



New Zealand Certificate in

# Concrete Construction Skills

Level 3



# Specifications

February 2021



**BCITO**  
building people



# Foreword

Welcome to the Specifications that set out the technical content of the New Zealand Certificate in Concrete Construction Skills (Level 3) [Ref: 4189] with strands in Formwork, Reinforcing, Placing and Finishing, Specified Concrete Finishes, Concrete Product Manufacture, Precast Concrete Manufacture, and Concrete Sawing and Drilling.

These Specifications are, collectively, a prescription for achieving the requirements of the qualification. Together they describe what a person must know and be capable of to become a qualified concrete construction worker.

They are intended to support tertiary education organisations to develop programmes that detail how learning and assessment will occur.

Programmes must encompass these Specifications and support the development of the knowledge, skills, and attributes that reflect the technical competence, self-management, and commercial competence standards.

# Assessment related to these Specifications

The individual skill sets included in these Specifications are designed to be read, interpreted and assessed together. This means the information contained in one skill set that is relevant to any other skill set is stated only once, in the most appropriate place. The expectation is that assessment will look for links across skills sets. This avoids duplicating information and allows the candidate to be assessed holistically. Where the knowledge and skills included in one skill set are essential to achieving other skill sets, the candidate must be capable of applying them to the level, scope and complexity required.

The New Zealand Certificate in Concrete Construction Skills (Level 3) [Ref: 4189] is achieved by completing the Fundamentals Specification and one or more of the strand Specifications and Industry Standard Specification.

To achieve the qualification a candidate must demonstrate concrete construction knowledge and skills to industry standard. The candidate must be capable of consistently performing the requirements of each skill set, and the Specifications as a whole:

- to current regulatory, industry and commercial standards
- within a commercially acceptable timeframe
- in commercial environments
- under the supervision of a commercially competent practitioner

Qualification: **New Zealand Certificate in Concrete Construction Skills (Level 3) [Ref: 4189]**

with strands in Formwork, Reinforcing, Placing and Finishing, Specified Concrete Finishes, Concrete Product Manufacture, Precast Concrete Manufacture, and Concrete Sawing and Drilling

This qualification consists of two compulsory specifications including:

- Fundamentals
- Industry Standards

Strand specifications:

- Formwork
- Reinforcing
- Placing and finishing
- Specified concrete finishes
- Concrete product manufacture
- Precast concrete manufacture
- Concrete sawing and drilling

Within each specification there are a number of skill sets covering the knowledge and practical skills required to be a qualified concrete construction worker operating in commercial or civil infrastructure construction contexts.

## Compulsory

Specification:	Fundamentals	30 credits
<b>Skill Sets:</b>	<b>Covering:</b>	
Health and Safety work practices	Health and safety legislation as it applies to concrete construction work	
Teamwork and communication	Communicating and working in a team	
Job documentation	Read and apply job documents	
Construction measurements	Measurements and calculations for concrete construction	
Specification:	Industry Standards	5 credits
<b>Skill Set:</b>	<b>Covering:</b>	
Industry standards	Performance standard required of a skilled concrete construction worker	

## Strand

Specification:	Formwork Construction	20 credits
<b>Skill Sets:</b>	<b>Covering:</b>	
Tools, plant and equipment	Hand and power tools and plant and equipment	
Materials	Formwork systems and materials, cast in elements, propping systems, cleaning agents	
Formwork construction	Falsework/formwork types, properties and construction, fabricate/assemble and dismantle formwork and propping systems.	

## Strand

Specification:	Reinforcing	20 credits
<b>Skill Sets:</b>	<b>Covering:</b>	
Tools, plant and equipment	Hand and power tools and plant and equipment	
Materials	Types of reinforcing, storage and handling	
Fix reinforcing	Fix reinforcing in concrete structures	

## Strand

Specification:	Placing and finishing	15 credits
<b>Skill Set:</b>	<b>Covering:</b>	
Tools, plant and equipment	Hand and power tools and plant and equipment	
Concrete	Ingredients and composition of concrete, how concrete is transported onsite	
Materials used in conjunction with concrete	The types, purposes and properties of liquid applications used when placing and finishing concrete	
Placing	Placing methods, compacting and curing concrete	
Finishing	Concrete finishes, finishing concrete flatwork, finishing off-form concrete surfaces, curing and remedial work	

## Strand

Specification:	Specified Concrete Finishes	15 credits
<b>Skill Sets:</b>	<b>Covering:</b>	
Tools, plant and equipment	Hand and power tools and plant and equipment	
Materials	Materials used in conjunction with concrete to achieve specified finishes	
Specified concrete finishes	Achieving specified finishes on concrete, stencilled concrete surface and integrally coloured concrete	

## Strand

Specification:	Concrete Product Manufacture	25 credits
<b>Skill Sets:</b>	<b>Covering:</b>	
Machinery, plant and equipment	Machinery plant and equipment for concrete product manufacture	
Concrete	Ingredients and composition of concrete	
Production processes	Preparing moulds, reinforcing, anchor placement, placing concrete	
Quality checking	Range and features of manufactured concrete products	
Post pour processes	Demould, secondary processes, grade and finish product, lifting and handling	

## Strand

Specification:	Precast Concrete Manufacture	25 credits
<b>Skill Sets:</b>	<b>Covering:</b>	
Pre-pour work	Assembling moulds, placing and securing reinforcing and cast-ins	
Placing and finishing	Transporting, placing, and finishing concrete, cure concrete, demould, clean and service moulds	
Post pour work	Move, handle, store and dispatch structural concrete elements	

## Strand

Specification:	Concrete Sawing and Drilling	15 credits
<b>Skill Sets:</b>	<b>Covering:</b>	
Tools, plant and equipment	Hand and power tools and plant and equipment	
Properties of hardened concrete	Properties of hardened concrete, safety and protection	
Saw concrete	Setting up for and sawing concrete	
Drill concrete	Setting up for and drilling concrete	

To achieve this qualification specification the candidate must understand the underpinning principles and be able to apply them in practice to all areas of work in at least one of the concrete skills listed in the strands of this qualification. Fundamental skill sets include:

- Health and safety work practices
- Construction measurements
- Teamwork and communication
- Job documentation

Each skill set comprises:

***Know***

(the theory that underpins the practical skills)

***Do***

(the practical skills the candidate needs to have)

***Comments***

(explanatory notes to clarify specific aspects of knowledge and skill)

---

<b>Skill set 1:</b>	<b>Health and safety work practices</b>	<b>10 credits</b>
<b>Know:</b>	Health and safety practices as they apply in a concrete construction workplace	
	Environmental protection practices as they apply to concrete construction	
<b>Do:</b>	Practically apply health and safety work practices in everyday contexts within concrete construction	
	Apply environmental protection practices in concrete construction work	
<b>Comments:</b>	Health and safety practices refers to the application of legislative frameworks including the hierarchy of Acts of Parliament, Regulations, Rules, local by-laws, Codes, Standards, approved codes of practice, and best practice guidelines	
	Environmental protection practices refers to actions taken to protect and mitigate the environmental and public health risks associated with concrete construction activities	
	The level of health and safety legislative knowledge required is that of a concrete construction worker rather than that of an expert with specialist knowledge	
<b>Skill set 2:</b>	<b>Construction measurement</b>	<b>5 credits</b>
<b>Know:</b>	The different units of measurement and how they are used	
	Conventions around the use of centres and spacing	
	How to calculate area and volume	
<b>Do:</b>	Apply measurements and calculations in one, two and three dimensions	
	Apply time measurements in concrete construction work	
<b>Comments:</b>	Units of measurement include length, area, volume and time (hours and minutes).	
<b>Skill set 3:</b>	<b>Communication and teamwork</b>	<b>10 credits</b>
<b>Know:</b>	The roles and responsibilities of the team members	
	The responsibilities of own role in the team	
<b>Do:</b>	Work effectively with own team and others in workplace place	
	Follow instructions and communicate with team to complete work tasks	
<b>Comments:</b>	Others in the workplace can include the main contractor, subcontractors, clients, suppliers, designers and compliance body representatives	
	Working effectively involves everyday contact on site and the ability to discuss and reach conclusions about work requirements	
	Communicating effectively involves written, oral and graphic communications	

Skill set 4:	Job documentation	5 credits
<b>Know:</b>	<p>The range of job documentation associated with a specific concrete construction process</p> <hr/> <p>How to interpret plans, detail drawings, schedules and job documentation associated with concrete construction processes</p> <hr/> <p>The record keeping requirements for the concrete construction processes</p>	
<b>Do:</b>	<p>Apply job documentation to complete a specific concrete construction process to specification</p> <hr/> <p>Maintain job records</p>	
<b>Comments:</b>	<p>Concrete construction processes include formwork, reinforcing, placing and finishing concrete, achieving specified concrete finishes, precast and concrete product manufacture and concrete sawing and drilling</p> <hr/> <p>Reading job documentation includes understanding relevant conventions, scales, symbols, dimensions, abbreviations and terminology</p> <hr/> <p>The minimum level to which job documentation needs to be understood and applied is to allow for a specific concrete construction process to be completed to specification</p>	

To achieve this qualification specification the candidate must understand and apply all aspects of formwork construction. Formwork construction is undertaken in commercial, civil infrastructure and concrete product manufacturing contexts.

This specification contains three skill sets:

- Tools plant and equipment
- Materials
- Formwork construction

Each skill set comprises:

***Know***

(the theory that underpins the practical skills)

***Do***

(the practical skills the candidate needs to have)

***Comments***

(explanatory notes to clarify specific aspects of knowledge and skill)

---

<b>Skill set 1:</b>	<b>Tools, plant and equipment</b>	<b>5 credits</b>
<b>Know:</b>	How to use hand and power tools for formwork construction	
	How to use plant and equipment for formwork construction	
	How to care for and maintain tools, plant and equipment used for formwork construction	
<b>Do:</b>	Use a range of hand and power tools for formwork construction	
	Use a range of plant and equipment for formwork construction	
	Maintain tools, plant and equipment used for formwork construction	
<b>Comments:</b>	Hand and power tools, and plant and equipment, are those typically used for formwork construction on a regular basis	
	Maintenance includes routine checks, inspections, cleaning and basic servicing and repair	

<b>Skill set 2:</b>	<b>Materials</b>	<b>5 credits</b>
<b>Know:</b>	The materials and accessories used to construct formwork for concrete structures	
	The types and purposes of cast-in elements	
	The release agents and cleaning agents used with formwork	
<b>Comments:</b>	Cast-in elements include reinforcing chairs, brackets, ties, waffle slab components, and conduits for services, bolts, plates, rods, pipes, penetrations, and ducting	
	The level of materials knowledge is that required of a skilled formwork construction worker rather than an engineer, designer or construction manager.	

<b>Skill set 3 :</b>	<b>Formwork</b>	<b>10 credits</b>
<b>Know:</b>	The materials, accessories and construction methods used to fabricate, assemble and dismantle different types of formwork, falsework and propping systems for concrete construction	
	The types, purpose and construction detail of concrete joints	
<b>Do:</b>	Fabricate, assemble and dismantle formwork, falsework and propping systems for foundations and structural and non-structural concrete elements	
	Construct formwork detail to allow for the formation of concrete joints	
<b>Comments:</b>	Formwork includes stud and sheathing, shutters and proprietary systems such as stackable pods, structural dome systems and insulated slabs'	
	Formwork types include modular, gang, table, jump/climb, slipform, permanent systems, in-situ or custom made and in-ground	
	Fabrication includes making from scratch and incorporating pre-made component	

To achieve this qualification specification the candidate must understand and apply all aspects of reinforcing. Reinforcing is undertaken in commercial, civil infrastructure and concrete product and precast concrete manufacturing contexts.

This specification contains three skill sets:

- Tools, plant and equipment
- Materials
- Fix reinforcing

Each skill set comprises:

***Know***

(the theory that underpins the practical skills)

***Do***

(the practical skills the candidate needs to have)

***Comments***

(explanatory notes to clarify specific aspects of knowledge and skill)

---

<b>Skill set 1:</b>	<b>Tools, plant and equipment</b>	<b>5 credits</b>
<b>Know:</b>	How to use a range of hand and power tools to bend and fix reinforcing How to use a range of plant and equipment to bend and fix reinforcing How to care for and maintain a range of tools, plant and equipment used to bend and fix reinforcing for concrete construction	
<b>Do:</b>	Use a range of hand and power tools to bend and fix reinforcing Use a range of plant and equipment to bend and fix reinforcing Maintain tools, plant and equipment used to bend and fix reinforcing	
<b>Comments:</b>	Hand and power tools and plant and equipment are those typically used to bend, and fix reinforcing on a regular basis Maintenance includes routine checks, inspections, cleaning and basic servicing and repair	

<b>Skill set 2:</b>	<b>Materials</b>	<b>5 credits</b>
<b>Know:</b>	The types and sizes of reinforcing steel used in concrete construction The types and purpose of cast-ins The different methods for handling and storing reinforcing steel to prevent damage or deterioration	
<b>Do:</b>	Prevent damage and deterioration of reinforcing materials	
<b>Comments:</b>	Types of reinforcing steel includes formed and fabricated mild, ductile and high-yield steel components, round bars, deformed bars, mesh and fibre Types of cast-ins include reinforcing chairs, brackets, ties, waffle slab components, pipes, conduits for services and ducting for post-tensioning The level of reinforcing materials knowledge required is that of a concrete construction worker rather than that of an engineer or designer	

<b>Skill set 3:</b>	<b>Fix reinforcing</b>	<b>10 credits</b>
<b>Know:</b>	The different methods used for cutting, bending and fixing reinforcing steel	
<b>Do:</b>	Receive and store reinforcing steel, materials and products Cut and tie reinforcing steel for slab, footings, foundations, ground beams, walls, masonry and other concrete structures	
<b>Comments:</b>	Types of reinforcing steel include formed and fabricated mild, ductile and high-yield steel components, round bars, deformed bars, mesh and fibre Reinforcing includes pre-fabricated components and individual items requiring on-site fabrication	

To achieve this qualification specification the candidate must understand and apply all aspects of concrete placing and finishing

This specification contains five skill sets:

- Tools plant and equipment
- Concrete
- Materials used in conjunction with concrete
- Placing
- Finishing

Each skill standard comprises:

***Know***

(the theory that underpins the practical skills)

***Do***

(the practical skills the candidate needs to have)

***Comments***

(explanatory notes to clarify specific aspects of knowledge and skill)

---

<b>Skill set 1:</b>	<b>Tools, plant and equipment</b>	<b>3 credits</b>
<b>Know:</b>	How to use a range of hand and power tools for placing and finishing concrete	
	How to use a range of plant and equipment for placing and finishing concrete	
	How to care for and maintain different tools, plant and equipment used for placing and finishing concrete	
<b>Do:</b>	Use a range of hand and power tools to place and finish concrete	
	Use a range of plant and equipment to place and finish concrete	
	Maintain tools and equipment used for placing and finishing concrete	
<b>Comments:</b>	Hand and power tools, and plant and equipment, are those typically used place and finish concrete on a regular basis	
	Maintenance includes routine checks, inspections, cleaning and basic servicing and repair	
<b>Skill set 2:</b>	<b>Concrete</b>	<b>2 credits</b>
<b>Know:</b>	The ingredients, composition and observable characteristics of fresh concrete	
	How to review concrete supplied against concrete specified	
	The tests applied to on-site concrete	
<b>Comments:</b>	Ingredients for concrete include aggregate, cement, water and additives that modify the properties, workability or appearance of concrete	
	Observable characteristics of fresh concrete include colour, presence of additives, aggregate size and type, and water content.	
	Tests applied to on-site concrete include slump test on fresh concrete and strength testing on hardened concrete	
	The level of knowledge required is that of a concrete placer and finisher rather than that of an engineer, designer or scientist.	
<b>Skill set 3:</b>	<b>Materials used in conjunction with Concrete</b>	<b>2 credits</b>
<b>Know:</b>	The materials used to prepare the base for concrete flatwork	
	The types and purposes of liquid applications used when placing and finishing concrete	
<b>Comments:</b>	Types of materials used to prepare a base for concrete include damp proof membranes (emulsion, polythene sheet and self-adhesive), base course and blinding.	
	Liquid applications include retarders, release agents sealers and cleaning agents	

Skill set 4:	Place concrete	4 credits
<b>Know:</b>	How to check pre-pour work is completed prior to placing concrete	
	The requirements for moving fresh concrete on-site.	
	The procedures for reviewing fresh concrete prior to placing	
	How to place fresh concrete for flatwork	
	How to form joints in fresh concrete	
	How to place concrete in formwork	
<b>Do:</b>	How to compact concrete	
	Check pre-pour work for suitability prior to placing concrete	
	Place concrete for flatwork	
	Place concrete in formwork	
<b>Comments:</b>	Compact concrete	
	Pre-pour checks include preparation of the base, installation of damp proof membrane and placement and securing of cast-ins and reinforcing has been completed	
	Checking includes confirmation of lines, levels, falls, integrity and stability	

Skill set 5:	Finish concrete	4 credits
<b>Know:</b>	How to finish around penetrations in concrete surface	
	The methods for finishing concrete flatwork	
	The methods used for curing concrete	
	How to wash and seal concrete surfaces	
	The types of defects encountered in finished concrete and what to do to remedy them	
<b>Do:</b>	Finish concrete flatwork surfaces	
	Finish concrete off-form surfaces	
	Cure concrete	
	Complete remedial work on finished concrete	
	Wash and seal concrete surfaces	
<b>Comments:</b>	The level of finishing concrete does not require achieving decorative finishes or high specifications for flatness and levelness	
	Methods of finishing concrete flatwork include levelling (screeding), floating, trowelling, and edging	
	Methods of curing concrete vary depending on site and environmental factors	

To achieve this specified concrete finishes Specification the candidate must understand and apply the skills and knowledge required to achieve specified concrete finishes.

This specification contains three skill sets:

- Tools plant and equipment
- Materials
- Specified concrete finishes

The skill standard comprises:

***Know***

(the theory that underpins the practical skills)

***Do***

(the practical skills the candidate needs to have)

***Comments***

(explanatory notes to clarify specific aspects of knowledge and skill)

---

<b>Skill set 1:</b>	<b>Tools, plant and equipment</b>	<b>5 credits</b>
<b>Know:</b>	How to use a range of hand and power tools to achieve specified finishes on concrete.	
	How to use a range of plant and equipment to achieve specified finishes on concrete.	
	How to maintain tools, plant and equipment used to achieve specified finishes on concrete.	
<b>Do:</b>	Use a range of hand and power tools to achieve specified concrete finishes on concrete.	
	Use a range of plant and equipment to achieve specified finishes on concrete	
	Maintain tools and equipment used to achieve specified concrete finishes	
<b>Comments:</b>	Hand tools and power tools and plant and equipment, are those typically used to achieve specified finishes on concrete on a regular basis	
	Maintenance includes routine checks, inspections, cleaning, basic servicing and repair	
<b>Skill set 2:</b>	<b>Materials used in conjunction with concrete</b>	<b>3 credits</b>
<b>Know:</b>	The types and use of materials to achieve a range of specified finishes.	
	The types and use of liquid applications used to achieve specified finishes on concrete	
<b>Do:</b>	Follow manufacturer's instructions and technical information to achieve a range of specified finishes on concrete	
<b>Comments:</b>	Materials used in conjunction with concrete to achieve specified finishes include aggregates, chemical stains, dyes and tints, and applied coatings.	
	Specified finishes include exposed aggregate, batch coloured, stamped, stencilled, overlays, stained, dyed, cut to pattern, tooled and super flat floors.	
<b>Skill set 3:</b>	<b>Specified concrete finishes</b>	<b>7 credits</b>
<b>Know:</b>	The types of specified concrete finishes and techniques used to achieve them	
	The concrete finishes classifications systems	
	Methods used for washing and sealing concrete surfaces	
<b>Do:</b>	Achieve a range of specified concrete finishes	
	Wash and seal concrete surfaces	
<b>Comments:</b>	Specified concrete finishes include exposed aggregate, seeded aggregate, batch coloured, dry-shake coloured, stamped, stencilled, overlays, stained, dyed, cut to pattern and tooled.	

To achieve this Concrete Product Manufacture specification the candidate must understand the underpinning principles of concrete product manufacture and be able to apply them in practice to all areas of concrete product manufacture work.

This specification contains five skill sets:

- Machinery, plant and equipment
- Concrete
- Production processes
- Quality control
- Post-curing production processes

Each skill standard comprises:

*Know*

(the theory that underpins the practical skills)

*Do*

(the practical skills the candidate needs to have)

*Comments*

(explanatory notes to clarify specific aspects of knowledge and skill)

Concrete Product Manufacture' refers to the manufacture of concrete products using automated/semi-automated standardised production processes

---

<b>Skill set 1:</b>	<b>Machinery, plant and equipment</b>	<b>5 credits</b>
<b>Know:</b>	How to use a range of machinery, plant and equipment for concrete product manufacture	
	How to care for and maintain different machinery, plant and equipment used in concrete product manufacture	
<b>Do:</b>	Use a range of machinery plant and equipment to manufacture concrete products	
	Maintain machinery, plant and equipment used for concrete product manufacture	
<b>Comments:</b>	The machinery, plant and equipment vary depending on the concrete product being manufactured	
	Manufactured concrete products include masonry units such as blocks, bricks, pavers and other standardised products manufactured through automated or semi-automated production processes	
	Machinery plant and equipment are those that are typically used for concrete product manufacture on a regular basis	
	Maintenance includes routine checks, inspections, cleaning and basic servicing and repair	
<b>Skill set 2:</b>	<b>Concrete</b>	<b>3 credits</b>
<b>Know:</b>	The ingredients, composition and observable characteristics of fresh concrete	
	The tests applied to fresh and hardened concrete	
<b>Comments:</b>	Ingredients of fresh concrete include aggregate, cement, water, and additives that modify the properties, workability or appearance of concrete	
	Observable characteristics of fresh concrete include colour, presence of additives, aggregate size and type and water content	
	The level of knowledge required is that of a concrete product manufacturer rather than that of an engineer, designer or scientist	
<b>Skill set 3:</b>	<b>Production processes</b>	<b>6 credits</b>
<b>Know:</b>	How to assemble, modify and prepare moulds for concrete product manufacture	
	How to form concrete joints in fresh concrete	
<b>Do:</b>	Assemble, modify and prepare moulds	
	How to place, compact and finish fresh concrete	
	Cure concrete	
<b>Comments:</b>	Assembling, modifying and preparing moulds for concrete product manufacture includes the use and alteration of pre-made , moulds, forming rebates, joints and block outs but does not include running stressing strands	

<b>Skill set 4:</b>	<b>Quality control</b>	<b>5 credits</b>
<b>Know:</b>	How to review supplied concrete against specifications	
	The concrete finish classifications systems	
	How to check the casting surface against job specifications	
	The finishes applied to and formed on the surface of concrete	
	Curing methods used to achieve specified finishes	
<b>Do:</b>	Review fresh concrete against job specifications	
	Check casting surface	
	Assess the quality of finished concrete products	
<b>Comments:</b>	Quality checking refers to the documented workplace procedures and practices required to meet job specifications, industry standards and other quality assurance Guidelines.	
	Quality checks include visual and physical checks, sampling, testing and grading.	
	Finishes include off-the-form and unformed	
	Methods used for curing concrete vary depending on manufacturing and environmental factors	
<b>Skill set 5:</b>	<b>Post-pour work</b>	<b>6 credits</b>
<b>Know:</b>	The systems and procedures for lifting, moving and storing manufactured concrete products	
	Methods used to prevent loading stress and physical damage to manufactured concrete products	
	The types of defects encountered in finished concrete surface	
	Remediation methods used to address defects in finished concrete surface	
<b>Do:</b>	Demould concrete products	
	Move, handle and store concrete products	
	Repair and remediate defects in finished concrete surface	
	Clean and service moulds used to manufacture concrete products	
<b>Comments:</b>	Moving concrete products includes the use of cranes and associated lifting systems and equipment inside the confines of the manufacturing yard; it does not include movement of elements in transit or off-site	
	Repairs and remedial work to address defects in finished concrete surface will be to achieve finish requirements detailed in job specifications	

To achieve this Precast specification the candidate must understand the underpinning principles of precast concrete manufacture and be able to apply them in practice to all areas of precast concrete work.

This specification contains three skill sets:

- Pre-pour work
- Placing and finishing
- Post-pour work

Each skill set comprises:

**Know**

(the theory that underpins the practical skills)

**Do**

(the practical skills the candidate needs to have)

**Comments**

(explanatory notes to clarify specific aspects of knowledge and skill)

Precast Concrete Manufacture' refers to the production of a range of structural reinforced concrete elements using reusable and adjustable moulds.

---

Skill set 1:	Pre-pour work	10 credits
<b>Know:</b>	How to prepare casting beds	
	How to assemble, modify and prepare moulds for precast concrete element manufacture	
	The purpose of reinforcing and cast-in elements used for precast concrete manufacture	
	How to position and secure reinforcing and cast-in elements	
<b>Do:</b>	Prepare, set and check the casting surface	
	Assemble, modify and prepare moulds and formwork	
	Position and secure reinforcing and cast-in elements	
<b>Comments:</b>	Assembling, modifying and preparing moulds or formwork for precast concrete element manufacture includes the use and alteration of pre-made , moulds, forming rebates, joints and block outs but does not include running stressing strands	
	Positioning and securing reinforcing and cast-in elements must be in accordance with design specifications and tolerances	
	Checking the casting surface includes review against working drawings and job specifications	
	Positioning and securing reinforcing includes integrating or modifying prefabricated cages some cutting and bending and tying individual elements to form the overall reinforcing requirements	
	Cast-in elements include lifting inserts, ducting, reinforcing chairs,	
Skill set 2:	Placing and finishing	10 credits
<b>Know:</b>	How to review supplied concrete against specifications	
	How to transport, place, compact and finish fresh concrete	
	The concrete finish classifications systems	
	The finishes applied to and formed on the surface of concrete	
	How to form concrete joints in fresh concrete	
	The methods used for curing a range of precast concrete elements	
	Methods used to achieve specified finishes	
<b>Do:</b>	Review supplied concrete against specification	
	Transport, place, compact and finish concrete	
	Cure concrete	
<b>Comments:</b>	Finishes include off-the-form and unformed	
	Methods used for curing concrete vary depending on manufacturing and environmental factors	

Skill set 3:	Post-pour work	5 credits
<b>Know:</b>	<p>How to operate lifting systems to move and store precast concrete elements</p> <p>Methods used to prevent loading stress and physical damage to manufactured precast concrete elements during lifting, movement and storage</p> <p>The types of defects encountered in finished concrete surface</p> <p>Remediation methods used to address defects in finished concrete surface</p>	
<b>Do:</b>	<p>Demould precast concrete elements</p> <p>Assess the quality of finished precast concrete elements</p> <p>Repair and remediate defects in finished concrete surface</p> <p>Lift, handle and store precast concrete elements</p> <p>Clean and service moulds used to manufacture precast concrete elements</p>	
<b>Comments:</b>	<p>Lifting and moving precast concrete elements includes the use of cranes and associated lifting systems inside the confines of the manufacturing yard; it does not include movement of elements in transit or off-site</p> <p>Repairs and remedial work to address defects in finished concrete surface will be to achieve finish requirements detailed in job specifications</p>	

To achieve this qualification specification the candidate must understand and apply all aspects of the concrete sawing and drilling trade.

This specification contains four skill sets:

- Tools, equipment and plant
- Properties of hardened concrete
- Sawing
- Drilling

Each skill set comprises:

***Know***

(the theory that underpins the practical skills)

***Do***

(the practical skills the candidate need to have)

***Comments***

(explanatory notes to clarify specific aspects of knowledge and skill)

---

<b>Skill set 1:</b>	<b>Tools, equipment and plant</b>	<b>3 credits</b>
<b>Know:</b>	How to use hand held power tools for sawing and drilling concrete	
	How to use items of equipment associated with sawing and drilling concrete	
	How to care for and maintain different tools and equipment used for sawing and drilling concrete	
<b>Do:</b>	Use hand held power tools to saw and drill concrete	
	Use a range of equipment associated with sawing and drilling concrete	
	Maintain tools and equipment used for sawing and drilling concrete	
<b>Comments:</b>	Tools, and equipment, are those typically used for concrete sawing and drilling on a regular basis	
	Maintenance includes routine checks, inspections, cleaning and basic servicing and repair.	
	Sawing concrete includes making horizontal and vertical cuts in concrete floors, precast slabs, pipes and beams using hand held concrete sawing tools	
	Drilling concrete includes making penetrations in concrete floors, walls precast slabs, pipes and beams using hand held concrete drilling tools	
<b>Skill set 2:</b>	<b>Properties of hardened concrete</b>	<b>2 credits</b>
<b>Know:</b>	The properties and composition of hardened concrete	
	The risks of harm to human health from concrete dust and the safety precautions required when sawing and drilling hardened concrete	
<b>Comments:</b>	Safety precautions includes protecting people and the environment from the effects of concrete dust.	
<b>Skill set 3:</b>	<b>Sawing</b>	<b>5 credits</b>
<b>Know:</b>	How to set up for concrete sawing using hand held tools	
	How to protect the structure, personnel and environment from concrete sawing activity	
<b>Do:</b>	Set up for concrete sawing	
	Saw concrete using hand held tools	
<b>Comments:</b>	Protection includes slurry control and the application of personal protective equipment during sawing activity	
<b>Skill set 4:</b>	<b>Drilling</b>	<b>5 credits</b>
<b>Know:</b>	How to set up for concrete drilling using hand held tools	
	How to protect the structure, personnel and environment from concrete drilling activity	
<b>Do:</b>	Set up for concrete drilling	
	Drill concrete using hand held tools	
<b>Comments:</b>	Protection includes slurry control and the application of personal protective equipment during drilling activity	

The Skill Set below reflects the performance standard required of a competent concrete construction worker. Candidates must be capable of demonstrating the skills and knowledge included in this Skill Set to be awarded the New Zealand Certificate in Concrete Construction Skills (Level 3) [Ref: 4189] with strands in Formwork, Reinforcing, Placing and Finishing, Specified Concrete Finishes, Concrete Product Manufacture, Precast Concrete Manufacture, and Concrete Sawing and Drilling.

The skill set comprises:

***Know***

(the theory that underpins the practical skills)

***Do***

(the practical skills the candidate need to have)

***Comments***

(explanatory notes to clarify specific aspects of knowledge and skill)

---

Skill set:	Industry standards	5 credits
<b>Know:</b>	<p>The applied standards of practice required to achieve the New Zealand Certificate in Concrete Construction Skills (Level 3) [Ref: 4189] with strands in Formwork, Reinforcing, Placing and Finishing, Specified Concrete Finishes, Concrete Product Manufacture, Precast Concrete Manufacture, and Concrete Sawing and Drilling</p> <p>Industry practices required to assure quality of work</p> <p>The connection between workplace standards of practice and the sustainability of the building and construction industry</p>	
<b>Do:</b>	<p>Perform familiar aspects of concrete construction on-site to industry standard</p> <p>Demonstrate behaviour to meet industry standards on a day-to-day basis</p> <p>Fulfil responsibilities in the workplace to meet employment and education agreements</p> <p>Comply with procedures to assure quality through all areas of concrete construction work</p> <p>Participate in learning and development in the concrete construction industry</p>	
<b>Comments:</b>	<p>Working to industry standard means being able to complete work to current regulatory requirements, within a commercially acceptable timeframe, in commercial environments , under the supervision of a commercially competent practitioner</p> <p>Performing familiar aspects of concrete construction includes the use of literacy and numeracy skills required for task completion.</p> <p>Demonstrating behaviours to industry standard means working constructively with work colleagues and others involved in the workplace, being consistently reliable, responsible and accountable, acting with integrity, making and keeping commitments, and showing respect and consideration for people, property and the environment.</p> <p>Industry sustainability refers to the workplace practices that contribute to the economic, social and environmental sustainability and improvement of the building and construction industry.</p> <p>Working to industry standard means being able to complete work to current regulatory requirements, within a commercially acceptable timeframe, in commercial environments , under the supervision of a commercially competent practitioner</p>	

# References

The following is a list of nationally applicable legislation, standards and best practice guidance information relevant to the learning and assessment included in this *Specification* at the time of this publication.

This is not intended to be an exhaustive list. Programme developers are expected and encouraged to develop programmes that also reflect the requirements of their region, learners and industry stakeholders.

It is the responsibility of TEOs offering programmes leading to the qualification to ensure learning and assessment reflect current local and national legislative, regulatory and industry standards.

**Acts of Parliament** available from [www.legislation.govt.nz](http://www.legislation.govt.nz)

Building Act 2004

Construction Contracts Act 2002

Health and Safety at Work Act 2015

Fair Trading Act 1986

Fire and Emergency New Zealand Act 2017

Hazardous Substances and New Organisms Act 1996

Heritage New Zealand Pouhere Taonga Act 2014

Resource Management Act 1991

**Regulations** available from [www.legislation.govt.nz](http://www.legislation.govt.nz)

Building (Definition of Restricted Building Work) Order 2011

Building (Forms) Regulations 2004

Building (Residential Consumer Rights and Remedies) Regulations 2014

Building (Specified Systems, Change the Use, and Earthquake-prone Buildings) Regulations 2005

Health and Safety at Work (Asbestos) Regulations 2016

Health and Safety at Work (General Risk and Workplace Management) Regulations 2016

Health and Safety at Work (Worker Engagement, Participation and Representation) Regulations 2016

Health and Safety at Work (Hazardous Substances) Regulations 2017

**Codes** available from [www.building.govt.nz](http://www.building.govt.nz)

The New Zealand Building Code

**Standards** available from [www.standards.co.nz](http://www.standards.co.nz)

NZS 3109 Concrete construction

NZS 3124 Specification for concrete construction for minor works

NZS 3602 Timber and wood based products for use in buildings

NZS 3604 Timber-framed buildings

NZS 3631 New Zealand timber grading rules

NZS 4210 Masonry construction: Materials and workmanship

NZS 4243.1 Energy efficiency - Large buildings - Building thermal envelope

NZS 4230 Design of reinforced concrete masonry structures

**Guidelines and Approved Codes of Practice** available from [www.worksafe.govt.nz](http://www.worksafe.govt.nz) for the following topics:

Cranes

Excavation and shafts for foundations

Load-lifting

Management and removal of asbestos

Manual handling

Management of substances hazardous to health

Management of noise

Powder-actuated, hand-held fastening tools

Power-operated elevating work platforms

The safe handling, transportation and erection of precast concrete elements

### **Best practice and good practice guidelines**

Various BRANZ publications available at [www.branz.co.nz](http://www.branz.co.nz)

*The Absolutely Essential Health and Safety Toolkit for Small Construction Sites* and other Worksafe NZ publications available from [www.worksafe.govt.nz](http://www.worksafe.govt.nz)

**0800 4 BCITO**  
BCITO.ORG.NZ

