1.1 Check room dimensions and opening sizes	
12.2 Draw division and opening locations	12.2.1 Draw on the floor and reproduce on the ceiling	

TASK 12 BUILD FIXED INTERIOR DIVISIONS		
Operations	**Sub-Operations**	**Clarifications**
12.3 Prepare materials	12.3.1 Draw and cut the sills 12.3.2 Cut and assemble the door heads 12.3.3 Cut the bridging pieces	
12.4 Assemble the components	12.4.1 Erect the divisions 12.4.2 Fasten to the floor and ceiling	
12.5 Apply required strapping	12.5.1 Mark strapping locations 12.5.2 Fasten strapping	
12.6 Correct walls and ceilings, if applicable	12.6.1 Check the alignment of walls and ceilings	
12.7 Install an access to the roof space (attic)	12.7.1 Mark the location 12.7.2 Place and fasten the access	
12.8 Apply the covering of ceilings and walls		

TASK 13 DO INDOOR FINISHING WORK

Main fields of application

For this task, the participants identified the following main fields of application:

- wall coverings;
- interior door and its accessories;
- decorative panel;
- decorative accessories;
- mouldings (various types);
- finish of closets, pantries or other storage spaces;
- stair carriage;
- stair finishes.

Operations	Sub-Operations	Clarifications
13.1 Interpret the waybill of finishes	13.1.1 Check accessory and finish material quantities	
13.2 Install inner doors, architraves and accessories	13.2.1 Install and adjust the interior doors 13.2.2 Install door architraves, accessories and hardware	
13.3 Thicken the frames of outer doors and windows		

TASK 13 DO INDOOR FINISHING WORK		
Operations	**Sub-Operations**	**Clarifications**
13.4 Install mouldings	13.4.1 Cut and fasten the mouldings	
13.5 Install closet shelves and support bars		

TASK 14 ASSEMBLE REMOVABLE DIVISIONS		

Main fields of application

For this task, the participants identified the following main fields of application:

- mobile division;
- folding division;
- office division (mid-height);
- retractable partition;
- suspended division;
- security grills.

Operations	**Sub-Operations**	**Clarifications**
14.1 Interpret the plan	14.1.1 Check sizes relative to locations and elevations 14.1.2 Check the type of hardware and anchors	
14.2 Draw division locations	14.2.1 Draw according to the plan and specifications	
14.3 Install supports	14.3.1 Drill and install supports and anchors 14.3.2 Fasten the track in a level way and stabilize it as necessary	
14.4 Erect removable panels		
14.5 Fasten tie links		
14.6 Fasten finish mouldings		

TASK 15 BUILD WOODEN STAIRCASES

Main fields of application

For this task, the participants identified the following main fields of application:
- straight, open-string, closed, open, or landing staircase;
- balanced or winding, angled, landing, or string staircase;
- circular, helical or spiral staircase;
- stepladder or skeleton staircase.

Operations	Sub-Operations	Clarifications
15.1 Determine the type of staircase	15.1.1 Check plan data and the materials order (landings, angled steps, spiral, number of flights, number of steps and number of stringers)	
15.2 Calculate the size of treads and risers	15.2.1 Check the opening's location and squareness 15.2 2 Check the elevation with the finished floor 15.2.3 Calculate the riser height 15.2.4 Determine the tread depth	
15.3 Draw the stair stringers	15.3 1 Draw with a square 15.3.2 Adjust with stops	
15.4 Cut the stringers	15.4.1 Cut or mortise	
15.5 Assemble staircase components	15.5.1 Screw, nail, glue	The riser is installed before the step. The components are, for example, steps, risers, wall stringers, railings, handrails, balusters, etc.

TASK 16 INSTALL INTEGRATED FURNITURE

Main fields of application

For this task, the participants identified the following main fields of application:
- kitchen cupboard and bathroom vanity modules;
- suspended module;
- commercial integrated furniture;
- on-site construction and installation of elements or modules;
- preparation and installation of wooden or laminated (Arborite) counter tops.

Operations	Sub-Operations	Clarifications
16.1 Interpret the workshop plan	16.1.1 Check the size of delivered modules and compare them with the plan 16.1.2 Check the location of utilities (plumbing, electricity, gas) 16.1 3 Check location sizes	
16.2 Draw module locations on the wall	16.2.1 Draw lines with a level or laser	
16.3 Install the modules	16.3.1 Dismantle the modules 16.3.2 Prepare openings for utilities, if applicable 16.3.3 Install the upper modules 16.3.4 Install the lower modules	
16.4 Install counter tops	16.4.1 Prepare and install counter tops 16.4.2 Drill sink holes 16.4.3 Apply silicone joints	For certain materials such as granite, marble and others, counter tops may be prepared and installed by different, contracted-out teams.
16.5 Install doors and drawers	16.5.1 Fasten 16.5.2 Adjust	
16.6 Install finish elements or accessories	16.6.1 Install toeboards 16.6.2 Install the hardware and accessories	
16.7 Complete the installation	16.7.1 Finish the joints with silicone 16.7.2 Pick up the materials and waste and clean up	

TASK 17 DO OUTDOOR FINISHING WORK

Main fields of application

For this task, the participants identified the following main fields of application:

- various finish materials: clapboard (wood, vinyl, aluminum, steel), fibre cement panel, brick without Novabrik mortar, cedar shingle, etc.;
- finish of roof overhangs, dormers, skylights, glass walls, and balconies;
- install balcony and staircase railings and balustrades;
- decorative accessories;
- caulking.

Operations	Sub-Operations	Clarifications
17.1 Interpret the architectural plan	17.1.1 Check the types of siding and fastening materials	
17.2 Work on balconies and stairs		
17.3 Install the exterior siding	17.3.1 Check the insulation 17.3.2 Apply window and door flashing 17.3.3 Apply backing strips as necessary 17.3.4 Install the siding's starter strips 17.3.5 Install the siding	
17.4 Seal around openings and intersections		
17.5 Cover roof overhangs		

TASK 18 INSTALL SUSPENDED CEILINGS

Operations	Sub-Operations	Clarifications
18.1 Interpret the plan	18.1.1 Check the necessary quantities of materials 18.1.2 Check the installation direction of supports (main and secondary bars)	
18.2 Define the levels	18.2.1 Note the levels with a laser and mark them	
18.3 Draw perimeter lines on the wall		

TASK 18 INSTALL SUSPENDED CEILINGS		
Operations	**Sub-Operations**	**Clarifications**
18.4 Draw squaring lines on the floor and reproduce them on the ceiling		
18.5 Install supports	18.5.1 Anchor the suspension (wires or other) 18.5.2 Fasten suspension supports	
18.6 Adjust the levels		
18.7 Install tiles or other finish materials		Precautions should be taken to avoid damaging or dirtying tiles and adjacent parts.

TASK 19 DO REPAIR WORK		
Operations	**Sub-Operations**	**Clarifications**
19.1 Learn about the situation		
19.2 Diagnose the problem		
19.3 Suggest a solution		
19.4 Acquire necessary materials, tools and equipment for the work		
19.5 Repair, adjust or replace the defective components		
19.6 Check the work quality		

TASK 20 DO RENOVATION WORK		
Operations	**Sub-Operations**	**Clarifications**
20.1 Learn about the plan or guidelines		
20.2 Prepare the work area	20.2.1 Determine a safety perimeter, if applicable 20.2.2 Install tarpaulins as necessary	
20.3 Remove the elements to be replaced		
20.4 Install new elements		
20.5 Put the work area back in order		
20.6 Check the work quality		

TASK 21 BUILD AND ERECT SCAFFOLDS		

Main fields of application

For this task, the participants identified the following main fields of application:
- tubular, metal frame or fibreglass scaffolding;
- pump jack scaffolding;
- pipe and fitting scaffolding;
- pen frame scaffolding;
- wooden scaffolding.

Operations	**Sub-Operations**	**Clarifications**
21.1 Interpret the plan		
21.2 Prepare the soil and materials	21.2.1 Establish the safety perimeter 21.2.2 Level as necessary	
21.3 Install the bases		
21.4 Mount the sections	21.4.1 Check the levels 21.4.2 Anchor the sections, if applicable	

TASK 21 BUILD AND ERECT SCAFFOLDS		
Operations	**Sub-Operations**	**Clarifications**
21.5 Check the work quality	21.5.1 Check the levels and solidity	
21.6 Have the work approved	21.6.1 Obtain the engineer's approval, if applicable	
TASK 22 INSTALL WOOD OR COMPOSITE PARQUET FLOORING		
TASK 23 FINISH WOOD OR COMPOSITE PARQUET FLOORING		
Annex 3, "Flooring-Layer-Sander," lists sub-operations and task clarifications related to wood and composite parquet flooring.		
TASK 24 PERFORM PILE-DRIVING RELATED ACTIVITIES		
TASK 25 SHORE UP RETAINING WALLS		
TASK 26 PUT A DIAPHRAGM OR MUD WALL IN PLACE		
TASK 27 PUT STEEL SHEET PILES IN PLACE		
Annex 3, "Deep Foundation Layer," lists sub-operations and task clarifications related to deep foundations.		

2.3 ACHIEVEMENT CONDITIONS

Achievement condition data were collected for the entire trade of carpenter-joiner. They pertain to aspects such as workplaces, work instructions, health and safety hazards, reference documents consulted and material resources used, etc.

Table 2.3 Achievement Conditions

ACHIEVEMENT CONDITIONS
Workplaces[12] Carpenter-joiners work on construction sites, indoors and outdoors, in every region of Quebec. Their activities pertain to any type of residential, commercial, institutional or industrial building, whether existing or under construction, but also to civil engineering and roads for formwork on works such as bridges, dams, viaducts and tunnels. They can be assigned to work in areas difficult to access and in confined spaces[13], where space is restricted and lighting poor. Working from heights, on ladders and fixed or mobile scaffolds, is also part of the conditions for practicing the trade. In addition, carpenter-joiners may be subjected to gruelling weather conditions (heat or cold).
Instructions Carpenter-joiners mainly work according to instructions from the team leader or foreman. To issue their instructions and guidelines, the latter refer to the plans and specifications, to data provided by the surveyor, architect or engineer, or to requests or specifications from the client or supplier. However, carpenter-joiners may also have to refer to the plans and specifications in the course or their work.
Tools and equipment In Annex 1 of the present report is a list of material resources used by carpenter-joiners.
Health and safety hazards In Annex 2 of the present report is a list of the main hazards related to the tasks and operations of the carpenter-joiner trade, as well as a list of applicable preventive measures.

12. Non-exhaustive list.
13. Some types of work in confined spaces require a permit.

ACHIEVEMENT CONDITIONS

Documentation

The main reference documents[14] use by carpenter-joiners are:

- Instructions and guidelines from the team leader or foreman
- Plans and specifications
- Layout plans
- Scaffolding plans
- Door and window waybills
- Finish waybills
- Plans from the supplier of small beams
- Plans from the supplier of roof trusses
- Plans from suppliers of prefabricated elements
- Specifications of materials suppliers

Supervision and collaboration

Carpenter-joiners generally work under the supervision of a team leader or foreman. For micro-enterprises, they work under the contractor's direct supervision. Most of the time, the work is done within a team, with journeymen or apprentices. On construction sites, carpenter-joiners have to collaborate with the following persons:

- Workers in other trades
- Engineers
- Architects
- Surveyors
- Materials suppliers
- Clients, occasionally

Stress factors

The participants reported that their trade involves stress factors, mainly related to:

- the obligation of productivity;
- weather conditions, notably extreme temperatures;
- deadlines;
- work quality and errors, which can generate substantial additional costs;
- concerns about the exact location of works;
- accident hazards and working from heights;
- the attitudes and behaviours of certain teammates, supervisors or clients.

14. Non-exhaustive list.

2.4 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.

To draw the list of criteria related to each task, the participants worked in teams of two or three. The teams' results were then collected and presented in full session. Thus, certain criteria may at times be as relevant to other tasks as to those for which they were retained.

Table 2.4 Performance Criteria

TASK 1 LAY OUT A WORK OR BUILDING
Performance Criteria
– Following instructions and guidelines – Interpreting the layout plan correctly – Adequately locating survey markers – Choosing and using measuring instruments appropriately – Determining the elevation level correctly and precisely – Communicating well visually with teammates – Observing health and safety rules
TASK 2 BUILD FORMS FOR FOOTINGS **TASK 3 BUILD FORMS FOR CONCRETE WALLS** **TASK 4 BUILD FORMS FOR CONCRETE COLUMNS** **TASK 5 BUILD FORMS FOR CONCRETE BEAMS, SLABS AND STAIRS** Annex 3, "Concrete Former," list tasks related to formwork.

TASK 6 BUILD WOOD FLOOR FRAMING SYSTEMS

Performance Criteria

- Following instructions and guidelines
- Interpreting the plan correctly
- Preparing the work and installation adequately
- Showing initiative in facing unforeseen events
- Carefully checking the quality of materials
- Choosing tools and equipment wisely
- Observance of the elevation and level of the retaining wall's beam
- Observance of beam spacing and alignment
- Adequate shoring positions
- Securely fastening small beams
- Appropriately fitting and fastening underlay panels
- Precisely squaring stair openings
- Cleanliness of the work and premises
- Harmonious and effective communication with teammates and interested parties
- Observing health and safety rules

TASK 7 BUILD EXTERIOR WOOD OR METAL WALL FRAMING SYSTEMS

Performance Criteria

- Following instructions and guidelines
- Interpreting the plan correctly
- Preparing the work and installation adequately
- Showing initiative in facing unforeseen events
- Carefully checking the quality of materials
- Precision with stud spacing and the size of door and window openings
- Presence and quality of the gasket
- Precisely squaring walls and corners
- Anchoring walls adequately
- Cleanliness of the work and premises
- Harmonious and effective communication with teammates and interested parties
- Observing health and safety rules

TASK 8 BUILD ROUNDWOOD AND LOG WALLS

Performance Criteria

- Following instructions and guidelines
- Interpreting the plan correctly
- Preparing the work and installation adequately
- Showing initiative in facing unforeseen events
- Choosing and using tools appropriately
- Carefully checking the quality of materials
- Precision in assembling parts and in the size of door and window openings
- Presence and quality of gaskets between parts
- Precisely squaring walls
- Solid structure
- Anchoring walls adequately
- Observance of caulking specifications
- Watertight structure
- Cleanliness of the work and premises
- Harmonious and effective communication with teammates and interested parties
- Observing health and safety rules

TASK 9 BUILD A ROOF FRAMING SYSTEM AND COVER A PITCHED ROOF

Performance Criteria

- Following instructions and guidelines
- Interpreting the plan correctly for the arrangement of roof trusses
- Preparing the work and installation adequately
- Safe scaffolds
- Showing initiative in facing unforeseen events
- Carefully checking the quality of materials
- Adequately signalling the crane operator during the delivery of roof trusses
- Handling roof trusses safely
- Precisely arranging roof trusses
- Precisely squaring with walls
- Precise roof overhangs
- Adequately anchoring roof trusses
- Appropriately fitting and fastening underlay panels
- Precise openings (location and size)
- Correct installation of flashing and ventilators
- Appropriate installation of covering : shingles; non-welded and non stapled sheet metal; clay tiles
- Following manufacturer recommendations
- Watertight sealing in valleys, at intersections, and at the junction of accessories (ventilator, plumbing vent, etc.)
- Compliant addition of cover parts to the peak and hips
- Appropriate installation of decorative elements, if applicable
- Watertight roofing
- Cleanliness of the work and premises
- Harmonious and effective communication with teammates and interested parties
- Observing health and safety rules

TASK 10 INSTALL OUTER DOORS AND WINDOWS

Performance Criteria

- Following instructions and guidelines
- Correctly interpreting the door and window waybill
- Preparing the work and installation adequately
- Showing initiative in facing unforeseen events
- Adequately handling doors and windows during installation (no breakage)
- Choosing and using tools appropriately
- Precise horizontal and vertical levels
- Adequate anchoring of doors and windows
- Insulation quality (product choice and insulation installation)
- Observance of insulation standards
- Finished product installation and operation according to manufacturer specifications
- Cleanliness of the work and premises
- Harmonious and effective communication with teammates and interested parties
- Observing health and safety rules

TASK 11 THERMALLY INSULATE WALLS AND CEILINGS

Performance Criteria

- Following instructions and guidelines
- Interpreting the plan correctly
- Preparing the work and installation adequately
- Showing initiative in facing unforeseen events
- Choosing and using tools appropriately
- Safe and efficient work methods
- Insulation quality (product choice and insulation installation)
- Adequately locating strapping
- Absence of insulation compaction around openings
- Adequately sealing the vapour barrier (perimeter, surface and contour of openings)
- Observance of insulation standards
- Cleanliness of the work and premises
- Harmonious and effective communication with teammates and interested parties
- Observing health and safety rules

TASK 12 BUILD FIXED INTERIOR DIVISIONS

Performance Criteria

- Following instructions and guidelines
- Interpreting the plan correctly
- Preparing the work and installation adequately
- Showing initiative in facing unforeseen events
- Carefully checking the quality of materials
- Precise stud spacing and the size of openings
- Presence and quality of temporary stairs
- Precise level and squareness of divisions
- Precise and solid strapping
- Adequate anchoring of divisions
- Cleanliness of the work and premises
- Appropriately securing floor openings
- Harmonious and effective communication with teammates and interested parties
- Observing health and safety rules

TASK 13 DO INDOOR FINISHING WORK

Performance Criteria

- Following instructions and guidelines
- Correctly interpreting finish waybills
- Preparing the work and installation adequately
- Showing initiative in facing unforeseen events
- Carefully checking the quality of materials
- Choosing and using tools appropriately
- Precise markings and measurements
- Ability to recognize moulding angles and cuts
- Minimal loss of materials
- Precise cuts and angles
- Precise module levels and squareness
- Precise shelf heights
- The finished product's installation and operation meet manufacturer specifications
- Adequate anchoring of modules and mouldings
- Solidity of installed elements
- Cleanliness of the work and premises
- Harmonious and effective communication with teammates and interested parties
- Observing health and safety rules

TASK 14 ASSEMBLE REMOVABLE DIVISIONS

Performance Criteria

- Following instructions and guidelines
- Interpreting the plan and assembly manual correctly
- Preparing the work and installation adequately
- Showing initiative in facing unforeseen events
- Adequately handling removable divisions during the installation (no breakage)
- Choosing and using tools appropriately
- Choosing supports appropriately
- Locating divisions precisely
- Precise alignment, levels and squareness of divisions
- Fastening mouldings adequately
- Cleanliness of the work and premises
- Harmonious and effective communication with teammates and interested parties on the construction site
- Observing health and safety rules

TASK 15 BUILD WOODEN STAIRCASES

Performance Criteria

- Following instructions and guidelines
- Preparing the work and installation adequately
- Showing initiative in facing unforeseen events
- Carefully checking the quality of materials
- Choosing and using tools appropriately
- Precise calculations, measurements and markings
- Ability to recognize angles and cuts
- Minimal loss of materials
- Precise cuts and angles
- Precise levels and squareness
- Adequate assembly and anchoring of stair elements (steps, risers, ramp, studs, handrail, etc.)
- Solidity of installed elements
- Cleanliness of the work and premises
- Harmonious and effective communication with teammates and interested parties
- Observing health and safety rules

TASK 16 INSTALL INTEGRATED FURNITURE

Performance Criteria

- Following instructions and guidelines
- Interpreting the workshop plan correctly
- Preparing the work and installation adequately
- Showing initiative in facing unforeseen events
- Carefully checking the quality of materials
- Choosing and using tools appropriately
- Precise measurements and markings
- Appropriate work methods
- Ability to recognize angles and cuts
- Minimal loss of materials
- Precise cuts and angles
- Precise measurements and markings
- The finished product's installation and operation meet manufacturer specifications
- Adequate anchoring of modules
- Solidity of installed elements
- Cleanliness of the work and premises
- Harmonious and effective communication with teammates and interested parties
- Observing health and safety rules

TASK 17 DO OUTDOOR FINISHING WORK

Performance Criteria

- Following instructions and guidelines
- Interpreting the architectural plan correctly
- Preparing the work and installation adequately
- Showing initiative in facing unforeseen events
- Carefully checking the quality of materials
- Choosing and using tools appropriately
- Precise measurements, markings and cuts
- Precise cuts and angles
- Precise alignment, levels and squareness
- Exterior siding installation according to manufacturer specifications
- Adequate anchoring of balconies and stairs
- Solidity of installed elements
- Meeting standards (steps and risers)
- Cleanliness of the work and work area
- Harmonious and effective communication with teammates and interested parties
- Observing health and safety rules
- Meeting environmental standards (waste disposal)

TASK 18 INSTALL SUSPENDED CEILINGS

Performance Criteria

- Following instructions and guidelines
- Interpreting the plan correctly
- Preparing the work and installation adequately
- Showing initiative in facing unforeseen events
- Adequately locating low points
- Correctly assessing obstacles and possibilities
- Adjusting the laser appropriately
- Precise measurements, markings and cuts (sharp tools, clean cuts)
- Using the correct benchmarks
- Precise alignment, levels and squareness
- Observance of distances between supports
- Solid supports (anchoring)
- Appropriately assembling tees
- Observance of tile sizes
- Cleanliness of the work and work area (wearing gloves, protecting walls, etc.)
- Delicate handling of tiles (cleanliness and no breakage)
- Harmonious and effective communication with teammates and interested parties
- Observing health and safety rules
- Meeting environmental standards (waste disposal)

TASK 19 DO REPAIR WORK

TASK 20 DO RENOVATION WORK

TASK 21 BUILD AND ERECT SCAFFOLDS

Due to time constraints, the participants could not list the performance criteria for the above three tasks.

