BC World of Concrete Sector Engagement Report

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By:

Canadian National Trades Expo Inc.
Diana Klingner
T: 604.928.0144
E: diana@canadiannationaltrades.ca

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1.0 Introduction

"Concrete waits for no one".

This phrase affects key aspects of life and business in the concrete world. Once it is poured, concrete begins to dry and concrete finishers work with this reality. The 'on the tools' trades don't have the time to mince words as the concrete is drying. This is a trade grounded in action.

A combination of water, aggregate, and cement[1] powder, concrete is the building material of choice for structures, because of its strength. It is present in most modern-day construction builds across residential, commercial, industrial, institutional, infrastructure and specialized projects. It is a principle material used to build foundations, support walls, bridges, tunnels, sidewalks, driveways, dams, houses, and high rises. Concrete finishers "place, finish and protect concrete surfaces". They also "texture, chip, grind and cure finished concrete work and are responsible for the repair and restoration" work when concrete is damaged.[2]

The concrete finisher trade has an enormous impact on the BC economy relative to the size of the its workforce. Data from the 2011 National Household Survey suggests there are only approximately 1,600 concrete finishers and up to 4,500 concrete contractors in BC. Yet concrete is vital to the success of virtualy all construction projects. In 2016, the B.C. Construction Association estimated that the sector contributes 8.1% to B.C.'s GDP and that the value of proposed construction projects in B.C. was $329B.[3] The B.C. 2025 Labour Market Outlook report[4] indicates that by 2025, B.C.'s construction sector workforce is forecast to expand by a further 15,200 due to economic growth, and more importantly, will require an additional 57,800 replacement workers due to retirements and other exits. In 2016, most (92%) of BC construction companies emplyoed fewer than 20 employees. 94% of employers planned to hire new employees.[5]

Close to fifty-percent (50%) of concrete contractors and finishers are set to retire in the next 8 years. These workers earn on average 2.5x the median wage rate in B.C. The aging workforce and expected retirements creates urgency for recruitment and training in concrete given the vital role played by experienced tradespersons in training the new generation or workers through knowledge sharing. There is a finite window of opportunity during which knowledge transfer can occur in a way that maintains the workforce required in this province to support projects such as hydro, LNG, pipelines, institutional builds, infrastructure, residential, commercial, and warehousing. These projects all require the concrete trade. The importance of concrete in construction means that there is little time to waste in the face of identified labour market issues.

[1] Cement and concrete might be synonymous as household terms, but are by nature different: cement, an ultra-fine grey powder, and water, bind sand and rocks, known as aggregate, into a fluid mass known as concrete. Concrete is the signature material in industry-standard construction types such as commercial, residential, industrial, infrastructure, and institutional. According to the Cement Association of Canada (CAC), annual global production of concrete is estimated at 5 billion cubic yards, or 1.25 billion tons.
[2] Source: Concrete Finisher / Red Seal
[3] Source: BC Construction Association, BC Construction Stat Pack Fall 2016
[4] Source: BC 2025 Labour Market Outlook
[5] Source: BC Construction Association, BC Construction Stat Pack January 2016

If economic growth and retirements are not met with a wave of new entrants who are attracted, trained, and retained in the sector, the economic impact could be significant. Concrete waits for no one.

The Labour Market Partnership Program

This document is the final report of Phase 1 of a five-phase Sector Labour Market Partnership (LMP). The LMP Program is an application-based funding program that helps industry and employers understand and respond to changing labour market demands and workforce development challenges. The Program provides funding for partnership-led projects that address broad sector and regional labour market issues in B.C., including current or anticipated imbalances between supply (workers) and demand (jobs), or a lack of appropriate skills and experience.[6]

The five LMP project phases are:

- Phase 1: Sector Engagement *(this report);*
- Phase 2: Labour Market Information Research;
- Phase 3: Strategy Development;
- Phase 4: Implementation; and
- Phase 5: Evaluation.

This Sector LMP was lead by Canadian National Trades (an organization focused on enhancing industry collaboration and promoting work in the trades), in collaboration with leaders in the sector. The objectives of this Phase 1 (Schedule A – Section 2.03) project were to:

- Clearly define the key labour market issues facing the concrete sector;
- Begin consideration of potential solutions; and
- Establish a leadership and governance structure for subsequent LMP project phases.

Project Activities and Timelines

The core of this project was the engagement of the concrete sector which was conducted over a two-month period. To ensure full representation of the sector, preliminary steps included the building of an initial contact database of concrete companies and key suppliers since there was no such consolidated information. To achieve the project objectives, we proceeded through four project steps, the results of which are described in the subsequent sections of this report.

Step 1 – The Concrete Sector *(report Section 2)*
Mapping the concrete sector to National Occupation Classification codes and North American Industry Classification System codes, and undertaking a preliminary review of the existing economic information on the sector.

[6] Source: WorkBC Labour Market Partnerships

Step 2 – Sector Engagement *(report Section 3)*
Creating a project steering committee, building a contact database, and interviewing stakeholders.

Step 3 – Key Themes and Findings *(report Section 4)*
Organizing the findings from the sector engagement into a narrative discussion about the scope of the labour market problem, key labour market issues, and potential solutions.

Step 4 – Consensus and Direction on Next Steps *(report Section 5)*
Outlining the next steps to address the sector's labour market issues, focusing on the scope of Phase 2 labour market information research.

2.0 The Concrete Sector

History

For millennia builders sought a material that binds stones into a solid, formed mass. Cement was used by Nabataea traders in Syria and Northern Jordan as far back as 6,500 BC. By 700 BC cement use expanded with the use of hydraulic lime extracted from limestone that is heated in kilns to replace clay for use as mortar for the construction of walls, concrete floors, and underground waterproof cisterns. The Egyptians used lime and gypsum mortar as the binding agent for the Pyramids. Cement was used by the Greeks and Romans to construct the Coliseum, and the huge Basilica of Constantine.

In 1824, Joseph Aspdin, a bricklayer, and mason in Leeds, England, took out a patent on a hydraulic cement that he called Portland Cement because its colour resembled the stone quarried on the Isle of Portland off the British coast. Aspdin's method involved the careful proportioning of limestone and clay, pulverizing them, and burning the mixture into clinker, which was then ground into finished cement.[7]

Today, concrete products come in a wide variety of forms and applications, and new formulas and uses are discovered every year. Advances make concrete more versatile and adaptable, extend its range of use, and improve other properties such as strength, electrical conductivity, and pollution control.[8] BC has first-hand experience with these advancements with projects using "pervious concrete." This type of concrete has high permeability and allows rain water to permeate [9]

[7] Source: Portland Cement Association
[8] Research continues into the application of cement and concrete for specialized uses. There are now cork-cement composites, previous concrete, mudcrete for road bases and land reclamation, glass concrete for aesthetics, rubberized concrete, polymer concrete, geopolymer green concrete, limecrete, strong and light hempcrete with good insulating properties, papercrete, and smog-eating concrete.
[9] Source: Gupta (2013). "Monitoring in situ performance of pervious concrete in British Columbia—A pilot study". Elsevier.

Type of Work

As explained in the concrete finisher National Occupation Analysis, "concrete finishers place, finish and protect concrete surfaces. They work on a variety of vertical and horizontal surfaces and structures such as concrete floors, walls, sidewalks, stairs, driveways, curbs and gutters, stairs, dams, bridges, and tunnels. They also texture, chip, grind and cure finished concrete work and are responsible for the repair and restoration of damaged concrete. They apply various finishes to concrete surfaces such as architectural, exposed, acid-stained, patterned, stamped, broomed overlays and smooth finishes. They install expansion joints, edge concrete surfaces, and install fixtures such as anchor bolts, steel plates, and door sills. They also apply membranes and other waterproofing products to concrete. Concrete finishers must possess a sound knowledge of the properties of various types of concrete and how mixes, proportions, and additives affect concrete strength, setting and curing times, finish and durability. Materials that concrete finishers work with include concrete, grouts, site-cured plastics, exotics, epoxies, polyurethanes, and acrylic."[10] It is also important to note that the work concrete finishers do is inter-dependent with work others do putting in the reinforcing bars (rebar) and the preparatory formwork.

Concrete is a unique trade in that the quality of the finished product is largely dependent on the weather. Rain, heat, and humidity are some of the factors that affect how concrete dries and the result. The result is irreversible so the need to 'get it right' is a paramount concern, making the knowledge transfer and understanding from seasoned tradespersons to new entrants so essential. The permanent nature of concrete and its vital role in the construction sector translates into concrete finishers having a significant amount of personal pride in their work.

North American Industry Classification System (NAICS)

Industry and employment data is often organized based on the North American Industry Classification System (NAICS) and National Occupational Classification (NOC) system. The North American Industry Classification System (NAICS) is an industry classification system developed by the statistical agencies of Canada, Mexico, and the United States. Created against the background of the North American Free Trade Agreement, it is designed to provide common definitions of the industrial structure of the three countries and a common statistical framework to facilitate the analysis of the three economies.

