



Construct landscape features using concrete

AHCLSC302

By the end of this topic, you should be able to:

- Plan and prepare work
- Set out and prepare the site
- Mix and pour concrete
- Finish concrete
- Check quality of work and clean-up site

You will be directed to complete a number of activities during this presentation.
Compile your responses into one submission and email your work to training@cstc.org.au
with the subject 'AHCLSC302 Activities'

Concrete landscape features

- There are a range of concrete landscape features/structures that may be built, including:

Paths and driveways



Entertaining areas



Ornamental garden elements



Walls



Fences



Pool surrounds



Floors



Footings



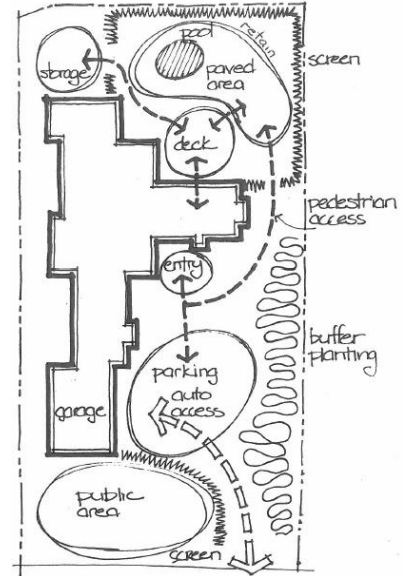
Steps



Plan and prepare work

- To prepare for concrete landscape projects, you should interpret plans and specifications
 - Landscape concept plans
 - These are a visual record of ideas
 - Usually rough freehand drawings

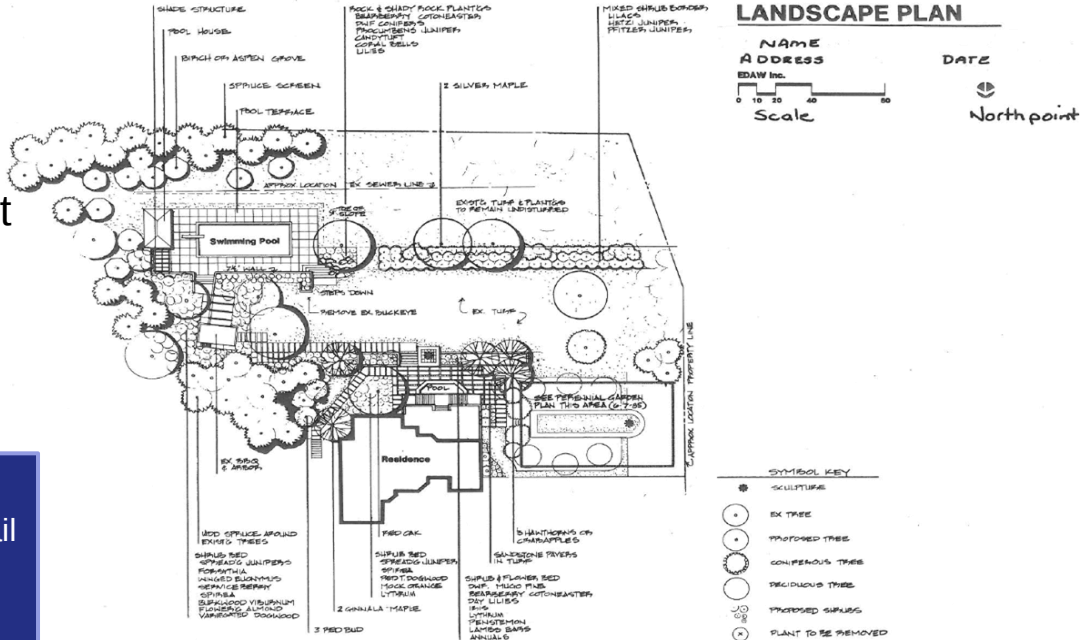
Activity 1: Identify/list the scope of the work to be carried out from the concept plan shown to the right



