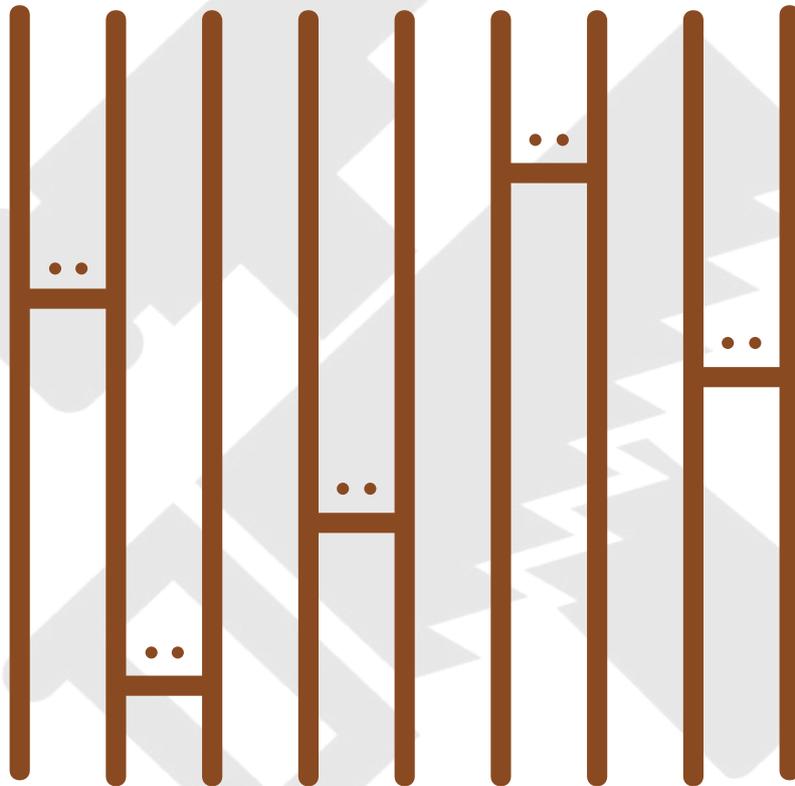




BCATS

BUILDING, CONSTRUCTION
AND ALLIED TRADE SKILLS

Timber deck



Unit Standard 12935 (v5), Level 2

Construct a spaced residential timber deck up to one metre high as a BCATS project.

8 CREDITS

BCITO
buildingpeople

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Table of contents

	Page
Introduction	4
How you will be assessed	5
Glossary of terms	6
Health and safety	7
Project overview	8
Common resources	9
Planning	10
Calculating quantities	11
Prepare an order for materials	13
Constructing a deck	14

Introduction

This handbook outlines the construction of a timber deck attached to a house. The images are drawn from a number of decks under construction in order to demonstrate a range of operations and processes. Your teacher/tutor can help you adapt the processes or materials for your deck's design and specifications.

Remember:

Your teacher/tutor will guide you as to the dimensions of the residential deck as well as the specifications. Specifications will include the materials the deck will be constructed of. The specifications will also say what materials to apply to protect the deck from the weather.

How you will be assessed

You need to show your teacher/tutor that you can follow a given plan to construct a residential timber framed deck up to 1 metre high.

Your teacher might give you a work diary to help you record how you constructed the deck. If you can, take photos as you go, including a photo of the completed deck.

You need to use project documentation to:

- calculate all the materials needed
- prepare an order for the materials
- set out pile positions and excavate pile holes
- place piles
- set out, cut and fix bearers and joists
- cut, fix and finish decking
- complete everything safely
- keep the site, tools, and equipment clean and tidy.



