



# Place concrete

CPCCCO3041



- By the end of this topic, you should be able to:
  - Plan and prepare to place concrete
  - Prepare location for concrete placement
  - Receive concrete
  - Place concrete
  - Clean up after placing concrete

- Have you achieved a satisfactory result for the unit:

CPCCWHS2001- Apply WHS requirements, policies and procedures in the construction industry

**CPCCCO3041 - Place concrete cannot be undertaken until a satisfactory result in CPCCWHS2001 has been achieved.**

- To ensure you are placing the concrete according to safe and compliant methods it is important to attend the workplace pre-start meeting where the job plan and all compliance and safety requirements are discussed. This meeting is when plans and specifications are viewed and shared, roles and responsibilities are discussed, and the schedule and all relevant procurements/deliveries are confirmed.
- Pre-start meetings should confirm:
  - Safe workplace and walk-through checks
  - Safe tools and equipment per safety inspections and pre-use checks
  - Safe systems of work per SWMS or work instructions

- You should be familiar with the following documentation before work commences:
  - Codes of Practice relevant to your work
  - Operator manuals and instructions
  - Safety legislation and regulations relevant to your state/territory
  - Site safety plan, policies and procedures
  - Environmental legislations and regulations relevant to your state/territory
  - Australian Standards relevant to your work tasks

<https://ncc.abcb.gov.au/>

NATIONAL  
CONSTRUCTION CODE

Site Safety Plan  
includes  
emergency  
procedures, points  
of access,  
hazards and risks  
on site.

## Workplace documents

- **Plans** provide a visual representations of the work to be undertaken. If there are hazards and discrepancies between plans and what is on site, a site manager, supervisor or project manager should be notified.
- **Manufacturer guidelines and specifications** can be available for anything on site, but most likely for materials, tools, equipment, heavy machinery, hazardous substances etc. These documents outline how a product is to be used, handled and maintained.
- **Safety Data Sheets (SDS)** are also documents provided by manufacturers or distributors of hazardous chemicals. These include information such as:
  - the chemical's identity and ingredients
  - health and physical hazards
  - safe handling and storage procedures
  - Personal protective equipment (PPE)
  - emergency procedures (first aid)
  - disposal considerations.
- **Material schedule** identifies the materials required for a project.

## Workplace documents

- **Site safety plan** includes information relating to:
  - Access
  - Emergency procedures
  - PPE
  - Site hazards and risks
  - Safe work procedures
  - Site rules
- **Safe work method statements (SWMS)** are developed to outline the high-risk construction work activities carried out within a workplace. They clarify the procedures or steps to be taken to complete a task safely. The following should be noted:
  - SWMS must be easy to understand, signed and dated by all in attendance;
  - SWMS must be amended if there is a change in the activity and a copy must be given to the principal contractor;
  - All persons affected by changes must be advised of amendments to the work method statement.
- **A Job Safety Analysis (JSA)** is a tool used to identify hazards or potential hazards at the worksite. Other terms used to describe this procedure are job hazard analysis (JHA) and Job Safety and Environment Analysis (JSEA) which includes a risk analysis relating to the environment and safety.
  - Identifies hazards and potential hazards that may be encountered while working.

## Workplace documents

- **Work Instructions** can be provided in verbal or written form. When written, these documents are generally presented in the form of procedures that clearly and precisely describe the correct way to perform certain tasks. That is, describe, dictate or stipulate the steps that must be followed to correctly perform any specific activity or **work**.
- **Traffic management plans** and traffic control plans are designed to manage traffic both vehicular and pedestrian on and around the work site.
- A traffic management plan may include details of:
  - the desired flow of pedestrian and vehicle movements
  - road closures and detours
  - the expected frequency of interaction of vehicles and pedestrians
  - illustrations of the layout of isolation barriers, walkways, signs and general arrangements to warn and guide traffic around, past, or through a work site or temporary hazard, such as placement of bollards, barricades and lights.
  - how short term, mobile work and complex traffic situations will be managed.
- A traffic management plan could also set out:
  - responsibilities of people managing traffic in the workplace
  - responsibilities of people expected to interact with traffic in the workplace, and
  - instructions or procedures for controlling traffic including in an emergency.
- Refer to the traffic management plan for safety signage and barrier requirements.