Plan and prepare work

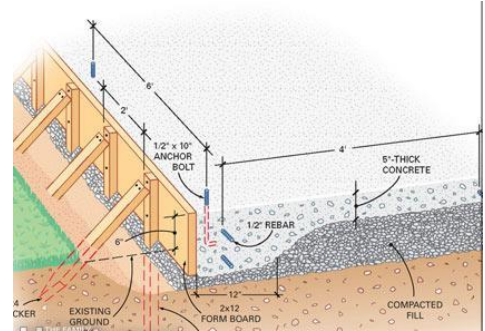
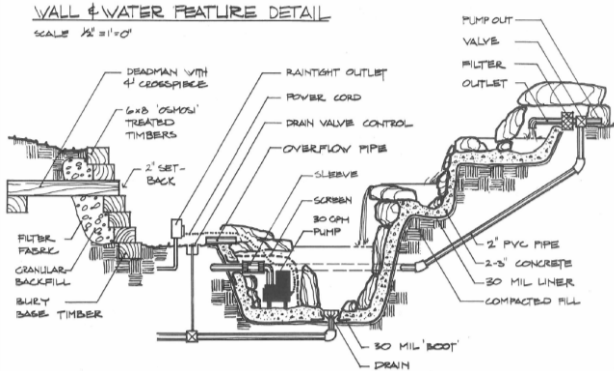
- To prepare for concrete landscape projects, you should interpret plans and specifications
- Landscape plans

Activity 2:
Identify/list the detail
on the landscape
plan shown



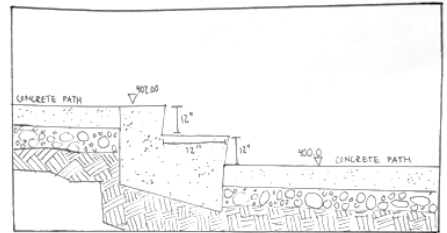
Plan and prepare work

- To prepare for concrete landscape projects, you should interpret construction details
 - Details the components of a structure and how they fit together
 - Provides material symbols



Activity 3: List the materials required to complete the water feature, by using the wall and water feature construction plan shown

- To prepare for concrete landscape projects, you should familiarise yourself with the task requirements
 - Location of services
 - Required materials, tools and equipment
 - Proposed site of concrete structure/feature
 - Measurements (including depths)
 - Reinforcement requirements
 - This should be read alongside the reinforcement schedule to determine placement
 - Concrete requirements (e.g. strength, finish)
 - Drainage requirements



CONCRETE PATH & STEPS

Plan and prepare work

- The materials to be used for concrete landscaping projects will differ depending on the work to be completed
- However, some common materials include:
 - Bedding materials, such as

Crusher dust



Coarse sand



Decomposed granite



It is your responsibility to check the quantities and quality of materials matches the specifications

Plan and prepare work

- The materials to be used for concrete landscaping projects will differ depending on the work to be completed
- However, some common materials include:
 - Reinforcement, such as

Ligatures



Mesh



Bars



It is your responsibility to check the quantities and quality of materials matches the specifications

- The materials to be used for concrete landscaping projects will differ depending on the work to be completed
- However, some common materials include:
 - Concrete components
 - Aggregate
 - Cement
 - Sand
 - Water
 - Decorative features (e.g. stone)



It is your responsibility to check the quantities and quality of materials matches the specifications

- To prepare for concrete landscaping projects, you should familiarise yourself with workplace requirements
 - **Laws applicable to your workplace, such as:**
 - Acts [e.g. Work Health and Safety Act 2011 (Qld)]
 - Regulations [e.g. Work Health and Safety Regulation 2011 (Qld)]
 - **Industry standards for:**
 - Bedding depth, level and falls
 - Shape, depth and dimensions of sub base level
 - Finished level of base material



Activity 4: Research and list relevant laws and standards relating to concreting works (e.g. Building Codes, Australian Standards, Codes of Practice)

Plan and prepare work

- To prepare for concrete landscaping projects, you should familiarise yourself with the work area
 - Identify any WHS hazards and assess risks (e.g. unauthorised persons in work area, underground services)
 - Consider the environmental impacts of the proposed works (e.g. erosion, redirection of water flow, runoff into stormwater drains)
- Report hazards to your supervisor within a timely fashion – especially emergency situations