TASK 22 INSTALL WOOD OR COMPOSITE PARQUET FLOORING

TASK 23 FINISH WOOD OR COMPOSITE PARQUET FLOORING

Annex 3, “Flooring-Layer-Sander,” lists task performance criteria related to wood and composite parquet flooring.

TASK 24 PERFORM PILE-DRIVING RELATED ACTIVITIES

TASK 25 SHORE UP RETAINING WALLS

TASK 26 PUT A DIAPHRAGM OR MUD WALL IN PLACE

TASK 27 PUT STEEL SHEET PILES IN PLACE

Annex 3, “Deep Foundation Layer,” lists task performance criteria related to deep foundations.

2.5 FUNCTIONS

Functions correspond to a set of related tasks. That set may be defined by the work results or by a procedure. For the carpenter-joiner trade, three functions appear to stand out:

- A function related to **construction**, and grouping the following tasks:
  - Build forms for footings;
  - Build forms for concrete walls;
  - Build forms for concrete columns;
  - Build forms for concrete beams, slabs and stairs;
  - Build wood floor framing systems;
  - Build exterior wood or metal wall framing systems;
  - Build roundwood and log walls;
  - Build a roof framing system and cover a pitched roof;
  - Build fixed interior divisions;
  - Build wooden staircases;
  - Perform pile-driving related activities;
  - Shore up retaining walls;
  - Put a diaphragm or mud wall in place;
  - Put steel sheet piles in place;

- A function related to **installation**, and grouping the following tasks:
  - Install suspended ceilings;
  - Install outer doors and windows;
  - Install integrated furniture;
  - Thermally insulate walls and ceilings;
  - Assemble removable divisions;
  - Install wood and composite parquet flooring;

- A function related to **finishing**, and grouping the following tasks:
  - Finish wood and composite parquet flooring;
  - Do indoor finishing work;
  - Do outdoor finishing work.

3. QUANTITATIVE DATA ON TASKS

3.1 OCCURRENCE

Occurrence data concern the percentage of carpenter-joiners[15] who perform a task in the same workplace. The data presented in the tables below are the average results of the participants in the workshop. They provide information on the use of time not only by the participants who attended the workshop, but also by all carpenter-joiners working in the companies represented.

Table 3.1 Occurrence of Task

Task		Occurrence
1	Lay out a work or building	24.7%
2	Build forms for footings	58.6%
3	Build forms for concrete walls	32.8%
4	Build forms for concrete columns	35.4%
5	Build forms for concrete beams, slabs and stairs	46.6%
6	Build wood floor framing systems	69.3%
7	Build exterior wood or metal wall framing systems	68.6%
8	Build roundwood and log walls	14.0%
9	Build a roof framing system and cover a pitched roof	59.3%
10	Install outer doors and windows	42.8%
11	Thermally insulate walls and ceilings	53.6%
12	Build fixed interior divisions	64.3%
13	Do indoor finishing work	44.6%
14	Assemble removable divisions	26.1%
15	Build wooden staircases	27.5%
16	Install integrated furniture	33.4%
17	Do outdoor finishing work	37.3%
18	Install suspended ceilings	37.9%
19	Do repair work	51.1%
20	Do renovation work	53.6%
21	Build and erect scaffolds	42.5%

15. The data also include apprentices.

3.2 IMPORTANCE AND DIFFICULTY OF TASKS

The importance of a task is estimated according to the more or less harmful consequences of performing a task poorly or not at all. The importance is assessed according to the following scale:

1. Not important at all: Performing the task less successfully does not lead to consequences for the result's quality, the costs, health and safety, etc.;

2. Not very important: Poor execution of the task may entail minimal costs, lead to a result of lesser quality, involve risks of injury, or minor accidents, etc.;

3. Important: Poor execution of the task may entail an unsatisfactory result, substantial additional costs, injuries, accidents, etc.;

4. Very important: Poor execution of the task may entail an unacceptable result and very major consequences regarding costs, safety, etc.

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 data presented in the following table are the average results for the workshop participants.

Table 3.2 Importance and Difficulty of Tasks

	Task	Importance	Difficulty
1	Lay out a work or building	3.6	2.3
2	Build forms for footings	3.4	2.1
3	Build forms for concrete walls	3.6	2.6
4	Build forms for concrete columns	3.7	2.4
5	Build forms for concrete beams, slabs and stairs	3.8	2.6
6	Build wood floor framing systems	3.4	2.0
7	Build exterior wood or metal wall framing systems	3.4	1.9
8	Build roundwood and log walls	2.6	2.0
9	Build a roof framing system and cover a pitched roof	3.5	2.2
10	Install outer doors and windows	3.2	1.7
11	Thermally insulate walls and ceilings	3.3	1.5
12	Build fixed interior divisions	3.1	1.6
13	Do indoor finishing work	3.1	1.8
14	Assemble removable divisions	2.8	1.8
15	Build wooden staircases	3.5	2.4
16	Install integrated furniture	2.9	1.7
17	Do outdoor finishing work	3.3	1.8
18	Install suspended ceilings	3.1	1.8
19	Do repair work	3.2	2.1
20	Do renovation work	2.9	2.3
21	Build and erect scaffolds	3.3	2.2

4. KNOWLEDGE, SKILLS AND ATTITUDES

The occupational analysis 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 participants, are considered essential for performing the tasks of the carpenter-joiner trade.

4.1 KNOWLEDGE

Mathematics

Carpenter-joiners have to apply some mathematical knowledge in practicing their trade. Geometry is particularly important for laying out and for calculating volumes, areas, angles, diagonals and slopes. Carpenter-joiners often have to measure and evaluate dimensions (heights and elevations, lengths, widths) with fractions and decimals, in the imperial and metric systems. Arithmetic and the rule of three are also useful in calculating dimensions, volumes and material quantities.

Plans and specifications

The team leader or foreman is generally responsible for interpreting plans and specifications. Carpenter-joiners may have to read plans and specifications, depending on the nature of the work to be done or if they have to work autonomously, without the foreman's assistance. So they must be able to interpret plans and specifications. In addition, occasionally they have to make hand drawings, to illustrate some of their work to a colleague, foreman or client. Knowledge of building structures and construction methods is also necessary for interpreting plans and specifications.

Welding and oxygen cutting

Basic knowledge of welding is useful to carpenter-joiners, but is limited to the rudiments of shielded metal arc welding (SMAW), oxygen cutting and safety measures for using that equipment[16].

Tools and equipment

Carpenter-joiners use a wide variety of tools and equipment, as demonstrated by the list in Annex 1. They must be able to use them correctly, maintain them and repair them when necessary. Knowledge of woodwork may also be useful, particularly for interior finishing and for installing integrated furniture.

Plumbing

Minimal knowledge of plumbing is necessary to take into account plumbing fixture installations in buildings.

Materials and finish

Practicing the trade requires a good knowledge of materials used in the construction of residential, industrial, institutional and commercial buildings. The main properties of materials, their uses and the finishing processes are part of the knowledge required of a carpenter-joiner. Knowledge of finishing products, colour mixtures and the methods of repairing finishing products is also useful.

Laws and regulations

Carpenter-joiners must have a good knowledge of the standards, laws and regulations governing their work. Generally, carpenter-joiners do not consult documents pertaining to laws and regulations; they become familiar with relevant information during their training or work, by discussing with their co-workers and supervisors. Moreover, they have to know the sources to refer to them when necessary. This knowledge mainly concerns:

- laws, regulations and building standards described in section 1.5 of the present report;

16. However, welding is important for the deep foundation layer to perform his tasks 24 to 27. See Annex 3, “Deep Foundation Layer,” in this regard.

- safety measures related to personal protective equipment (boots, hard hat, etc.);
- safety rules for working from heights and on scaffolds;
- regulations specific to the work to be done (e.g.: municipal by-laws for layouts);
- lockout rules and procedures;
- safety rules for working in confined spaces.

Communication

The participants agree that the quality of communication between co-workers and with supervisors is essential for an agreeable working climate. Carpenter-joiners generally work in a team; so they must be able to establish harmonious interpersonal relations, so as to correctly interpret instructions and provide relevant data for work to be done. Dispute-resolution measures are also necessary to face certain difficult situations in relations with co-workers, interested parties on the construction site, or clients. The ability to communicate one's knowledge to co-workers (notably apprentices) is also important, according to the participants.

Although Quebec's language of work is French, communicating in English may be necessary on some construction sites (particularly outside Quebec or in remote areas). Knowledge of English and French terminology can be an asset in practicing the trade.

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 used for working. According to the participants in the occupational analysis workshop, the main cognitive skills necessary to carpenter-joiners are the following:

- anticipating and planning work stages;
- problem-solving;
- demonstrating common sense and judgement.

Motor skills

Motor skills involve gestures and movements. The main motor skills necessary to carpenter-joiners are the following:

- good physical ability and strength;
- good coordination, to perform several operations simultaneously and continuously;
- dexterity, particularly for finishing tasks;
- no vertigo, in doing certain types of work.

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 carpenter-joiners are the following:

- visual acuity, for levelling, alignment and finishing work;
- ability to distinguish colours, to recognize and reproduce finishes;
- ability to perceive sounds and recognize noises, for safety reasons;
- sense of smell, for detecting hazardous materials or abnormal odours.

4.3 ATTITUDES

Attitudes are a way of acting, reacting and relating with others or with one's environment. They involve personal skills. The main attitudes necessary to carpenter-joiners are the following:

- good judgement;
- listening ability;
- integrity and honesty;
- punctuality;
- conscientiousness;
- teamwork ability;
- ability to share knowledge;
- ethics and confidentiality, particularly regarding bid data.

5. TRAINING SUGGESTIONS

Initial training

The participants made the following suggestions about various aspects of the initial training:

- Most of the participants agree that training periods on construction sites would be very important in training future carpenter-joiners. They also point out that periodic training periods in the workplace would be necessary for keeping instructors up-to-date.
- For training newcomers, training periods in the workplace should take place at the start of training, to confirm candidates' career choice.
- The participants insisted on the importance of reading plans and of practical skills. In this regard, subsidized practical training could be dispensed on construction sites, according to the participants. However, they recognize that there are constraints on such an initiative.
- The knowledge and skills for using tools, notably a circular saw, were mentioned as important components of initial training.
- It is essential to present the trade's realities to future carpenter-joiners, by emphasizing the specific contexts – both good and more difficult – of working on construction sites.

Professional development and upgrading

The participants mentioned that they would be interested in skills being upgraded with regard to the following:

- managing a team (professional upgrading adapted to foremen on construction sites);
- human relations;
- roundwood framing systems and structures.

The participants would like an opportunity to retake some of the training they have already taken, which is not currently possible.

Annexes

Annex 1

TOOLS AND EQUIPMENT

During the workshop, the participants were presented lists of tools and equipment from the national occupational analysis of the carpenter-joiner trade (Red Seal). In the following pages, for each task, is the list of tools and equipment that was validated by the participants.

Table A.1 Tools and Equipment[17]

TASK 1 LAY OUT A WORK OR BUILDING

Hand Tools
crowbar
wheelbarrow
toolbox
compass
chalk line
knives (utility, drywall)
pencil/marking instrument
hand-saw
framing square
plumb bobs
large square
framing hammers
hand levels
shovels
rakes
measuring tape (various)
nail bag
hand saws (hack, keyhole, drywall, coping, chain-saw, back saw, pruning saw)
carpenter's apron

Portable Power Tools and Accessories
calculator
generator
cordless drill
extension cords
circular saw
water pump and accessories

Rigging, Hoisting and Access Equipment
ladders

Layout Instruments
string line
chalk line
plumb bobs
builder's level
laser level
scale rulers
measuring tape
theodolites

Personal Protective Equipment and Safety Equipment
safety boots
hard hat
safety lifeline
gloves
knee pads
reflective vest
safety glasses

17. Under their collective agreement, carpenter-joiners must provide the following tools as a condition of employment: nail bag; hammer; 25-foot measuring tape; 24-inch level; punch; toolbox; combination pliers; chalk line; plumb bobs; set of wood chisels; gypsum knife; two-handed saw; hacksaw; stapler; tin snips; crowbar; finishing hand-saw; hand-saw; compass; set of screwdrivers.

TASK 2	**BUILD FORMS FOR FOOTINGS**
TASK 3	**BUILD FORMS FOR CONCRETE WALLS**
TASK 4	**BUILD FORMS FOR CONCRETE COLUMNS**
TASK 5	**BUILD FORMS FOR CONCRETE BEAMS, SLABS AND STAIRS**

Annex 3 “Concrete Former,” lists raw materials, tools and equipment related to concrete formwork.

TASK 6 BUILD WOOD FLOOR FRAMING SYSTEMS

Hand Tools
stapler (hand, electric, hammer)
nail puller
brooms
brushes
wood chisels
toolbox
chalk line
knives (utility, drywall)
pencil/marking instrument
hand-saw
large square
scrapers (cabinet, floor, form)
file
framing hammers, sledge hammer
hand levels
shovels
caulking gun
measuring tape (various)
nail bag
carpenter’s apron

Portable Power Tools and Accessories
porta power
generator
hammer drill
concrete bits
wood boring bits
power-actuated tools
cut-out tools
electric drill and bits
cordless drill
extension cords
concrete cutting saw
chainsaw
reciprocating saw
circular saw

Pneumatic Tools and Equipment
air compressor
air pipes
nailers
impact gun with lubricant

Rigging, Hoisting and Access Equipment
ladders

Layout Instruments
chalk line
combination square
triangulated square (speed square)
builder’s level
laser level
measuring tape
dividers

Personal Protective Equipment and Safety Equipment
safety boots
hard hat
hearing protection
safety lifeline
lanyard
rope grab
fall protection equipment
gloves
knee pads
safety glasses

TASK 7 BUILD EXTERIOR WOOD OR METAL WALL FRAMING SYSTEMS

Hand Tools
stapler (hand, electric, hammer)
nail puller
brooms
bars (nail, pry, wrecking, aligning)
brushes
wood chisels
toolbox
chalk line
knives (utility, drywall)
pencil/marking instrument
wall jack
hand-saw
drywall t-square
large square
framing hammers, sledge hammer
scrapers (cabinet, floor, form)
file
hand levels
shovels
caulking gun
measuring tape (various)
nail bag
carpenter's apron
multi-driver screwdriver

Portable Power Tools and Accessories
porta power
generator
wood spade bit set
wood boring bits
cut-out tools
cordless drill
extension cords
reciprocating saw
mitre saw
circular saw

Pneumatic Tools
staplers
nailers
air compressor

Rigging, Hoisting and Access Equipment
pinch bar
rope
ladder jacks
ladders
chokers
synthetic lifting straps
hoist
lifting beam

Layout Instruments
string line
chalk line
combination square
triangulated square (speed square)
builder's level
laser level
measuring tape

Personal Protective Equipment and Safety Equipment
safety boots
hard hat
hearing protection
safety lifeline
lanyard
rope grab
fall protection equipment
gloves
knee pads
safety glasses

TASK 8 BUILD ROUNDWOOD AND LOG WALLS

Hand Tools
stapler (hand, electric, hammer)
nail puller
tarps
brooms
bars (nail, pry, wrecking, aligning)
brushes
wheelbarrow
nail set
tin snips
aviation snips
wood chisels
cone/tie wrench
spud wrench
adjustable wrench
toolbox
chalk line
knives (utility, drywall)
pencil/marking instrument
hand-saw
plumb bobs
large square
hatchet
file
framing hammers, sledge hammer
hand levels
shovels
caulking gun
planes (various)
rasp
hand saws (hack, keyhole, drywall, coping, rip, hole, cross cut, back, pruning)
clamps
measuring tape (various)
nail bag
carpenter's apron
screwdrivers (Robertson, Phillips, straight, Torx, hexagonal)
multi-driver screwdriver
butt gauge

Stationary Power Tools
sawbench

Pneumatic Tools and Equipment
fittings
air pipes
air compressor
gauges
impact gun

Rigging, Hoisting and Access Equipment
pinch bar
cables
ropes
ladder jacks
ladders
chokers
synthetic lifting straps
hoist
lifting beam
pulleys
skid ramps
turnbuckles
grip hoists (tirfors)
come-alongs
stepladder
trestles

Layout Instruments
scribing compass
string line
chalk line
combination square
triangulated square (speed square)
sliding T-bevel
plumb bobs
templates
jigs
stair gauge
drawing instruments
builder's level
laser level
scriber
scale rulers
measuring tape
dividers
transit

TASK 8 BUILD ROUNDWOOD AND LOG WALLS

Portable Power Tools and Accessories
porta power
wet/dry vacuum
calculator
construction heaters
generator
wood spade bit set
coring drill and bits
wood boring bits
grinders
mini-grinder
electric drill and bits
cordless drill
sanders (palm, belt, random, detail)
planer
extension cords
chainsaw
reciprocating saw
circular saw
router and bits
hydraulic jacks

Personal Protective Equipment and Safety Equipment
full body harness
safety boots
hard hat
hearing protection
safety lifeline
lanyard
rope grab
fall protection equipment
gloves
knee pads
safety glasses

TASK 9 BUILD A ROOF FRAMING SYSTEM AND COVER A PITCHED ROOF

Hand Tools
stapler (hand, electric, hammer)
nail puller
tarps
brooms
brushes
wheelbarrow
nail set
tin snips
aviation snips
toolbox
chalk line
knives (utility, drywall)
pencil/marking instrument
hand-saw
drywall t-square
plumb bobs
large square
scrapers (cabinet, floor, form)
file
framing hammers, sledge hammer
hand levels
shovels
measuring tape (various)
hand saws (hack, keyhole, drywall, coping, rip, hole, cross cut, back, pruning)
nail bag
carpenter's apron

Portable Power Tools and Accessories
porta power
calculator
construction heaters
generator
extension cords
chainsaw
reciprocating saw
mitre saw
circular saw

Stationary Power Tools
Table saw

Pneumatic Tools and Equipment
fittings
air loses
nailers
air compressor

Rigging, Hoisting and Access Equipment
wire rope
cables
ropes
ladders
chokers
synthetic lifting straps
hoist
pulleys
come-alongs
stepladder
trestles

Layout Instruments
scribing compass
string line
chalk line
combination square
triangulated square (speed square)
sliding T-bevel
plumb bobs
templates
jigs
builder's level
laser level
measuring tape

Personal Protective Equipment and Safety Equipment
respiratory equipment, dust mask and respirators
footrest
full body harness
safety boots
hard hat
hearing protection
lanyard
gloves
knee pads
safety glasses

TASK 10 INSTALL OUTER DOORS AND WINDOWS

Hand Tools
brooms
wood chisels
cold chisels
toolbox
knives (utility, drywall)
pencil/marking instrument
hand-saw
plumb bobs
large square
framing hammers, rubber mallet
hand levels
measuring tape (various)
hand saws (hack, keyhole, drywall, coping, rip, hole, cross cut, back, pruning)
nail bag
carpenter's apron
screwdrivers (Robertson, Phillips, straight, Torx, hexagonal)
multi-driver screwdriver