- The Environmental Management Plan is used to outline how the local environment is to be protected. An Environmental Management Plan is developed to meet the requirements of the Environmental Protection Act and covers site information for things such as:
  - Cultural and heritage protection
  - Noise and vibration control
  - Sediment, erosion and dust control
  - Chemicals and fuel controls
  - Clean up and waste management

# Workplace documents

- The National Construction Code (NCC) incorporates all on-site building and plumbing requirements into a single code, setting out the minimum requirements for the design, construction and performance of buildings throughout Australia.
- In Queensland we also refer to the **Queensland Development Code (QDC)**, which contains, amongst other things, Queensland variations to the National Construction Code and consolidates Queensland-specific building standards into a single document. The QDC covers Queensland matters that are outside the scope of, and in addition to, the National Construction Code (e.g. requirements for energy efficiency).
- The **Building Code of Australia (BCA)** and **Plumbing Code of Australia (PCA)** are given legal status in Queensland by reference in the ***Building Act 1975*** and the **Plumbing and Drainage Regulation**.
- If you're not working with the right version of the NCC, you're in breach of their statutory and contractual obligations, so make sure you're across the recent changes: <https://ncc.abcb.gov.au/ncc-online/NCC>
- Australian Standards
  - Different Australian Standards will apply to your concrete work such as:
    - AS 3660 – Concrete structures
    - AS 3610 Formwork for concrete
  - Standards relevant to high performance concrete includes but is not limited to:
    - AS/NZS 5100 series - Bridge design
    - AS/NZS 3845 - Road safety barrier systems and devices Road safety device
    - AS/NZS 3666 Set - Air-handling and water systems of buildings Set

## Personal Protective Equipment (PPE)

- During concrete placement, the appropriate protective equipment must be used/applied.
- You may be expected to wear:
  - safety helmets, sun hats
  - safety spectacles, goggles, face shields
  - ear muffs, ear plugs
  - dust masks, respirators
  - gloves, barrier creams
  - safety boots and shoes, rubber boots
  - clothing to protect from sun, cuts, abrasions and burns
- Check PPE before wearing for fit, cleanliness and hygiene.



## Tools, equipment and materials

- Tools and equipment you may need:
  - Metal screed, Wooden float, Magnesium float
  - Steel trowel, Edging trowel, Jointing trowel (groover)
  - Spirit level, Tape measure
  - Shovel, Mattock, Broom
  - Measuring jug, Hose, Bucket
  - Hammer, Timber saw
  - Carpenters' square, Rake
  - Wheelbarrow or concrete mixer
  - Tamper or plate compactor for compacting the base material
- Materials you may need:
  - Concrete delivery or Bags of Concrete Mix
  - Lengths of timber for formwork
  - Timber stakes
  - Clean water
  - Reinforcing mesh (& bar chairs if required)
  - Double headed or clout nails for easy removal
  - Road base or crusher dust to bed slab

## Tools and equipment

- It is essential that tools and equipment are checked for serviceability, and any faults are rectified or reported prior to commencement. This requires you to follow all workplace protocols for rectification and reporting applicable to your organisation. These protocols will require you to complete forms, place signage on equipment, and report faults to supervisors.
- Remember: before you use any equipment identify if there is a maintenance schedule, ensure that there are no discrepancies and that it is signed off.



## DEFECTIVE EQUIPMENT PROTOCOL



## Prepare to place concrete

- Concrete is made from a mixture of:
  - Cement
  - Water
  - Aggregates/sand (coarse and fine)
  - Admixtures (as and when required)

The concrete basics booklet from CCAA states:

There are two classes that concrete can be supplied as: Normal Class and Special Class.

NORMAL CLASS CONCRETE has a strength grade of N20, N25, N32, N40 and N50 with the corresponding characteristic strength of 20, 25, 32, 40 and 50 MPa at 28 days. The slump at the point of delivery should be 20–120 mm and the maximum size of coarse aggregate should be 10, 14 or 20 mm. Normal class concrete is suitable for most purposes including houses. A typical specification is: Strength 20 MPa Aggregate size 20 mm Slump 100 mm (recommended).

For most domestic applications such as driveways and paths grade N20 and N25 are the common grades ordered.

SPECIAL CLASS CONCRETE is specified when you have additional or alternative requirements to those for normal class concrete, eg lightweight aggregate, colour pigments, a non-standard strength grade.