NAICS codes have a tiered structure with "2-digit" NAICS being higher aggregations of "3-digit" and subsequent NAICS tiers. The relevant codes for concrete are 23 (Construction), and 31 – 33 (Manufacturing). The focus for this concrete sector LMP is on NAICS 238 (Specialty Trade Contractors), but it should be noted that aspects of the concrete industry are also represented by 236 (Construction Buildings), 237 (Heavy and civil engineering construction) through specialty trade contractors working on projects, as well as 327 (non-metallic mineral product manufacturing). NAICS 327 is focused on the manufacturing of the end use products rather than

[10] Source: Concrete Finisher / Red Seal NOA

the use of those products in the construction sector, and is not in scope for this LMP. The in-scope relevant NAICS codes are presented below. Please refer to Appendix 1 for full descriptions.

23 – Construction[11]

- **236** Construction of buildings
  - 2361 Residential building construction
  - 2362 Non-residential building construction
- **237** Heavy and civil engineering construction
  - 2371 Utility system construction
  - 2372 Land subdivision
  - 2373 Highway, street and bridge construction
  - 2379 Other heavy and civil engineering construction
- **238** Specialty Trade Contractors
  - **2381** Foundation, Structure, and building Contractors
    - **23811** Poured concrete foundation and structure contractors
      - **238110** Poured concrete foundation and structure contractors
    - **23812** Structural steel and precast concrete contractors
      - **238120** Structural steel and precast concrete contractors
    - **23814** Masonry contractors
      - **238140** Masonry contractors

National Occupational Classification (NOC)

The National Occupational Classification (NOC) is the nationally accepted reference on occupations in Canada. It organizes over 40,000 job titles into 500 occupational groups. The NOC 2011 version was developed jointly by Statistics Canada and Human Resources and Skills Development Canada to support analysis of aggregated occupational data by NOC skill level.[12,13]

The NOC code relevant for concrete is '7' (Trades, transport and equipment operators and related occupations). The specific focus will be on two 4-digit NOCs: 7205 (Contractors and supervisors, other construction trades), and 7282 (Concrete Finishers). Note that NOC 7205 encompasses a broader set of trades than only concrete, a point which will be explored in Phase 2. NOC 7611 (Construction Trades Helpers and Labourers) and NOC 7236 (Ironworkers) will also be relevant to the Phase 2 study as they include workers performing tasks related to concrete pouring and finishing, such as building concrete forms and positioning and securing reinforcing steel bars. Meanwhile, NOC 9414 is focused on employment in the manufacture of concrete and is not in scope for this sector LMP. Please refer to Appendix 2 for full descriptions of the NOCs.

7 – Trades, transport and equipment operators and related occupations[14]

- **72** Industrial, electrical and construction trades

[11] NAICS 23 (2017)
[12] Source: NOC Codes
[13] Source: NOC (2011)
[14] Source: NOC 7 (2016)

720 Contractors and supervisors, other construction trades, installers, repairers and servicers

7205 Contractors/supervisors, other construction trades, installers, repairers/servicers

728 Masonry and plastering trades

7282 Concrete finishers

The Concrete Sector in B.C.

Using the NAICS and NOC codes, we reviewed existing information from the Statistics Canada National Household Survey, Labour Force Survey, and the B.C. 2025 Labour Market Outlook to present an overview of the construction sector labour market in British Columbia, and the concrete sector in particular.

B.C.'s 2025 Labour Market Outlook[15] estimates that there are over 200,000 people employed in the construction sector and estimates that there will be 57,800 job openings as a result of replacing existing workers (including those exiting because of death or retirements), and 15,200 jobs openings due to economic expansion through to 2025.

Table 1 – Labour Market Outlook for the Construction Sector

	2016 EMPLOYMENT		EMPLOYMENT GROWTH (AVERAGE ANNUAL %)		JOB OPENINGS		
INDUSTRY	NUMBER	SHARE OF TOTAL	2016-2020	2020-2025	TOTAL	EXPANSION	REPLACEMENT
Construction	207,400	8.9%	.7%	.4%	73,000	15,200	57,800

Figure 1 shows that the unemployment rate in the construction sector in B.C. has declined in recent years.[16]

[15] Source: BC 2025 Labour Market Outlook
[16] Source: Labour Force Survey

Figure 1 - Employment in the B.C. Construction Sector

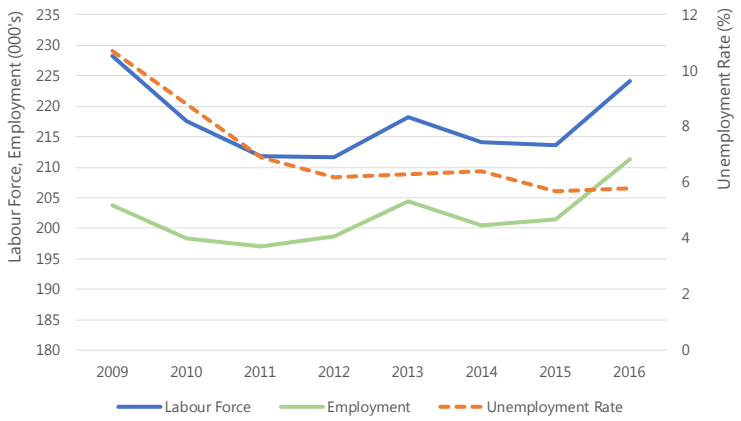


Table 2 presents information from the 2011 National Household Survey showing that

- There are approximately 4,540 contractors and supervisors (NOC 7205), and 1,545 concrete finishers (NOC 7282) in B.C.
- 50% of Contractors and supervisors (NOC 7205), and 70% of Concrete Finishers (NOC 7282) in B.C. are employees rather than self-employed. At 30%, B.C. is the province with the highest number of self-employed concrete finishers in Canada. The next highest are Alberta and Saskatchewan with 21% and 20% respectively.[17]

Table 2 – Employment in British Columbia by Occupation (All sexes, all ages)

		Total	Employee	Self-employed [3]	Self-employed	Unpaid family worker
Total	Occupation - National Occupational Classification (NOC) 2011	2,171,470	1,873,695	297,775	291,755	6,020
7	Trades, transport and equipment operators and related occupations	309,785	256,755	53,035	52,490	540
72	Industrial, electrical and construction trades	117,680	87,830	29,850	29,630	220
720	Contractors and supervisors, industrial, electrical and construction trades and related workers	10,980	7.145	3,825	3,810	30
7205	Contractors and supervisors, other construction trades, installers, repairers and servicers	4,540	2,320	2,220	2,205	0
728	Masonry and plastering trades	9,940	6,085	3,860	3,815	50
7282	Concrete finishers	1,545	1,075	470	465	-

[17] Source: National Household Survey 2011

Source: Statistics Canada - 2011 National Household Survey. Catalogue Number 99-012-X2011033.

[3] Includes self-employed with an incorporated business and self-employed with an unincorporated business. Also included among the self-employed are unpaid family workers.

Table 3 presents information from the Ministry showing that across the two 4-digit NOC codes identified above, there are 2,720 job openings projected for the concrete sector through to 2025, all of which are estimated to have a median wage rate close to $30 per hour (2.5 x the median wage rate in BC). Combining data in Tables 2 and 3, these job openings represent 45% of the current employment in the sector.[18]

Table 3 – Labour Market Outlook for the Concrete Sector

Occupation	JOB OPENINGS TO 2025	MEDIAN WAGE RATE	WAGE RATE LOW	WAGE RATE HIGH
Contractors and supervisors, other construction trades, installers, repairers and servicers (NOC 7205)	2,200	$ 30.00	$ 19.00	$ 38.46
Concrete Finishers (NOC 7282)	520	$ 27.00	$ 19.00	$ 35.00

Table 4 presents demographic data from the National Household Survey based on the two in-scope 4-digit NOC codes identified above which illustrates the demographic challenge facing the concrete sector over the projection horizon:

- Over 50% of Concrete Finishers (NOC 2782) are 35 or older. As this data is 10 years old, it is possible the percentage has increased since this data was collected *(data by NAICS in Appendix 3 leads to the same conclusion);*
- Between 0% and 10% of employees are female in the sector *(refer to Table 4 and Appendix 3 NAICS data)*

[18] Total Job Openings (2,200 + 520) / Total Employment (4,540+1,545) = 45%

Table 4 – Distribution of BC Employees by Age and Sex (NOC) 2011

National Occupational Classification (NOC) 2011 % of Total Employees in B.C.	7282 - Concrete Finishers
All male, Ages: 20 - 24 years	10.0%
All male, Ages: 25 - 34 years	30.1%
All male, Ages: 35 - 44 years	19.1%
All male, Ages: 45 - 54 years	28.5%
All male, Ages: 55 - 64 years	8.1%
All male, Ages: 65 - 74 years	2.6%
All Females, All Ages	0.0%

Source: Statistics Canada - 2011 National Household Survey. Catalogue Number 99-012-X2011033.

Additional data on the concrete sector in Canada and B.C. is included for reference in Appendix 3.

Training

In regular structural concrete, the strength[19] of the concrete is largely determined by the water-to-cement ratio. The lower the water content the stronger the concrete. The mix will have less aggregate[20] when especially strong concrete is required. The strength of concrete is also affected by environmental conditions, specifically temperature and moisture during the curing process. The industry uses chemical additives to assist the curing process and the specialized knowledge gained by tradespeople working with concrete in various weather conditions is vital in understanding the optimal conditions of pouring, placing and finishing concrete. As a result, it is vital that this knowledge is directly passed on from experienced tradespersons to new entrants as part of the training to prepare the next generation of concrete finishers.