Portable Power Tools and Accessories
wet/dry vacuum
generator
wood spade bit set
concrete bits
wood boring bits
electric drill and bits
cordless drill
extension cords
screw taps

Rigging, Hoisting and Access Equipment
pinch bar
stepladder

Layout Instruments
string line
chalk line
plumb bobs
templates
jigs
builder's level
laser level
measuring tape

Personal Protective Equipment and Safety Equipment
safety boots
hard hat
safety lifeline
rope grab
fall protection equipment
gloves
knee pads

TASK 11 THERMALLY INSULATE WALLS AND CEILINGS

Hand Tools
stapler (hand, electric, hammer)
brooms
toolbox
knives (utility, drywall)
pencil/marking instrument
hammers (framing, finishing)
caulking gun
measuring tape (various)
nail bag
carpenter's apron

Portable Power Tools and Accessories
staplers
circular saw

Pneumatic Tools and Equipment
staplers
air pipes
nailers, impact gun
air compressor

Rigging, Hoisting and Access Equipment
stepladder
scaffolding
ladders

Layout Instruments
string line
chalk line
measuring tape

Personal Protective Equipment and Safety Equipment
respiratory equipment, dust mask and respirators
safety boots
hard hat
safety lifeline
lanyard
rope grab
fall protection equipment

TASK 12 BUILD FIXED INTERIOR DIVISIONS

Hand Tools
stapler (hand, electric, hammer)
nail puller
tarps
brooms
bars (nail, pry, wrecking, aligning)
brushes
wheelbarrow
nail set
wood chisels
toolbox
knives (utility, drywall)
pencil/marking instrument
hand-saw
plumb bobs
scrapers (cabinet, floor, form)
large square
hammers (framing, sledge)
hand levels
shovels
measuring tape (various)
hand saws (hack, keyhole, drywall, coping, rip, hole, cross cut, back, pruning)
nail bag
carpenter's apron

Portable Power Tools and Accessories
porta power
calculator
construction heaters
generator
power-actuated tools
extension cords
chainsaw
reciprocating saw
mitre saw
circular saw
jigsaw
hydraulic jacks

Stationary Power Tools
table saw

Pneumatic Tools and Equipment
fittings
air pipes
nailers
air compressor

Rigging, Hoisting and Access Equipment
ladders
stepladder
trestles

Layout Instruments
scribing compass
string line
chalk line
combination square
triangulated square (speed square)
sliding T-bevel
templates
builder's level
laser level
measuring tape

Personal Protective Equipment and Safety Equipment
respiratory equipment, dust mask and respirators
safety boots
hard hat
hearing protection
fall protection equipment
gloves
knee pads
safety glasses

TASK 13 DO INDOOR FINISHING WORK

Hand Tools
tarps
brooms
nail set
wood chisels
toolbox
knives (utility, drywall)
pencil/marking instrument
hand-saw
plumb bobs
large square
brad driver
hammers (framing, finishing, dead blow, rubber mallet, wood mallet, sledge)
hand levels
caulking gun
planes (various)
measuring tape (various)
nail bag
carpenter's apron
screwdrivers (Robertson, Phillips, straight, Torx, hexagonal)
multi-driver screwdriver

Portable Power Tools and Accessories
wet/dry vacuum
wood spade bit set
concrete bits
wood boring bits
power-actuated tools
electric drill and bits
cordless drill
planer
extension cords
mitre saw
circular saw
jigsaw
router and bits

Stationary Power Tools
planer
radial arm saw
table saw

Pneumatic Tools and Equipment
fittings
air pipes
nailers, impact gun
air compressor
drills

Rigging, Hoisting and Access Equipment
stepladder

Layout Instruments
string line
chalk line
sliding T-bevel
plumb bobs
templates
jigs
builder's level
laser level
measuring tape

Personal Protective Equipment and Safety Equipment
safety boots
hard hat
knee pads
safety glasses

TASK 14 ASSEMBLE REMOVABLE DIVISIONS

Hand Tools
brooms
brushes
wheelbarrow
toolbox
knives (utility, drywall)
pencil/marking instrument
large square
file
framing hammers, finishing hammers
hand levels
caulking gun
measuring tape (various)
nail bag
hand saws (hack, keyhole, drywall, coping, rip, hole, cross cut, back, pruning)
carpenter's apron
screwdrivers (Robertson, Phillips, straight, Torx, hexagonal)
multi-driver screwdriver

Portable Power Tools and Accessories
concrete bits
mini-grinder
power-actuated tools
electric drill and bits
cordless drill
extension cords

Stationary Power Tools
radial arm saw

Rigging, Hoisting and Access Equipment
ladder jacks
synthetic lifting straps
hoist
come-alongs

Layout Instruments
chalk line
triangulated square (speed square)
plumb bobs
builder's level
laser level
measuring tape
transit
theodolites

Personal Protective Equipment and Safety Equipment
full body harness
safety boots
hard hat
hearing protection
safety lifeline
lanyard
rope grab
fall protection equipment
gloves
knee pads
safety glasses

TASK 15 BUILD WOODEN STAIRCASES

Hand Tools
nail puller, nail claw
brooms
wood chisels
toolbox
knives (utility, drywall)
pencil/marking instrument
hand-saw
large square
framing hammers, finishing hammers, sledge hammer
hand levels
caulking gun
measuring tape (various)
nail bag
hand saws (hack, keyhole, drywall, coping, rip, hole, cross cut, back, pruning)
carpenter's apron
screwdrivers (Robertson, Phillips, straight, Torx, hexagonal)

Portable Power Tools and Accessories
generator
wood spade bit set
power-actuated tools
cut-out tools
cordless drill
sanders (palm, belt, random, detail)
extension cords
chainsaw
reciprocating saw
mitre saw
circular saw
jigsaw
router and bits

Stationary Power Tools
jointer
mortiser
disk sander/drum sander
planer
radial arm saw
band saw
table saw
router table

Pneumatic Tools and Equipment
fittings
air loses
wrenches
nailers
air compressor
drills
impact gun

Rigging, Hoisting and Access Equipment
ladders
stepladder

Layout Instruments
scribing compass
string line
chalk line
combination square
triangulated square (speed square)
sliding T-bevel
templates
jigs
stair gauge
drawing instruments
builder's level
laser level
scale rulers
measuring tape

Personal Protective Equipment and Safety Equipment
respiratory equipment, dust mask and respirators
safety boots
hard hat
hearing protection
gloves
knee pads
safety glasses

TASK 16 INSTALL INTEGRATED FURNITURE

Hand Tools
stapler (hand, electric, hammer)
bull floats
nail puller
tarps
brooms
bars (nail, pry, wrecking, aligning)
brushes
wheelbarrow
nail set
sheet metal shears
tin snips
aviation snips
wood chisels
cold chisels
cone/tie wrench
spud wrench
adjustable wrench
toolbox
string line
circle cutter
knives (utility, drywall)
pencil/marking instrument
hand-saw
finishing hand-saw
framing square
drywall t-square
plumb bobs
large square
scrapers (cabinet, floor, form)
brad driver
chalk line
file
hammers (framing, finishing, dead blow, rubber mallet, wood mallet, sledge, roofing, drywall)
hand levels
shovels
caulking gun
punch
planes (various)
rasp
rollers
measuring tape (various)
nail bag
hand saws (hack, keyhole, drywall, coping, rip, hole, cross cut, back, pruning)
clamps
carpenter's apron
screwdrivers (Robertson, Phillips, straight, Torx, hexagonal)
multi-driver screwdriver
butt gauge

Portable Power Tools and Accessories
porta power
staplers
wet/dry vacuum
calculator
construction heaters
generator
wood spade bit set
biscuit joiner
coring drill and bits
concrete bits
wood boring bits
grinders
mini-grinder
cut-out tools
electric drill and bits
cordless drill
sanders (palm, belt, random, detail)
planer
extension cords
laminate trimmer
cut-off saw (metal)
reciprocating saw
mitre saw
circular saw
jigsaw
router and bits

Stationary Power Tools
table saw

Rigging, Hoisting and Access Equipment
spreader bar
pinch bar
eyebolts
wire rope
cables
tag lines
ropes
ladder jacks
ladders
turnbuckles
stepladder
trestles

TASK 16 INSTALL INTEGRATED FURNITURE

Personal Protective Equipment and Safety Equipment
respiratory equipment, dust mask and respirators
full body harness
safety boots
hard hat
hearing protection
safety lifeline
lanyard
rope grab
fall protection equipment
gloves
knee pads
safety glasses

Pneumatic Tools and Equipment
fittings
staplers
air dryer
pipes
nailers
air compressor

Layout Instruments
scribing compass
string line
chalk line
combination square
triangulated square (speed square)
sliding T-bevel
plumb bobs
templates
jigs
builder's level
laser level
scriber
scale rulers
measuring tape
tri-square

TASK 17 DO OUTDOOR FINISHING WORK

Hand Tools
siding shears
aviation snips
toolbox
knives (utility, drywall)
pencil/marking instrument
hand-saw
large square
framing hammers, finishing hammers
hand levels
caulking gun
measuring tape (various)
hand saws (hack, keyhole, drywall, coping, rip, hole, cross cut, back, pruning)
nail bag
carpenter's apron

Portable Power Tools and Accessories
electric shears
generator
electric drill and bits
cordless drill
extension cords
cut-off saw (metal)
circular saw
jigsaw

Stationary Power Tools
shaper
radial arm saw
table saw

Pneumatic Tools and Equipment
air loses
shears
nailers
air compressor

Rigging, Hoisting and Access Equipment
ladder jacks
scaffoldings and planks
ladders
aerial platform

Layout Instruments
chalk line
sliding T-bevel
stair gauge
builder's level
laser level
measuring tape

Personal Protective Equipment and Safety Equipment
safety boots
hard hat
safety lifeline
lanyard
rope grab
fall protection equipment
gloves
knee pads
safety glasses

TASK 18 INSTALL SUSPENDED CEILINGS

Hand Tools
tarps
alignment brooms
brushes
wheelbarrow
nail set
tin snips
siding shears
aviation snips
toolbox
circle cutter
knives (utility, drywall)
pencil/marking instrument
hand-saw
drywall t-square
plumb bobs
large square
hammers (framing, finishing, gypsum board)
hand levels
shovels
pin clamp, flat clamp
caulking gun
measuring tape (various)
nail bag
clamps
carpenter's apron
screwdrivers (Robertson, Phillips, straight, Torx, hexagonal)
multi-driver screwdriver
butt gauge

Portable Power Tools and Accessories
wet/dry vacuum
calculator
construction heaters
concrete bits
power-actuated tools
electric drill and bits
cordless drill
extension cords
reciprocating saw
circular saw
jigsaw

Rigging, Hoisting and Access Equipment
scaffolding de type Baker
scaffoldings and planks
scissor lift
stepladder

Layout Instruments
scribing compass
string line
chalk line
combination square
triangulated square (speed square)
sliding T-bevel
builder's level
laser level
measuring tape
theodolites

Personal Protective Equipment and Safety Equipment
respiratory equipment, dust mask and respirators
full body harness
safety boots
hard hat
hearing protection, ear plugs
safety lifeline
lanyard
rope grab
fall protection equipment
gloves
safety glasses

TASK 19	**DO REPAIR WORK**
TASK 20	**DO RENOVATION WORK**
TASK 21	**BUILD AND ERECT SCAFFOLDS**

Due to time constraints, the participants could not complete the list of tools and equipment for the above three tasks.

TASK 22	**INSTALL WOOD OR COMPOSITE PARQUET FLOORING**
TASK 23	**FINISH WOOD OR COMPOSITE PARQUET FLOORING**

Annex 3, “Flooring-Layer-Sander,” lists tools and equipment related to parquet flooring.

TASK 24	**PERFORM PILE-DRIVING RELATED ACTIVITIES**
TASK 25	**SHORE UP RETAINING WALLS**
TASK 26	**PUT A DIAPHRAGM OR MUD WALL IN PLACE**
TASK 27	**PUT STEEL SHEET PILES IN PLACE**

Annex 3, “Deep Foundation Layer,” lists tools and equipment related to laying deep foundations.

Annex 2

GRID OF OCCUPATIONAL HEALTH AND SAFETY ELEMENTS

Produced by: **Louise Lessard**, Prevention Consultant
ASP Construction

Table A.2 Description of Hazards in Practicing the Carpenter-joiner Trade

Hazards	Effects on Health and Safety	Means of Prevention
Task 1 Lay out a work or building		
Same-level fall hazards (housekeeping, slippery surfaces)	• Collisions • Contusions • Fractures • Bruises	• Clean the work area (pick up debris). • Absorb oils. • Apply abrasives to make the surface less slippery.
Hand injuries	• Cuts • Fractures	• Wear work gloves. • Ensure that manual and portable tools are in good condition.
Collisions with machinery (proximity of the shovel)	• Fractures • Contusions	• Never stand below the shovel bucket; request a flagger's help if necessary.
Excessive efforts	• Backache	• Respect your limits; ask a co-worker for help if necessary. • Take training in manual handling methods.
Task 2 Build forms for footings **Task 3 Build forms for concrete walls** **Task 4 Build forms for concrete columns** **Task 5 Build forms for concrete beams, slabs and stairs**		
Consult Annex 3, "Concrete Former."		
Task 6 Build wood floor framing systems		
Hand injuries	• Cuts • Fractures	• Wear work gloves. • Ensure that manual and portable tools are in good condition.
Back injuries (excessive efforts)	• Backache (low back pain, sprains or herniated disks)	• Use appropriate rigging equipment and avoid excessive twists and efforts. • Take training in manual handling methods.

Hazards	Effects on Health and Safety	Means of Prevention
Falls from height hazards (using a ladder, footwalk and reinforcement)	• Collisions • Internal injuries • Fractures • Bruises • Death • Psychological and physical after-effects	• Use a class 1 ladder: o position and observe an angle of slope of 1/4 to 1/3 from the height of the support point; o climb up and down a ladder while: – always having three support points; – holding the bars, not the side rails; – remaining between the side rails; – holding nothing in the hands; – facing the ladder; o check the soil bearing capacity and install beds. • When there is a risk of falling more than 3 m: – install a guardrail system; or – wear a shock-absorbing harness, with an anchor that has a breaking strength of 18 kN (4046 lb/F), complying with the specifications in the Safety Code for the construction industry, sec. 2.10.12. • Take fall-prevention training.
Noise	• Deafness	• Wear hearing protection complying with the Safety Code for the construction industry, sec. 2.10.7.6.
Heat	• Heat exhaustion • Heatstroke	• Drink enough water (about 250 ml every 20 minutes) during a heat wave. • Wear absorbent clothing.
Cold	• Chilblains (frostbite)	• Wear insulating clothing.
Eye injuries	• Foreign bodies	• Wear safety glasses complying with the Safety Code for the construction industry, sec. 2.10.5.
Electric discharges	• Electrocution	• Use conforming electric equipment (double insulation or grounding) and use extension cords in good condition.
Repetitive movements	• Tendinitis	• Use ergonomic tools (better suited for the task).

Hazards	Effects on Health and Safety	Means of Prevention
Task 7 Build exterior wood or metal wall framing systems		
Hand injuries	• Cuts • Fractures	• Wear work gloves. • Ensure that manual and portable tools are in good condition.
Back injuries (excessive efforts)	• Backache (low back pain, sprains or herniated disks)	• Use appropriate rigging equipment and avoid excessive twists and efforts. • Take training in manual handling methods.
Eye injuries	• Foreign bodies	• Wear safety glasses complying with the Safety Code for the construction industry, sec. 2.10.5.
Falls from height (using a ladder, scaffolding and footwalk)	• Collisions • Internal injuries • Fractures • Bruises • Death • Psychological and physical after-effects	• Use a class 1 ladder: o position and observing an angle of slope of 1/4 to 1/3 from the height of the support point; o climb up and down a ladder while: – always having three support points; – holding the bars, not the side rails; – remaining between the side rails; – holding nothing in the hands; – facing the ladder; o check the soil bearing capacity and install beds. • When there is a risk of falling more than 3 m: – install a guardrail system; or – wear a shock-absorbing harness, with an anchor that has a breaking strength of 18 kN (4046 lb/F), complying with the specifications in the Safety Code for the construction industry, sec. 2.10.12. • Take fall-prevention training.
Heat	• Heat exhaustion • Heatstroke	• Drink enough water (about 250 ml every 20 minutes) during a heat wave. • Wear absorbent clothing.
Electric discharges	• Electrocution	• Use conforming electric equipment (double insulation or grounding) and use extension cords in good condition.
Repetitive movements	• Tendinitis	• Use ergonomic tools (better suited for the task).

Hazards	Effects on Health and Safety	Means of Prevention
Task 8 Build roundwood and log walls		
Back injuries (excessive efforts)	• Backache (low back pain, sprains or herniated disks)	• Use appropriate rigging equipment and avoid excessive twists and efforts. • Took training in manual handling methods.
Hand and other bodily injuries	• Cuts • Fractures	• Wear work gloves. • Ensure that manual and portable tools are in good condition.
Eye injuries	• Foreign bodies	• Wear safety glasses complying with the Safety Code for the construction industry, sec. 2.10.5.
Electric discharges	• Electrocution	• Use conforming electric equipment (double insulation or grounding) and use extension cords in good condition.
Same-level falls (housekeeping, slippery surfaces)	• Collisions • Contusions • Fractures • Bruises	• Clean the work area (pick up debris). • Absorb oils. • Apply abrasives to make the surface less slippery.
Falls from height (using a ladder, scaffolding and footwalk)	• Collisions • Internal injuries • Fractures • Bruises • Death • Psychological and physical after-effects	• Use a class 1 ladder: o position and observing an angle of slope of 1/4 to 1/3 from the height of the support point; o climb up and down a ladder while: – always having three support points; – holding the bars, not the side rails; – remaining between the side rails; – holding nothing in the hands; – facing the ladder; o check the soil bearing capacity and install beds. • When there is a risk of falling more than 3 m: – install a guardrail system; or – wear a shock-absorbing harness, with an anchor that has a breaking strength of 18 kN (4046 lb/F), complying with the specifications in the Safety Code for the construction industry, sec. 2.10.12. • Take fall-prevention training.

Hazards	Effects on Health and Safety	Means of Prevention
Task 9 Build a roof framing system and cover a pitched roof		
Eye injuries	• Foreign bodies	• Wear safety glasses complying with the Safety Code for the construction industry, sec. 2.10.5.
Hand and other bodily injuries	• Cuts • Fractures	• Wear work gloves. • Ensure that manual and portable tools are in good condition.
Electric discharges	• Electrocution	• Use conforming electric equipment (double insulation or grounding) and use extension cords in good condition.
Falls from height (using a ladder, scaffolding and footwalk)	• Collisions • Internal injuries • Fractures • Bruises • Death • Psychological and physical after-effects	• Use a class 1 ladder: o position and observing an angle of slope of 1/4 to 1/3 from the height of the support point; o climb up and down a ladder while: – always having three support points; – holding the bars, not the side rails; – remaining between the side rails; – holding nothing in the hands; – facing the ladder; o check the soil bearing capacity and install beds. • When there is a risk of falling more than 3 m: – install a guardrail system; or – wear a shock-absorbing harness, with an anchor that has a breaking strength of 18 kN (4046 lb/F), complying with the specifications in the Safety Code for the construction industry, sec. 2.10.12. • Take fall-prevention training.
Same-level falls (housekeeping, slippery surfaces)	• Collisions • Contusions • Fractures • Bruises	• Clean the work area (pick up debris). • Absorb oils. • Apply abrasives to make the surface less slippery.
Jamming, crashing	• Collisions • Contusions • Fractures • Bruises	• Maintain good work methods. • Use guide lines as necessary. • Never stand below a load.