Glossary of terms

Term	Meaning
Annular grooves	Ring-shaped serrations which improve the holding power of nails.
Baluster	The vertical members of a balustrade that support a handrail.
Countersunk	To enlarge the top of a screw hole so that the conical head of a screw is set flush or below the surface of the work.
Galvanised	A zinc coating used to protect metal.
Hand rail	A rail fixed parallel to the stringer which provides support for people when using the stair.
Open riser	A stair with treads only. These can either be housed into the stringer or fixed on to the top of the stringer using triangular-shaped blocks.
Plant	Equipment.
Plumb	True vertical.
Riser	The vertical board of a step.
Step	The combination of both the tread and the riser.
Stringer	The side board of a stair that runs at an angle from the top of a deck to the ground and supports the stair treads and risers.
Tamp	To pack down and consolidate.
Tread	The horizontal upper surface of a step where the foot is placed.
Wire dogs	Timber connectors typically used in wind uplift situations.

Health and safety

The Health and Safety at Work Act 2015 is designed to:

- prevent harm to employees at work
- promote good practices in health and safety management.

The Act puts responsibilities on everyone to take all practical steps to ensure your own safety and the safety of others.

One way you can help ensure your own safety is to use personal protection equipment (PPE). For this project you will need to use:

- hearing protection
- safety boots or covered shoes
- gloves when handling treated timber
- dust masks
- safety glasses (even if you wear prescription glasses, you must still use safety glasses)
- apron or overalls.

The machinery and other equipment you use can cause serious injuries. You must use appropriate guards and safety devices. You must not use any machine without the safety guards fitted correctly. You must receive training in the use of machines and equipment and apply it when you use them.

When using powered equipment outdoors such as an electric drill, portable saw, or a concrete mixer, ensure an RCD device is used at all times. Ensure that the RCD device is plugged directly into the power socket and power cords are positioned so they will not be run over or placed on damp. Test the RCD device before using electrical equipment. If mixing concrete, which requires water, be extremely careful positioning power chords as water conducts electricity.

Before using a machine or portable power tool, check to see if all chords are in good condition. Also check that the compliance tags are current.



Keep power tools and power leads on a dry surface and all safety equipment readily accessible.



Use a residual current device if working outside no matter what the weather conditions are.

Project overview

Decks come in all sizes, from small to large. A deck creates a flow between indoor and outdoor spaces. It can add a practical and accessible flat area on sloping sections.

The deck area should be large enough to be usable but not overpower a garden area, especially on smaller sections.

It is important to take into account the size of outdoor furniture and where it may be positioned on the deck at the design stage. At this stage, also think about the construction of screens for privacy.



Furniture on a deck



Privacy screen

To produce good workmanship, you should follow and plans and specifications carefully at every stage of the project.

- Make sure you understand the drawings and specifications. If you aren't sure, ask your teacher/tutor.
- From the drawings and specifications, identify and select the correct materials.
- Create a cutting list. Make sure you have enough of the correct materials and plan any cuts so you don't waste materials.
- Cut all decking components accurately.
- Assemble all decking components accurately.
- Finish the deck as per the specifications. The completed deck should look good and stand up to the conditions it's used in.

For any construction job you carry out, it's also important to:

- choose and use appropriate personal protective equipment (PPE)
- use tools correctly and safely
- keep the work area clean and dispose of waste
- clean, store and maintain tools, plant and equipment correctly.

Common resources

Getting started

The first step is to get the job specifications and a drawing from your teacher/tutor. The working drawings and job specifications will include the size and design of the timber framed deck as well as the materials to be used.

What tools/equipment will I need?

You will use a wide range of hand tools and portable power tools. The actual range will depend on the approach taken as well as the physical resources available to you.

TOOLS AND EQUIPMENT COMMONLY USED FOR A TIMBER FRAMED DECK

Hand tools

- tape measure
- string line
- spirit level
- set square
- cross cut saw
- claw hammer
- nail punch
- shovel
- set spanners or socket set

Portable power tools

- portable power saw
- compound mitre saw

Fixed machinery

- concrete mixer

Depending on your school's policy, you might not be able to use some portable power tools on your own accord, such as a compound mitre saw. If this is the case, you must still set up the machine for your teacher/tutor to use and be on hand to be talked through how to use the machine safely and to see the process completed.