Informal Training

There is no single entry-path into the concrete sector. A schematic of the ways the current workforce found themselves working in the trade would resemble a web rather than a ramp or other linear representation. This is partly because the concrete sector is currently dominated by an informal approach to training whereby individuals are recruited through social networks and receive on-the-job training. Red-seal tickets are not as common in concrete as for other trades. Employees typically start learning to place concrete and progress naturally to finishing tasks as they gain experience, developing both hard skills (e.g. tool use) and sof skills (e.g. communication), necessary to advance in the trade.

Formal Training

The National Occupational Analysis (NOA)[21] is a key document for each Red Seal trade. Each NOA sets the standard for a Red Seal trade, is the basis for Red Seal examinations, and the basis for provincial and territorial apprenticeship training programs. In short, the NOA outlines everything that a tradesperson needs to know about their trade. This includes:

- trade activities (tasks and sub-tasks);
- skills and knowledge requirements;
- essential skills;
- safety information;
- trends affecting the trade;
- technical terms;
- names of tools and equipment; and
- acronyms.

[19] Concrete strength is measured in pounds per square inch or kilograms per square centimeter of force This is the force that is needed to crush a cement sample of a certain age or hardness.
[20] Aggregate is added with water to the cement mixture which gives it volume, stability, resistance to wear and erosion. Common aggregates include sand, crushed or broken stone, gravel, broken blast furnace slag, boiler ashes (clinkers), burned shale, and burned clay.
[21] Source: Occupational Standards / Red Seal

The Canadian Council of Directors of Apprenticeship (CCDA) recognizes this Occupational Analysis as the national standard for the occupation of Concrete Finisher.[22] The Red Seal program for Concrete Finisher (Cement Mason) and Certificate of Qualification with Red Seal endorsement is offered by Operative Plasterers' and Cement Masons' Local Union 919, through the Trowel Trades Training Association.[23]

Red Seal Concrete Finisher Designation:
NOC: 7282

Designation Year: 1993

Designated Red Seal in AB, BC, MB, NB, NL, NS, ON, PE, QC

Trade title: Concrete Finisher, in AB, MB, NB, NL, NS, PE

Other titles used in provinces/territories: Cement Finisher (QC), Cement Mason (BC), Cement (Concrete) Finisher (ON)

2017/2018 Training Schedule: [24]
All classes run from 8:00 am to 4:00 pm

Concrete Finisher Level 1 runs from Feb 6, 2017 - Mar. 3, 2017

Cement Mason Level 1 runs from Oct. 30, 2017- Nov. 24, 2017

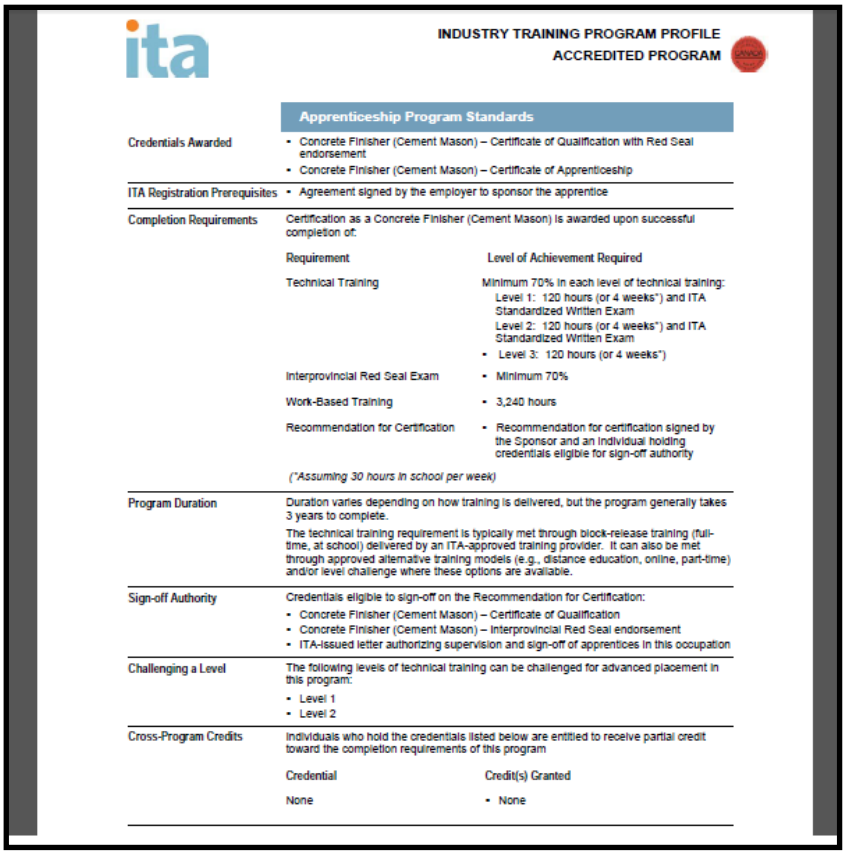
Concrete Finisher Level 3 runs from Feb 26, 2018 - March 23, 2018

Cement Mason Level 2 runs from Jan 8, 2018 - Feb 2/2018

Concrete Finisher Apprenticeship program standards are administered by the Industry Training Authority.[25]

[22] The analysis covers tasks performed by concrete finishers whose occupational title has been identified by some provinces and territories of Canada as Cement Finisher and Cement Mason
[23] Trowel Trades Training Association
[24] Source: Concrete Finisher / Red Seal
[25] Source: Industry Training Authority Program Standards

Figure 2: Concrete Finisher Program Profile



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INDUSTRY TRAINING PROGRAM PROFILE
ACCREDITED PROGRAM

Apprenticeship Program Standards

Credentials Awarded	• Concrete Finisher (Cement Mason) – Certificate of Qualification with Red Seal endorsement • Concrete Finisher (Cement Mason) – Certificate of Apprenticeship
ITA Registration Prerequisites	• Agreement signed by the employer to sponsor the apprentice
Completion Requirements	Certification as a Concrete Finisher (Cement Mason) is awarded upon successful completion of:

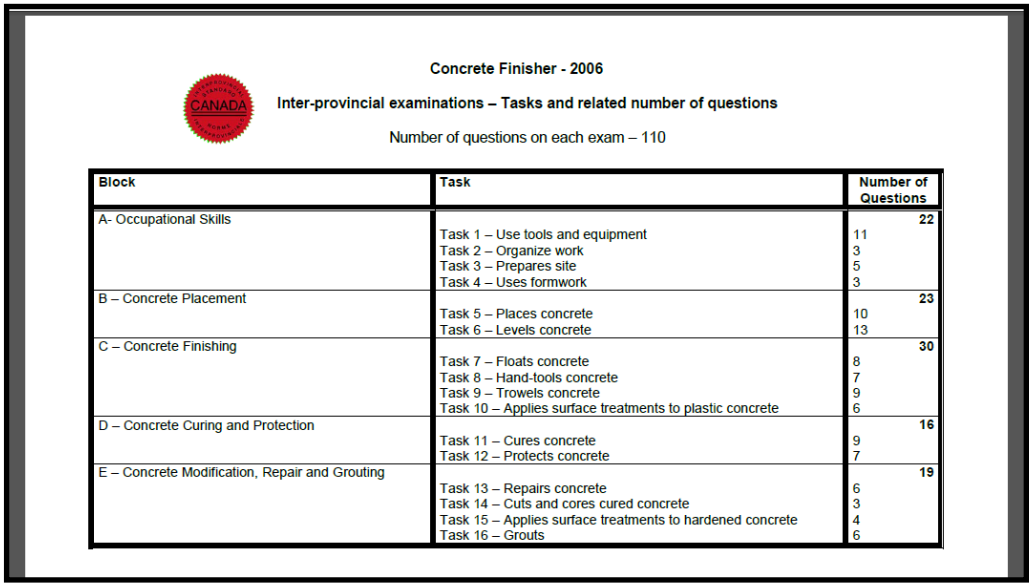
Requirement	Level of Achievement Required
Technical Training	Minimum 70% in each level of technical training: Level 1: 120 hours (or 4 weeks*) and ITA Standardized Written Exam Level 2: 120 hours (or 4 weeks*) and ITA Standardized Written Exam • Level 3: 120 hours (or 4 weeks*)
Interprovincial Red Seal Exam	• Minimum 70%
Work-Based Training	• 3,240 hours
Recommendation for Certification	• Recommendation for certification signed by the Sponsor and an individual holding credentials eligible for sign-off authority

*(*Assuming 30 hours in school per week)*

Program Duration	Duration varies depending on how training is delivered, but the program generally takes 3 years to complete. The technical training requirement is typically met through block-release training (full-time, at school) delivered by an ITA-approved training provider. It can also be met through approved alternative training models (e.g., distance education, online, part-time) and/or level challenge where these options are available.
Sign-off Authority	Credentials eligible to sign-off on the Recommendation for Certification: • Concrete Finisher (Cement Mason) – Certificate of Qualification • Concrete Finisher (Cement Mason) – Interprovincial Red Seal endorsement • ITA-issued letter authorizing supervision and sign-off of apprentices in this occupation
Challenging a Level	The following levels of technical training can be challenged for advanced placement in this program: • Level 1 • Level 2
Cross-Program Credits	Individuals who hold the credentials listed below are entitled to receive partial credit toward the completion requirements of this program