Plan and prepare work

- To prepare for concrete projects, you should organise required PPE, machinery, tools and equipment
 - **PPE may include:** Face mask, gloves, goggles, long pants, sleeved clothing, wide brimmed hat, work boots
 - **Machinery may include:** Bobcat, dingo, excavator, plate compactor
 - **Safety equipment may include:**
 - Bunting and barricades to reduce risks to personnel on site (e.g. marking exclusion zones)
 - Signage to convey safety messages – placed visibly in the relevant work area, at eye height
 - **Tools and equipment may include:** Formwork, hammer, concrete mixer, floats, tape measure, screeds, shovel, spade, stringlines, trowels, wheelbarrow, surveying and levelling tools



Ensure they are appropriately selected, prepared and used for the task, following manufacturer recommendations

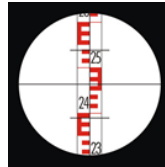
Set out and prepare site

- Follow the steps outlined below when setting out the site:
 - Locate services (e.g. telephone, gas, electricity, water, cable, sewerage)
 - Contact Dial Before You Dig to check the location of such services
 - Mark out the position of the concrete landscape structure/feature
 - Locate existing elements/structures to take measurements from
 - Mark out the construction area
 - Use chalk on hard paved surfaces
 - Use stringlines and pegs over soil or turf
 - Marking paint
 - A long garden hose may also be useful for marking out shapes on both hard and soft surfaces



Set out and prepare site

- Follow the steps outlined below when setting out the site:
 - Establish survey benchmarks
 - Benchmarks are based on established datum points
 - A datum is a level surface above or below which all heights are measured – think of it as a ‘starting point’



- The position of the job datum should be clearly marked on site plans
- Benchmarks are fixed points of known height to which other points can be referred
- Benchmarks should be established on positions or structures where they cannot be disturbed by construction activity

Set out and prepare site

- Follow the steps outlined below when setting up the site:
 - **Determine the location and depth of excavations**
 - Peg the reduced levels of the proposed area from the survey benchmark using the rise and fall method in a closed level run
 - Remove any roots, soft earth or debris from the subsoil/subgrade
 - Compact the base of the trench to provide a solid foundation for concrete
 - **Spread and compact the subbase/bedding material**
 - Spread bedding material loosely over the area