Planning

Before designing the deck, check with your local council for any planning restrictions. These vary from region to region. Some will require planning consent or a neighbour's permission. Others will have size limits, or have to be a minimum distance from boundaries, or below a certain height, and so on.

The deck you will make can be no higher than one metre. Any deck from which a person may fall more than one metre requires a building consent.

Decks will fail if there is limited air movement and poor drainage between the ground and the underside of the decking material. It is best to slope the ground to provide adequate run-off.

Higher decks should be braced in two directions to stiffen the structure. If a deck is constructed near the sea, stainless steel fittings must be used.



Provide adequate run-off for low decks



Cross-brace higher decks

Calculating quantities

Before placing an order you need to calculate the materials and hardware required. Below is an example of the calculations to build a deck to the stated dimensions and materials.

Example

Calculate the materials required for the following deck, attached to a house, to be built on a level site.

Width	3m
Length	2.7m
Top of deck	400mm above ground level
2 anchor piles, 4 intermediate piles	125 x 125mm H5
2 rows of bearers	100 x 75mm H3.2
Joists	100 x 50mm @ 600 centres
Grip tread decking	88 x 32mm

Calculations

Concrete volume
= length x width x depth
= (l x w x d of anchor hole x number of holes) + (l x w x d of intermediate hole x number of holes)
= (0.350 x 0.350 x 0.900 x 2) + (0.200 x 0.200 x 0.200 x 4)
= 0.221 + 0.032
= 0.253m³

Piles anchor pile length
= deck height + footing depth – footing base thickness
= 0.400 + 0.900 – 0.100
= 1.2m
intermediate piles
= deck height + footing depth – footing base thickness – bearer depth – joist depth
= 0.400 + 0.2

Bearers number of
= number of rows x deck length
= 2 x 3
= 6m

Calculating quantities

Joist numbers = (joist spaces - 1) + edge joists + anchor pile joists + boundary joist

$$\text{joist spaces} = (\text{width between anchor pile joists}) \div (\text{maximum joist spacing allowed})$$

$$2400 \div 0.600$$

$$4$$

$$= (4 - 1) + 2 + 2 + 1$$

$$= 8$$

Decking = (deck width \div (decking width x deck length)) + waste factor

$$= (30.681 \times 3.000) + 5\%$$

$$= 92.043 + 4.602$$

$$= 96.645$$

Fixings Bearers to anchor pile bolts

$$= \text{pile thickness} + \text{bearer thickness} + \text{excess bolt thread}$$

$$= 125 + 75 + 20$$

$$= 220\text{mm}$$

Joists to anchor pile bolts

$$= \text{pile thickness} + \text{joist thickness} + \text{excess bolt thread}$$

$$= 125 + 50 + 20$$

$$= 195\text{mm}$$

Therefore the materials required to complete the deck are:

→ Concrete for piles	0.25m ³
→ Piles	125 x 125mm H5 - 2@1.2m, 4@400mm
→ Bearers 100 x 75mm H3	2/3m
→ Joists 100 x 50mm H3	8/3m
→ Decking (griptread) 88 x 32mm	97m
→ Bearer/joist bolts (galvanised or stainless steel)	12mm / 2/220mm
→ Washers (galvanised or stainless steel)	11/50 x 50 x 3mm
→ Wire dogs (bearers to intermediate piles)	8
→ Nails	100 x 3.75 galvanised flat head nails
	75 x 3.15 galvanised flat head nails

Prepare an order for materials

When placing an order with a supply merchant for building materials, you need to provide the following information. This will ensure that the right materials are supplied to the right place at the right time, and the correct information is supplied for budget and accounting purposes.

The order should be clearly written or typed, and include the following information:

- date of order
- customer's name, account number and billing address
- job identification or number
- order number
- supply merchant's name
- description of goods required and quantity
- address where the order should be delivered
- date and time required
- any other delivery details
- authorised purchaser's signature.