Credential	Credit(s) Granted
None	• None

Figure 3: Concrete Finisher Red Seal Interprovincial Exam



Concrete Finisher - 2006

Inter-provincial examinations – Tasks and related number of questions

Number of questions on each exam – 110

Block	Task	Number of Questions
A- Occupational Skills		22
	Task 1 – Use tools and equipment	11
	Task 2 – Organize work	3
	Task 3 – Prepares site	5
	Task 4 – Uses formwork	3
B – Concrete Placement		23
	Task 5 – Places concrete	10
	Task 6 – Levels concrete	13
C – Concrete Finishing		30
	Task 7 – Floats concrete	8
	Task 8 – Hand-tools concrete	7
	Task 9 – Trowels concrete	9
	Task 10 – Applies surface treatments to plastic concrete	6
D – Concrete Curing and Protection		16
	Task 11 – Cures concrete	9
	Task 12 – Protects concrete	7
E – Concrete Modification, Repair and Grouting		19
	Task 13 – Repairs concrete	6
	Task 14 – Cuts and cores cured concrete	3
	Task 15 – Applies surface treatments to hardened concrete	4
	Task 16 – Grouts	6

3.0 Sector Engagement

Stakeholder Engagement Approach

Our primary goal in this Phase 1 Sector Labour Market Partnership project was to bring together stakeholders and principals from across the concrete sector. We need to understand the challenges they are facing to recruit, train, and retain highly skilled workers to continue to support the construction industry in B.C. Through better insights and understanding from industry leaders themselves we will have the building blocks to move forward in supporting, growing, and sustaining this vital part of the B.C. economy. The key stakeholders and principals we brought together included:

1. Commercial Contractors, large and small;
2. Residential Contractors, large and small;
3. Industrial Contractors (large projects, infrastructure);
4. Concrete Suppliers;
5. Specialty contractors (stamp, colour, decorative, underwater);
6. Labour union; and
7. Tradesmen and tradeswomen.

The success of this engagement phase was very much dependent on the ability to communicate with sector stakeholders. The observation that "concrete waits for no one" translates into a professional communication style that is efficient, direct, in the moment, and unfiltered. The 'on the tools' trades literally don't have the time to mince words as the concrete is drying. They say what they mean and mean what they say. They don't have time to waste and their patience level for idle talk is low. Our understanding of this predominant communication style was central to the design of our stakeholder outreach strategy. While online interactions have replaced telephone and face to face interactions in many respects across many sectors, this is not the case with the concrete sector and its tradespeople.

A significant majority of the companies engaged were owner-operated, meaning that communications were with practicing tradespeople and not human resource or communication department representatives. This group is not well-suited to structured meetings with defined timelines and power point presentations nor through online initiatives such as emails and web based surveys. This is in part driven by the unpredictability of work schedules in the sector. Companies usually cannot tell you until the day before, or even day of, how a job will unfold, leaving planning to the 'best guess' of the skilled tradesperson. When a job is underway, all efforts are focused upon it. Communication and activities unrelated to the job are not an option.

To address these realities, we used a combination of phone calls and face to face meetings held throughout the province (Kelowna, Nanaimo, Victoria, Metro Vancouver, Prince George, Williams Lake, and Smithers). Meetings were held at convenient locations (including job sites in some cases) for company representatives, and times were arranged in most cases on the day they were to occur. Meetings were efficient and based on clear, direct questions. The resulting

conversations resulted in the formation of a well-rounded Steering Committee, and produced a solid understanding of the sector labour market challenges.

Governance & Project Steering Committee

The project established a leadership structure to steward this initiative through potential subsequent LMP phases that includes representatives from across B.C.'s development regions. Regional representation was important because each region faces challenges unique to its area, including weather and labour market conditions. Many companies work across regions and project types (residential, specialty, commercial, industrial, and infrastructure). The engagement process was inclusive of a range of companies covering curb and gutter, placing and finishing, decorative, pre-cast, ready-mix, underwater, and suppliers.

Regions:

1. Vancouver Island/Coast
2. Mainland Southwest
3. Thompson Okanagan
4. Cariboo
5. Nechako

Table 5: Project Steering Committee

#	Companies	Contact
Region: Thompson Okanagan - Kelowna		
1	Silver Springs Concrete Services	Connie Krissler
2	QCT Concrete	Dave Mclane
3	Pire Bros Contracting	Joe Pires
Region: Thompson Okanagan - Peachland		
4	KRB Construction	Andrew Gee
Region: Vancouver Island/Coast – Nanaimo		
5	Intrusion Prepakt Ltd.	David Ritchie
6	Nanaimo Decorative	Dean Borrelli
7	Bedrock Redi-Mix	Terry Hughes
8	ABC Concrete (Lehigh Hanson)	Doug Lum
Region: Vancouver Island/Coast – Victoria		
9	A.C.T Concrete Placing & Finishing	Terry Robinson

10	ICL	Todd Skelton
11	Vicon Enterprises	Mark Firer
12	Vicon Enterprises	Wayne Cox
Region: Cariboo – Williams Lake		
13	Grosso	Chris Lutters
14	United Concrete & Gravel	Paul Zacharias
Region: Cariboo – Prince George		
15	Rolling Mix Concrete	John Paolucci
Region: Nechako - Smithers		
16	Boreal Pacific Enterprises	Tim Holmes
17	West Fraser Concrete	Hank Meerdink
Region: Mainland Southwest – Metro Vancouver		
18	Captain Concrete	Darrell Rempel
19	Canadian National Trade	Diana Klingner
20	Herfort Concrete	Leo Herfort
21	Kednic Concrete	Nic Chutskoff
22	White Water Concrete	Kyle Smith
23	Cement Mason Journeyman	Karl Jardine

Stakeholder Outreach

The concrete sector is not represented by an association that actively maintains contact information for companies. Consequently, our starting point was to construct an initial database of contacts using online research, including through on-line directories such as the yellow pages. This resulted in an initial database of approximately 150 companies. Phones calls were then made and those that were able and willing to contribute were asked the questions outlined in Appendix 4. Of the 150 organizations in the database, 65 were successfully reached via phone and participated.[26] 20 face-to-face regional meetings were held in May and June 2017. Regional meetings were conducted in Victoria, Nanaimo, Metro Vancouver, Kelowna, Peachland, Williams Lake, Prince George, and Smithers and represented 5 of the 8 regions in B.C.

[26] At least 2 phone messages were left to try to contact the remaining 90 stakeholders. Stakeholder engagement revealed that if this sector is not reached directly (answer the phone when you call) they are unlikely to be reached.

4.0 Key Themes and Findings

Scope of the Problem

Demand for skilled concrete workers in B.C. is likely to persist. The concrete finisher trade consists of a small number of workers, but those workers have an enormous impact on the construction sector. Most construction projects from a new sidewalk to a downtown high rise require concrete finishers. In today's building climate that shows little evidence of slowing[27], projections suggest there are likely to be a significant number of job openings relative to the existing concrete sector labour force (job openings could represent 45% of current employment as outlined in section 2 above) by 2025.[28] The existing data is supported by the conversations we had during our stakeholder engagement. The sector has work, but most employers interviewed report being unable to find individuals to fill vacant positions. The concern is that the gap between the demand and the number of skilled workers in B.C. will continue to grow.

The skilled concrete worker is becoming sufficiently scarce that they can now negotiate their own pay and terms of employment. It is very much a seller's market. Conversations and concrete demos at the Trade Expo event revealed that there are individuals who would be well suited to work in the concrete sector. The work is described with pride and satisfaction by most participants interviewed as part of our stakeholder engagement activities. One reason given is the satisfaction that comes with the creation of permanent structures in our everyday landscape. People's satisfaction is also expressed by low rates of attrition - once individuals find their footing in the sector, they tend to remain.

Finding and training this potential pool of supply in the next 10 years is critically important. The impending retirement of seasoned concrete tradespersons will reduce the pool of knowledge available to support the training of the next generation of tradespeople in the sector. This is especially problematic for concrete, a non-traditional trade requiring unique training conditions. Once concrete sets, it cannot be reused, making formal training outside of the context of a job-site impractical. The importance of condition-specific knowledge (e.g. weather) in concrete work makes on-the-job training under the direction of a skilled and experienced tradesperson critical and essential.

When a potential worker is found, they tend to have little or no relevant skills or training so that the company is tasked with providing informal on-the-job training. Unfortunately, in many cases the result is short-lived employment since many individuals determine that "concrete is not for them", or they leave to start their own businesses and those with the ability to build capacity eventually compete with the original employer. There is currently no coordinated training for concrete tradespeople in B.C. beyond the ongoing efforts of the Operative Plasterers' and Cement Masons' (OPCMIA) Local Union 919 and recent efforts by Canadian National Trades Expo. Based on the consultations undertaken as part of this Phase 1 project, initial indications are that

[27] Building permit data year to date for BC shows a 7.1% increase, continuing the upward trend in the value of building permits since 2013. Source: Building Permits
[28] LMO data presented in Section 2.

the concrete sector is willing to mobilize to drive the required change to address the labour market challenges they face. The first step is to determine 'the how' since the traditional learning and support structure of other trades is not readily applied to concrete. The challenge this Labour Market Partnership will need to confront is how to best attract individuals with the potential to become highly skilled, train them without significant work-flow or profitability impacts to employers, and retain them to support the next generation worth of high quality construction in the Province of British Columbia.