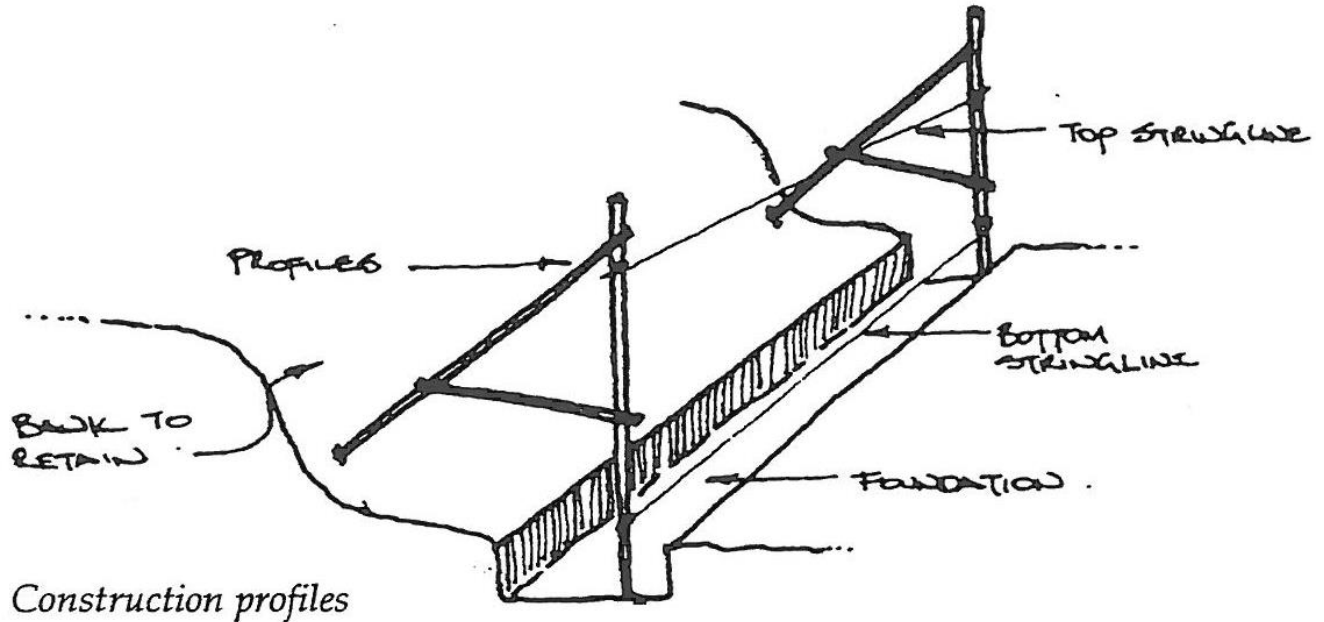


Set out and prepare site

- Follow the steps outlined below when setting out the site:
 - Establish profiles to conform to the designated tolerances
 - A profile is a temporary fixture (e.g. timber pegs with cross boards attached) which assists in determining a structure's position and intended height
 - Stringlines are positioned from profile to profile in the exact position, height and batter of the wall. By sighting through two stringlines (i.e. one at the top of the feature construction and one at the bottom), a plane or finished face can be seen
 - This is the front face to build the concrete structure/feature to



Set out and prepare site

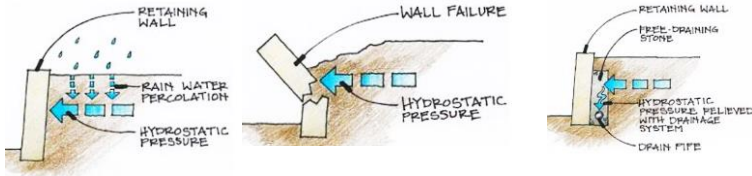


Drainage

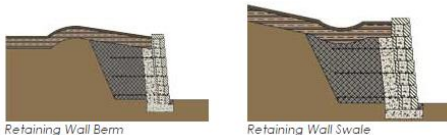
- A retaining wall requires drainage to be installed
 - Drainage types include surface and subsurface

Consequences of poor drainage:

- The wall will act as a dam
- Cracks in the wall due to erosion under the base material
- Walls sinking or moving
- Blocks shifting out of alignment
- Wall failure



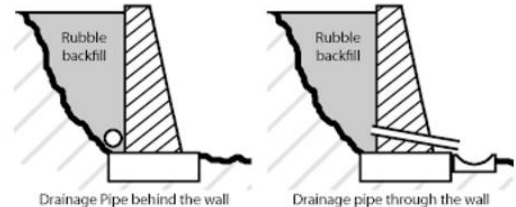
- Installing adequate drainage



Activity 5: List the components for four (4) common surface drainage systems used in landscape construction: Spoon, Channel and grate, Pit, Contour

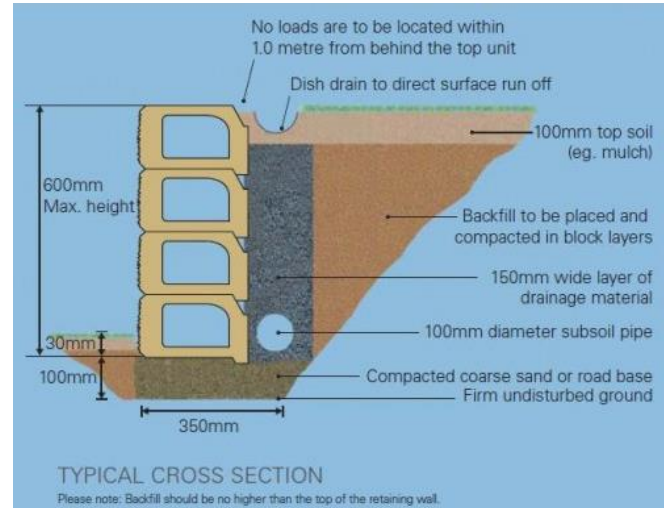
- When do I need drain pipes?
 - All walls taller than 1.2m
 - Sites with poorly draining soils
 - Alongside paved areas
 - Water lines, mains or fire hydrants
 - With slopes above the wall
 - On multi-tiered and terraced walls
 - All commercial and municipal projects

Activity 6: List the advantages and disadvantages of drainage behind and through the build wall (as shown below)



Retaining wall drainage

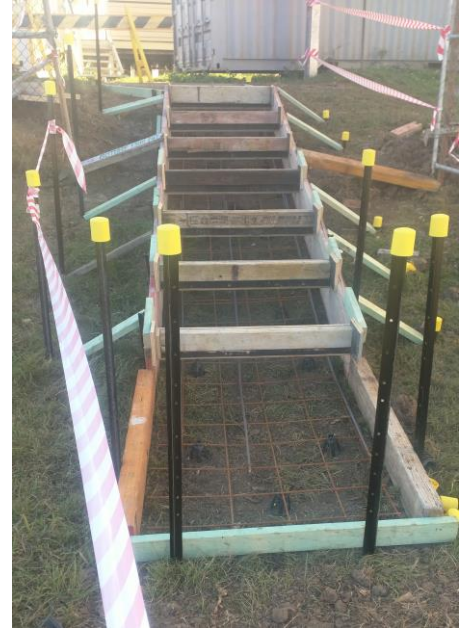
- Subsurface drainage is installed usually around the first or second courses of blocks
- Conduit / ag-flow pipe / weep holes should be placed at various points in the wall to allow sub-surface water to exist
- This may not always be aesthetically pleasing, hence a rubble drain behind the wall is the most general method



- Note the effects of altering water flow when installing drainage
 - Be mindful of water pooling in new areas, which may affect nearby plants and structures
 - Ensure that slopes are directed away from buildings
 - Consider infiltration water – water entering the bedding sand must not pond
 - Consider subsurface flow – water from beyond the concrete structure and flowing under it
 - Consider surface runoff – that water falls directly onto the concrete structure and flows off the surface

Set out and prepare site

- Formwork should be installed to provide a mould into which concrete can be poured.
- Formwork can be made from a number of materials, including:
 - Block work
 - Bricks
 - Plastic
 - Steel
 - Timber



Set out and prepare site

- Tips for installing formwork:
 - Ensure formwork is fastened to ensure its stability (e.g. using nails and screws with timber formwork)
 - To allow formwork to be more easily removed at the end of a project, apply release agents to stop concrete products sticking to the formwork



Set out and prepare site

- The purpose of reinforcement steel is to withstand and counteract the concrete's tendency to crack
 - Flexing occurs when loads are applied on the concrete
- The reinforcement required essentially depends on the thickness of the concrete

Reinforcement fabric and bars should be tied or fixed to configuration (this will be outlined in the reinforcement schedule of the plan)



Mix and pour concrete

- To establish the required concrete mix, you need to determine the strength requirements for the project

	APPLICATION	CEMENT	SAND	AGGREGATE	20kg BAGS OF CEMENT PER m ³
	CONCRETE				
	Improved water tightness High strength	1	1.5	3	17
	Paths, driveways, patios, floors	1	2	3	16
	Foundations, footings	1	3	3	13

- All dry ingredients should be thoroughly mixed together along with required additives
 - Additives may include: Oxides to colour concrete; Additional aggregates

- Introduce sufficient water to produce a concrete mix of the required consistency
 - Concrete is designated with a number (e.g. N32 has a compressive strength of 32 MPa after 28 days of curing)
 - If too much or too little water is added to the mix, the concrete will be weaker than intended
 - You need to achieve the correct water-cement ratio, which is a ration between the mass of water and mass of cement in concrete

Activity 7: Explain the purpose of a slump test. Describe the process of how such a test is conducted.

- Pour concrete to designated levels (e.g. following formwork)
 - Avoid segregation by minimising the height of the vertical drop of the concrete
- Consolidate concrete using an approved vibration method
 - This aims to eliminate any trapped air in the concrete and limit honeycombing in the placed concrete

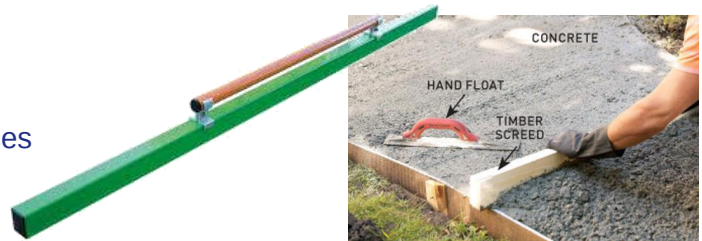


Example of honeycomb in concrete

- Screed concrete to the desired finished level
 - You may use a mechanical screed or screed by hand
 - Benefits of mechanical screeds include:
 - Quicker and requires less effort
 - Aids in the vibration of concrete
 - Disadvantages of mechanical screeds include:
 - Doesn't screed to falls very accurately
 - Very hard to use in small confined spaces due to size and engine fumes

To screed by hand:

1. Pull bulk material straight back, always keeping the screed parallel to your body
2. Cut left or right sides down to finished concrete heights
3. Pull middle areas back again, ensuring no hump is in the middle
4. Close all surface areas, ready for the bull float



Finish concrete

- Floating is the first stage in finishing the concrete after screeding
 - Floating is done to level ridges, fill voids and smooth the surface in preparation for trowelling
 - Floats can be a small hand tool or larger bull float with long handle



It is important to wash tools within a few minutes of using them

Finish concrete

- Trowelling produces a hard, dense surface with a smooth finish
 - It should be done immediately after floating the concrete surface



- The next stages for finishing concrete are:

- **Edging:**

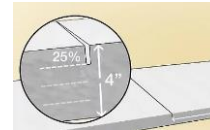
- Produces a neat rounded edge along the slab perimeter which aids in reducing chipping
- Work the edger back and forth in long strokes lifting the leading edge slightly

- **Grooving:**

- Provides control joints for cracking
- Note: Most plans don't have joint spacing marked on them

- **Brooming:**

- Wait for bleed water to evaporate, then broom the surface with a concrete broom
 - Broom marks should run towards the drainage area
- You can create decorative effects by running the broom texture in various directions



Finish concrete

- There are a range of decorative finishes that may be applied to concrete, including:

Exposed aggregate



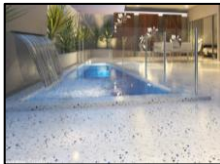
Stamped



Stencilling



Polished



Coloured



Finish concrete

- Concrete needs to be cured to control the rate of moisture loss, which ensures maximum strength and durability
 - Concrete in traffic areas needs to have a textured finish and be cured
- To slow down the curing process any of the following can be applied

Process	Description	Image
Curing compounds	Spray on products	
Water curing	Lightly watering a few times a day for a week	
Plastic sheeting	A light spray of water before applying plastic sheeting	

Activity 8: Research and list a range of curing compounds and the advantages of using each type

Quality check and clean up

- After constructing the concrete feature/structure, you are required to complete the following practices:
 - Compare the quality of the finished works with the drawings and specifications standards
 - Record and/or report your work outcomes to your supervisor
 - Clean up the work site
 - Shut down, maintain, clean and pack away machinery, tools and equipment
 - Follow manufacturer's specifications and supervisor's instructions
 - Report faults that are discovered in logbook and/or site records

Activity 9: List environmentally safe products for cleaning



- After installing the concrete feature/structure, you are required to complete the following practices:
 - Strip formwork (after at least 24 hours)
 - Carefully remove edge boxing and braces in sequence to limit the risk of collapse
 - Check formwork components for damage, disposing as necessary
 - De-nail, clean and store/stack timber components
 - Clean, oil and store/stack steel components
 - Clean and stack shutters, screens, bracing and pegs

- After installing the concrete feature/structure, you are required to complete the following practices:
 - **Dispose of materials that cannot be reused or recycled**
 - Separate soil and waste material (e.g. organic, inorganic and recyclable piles)
 - Ensure that you follow the enterprise guidelines (e.g. JSA and SWMS for handling and disposing of waste)
 - Follow Safety Data Sheets (SDS) and environmental plans to ensure environmentally safe practices



Activity 10: Have team members take photos and videos of your involvement with concrete features. Be sure to include all stages of construction.