Send the order to the supplier allowing enough time for them to prepare and deliver it. (You should also keep a copy of the order for your records.) It's a good idea to follow up with a phone call if you don't receive confirmation that the order has been received.

Once your timber is delivered, prevent it bowing or deteriorating by stacking it flat and clear of the ground and keeping it covered.

Note:

An order form template is available in the resources for your use. It can be downloaded and completed electronically or printed off to complete by hand.

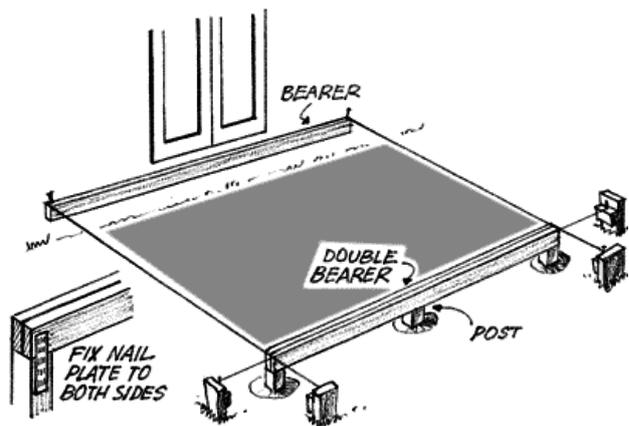
Constructing a deck

Preparing the site

1. Prepare the site by removing any unwanted material and completing any earthworks such as creating a slope for natural drainage. A week or two before starting, weed spray the area to be covered to keep weeds down after the deck is completed.

Setting out

2. Measure down from where the finished deck height should be on the building. Draw a level line to mark where the top of stringer will go. Fixings will be attached 75mm below this line, so check that the bolts will be securely fixed into the framing or foundation wall. You may need to adjust the height of the deck to ensure secure fixing.
3. Fix the 150 x 50mm stringer along this line, packed out 20mm from the wall. Fix 12mm bolts - one 300mm from each end and one in the centre - through the stringer and into the foundation. Use a 50 x 50 x 3mm washer where the bolt bears on timber.
4. Construct profiles about 900mm outside the outline of the deck. Profiles must be solidly braced in all directions so that you can be confident the string lines will stay in place throughout the build.
5. Use string lines to set out the perimeter of the deck. To make sure the deck is square, check that the diagonal dimensions are equal.
6. Drive nails partly into the top of the profiles to mark these lines and hammer nails another 200mm inside these lines to mark the outside edge of the piles.
7. Using the string lines set to the inside nails on the profiles, mark the positions of each pile on the ground using a can of spray paint.
8. Position the piles according to the string lines.



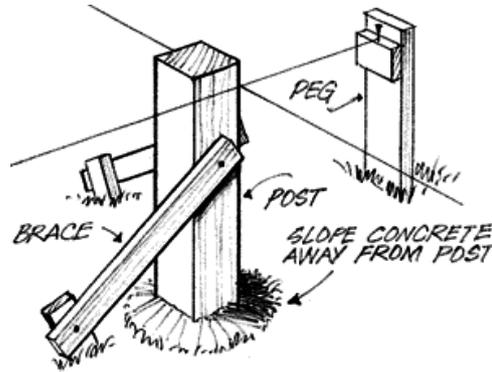
Digging the pile holes

9. Measure the size of the hole to be dug from the midpoint of the pile.
10. For the two anchor piles, dig a hole 350 x 350mm square and 900mm deep.
11. For the intermediate piles, dig a 200 x 200mm hole, at least 200mm deep or until the topsoil layer has been penetrated and the ground at the bottom of the hole is firm.

Placing the anchor piles

The pile will be cut to height after the concrete has set. If cutting a longer pile in half to create two piles, ensure the non-cut end is placed in the hole.