Workforce Challenges and Priorities

A clear set of themes emerged out of the LMP Phase 1 stakeholder engagement process that could form the basis for a research agenda in Phase 2. This section summarizes these findings, organizing the discussion into five challenges related to the concrete sector labour market and two strengths. Several of these themes are closely related as will become clear in the discussion that follows.

Our stakeholder engagement lead to a clear consensus among project partners about the strengths and challenges of the concrete sector. Long-term employee retention is a significant strength. Once employees are hired, trained, and effective contributors to the business, they tend to stay in the sector. Relatively high wages and job satisfaction are the two main reasons.

On the other hand, recruitment is the overarching challenge for the sector. Finding new ways to source existing talent and generating new talent must be a major priority if the sector is to meet the labour market challenges outlined above. In many ways, other challenges uncovered in the research were barriers to achieving this goal. Challenging working conditions, the need for entrants to develop appropriate work habits, the cost of screening employees, the need for training and knowledge transfer, and the lack of industry organization lead naturally from one to the next, and can all be seen through the lens of the challenge of recruitment.

Recruitment

Recruitment is vital to a healthy concrete sector moving forward. There is no existing coordinated recruitment effort in the sector beyond the ongoing activities of the OPCMIA 919 Union, and recent activities by Canadian National Trades. Direct employer recruitment efforts are also limited since historically many employees entered through family-owned companies or other localized networking (friends, neighbors). A common comment during our consultations was that there seems to be a generational shift whereby there is less interest by millennials in taking over the family business, making new types of recruitment a pressing need. Screening new employees can be costly for companies as they devote resources to on-the-job training of individuals who may decide to find themselves another line of work after a few months. Employers reported an inability to find existing skilled concrete employees, no matter where they placed job advertisements.

Working Conditions and Logistics

Concrete's dependency on weather conditions has a significant impact on project scheduling and work hours. This is not a 9 to 5 job. Workers need to be prepared for intense periods of work and long hours, including periods where weather prevents work and time spent "babysitting concrete" (watching it dry). For example, a concrete finisher starts a job anywhere from 10:00 am to 1:00 pm and may not finish the job until after midnight depending on the weather, how the concrete dries, noise variances, job size and other factors. Concrete placers come in earlier, prior to the finishers, to place the concrete, and can start anywhere between 5:00 am to l:00 pm and finish once the job is done. Depending on the job size the placing and finishing may done by the same person. Individuals looking for a predictable work schedule are ill-suited to the job. Hours and days of work are inconsistent and often determined within 48 hours of the work day. In addition, the work locations of company projects can take employees outside of the immediate areas where they live. Ultimately, this challenge can be expressed as follows: "How do employers attract, recruit, screen, and train, in a trade where work is subject to marked short-term unpredictably"?

Developing Appropriate Work Habits

Employers repeatedly discussed concerns about productivity and safety when talking about experiences with millennial employees. When it comes to concrete, habits like 'sending or viewing a quick text' take the focus off the job which can have a significant effect on the employee's ability to properly gauge project progress and on their awareness of large equipment and concrete trucks and booms near them. The potential health and safety implications are significant.

There was some disagreement among interviewees about how to address this challenge. Some of the seasoned tradespersons interviewed felt that the right young person just needs the right guidance and that they would evolve to be a great asset to the concrete trade. For this group, informal on-the-job training, with mentorship from seasoned workers is an important tool to help develop skills and better habits. Meanwhile, other respondents voiced frustration with being unable to relate and communicate with young workers, which has resulted in generalizations about an entire generation that hinder recruitment.

Training

Training in concrete requires that skills be developed on-the-job so that the tradesperson learns to account for factors such as weather, changing mix designs, different water types, and truck logistics, which all affect the outcome of the product. This is true whether the project is a high-rise slab, house driveway, bridge deck, or ice rink. In this context, specific knowledge and skill cannot effectively be taught in a school or warehouse or by instructors that are no longer working in the sector. Existing skilled tradespersons are central to the success of training new talent. The importance of understanding what effects various conditions have on the concrete cannot be over-emphasized, and the only way this can truly be taught is under real world conditions on the job, in the elements, with the supporting knowledge of the senior tradespersons. As a result,

companies are tasked with training and engaged companies reported dedicating significant resources to training new recruits.

Not everyone is suited to work in concrete. Beyond the unpredictability of the days and hours worked which was discussed above, a certain amount of aptitude is required. For example, workers need what is called “an eye for flat”, meaning they have an aptitude or natural ability to flatten surfaces, much like an artist does when they handle and form clay or a cake decorator does when they frost cakes by hand. Employers report that many new recruits are “screened out” through the process of on-the-job training under the supervision of a skilled tradesperson which leads to the determination that they are not well suited to the trade. As discussed below, long-term retention is not a problem for the concrete sector, but there are significant challenges finding the right employees to retain.

The importance of training only increases as concrete finishing becomes more mechanized with equipment such as power screeds, power trowels, and laser levels, to name a few. Hand trowelling is still required for small jobs and to finish hard-to-reach spots in corners, edges and around obstacles such as pipes. These changes may increase the value of formal training to prepare workers for job sites. However, red seal tickets are not a requirement given the urgency in the sector generated by the wave of impending retirements. With the advancement of technology, it is important to have highly trained workers that are not only able to use new advances, but use them in a manner still grounded in the realities of what is going on with the concrete on the day it’s poured. Although more sophisticated equipment has made many tasks easier, most small companies do not have the capacity to use this type of technology.

Lack of Industry Organization

A final challenge that emerged through stakeholder engagement was that the sector has no single voice to promote the interests of its tradespeople and employers. There are no standard operation procedures for the industry, no formal industry work standards, and no coordinated efforts to tackle the developing recruitment challenges in the sector through promotion of the benefits of working in the concrete trade, coordinated training efforts, development of labour market information, and other potential initiatives. This Labour Market Project represents the first time that employers in the sector have banded together. It is essential that the project lead to action to overcome group fragility through a common sense of purpose.

Retention and Job Satisfaction

Although initial retention as part of recruitment and screening is a challenge for the sector, established concrete workers tend to be satisfied with their jobs and take pride in their contribution to making the public’s built environment. Many of the companies engaged said they had long term employees of 10, 15, 20+ years, indicating that retention of “the right worker” is not a major problem in the sector. It appears that a certain type of individual is drawn to

concrete. Employers reported that effective concrete workers have come from the food industry, specifically those formerly pursuing careers as chefs, partly because of similarities in the pace and creativity of the work environment.

Compensation and Wages

For those that stay in the concrete sector the pay is good, with starting wages between $18 - $25 per hour, and climbing with skill and experience for specialized workers to $35 to $50 per hour. Despite the unpredictability of work schedules, most employees tend to earn annual incomes ranging between $45,000 to $110,000.

Potential Solutions

In addition to labour market challenges in the concrete sector, our stakeholder engagement also points the way to some potential solutions that could be explored in subsequent phases of the Labour Market Partnership. Two potential types of solutions emerged.

1. *Establish an Industry Voice:*
    a. *Industry Collaboration.* This Phase 1 project brought together a diverse group of 'on the tools' concrete companies to identify and quantify the major labour market challenges with an eye towards jointly developing the best solutions to address increasingly urgent human resource challenges facing the concrete sector. There are supplier (e.g. concrete manufacturing) associations at "the front end of the truck" but no formalized groups at "the back end of the truck" to support companies pouring the concrete on job sites.
    b. *Developing regional HR supports, reflecting local weather and labour market conditions and training needs.* How the sector deals with concrete in the heat of the interior is very different from how the sector deals with concrete in the rain in the lower mainland and the cold of the Northern parts of B.C. The quantity and quality of the labour pool also varies between regions.
    c. *Coordinated promotion of the concrete sector*. Events such as Trades Expo have showcased concrete as a trade with some success in terms of effective recruitment.

2. *Drawing on historically underutilized sources of labour supply:*
    a. *Promoting the inclusion of women in the concrete sector*. New technologies mean that concrete is not as labour intensive as in the past, opening the door to more women to work in the sector.
    b. *Immigration as a source of labour supply*. Some employers reported that immigrants are one source of labour supply (often coming from South America).
    c. *Individuals that by traditional classifications are considered to have learning disabilities.* During stakeholder engagement, an interesting insight was the

potential of these individuals in the concrete sector since they are often wholistic and conceptual thinkers who can see the whole picture as opposed to individuals who tend to focus on the process in discrete steps as they come. This is an important attribute in the concrete sector.

d. *Indigenous individuals as a source of labour supply.* Preliminary conversations with individuals in northern indigenous communities suggests there may be opportunities to increase participation of this group in the concrete sector.