Hazards	Effects on Health and Safety	Means of Prevention
Task 10 Install outer doors and windows		
Same-level falls (housekeeping, slippery surfaces)	• Collisions • Contusions • Fractures • Bruises	• Clean the work area (pick up debris). • Absorb oils. • Apply abrasives to make the surface less slippery.
Falls from height (using a ladder, scaffolding and footwalk)	• Collisions • Internal injuries • Fractures • Bruises • Death • Psychological and physical after-effects	• Use a class 1 ladder: o position and observing an angle of slope of 1/4 to 1/3 from the height of the support point; o climb up and down a ladder while: – always having three support points; – holding the bars, not the side rails; – remaining between the side rails; – holding nothing in the hands; – facing the ladder; o check the soil bearing capacity and install beds. • When there is a risk of falling more than 3 m: – install a guardrail system; or – wear a shock-absorbing harness, with an anchor that has a breaking strength of 18 kN (4046 lb/F), complying with the specifications in the Safety Code for the construction industry, sec. 2.10.12. • Take fall-prevention training.
Back injuries (excessive efforts)	• Backache (low back pain, sprains or herniated disks)	• Use appropriate rigging equipment and avoid excessive twists and efforts. • Take training in manual handling methods.
Task 11 Thermally insulate walls and ceilings		
Eye injuries	• Irritations due to wool	• Wear safety glasses.
Respiratory problems	• Irritations of bronchial tubes and airways	• Use a type 100 reusable respirator.
Hand injuries	• Cuts	• Wear work gloves.
Same-level falls (housekeeping, slippery surfaces)	• Collisions • Contusions • Fractures • Bruises	• Clean the work area (pick up debris). • Absorb oils. • Apply abrasives to make the surface less slippery.

Hazards	Effects on Health and Safety	Means of Prevention
Falls from height (using a ladder)	• Collisions • Internal injuries • Fractures • Bruises • Death • Psychological and physical after-effects	• Use a class 1 ladder: o position and observing an angle of slope of 1/4 to 1/3 from the height of the support point; o climb up and down a ladder while: – always having three support points; – holding the bars, not the side rails; – remaining between the side rails; – holding nothing in the hands; – facing the ladder; o check the soil bearing capacity and install beds. • When there is a risk of falling more than 3 m: – install a guardrail system; or – wear a shock-absorbing harness, with an anchor that has a breaking strength of 18 kN (4046 lb/F), complying with the specifications in the Safety Code for the construction industry, sec. 2.10.12. • Close all openings (stairwell) or install a guardrail. • Take fall-prevention training.
Task 12 Build fixed interior divisions		
Back injuries (excessive efforts)	• Backache (low back pain, sprains or herniated disks)	• Use appropriate handling equipment and avoid excessive twists and efforts. • Take training in manual handling methods.
Eye injuries	• Foreign bodies	• Wear safety glasses.
Hand and other bodily injuries	• Cuts • Fractures	• Wear work gloves. • Ensure that manual and portable tools are in good condition.
Same-level falls (housekeeping)	• Collisions • Contusions • Fractures • Bruises	• Clean the work area (pick up debris). • Close all openings or install a guardrail.

Hazards	Effects on Health and Safety	Means of Prevention
Falls from height (using a ladder and stepladder)	• Collisions • Internal injuries • Fractures • Bruises • Death • Psychological and physical after-effects	• Use a class 1 ladder: o position and observing an angle of slope of 1/4 to 1/3 from the height of the support point; o climb up and down a ladder while: – always having three support points; – holding the bars, not the side rails; – remaining between the side rails; – holding nothing in the hands; – facing the ladder; o check the soil bearing capacity and install beds. • Close all openings (stairwell) or install a guardrail.
Task 13 Do indoor finishing work		
Eye injuries	• Foreign bodies	• Wear safety glasses.
Hand and other bodily injuries	• Cuts • Fractures	• Wear work gloves. • Ensure that manual and portable tools are in good condition.
Same-level falls (housekeeping)	• Collisions • Contusions • Fractures • Bruises	• Clean the work area (pick up debris). • Close all openings or install a guardrail.
Falls from height (using a ladder and stepladder)	• Collisions • Internal injuries • Fractures • Bruises • Death • Psychological and physical after-effects	• Use a class 1 ladder: o position and observing an angle of slope of 1/4 to 1/3 from the height of the support point; o climb up and down a ladder while: – always having three support points; – holding the bars, not the side rails; – remaining between the side rails; – holding nothing in the hands; – facing the ladder; o check the soil bearing capacity and install beds. • Close all openings (stairwell) or install a guardrail.

Hazards	Effects on Health and Safety	Means of Prevention
Task 14 Assemble removable divisions		
Back injuries (excessive efforts)	• Backache (low back pain, sprains or herniated disks)	• Use appropriate handling equipment and avoid excessive twists and efforts. • Take training in manual handling methods.
Noise	• Deafness	• Wear ear plugs or shells. • Use less-noisy tools.
Eye injuries	• Foreign bodies	• Wear safety glasses.
Hand and other bodily injuries	• Cuts • Fractures	• Wear work gloves. • Ensure that manual and portable tools are in good condition.
Same-level falls (housekeeping)	• Collisions • Contusions • Fractures • Bruises	• Clean the work area (pick up debris). • Close all openings or install a guardrail.
Falls from height (using a ladder and stepladder)	• Collisions • Internal injuries • Fractures • Bruises • Death • Psychological and physical after-effects	• Use a class 1 ladder: o position and observing an angle of slope of 1/4 to 1/3 from the height of the support point; o climb up and down a ladder while: – always having three support points; – holding the bars, not the side rails; – remaining between the side rails; – holding nothing in the hands; – facing the ladder; o check the soil bearing capacity and install beds. • Close all openings (stairwell) or install a guardrail.
Respiratory problems	• Irritations of bronchial tubes and airways	• Use a type 100 reusable respirator.

Hazards	Effects on Health and Safety	Means of Prevention
Task 15 Build wooden staircases		
Eye injuries	• Foreign bodies (wood splinters)	• Wear safety glasses complying with the Safety Code for the construction industry, sec. 2.10.5.
Hand and other bodily injuries	• Cuts • Fractures	• Wear work gloves. • Ensure that manual and portable tools are in good condition.
Electric discharges	• Electrocution	• Use conforming electric equipment (double insulation or grounding) and use extension cords in good condition.
Task 16 Install integrated furniture		
Back injuries (excessive efforts)	• Backache (low back pain, sprains or herniated disks)	• Use appropriate handling equipment and avoid excessive twists and efforts. • Take training in manual handling methods.
Eye injuries	• Foreign bodies	• Wear safety glasses complying with the Safety Code for the construction industry, sec. 2.10.5.
Hand and other bodily injuries	• Cuts • Fractures	• Wear work gloves. • Ensure that manual and portable tools are in good condition.
Electric discharges	• Electrocution	• Use conforming electric equipment (double insulation or grounding) and use extension cords in good condition.
Fall or overturn of an aerial platform	• Collisions • Internal injuries • Fractures • Bruises • Death • Psychological and physical after-effects	• Know the correct way to use this type of equipment and never exceed the rated load.

Hazards	Effects on Health and Safety	Means of Prevention
Task 17 Do outdoor finishing work		
Eye injuries	• Foreign bodies	• Wear safety glasses complying with the Safety Code for the construction industry, sec. 2.10.5.
Noise	• Deafness	• Wear ear plugs or shells. • Use less-noisy tools.
Electric discharges	• Electrocution	• Use conforming electric equipment (double insulation or grounding) and use extension cords in good condition.
Same-level falls (housekeeping)	• Collisions • Contusions • Fractures • Bruises	• Clean the work area (pick up debris). • Close all openings or install a guardrail.
Falls from height (using a ladder, stepladder, scaffolding or aerial platform)	• Collisions • Internal injuries • Fractures • Bruises • Death • Psychological and physical after-effects	• Use a class 1 ladder: o position and observing an angle of slope of 1/4 to 1/3 from the height of the support point; o climb up and down a ladder while: – always having three support points; – holding the bars, not the side rails; – remaining between the side rails; – holding nothing in the hands; – facing the ladder; o check the soil bearing capacity and install beds. • When there is a risk of falling more than 3 m: – install a guardrail system; or – wear a shock-absorbing harness, with an anchor that has a breaking strength of 18 kN (4046 lb/F), complying with the specifications in the Safety Code for the construction industry, sec. 2.10.12. • To use a platform, know the correct way to use this type of equipment and never exceed the rated load.
Heat	• Heat exhaustion • Heatstroke	• Drink enough water (about 250 ml every 20 minutes) during a heat wave. • Wear absorbent clothing.
Cold	• Chilblains (frostbite)	• Wear insulating clothing.

Hazards	Effects on Health and Safety	Means of Prevention
Task 18 Install suspended ceilings		
Eye injuries	• Foreign bodies • Dust	• Wear safety glasses.
Falls from height (using a ladder, stepladder, scaffolding or aerial platform)	• Collisions • Internal injuries • Fractures • Bruises • Death • Psychological and physical after-effects	• Use a class 1 ladder: o position and observing an angle of slope of 1/4 to 1/3 from the height of the support point; o climb up and down a ladder while: – always having three support points; – holding the bars, not the side rails; – remaining between the side rails; – holding nothing in the hands; – facing the ladder; o check the soil bearing capacity and install beds. • When there is a risk of falling more than 3 m: – install a guardrail system; or – wear a shock-absorbing harness, with an anchor that has a breaking strength of 18 kN (4046 lb/F), complying with the specifications in the Safety Code for the construction industry, sec. 2.10.12. • To use a platform, know the correct way to use this type of equipment and never exceed the rated load.
Hand and other bodily injuries	• Cuts • Fractures	• Wear work gloves. • Ensure that manual and portable tools are in good condition.
Task 19 Do repair work		
The risk will depend on the repair work to be done.		
Task 20 Do renovation work		
The risk will depend on the renovation work to be done.		

Hazards	Effects on Health and Safety	Means of Prevention
Task 21 Build and erect scaffolds		
Excessive efforts	• Back injuries • Backache (low back pain, sprains or herniated disks)	
Falls from height	• Collisions • Internal injuries • Fractures • Bruises • Death • Psychological and physical after-effects	• When there is a risk of falling more than 3 m: – install a guardrail system; or – wear a shock-absorbing harness, with an anchor that has a breaking strength of 18 kN (4046 lb/F), complying with the specifications in the Safety Code for the construction industry, sec. 2.10.12.
Collapses	• Collisions • Internal injuries • Fractures • Bruises • Death • Psychological and physical after-effects	• Mount any scaffolding under the supervision of an experienced person and in a way that complies with all requirements of the Safety Code for the construction industry (see section 3.9).
Task 22 Install wood or composite parquet flooring **Task 23 Finish wood or composite parquet flooring**		
Consult Annex 3, "Flooring-Layer-Sander."		
Task 24 Perform pile-driving related activities **Task 25 Shore up retaining walls** **Task 26 Put a diaphragm or mud wall in place** **Task 27 Put steel sheet piles in place**		
Consult Annex 3, "Deep Foundation Layer."		

Annex 3

OCCUPATIONAL ANALYSIS REPORTS
ON THE THREE (3) SPECIALTIES OF THE CARPENTER-JOINER TRADE

- **Occupational Analysis Report “Concrete Former”**
- **Occupational Analysis Report “Flooring-Layer-Sander”**
- **Occupational Analysis Report “Deep Foundation Layer”**

Annex 3

Concrete Former

A Specialty of the Carpenter-joiner Trade

Occupational Analysis Report

March 2011

Commission
de la construction
du Québec

The purpose of this report is to describe as accurately as possible the specialty of concrete former 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 competencies 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 present report does not bind the Commission in any way. It has no legal effect and is meant as a reflection of discussions held on the date of the analysis workshop.

PRODUCTION TEAM

The Commission de la construction du Québec wishes to thank the production team for this occupational analysis of the concrete former specialty. This report is an integral part of Annex 3 of the carpenter-joiner occupational analysis report adopted by Commission authorities.

Direction
Jean Mathieu
Section Manager
Commission de la construction du Québec

Coordination
Doris Gagnon
Training Advisor
Commission de la construction du Québec

Conduct of the workshop and production of the report
Lucie Marchessault
Training Consultant

Production support
Alyre Thireau
Instructor, Centre de formation Pierre-Dupuy
Marie-Victorin School Board

Yves Rondeau
Training Advisor
Commission de la construction du Québec

Secretarial Work and Page Layout
Sylvie Brien
Commission de la construction du Québec

Translation
Traductions Globe Translations

The masculine gender is used generically
in this document to facilitate reading.

ACKNOWLEDGEMENTS

Production of the present report was made possible by the collaboration and participation of many people. The Commission de la construction du Québec (CCQ) is grateful for the quality of the information provided by those consulted during the main workshop on the carpenter-joiner trade, held on January 19, 20 and 21, 2011, and gives special thanks to the concrete formers who so generously agreed to participate in the analysis workshop regarding their specialty on March 14, 2011 in order to validate and complete the portrait of their specialty. The persons consulted are:

Jean Lachance
Carpenter-joiner, foreman
Neilson, Saint-Nicolas

Domenic Sicuso
Concrete former, foreman
ONE, Manitoba

TABLE OF CONTENTS

List of Tables

INTRODUCTION

In early 2009, the CCQ's Direction de la formation professionnelle launched a large-scale operation to review the occupational analyses[1] of all construction industry trades[2] and specialities.

The CCQ undertook this operation for many reasons, particularly the following:

- 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 and specialty;
- the fact that most construction occupational analyses had been conducted between 1987 and 1991 and had not been reviewed since;
- updates to vocational qualification 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 updating the occupational analyses in order to obtain a current and complete provincial profile of the various trades and specialities.

The occupational analysis of the concrete former specialty belongs to this context[3]. Its purpose is to describe the specialty as currently practiced by journeymen in the construction industry. The present report was written in order to collate and organize the information gathered during the supplementary occupational analysis workshop on the carpenter-joiner trade, held in Montreal on March 14, 2011, with regard to the concrete former specialty.

This analysis aims to draw a portrait (tasks and operations) of the specialty and its entry requirements, 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 concrete formers. A special effort was made to include in this report all the data collected during the workshop and to ensure that the data accurately depict the realities of the specialty analysed.

1. Occupational analyses were then called "work situation analyses".
2. The terms "profession" and "trade" are considered synonymous.
3. This occupational analysis was conducted according to 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 the Commission des partenaires du marché du travail, ministère de l'Emploi et de la Solidarité sociale.

1. GENERAL CHARACTERISTICS OF THE SPECIALTY

1.1 DEFINITION OF THE SPECIALTY

Concrete formers perform their tasks in companies specializing in the formwork of buildings, or for general contractors in the four construction industry sectors. They practice their specialty as part of the carpenter-joiner trade when they do work subject to the Act Respecting Labour Relations, Vocational Training, and Workforce Management in the Construction Industry.

The following is the description of the concrete former specialty as a result of the request to amend Regulation r.6.2 on the definition of trades and occupations[4], submitted by the CCQ in June 2001:

> The specialty of concrete former includes the erection of concrete forms and their support system.
>
> Excluded are form removal, and work on metal forms for streets and sidewalks.

The participants in the occupational analysis workshop agree with the definition presented[5].

1.2 JOB TITLES

The participants mentioned that on construction sites, they are usually called “carpenters.” However, the job title used in the present report will be that of “concrete former,” because this title describes the specialty.

1.3 SECTORS OF ACTIVITY

Concrete formers are active in all four sectors of the construction industry, but to various degrees. For the year 2010, 1,395 workers, including 3 women, declared hours worked as concrete formers[6].

4. Changes have been made to that version of the regulation amendment. The version tabled in February 2011 to the Minister of Labour reads as follows: “The term ‘concrete former’ means any person who performs construction, erection and repair work on concrete forms including forms for footings, walls, piers, columns, beams, slabs, stairs, roads, sidewalks and curbs at ground level and form ties.”
5. The reader is invited to consult eventually the final version to be adopted by the Cabinet.

We asked the participants to estimate their work time allocation among the four sectors of activity, over their entire career as concrete formers in the construction industry. The table below presents the situation described by the concrete formers attending the analysis workshop.

Table 1.1 Work Time Allocated to Each Sector of Activity

Sector of Activity	Work Time Allocated to Each Sector
Residential	0%
Institutional and commercial	50%
Civil engineering and roads	30%
Industrial	20%

1.4 FIELD OF PRACTICE

The trade's field of practice is the construction industry. The Act r*especting 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

Concrete formers in the construction industry are subject to:

- the *Act respecting Labour relations, vocational training and workforce management in the construction industry* (R.S.Q., c. R-20);

6. Data compiled by the CCQ from the hours worked by apprentices and journeymen and declared in employers' monthly reports. However, some formwork hours may be declared in the carpenter-joiner code.

- the *Regulation respecting the vocational training of workforce in the construction industry* (R-20, r.6.2*);*
- the four sector-based collective *agreements* for the *construction industry*;
- the *National Building Code – Canada* (NBC);
- the *Quebec Building Code*, Chapter I – Building;
- the *Act Respecting Occupational Health and Safety* (R.S.Q., c.S-2.1);
- the *Safety Code for the construction industry* (R.Q. c. S-2.1, r.6);
- municipal by-laws, if applicable.

1.6 WORKING CONDITIONS[7]

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

Salary

The concrete former's hourly wage varies according to the construction industry sector in which work is done. According to the 2010-2013 collective agreements, a journeyman's daytime hourly wage, in October 2010, was as follows:

- Industrial, institutional and commercial, civil engineering and roads: $32.86
- Residential (heavy): $32.84
- Residential (light): $29.62

7. The general data on working conditions are taken from the four 2010-2013 collective agreements of the construction industry. The salary of concrete formers corresponds to that of carpenter-joiners.

Vacations and time off

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.

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.

Physical requirements

The work of concrete formers requires good physical condition and strength, because they have to lift and move substantial weights. However, safety rules and new equipment are contributing more and more to limit the weight of loads that concrete formers have to lift.

Work schedules

A 40-hour work week from Monday to Friday is the general rule in all construction industry sectors. Usually, the daily limit is 8 hours; but the four sector-based collective agreements provide a specific rule for carpenter-joiners, including concrete formers, that raises that limit to 10 hours.

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.

Moreover, the regular working hours of any employee assigned to some tasks in the civil engineering and roads sector are 45 hours per week from Monday to Friday, with a daily limit of 9 or 10 hours from Monday to Thursday and of 5 hours on Friday.

The participants pointed out that when working on construction sites in remote regions, work weeks may total up to 70 hours and include evenings and weekends.

1.7 JOB MARKET ENTRY CONDITIONS[8]

To obtain the competency certificate-apprentice in the trade, candidates must present to the CCQ the original version of an academic transcript or apprenticeship transcript attesting that they have passed a course of study and obtained a diploma recognized by the CCQ, i.e., the DEP in the carpenter-joiner trade, as well as a guarantee of employment from an employer registered with the CCQ for at least 150 hours within a period of not more than three consecutive months.

Although the construction industry favours graduates for access to the trade, labour shortages may at times make it necessary for the CCQ to admit candidates without a diploma.

8. For detailed information on access to the construction industry, consult the following section of the CCQ's website: http://www.ccq.org/E_CertificatsCompetence.aspx?sc_lang=en-CA&profil=DevenirTravailleur.

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 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.

The apprentice carpenter-joiner must have completed three apprenticeship periods of 2,000 hours each (6,000 hours total) in order to be eligible for the provincial qualification examination that leads to obtaining the competency certificate-journeyman for the trade[9]. Credits are paid into the apprenticeship record book of a carpenter-joiner who has obtained his diploma.

It should be noted that the participants did not take the study program leading to a DEP.

Moreover, certain characteristics are sought by employers hiring new concrete formers. The following list presents the main characteristics, in the order in which they were mentioned by the analysis workshop participants, and not in order of importance:

- ability to make and sustain physical effort;
- interest in learning;
- problem-solving ability and resourcefulness.

9. There exists certain conditions for obtaining a competency certificate limited to a specialized trade.

1.8 PLACE OF WOMEN IN THE SPECIALTY

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."

The main obstacle to the integration of women may be the necessary physical strength. Indeed, some men also find the work too difficult in this regard. However, according to the participants, although the work is physically demanding, some women can do it. The foremen should allocate tasks according to the abilities of each team member; so he can assign female concrete formers to tasks they are able to perform.

1.9 CAREER PROSPECTS

Concrete formers who want to advance in the construction field can aim for positions as team leader, foreman or superintendents. They can also become contractors and start up their own formwork company.

1.10 DEVELOPMENT OF THE SPECIALTY

The participants foresee changes in coming years and have already witnessed the following changes in the specialty:

- new types forms and equipment are appearing;
- concrete formers need more and more tools to work on new types of forms.

According to the participants, not only will the types of forms be more and more varied, but also the use of aluminum and prefabricated forms will increase.

1.11 IMPACT OF ENVIRONMENTAL STANDARDS ON THE PRACTICE OF THE TRADE

Generally, environmental rules have no direct impact on the work of concrete formers, who do not use products harmful to the environment.

2. WORK DESCRIPTION

2.1 TASKS AND OPERATIONS

List of tasks

The following list presents the main tasks performed by concrete formers[10]. The order in which the tasks are presented does not necessarily reflect their importance in the specialty.

Task1 Build forms for footings

Task 2 Build forms for concrete walls

Task 3 Build forms for concrete columns

Task 4 Build forms for concrete beams, slabs and stairs

Table of tasks and operations

During the workshop, a table of tasks and operations produced by concrete formers was submitted to the participants. Following discussions, changes were made to the table. The final version is presented in the following pages.

Types of forms

Concrete formers may build the following types of forms:

- wooden with metal stringers;
- permanent/insulating;
- industrial;
- with jacks and scaffolds;
- prefabricated (Aluma type);
- metal (panels);
- flying.

10. These tasks correspond to tasks 2 to 5 of the carpenter-joiner occupational analysis.

Table 2.1 Tasks and Operations

TASKS	OPERATIONS[11]					
1. **BUILD FORMS FOR FOOTINGS**	1.1 Learn about the work to be done	1.2 Draw the footing lines	1.3 Prepare the forms	1.4 Draw the level pour line	1.5 Prepare and fasten templates for the reinforcing steel and anchors	1.6 Prepare the passage of the building's mechanical elements
	1.7 Install keys and gaskets and check the stays	1.8 Monitor the forms during the pour	1.9 Strip the footing forms and store the materials			
2. **BUILD FORMS FOR CONCRETE WALLS**	2.1 Learn about the work to be done	2.2 Draw the wall lines	2.3 Assemble panels, ties and, if applicable, spacers	2.4 Put in place the false frames of openings	2.5 Double the panels (on the inner side)	2.6 Install the sole plate or anchors
	2.7 Align the forms and shore them up	2.8 Install walkways, railings and accesses, if applicable	2.9 Prepare and fasten anchoring templates	2.10 Check the assemblies	2.11 Monitor the forms during the pour	2.12 Strip the forms and store the materials
3. **BUILD FORMS FOR CONCRETE COLUMNS**	3.1 Learn about the work to be done	3.2 Draw the location of columns on the concrete base or slab	3.3 Install base flanges, if applicable	3.4 Assemble the form panels	3.5 Put the forms in place	3.6 Surround and shore up the forms
	3.7 Check the assemblies	3.8 Make cleaning doors, if applicable	3.9 Monitor the forms during the pour	3.10 Strip the forms and store the materials		

11. Read the professional subcommittee's comment in Annex 3, note 1.

TASKS	OPERATIONS[11]					
4. **BUILD FORMS FOR CONCRETE BEAMS, SLABS AND STAIRS**	4.1 Learn about the work to be done	4.2 Draw the location of beams, slabs, mechanical shafts and stairs on the footing	4.3 Install shoring systems	4.4 Place light beams (stringers and joists)	4.5 Assemble beam and floor panels	4.6 Check the slab bottom's final elevation
	4.7 Complete the formwork at the perimeter of the floor and columns	4.8 Make the final adjustment to the perimeter's shoring and elevation	4.9 Oil the panels, if applicable	4.10 Prepare and install expansion joints (and pour-stop joints)	4.11 Monitor the forms during the pour	4.12 Strip, shore up again and store the materials

2.2 OPERATIONS, SUB-OPERATIONS AND CLARIFICATIONS

In the following pages are presented the sub-operations related to most of the operations[12], as well as a few clarifications made by the participants.

The participants mentioned that in addition to the following tasks, operations and sub-operations, concrete formers have to install the necessary scaffolds for working from heights. However, on large construction sites, scaffolds are installed by a team of subcontractors.

Table 2.2 Sub-Operations and Operation Clarifications

TASK 1 BUILD FORMS FOR FOOTINGS

Main fields of application

For this task, the participants identified the following main fields of application:

- foundation footings;
- pillar supports;
- tower crane supports;
- dam foundations;
- retaining wall supports.

Operations	Sub-Operations	Clarifications
1.1 Learn about the work to be done		
1.2 Draw the footing lines	1.2.1 Reinstall footing lines after digging	The foreman provides guidelines on lines to be drawn.
1.3 Prepare the forms	1.3.1 Prepare and install formwork parts (oil, if applicable) 1.3.2 Prepare and install struts for the footing width 1.3.3 Immobilize the formwork 1.3.4 Align the forms	
1.4 Draw the level pour line		

12. The sequence of operations may vary according to the methods, techniques or products used, or according to the company's organization.

TASK 1 BUILD FORMS FOR FOOTINGS

Operations	Sub-Operations	Clarifications
1.5 Prepare and fasten templates for the reinforcing steel and anchors	1.5.1 Measure, draw and prepare templates 1.5.2 Install and fasten templates	
1.6 Prepare the passage of the building's mechanical elements	1.6.1 Prepare and install boxes or other insertion structures 1.6.2 Install anchors	
1.7 Install keys and gaskets and check the stays	1.7.1 Prepare and install wooden keys 1.7.2 Prepare and install gaskets 1.7.3 Check the formwork's solidity	This operation will be verified with the surveyor.
1.8 Monitor the forms during the pour		The former must ensure that the formwork remains firmly in place during the pour. If a problem arises, the former can have the pour stopped.
1.9 Strip the footing forms and store the materials	1.9.1 Remove the formwork and stays 1.9.2 Remove the nails 1.9.3 Pick up and clean the forms 1.9.4 Pick up debris 1.9.5 Oil the forms as necessary	Normally, the labourer strips the forms, but occasionally the journeyman former does it.

TASK 2 BUILD FORMS FOR CONCRETE WALLS

Main fields of application

For this task, the participants identified the following main fields of application:

- foundations;
- walls (underground, etc.);
- ventilation shafts;
- silos, vaults, pools or ponds, furnaces, safety chambers, nuclear shelters, safes;
- firewalls, soundproof walls, explosion-proof walls;
- retention ponds;
- elevator shafts;
- forms: wooden, metal, in insulating material, plastic, and cardboard.

Operations	Sub-Operations	Clarifications
2.1 Learn about the work to be done		

TASK 2 BUILD FORMS FOR CONCRETE WALLS

Operations	Sub-Operations	Clarifications
2.2 Draw the wall lines	2.2.1 Place lines on the trestles 2.2.2 Lower the exterior wall points on the footing 2.2.3 Draw lines on the footing 2.2.4 Drive nails on the footing to align the forms	The surveyor provides the points to be observed.
2.3 Assemble panels, ties and, if applicable, spacers	2.3.1 Prepare the materials 2.3.2 Check the condition and oiling of panels 2.3.3 Align form panels on the footing and fasten them 2.3.4 Place the ties and, if applicable, the spacers 2.3.5 Block the panels	
2.4 Put in place the false frames of openings	2.4.1 Level and fasten the false frames on form panels 2.4.2 Install reinforcing steel as necessary and according to the plan (residential)	The work is done while the formwork is being assembled.
2.5 Double the panels (on the inner side)		The sequence of this operation may vary according to the type of formwork.
2.6 Install the sole plate or anchors	2.6.1 Level the sole plate and put it at the correct location in the formwork 2.6.2 Fasten the sole plate (nailing, anchor bolts or others)	
2.7 Align the forms and shore them up	2.7.1 Draw the lines on the formwork 2.7.2 Align the forms and shore them up solidly on each side	
2.8 Install walkways, railings and accesses, if applicable	2.8.1 Install and ensure compliance with standards and solidity	For traditional formwork, metal squares are installed.
2.9 Prepare and fasten anchoring templates		The surveyor determines the dimensions and levels to be observed.

TASK 2 BUILD FORMS FOR CONCRETE WALLS

Operations	Sub-Operations	Clarifications
2.10 Check the assemblies	2.10.1 Check the panel assembly and the stays' solidity 2.10.2 Make corrections, if applicable	
2.11 Monitor the forms during the pour		This mainly involves ensuring formwork alignment and solidity.
2.12 Strip the forms and store the materials	2.12.1 Remove the sinkers 2.12.2 Remove the forms and stays 2.12.3 Remove the nails 2.12.4 Break the ties 2.12.5 Pick up and clean the forms 2.12.6 Oil the forms as necessary	Normally, the labourer strips the forms, but occasionally the journeyman former does it.

TASK 3 BUILD FORMS FOR CONCRETE COLUMNS

Main fields of application

For this task, the participants identified the following main fields of application:

- rectangular, square, hexagonal, octagonal, etc. columns;
- round columns;
- irregularly shaped columns;
- capped columns.

Operations	Sub-Operations	Clarifications
3.1 Learn about the work to be done		
3.2 Draw the location of columns on the concrete base or slab[13]		
3.3 Install base flanges, if applicable	3.3.1 Fasten the base flanges to the slab	
3.4 Assemble the form panels		For round cardboard columns, no assembly is required.
3.5 Put the forms in place	3.5.1 Fasten to the base flange	

13. Read the professional subcommittee's comment in Annex 3, note 2.

TASK 3 BUILD FORMS FOR CONCRETE COLUMNS

Operations	Sub-Operations	Clarifications
3.6 Surround and shore up the forms	3.6.1 Level the columns and place them at the correct elevation	Steel belts or pieces of wood are used (2 in. × 4 in.).
3.7 Check the assemblies	3.7.1 Make sure of the location and solidity	
3.8 Make cleaning doors, if applicable	3.8.1 Make openings and cleaning doors to clean and reclose after cleaning	
3.9 Monitor the forms during the pour		
3.10 Strip the forms and store the materials	3.10.1 Remove the belts 3.10.2 Remove the forms and stays 3.10.3 Remove the nails 3.10.4 Pick up and clean the forms 3.10.5 Oil the forms as necessary	Normally, the labourer strips the forms, but occasionally the journeyman former does it.

TASK 4 BUILD FORMS FOR CONCRETE BEAMS, SLABS AND STAIRS

Main fields of application

For this task, the participants identified the following main fields of application:

- slabs on concrete beams;
- slabs on steel beams;
- cantilever slabs;
- economical slabs (with hollowed-out bottom);
- sloping slabs;
- vault slabs;
- beams on columns;
- cantilever beams;
- arched beams;
- vault beams;
- stairs: solid, open, with hollowed-out bottom, and with landings.

Operations	Sub-Operations	Clarifications
4.1 Learn about the work to be done		
4.2 Draw the location of beams, slabs, mechanical shafts and stairs on the footing		Locations and elevations are determined according to data provided by the surveyor.
4.3 Install shoring systems	4.3.1 Check the alignment and elevation of scaffolds and jacks	

TASK 4 BUILD FORMS FOR CONCRETE BEAMS, SLABS AND STAIRS		
Operations	**Sub-Operations**	**Clarifications**
4.4 Place light beams (stringers and joists)	4.4.1 Mark and place	
4.5 Assemble beam and floor panels	4.5.1 Measure, assemble and, as necessary, oil the beam and floor panels 4.5.2 Ensure the jointing of panels 4.5.3 Reserve spaces to transfer the axes and benchmark to the next slab	The benchmark is often called “BM.”
4.6 Check the slab bottom’s final elevation	4.6.1 Check the level with the surveyor’s data 4.6.2 Adjust as necessary	
4.7 Complete the formwork at the perimeter of the floor and columns		
4.8 Make the final adjustment of the perimeter’s shoring and elevation		The engineer checks, and the former makes necessary adjustments.
4.9 Oil the panels, if applicable		
4.10 Prepare and install expansion joints (and pour-stop joints)	4.10.1 Determine the location of expansion joints, prepare and install them 4.10.2 Plan, prepare and install pour-stop joints	
4.11 Monitor the forms during the pour		
4.12 Strip, shore up again and store the materials	4.12.1 Unscrew the jacks 4.12.2 Remove the small beams and scaffolding 4.12.3 Remove forms, stays and form nails 4.12.4 Pick up and clean the forms 4.12.5 Pick up the debris 4.12.6 Oil the forms as necessary	Normally, the labourer strips the forms, but occasionally the journeyman former does it.

2.3 ACHIEVEMENT CONDITIONS

Achievement condition data were collected for the entire specialty of concrete former. They pertain to aspects such as workplaces, work instructions, health and safety hazards, reference documents consulted, etc.

Table 2.3 Achievement Conditions

ACHIEVEMENT CONDITIONS
Workplaces[14] Concrete formers almost always work outdoors (about 90% of the time) and often in difficult conditions (rain, snow, extreme temperatures, uneven and muddy ground, etc.).
Instructions Concrete formers receive verbal instructions from their foreman. The latter may also, occasionally, make hand drawings to explain the work to be done.
Documentation Concrete formers do not use specific written documentation to do their work. The foreman refers to the plans, specifications, codes, standards, etc., and then gives the information to the former.
Supervision and collaboration Concrete formers always work in a team, with another former and occasionally a labourer. The teams can be comprised of several pairs or trios. Experienced workers have a lot of autonomy.
Stress factors According to the participants, the main stress factors are: ▪ working in confined spaces; ▪ tight deadlines to meet; ▪ working from heights, in the case of workers subject to vertigo.

14. Non-exhaustive list.

2.4 PERFORMANCE CRITERIA

Performance criteria were collected for each task. They are used for evaluating whether tasks have been performed satisfactorily. The criteria apply to aspects such as the quantity and quality of the work done, observance of a work procedure, the attitudes adopted, etc.

Table 2.4 Performance Criteria

TASK 1 BUILD FORMS FOR FOOTINGS
Performance Criteria
▪ Observing the allocated time ▪ Observing the sequence of tasks ▪ Choosing the appropriate work technique ▪ Following instructions ▪ Solid and correctly assembled forms ▪ Positioning forms appropriately ▪ Observing the footing lines ▪ Appropriately protecting the footing once the forms are stripped ▪ Observing health and safety rules
TASK 2 BUILD FORMS FOR CONCRETE WALLS
Performance Criteria
▪ Observing the allocated time ▪ Observing the sequence of tasks ▪ Choosing the appropriate work technique ▪ Following instructions ▪ Solid and correctly assembled forms ▪ Observing the measurements ▪ Cleaning the wall appropriately ▪ Observing health and safety rules

TASK 3 BUILD FORMS FOR CONCRETE COLUMNS

Performance Criteria

- Observing the allocated time
- Observing the sequence of tasks
- Choosing the appropriate work technique
- Following instructions
- Solid and correctly assembled forms
- Observing the measurements
- Cleaning the wall appropriately
- Precise work
- Observing health and safety rules

TASK 4 BUILD FORMS FOR CONCRETE BEAMS, SLABS AND STAIRS

Performance Criteria

- Observing the allocated time
- Observing the sequence of tasks
- Choosing the appropriate work technique
- Following instructions
- Solid and correctly assembled forms
- Observing the measurements
- Cleaning the wall appropriately
- Precise work
- Observing health and safety rules

3. QUANTITATIVE DATA ON TASKS

3.1 OCCURRENCE

Occurrence data concern the percentage of concrete formers[15] who perform a task in the same workplace. The data presented in the tables below are the average results of the participants in the workshop. They provide information on the use of time not only by the participants who attended the workshop, but also by all concrete formers working in the companies represented.

Table 3.1 Occurrence of Tasks

Task	Occurrence
1 Build forms for footings	100%
2 Build forms for concrete walls	77.5%
3 Build forms for concrete columns	90%
4 Build forms for concrete beams, slabs and stairs	50%

3.2 IMPORTANCE AND DIFFICULTY OF TASKS

The importance of a task is estimated according to the more or less harmful consequences of performing a task poorly or not at all. The importance is assessed according to the following scale:

1. Not important at all: Performing the task less successfully does not lead to consequences for the result's quality, the costs, health and safety, etc.;

2. Not very important: Poor execution of the task may entail minimal costs, lead to a result of lesser quality, involve risks of injury, or minor accidents, etc.;

15. The data also include apprentices.

3. Important: Poor execution of the task may entail an unsatisfactory result, substantial additional costs, injuries, accidents, etc.;

4. Very important: Poor execution of the task may entail an unacceptable result and very major consequences regarding costs, safety, etc.

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 specialty.

The data presented in the following table are the average results for the workshop participants.

Table 3.2 Importance and Difficulty of Tasks

Task		Importance	Difficulty
1	Build forms for footings	2	2
2	Build forms for concrete walls	4	2
3	Build forms for concrete columns	4	2.5
4	Build forms for concrete beams, slabs and stairs	4	3.5

4. KNOWLEDGE, SKILLS AND ATTITUDES

The occupational analysis 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 participants, are considered essential for performing the tasks of the specialty of concrete former.

4.1 KNOWLEDGE

Communication

The concrete former has to communicate with his teammates, the foreman, workers in other trades, the surveyor, etc. In all cases, he must demonstrate respect, so as to maintain harmonious relations.

Mathematics

The concrete former uses the four basic operations, mainly to take measurements. Calculations are particularly important during stair formwork. The concrete former mainly uses the metric system.

Health and safety

The concrete former has to know the health and safety rules inherent to the practice of his specialty.

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 used for working. According to the occupational analysis workshop participants, the main cognitive skills necessary to concrete formers are the following:

- problem-solving;
- planning the work.

Motor skills

Motor skills involve gestures and movements. The main motor skills necessary to concrete formers are the following:

- good coordination;
- dexterity.

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 concrete formers are the following:

- good vision, particularly for alignment operations;
- fine sense of smell, particularly for distinguishing gas or diesel odours;
- good spatial perception, to visualize the necessary formwork for obtaining a specific shape.

4.3 ATTITUDES

Attitudes are a way of acting, reacting and relating with others or with one's environment. They involve personal skills. The main attitudes necessary to concrete formers are the following:

- respect for others;
- attention to tools and equipment;

- ability to concentrate;
- patience with young people new to the trade;
- autonomy;
- imagination;
- resourcefulness.

5. TRAINING SUGGESTIONS

Initial training

The participants consider that apprentices should learn from the beginning to do things as they should be done – in other words, that apprentices should be well supervised by experienced and competent journeymen. The participants mentioned that form stripping teaches how to do formwork well, because it shows the things that should not be done. Taking care to be precise is an important trait to be developed in apprentices.

Professional development and upgrading

The participants would be interested in upgrading their skills in areas such as:

- new formwork systems (ex.: Peri® type);
- permanent insulating formwork;
- reading plans and specifications (to become foremen);
- certain types of unusual formwork (e.g.: variable-geometry formwork).

Annexes

Annex 1

MATERIAL RESOURCES, TOOLS AND EQUIPMENT

Tools and equipment

- Crowbar
- Toolbox
- Scaffolds
- Heater
- Personal protective equipment
- Sledge hammer
- Laser level, surveyor's level
- Shovel
- Drill
- Plumb laser
- Rake
- Grinder
- Electric saw, two-handed saw
- Clamp
- Trowel
- Telescopic jacks
- Vibrator

Material resources

- Ties
- Reinforcing bars
- Concrete
- Prefabricated polymer blocks and panels
- Wire
- Steel cables
- Chairs for reinforcing steel
- Nails
- Studs
- Plywood
- Metal belts and turnbuckle
- Planks
- Panels
- Stakes
- Boards
- Polyethylene
- Small beams
- Joists
- Tie rods
- Ties
- Insulating canvases
- Tubes

Annex 2

GRID OF OCCUPATIONAL HEALTH AND SAFETY ELEMENTS

Produced by: **Louise Lessard**, Prevention Consultant
ASP Construction

Table A.1 Description of Hazards in Practicing the Concrete Former Specialty

Hazards	Effects on Health and Safety	Means of Prevention
Hand injuries	• Cuts • Scratches	• Wear working gloves.
Eye injuries	• Foreign bodies	• Wear safety glasses.
Excessive efforts	• Backache	• Use handling equipment or do the handling within a team.
Falling objects	• Crashing • Jamming	• Use good slinging techniques. • Never stand below a lifting device.
Same-level falls (slipping, mud, snow)	• Collisions • Contusions • Fractures • Bruises	• Clean the work areas (pick up debris). • Absorb the oils. • Apply abrasives to make the surface less slippery.
Falls from height	• Collisions • Internal injuries • Fractures • Bruises • Death • Psychological and physical after-effects	• Install a guardrail beside all the holes left without protection; otherwise, wear a safety harness in accordance with section 2.10.12 of the Safety Code for the construction industry.
Noise	• Deafness	• Wear hearing protection complying with SC provisions, section 2.10.7.6.
Heat	• Heat exhaustion • Heat stroke	• Drink enough water (about 250 ml every 20 minutes) during a heat wave. • Wear absorbent clothing.

Hazards	Effects on Health and Safety	Means of Prevention
Cold and humidity (90% outdoors)	• Chilblains (frost bite)	• Wear insulating clothing.
Collisions with machinery	• Fractures • Contusions	• Make sure to always be visible to the crane operator; otherwise, request a flagger's help.
Presence of corrosive materials (formwork oil)	• Skin injuries	• Train workers in WHMIS.
Electric tools	• Electrocution	• Use tools in good condition and keep any extension cord or electric connection away from water.

Annex 3

COMMENTS OF THE CARPENTER-JOINER PROFESSIONAL SUBCOMMITTEE

At the meeting of the carpenter-joiner professional subcommittee, held on April 26, 2012 in Montreal, the subcommittee members issued the following comments about the concrete former specialty:

1. Table 2.1, p. 12 and 13, about the specialities tasks and operations:

   Depending on weather conditions, concrete formers may have to erect temporary shelters. In those cases, for each task, an operation can be added to those already listed.

2. Table 2.2, p. 17, Task 3 Build forms for concrete columns:

   A sub-operation, “Install shoring systems,” should be added between operations 3.2 and 3.3.

Annex 3

Flooring-layer-sander

A Specialty of the Carpenter-Joiner Trade

Occupational Analysis Report

April 2011

Commission
de la construction
du Québec

The purpose of this report is to describe as accurately as possible the specialty of flooring-layer-sander 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 competencies 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 present report does not bind the Commission in any way. It has no legal effect and is meant as a reflection of discussions held on the date of the analysis workshop.

PRODUCTION TEAM

The Commission de la construction du Québec wishes to thank the production team for this occupational analysis of the flooring-layer-sander specialty. This report is an integral part of Annex 3 of the carpenter-jointer occupational analysis report adopted by Commission authorities.

Direction
Jean Mathieu
Section Manager
Commission de la construction du Québec

Coordination
Doris Gagnon
Training Advisor
Commission de la construction du Québec

Conduct of the workshop and production of the report
Lucie Marchessault
Training Consultant

Production support
Alyre Thireau
Teacher, Centre de formation Pierre-Dupuy
Marie-Victorin School Board

Yves Rondeau
Training Advisor
Commission de la construction du Québec

Secretarial Work and Page Layout
Sylvie Brien
Commission de la construction du Québec

Translation
Traductions Globe Translations

The masculine gender is used generically
in this document to facilitate reading.

ACKNOWLEDGEMENTS

Production of the present report was made possible by the collaboration and participation of many people. The Commission de la construction du Québec (CCQ) is grateful for the quality of the information provided by those consulted during the main workshop on the carpenter-joiner trade, held on January 19, 20 and 21, 2011, and gives special thanks to the flooring-layers-sanders who so generously agreed to participate in the analysis workshop regarding their specialty on March 10, 2011. The persons consulted are:

Billy Charbonneau
Carpenter-joiner
Montreal

Roger Landry
Flooring-layer-sander
Le Gardeur

TABLE OF CONTENTS

List of Tables

INTRODUCTION

In early 2009, the CCQ's Direction de la formation professionnelle launched a large-scale operation to review the occupational analyses[1] of all construction industry trades[2] and specialties.

The CCQ undertook this operation for many reasons, particularly the following:

- 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 and specialty;
- the fact that most construction occupational analyses had been conducted between 1987 and 1991 and had not been reviewed since;
- updates to vocational qualification 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 updating the occupational analyses in order to obtain a current and complete provincial profile of the various trades and specialities.

The occupational analysis of the flooring-layer-sander specialty belongs to this context[3]. Its purpose is to describe the specialty as currently practiced by journeymen in the construction industry. The present report was written in order to collate and organize the information gathered during the supplementary occupational analysis workshop on the carpenter-joiner trade, held in Montreal on March 10 2011, for the flooring-layer-sander specialty.

This analysis aims to draw a portrait (tasks and operations) of the specialty and its entry requirements, 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 flooring-layers-sanders. A special effort was made to include in this report all the data collected during the workshop and to ensure that the data accurately depict the realities of the specialty analysed.

1. Occupational analyses were then called "work situation analyses".
2. The terms "profession" and "trade" are considered synonymous.
3. This occupational analysis was conducted according to 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 the Commission des partenaires du marché du travail, ministère de l'Emploi et de la Solidarité sociale.

1. GENERAL CHARACTERISTICS OF THE SPECIALTY

1.1 DEFINITION OF THE SPECIALTY

Flooring-layers-sanders perform their tasks in companies specializing in laying parquet flooring and floors, particularly in the residential, institutional and commercial sectors. They practice their specialty as part of the carpenter-joiner trade when they do work subject to the Act Respecting Labour Relations, Vocational Training, and Workforce Management in the Construction Industry.

According to the Regulation respecting the vocational training of workforce in the construction industry (Annex A, sec. 1), the term “flooring-layer-sander” means:

> […] any person who:
>
> a) for the purposes of assembling parquet flooring made of wood or substitute composite materials,
>
> i. prepares, assembles and applies the furring and covering of the subfloor;
>
> ii. does minor preparatory work on the surface;
>
> iii. sets sound and thermal insulation;
>
> iv. lays parquet flooring, particularly wood lathing and laying of floors, including peripheral mouldings;
>
> v. performs the sanding and finishing of wooden flooring;
>
> b) lays, sands and finishes the wooden flooring of bowling alleys.
>
> Performance of the work described in the first and third paragraphs includes trade-related handling for the purposes of immediate and permanent installation.

The participants in the occupational analysis workshop agree with the definition presented.

1.2 JOB TITLES

The title “flooring-layer-sander” is rarely heard on construction sites; but this report uses that title, because it is used in the Regulation respecting the vocational training of workforce in the construction industry. In the workplace, flooring-layers-sanders are most often called “floorers.”

The participants point out that contractors often ask them if they also hold a competency card for the trade of resilient flooring layer or tile setter; if that is the case, contractors do not have to hire more than one person to finish covering all the floors in a building.

1.3 SECTORS OF ACTIVITY

Flooring-layers-sanders are mainly active in two sectors of activity in the construction industry:

- residential, for 80% of the workload;
- institutional and commercial, for 20% of the workload[4].

They rarely work in the industrial sector or the civil engineering and roads sector. In 2010, 612 workers, including 3 women, had declared hours worked in flooring.

We asked the participants to estimate their work time allocation among the four sectors of activity, over their entire career as flooring-layers-sanders in the construction industry. The table below presents the situation described by the flooring-layers-sanders attending the analysis workshop.

Table 1.1 Work Time Allocated to Each Sector of Activity

Sector of Activity	Work Time Allocated to Each Sector
Residential	25%
Institutional and commercial	75%
Civil engineering and roads	0%
Industrial	0%

4. Data compiled by the CCQ for the year 2010, from the hours worked by apprentices and journeymen and declared in employers' monthly reports. However, some flooring-layer-sander hours may be declared in the carpenter-joiner code.

1.4 FIELD OF PRACTICE

The trade's field of practice is the construction industry. The Act r*especting 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

Flooring-layers-sanders in the construction industry are subject to:

- the *Act respecting Labour relations, vocational training and workforce management in the construction industry* (R.S.Q., c. R-20);
- the *Regulation respecting the vocational training of workforce in the construction industry* (R-20, r.6.2*);*
- the four sector-based collective *agreements* for the *construction industry*;
- the *National Building Code – Canada* (NBC);
- the *Quebec Building Code*, Chapter I – Building;
- the *Act Respecting Occupational Health and Safety* (R.S.Q., c.S-2.1);
- the *Safety Code for the construction industry* (R.Q. c. S-2.1, r.6);
- municipal by-laws, if applicable.

1.6 WORKING CONDITIONS[5]

The following information provides an overview of the conditions and context of the work of flooring-layers-sanders, as commented by the participants in the occupational analysis workshop. To obtain up-to-date and complete information that has legal effect, it is necessary to refer to the four collective agreements for the construction industry sectors.

Salary

The flooring-layer-sander's hourly wage varies according to the construction industry sector in which work is done. According to the 2010-2013 collective agreements, a journeyman's daytime hourly wage, in October 2010, was as follows:

- Industrial, institutional and commercial, civil engineering and roads: $32.86
- Residential (heavy): $32.84
- Residential (light): $29.62

Vacations and time off

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. The general data on salaries are taken from the four 2010-2013 collective agreements of the construction industry. The salary of flooring-layers-sanders corresponds to that of carpenter-joiners.

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.

Physical requirements

The work requires good physical condition. Flooring-layers-sanders are continually in movement and must almost always be on their knees or bent over, with their back and joints under stress. The workers must be strong enough to carry sandblasters (often more than once a day), and rarely take the time to disassemble them and thus lessen their weight.

Work schedules

A 40-hour work week from Monday to Friday is the general rule in all construction industry sectors. Usually, the daily limit is 8 hours; but the four sector-based collective agreements provide a specific rule for carpenter-joiners, including flooring-layers-sanders, that raises that limit to 10 hours.

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.

The working hours of flooring-layers-sanders can vary from one contract to another; they may work long hours for a few days and then have a few less-busy days. They often start very early in the morning, to end their day in mid-afternoon. Overtime and evening work are rare for flooring-layers-sanders, because daylight is necessary to ensure the quality of their work. The persons consulted work some thirty hours a week on average, about from April to November. Flooring-layers-sanders rarely work outside their area of residence.

1.7 JOB MARKET ENTRY CONDITIONS[6]

To obtain the competency certificate-apprentice in the trade, candidates must present to the CCQ the original version of an academic transcript or apprenticeship transcript attesting that they have passed a course of study and obtained a diploma recognized by the CCQ, i.e., the DEP in the carpenter-joiner trade, as well as a guarantee of employment from an employer registered with the CCQ for at least 150 hours within a period of not more than three consecutive months.

Although the construction industry favours graduates for access to the trade, labour shortages may at times make it necessary for the CCQ to admit candidates without a diploma. 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 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.

6. For detailed information on access to the construction industry, consult the following section of the CCQ's website: http://www.ccq.org/E_CertificatsCompetence.aspx?sc_lang=en-CA&profil=DevenirTravailleur.

The apprentice carpenter-joiner must have completed three apprenticeship periods of 2,000 hours each (6,000 hours total) in order to be eligible for the provincial qualification examination that leads to obtaining the competency certificate-journeyman for the trade[7]. Credits are paid into the apprenticeship record book of a carpenter-joiner who has obtained his diploma.

It should be noted that the persons we consulted did not take the study program leading to a DEP, but did take a variety of training offered by the CCQ.

Moreover, certain characteristics are sought by employers hiring new flooring-layers-sanders. The following list presents the main characteristics, in the order in which they were mentioned by the analysis workshop participants, and not in order of importance:

- autonomy;
- manual skill;
- motivation.

It is also mentioned that the age of candidates is important because the work is physically demanding. So young candidates are generally preferred to older ones.

1.8 PLACE OF WOMEN IN THE SPECIALTY

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 participants, very few women practice the specialty of flooring-layers-sanders, mainly because of the necessity to carry heavy loads (sandblasters and materials), which requires substantial physical strength, and because of the constant physical effort required by the work.

7. There exists certain conditions for obtaining a limited competency certification for specialist. There is a journeyman qualification exam for specialist that an apprentice flooring-layer-sander can pass after having worked 4000 hours in the trade.

1.9 CAREER PROSPECTS

According to the persons consulted, many flooring-layers-sanders start their own company. Many also practice the trade from father to son. Given that small companies are numerous in the field, competition is very strong, and many contractors are not self-employed for long. Flooring-layers-sanders who want to advance in the field can also become foremen, superintendents, project leaders, etc.

1.10 DEVELOPMENT OF THE SPECIALTY

The participants foresee changes in coming years and have already witnessed the following changes in the specialty:

- the arrival of prevarnished parquet flooring has modified the work of flooring-layers-sanders, since no finish is necessary for this type of parquet flooring;
- the arrival of floating floors has introduced a different installation technique.

1.11 IMPACT OF ENVIRONMENTAL STANDARDS ON THE PRACTICE OF THE TRADE

Generally, the participants state that they are more aware of environmental protection and the application of related standards. In this regard, the participants noted the following:

- the products are less toxic than in the past, which benefits the health of flooring-layers-sanders;
- normally, empty containers and the remains of products must be disposed of in appropriate locations. However, this procedure is still not always applied; it is often simpler to throw them away among other waste materials;
- the aluminium used in new varnishes could become a problem in future sanding, because it is reportedly toxic;
- there will be further changes to the types of products used, because manufacturers still seek a product equivalent to oil-based crystal varnish, without the latter’s toxicity.

2. WORK DESCRIPTION

2.1 TASKS AND OPERATIONS

List of tasks

The following list presents the main tasks[8] performed by flooring-layers-sanders. The order in which the tasks are presented does not necessarily reflect their importance in the specialty.

Task 1 Install wood or composite parquet flooring

Task 2 Finish wood or composite parquet flooring

Task 3 Do repair or renovation work[9]

Table of tasks and operations

During the workshop, a table of tasks and operations produced by flooring-layers-sanders was submitted to the participants. Following discussions, changes were made to the table. The final version is presented in the following pages.

8. These tasks correspond to tasks 22 and 23 of the carpenter-joiner occupational analysis.
9. For details of this task, refer to task 19, “Do repair work,” in the table of carpenter-joiner tasks and operations.

Table 2.1 Tasks and Operations

TASKS	OPERATIONS					
1. **INSTALL WOOD OR COMPOSITE PARQUET FLOORING**	1.1 Learn about the work to be done	1.2 Check the floor structure and the subfloor	1.3 Prepare the surface to be covered	1.4 Place felt paper and soundproofing, if applicable	1.5 Install the floor finish covering	
2. **FINISH WOOD OR COMPOSITE PARQUET FLOORING**	2.1 Learn about the work to be done	2.2 Prepare the surface	2.3 Sand the parquet flooring	2.4 Clean the parquet flooring	2.5 Colour or oil the parquet flooring, if applicable	2.6 Varnish the parquet flooring, if applicable

2.2 OPERATIONS, SUB-OPERATIONS AND CLARIFICATIONS

In the following pages are presented the sub-operations related to most of the operations[10], as well as a few clarifications made by the participants.

Table 2.2 Sub-Operations and Operation Clarifications

TASK 1 INSTALL WOOD OR COMPOSITE PARQUET FLOORING

Main fields of application

Flooring-layers-sanders lay parquet flooring that is:
- made of wood laths, which can be stapled, nailed or glued;
- made of wood parquetry, which is glued;
- engineered (composite materials, wood, cork), which is floating or glued in the grooves;
- floating (composite materials).

They may also apply mouldings and the finish covering of stairs.

Operations	Sub-Operations	Clarifications
1.1 Learn about the work to be done	1.1.1 Receive instructions from the foreman or client 1.1.2 Examine the premises 1.1.3 Check the voltage and amperage of the electric installation 1.1.4 Check the humidity level of the installation area, subfloor and wood laths to be installed	The flooring-layer-sander does not use any plan or specifications. He only works according to verbal instructions, including for the production of specific patterns (e.g.: wind rose).
1.2 Check the floor structure and the subfloor	1.2.1 Check the small beams' installation direction 1.2.2 Check if the joints are equalized 1.2.3 Check the screwing or nailing 1.2.4 Ensure that the surface is cleared	Normally, wood laths are laid in the opposite direction of the small beams. However, for various reasons, they are occasionally laid differently (e.g.: at 45°).
1.3 Prepare the surface to be covered	1.3.1 Repair the structure of the floor and subfloor, if applicable 1.3.2 Eliminate glue or other residues from a concrete surface 1.3.3 Sweep the surface 1.3.4 Apply self-levelling cement, if applicable 1.3.5 Equalize the subfloor joints	
1.4 Place felt paper and soundproofing, if applicable		
1.5 Install the floor finish covering	1.5.1 Install laths, parquetry, engineered or floating parquet 1.5.2 Install mouldings and trims, if applicable	

10. The sequence of operations or sub-operations may vary according to the methods, techniques or products used, or according to the company's organization.

TASK 2 FINISH WOOD OR COMPOSITE PARQUET FLOORING		
Operations	**Sub-Operations**	**Clarifications**
2.1 Learn about the work to be done	2.1.1 Receive instructions from the foreman or client 2.1.2 Examine the client's special requests 2.1.3 Perform tests (colouring, varnish, etc.)	
2.1 Prepare the surface	2.2.1 Clean the surface (broom, vacuum cleaner) 2.2.2 Fill the holes, grooves, empty spaces, etc. (parquetry and laths) 2.2.3 Cut the bottom of doors and jambs, if applicable	
2.3 Sand the parquet flooring	2.3.1 Pass the contour sander 2.3.2 Pass the large sandblaster 2.3.3 Pass the polisher, if applicable	Various sanding techniques may be applied in order to obtain a perfect finish (e.g.: at 45° and then in the direction of the wood grain). The flooring-layer-sander chooses the technique according to the type of wood, the direction of light in the room, etc.
2.4 Clean the parquet flooring	2.4.1 Pass the vacuum cleaner 2.4.2 Apply methanol, if applicable	The cleaning step is crucial, because it will have a major impact on the finish quality. All traces of dust or dirt must be eliminated. Some contractors use methanol to clean and open the wood pores, thus ensuring a uniform finish. This is an optional step that is not always taken, because it entails additional expenses.
2.5 Colour or oil the parquet flooring, if applicable	2.5.1 Apply the colouring or oil 2.5.2 Polish and clean the parquet flooring between the layers of colouring or oil	The colouring or oil should be applied in the direction of the wood grain. They are applied using brushes, rollers, rags, etc.
2.6 Varnish the parquet flooring, if applicable	2.6.1 Apply varnish 2.6.2 Polish and clean the parquet flooring between the layers of varnish	

2.3 ACHIEVEMENT CONDITIONS

Achievement condition data were collected for the entire specialty of flooring-layer-sander. They pertain to aspects such as workplaces, work instructions, health and safety hazards, reference documents consulted, etc.

Table 2.3 Achievement Conditions

ACHIEVEMENT CONDITIONS
Workplaces[11] Parquet flooring may be laid and finished in any residential, commercial or institutional building. The flooring may be in a residence, shop or institution, may be a gym floor, a bowling alley floor, a stair covering, etc.
Instructions The instructions are verbal, from the foreman or client.
Documentation Flooring-layers-sanders do not use specific written documentation to do their work. In the case of new products, they consult the manufacturer's recommendations.
Supervision and collaboration Flooring-layers-sanders always work in a team, generally comprised of two or three persons. Generally, flooring-layers-sanders have a lot of autonomy; the foreman gives them guidelines at the start of work, and then they work autonomously. The client provides the final appreciation of the quality of their work.
Stress factors According to the participants, the main stress factors are: ▪ production requirements; competition between contractors is fierce, so workers are imposed a sustained pace of work and tight deadlines; ▪ losses of time due to workers in other trades being late in their work.

11. Non-exhaustive list.

2.4 PERFORMANCE CRITERIA

Performance criteria were collected for each task. They are used for evaluating whether tasks have been performed satisfactorily. The criteria apply to aspects such as the quantity and quality of the work done, observance of a work procedure, the attitudes adopted, etc.