12. Place the pile in the hole. Nail a temporary timber batten to the pile to hold it 100mm above the bottom of the hole. This allows space for a concrete footing under the pile.
13. Align the outside edges of the pile with the string lines. Brace the pile to secure it in position while concrete is placed in the hole.
14. Place 150mm of concrete in the bottom of the hole and tamp it with a piece of 50mm x 25mm timber to make sure that concrete is forced completely under and around the pile.
15. Use a spirit level to check that the pile is plumb, and check it is square with the string line. Make adjustments if necessary.
16. Add further concrete about 150mm at a time, tamping the concrete as you go, until the hole is full.
17. Check the position of the pile again and adjust if necessary
18. Place the remaining piles using the same method.
19. To control regrowth of weeds, place a layer of black polythene sheet on the ground before placing the bearers and joists. Before laying the polythene, prepare a run-off for water if one hasn't already been prepared.



Placing the bearers

Allow the concrete supporting the piles to harden.

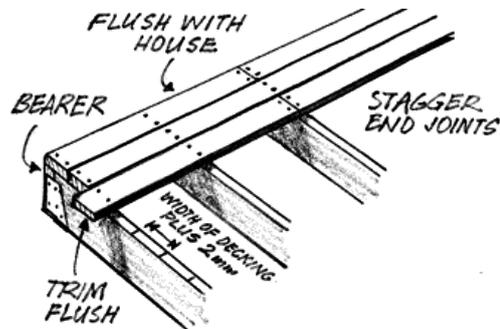
20. Use the string lines and a level to mark the correct height on all of the posts. Cut the posts to height.
21. Sit the bearer on top of the piles. It should finish in line with the front of the piles and in line with the string line.
22. Fix the front bearer to the piles with a 100 x 3.75mm nail and a wire dog each side of the piles.
23. Place the centre bearer on the centre intermediate piles and fix with nails and wire dogs.
24. When fixed, the bearers should be level across their length and with one another.
25. Trim the ends of the bearers to finish in line with the outside string line.

Placing the joists

26. Set out for the joists according to specifications. Cut the joists to length and sit in position on top of the bearers.
27. Skew nail the joists to the bearers using 90mm nails.
28. Fix a 100 x 50mm boundary joist to the ends of the joists with two 100 x 3.75mm nails into the ends of each joist.

Placing the decking

29. Lay the first piece of decking nearest the house, leaving a 10mm gap to allow drainage. Overhang the end of each board approximately 10mm.



30. Tack the board in place, check that it is straight and then nail the board with two 65mm galvanised flat head nails at each joist. Use a 75mm nail to set the space between the next board and nail in place.

31. Check every fifth or sixth board to ensure they are still parallel with the house foundation and that the outside ends of the boards overhang the outside joists. Keep the number of joints to a minimum by carefully choosing which boards to use by laying the boards out on top of deck.



Any joints you need to make must be centred on a joist, with both boards carefully lined up and nailed. It may be necessary to drill

holes for the nails on the end of boards to prevent them splitting.

Joints in boards should also be staggered – a joint in one board should not be on the same joist as the board next to it.

32. The last board should overhang the boundary joist by about 10mm. Trim the ends to the decking in line with the edge joists



Attaching handrails

Decks more than one metre from the ground will not get a consent unless they include handrails. For domestic use, the height of the railing should be a minimum of one metre above the decking.

The decision about whether or not to add handrails for lower decks will depend on the deck's design and purpose. Clients with babies and small children, for example, may prefer a barrier to reduce the risk of falls.

Handrailings can be bolted to posts using one or two 10mm diameter galvanised bolts or coach screws. Which is best to use depends on the width and design of the rail.

If the deck support posts do not extend through the deck, use two 12mm diameter galvanised bolts to attach additional posts to bearers or joists as appropriate. These should be adequately braced.

Infill between the handrail and decking can be achieved in numerous ways – plywood or glass panels, vertical balusters or horizontal rails. The gap between these must not be more than 100mm.



Timber deck

Maintaining a deck

Decks are exposed to the weather – temperature changes, rain, hail, sun, and sometimes snow. You can maximize the lifespan a deck by washing it down and re-staining it.



Washing a deck



Freshly re-stained deck