5.0 Consensus and Direction on Next Steps

The key themes and findings uncovered during Phase 1 lay the ground work for the more in-depth labour market research planned for Phase 2. The Phase 1 stakeholder engagement made it clear that industry is willing to participate to address the labour market challenges identified in this report on the basis that their participation lead to action. The Steering Committee has agreed to support Canadian National Trades to pursue a contract to undertake a sector LMP Phase 2 labour market information research project to lay the foundation for strategy development, implementation, and evaluation in subsequent phases. We anticipate proceeding as follows:

1. Phase 1 Final Report submitted and approved by the Provincial Government to satisfy Phase 1 Sector LMP services and deliverables;
2. Application to the Province for a Phase 2 Sector LMP project;
3. Recruitment of a qualified firm to undertake Phase 2 through an approach agreed by the Steering Committee;
4. Begin Phase 2 research.

The rest of the section concludes our Phase 1 engagement report by summarizing "the scope of the Phase 2 LMI research, research priorities, key research questions, methodological approach, timelines and budget", and the steering committee's "role in leading and steering Phase 2 LMI research, including its Terms of Reference".

Phase 2 LMI Research Priorities & Research Themes

Four research priorities have been identified for Phase 2 research:

1. *Scope/definition of the industry* – types of business (number of employees, main business activities, etc.), type of occupations / work, workforce characteristics (demographics, training background, aptitudes, length of service in occupation), relationship between and within NOCs 7205 and 7282. Potential analysis of NOCs 7611 and 7236 as sources of labour for supporting formwork and rebar installation.

2. *Labour market conditions and outlook* – Baseline employment in sector, labour market projections and factors affecting them (scenario analysis).

3. *Labour market issues* – Validating Phase 1 and getting more detail:

a. Supply Side - Recruitment (working conditions, young worker and millennial expectations / perceptions, training, industry voice), retention (salary and job satisfaction)
b. Demand Side – Any relevant industry trends to explore (automation, new technology, growth, regulation, etc.)

4. *Solutions* – Explore potential solutions (e.g. establishing an industry voice, accessing historically underutilized sources of supply) to support subsequent strategy development in a Phase 3 sector LMP project.

Steering Committee Terms of Reference

The steering committee will have several roles in supporting Phase 2 Labour Market Research:

- Providing project continuity through project oversight;
- Sourcing participants for structured interviews, surveys, and case studies, either through direct participation, or through warm referrals to the project team; and
- Reviewing interim and final reports.

In addition, a smaller group of 3 - 5 steering committee members will be made available to the project team for more regular discussions and validation.

Methodological Approach

We anticipate that Phase 2 research will involve several complementary research tools which will generate information to be synthesized in a holistic labour market analysis to address the research priorities outlined above. Five potential research tools are currently being considered.

Review of Existing Labour Market Information – The starting point for Phase 2 research will be to leverage existing work through a literature review and / or jurisdictional scan.

Structured Interviews – We anticipate that structure interviews will play a more important role in generating labour market information for the concrete sector than for sectors more readily reached using online tools. In the absence of a significant survey effort, we would expect to interview approximately ~30 employers, along with employees and other stakeholders (including the Union). Structured interview guides would be developed with specific questions to support these interviews.

Surveys – As outlined in Section 3 of this report, the concrete sector is difficult to engage using online tools. We anticipate that this will likely reduce reliance on surveys but we think they might still be considered as a complementary research tool. Employers, and past, current, and prospective employees could be potential survey participants.

Economic Modeling – With labour market projections as a foundation, (e.g. buildforce, Ministry LMI), an economic model could be developed to assess the potential impact of different macro-

economic factors (economic growth, construction sector growth, retirement rates, etc.) on the labour market outlook for the sector and quantify the potential impact of various solutions identified as part of Phase 2 primary research. The model could incorporate a variety of data sources including: Labour Market Outlooks, Buidforce, Conference Board of Canada, Statistics Canada, BC Stats, and NOC/NAICS data for comparable industries, among others.

Case Studies – Detailed Case Studies building on the foundation of a structured interview could be developed to identify industry best practices in recruitment, training, and retention in the concrete sector.

Timelines & Budget

We anticipate that Phase 2 research will be completed over October 2017 to March 2018. A budget for the project will be determined based on discussions with the selected research firm. This timeline also coincides with the industries more traditional 'slow period', due to poor weather conditions, making individuals more accessbile.

Appendix 1: NAICS Codes

23 - Construction
This sector comprises establishments primarily engaged in constructing, repairing and renovating buildings and engineering works, and in subdividing and developing the land.

There are substantial differences in the types of equipment, work force skills, and other inputs required by establishments in this sector. To highlight these differences and variations in the underlying production functions, this sector is divided into three subsectors. Establishments are distinguished initially between those that undertake projects that require several different construction activities (known as trades) to be performed and establishments that specialize in one trade.

236 - Construction of buildings
This subsector comprises establishments primarily engaged in the construction of buildings. Buildings are distinguished by their primary function, such as residential, commercial and industrial.

Part or all the production work for which the establishments in this subsector have responsibility may be subcontracted to other construction establishments - usually specialty trade contractors (#238).

237 - Heavy and civil engineering construction
This subsector comprises establishments whose primary activity is the construction of entire engineering projects (e.g. highways and dams), and specialty trade contractors, whose primary activity is the production of a specific component for such projects. Specialty trade contractors (#238) in this subsector generally provide specialized services of a type related to heavy and civil engineering construction projects and not normally performed on buildings or building related projects.

238 - Specialty trade contractors
This subsector comprises establishments primarily engaged in trade activities generally needed in the construction of buildings and structures, such as masonry, painting, or electrical work. The work performed may include new work, additions, alterations, maintenance, and repairs. Specialty trade contractors usually work under contract to general contractors or operative builders to carry out a component of an overall project. However, they may contract directly with the owner of the property, especially in renovation and repair construction.

2381 Foundation, Structure, and building Contractors
This industry group comprises establishments primarily engaged in the specialty trades needed to complete the basic structure (i.e., foundation, frame, and shell) of buildings. The work performed may include new work, additions, alterations, maintenance, and repairs.

23811 Poured concrete foundation and structure contractors
This industry comprises establishments primarily engaged in pouring and finishing concrete foundations and structural elements. This industry also includes establishments performing grout and shotcrete work. The work performed may include new work, additions, alterations, maintenance, and repairs.

238110 Poured concrete foundation and structure contractors
This Canadian industry comprises establishments primarily engaged in pouring and finishing concrete foundations and structural elements. This industry also includes establishments performing grout and shotcrete work. The work performed may include new work, additions, alterations, maintenance, and repairs.

Illustrative example(s)

- concrete footing and foundation contractors
- concrete resurfacing
- mud-jacking contractors
- retaining walls, poured concrete, construction
- shotcrete contractors

23812 Structural steel and precast concrete contractors
This industry comprises establishments primarily engaged in: (1) erecting and assembling structural parts made from steel or precast concrete (e.g., steel beams, structural steel components, and similar products of precast concrete); and/or (2) assembling and installing other steel construction products (e.g., steel rods, bars, rebar, mesh, and cages) to reinforce poured-in-place concrete. The work performed may include new work, additions, alterations, maintenance, and repairs.

238120 - Structural steel and precast concrete contractors
This Canadian industry comprises establishments primarily engaged in: (1) erecting and assembling structural parts made from steel or precast concrete (e.g., steel beams, structural steel components, and similar products of precast concrete); and/or (2) assembling and installing other steel construction products (e.g., steel rods, bars, rebar, mesh, and cages) to reinforce poured-in-place concrete. The work performed may include new work, additions, alterations, maintenance, and repairs.
Illustrative example(s)

- balconies, precast, concrete, installation
- reinforcing rods, bars, mesh, and cage, installation
- reinforcing steel contractors
- structural steel erection, contractors

23814 Masonry contractors
This industry comprises establishments primarily engaged in masonry work, stone setting, brick laying, and other stone work. The work performed may include new work, additions, alterations, maintenance, and repairs.

238140 Masonry contractors
This Canadian industry comprises establishments primarily engaged in masonry work, stone setting, brick laying, and other stone work. The work performed may include new work, additions, alterations, maintenance, and repairs.

Illustrative example(s)

- bricklaying, contractors
- cement block laying
- field stone, installation
- glass block laying
- masonry contractors
- masonry pointing, cleaning or caulking
- retaining wall construction, block, stone, or brick, contractors

31-33 - Manufacturing[29]
This sector comprises establishments primarily engaged in the chemical, mechanical or physical transformation of materials or substances into new products.

327 - Non-metallic mineral product manufacturing
This subsector comprises establishments primarily engaged in manufacturing non-metallic mineral products. These establishments cut, grind, shape and finish granite, marble, limestone, slate and other stone; mix non-metallic minerals with chemicals and other additives; and heat non-metallic mineral preparations to make products, such as bricks, refractories, ceramic products, cement, and glass.

3273 Cement and concrete product manufacturing
This industry group comprises establishments primarily engaged in manufacturing hydraulic cement, ready-mix concrete, concrete bricks, pipes and blocks, and other concrete products.

32731 Cement manufacturing
This industry comprises establishments primarily engaged in the production of clinker and subsequent grinding of clinker using either dry or wet production processes.

[29] Source: NAICS 31 - 33 (2017)

327310 Cement manufacturing
This Canadian industry comprises establishments primarily engaged in the production of clinker and subsequent grinding of clinker using either dry or wet production processes.