## Prepare to place concrete

- Before concrete can be placed, it is vital that you confirm the type of concrete needed and calculate amounts and timing for the pour. Depending on the required outcome, different admixtures may be required to make the concrete set faster or slower or make it denser.
- Concrete is placed in temporary formwork for a variety of locations and situations such as: single and multi-level slabs, wet areas, insitu decks for bridges and piers and more. Usually, wet areas in buildings are constructed in lower areas in the slab.
- Specifications will indicate the type of concrete required; rule of thumb suggests that for any job over  $0.5\text{m}^3$  it is best to have pre-mixed concrete delivered – smaller jobs can require that you mix the concrete on the site.
- Ideally, concrete is placed and finished during the early morning, before air temperatures and wind speed rise and the air humidity drops.

## Prepare to place concrete

- Before the concrete arrives at the site:
  - Make sure all tools and equipment are ready for use
  - Check that you have enough man power for the task
  - Safety checks to ensure hazards and risks have been identified and controlled
  - Ensure the formwork and reinforcement is ready, secure, separated from structures and free from debris and waste. You may need to discuss how the concrete will be separated from existing structures with a relevant person.
  - Discuss the separation process and any relevant connection processes relevant when placing concrete near existing structures. (Consider adding length to an existing pathway or concreting around a downpipe)
  - If considerations must be made for load bearing walls or columns, it is important that the engineer or site architect contribute to the discussion and provide instruction. If these type of issues do not receive consultation from the relevant engineer, the structure may not be completed to the required strength due to incorrect concrete or insufficient reinforcement and may collapse.
  - Make sure any required traffic controls, signs and barriers are in place to separate the work from others and that the truck driver can see or be guided into the safe and correct position for the pour.

Reinforcement can be used to increase the strength of concrete and/or to help control cracking.

- For house floors resting on the ground it is placed in the top 1/3 of slabs and in the bottom of thickening and beams. In strip footings, it is placed in the top and bottom.
- The reinforcement must be covered by a specified amount of concrete which protects the steel from rusting. This is called cover. The amount of cover depends on whether the slab is inside or outside, is in contact with the ground or protected by a membrane. It is measured to the top, side or bottom of the outer surface.
- Reinforcement should be securely held for slab on ground construction. Bars and mesh should overlap by a specified amount and at the corners of strip footings.
- F62 mesh is a multipurpose steel mesh available in 3m x 2m sheets. suitable for use to reinforce general concrete pavement applications, residential raft slabs and footings to AS2780 and most structural applications to AS3600 and AS2327.1.

## Prepare to place concrete

- On arrival of the truck at the site:
  - Confirm the delivery docket against the order and requirements
  - Direct the truck to the discharge site using signs, barriers or spotters
  - Monitor the discharge via the chute into formwork, wheelbarrow, bucket, kibble, pump etc.
  - Handle according to manufacturer and SDS requirements
  - The supplier must be contacted if items are missing from a delivery
- If you come across any discrepancies between plans, specifications, dockets that you check, notify your supervisor immediately for required action.



## Calculating concrete

- When calculating concrete for a slab:

Multiply

Length x width x depth = volume

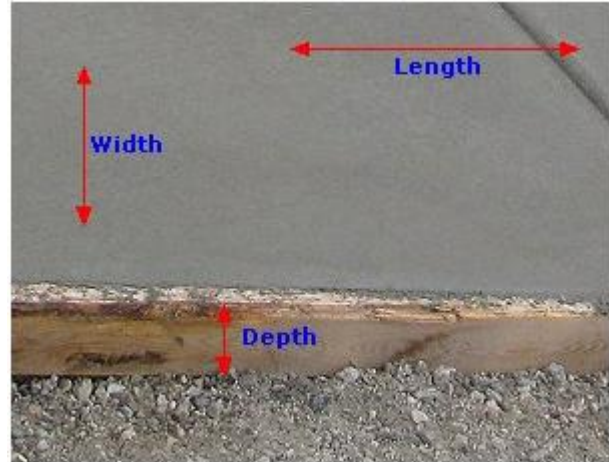
*Example:*

*Slab length = 10m*

*Slab width = 8m*

*Slab thickness = 100mm changed to m = 0.1*

*$10 \times 8 \times 0.1 = 8m^3$*



## Placing concrete

- Concrete should be placed not poured. Even when the concrete is delivered by truck, the 'chute' should be placed low and the concrete placed via wheelbarrow to the formwork. The vertical drop should be minimal and definitely less than 2m to avoid segregation of the concrete materials. (*Segregation is the term used when concrete materials separate*)