Table 2.4 Performance Criteria

TASK 1 Install wood or composite parquet flooring
Performance Criteria
▪ No space between laths or tiles ▪ Sufficient time before the installation to allow materials to adapt to ambient conditions ▪ Meticulous alignment of laths and tiles ▪ Appropriate offset of joints ▪ Sufficient space for the parquet flooring to expand ▪ Adequately handling the equipment to avoid damage to walls and floors ▪ Minimizing material losses ▪ Carefully preparing the subfloor ▪ Cleanliness of the premises and surface ▪ Observing the guidelines ▪ Observing health and safety rules ▪ Uniform parquet flooring

TASK 2 Finish wood or composite parquet flooring

Performance Criteria

- No dust or other impurities (traces of silicone, latex, etc.)
- No defects such as stripes, spaces, colour variations, etc.
- Adequately handling equipment to avoid damage to walls and mouldings
- Following the foreman's guidelines
- Meeting the client's requests (e.g.: colour)
- Observing health and safety rules
- Uniform surfaces
- Uniform application of colourings, oils and varnishes
- Complete colouring mixes ensuring a uniform colour
- Carefully preparing the surface before finishing

3. QUANTITATIVE DATA ON TASKS

3.1 OCCURRENCE

Occurrence data concern the percentage of flooring-layers-sanders[12] who perform a task in the same workplace. The data presented in the tables below are the average results of the participants in the workshop. They provide information on the use of time not only by the participants who attended the workshop, but also by all flooring-layers-sanders working in the companies represented.

Table 3.1 Occurrence of Task

Task	Occurrence
1 Install wood or composite parquet flooring	100%
2 Finish wood or composite parquet flooring	100%

3.2 IMPORTANCE AND DIFFICULTY OF TASKS

The importance of a task is estimated according to the more or less harmful consequences of performing a task poorly or not at all. The importance is assessed according to the following scale:

1. Not important at all: Performing the task less successfully does not lead to consequences for the result's quality, the costs, health and safety, etc.;

2. Not very important: Poor execution of the task may entail minimal costs, lead to a result of lesser quality, involve risks of injury, or minor accidents, etc.;

3. Important: Poor execution of the task may entail an unsatisfactory result, substantial additional costs, injuries, accidents, etc.;

4. Very important: Poor execution of the task may entail an unacceptable result and very major consequences regarding costs, safety, etc.

12. The data also include apprentices.

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 specialty.

The data presented in the following table are the average results for the workshop participants.

Table 3.2 Importance and Difficulty of Tasks

Task	Importance	Difficulty
1 Install wood or composite parquet flooring	3	3
2 Finish wood or composite parquet flooring	4	4

4. KNOWLEDGE, SKILLS AND ATTITUDES

The occupational analysis 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 participants, are considered essential for performing the tasks of the specialty of flooring-layer-sander.

4.1 KNOWLEDGE

Communication

Flooring-layers-sanders have to communicate with their co-workers, their foreman, workers in other trades, etc. In every case, the participants insist on the importance of respect. Moreover, given the loud noise of sandblasters, communication is often non-verbal and done with signs. Finally, to be understood and to correctly interpret the information he receives, a flooring-layer-sander has to know the terminology used in his field.

Mathematics

Flooring-layers-sanders have to apply arithmetic concepts, mainly to calculate surfaces and angles, take measurements (e.g.: squareness), convert metric to imperial measurements, etc. They have to perform the four basic operations, with fractions and decimals.

Products and techniques

Flooring-layers-sanders have to be able to distinguish between the different wood essences used in parquetry and know their characteristics in relation to the work to be done (e.g.: absorption of colouring, reaction to sanding, etc.). They must also know the characteristics of the products (cleansers, colourings, varnishes, oils, etc.) they have to use, as well as the products' possible reactions when in contact with incompatible products, the precautions to be taken, etc.

Given that flooring-layers-sanders do not use plans, they must occasionally demonstrate creativity and a certain artistic ability, to reproduce or design specific patterns (mosaic, wind rose, etc.). In most cases, the work is done “with the naked eye”; flooring-layers-sanders rarely prepare templates or models.

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 used for working. According to the occupational analysis workshop participants, the main cognitive skills necessary to flooring-layers-sanders are the following:

- planning work;
- problem-solving;
- concentration.

Motor skills

Motor skills involve gestures and movements. The main motor skill necessary to flooring-layers-sanders is good coordination, to perform many operations with machines, simultaneously and continuously.

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 flooring-layers-sanders are the following:

- visual acuity, to apply colourings, oils and varnishes;
- the ability to distinguish colours, to be able to reproduce them (colouring mixes);
- the ability to perceive and recognize sounds (e.g.: the sander's sound will be different if the paper is poorly placed).

4.3 ATTITUDES

Attitudes are a way of acting, reacting and relating with others or with one's environment. They involve personal skills. The main attitudes necessary to flooring-layers-sanders are the following:

- autonomy;
- resourcefulness;
- interest in the work;
- attention to detail;
- patience;
- quick execution;
- conscientiousness.

5. TRAINING SUGGESTIONS

Professional development and upgrading

The participants mentioned that they would be interested in skills being upgraded with regard to the characteristics and reactions of the various products they use (precautions to be taken, usage restrictions, etc.).

They added that the upgrading activity (offered by the CCQ) pertaining to sanding is of little use because it is too removed from the realities of the industry. At best, it only familiarizes workers with handling the sandblaster.

Annexes

Annex 1

MATERIAL RESOURCES, TOOLS AND EQUIPMENT

Tools and equipment [13]

- Stapler
- *Nail bar*
- *Wood chisel*
- Nailer
- *Toolbox*
- *Chalk line*
- *Utility knife*
- *Hand-saw*
- *Square*
- *Bevel square*
- Scrapers
- Laser
- *Hammer*
- Level
- Sheepskin
- Drill
- Brushes
- *Combination pliers*
- *Punch*
- Polisher
- Rollers
- *Measuring tape*
- Sander
- *Nail bag*
- Circular saw, jigsaw and mitre saw
- Table saw
- *Screwdriver*

Material resources

- Levelling cement
- Nails
- Glue
- Clamps
- Plywood sheets
- Oil
- Methanol
- Floorboards, marquetry, cork, etc.
- Masking tape
- Colouring
- Varnish
- Screws

13. The tools in italics are those that flooring-layers-sanders must provide under collective agreements.

Annex 2

GRID OF OCCUPATIONAL HEALTH AND SAFETY ELEMENTS

Produced by: **Louise Lessard**, Prevention Consultant
ASP Construction

Table A.1 Description of Hazards in Practicing the Flooring-layer-sander Specialty

Hazards	Effects on Health and Safety	Means of Prevention
Same-level falls (slipping, rain, mud, snow, housekeeping)	• Collisions • Contusions • Fractures • Bruises	• Clean the work area (pick up debris). • Ensure good housekeeping.
Falls from height (floor openings)	• Collisions • Internal injuries • Fractures • Bruises • Death • Psychological and physical after-effects	• When there is a risk of falling more than 3 m (10 ft.), install a guardrail or wear a shock-absorbing harness, with an anchor that has a breaking strength of 18 kN (4046 lb/F) or with a vertical lifeline meeting SC specifications, section 2.10.12. • Train workers in fall prevention.
Hand injuries	• Cuts • Fractures	• Wear working gloves. • Ensure that manual and portable tools are in good condition.
Excessive efforts	• Backache	• Do not exceed your limits; ask a co-worker for help if necessary. • Train workers in manual handling methods.
Eye injuries	• Foreign bodies	• Wear safety glasses.
Noise	• Deafness	• Wear hearing protection complying with SC provisions, section 2.10.7.6.
Knee injuries	• Sprains • Inflammations	• Wear knee pads as necessary.
Dust	• Respiratory tract irritation	• Wear a type 100 reusable respirator.

Hazards	Effects on Health and Safety	Means of Prevention
Chemicals (varnishing and colouring)	• Respiratory tract irritation • Intoxications • Skin burns	• Wear an active carbon respirator (for the product in question) or, for large surfaces, an assisted ventilation respirator. • Wear rubber gloves.

Annex 3

Deep Foundation Layer

A Specialty of the Carpenter-Joiner Trade

Occupational Analysis Report

April 2011

Commission
de la construction
du Québec

The purpose of this report is to describe as accurately as possible the specialty of deep foundation layer 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 competencies 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 present report does not bind the Commission in any way. It has no legal effect and is meant as a reflection of discussions held on the date of the analysis workshop.

PRODUCTION TEAM

The Commission de la construction du Québec wishes to thank the production team for this occupational analysis of the deep foundation layer specialty. This report is an integral part of Annex 3 of the carpenter-joiner occupational analysis report adopted by Commission authorities.

Direction
Jean Mathieu
Section Manager
Commission de la construction du Québec

Coordination
Doris Gagnon
Training Advisor
Commission de la construction du Québec

Conduct of the workshop and production of the report
Lucie Marchessault
Training Consultant

Production support
Alyre Thireau
Instructor, Centre de formation Pierre-Dupuy
Marie-Victorin School Board

Yves Rondeau
Training Advisor
Commission de la construction du Québec

Secretarial Work and Page Layout
Sylvie Brien
Commission de la construction du Québec

Translation
Traductions Globe Translations

The masculine gender is used generically
in this document to facilitate reading.

ACKNOWLEDGEMENTS

Production of the present report was made possible by the collaboration and participation of many people. The Commission de la construction du Québec (CCQ) is grateful for the quality of the information provided by those consulted during the main workshop on the carpenter-joiner trade, held on January 19, 20 and 21, 2011, and gives special thanks to the deep foundation layers who so generously agreed to participate in the analysis workshop regarding their specialty on March 21, 2011. The persons consulted are:

Mario Boisclair
Deep Foundation Layer
Montreal

Stéphane Marquis
Deep Foundation Layer
L'Ange-Gardien

Paul-Aimé Grondin
Deep Foundation Layer
Rosemere

The following person attended the meeting as an observer:

Jonathan Bélair
Competency Evaluation Writer
Commission de la construction du Québec

TABLE OF CONTENTS

List of Tables

INTRODUCTION

In early 2009, the CCQ's Direction de la formation professionnelle launched a large-scale operation to review the occupational analyses[1] of all construction industry trades[2] and specialties.

The CCQ undertook this operation for many reasons, particularly the following:

- 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 and specialty;
- the fact that most construction occupational analyses had been conducted between 1987 and 1991 and had not been reviewed since;
- updates to vocational qualification 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 updating the occupational analyses in order to obtain a current and complete provincial profile of the various trades and specialities.

The occupational analysis of the deep foundation layer specialty belongs to this context[3]. Its purpose is to describe the specialty as currently practiced by journeymen in the construction industry. The present report was written in order to collate and organize the information gathered during the supplementary occupational analysis workshop on the carpenter-joiner trade, held in Montreal on March 25 2011, for the deep foundation layer specialty.

This analysis aims to draw a portrait (tasks and operations) of the specialty and its entry requirements, 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 deep foundation layers. A special effort was made to include in this report all the data collected during the workshop and to ensure that the data accurately depict the realities of the specialty analysed.

1. Occupational analyses were then called "work situation analyses".
2. The terms "profession" and "trade" are considered synonymous.
3. This occupational analysis was conducted according to 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 the Commission des partenaires du marché du travail, ministère de l'Emploi et de la Solidarité sociale.

1. GENERAL CHARACTERISTICS OF THE SPECIALTY

1.1 DEFINITION OF THE SPECIALTY

Deep foundation layers perform their tasks in specialized companies from the residential, commercial, industrial and civil engineering and roads sectors. They practice their specialty as part of the carpenter-joiner trade when working in the construction industry.

The following is the description of the deep foundation layer specialty as a result of the request to amend Regulation r.6.2 on the definition of trades and occupations[4], submitted by the CCQ in June 2001:

> The specialty of deep foundation layer includes work related to deep foundations, i.e.:
>
> 1) the preparation and installation piles of all types and composition, including bored or excavated piles, as well as metal sheet-piling;
>
> 2) the installation of reinforcing steel cages.

The participants in the occupational analysis workshop agree with the definition presented[5].

1.2 JOB TITLES

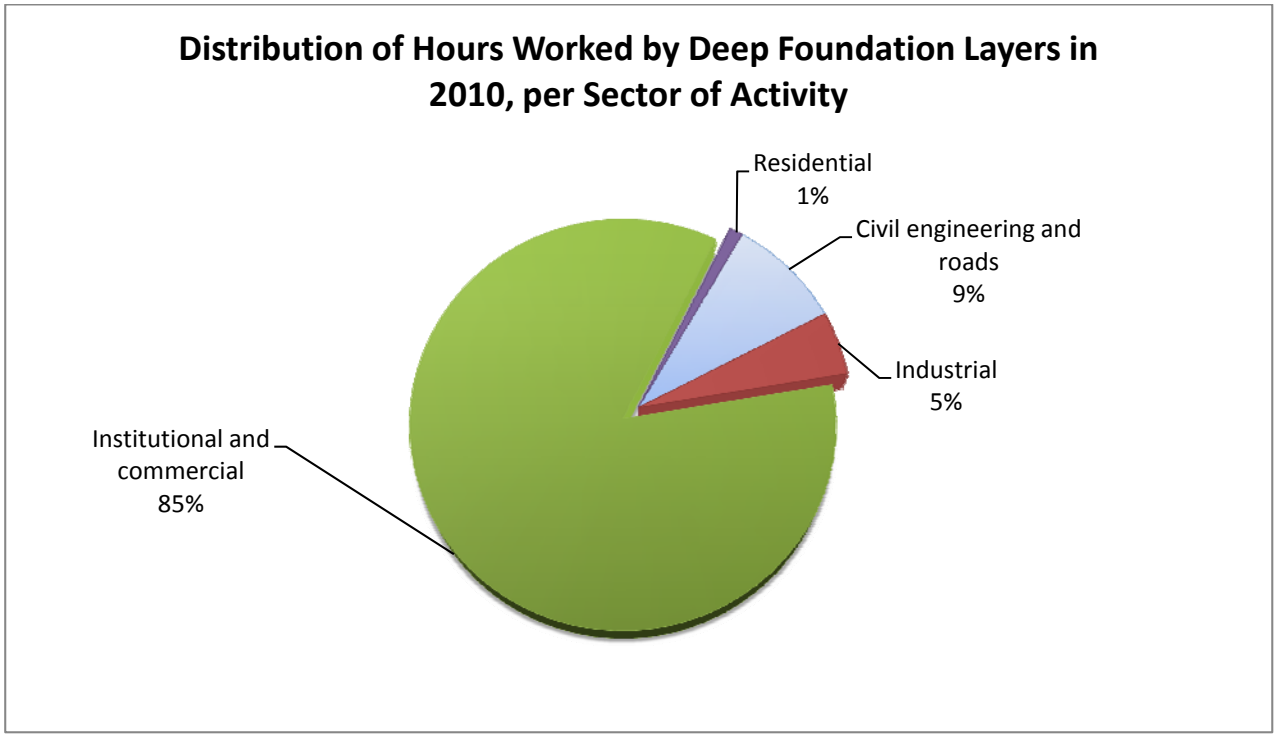
The job title “deep foundation layer” is not used on construction sites; but it is the one used in the present report, because it is the official term for the new specialty to come.

In the workplace, deep foundation layers are most often called “pile setters” – the term used in the current Regulation respecting the vocational training of workforce in the construction industry – or “leadmen.” The latter title illustrates the leading role played by a deep foundation layer within his small work team.

4. Changes have been made to that version of the regulation amendment. The version tabled in February 2011 to the Minister of Labour reads as follows: “The term ‘deep foundation layer’ means any person who performs construction, erection and repair work for the installation of deep foundations, such as the installation, hoisting and handling of: steel sheet-piling, shoring piles, wales, braces, struts, bearing piles and temporary steel or timber stays driven into the ground.”
5. The reader is invited to consult eventually the final version to be adopted by the Cabinet.

1.3 SECTORS OF ACTIVITY

Deep foundation layers are active in all four sectors of the construction industry, but to various degrees. For the year 2010, 336 workers, including one woman, declared hours worked as deep foundation layers[6]. Their workload is distributed as follows:



We asked the participants to estimate the distribution of their working hours in the four sectors of activity, over their entire career as deep foundation layers in the construction industry. The table below presents the situation described by the deep foundation layers attending the analysis workshop.

Table 1.1 Work Time Allocated to Each Sector of Activity

Sector of Activity	Work Time Allocated to Each Sector
Residential	0%
Institutional and commercial	14%
Civil engineering and roads	46%
Industrial	40%

6. Data compiled by the CCQ from the hours worked by apprentices and journeymen and declared in employers' monthly reports. However, some deep foundation laying work hours may be declared in the carpenter-joiner code.

1.4 FIELD OF PRACTICE

The trade's field of practice is the construction industry. The Act r*especting 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

Deep foundation layers in the construction industry are subject to:

- the *Act respecting Labour relations, vocational training and workforce management in the construction industry* (R.S.Q., c. R-20);
- the *Regulation respecting the vocational training of workforce in the construction industry* (R-20, r.6.2*);*
- the four sector-based collective agreements for the construction industry;
- the *National Building Code – Canada* (NBC);
- the *Quebec Building Code*, Chapter I – Building;
- the *Act Respecting Occupational Health and Safety* (R.S.Q., c.S-2.1);
- the *Safety Code for the construction industry* (R.Q. c. S-2.1, r.6);
- municipal by-laws, if applicable.
- the welding standards of the Canadian Welding Bureau (CWB) for some work.

1.6 WORKING CONDITIONS[7]

The following information provides an overview of the conditions and context of the work of deep foundation layers, as commented by the participants in the occupational analysis workshop. To obtain up-to-date and complete information that has legal effect, it is necessary to refer to the four collective agreements for the construction industry sectors.

Salary

A deep foundation layer's hourly wage varies according to the construction industry sector in which work is done. According to the 2010-2013 collective agreements, a journeyman's daytime hourly wage, in October 2010, was as follows:

- Industrial, institutional and commercial, civil engineering and roads: $32.86
- Residential (heavy): $32.84
- Residential (light): $29.62

Vacations and time off

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.

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.

7. The general data on working conditions are taken from the four 2010-2013 collective agreements of the construction industry. The salary of deep foundation layers corresponds to that of carpenter-joiners.

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.

Physical requirements

The work requires good physical condition, endurance and a certain physical strength, particularly to lift and carry equipment and accessories. However, it is noted that in recent years, the equipment made available to deep foundation layers has slightly reduced the tasks' physical requirements.

Deep foundation layers must mainly have good resistance, notably to outdoor conditions such as intense cold and heat, humidity, etc. Given that working from heights is frequent, persons who are subject to vertigo would have difficulty practicing the specialty.

Work schedules

A 45-hour work week from Monday to Friday is the general rule for deep foundation layers, with a daily limit of 9 hours.

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.

The work schedules of deep foundation layers are quite regular and are distributed mainly between 7 a.m. and 4:30 p.m., Monday to Friday. Overtime is occasionally necessary for some assignments, for example to speed up completion of work requiring major road arteries to be closed, but that situation is infrequent.

Deep foundation layers often have to travel outside their area of residence, for up to several months. Working in remote areas or in other provinces makes it possible for deep foundation layers to remain active throughout the year. In fact, a person who does not want to spend time away from his area of residence finds it more difficult to find work all year long.

1.7 JOB MARKET ENTRY CONDITIONS[8]

To obtain the competency certificate-apprentice in the trade, candidates must present to the CCQ the original version of an academic transcript or apprenticeship transcript attesting that they have passed a course of study and obtained a diploma recognized by the CCQ, i.e., the DEP in the carpenter-joiner trade, as well as a guarantee of employment from an employer registered with the CCQ for at least 150 hours within a period of not more than three consecutive months.

Although the construction industry favours graduates for access to the trade, labour shortages may at times make it necessary for the CCQ to admit candidates without a diploma.

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 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.

The apprentice carpenter-joiner must have completed three apprenticeship periods of 2,000 hours each (6,000 hours total) in order to be eligible for the provincial qualification examination that leads to obtaining the competency certificate-journeyman for the trade[9]. Credits are paid into the apprenticeship record book of a carpenter-joiner who has obtained his diploma.

8. For detailed information on access to the construction industry, consult the following section of the CCQ's website: http://www.ccq.org/E_CertificatsCompetence.aspx?sc_lang=en-CA&profil=DevenirTravailleur.
9. There exists certain conditions for obtaining limited competency certificate for specialists.

It should be noted that the participants did not take the study program leading to a DEP – a program that in any case does not prepare students to work as deep foundation layers.

Moreover, certain characteristics are sought by employers hiring new deep foundation layers. The following list presents the main characteristics, in the order in which they were mentioned by the analysis workshop participants, and not in order of importance:

- demonstrating resourcefulness and punctuality;
- teamwork ability;
- not being afraid to get dirty;
- tolerating noise;
- demonstrating leadership, to manage a small team.

1.8 PLACE OF WOMEN IN THE SPECIALTY

Section 126.0.1 of the Act r*especting 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 participants, no female journeyman is currently practicing the speciality, but nothing would prevent a woman to be a deep foundation layer.

1.9 CAREER PROSPECTS

Deep foundation layers who want to advance in the construction field can aim for positions as team leader, foreman or superintendents. They can also become contractors, although starting up a company in this field requires substantial investments.

1.10 DEVELOPMENT OF THE SPECIALTY

For many years, the work remained essentially the same for deep foundation layers. But in recent years, the specialty has seen changes, mainly with the machinery used. For example, the types of hammers are evolving. Some include a small computer recording the number of hammer blows, the blow height, etc. Although drop hammers, which prevailed for many years, are still used, diesel hammers are now the norm, and hydraulic hammers are seen more and more often.

The trade's safety aspect is growing in importance, and has an impact on work methods (e.g.: refraining to the extent possible from approaching moving equipment) and on the equipment used (e.g.: using a laser level rather than a carpenter's level to measure the angle of piles, thus keeping a safe distance from the hammer in movement).

1.11 IMPACT OF ENVIRONMENTAL STANDARDS ON THE PRACTICE OF THE TRADE

Generally, the participants said they were more aware of environmental protection and related standards. In this regard, the participants noted the following:

- deep foundation layers have to demonstrate greater vigilance, particularly in disposing of waste, some of which must be thrown away at specific locations;
- they have to report any environmental risk of toxic products being spilled (oil, fuel, etc.);
- in many companies, at the beginning of a contract, they have to take training in emergency measures to be applied in case, for example, hazardous products are spilled.

2. WORK DESCRIPTION

2.1 TASKS AND OPERATIONS

List of tasks

The following list presents the main tasks performed by deep foundation layers[10]. The order in which the tasks are presented does not necessarily reflect their importance in the specialty.

Task 1 Perform pile-driving related activities

Task 2 Shore up retaining walls

Task 3 Put a diaphragm wall or a mud wall in place

Task 4 Put metal sheet-piling in place

Table of tasks and operations

During the workshop, a table of tasks and operations produced by deep foundation layers was submitted to the participants. Following discussions, changes were made to the table. The final version is presented in the following pages.

10. These tasks correspond to tasks 24 to 27 of the carpenter-joiner occupational analysis.

Table 2.1 Tasks and Operations

TASKS	OPERATIONS					
1. **PERFORM PILE-DRIVING RELATED ACTIVITIES**	1.1 Prepare the pile-driving equipment	1.2 Learn about the work to be done	1.3 Prepare the work	1.4 Direct pile-driving operations		
2. **SHORE UP RETAINING WALLS**	2.1 Learn about the work to be done	2.2 Direct the excavation	2.3 Place planks between piles already driven	2.4 Complete the retaining walls (soldier-pile walls)		
3. **PUT A DIAPHRAGM WALL OR A MUD WALL IN PLACE**	3.1 Control the excavation depth	3.2 Monitor the filling of the bentonite trench	3.3 Lower the reinforcing steel cage			
4. **PUT METAL SHEET-PILING IN PLACE**	4.1 Learn about the work to be done	4.2 Prepare the equipment	4.3 Ensure the positioning of sheet-piling	4.4 Install the sheet piles	4.5 Drive the sheet piles	4.6 Support the wales
	4.7 Install the wales	4.8 Dismantle the structure when the work is completed				

2.2 OPERATIONS, SUB-OPERATIONS AND CLARIFICATIONS

In the following pages are presented the sub-operations related to most of the operations[11], as well as a few clarifications made by the participants.

Table 2.2 Sub-Operations and Operation Clarifications

TASK 1 PERFORM PILE-DRIVING RELATED ACTIVITIES		
Operations	**Sub-Operations**	**Clarifications**
1.1 Prepare the pile-driving equipment	1.1.1 Guide the crane operator to lower the semi-trailer crane 1.1.2 Assemble the crane's components: a) extension arm b) controller c) cables 1.1.3 Unload the toolbox and equipment 1.1.4 Check the equipment's condition 1.1.5 Install the pile-driving hammer	
1.2 Learn about the work to be done	1.2.1 Interpret the plans 1.2.2 Interpret verbal or written instructions 1.2.3 Learn about the surveyor's reference stakes 1.2.4 Establish offset reference points	The plans provide data such as the location where each pile is to be installed, the angle of each pile, etc. The reference points will be used by the deep foundation layer to maintain the position of the pile's centre. Indeed, once the pile is positioned on the ground, the reference stake planted by the surveyor is no longer visible.
1.3 Prepare the work[12]	1.3.1 Organize the reception of piles 1.3.2 Stack the piles 1.3.3 Weld the bottom plate or the pile-driving shoe 1.3.4 Graduate the piles 1.3.5 Determine the sequence of operations to be performed	A crane is used to move and stack the piles. The deep foundation layer's work consists of guiding the crane operator, for the first two sub-operations. The piles must be graduated (in metres, quarter-metres, etc.) to enable the deep foundation layer to evaluate, after each pile-driving, how deep the pile has sunk.

11. The sequence of operations may vary according to the methods, techniques or products used, or according to the company's organization.
12. Read the professional subcommittee's comment in Annex 3, note 1.

TASK 1 PERFORM PILE-DRIVING RELATED ACTIVITIES		
Operations	**Sub-Operations**	**Clarifications**
1.4 Direct pile-driving operations	1.4.1 Select the pile 1.4.2 Ensure the verticality or the degree of slant 1.4.3 Apply the pile-driving formula 1.4.4 Decide when pile-driving stops 1.4.5 Assist the technician during the dynamic test 1.4.6 Have pile-driving restart as necessary 1.4.7 Cut pile excesses and recover pile sections 1.4.8 Weld the anchors, if applicable 1.4.9 Put the reinforcing steel cages in place, if applicable 1.4.10 Fill the cylindrical tubular piles with concrete, if applicable	The pile is chosen according to plan information. The pile excess is cut with an oxyacetylene torch[12]. During this entire operation, the deep foundation layer must record various data, such as pile characteristics (length, thickness, etc.), burial depth, the number of hammer blows per metre, hammer blow height, work start and end times, etc.
TASK 2 SHORE UP RETAINING WALLS		
Operations	**Sub-Operations**	**Clarifications**
2.1 Learn about the work to be done	2.1.1 Interpret the plans 2.1.2 Interpret verbal or written instructions	
2.2 Direct the excavation		
2.3 Place planks between piles already driven	2.3.1 Cut the planks 2.3.2 Fasten planks to the piles	The planks are installed on the piles, from top to bottom.
2.4 Complete the retaining walls (soldier-pile walls)	2.4.1 Drill holes in the wall 2.4.2 Place walers 2.4.3 Fasten a ring to the anchor ties 2.4.4 Stress the ties with a hydraulic jack 2.4.5 Cut cable excesses	A driller will install ties between sub-operations 2.4.1 and 2.4.2. Cable excesses are cut with a torch.

TASK 3 PUT A DIAPHRAGM WALL OR A MUD WALL IN PLACE

It was not possible to determine the sub-operations and clarifications for this task's operations.
It should be noted that only one company installs diaphragm walls and mud walls in Quebec. However, the participants estimate that such work, although costly, should be more common in coming years, because it reduces the risks of contamination and thus meets environmental standards.

Operations	Sub-Operations	Clarifications
3.1 Control the excavation depth		
3.2 Monitor the filling of the bentonite trench		
3.3 Lower the reinforcing steel cage		

TASK 4 PUT METAL SHEET-PILING IN PLACE

Operations	Sub-Operations	Clarifications
4.1 Learn about the work to be done	4.1.1 Interpret the plans 4.1.2 Interpret verbal or written instructions	
4.2 Prepare the equipment		The template is prepared at this stage.
4.3 Ensure the positioning of sheet-piling		
4.4 Install the sheet piles		The sheet piles are installed by being slid side-by-side, so they form a "wall" to support the soil or produce cofferdams.
4.5 Drive the sheet piles		The sheet piles must be driven from one template to the other.

TASK 4 PUT METAL SHEET-PILING IN PLACE		
Operations	**Sub-Operations**	**Clarifications**
4.6 Support the wales		The wales are supported temporarily and then installed.
4.7 Install the wales		
4.8 Dismantle the structure when the work is completed		

2.3 ACHIEVEMENT CONDITIONS

Achievement condition data were collected for the entire specialty of deep foundation layer. They pertain to aspects such as workplaces, work instructions, health and safety hazards, reference documents consulted, etc.

Table 2.3 Achievement Conditions

ACHIEVEMENT CONDITIONS
Workplaces[13] Deep foundation layers usually work outdoors. At times they work indoors, for example in a factory, to build a base that will receive specific equipment. Outdoors, their work environment thus depends on weather conditions. They often experience intense cold or heat, bad weather, humidity (e.g.: work on barges or near streams), etc. The noise is high and constant.
Instructions Written instructions are given in the form of plans or instruction lists. Verbal instructions are given by the foreman and mainly concern the progress of work, the client's requests and the project's specifics.

13. Non-exhaustive list.

ACHIEVEMENT CONDITIONS
Documentation Deep foundation layers use the following documents: ▪ pile-driving record; ▪ plans (positioning of piles); ▪ instructions; ▪ manufacturer's manual, for certain machines. In addition, they have to write a brief report each day to give an accounting of the work they have done during the day.
Supervision and collaboration Deep foundation layers always work in a team. In fact, they manage their small team, comprised of at least one deep foundation layer, a crane operator and, most of the time, a welder. If the team does not include a welder[14], the deep foundation layer performs the welding work. Generally, deep foundation layers have a lot of autonomy; the foreman gives them guidelines (in person or by telephone) and then leaves them to perform their tasks autonomously.
Stress factors According to the participants, the main stress factors are: ▪ the hazards inherent to the trade, which is considered dangerous; deep foundation layers must be constantly vigilant, which is somewhat stressful; ▪ tighter and tighter deadlines.

2.4 PERFORMANCE CRITERIA

Performance criteria were collected for each task. They are used for evaluating whether tasks have been performed satisfactorily. The criteria apply to aspects such as the quantity and quality of the work done, observance of a work procedure, the attitudes adopted, etc.

14. Read on this subject the professional subcommittee's comment in Annex 3, note 2.

Table 2.4 Performance Criteria

TASK 1 PERFORM PILE-DRIVING RELATED ACTIVITIES
Performance Criteria
▪ Observing occupational health and safety rules ▪ Meeting environmental standards ▪ Interpreting the plans correctly ▪ Following the plans ▪ Detecting discrepancies between the plans and the construction site ▪ Taking into consideration the type of soil when pile-driving ▪ Appropriate pile angle for the soil type ▪ Pile layout at the correct location ▪ Observing the work sequence ▪ Recording data rigorously
TASK 2 SHORE UP RETAINING WALLS
Performance Criteria
▪ Observing occupational health and safety rules ▪ Meeting environmental standards ▪ Interpreting the plans correctly ▪ Following the plans ▪ Detecting discrepancies between the plans and the construction site ▪ Carefully checking the condition of piles already driven ▪ Fastening planks solidly to the piles ▪ Observing the work sequence ▪ Solid welds ▪ Recording data rigorously
TASK 3 PUT A DIAPHRAGM WALL OR A MUD WALL IN PLACE
Performance Criteria
▪ Observing occupational health and safety rules ▪ Meeting environmental standards ▪ Interpreting the plans correctly ▪ Following the plans ▪ Detecting discrepancies between the plans and the construction site ▪ Appropriate excavation depth ▪ Diligently monitoring the trench filling ▪ Correct bentonite level ▪ Observing the work sequence ▪ Recording data rigorously ▪ Appropriate positioning of the reinforcing steel cage

TASK 4 PUT METAL SHEET-PILING IN PLACE

Performance Criteria

- Observing occupational health and safety rules
- Meeting environmental standards
- Interpreting the plans correctly
- Following the plans
- Detecting discrepancies between the plans and the construction site
- Using templates judiciously
- Correct sheet-pile positioning and driving
- Methodically dismantling the structure when the work is completed
- Observing the work sequence
- Recording data rigorously

3. QUANTITATIVE DATA ON TASKS

3.1 OCCURRENCE

Occurrence data concern the percentage of deep foundation layers[15] who perform a task in the same workplace. The data presented in the tables below are the average results of the participants in the workshop. They provide information on the use of time not only by the participants who attended the workshop, but also by all deep foundation layers working in the companies represented.

Table 3.1 Occurrence of Tasks

	Task	Occurrence
1	Perform pile-driving related activities	100%
2	Shore up retaining walls	100%
3	Put a diaphragm wall or a mud wall in place	43%
4	Put metal sheet-piling in place	60%

3.2 WORK TIME

Work time, also expressed as a percentage, represents, on average, the time allocated for each task by the participants, from the beginning of their career.

Table 3.2 Work Time

	Task	Work Time
1	Perform pile-driving related activities	55%
2	Shore up retaining walls	20%
3	Put a diaphragm wall or a mud wall in place	5%
4	Put metal sheet-piling in place	20%
		100%

15. The data also include apprentices.

3.3 IMPORTANCE AND DIFFICULTY OF TASKS

The importance of a task is estimated according to the more or less harmful consequences of performing a task poorly or not at all. The importance is assessed according to the following scale:

1. Not important at all: Performing the task less successfully does not lead to consequences for the result's quality, the costs, health and safety, etc.;

2. Not very important: Poor execution of the task may entail minimal costs, lead to a result of lesser quality, involve risks of injury, or minor accidents, etc.;

3. Important: Poor execution of the task may entail an unsatisfactory result, substantial additional costs, injuries, accidents, etc.;

4. Very important: Poor execution of the task may entail an unacceptable result and very major consequences regarding costs, safety, etc.

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 specialty.

The data presented in the following table are the average results for the workshop participants.

Table 3.3 Importance and Difficulty of Tasks

	Task	Importance	Difficulty
1	Perform pile-driving related activities	3.7	2.3
2	Shore up retaining walls	4	1.7
3	Put a diaphragm wall or a mud wall in place	4	2.0
4	Put metal sheet-piling in place	4	3.3

4. KNOWLEDGE, SKILLS AND ATTITUDES

The occupational analysis 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 participants, are considered essential for performing the tasks of the deep foundation layer specialty.

4.1 KNOWLEDGE

Communication

The deep foundation layer's role is crucial to the operation of the work team. He decides how the operations will unfold and directs the other team members. So interpersonal communication is particularly important to the deep foundation layer. He must be able to provide clear information, demonstrate leadership, maintain a satisfactory pace of work, while respecting his co-workers. He must also be able to plan the work to be done and to allocate work efficiently between team members.

Moreover, given that one of his main roles is to guide the crane operator in carrying out the various stages of work, the deep foundation layer must have a perfect knowledge of hoisting signals.

Finally, it was mentioned that English can be useful in some cases, particularly to deep foundation layers who choose to work in other provinces or abroad. In addition, the documentation of some machinery manufacturers is occasionally in English.

Mathematics

The deep foundation layer uses the four basis operations, to take measurements, calculate the quantities and volumes of materials, surfaces, etc. He must also calculate angles and apply the rule of three.

Mechanics

Basic mechanical knowledge is useful to the deep foundation layer, particularly in smaller companies, which do not always have a mechanic available in the event of breakdown. Working in remote areas, where specialized resources may be nonexistent, also often requires resourcefulness in doing minor mechanical work.

Health and safety

The deep foundation layer must know the occupational health and safety rules inherent to practicing his specialty, particularly those related to the use of machinery, which can cause serious injuries.

Welding

According to the participants, a deep foundation layer unable to weld would have a very limited choice of companies to work in. So welding knowledge is essential. In addition, welding work on structural components requires deep foundation layers to hold the Canadian Welding Bureau (CWB) certification. The processes most often used are four-position shielded metal arc welding (SMAW) and oxygen cutting.

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 used for working. According to the occupational analysis workshop participants, the main cognitive skills necessary to deep foundation layers are the following:

- planning the work to be done;
- decision-making;
- problem-solving.

Motor skills

Motor skills involve gestures and movements. The main motor skill necessary to deep foundation layers is good coordination.

Perceptual skills

Perceptual skills are sensory skills enabling a person to perceive by his senses what is happening in his environment. The main perceptual skill necessary to deep foundation layers is an ability to perceive and distinguish sounds (e.g.: sounds change according to the type of soil).

4.3 ATTITUDES

Attitudes are a way of acting, reacting and relating with others or with one's environment. They involve personal skills. The main attitudes necessary to deep foundation layers are the following:

- attention
- autonomy
- adaptability
- ability to communicate

- leadership
- patience
- punctuality
- prudence
- vigilance

5. TRAINING SUGGESTIONS

Initial training

The participants consider that the training of apprentices interested in laying deep foundations should focus on learning hoisting signals and about the operation and capacities of a crane (used for such work). The participants emphasized the importance of an apprentice working with a competent journeyman who wants to share his knowledge.

Professional development and upgrading

The participants expressed an interest in upgrading their skills in first-aid and welding, and in an overview of all techniques used in the specialty. They said they would like more training related to their specialty to be offered.

Annexes

Annex 1

MATERIAL RESOURCES, TOOLS AND EQUIPMENT

Tools and equipment

- Pile-driving devices (e.g.: air, drop or vibrator hammer, siphon, drill bit)
- Pry bar
- Torch
- Bolt, monkey, adjustable wrenches
- Dry line
- Ignition device
- Square
- Personal protective equipment
- Axe
- Laser
- Welding machine
- Marker
- Hammer
- Sledge hammer
- Surveyor's level, carpenter's level
- Shovels
- Grease gun
- Measuring tape
- Saws

Material resources

- Bentonite
- Stapler
- Steel, fibre cables
- Wedges
- Rope
- Chalk
- Slings
- Steel or wood shoring scaffolding
- Struts
- Plumb line
- Planks
- Wales
- Sheet-piling
- Bearing and shoring piles
- Steel plate
- Cable tensioner
- Hoppers

Annex 2

GRID OF OCCUPATIONAL HEALTH AND SAFETY ELEMENTS

Produced by: **Louise Lessard**, Prevention Consultant
ASP Construction

Table A.1 Description of Hazards in Practicing the Deep Foundation Layer Specialty

Hazards	Effects on Health and Safety	Means of Prevention
Hand injuries	• Cuts • Scratches	• Wear work gloves.
Eye injuries	• Foreign bodies • Dust	• Wear safety glasses.
Excessive efforts	• Backache	• Use handling equipment or handle as a team.
Falling objects	• Crashing • Jamming	• Use good slinging techniques.
Same-level falls (slipping, mud, snow)	• Collisions • Contusions • Fractures • Bruises	• Clean the work area (pick up debris). • Absorb the oils. • Apply abrasives to make the surface less slippery.
Falls from heights	• Collisions • Internal injuries • Fractures • Bruises • Death • Psychological and physical after-effects	• Install a guardrail bordering all holes left unprotected.
Noise	• Deafness	• Wear hearing protection complying with SC provisions, section 2.10.7.6.

Hazards	Effects on Health and Safety	Means of Prevention
Heat	• Heat exhaustion • Heat stroke	• Drink enough water (about 250 ml every 20 minutes) during a heat wave. • Wear absorbent clothing.
Cold	• Chilblains (frostbites)	• Wear insulating clothing.
Collisions with machinery	• Fractures • Contusions	• Make sure to always be visible to the crane operator; otherwise, request a flagger's help.
Presence of infectious materials	• Infection from skin injuries	• Vaccinated against tetanus and hepatitis. • Train workers in WHMIS.

Annex 3

COMMENTS OF THE CARPENTER-JOINER PROFESSIONAL SUBCOMMITTEE

At the meeting of the carpenter-joiner professional subcommittee, held on April 26, 2012 in Montreal, the subcommittee members issued the following comments about the deep foundation layer specialty:

1. Task 1 Perform pile-driving related activities, Table 2.2 p. 13:

   At operation 1.3 Prepare the work, a sub-operation on handling materials should be added.

   At operation 1.4 Direct pile-driving operations, in the clarifications column, it is pointed out that pile excesses are cut with an oxyacetylene torch. But occasionally the deep foundation has to lengthen piles.

2. Table 2.3 Achievement Conditions, Supervision and Collaboration section, page 17:

   Welding should always be performed by the deep foundation layer.