Illustrative example(s)
- cement (e.g., hydraulic, masonry, portland, pozzolana), manufacturing
- manufacturing dry-batched ready-mix concrete

32732 Ready-mix concrete manufacturing
This industry comprises establishments primarily engaged in mixing together water, cement, sand, gravel or crushed stone to make concrete, and delivering it to a purchaser in a plastic or unhardened state.

327320 Ready-mix concrete manufacturing
This Canadian industry comprises establishments primarily engaged in mixing together water, cement, sand, gravel or crushed stone to make concrete, and delivering it to a purchaser in a plastic or unhardened state. Illustrative example(s)
- concrete batch plants (including temporary)
- ready-mix concrete manufacturing and distribution

32733 Concrete pipe, brick and block manufacturing
This industry comprises establishments primarily engaged in manufacturing concrete pipes, bricks and blocks from a mixture of cement, water, and aggregate.

327330 Concrete pipe, brick and block manufacturing MEX
This Canadian industry comprises establishments primarily engaged in manufacturing concrete pipes, bricks, and blocks from a mixture of cement, water, and aggregate.

Illustrative example(s)
- blocks, concrete, and cinder (i.e., clinker), manufacturing
- bricks, concrete, manufacturing
- paving blocks, concrete, manufacturing
- pipe, concrete, manufacturing
- precast concrete blocks, pipes, and bricks, manufacturing
- prestressed concrete blocks, bricks, and pipes, manufacturing

32739 Other concrete product manufacturing
This industry comprises establishments, not classified to any other industry, primarily engaged in manufacturing concrete products

327390 Other concrete product manufacturing in the US
This Canadian industry comprises establishments, not classified to any other Canadian industry, primarily engaged in manufacturing concrete products. Illustrative example(s)

- catch basin covers, concrete, manufacturing
- floor slabs, precast concrete, manufacturing
- furniture, concrete (e.g., benches, tables), manufacturing
- poles, concrete, manufacturing
- precast concrete products (except block, brick, pipe), manufacturing
- prestressed concrete products (except block, brick, pipe), manufacturing
- roofing tile, concrete, manufacturing
- storage tanks, concrete, manufacturing
- terrazzo products, precast (except block, brick, and pipe), manufacturing

Appendix 2: NOC Codes[30,31]

NOC Skill Level B: Occupations usually require college education or apprenticeship training

7 – Trades, transport and equipment operators and related occupations
These occupations include trades supervisors and contractors, construction and mechanical tradespersons, operators of transportation and heavy equipment and trades helpers. These occupations are found in a wide range of industrial sectors, with many in the construction and transportation industries.

This category includes most of the apprenticeable trades, including all those related to the construction industry. Other occupations in this category usually require completion of college or vocational education programs combined with on-the-job training. Helpers obtain training on the job site. Progression to supervisory positions or self-employed contractor status is possible with experience. There is limited mobility or transferability of skills among occupations in this category due to specific apprenticeship, training and licensing requirements for most occupations.

72 – Industrial, electrical and construction Trades
This major group comprises occupations in industrial, electrical and construction trades, which usually require three or more years of apprenticeship, or several years of work

[30] Source: NOC 7 (2016)
[31] Source: NOC 9 (2016)

experience in the trade combined with related high school, college or industry courses. It includes occupations in machining, metal forming, shaping and erecting trades; electrical trades and electrical power line and telecommunications workers; plumbers, pipefitters and gas fitters; carpenters and cabinetmakers; masonry and plastering trades; and other construction trades, as well as related supervisors and contractors.

720 Contractors and supervisors, industrial, electrical and construction trades and related workers

This minor group includes industrial, electrical and construction trade contractors who own and operate their own businesses; and supervisors who supervise and co-ordinate the activities of workers in industrial, electrical and construction trades. They are employed by construction companies; electrical, mechanical, carpentry, bricklaying, masonry, cement and concrete, plastering, drywalling and lathing, roofing, insulation, painting, floor covering, construction glass installation, and plumbing and pipefitting trade contractors; maintenance departments of industrial, commercial and manufacturing establishments; machine shops; structural, platework and related metal products fabrication, manufacturing and erecting companies; electric power generation, transmission and distribution companies and public utility commissions; telephone, cable and satellite television and other telecommunications transmission companies; gas distribution companies; manufacturers of custom furniture and fixtures and of precast concrete products; service and repair shops; glass fabrication shops; and pest control companies; or they may be self-employed.

7205 Contractors and supervisors, other construction trades, installers, repairers and servicers

This unit group includes roofing, masonry, painting and other construction trade contractors, not elsewhere classified, who own and operate their own business. Supervisors in this unit group supervise and co-ordinate the activities of various tradespersons, installers, repairers and servicers classified in the following minor groups: Masonry and Plastering Trades (728), Other Construction Trades (729) and Other Installers, Repairers and Servicers (744). They are employed by a wide range of establishments; places of employment are indicated in the unit group descriptions. This unit group also includes prefabricated product installation and service contractors and proprietors of some repair and service establishments.

Illustrative example(s)

- bicycle repair shop supervisor
- bricklaying contractor
- cement finishing contractor
- glaziers foreman/woman
- insulators foreman/woman
- painters and decorators supervisor
- painting contractor
- pest control supervisor

- plasterer foreman/woman
- roofing contractor
- tilesetters supervisor

728 Masonry and plastering trades
This minor group includes bricklayers, concrete finishers, tilesetters, plasterers, drywall installers and finishers and lathers. They are employed by construction companies; bricklaying, cement, concrete, masonry, plastering, drywalling and lathing contractors; and manufacturers of precast concrete products; or they may be self-employed.

7282 Concrete finishers
Concrete finishers smooth and finish freshly poured concrete, apply curing or surface treatments and install, maintain and restore various masonry structures such as foundations, floors, ceilings, sidewalks, roads, patios and high-rise buildings. They are employed by construction companies, cement and concrete contractors and manufacturers of precast concrete products, or they may be self-employed. Illustrative example(s)

- cement finisher apprentice
- cement mason
- concrete finisher
- concrete mason
- precast concrete finisher

9 - Occupations in manufacturing and utilities
This category contains supervisory, production and labouring occupations in manufacturing, processing and utilities.

Occupations in this category are characterized by either technical training or internal progression, and on-the-job training. Process control occupations in this category are increasingly technical and post-secondary training is usually required. For many occupations in this category, workers typically start out as labourers and progress to machine operation occupations through experience. Progression to supervisory positions requires experience in the occupations supervised. Mobility in some of these occupations may be limited by seniority provisions of collective agreements, or may require additional training.

94 Processing and manufacturing machine operators and related production workers
This major group comprises occupations in processing and manufacturing machine operation and related production work which usually require completion of secondary school and experience or on-the-job training. It includes machine operators and related workers in mineral and metal products processing and manufacturing; chemical, plastic and rubber processing; pulp and paper production and wood processing and manufacturing; textile, fabric, fur and leather products processing and manufacturing;

food, beverage and associated products processing; and printing equipment operators and related occupations.

941 Machine operators and related workers in mineral and metal products processing and manufacturing

This minor group includes machine operators in mineral and metal processing; foundry workers; glass forming and finishing machine operators and glass cutters; concrete, clay and stone forming operators; inspectors and testers in mineral and metal processing; metalworking and forging machine operators; machining tool operators; and other metal products machine operators. They are employed by mineral ore and metal processing plants and cement processing plants; metal foundries and foundry departments of metal products manufacturing companies; glass and glass products manufacturing companies; concrete, clay and stone products manufacturing companies; sheet metal products manufacturing companies, sheet metal shops and other light metal products manufacturing establishments; structural steel fabrication, boiler and platework manufacturing companies and heavy machinery manufacturing companies; metal products and other manufacturing companies and machine shops; and in the shipbuilding, fabricated metal products, machinery and transportation equipment manufacturing industries.

9414 Concrete, clay and stone forming operators

This unit group includes workers who cast and finish concrete products, operate machines to extrude, mold, press and bake clay products, and operate machines to form, cut and finish stone products. They are employed by concrete, clay and stone products manufacturing companies.

Illustrative example(s)

- asbestos shingle presser
- brick presser operator
- clay press operator
- clay products molder
- concrete block maker
- finisher - concrete, clay and stone products
- granite cutter
- marble cutter
- precast concrete molder
- precast concrete slab maker
- stone driller
- stone planer
- stonework molder

Appendix 3: Data Tables

	Construction 2381	Manufacturing 3273
All Female, All Ages	8.9%	10.1%
All Male, Ages 15 - 19 yrs.	2.6%	1.6%
All Male, Ages 20-24 yrs.	11.7%	7.4%
All Male, Ages 25-34 yrs.	24.3%	16.8%
All Male, Ages 35-44 yrs.	20.0%	19.4%
All Male, Ages 45-54 yrs.	21.0%	25.4%
All Male, Ages 55-64 yrs.	9.3%	18.2%
All Male, Ages 65-74 yrs.	1.8%	1.2%

Source: Statistics Canada - 2011 National Household Survey. Catalogue Number 99-012-X2011034.