Image courtesy of:  
<https://hornbillcontracting.com/services/preconstruction-consulting>

## Placing concrete

- Concrete should be discharged as soon as possible after it arrives on site to avoid stiffening.
- Concrete is placed in horizontal layers into location according to indicated levels. Each layer must be compacted before the next is placed.
- Poured concrete is consolidated during process using approved compaction or vibration method.

Image  
courtesy of:  
[https://www.  
engineering  
civil.com/co  
ncrete-  
pouring.html](https://www.engineeringcivil.com/concrete-pouring.html)



## Placing and compacting concrete

- Compacting is the action of moving the concrete sufficiently within the formwork to expel any trapped air. Compacting is achieved using vibrating equipment that vibrates and shakes the air out.
- Compaction is done during concrete placing while the concrete is still 'plastic'. Concrete that is properly compacted is stronger, more durable and denser than concrete that has not been properly compacted.
- Vibration can be achieved using internal vibration with a mechanical vibrator or poker vibrator. The poker is put into concrete and the size of the poker is determined on the amount of concrete being vibrated at one time. The vibrator will usually penetrate 150mm and vibrate it from the inside. During internal vibration it is important to put the poker in quickly and withdraw slowly, the poker must be long enough to go into the bottom layers BUT must never touch the reinforcement or formwork. External vibration is achieved using a compactor or screed.
- Consistent measuring and checking is required to ensure sufficient concrete has been placed to meet the desired result. More concrete will have to be ordered should there be a shortfall in supply.

## Levels

- During concrete placement, you should consistently check that the levels and fall meet specifications.
- Original levels are taken by first establishing the datum point and using these to establish the bench marks. You must consistently take, verify and record levels during the work.
- The level peg is placed in the work to ensure you have a reference point to gauge the thickness, particularly during screeding or when applying a coating over the surface of the concrete.
- A stringline is used to create a straight and level line between two surfaces. The position of the stringline can be checked by using a spirit level.
- Markers such as a nail or a chalk maker can be used as a reference point in the formwork.
- Laser levels are the preferred levelling equipment particularly on a larger job such as a house slab. If using levelling pegs, Use a laser to determine the highest point, mark the high point in the area needing building up, cut the pegs to the height just marked and stick the peg to the floor with an adhesive.

- Screeding, floating and trowelling are methods used to densify and compact the surface layer of the concrete further. You will screed to achieve the level of the formwork. When using a hand screed, this will involve:
  - Using the screed to pull the bulk of the concrete back, keeping the screed parallel to your body
  - Cut the left and right sides down to finished concrete heights and then
  - Pull the centre area again to make sure there is no bump in the middle.
  - Close off the surface areas and begin using the float.

## Screeding

- Mechanical screeds help to achieve larger area screeding quickly without needing as many workers, however they don't screed falls very well, are difficult to use in small spaces and best suited to flat surfaces.



Image courtesy of: <https://compactequip.com/hand-tools/good-vibrations/>

- Joints are used to control cracking in concrete and can be made before concrete is placed (construction joints; isolation joints) or after concrete has been placed and compacted (control joints). Control joints may be made while concrete is hardening by slicing it with a thin piece of metal. The edges of the joints should be finished with a grooving or edging tool. Control joints may also be sawn, but timing is very important. Too early and the cut will not be clean; too late and the concrete will have already cracked randomly.
- Cold joints occur when fresh concrete is placed against the face of concrete that is still curing. The cracks that form will pass through the depth of the slab. Skilled concretors can effectively work the new concrete into the existing concrete to avoid cold joints occurring.

## Clean up

- When work is completed the site should be cleaned.
- Excess materials used should be recycled or returned to storage.
- Maintain plant, tools and equipment
- All tools and equipment used on the job should be cleaned in order to maintain them in good condition. They should be stored safely and correctly in accordance with the manufacturer's recommendations and standard work practices, so as not to damage them.
- Report faults in logbook and in site records
- All personal rubbish should be placed in a bag and disposed of in the site rubbish bin.

[WARNING]

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