NOC 2011 - Canada

Employment Income Statistics (All sexes, all ages)

Codes	Occupation - National Occupational Classification (NOC) 2011 (693)	Total – Employ income statistics in 2010 [4]	With employ income	Median employ income [5]	Average employ income [6]	With wages and salaries	Median wages /salaries [7]	Average wages and salaries [8]
Total	All occupations [10]	19,133,310	17,832,495	33,542	43,565	16,626,040	34,819	43,994
7	Trades, transport and equipment operators, related occupations	2,717,620	2,527,155	37,469	41,859	2,314,345	39,349	43,306
72	Industrial, electrical, construction trades	973,110	903,110	40,011	44,982	807,605	42,107	46,944
720	Contractors and supervisors, industrial, electrical, construction trades and related workers	79,050	73,740	54,966	61,203	65,310	58,792	64,711
7205	Contractors and supervisors, other construction trades, installers, repairers and servicers	28,965	26,400	41,811	48,933	21,275	47,022	53,208
728	Masonry and plastering trades	79,150	72,400	30,586	34,272	60,390	31,607	34,473
7282	Concrete finishers	12,515	11,565	37,582	38,759	10,815	38,836	39,555
9	Occupations in manufacturing and utilities	870,730	810,930	33,039	38,908	791,830	33,562	39,425
94	Processing and manufacturing machine operators and related production workers	278,140	259,345	32,030	34,840	251,335	32,600	35,443

NOC 2011 - British Columbia

Employment Income Statistics (All sexes, all ages)

Codes	Occupation - National Occupational Classification (NOC) 2011 (693)	Total - Employ income statistics in 2010 [4]	With employ income	Median employ income [5]	Average employ income [6]	With wages / salaries	Median wages and salaries [7]	Average wages and salaries [8]
Total	All occupations	2,529,750	2,342,805	32,888	42,289	2,156,925	34,373	43,060
7	Trades, transport & equipment operators & related occupations	364,580	337,310	38,522	42,752	301,355	40,634	44,429
72	Industrial, electrical and construction	137,885	127,315	36,861	42,594	108,195	40,012	45,149
720	Contractors supervisors, electrical and construction trades, related workers	12,335	11,320	54,453	59,110	9,255	59,205	64,254
7205	Contractors, supervisors, construction trades, installers, repairers	5,125	4,560	38,452	46,268	3,310	44,142	51,893
728	Masonry and plastering	11,620	10,595	28,004	32,589	7,830	30,003	33,774
7282	Concrete finishers	1,810	1,695	38,751	38,298	1,485	39,669	38,710
9	Occupations in manufacturing and utilities	81,635	76,165	34,151	39,845	73,385	34,930	40,476
94	Processing and manufacturing machine ops & related workers	29,850	27,810	34,872	38,394	26,545	35,866	39,281
941	Machine operators, related workers in mineral metal products processing and manufacturing	4,805	4,555	40,294	44,777	4,385	40,955	45,145
9414	Concrete, clay stone forming operators	835	755	36,225	38,151	690	35,566	37,960

Source: Statistics Canada - 2011 National Household Survey. Catalogue Number 99-014-X2011042.

NOC *2011* - Canada

Employment by Occupation (All sexes, all ages)

Codes	Occupation - National Occupational Classification (NOC) 2011 (691)	Total - Class of worker	Employee	Self-employed [3]	Self-employed	Unpaid family worker
Total	Occupation - National Occupational Classification (NOC) 2011	16,595,030	14,720,340	1,874,690	1,829,115	45,575
7	Trades, transport and equipment operators and related occupations	2,337,045	2,014,330	322,715	319,725	2,990
72	Industrial, electrical and construction trades	839,815	680,455	159,355	158,390	965
728	Masonry and plastering trades	67,035	47,385	19,650	19,490	160
7282	Concrete finishers	10,120	8,375	1,750	1,745	-
9	Occupations in manufacturing and utilities	742,170	719,810	22,360	21,670	690
94	Processing and manufacturing machine operators and related production workers	238,415	229,000	9,415	9,215	200
941	Machine operators and related workers in mineral and metal products processing and manufacturing	55,080	53,690	1,390	1,360	25
9414	Concrete, clay and stone forming operators	5,865	5,465	400	400	

Source: Statistics Canada - 2011 National Household Survey. Catalogue Number 99-012-X2011033.

[3] Includes self-employed with an incorporated business and self-employed with an unincorporated business. Also included among the self-employed are unpaid family workers.

NOC *2011* - British Columbia
Employment by Occupation (All ages, All Female)

Codes	Occupation - National Occupational Classification (NOC) 2011 (691)	Total - Class of worker	Employee	Self-employed [3]	Self-employed	Unpaid family worker
Total	Occupation - National Occupational Classification (NOC) 2011	1,046,880	935,165	111,710	107,505	4,205
7	Trades, transport and equipment operators and related occupations	17,780	15,055	2,730	2,505	225
72	Industrial, electrical and construction trades	4,395	3,140	1,260	1,135	125
728	Masonry and plastering trades	370	245	130	115	15
7282	Concrete finishers	15	-	-	-	-
9	Occupations in manufacturing and utilities	18,190	17,325	865	825	40
94	Processing and manufacturing machine operators and related production workers	7,195	6,755	435	425	-
941	Machine operators and related workers in mineral and metal products processing and manufacturing	335	325	-	-	-
9414	Concrete, clay and stone forming operators	20	15	-	-	-

Source: Statistics Canada - 2011 National Household Survey. Catalogue Number 99-012-X2011033.

[3] Includes self-employed with an incorporated business and self-employed with an unincorporated business. Also included among the self-employed are unpaid family workers.

NAICS 2007 - Canada
Employment by Industry (All sexes, all ages)

Codes	Industry - North American Industry Classification System (NAICS) 2007 (425)	Total - Class of worker	Employee	Self-employed [3]	Self-employed	Unpaid family worker
Total	Industry - North American Industry Classification System (NAICS) 2007	16,595,030	14,720,340	1,874,690	1,829,120	45,575
23	Construction	1,100,400	841,405	258,995	254,845	4,150
238	Specialty trade contractors	675,325	513,225	162,095	159,625	2,470
2381	Foundation, structure, and building exterior contractors	131,065	102,580	28,480	28,020	460
31-33	Manufacturing	1,525,405	1,454,235	71,170	69,545	1,620
327	Non-metallic mineral product manufacturing	51,135	47,650	3,485	3,355	125
3273	Cement and concrete product manufacturing	28,350	27,275	1,080	1,075	-

Source: Statistics Canada - 2011 National Household Survey. Catalogue Number 99-012-X2011034.

[3] Includes self-employed with an incorporated business and self-employed with an unincorporated business. Also included among the self-employed are unpaid family workers.

NAICS 2007 - British Columbia
Employment by Industry (All sexes, all ages)

Codes	Industry - North American Industry Classification System (NAICS) 2007 (425)	Total - Class of worker	Employee	Self-employed[3]	Self-employed	Unpaid family worker
Total	Industry - North American Industry Classification System (NAICS) 2007	2,171,470	1,873,695	297,770	291,755	6,020
23	Construction	165,340	117,930	47,410	46,615	795
238	Specialty trade contractors	102,250	71,745	30,510	30,060	445
2381	Foundation, structure, and building exterior contractors	20,225	14,740	5,480	5,345	140
31-33	Manufacturing	139,695	128,660	11,040	10,770	260
327	Non-metallic mineral product manufacturing	6,270	5,595	675	650	25
3273	Cement and concrete product manufacturing	3,370	3,235	135	135	-

Source: Statistics Canada - 2011 National Household Survey. Catalogue Number 99-012-X2011034.

[3] Includes self-employed with an incorporated business and self-employed with an unincorporated business. Also included among the self-employed are unpaid family workers.

NAICS 2007 - British Columbia
Employment by Industry (All Female, all ages)

Codes	Industry - North American Industry Classification System (NAICS) 2007 (425)	Total - Class of worker	Employee	Self-employed[3]	Self-employed	Unpaid family worker
Total	Industry - North American Industry Classification System (NAICS) 2007	1,046,875	935,165	111,710	107,510	4,200
23	Construction	20,115	15,470	4,645	4,075	570
238	Specialty trade contractors	11,290	8,325	2,965	2,620	345
2381	Foundation, structure, and building exterior contractors	1,800	1,310	495	410	85
31-33	Manufacturing	37,345	34,250	3,100	2,925	170
327	Non-metallic mineral product manufacturing	1,055	800	260	240	20
3273	Cement and concrete product manufacturing	340	325	-	-	-

Source: Statistics Canada - 2011 National Household Survey. Catalogue Number 99-012-X2011034.

[3] Includes self-employed with an incorporated business and self-employed with an unincorporated business. Also included among the self-employed are unpaid family workers.

Appendix 4: Concrete Narrative Questionnaire

Concrete Industry Questions

Company:
Contact: Position:
Phone: Email:
Background on contact:
Would he/she be willing to come and meet with us face-to-face? Week of….

Company info:
What the company does: Work year-round:

Company ownership:

Tradespeople info:
# of employees: Any Journeyman?

#Sr. Trade?

Average Wage?
☐ $17 - $20 ☐ $20 - $25 ☐ $25 - $30 ☐ $30 - $44

Are you a union, closed, or open shop?

Labour Market
Do you have any recruitment or skill issues? How do you deal with them?

Where do you find your workers?

Skill
What kind of skill do you look for? What kind of skill do you HOPE for?

How do the workers get skill?
Do you have a trainer/s?
Sink or swim model?

NOTES: