APPLY KNOWLEDGE OF RESIDENTIAL BUILDING PROCESSES AND MATERIALS
CERTIFICATE II IN BUILDING AND CONSTRUCTION (PATHWAY – PARAPROFESSIONAL)
30010
LEARNER’S GUIDE
BUILDING AND CONSTRUCTION
Apply knowledge of residential building processes and materials

30010

Learner’s guide
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Annex D – Assessments

Annex E – Marking guides

Annex F – Design and build a house flowchart

Annex G – Personnel involved in residential building processes
Welcome

Welcome to the learner’s guide for 30010 Apply knowledge of residential building processes and materials. In this guide, you will be following the sequence of events and associated trades from the initial contact between the client and the designer through to the conclusion when the builder has built the house and hands it over to the client.

Knowledge of residential building processes and materials is essential for people who work in the building and construction industry. This unit will provide you with an understanding of the typical processes and materials of residential building construction, the way the processes relate to each other, and whether they relate to the pre-construction, construction or post-construction stage.

Areas of explanation include:

• residential building processes
• residential building materials
• the order and basic characteristics of processes and how they interrelate.

The processes involved in designing and building a house are summarised in Annex F. You will find it helpful to refer to this chart to see how each process interrelates with the others.

The people involved in each stage are summarised in Annex G. You will find it helpful to refer to this table at each stage to see which personnel are involved.

The term ‘designer’ has been used throughout this guide and is intended to include architect, draftsperson and project home builder. These terms will be used separately when appropriate to describe different processes.

The term ‘builder’ has been used throughout and is intended to include project home builders. These terms will be used separately when appropriate to describe different processes.
Qualification overview

This unit of competency, 30010 Apply knowledge of residential building processes and materials, forms part of Certificate II in Building and Construction (Pathway – Paraprofessional) and is aimed at people who are considering a paraprofessional career in the residential building industry (as opposed to the trade sector).

The course consists of 12 units of study and a period of work placement. These two components, study and work, will provide you with an introductory background to the paraprofessional side of the residential building industry.

To progress further in the industry from this introductory level, you will then need to specialise in a particular field(s) of study, such as building, estimating, scheduling, drafting, building design. Courses for these careers usually commence at Certificate IV level and progress through to diploma or even advanced diploma levels at a registered training provider that delivers these programs.

Some areas of study, such as architecture, interior design and construction management, can then be studied further at degree level at a university.
Unit overview

This unit of competency specifies the outcomes required to understand the importance and the basic operation of the residential building industry and to develop employability skills relevant to an entry-level employee of the industry. It supports the attainment of basic understanding and application of construction processes and materials to tasks such as estimating, costing and drafting.

Competence in this unit will be demonstrated by:

- compilation of a resource file of construction types and materials
- use of a construction program to identify and describe the impacts of variations on the timeline
- selection of a construction type and materials for a specific house.

Unit summary

Some basic information about this unit of competency is provided below. You can find the full unit details at Annex A at the back of this guide.

<table>
<thead>
<tr>
<th>Unit title</th>
<th>Apply knowledge of residential building processes and materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Descriptor</td>
<td>This unit of competency specifies the outcomes required to apply knowledge of residential building processes and materials. This includes the processes themselves, the interrelationships between them and the major processes. An ability to apply knowledge of materials used in construction is also developed.</td>
</tr>
<tr>
<td>Employability skills</td>
<td>The following employability skills are an integral part of the delivery of this unit. They include: communication; teamwork; problem solving; initiative and enterprise; planning and organising; self-management; learning; and technology.</td>
</tr>
<tr>
<td>Pre/co-requisite units</td>
<td>Develop residential building industry knowledge Carry out basic measurement and calculations for residential buildings</td>
</tr>
<tr>
<td>Application</td>
<td>This unit supports the attainment of a basic understanding and application of construction processes and materials to tasks such as estimating, costing and drafting.</td>
</tr>
</tbody>
</table>
Element 1 Develop knowledge of residential building processes

1.1 Identify processes associated with construction of residential buildings

1.2 Identify different trades and non-trade occupations commonly engaged in residential building industry

1.3 List the processes that occur in order to progress a typical residential building from initial client enquiry to contract completion

Element 2 Develop knowledge of common residential building materials

2.1 Identify materials in common use in residential buildings in local areas

2.2 Research general characteristics of these materials

Element 3 Identify the order, basic characteristics and interrelationships in processes

3.1 Develop an understanding of the basic characteristics of the processes and of how processes interrelate

3.2 Seek information on how long processes take and what could determine variation in time

3.3 Identify typical machinery and equipment required to complete or improve processes

3.4 Examine and follow documentation of examples of the timelines for a residential building project

Skills recognition and recognition of prior learning (RPL)

You are encouraged to discuss with your lecturer any previous courses or work experience in which you have participated so that it can be recognised. Evidence must be provided.
Resources

Required

Your lecturer will provide:

- access to a classroom with computers with internet access and word-processing and spreadsheet applications

You will need to provide:

- an A4 notepad
- an A4 file for notes, handouts and other printed documents
- pens, pencils, eraser and highlighters
- a USB thumb drive (1Gb).

Recommended

The resources that you need will depend on your specific trade area, but may include some of the following. Your lecturer will provide access to any of these required.

<table>
<thead>
<tr>
<th>Trade area</th>
<th>Resource</th>
<th>Publisher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bricklaying and stonemasonry</td>
<td>AS 3700:2001 <em>Masonry structures</em></td>
<td>SAI Global</td>
</tr>
<tr>
<td>Timber and steel framing</td>
<td>AS 1684:2006 <em>Residential timber-framed construction</em></td>
<td>SAI Global</td>
</tr>
<tr>
<td></td>
<td>NASH Standard: <em>Residential and low-rise steel framing Part 1 – Design criteria</em></td>
<td>National Association of Steel-Framed Housing</td>
</tr>
<tr>
<td>Cabinetry and joinery</td>
<td>HIA construction guide – Guide to kitchen and bathroom construction</td>
<td>Housing Industry Association</td>
</tr>
<tr>
<td>Electrical</td>
<td>AS/NZS 3000:2012 <em>Electrical installations (known as the Australian/New Zealand wiring rules)</em></td>
<td>SAI Global</td>
</tr>
<tr>
<td>Plumbing</td>
<td>AS/NZ 3500 <em>Plumbing and drainage</em></td>
<td>SAI Global</td>
</tr>
<tr>
<td>Concrete</td>
<td>AS 2870 <em>Residential slabs and footings</em></td>
<td>SAI Global</td>
</tr>
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</table>
Websites

- Association of Wall and Ceiling Industries <www.awci.org.au>
- Australian Institute of Architects <www.architecture.com.au>
- Australian Paint Manufacturers Federation <www.apmf.asn.au>
- Cement Concrete and Aggregates Australia (CCAA) <www.concrete.net.au>
- Cordell® Information <www.cordell.com.au>
- Housing Industry Association (HIA) <www.hia.com.au>
- Master Builders Australia <www.masterbuilders.com.au>
- National Association of Steel-Framed Housing <www.nash.asn.au>
- Rawlinsons Management Services Ltd <www.rawhouse.com>
- Think Brick <www.thinkbrick.com.au>

Common abbreviations

Throughout this guide you will come across some abbreviations. Below is a list of the most commonly used ones.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABCB</td>
<td>Australian Building Codes Board</td>
</tr>
<tr>
<td>APMF</td>
<td>Australian Paint Manufacturers Federation</td>
</tr>
<tr>
<td>AS</td>
<td>Australian Standard®</td>
</tr>
<tr>
<td>AWCI</td>
<td>Association of Wall and Ceiling Industries</td>
</tr>
<tr>
<td>BCA</td>
<td>Building Code of Australia</td>
</tr>
<tr>
<td>CCAA</td>
<td>Cement Concrete and Aggregates Australia</td>
</tr>
<tr>
<td>GBMA</td>
<td>Gypsum Board Manufacturers of Australasia</td>
</tr>
<tr>
<td>HIA</td>
<td>Housing Industry Association</td>
</tr>
<tr>
<td>HWU</td>
<td>Hot water unit</td>
</tr>
<tr>
<td>ISO</td>
<td>International Organization for Standardization</td>
</tr>
<tr>
<td>NASH</td>
<td>National Association of Steel-Framed Housing</td>
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<tr>
<td>NZ</td>
<td>New Zealand Standard</td>
</tr>
<tr>
<td>PCA</td>
<td>Plumbing Code of Australia</td>
</tr>
<tr>
<td>TAA</td>
<td>Tilers Association of Australia</td>
</tr>
</tbody>
</table>
Self-checklist

As you work through this guide you should return to this checklist and record your progress. Where you understand something and think that you can perform it ‘easily’, congratulations. Where your response is ‘with help’, revise the material in that section and/or discuss it with your lecturer or other learners in your group.

<table>
<thead>
<tr>
<th>30010 Apply knowledge of residential building processes and materials</th>
<th>I understand</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Element 1 Develop knowledge of residential building processes</strong></td>
<td></td>
</tr>
<tr>
<td>1.1 Identify processes associated with construction of residential buildings</td>
<td>Easily</td>
</tr>
<tr>
<td>1.2 Identify different trades and non-trade occupations commonly engaged in residential building industry</td>
<td></td>
</tr>
<tr>
<td>1.3 List the processes that occur in order to progress a typical residential building from initial client enquiry to contract completion</td>
<td></td>
</tr>
<tr>
<td><strong>Element 2 Develop knowledge of common residential building materials</strong></td>
<td></td>
</tr>
<tr>
<td>2.1 Identify materials in common use in residential buildings in local areas</td>
<td>Easily</td>
</tr>
<tr>
<td>2.2 Research general characteristics of these materials</td>
<td></td>
</tr>
<tr>
<td><strong>Element 3 Identify the order, basic characteristics and interrelationships in processes</strong></td>
<td></td>
</tr>
<tr>
<td>3.1 Develop an understanding of the basic characteristics of the processes and of how processes interrelate</td>
<td>Easily</td>
</tr>
<tr>
<td>3.2 Seek information on how long processes take and what could determine variation in time</td>
<td></td>
</tr>
<tr>
<td>3.3 Identify typical machinery and equipment required to complete or improve processes</td>
<td></td>
</tr>
<tr>
<td>3.4 Examine and follow documentation of examples of the timelines for a residential building project</td>
<td></td>
</tr>
</tbody>
</table>
About the icons

Note that not all icons may appear in this guide.

**Performance criteria**
This icon indicates the performance criteria covered in a section. The performance criteria contribute to the elements of competency that you must demonstrate in your assessment.

**Activity**
This icon indicates that there is an activity for you to do.

**Computer-based activity**
This icon indicates that there is an activity for you to do on the computer.

**Discussion**
This icon indicates that there will be a discussion, which could be with a partner, a group or the whole class.

**Research**
This icon indicates that you are to do a research activity using the internet, texts, journals or other relevant sources to find out about something.

**Case study**
This icon indicates that there is a case study or scenario to read.

**Think**
This icon indicates that you should stop and think for a moment about the point being made or the question being asked.

**Assessment task**
This icon indicates that an activity or task is part of your assessment.
Section 1 – Pre-construction: part 1

Introduction

A great deal of information and preparation is required before a builder can start constructing a house. When you have completed Section 1, you will understand what is involved in the first five processes of pre-construction:

- client–designer contact
- design brief
- survey
- design and documentation
- estimates.

Performance criteria

1.1 Identify processes associated with construction of residential buildings
1.2 Identify different trades and non-trade occupations commonly engaged in residential building industry
1.3 List the processes that occur in order to progress a typical residential building from initial client enquiry to contract completion
3.1 Develop an understanding of the basic characteristics of the processes and of how processes interrelate
3.3 Identify typical machinery and equipment required to complete or improve processes

Client–designer contact

In order to begin the design process the client is required to contact an architect, building designer or project home builder, who will draw up the drawings to a given brief and obtain the necessary approvals.

Different states and territories have different requirements as to who is qualified to carry out the design and prepare the required documentation for the construction of houses.
Design brief

Once the client has chosen a designer, a brief is prepared to ensure that both parties understand the requirements of the design, the extent of services the designer is to provide and the fees to be received for these services. Attached to the brief is the contract between the designer and client and also a program or timeline of when each stage will be completed.

Survey

When a site is purchased, a Certificate of Title is issued. It shows the location of the site as a parcel of land within the particular state/territory and locality, gives the lengths of the boundaries, lists the address and confirms the ownership.

The designer or builder needs more information than is shown on the Certificate of Title, and also a plan that shows the features. So a surveyor prepares a drawing called a site survey, which is a drawing of the site that shows all the features.

The site survey is used by:

- the designer, to ensure all features have been addressed in the design and documentation stage
- the builder, to carry out the construction within the boundaries and around any features that are to be kept or used.

Figure 1.1 shows an example of a site survey that shows the boundaries and main features of a site.
Figure 1.1: An example of a site survey drawing.
### Activity 1.1 The drawing

Here is a list of information that may be shown on a typical site survey drawing. Which of these things can you find on the site survey in Figure 1.1? Place a tick next to anything you can see.

<table>
<thead>
<tr>
<th>Location of the site</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Angles of the boundaries</td>
<td></td>
</tr>
<tr>
<td>Locations of the boundaries</td>
<td></td>
</tr>
<tr>
<td>Lengths of the boundaries</td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td></td>
</tr>
<tr>
<td>Levels of the land</td>
<td></td>
</tr>
<tr>
<td>Services, such as:</td>
<td></td>
</tr>
<tr>
<td>• power</td>
<td></td>
</tr>
<tr>
<td>• gas</td>
<td></td>
</tr>
<tr>
<td>• water</td>
<td></td>
</tr>
<tr>
<td>• sewer</td>
<td></td>
</tr>
<tr>
<td>• communication</td>
<td></td>
</tr>
<tr>
<td>Vegetation</td>
<td></td>
</tr>
<tr>
<td>Any existing structures</td>
<td></td>
</tr>
</tbody>
</table>

Can you identify any other information from the drawing? List anything else that you can see.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Design and documentation

The designer uses the brief to prepare sketches for the client to check whether the designer’s interpretation is correct. These are called the preliminary sketches, or client approval drawings, and they may be coloured and include a 3D view like the examples shown here.

When these drawings have been approved by the client, the documentation can proceed through the next five stages.

1. Drawings to be submitted for planning approval by the local council (if required).
2. Drawings to be submitted for building licence approval by the local council (mandatory).
3. Drawings to be submitted for the builder(s) to provide quotes on the cost of construction, called tender documents (unless the client has selected a project home builder).
5. Contract administration (the designer may not have been engaged to provide this service).

In most states and territories these stages of documentation can only be carried out by qualified personnel.
Apply knowledge of residential building processes and materials

Activity 1.2 Qualifications

What are the minimum qualification requirements in your state or territory for these stages of documentation, and what are the limitations (if any)?

Drawings submitted for planning approval by local council

Planning approval is confirmation from the local council that the use of the building is as per the zoning. The approval process has different names in different states and territories, and not all local councils require planning approval applications.

Activity 1.3 Approvals process

What is the name of the approvals process in your state/territory?

Your lecturer will choose a local council for you to research. Is the approvals process required by that council?
Drawings submitted for building licence approval by local council

In Australia, building licence drawings are mandatory. A building can’t be constructed unless permission has been gained from the local council.

Drawings for building licence approval are very detailed and they must comply with the provisions in the Building Code of Australia (BCA) and any additional requirements a local council may have.

Detailed information about the BCA will be provided in 30012 Undertake application of building codes and standards to residential buildings.

Most councils require a structural engineer to sign off on the drawings to ensure they are structurally sound and capable of carrying the loads of the roof down to the footings. Council may also ask for separate drawings from the structural engineer showing the details of the footings and floor structure.

Drawings submitted for tendering and builder selection

Tendering is the process of asking various builders to price the building of the house. The client then selects a builder based on the submissions received. If the client has selected a home project builder, the tendering process is not necessary.

Activity 1.4 Builder selection

The client may not necessarily select the builder who quoted the lowest price. What other factors might affect the client’s selection of the builder?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
The tender documentation is very detailed. Drawings for planning and building licence approval are at a small scale so that everything can be seen. On the tender drawings, details are drawn up at a much larger scale.

Figure 1.2: Small-scale drawings can show an entire house. Large-scale drawings are used for showing details, in this case a window.

**Specification document**

A specification document is also prepared, as not everything required in the house can be shown on the drawings.

**Activity 1.5 Specification document**

What are some items that would typically be included in a specification document?

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Contract administration

After the builder has been selected, a contract between the builder and the client is signed. The designer may not be included in this stage, as the client may wish to liaise with the builder directly.

Activity 1.6 Role of the designer

If the designer has been engaged by the client to be included in the contract administration stage, what would the designer's role be?

Estimates

An estimate is a prediction of the cost of building the house. Estimates use overall areas of spaces and apply square metre rates or costs to the areas of those spaces. The areas covered in an estimate are generally broken up into three types:

- the area of living space
- the area of external spaces, such as garages, carports, verandahs, porches and pergolas
- uncovered areas, such as landscaping, paving and driveways.

Each of these spaces will cost a different amount of money to build. For example, the living spaces will cost more than the driveway.

The client will have given the designer a budget, or maximum cost for the house. This cost usually includes all fees, including those of the designer, the engineer and the applications for approvals. To ensure the design stays within the budget, the designer prepares estimates during the various stages of documentation.

Estimates are calculated based on the designer’s own experience and the use of industry data sources such as:

- Rawlinsons Management Services Ltd
- Cordell® Information
- magazines with the latest construction costs.

For complex or unusual building projects, the designer may choose to engage an estimator who is qualified to carry out a more accurate estimate.
Activity 1.7 Estimate areas

Which three different spaces on the house below would an estimator calculate the areas of? Use different coloured highlighters to outline the three.

Estimates are dealt with in more detail in 30013 Carry out basic measurements and calculations for residential buildings, and 30015 Undertake basic estimation and costing from contract documents.
Section 2 – Pre-construction: part 2

Introduction
This section concludes our overview of the pre-construction processes, covering:

• registered building contractors
• subcontractors
• quotes
• contracts
• the construction program and scheduling.

Performance criteria

1.1 Identify processes associated with construction of residential buildings
1.2 Identify different trades and non-trade occupations commonly engaged in residential building industry
1.3 List the processes that occur in order to progress a typical residential building from initial client enquiry to contract completion
3.1 Develop an understanding of the basic characteristics of the processes and of how processes interrelate
3.4 Examine and follow documentation of examples of the timelines for a residential building project

Registered building contractors

Unless a person applies to the local council when submitting the building licence approval drawings to be an ‘owner builder’, all construction must be carried out by a registered building contractor, or builder.

The builder is the head contractor or main contractor, and all contact with the client or designer is through the builder.

Generally the builder will have on staff a carpenter and a labourer, depending on the size of the company.
Subcontractors

The subcontractors, such as the plumber and the electrician, are engaged by the builder. They generally don’t have direct contact with the client or designer – any queries are referred to the builder, who then contacts the client or designer for answers.

Quotes

A quote specifies the actual cost of building the house, and is obtained through tendering (unless a home project builder is being used).

We looked at tendering and builder selection in Section 1, where we learned that the client or designer requests quotes from various builders to ensure the best service and price. The builders’ quotes have to include not only all the requirements on the drawings and in the specification, but also what is needed to complete the project on budget and on time. This includes:

- materials
- labour
- equipment
- any special requirements such as additional storage, scaffolding, on-site toilets and so on.

The builder does not perform all the tasks on the construction of a house, but will subcontract some of the tasks to others. For example, the plumbing and electrical installation must be done by licensed tradespeople. As the builder also wants the best prices for this work, he or she requests several quotes from each of the different trades. The tradesperson (or company) that submits the best price and service becomes the builder’s subcontractor.

The final quote is broken down into all the trades to be involved in the construction of the house, along with the price and services the builder is going to provide.
Activity 2.1 Who quotes?

What are some of the trades you think the builder may invite quotes from?

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Contracts

A contract is an agreement between two or more parties. It sets out what each party is to provide and when it is to be provided. The following organisations provide standard building contracts:

- Australian Institute of Architects
- Home Building Business Centre
- Housing Industry Association
- Master Builders Australia.

Each state and territory also has contracts that are required by the regulations in that area.

Head contract

The contract to build a house is between the client and the builder, and is signed before the start of construction. It includes the price and at what stages in the contract the builder will get paid. It also includes when the builder will start and finish construction.

As the works required in the contract come to an end, the builder is required to ‘hand over’ the house to the client. This aspect of the contract will be dealt with in Section 18.

The designer may be named as the contact between the client and the builder if the client has engaged the designer to carry out this role.
Subcontracts

The builder also has a contract with each of the subcontractors who have been selected to provide a service. This agreement includes the price and the time expected to carry out the required tasks.

Construction program and scheduling

The construction program is not only about time. As well as setting out how long each task will take, it also specifies the materials, labour, equipment and money required to complete the tasks within the allocated time frame. The builder also produces schedules for items that have to be pre-fabricated or simply purchased and installed.

Schedules will be prepared for the:

- windows – number, size, type, materials, colour, security screen or flyscreen
- doors and frames – number, size, type, materials, colour, security screen or flyscreen
- hardware – eg door knobs, hinges and taps.

Scheduling out these items helps the builder to check numbers when purchasing, and to check the orders when they have arrived on site.

Subcontractors also prepare schedules to make purchasing easier, especially if the information is being gathered from the specification. For example, the plumber would have a schedule for:

- fixtures such as basins and toilets
- fittings such as taps and mixers.
### Activity 2.2 The construction program

Using the construction program given to you by your lecturer, select a trade and answer the following questions.

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<thead>
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<td>The subcontractor may have done several periods of work on site. Note what was done each time.</td>
<td>How many days was the contractor on site for each activity?</td>
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<td>How many days was the contractor on site in total?</td>
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Apply knowledge of residential building processes and materials
Section 3 – Construction: site preparation

Introduction

After the contract has been signed, the builder takes possession of the site. This means the insurance has been transferred from the client to the builder. The builder is now responsible for any damages or injuries that occur on the construction site, and as a result any visitors and tradespeople require permission from the builder to enter the site.

Generally the builder will carry out the construction of a house in the following sequence (variations to this sequence may occur with different builders).

Section 3 tracks the first three stages of construction:

- site set-up
- site works
- plumbing pre-lay.

Performance criteria

1.1 Identify processes associated with construction of residential buildings
1.2 Identify different trades and non-trade occupations commonly engaged in residential building industry
1.3 List the processes that occur in order to progress a typical residential building from initial client enquiry to contract completion
2.1 Identify materials in common use in residential buildings in local areas
2.2 Research general characteristics of these materials
3.1 Develop an understanding of the basic characteristics of the processes and of how processes interrelate
3.3 Identify typical machinery and equipment required to complete or improve processes
Site set-up

Site set-up means preparing the site for construction, and involves the following tasks.

Checking the boundaries

The builder will carry out what is called a re-peg to check that the pegs identifying the site boundaries are as per the site survey and have not been moved. On a complex site, the builder may engage a surveyor to do the re-peg.

Power supply

The builder pays for the electricity to the site during construction, and the supply comes from the power in the street to a temporary switchboard. The connection to this supply must be carried out by the local area supply authority in conjunction with a licensed electrician.

Activity 3.1 Power supply

What is the name of the authority supplying power to your state or territory?

Water supply

If a water meter is not already on site, then one must be installed. As with the power, the builder pays for the water used on site during construction. Tapping into the water supply in the street must be done by a licensed plumber in conjunction with the local water supply authority.

Activity 3.2 Water supply

What is the name of the authority supplying water to your state or territory?
Putting up the storage sheds and toilets

Secure storage is required on site for the builder’s materials and equipment, and a busy building site will need at least one toilet.

Subcontractors may also require storage sheds, so the builder needs to know the total number and size of storage sheds required. This has to be carefully planned to ensure that sheds and equipment do not conflict with the construction zone, including allowing enough working space and easy and safe access for all the activities that are to follow.

Site works

Most of the site works will be contracted out; however, the builder may carry out some of these tasks. The tasks involved are as follows.

Demolishing any existing buildings

Demolition requires approval from the local council. It must be carried out by a qualified demolition contractor as there will be environmental issues to be considered, such as:

- the type of rubbish involved
- whether the rubbish needs to be separated before removal
- which tip will accept the demolition rubble.

Apart from these environmental issues, the demolition contractor must also ensure that:

- all services have been disconnected
- dust is kept to a minimum
- the trucks carting the rubble away are covered.

It is also necessary to check whether any existing structures are heritage listed.
Removing vegetation

It is also necessary to check whether the vegetation is heritage listed, and whether approval to remove it is required from council. Removing vegetation falls into two categories.

1. Removing trees and shrubs. When the roots are removed the soil is left disturbed and weak, and must be compacted before building commences. This means using a compacting machine to make the soil hard and firm enough to build on.

2. Removing any surface vegetation or top soil. This is necessary because the foundation must be clean and free of any debris or organic matter.

Both these tasks are required under the BCA. Compaction is required to ensure that the foundation is able to carry the pressure or load of the house.

Activity 3.3 Site works

What trades and machinery/equipment would be used to carry out the site works?

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Levelling the site

If the site is sloping and the design requires the site to be flat, an excavator will be brought in to level the site. The most economical solution is to use the high side to fill the low side of the site, as shown in Figure 3.1. This is called the ‘cut and fill’ method. This way of levelling the site saves money, as there are no costs of carting any excess soil away or bringing soil in. Additional clean fill may be bought in to lay the slab on.

Figure 3.1: The cut and fill process for levelling a slope. The high side of the slope (A) is used to fill the low side (B). A 3D view of the completed cut and fill is shown at (C). A section through the cut and fill is shown at (D).
Setting out the footings of the house using the plans

Pegs with horizontal crossbars attached to them are driven into the ground at each corner of the house. String lines are tied to the crossbars to represent the outside face of the footings. The concreter or carpenter will carry out this task, which will be checked by the builder and/or the site manager.

Figure 3.2: Pegs and string lines mark the outside face of the footings.
Digging the trenches for the footings

The footings are the base on which the house is built – they carry the weight of the house above and transfer all the loads down into the ground.

Generally, footings are made from concrete that has been poured into a trench in the ground. As they are below the ground, the trenches are first made with a digger and later filled with concrete.

The BCA sets out the minimum sizes of footings. Footings will be looked at in more detail in Section 4.

Figure 3.3: The outside face of the completed trenches is level with the string lines.
Plumbing pre-lay

In the majority of house constructions, the only services under the floor are the waste pipes from sinks, basins, troughs, baths, showers, spas, washing machines, dishwashers and toilets. (These items are called plumbing fixtures, and will be dealt with in more detail in Section 13.) Laying the pipes in the ground under the floor is called the plumbing pre-lay. The plumbing pre-lay is carried out by a licensed plumber who is a subcontractor to the builder.

Materials

The sewer pipes in the ground are made from polyvinyl chloride (PVC), which comes in a variety of classes. Pipes being laid in the ground and so never to be exposed to the sun are of a different quality from pipes that are to be above the ground.

Different sizes are used to attach to different fixtures. For example, the pipes attached to the sink are smaller than those attached to the toilet.

Australian Standard® AS3500 sets out which type of PVC pipe is to be used where, as well as the minimum sizes.

Laying the pipework

Any plumbing fixtures requiring waste pipes in the ground are marked on the soil. They are located by measuring from the string using the dimensions given on the plan.

The plumber digs the trenches (by hand or with a digger) from the fixture to the outside of the house. The pipes are then laid in the trenches and covered over with soil, which must then be compacted.
Activity 3.4 Laying the pipework

Why does the soil over the pipes have to be compacted?

_________________________________________________________________________________________

_________________________________________________________________________________________

_________________________________________________________________________________________

_________________________________________________________________________________________

Figure 3.4: Trenches are dug for the pipes. Pipes are laid in the trenches and covered with soil, and the soil is compacted. After the floor has been laid, the pipes installed in the plumbing pre-lay will appear above the slab.
Activity 3.5 Plumber required?

Which items on this floor plan would a plumber have to connect? Use a highlighter to identify them.

List the fixtures that you highlighted on the plan.

1. 
2. 
3. 
4. 
5. 
6.
Section 4 – Construction: footings

Introduction

Footings are the base on which the house is built – they carry the weight of the house above and transfer all the loads down into the ground. On completion of the site works, the footings are laid in the trenches.

The majority of footings in house construction around Australia are made from concrete. Concrete footings are a continuous strip of concrete around the perimeter of the house, under the external walls. Because they are below ground, the footings are not seen once construction is finished.

The external wall is built on top of the footings, and the edge of the concrete slab also rests on the footings. This arrangement will be looked at in more detail later in this unit. Houses built on timber or steel stumps are covered in units not included in this program.

Performance criteria

1.1 Identify processes associated with construction of residential buildings
1.2 Identify different trades and non-trade occupations commonly engaged in residential building industry
1.3 List the processes that occur in order to progress a typical residential building from initial client enquiry to contract completion
2.1 Identify materials in common use in residential buildings in local areas
2.2 Research general characteristics of these materials
3.1 Develop an understanding of the basic characteristics of the processes and of how processes interrelate
3.3 Identify typical machinery and equipment required to complete or improve processes

Materials

A variety of materials can be used as part of the footings, depending on the site conditions and the type of building.
Reinforcement

Reinforcement used for footings comprises round steel bars, either in the form of single rods or as rods welded together in two directions to make a mesh. These are placed within the concrete to make it stronger. Both the single rods and the mesh come in different sizes or diameters. The larger the diameter of the bars, the stronger they are. This steel reinforcement enables the concrete to carry heavier loads.

The BCA sets out the amount and size of the reinforcement required in footings.

Although steel is strong and makes concrete even stronger, it is only a durable or tough material if it is protected from rusting. If the steel in concrete comes in contact with water it will start to rust, and as it rusts it expands and pushes the concrete away, leaving even more steel exposed to water.

When the rust on steel within concrete continues to grow, it is called 'concrete cancer'. The concrete in the footings must cover the steel by an amount specified in the BCA to stop rust occurring.

Reinforcement bar chairs

To stop the steel reinforcement from touching the soil, getting wet and rusting, it is raised up off the ground on reinforcement chairs.

Once the reinforcement is in the correct position on the chairs, it has to be checked to ensure that it’s in place as per the engineer’s drawings.

These chairs come in a variety of shapes, sizes and materials, such as plastic, concrete and steel.
Concrete

Concrete is made up of four components:

- cement – a fine grey powder
- sand – must be clean and must not contain leaves, twigs or rubbish
- aggregate – small rocks 20 mm in diameter as required by the BCA
- water – clean and drinkable.

The amount of each of the above ingredients determines the strength of the concrete. The proportions of ingredients required for the concrete mix used in house footings are specified in the BCA.

Concrete is a strong material, and the reinforcement makes it stronger. It’s also a very durable or tough material, and isn’t affected or damaged by:

- erosion – it’s not worn down by rain, wind or sea salt in the air
- termites
- the sun or UV light.

Additionally, concrete is fire resistant.

Activity 4.1 Footings

Label the footing drawing below.
Building the footings

There are five steps in the process of building the footings.

**Step 1: Lay the reinforcement**

The trenches were made by a digger before the plumbing pre-lay. It’s generally trench mesh reinforcement that gets used in house footings.

The reinforcement bar chairs are placed in the bottom of the trench on the ground, and the reinforcement is then laid on top of the chairs. The amount of concrete required between the reinforcement and the ground underneath is specified in the BCA. Because the reinforcement and concrete are placed on the ground next to the soil, the BCA refers to this as ‘unprotected ground’.

The concrete contractor will lay the trench mesh.

**Step 2: Pour the concrete**

A concrete mixer delivers the concrete. The mixer is continually turning to ensure the ingredients do not become segregated. When the concrete arrives at the site it will be pumped or poured from the mixer into the trench. The concrete subcontractors pour, compact and finish the concrete.

**Step 3: Compact the concrete**

While the concrete is being poured into the trenches it is being ‘worked’ by the concrete workers. They are constantly moving it with shovels and long rods to ensure that it gets around the reinforcement and into the corners of the trenches. This is called compacting, and it also expels any air pockets, making the concrete more dense and therefore stronger.
Step 4: Finish the concrete

Finishing the concrete means levelling out the top to the required height. This can be a time-consuming process, because it’s important that the concrete is level in all places.

Step 5: Cure the concrete

Curing the concrete means allowing it to set and harden. The concrete cannot carry any loads until it has completed hardening.

Activity 4.2 About concrete

Go to the Cement Concrete and Aggregates Australia website at www.concrete.net.au.
Go to Concrete Structures > Residential > Concrete Basics, and answer the following questions.

What are aggregates?

________________________________________________________________________
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Why can’t seawater be used to make concrete?

________________________________________________________________________
________________________________________________________________________
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________________________________________________________________________
Apply knowledge of residential building processes and materials

Why is a ‘slump test’ carried out?

_____________________________________________________________

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Why is concrete compacted?

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_____________________________________________________________
Section 5 – Construction: floors

Introduction

In Australia, the most common material used for floors in single-storey houses is concrete, and it is generally referred to as a concrete slab. (Timber floors on timber or steel stumps are not dealt with in this program.)

In this section, the ‘floor’ we are referring to is the structural floor – that is, the material used to carry the weight of all the loads such as the internal walls, people and furniture. We are not referring to the finishes applied, such as carpet, tiles or timber, as these will be dealt with in a later section.

Performance criteria

1.1 Identify processes associated with construction of residential buildings
1.2 Identify different trades and non-trade occupations commonly engaged in residential building industry
1.3 List the processes that occur in order to progress a typical residential building from initial client enquiry to contract completion
2.1 Identify materials in common use in residential buildings in local areas
2.2 Research general characteristics of these materials
3.1 Develop an understanding of the basic characteristics of the processes and of how processes interrelate
3.3 Identify typical machinery and equipment required to complete or improve processes

The slab

Materials

There are several tasks to be carried out before the slab is poured, and these all use different materials.

Formwork

Because concrete is a liquid, it has to be contained. Formwork is erected around the perimeter of the slab as a container, and is then removed once the concrete has set. Timber is generally used for this.

The top of the formwork will be the top of the slab.
Termite barriers

The BCA requires all houses be treated to deter invasion by termites. There are two types of termite barriers: physical and chemical. Physical barriers can include steel mesh and graded stone particles. Chemical barriers, which require licensed operators, involve using chemicals in the soil.

Waterproof membrane

Because concrete is not waterproof, without a waterproof membrane water would seep through the slab and into the house, causing tiles to pop off and carpet and timber to get mouldy and give off a musty smell. To avoid this happening, a waterproof membrane – usually a thick plastic sheet – is laid under the slab.

The types and thicknesses of waterproof membranes are specified in the BCA under ‘Vapour barriers’.

Reinforcement

The BCA specifies that mesh-type reinforcement must be used in house slabs. The diameter of the bars varies according to the slab length and soil type. For example, clay soils move, therefore a larger-diameter bar must be used in the mesh.

Reinforcement bar chairs

The slab mesh, like the reinforcement in the footings, is also laid on bar chairs, even though there is a waterproof membrane under the slab. The BCA refers to the cover required to the reinforcement over a waterproof membrane as ‘protected ground’.
Activity 5.1 Reinforcement bar chairs

Why is the reinforcement placed on top of bar chairs?

Concrete

The concrete for the slab is the same as described in Section 4 for the footings.

Activity 5.2 Concrete mixers

Why is the mixer on a concrete truck continually turning? What would happen if it stopped?

Preparing for the slab

Sand pad

The foundation for the slab is prepared as described in Section 3.

Termite treatment

Most termite treatments are only installed around the perimeter of the house, although there are treatments that can act as a continuous barrier under the slab for additional protection against termites.

If the client had requested a continuous barrier under the slab, this work would be carried out at this stage. This work is done by specialist subcontractors, because it's generally only guaranteed by the manufacturer if an accredited installer carries out the termite treatment.

Formwork

The formwork is usually installed by the concrete contractor. It is held in place with timber or steel pegs. The formwork is removed once the slab has set.
Waterproof membrane

After the formwork has been put up the membrane is laid on the ground. Some builders will carry it up to the sides of the formwork, while others will terminate it at the base of the formwork and treat the slab edge with pargeting, as shown in Figure 5.1.

Reinforcement

The mesh-type reinforcement is now laid out on top of the membrane, on top of the chairs, at the height required by the BCA or as per the engineer’s details. This ensures it has the correct amount of cover or concrete underneath, on the sides and on the top.

Once these tasks have been completed, the concrete can be poured. The builder would order the concrete in advance, and provide the required specifications for the mix to the concrete company.
Concrete

The concrete subcontractor will pour, compact and finish the concrete.

Figure 5.2: A section showing where the reinforcement is positioned.
Activity 5.3 Compacting the slab

How is the concrete compacted?

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__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

Why is the concrete compacted?

__________________________________________________________________________
__________________________________________________________________________
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Activity 5.4 Finishing concrete

Go to the Cement Concrete and Aggregates Australia website at www.concrete.net.au.
Go to Concrete Structures > Residential > Concrete Basics, and answer the following questions.

1. List what you need to tell the concrete supplier when ordering premixed concrete.

2. Finishing takes place in two stages. What are they?
3. Why is concrete cured?

4. How long should you cure concrete for, to make it stronger and more durable?

5. Name two defects that can occur in concrete, and explain the cause of each.
   Defect 1:
   Cause:
   
   Defect 2:
   Cause:
Section 6 – Construction: walls

Introduction

There are many different styles and materials used for walls in house construction across Australia, but the three most common wall types are:

- full masonry
- brick veneer
- timber or steel frame.

In all three wall types the window and door frames are built into the walls during construction.

Clay bricks are the most common material used for the brickwork in full masonry walls, while brick veneer and timber or steel is used in brick veneer and framed construction.

Performance criteria

1.1 Identify processes associated with construction of residential buildings
1.2 Identify different trades and non-trade occupations commonly engaged in residential building industry
1.3 List the processes that occur in order to progress a typical residential building from initial client enquiry to contract completion
2.1 Identify materials in common use in residential buildings in local areas
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3.3 Identify typical machinery and equipment required to complete or improve processes
Full masonry walls

Full masonry walls are two brick walls parallel to one another with a gap between them called a cavity. Each wall is called a ‘leaf’ of brickwork.

The internal leaf generally holds up the roof, and the external leaf is a veneer creating the cavity between the two leaves. Each horizontal layer of bricks is called a course.

Figure 6.1: The cavity between the external leaf and the internal one protects the internal leaf from moisture. The slab and any internal finishes such as plaster, touch the internal leaf.
Materials

Bricks

Clay bricks come in many different sizes, shapes and colours. When selecting bricks we need to consider which of the two categories of brickwork they will be used for:

1. face – the bricks will be seen
2. hidden – the bricks will be covered with render or plaster and will not be seen.

Brickwork is a strong and durable material. Bricks, like concrete, are not affected by termites and are fire resistant, although the capacity to resist fire varies with brick types. Brick manufacturers provide information sheets on the different types of bricks to ensure the correct selection is made to suit the application and environment.

Bricks are ordered by the builder, and delivered to the site on a truck in pallets. Once they’re unloaded with a forklift they are located around the site in places convenient for the bricklayer.

Mortar

Mortar is used to ‘glue’ the bricks together, and is made of a mixture of:

- cement
- lime
- sand
- water.

The amount of each of these ingredients is dependent on the environment. A more durable mix is required in coastal areas where there is a high content of salt spray in the air.

Mortar can be coloured with additives included in the mix, to either blend in with the brick colour or become a feature by being a very different colour.

Activity 6.1 Mortar mix

Go to the Cement Concrete and Aggregates Australia website at www.concrete.net.au.
Go to Concrete Structures > Residential > Mortar Mixes for Masonry, and answer the question below.

Determine the mortar mix you would need to use for brickwork in your area.
Brick ties

Brick ties are metal or plastic straps that are laid in the horizontal mortar joints in the brickwork across both leaves. They connect the outside leaf to the inside leaf.

The metal ties are galvanised to prevent rusting as specified in the BCA. The BCA also specifies the strength grade of the plastic ties.

They are used to hold the outside leaf, which is only a veneer, to the inside leaf.

![Diagram of brick ties](image)

**Figure 6.2:** Brick ties in some of the horizontal mortar joints connect the outside and inside leaves.

Accessories

**Lintels** hold up the brickwork over windows and doors. They are made of steel, concrete or brickwork. Steel lintels must have a protective coating as specified in the BCA, such as galvanising to prevent rusting.

**Flashings** are used around openings when the cavity has been bridged. They stop water from getting to the inside leaf. They are made of reinforced plastic or bitumen-coated aluminium.

Building full masonry walls

All the materials required for the job are ordered and paid for by the builder. The bricks are delivered to the site on a truck, bound in bundles on pallets, and unloaded on to the site with a forklift.
A new string line is set up around the outside of the house where the bricks are to be laid, and as the wall gets higher the string line is raised. A steel or timber coursing rod is also set up at each corner – this has the height of each course marked on it to ensure it's laid to the correct height.

The bricklaying company will have a team of qualified bricklayers and perhaps an apprentice.

The mortar is prepared in a mixer and is carried from the mixer in a wheelbarrow to the bricklayer.

The first course of brickwork is laid on the footing. A bricklayer's trowel is used to put the mortar on the bricks.

The joints between the bricks can be various styles – they can be flush with the bricks or raked out before the mortar dries out.
Figure 6.3: A completed masonry wall consisting of internal and external leaves and a cavity between them. A wall plate is strapped to the internal wall before the ceiling joists go up.
Activity 6.2 Types of joints

Go to the section on joints. Draw and label the different types.
Brick veneer walls

Brick veneer walls are two walls parallel to one another. The external wall is a leaf of brickwork and the internal wall is a timber or steel stud frame with a lining on the inside.

A cavity is still required to stop any water that has passed through the external brick wall getting to the framed wall.

Figure 6.4: In a brick veneer wall the brickwork sits on the footing, and the interior frame sits on the slab. A cavity between the external wall and the frame protects the frame from moisture. The slab and any internal finishes, such as plaster, touch the internal frame.
Materials

Bricks
Refer to full masonry walls.

Mortar
Refer to full masonry walls.

Brick ties
Brick ties are still required in brick veneer walls, because the external leaf needs to be tied to the internal wall for stability. The roof is tied to the internal wall, which makes it stable.

These ties are metal and galvanised.

![Diagram of brick ties](image)

**Figure 6.5:** Brick ties in some of the horizontal mortar joints connect the outside leaf to the internal frame.

Accessories

**Lintels** for brick veneer walls are the same as for full masonry walls in the outside leaf; however, the timber or steel studs over windows and doors are supported on timber lintels in the inside framed leaf. They can be solid timber or laminated veneer lumber (LVL).

**Flashings** for brick veneer walls are the same as for full masonry walls.
Timber

Solid timber is used to build the internal frame, and must be treated against termites and weathering. There are different levels of treatment against weathering, according to the amount of exposure. Seasoned timber should be used, as it doesn’t shrink or warp like unseasoned timber does as it’s drying out.

The required sizes and stress grades of the timber members are specified in the span tables of Australian Standard® AS 1684:2006 Residential timber-framed construction. Generally stress-grade MGP10 is used and a stud size of 90 × 35 at 450 centres. To use the standards, the names of the timber members need to be known.

As most treated timber contains copper, compatible metal fixings must be used. This includes nails, screws and any prefabricated timber connectors – particularly if they are going to be exposed to any moisture.

Steel

Steel studs come in a variety of section shapes. They can be channels, ‘C’ sections or ‘Z’ sections. Steel should have a protective coating to prevent rusting; generally this is zinc or aluminium/zinc. Span tables are available from the various manufacturers to determine the size and spacing of the studs.

Self-tapping and pop rivets are the most popular fixings; however, there are also prefabricated systems available provided with lug connectors.
Activity 6.3 Steel frames

Go to the National Association of Steel-Framed Housing (NASH) website at www.nash.asn.au. Go to Publications > General Guide to Steel-Framed Building.

Research the benefits of steel-framed buildings and list them below.

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Insulation

Brick veneer houses must be insulated in accordance with the BCA. The insulation comes in two types:

- bulk – there are many products available made out of a variety of materials; the thickness depends on the grade of insulation required (R value)
- foil – these are generally a mesh of plastic or woven plastic laminated to an aluminium foil sheet.

The type selected is governed by the client’s choice and the requirements in the BCA.

Building brick veneer walls

The internal frame wall, whether it is steel or timber, is erected first. It’s fixed to the edge of the slab in the same location as the internal leaf of brickwork is in full masonry.

The builder engages a team of carpenters as subcontractors to erect the timber frame.

Figure 6.6: The internal frame wall of brick veneer sits on the slab.
If the internal wall is steel, the builder has three choices.

- Engage a subcontractor from a steel frame fabricator to supply and install.
- Have the material delivered under the head contract and have steel framing fixers erect the frame.
- Have the steel frame delivered cut to lengths and have a team of either carpenters or steel frame fixers erect the frame.

If foil insulation is being used, then it’s fixed to the studwork prior to the bricks being laid. As bulk insulation is not water resistant, it’s not installed until the roof has been erected and the services are roughly complete, but before the internal wall lining is fixed.

All the brickwork is laid as for full masonry construction, including the 50 mm cavity between the two leaves.

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**Figure 6.7:** When foil insulation is used the brick tie is face fixed to the stud. The footing shown here is not always required. In some soil types the two walls can sit on the edge of the slab.
Activity 6.4 Veneer walls

In Section 3.2 Veneer walls, Figure 11 is a drawing of the footing, slab and wall connection. The walls are sitting on the slab edge.
Redraw Figure 11 below and label each part.
Section 6 – Construction: walls

Framed walls

Framed walls are a single wall only and can have a variety of cladding materials applied to the external face and generally have plasterboard on the inside. The frames for brick veneer construction can be steel or timber.

Materials

Timber

Refer to Brick veneer walls.

Steel

Refer to Brick veneer walls.

Insulation

Refer to Brick veneer walls.

Accessories

Refer to Brick veneer walls.

Bracing

Framed houses have to be braced from the force of the wind, and the braces can be steel straps or sheets of plywood. Steel bracing for timber framing is a prefabricated steel angle that doesn’t have to be treated against rust because it’s fully enclosed by the external and internal cladding.

Steel bracing in steel framing can be a channel, ‘C’ or ‘Z’ section.

Plywood is layers of fine timber that has been shaved off a log while it is turning. The layers are glued together with the grain in opposing directions to form strong sheets of timber up to three metres in length and of varying widths.
External wall claddings
The most common cladding types are as follows.

Timber weatherboard
All timber boards must be sealed with oils or paints to provide protection against the elements. All wood other than cedar must also be treated against termite attack. Although timber does not rust, care needs to be taken when choosing metal fixings, as steel does rust and will leave stains on the timber.

Fibre cement
Fibre cement is a very durable material. It is resistant to:

- water
- fire
- termite attack
- UV light
- salt.

Fibre cement also improves the thermal and acoustic properties of a framed house.

Profiled metal sheeting
The base material in metal sheeting is steel, and this is supplied pre-finished with a zinc (or combination of zinc and aluminium) coating. It can also be purchased with a paint finish for additional protection and aesthetics. As dissimilar metals have a chemical reaction when exposed to air and water, the fixings must be compatible with the base metal and coatings to avoid corrosion.

Building framed walls
The works for a framed wall house are the same as for the framed wall described in brick veneer construction, except for the inclusion of bracing and an external cladding.

Bracing is installed at the corners of the house, and the amount of bracing is determined using the calculations in Australian Standard® AS 1684:2006 Residential timber-framed construction.

Steel bracing straps are installed at 45 degrees with minor variations also specified in AS 1684 to cater for window and door openings. The bracing in steel framing is set between the studs.

If steel bracing is used in a timber frame, a saw cut is made on the face of the studs, trimmers and plates that it passes over, and one leg of the angle is pushed into the cut.
If plywood is used for the bracing, full-height sheets are fixed to the top plate, bottom plate, studs and trimmers.

Note the bracing in the steel-framed and timber-framed structures shown here.

The slab edge is a different detail, to ensure that water does not seep between the bottom plate and the concrete slab into the house.

Figure 6.8: A frame on a slab. Note the shape of the slab edge, designed to ensure that water does not seep between the bottom plate and the concrete slab into the house.
After the foil insulation is fixed onto the studs (if bulk insulation is not being used), the external wall cladding can be installed by an experienced carpenter.

The builder may choose to put on the wall cladding at this point or wait until the roof is finished, but in either case a carpenter will fix the cladding onto the studs after the reflective foil has been installed (if bulk insulation is not being used).

Figure 6.9: Insulation and cladding is fixed to the frame.
Activity 6.5 Framed wall

The detail under a single framed wall does not require a footing in some soil types, only a thickening on the slab edge.

Draw a detail below and label it.
Apply knowledge of residential building processes and materials
Section 7 – Construction: ceiling frame

Introduction

After the walls have been erected, the ceiling frame goes up and is fixed to the top of the walls on a timber plate. Shown here are some types of ceilings that you may have seen.

Figure 7.1: A coffered ceiling.  Figure 7.2: A raked ceiling.

Figure 7.3: A flat ceiling.

The most common ceiling type used in Australian homes is the flat ceiling. Flat ceilings provide a cavity between the ceiling and the roof finish. This void naturally provides insulation from the intense heat and is improved by installing additional insulation, which is a compulsory requirement under the BCA.

In colder climates the roof is also insulated, to keep the heat generated inside the house from escaping up into the roof space.

In this guide we will look at fixing the ceiling frame to the top of the internal leaf in full masonry construction. In the other wall types it would be fixed to the top of the timber wall.
In our example the ceiling frame is a horizontal timber frame, called ceiling joists, sitting on top of the walls and lined with plasterboard. After the plasterboard has been installed under the ceiling joist, the height of the ceiling is just over 2400 mm, which is the minimum ceiling height specified in the BCA and is the most common height in Australian housing.

Performance criteria

1.1 Identify processes associated with construction of residential buildings
1.2 Identify different trades and non-trade occupations commonly engaged in residential building industry
1.3 List the processes that occur in order to progress a typical residential building from initial client enquiry to contract completion
2.1 Identify materials in common use in residential buildings in local areas
2.2 Research general characteristics of these materials
3.1 Develop an understanding of the basic characteristics of the processes and of how processes interrelate

Materials

Timber

Because pine is used for ceiling joists, it’s recommended that they are treated against termite attack. The ceiling joists are usually 90 × 45 MGP10 as specified in AS 1684 for a span of 2400 mm or less.

Other timbers may have to be used to give additional support to the ceiling joists. These may be manufactured timbers or engineered timber products, as opposed to using large sections of expensive natural timber.

Activity 7.1 Types of engineered timber

Go to Technical Manual > Material Use > 5.9 Lightweight Timber and examine the different products shown under Structural Capability.

All the nails and screws and any connectors used must be compatible with the termite treatment that has been impregnated into the timber.

Plasterboard

Plasterboard will be dealt with in Section 12 – Construction: linings.
Building the ceiling frame

The house plan shown here will be used by your lecturer to demonstrate the construction of the ceiling frame.

Figure 7.4: A floor plan for a house. This section will refer to this house plan as an example.
Activity 7.2 Building the ceiling frame

Your lecturer will describe the stages of building the ceiling frame. Label each of the diagrams below as the stages are discussed.

1. In full masonry, the wall plate is tied down to the wall. In a brick veneer or framed wall it is fixed to the studs as the wall is built.
2. Ceiling joists shorter than 2400 mm in length are put up and fixed to the wall plate.

3. Ceiling joists over the living and dining room are over 2400 mm long and cannot go up until additional support is provided.
4. A hanging beam is put up to reduce the span of the ceiling joists.

5. Ceiling joists can be hung from the hanging beam with connectors made of metal. Label all of the items in the drawing, using arrows to indicate their location.
Activity 7.3 Load-bearing walls and the slab

The walls that the hanging beam is sitting on have become ‘load bearing’.
The slab had to be thickened under the wall between the living/dining room and the bedroom, and also under the wall between the living room and the bathroom/laundry.
Draw the slab thickening detail in the space below.
Apply knowledge of residential building processes and materials
Section 8 – Construction: roofs

Introduction

There are many different types and shapes of roofs, but the actual construction always falls into one of the following two categories:

• a ‘stick’ frame, where each member is cut on site
• a trussed roof, where sections of the roof are assembled in a workshop and then put together on site.

Either category can be constructed of timber or steel.

Once the construction principles for a simple roof are understood, they’re transferrable to any roof type.

Performance criteria

1.1 Identify processes associated with construction of residential buildings
1.2 Identify different trades and non-trade occupations commonly engaged in residential building industry
1.3 List the processes that occur in order to progress a typical residential building from initial client enquiry to contract completion
2.1 Identify materials in common use in residential buildings in local areas
2.2 Research general characteristics of these materials
3.1 Develop an understanding of the basic characteristics of the processes and of how processes interrelate
Materials

Timber

Although the roof timber is protected from the elements and therefore not susceptible to rot, it is still vulnerable to termite attack. Therefore, treated timber is recommended.

The most common size for rafters is 120 × 35 at 900 centres for a metal roof, and the same size for a tile roof but with the centres at 600 because tiles are heavier. This size rafter as specified in AS 1684 has a maximum span of 3000 mm.

The size of the timber used depends on five considerations:

• span – the distance between the supports
• weight of roof finish – for example, tiles are heavier than metal
• wind category – N1, N2, N3 or cyclonic
• how close the members are to one another, called the spacing or centres
• whether it’s a coupled or non-coupled roof.

Figure 8.1: The weight of the roof finish affects the size of timber required. For example, a tiled roof finish (A) is heavier than a metal roof finish (B).
Figure 8.2: A coupled roof (A) and a non-coupled roof (B). Note the collar tie running between the two halves of the coupled roof.

**Fixings**

All fixings must be compatible with the chemicals used in the treatment of the timber. Some treated timbers contain copper, which means that steel nails can’t be used because the copper will eventually corrode the steel.

Any prefabricated connectors also need to be compatible with treated timber.
Building the roof

The house plan shown here will be used to demonstrate the construction of a roof. We will assume that the rafter in the roof construction described has a maximum span of 3000 mm.

![FLOOR PLAN](image)

*Figure 8.3: A floor plan for a house. This section will refer to this house plan as an example.*

We will also assume that this house has a hip roof. A hip roof slopes up from the external walls to the highest point, called the ridge. Additionally, with a hip roof:

- the hips are at 45 degrees in plan from the external corners
- the slope varies, and is called the pitch.

A tiled roof needs to have a steeper pitch than a metal roof. You’ll learn more about the properties of roof finishes and how the pitch relates in Section 10 – Construction: roof finishes.
Activity 8.1 Parts of a roof

The finish on the roof covers the timber frame. Label the roof components as seen with the roof finish on.
Activity 8.2 Parts of a roof frame

The roof frame is supported on the walls; in full masonry and brick veneer the inner leaf of the external walls supports the roof.

Label each of the roof members as seen here without the roof finish on.
Activity 8.3 Building a timber roof

Your lecturer will describe the stages of building the roof. Label each of the diagrams below as the stages are discussed.

The wall plate has already been installed and the ceiling joists are fixed to it. In the diagrams below, the ceiling joists have been removed for clarity.

1. The ridge board is propped up.
2. The common rafters are put up and fixed to the ridge board and wall plate.
3. The collar ties are put up, fixed to each opposing rafter.

4. The hip and jack rafters are fixed to the wall plate, the ridge board and each other.
5. The creeper rafters are fixed to the hip and wall plate.

The roof battens are put up next. The size and spacing will depend on the roof finish, and will be discussed in Section 10 – Construction: roof finishes.
Activity 8.4 Tie-down on a full masonry wall

The wall plate in full masonry constructions sits on top of the internal leaf of brickwork. Draw and label a detail below of the tie-down on a full masonry wall.
Apply knowledge of residential building processes and materials
Section 9 – Construction: services rough-in

Introduction

While the walls are still open it’s easy for the service pipes, including plumbing, electrical wiring, gas pipes and communication cables, to be installed but not connected. This is called the ‘services rough-in’.

During the services rough-in the tradespeople (or builder’s subcontractors) do the preliminary installation of pipes and cables for all the services such as water, electricity, communication and gas. Remember that the sewer or waste pipes have already been laid under the slab during the plumbing pre-lay.

Several activities will start to overlap as the main structure is completed. At this stage:

• the roof finish can now be installed
• the external wall cladding on framed construction can be fixed
• any render on the external face of full masonry (and brick veneer if specified) can be done
• the front door can be installed
• installation of windows can be completed.

All of these activities are called ‘closing up’ or ‘preparing for lock-up’. When completed, the house will be secure and waterproof.

Performance criteria

1.1 Identify processes associated with construction of residential buildings
1.2 Identify different trades and non-trade occupations commonly engaged in residential building industry
1.3 List the processes that occur in order to progress a typical residential building from initial client enquiry to contract completion
2.1 Identify materials in common use in residential buildings in local areas
2.2 Research general characteristics of these materials
3.1 Develop an understanding of the basic characteristics of the processes and of how processes interrelate
3.2 Seek information on how long processes take and what could determine variation in time
Services

Plumbing

All the plumbing work can only be carried out by a licensed plumber in accordance with AS 3500 and any local authority requirements.

Water supply

Earlier in the construction process, a copper pipe was laid underground from the water meter to the house. This pipe rises up inside the cavity to the roof space above the ceiling in full masonry and brick veneer walls, but in framed wall construction it rises up to the ceiling space between the studs and is fed through holes in the noggings. The size and number of holes allowed in the noggings is specified in AS 1684.

Copper is used for this piping, because it doesn’t rust and can’t be damaged by termites. The pipework inside the house can also be approved plastic. The required depth of the pipe in the ground is specified in AS 3500.

The water supply pipework is reticulated in the ceiling space on top of the ceiling joists to each of the walls that will have a fixture attached, such as a basin, sink, trough, bath, shower, hot water unit or toilet.

In full masonry the pipes are chased into the brickwork down to the fixture and terminated, ready to receive the taps at a later stage. The pipes in brick veneer or framed construction are fed down to the future tap location between the studs and through the noggings in accordance with AS 1684.

The same process is followed to take water from the hot water unit to the fixtures. All hot water pipes must be insulated, as specified in the BCA.

Water supply from rainwater tanks and recycling water

This topic is dealt with in 30014 Apply principles of sustainability in residential building practices.

Gas supply

The gas is also supplied in copper pipes and the same process as for the water supply is carried out to get the gas to the fixtures specified, which may include a hot water unit, oven, stove and heating unit.
Activity 9.1 Water requirements

Some fixtures require hot and cold water but others only require a cold water supply. Using a red pen for hot water and a blue pen for cold water, mark with a cross the water supply requirements on the fixtures in the plan below.

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Electrical work

All the electrical work can only be carried out by a licensed electrician, in accordance with AS/NZS 3000 and any local authority requirements.

Earlier in the construction process, the electricity supply in the street was connected to the meter box for the house.

Now cables are run from the meter box for electrical power and lighting up inside the walls, and reticulated in the roof space using the same process as for the plumbing. Power may also be required to the hot water unit, oven and stove.

Drawings have been prepared showing where the power points are to be located, as well as the lights and the type of lights.
The wiring is drawn through to the final locations for all the required points, but the power is not connected yet. This will be done after the wall and ceiling finishes have been completed.

Communication

Telephone

The telephone cabling comes from the street and runs underground to the house, and is then reticulated through the ceiling and walls to the phone connection points. Only tradespeople with appropriate accreditation are permitted to install telephone cabling.

Other

Other communication requirements may include wiring for cable television or digital and internet services. These are installed by specialised subcontractors.

Activity 9.2 Lighting requirements

Prepare a lighting layout on the plan below, including the link between the lights and light switch. Use small circles to indicate the lights and a dotted line from the light to a cross on a wall to indicate the light switch.
Section 10 – Construction: roof finishes

Introduction

On a well-supervised site, the roof can be installed at the same time as the services rough-in is being done. The external wall linings on a framed house can also be applied at this point.

In this section we’ll look at the activities carried out by the roofer who will be putting on the roof finish, which could be tiles or metal.

Performance criteria

1.1 Identify processes associated with construction of residential buildings
1.2 Identify different trades and non-trade occupations commonly engaged in residential building industry
1.3 List the processes that occur in order to progress a typical residential building from initial client enquiry to contract completion
2.1 Identify materials in common use in residential buildings in local areas
2.2 Research general characteristics of these materials
3.1 Develop an understanding of the basic characteristics of the processes and of how processes interrelate
3.3 Identify typical machinery and equipment required to complete or improve processes

Materials

The two most common roofing materials are tiles and lightweight sheet metal. Both provide the waterproofing requirements but each has different properties.

Tiles

Tiles are small interlocking units of various sizes that are made of clay or concrete. They come in a large range of colours and styles, and they can be smooth, rough, shiny or matte.

Clay tiles do not require a finish, because although they absorb a little moisture it is not enough to penetrate through the tile in normal rainfall.

As concrete does absorb moisture, concrete tiles must have a finish applied. This finish is a baked glaze that’s available in a variety of colours.
Sheet metal

Sheet metal roofing comes in a variety of profiles, colours and finishes. The base metal is steel, although in extreme marine or high-pollutant areas stainless steel may be used.

For added protection and aesthetics, finishes are applied to the base metal. These finishes can be:

- a mixture of zinc and aluminium
- a sophisticated sprayed paint finish available in two thicknesses
- both of the above, with the zinc/aluminium coating under the paint finish.

The materials used for the screws must be as specified by the manufacturer to avoid corrosion from dissimilar metals, as must the fixing method such as sheet overlap with rubber washers between the screw head and metal.

Any penetrations through the roof – for vents, exhaust fans, water pipes from solar hot water units and cables from photovoltaic panels – must be ‘flashed’ to stop water leaks. The materials used for the flashings must be compatible with the metal.

Sarking

Sarking is mainly used under a tiled roof to collect any rainwater that may have been driven under the tiles by wind. Various materials are used for sarking, but most are made from heavy-duty paper bonded between two layers of aluminium foil and meshed with fibreglass for strength.

Sarking comes with an anti-glare finish on one face, which is laid face-up to avoid sunburn. It may also be installed under a tile or metal roof to:

- provide insulation
- reduce dust and wind in the roof space
- increase the length of time a fire takes to get into the roof space and ignite the rafters.
Putting on the roof finish

Tile roof

Tiling is a trade in its own right, with specialist skills and knowledge.

As tiles are small, if the roof pitch is not steep enough, water will back-flow under the tiles, causing leaks.

Lower pitches can be achieved by laying sarking under the tiles. Tile manufacturers specify whether sarking is required, depending on the length of the roof and the tile's profile. The sarking is laid over the top of the rafters before the battens go on.

Under a tile roof, the battens are always fixed by the tiler to suit the tile size. The tiles are laid over the top of the timbers, and locked together on the edges with the adjoining tiles.

Coloured mortar is used to fix the tiles over the hips and ridge.

Roof tiles are raised up onto the roof in a small construction lift and distributed evenly over the roof to avoid point loading that the roof has not been designed to carry.
Sheet metal roof

Sheet metal roofers are a trade specialising in fixing, cutting and flashing sheet metal roofs. On a sheet metal roof the battens are fixed at the size and spacing specified in AS 1684. These are fixed by either the carpenter or the roofing subcontractor.

Sarking maybe installed under a sheet metal roof for insulation.

The roof sheeting is fixed to the battens in long lengths to avoid joins if possible. The ridge and hips are covered with a profiled capping to suit the profile of the metal sheeting. The pitch on a metal roof is dependent on the profile – the deeper the pan, the shallower the pitch can be.

Activity 10.1 Roof finishes

Answer the following questions by researching roof finishes through:

- manufacturers of metal roof sheeting in your state/territory
- manufacturers of concrete and clay roof tiles in your state/territory
- your local council.

Metal roof (select a metal roof profile)

1. What is the profile called?

2. What is the minimum pitch of roof for the profile?

3. What are the centres of the screws used to fix the metal roof to the battens?

4. What material is recommended for the screws?
Section 10 – Construction: roof finishes

Tile roof (select a tile style)
1. What is the tile made of?

2. Does the tile have a finish? If so, what is it?

3. What centre are the battens at under the tiles?

4. What is the minimum pitch of the roof for the tile selected?

Sarking (select a brand)
1. What is this brand of sarking made of?

2. Is it made from the same materials described in the information about sarking earlier in this section?

3. Does your local council have sarking as a requirement under a tile roof?
Apply knowledge of residential building processes and materials
Section 11 – Construction: roof plumbing

Introduction

Once the roof material has been laid, the roof is now waterproof. However, at this stage the roof has no means of collecting any rainwater, so roof plumbing is now installed at the perimeter of the roof for this purpose.

Performance criteria

1.1 Identify processes associated with construction of residential buildings
1.2 Identify different trades and non-trade occupations commonly engaged in residential building industry
1.3 List the processes that occur in order to progress a typical residential building from initial client enquiry to contract completion
2.1 Identify materials in common use in residential buildings in local areas
2.2 Research general characteristics of these materials
3.1 Develop an understanding of the basic characteristics of the processes and of how processes interrelate

Roof plumbing

Gutters collect the rainwater from the roof. The water then runs through to the downpipes.

The size of the gutters and the number and size of downpipes needed are calculated using the relevant table in the BCA, which is based on the intensity of rainfall in a given area.
Apply knowledge of residential building processes and materials

Activity 11.1 Rainfall

The information in the BCA has been calculated based on the history of the amount of rainfall in that area.
Think about the amount of rainfall that might be expected in Cairns in Queensland. How would it compare to the amount expected in Perth in Western Australia?

Materials

Because gutters and downpipes carry water, they must be rust resistant, and therefore are made from the same base metal and use the same finishes as the sheet metal used in roofing.

Activity 11.2 Roof plumbing

Research gutters, fascias and downpipes available from local manufacturers, and then answer the following questions.

1. What is the base metal?

2. What is the first finish applied to the base metal?

3. What is the final finish applied for aesthetics?
Activity 11.3 Gutters, fascias and downpipes

Research through your local manufacturers the profiles, materials and finishes available for:
- gutters
- fascias
- downpipes.

Draw three standard gutter types.

Draw two standard downpipe profiles.

What is the most popular material in your state or territory for gutters and downpipes?

What is the most popular finish in your state or territory for gutters and downpipes?
Installing roof plumbing

A roof plumber puts up the gutters, which are fixed to a fascia. Fascias, gutters and downpipes are generally all made of the same material.

![Figure 11.1: Gutters are fixed to a fascia, and downpipes run down from the gutter.](image)
Tanks and soakwells

Water collected from the gutters and downpipes then feeds into rainwater tanks, soakwells or underground drainage pipes.

Figure 11.2: Downpipes may run into rainwater tanks, onto the ground or into soakwells underground.
Apply knowledge of residential building processes and materials
Section 12 – Construction: linings

Introduction

Now that the house is waterproof, the internal linings (which mustn’t get wet) are installed.

Generally the walls in a brick veneer or framed house, and the ceilings in all house types in Australia, are lined with plasterboard. The internal brick walls in a full masonry house are rendered and plastered. As the ‘wet wall’ finish has to be applied before the ceiling goes up, this section looks at rendering and plastering first, followed by ceiling installation.

The process of rendering the external wall of a full masonry or a brick veneer house (if specified) is the same as the process for the first coat applied to the internal wall in full masonry, and therefore is not described here as a separate activity. It should be noted that it would have been done before the ceiling and roof were erected.

As the same process is used to fix plasterboard to ceilings and walls in brick veneer and framed housing, we’re going to look only at the process for ceilings.

Performance criteria

1.1 Identify processes associated with construction of residential buildings
1.2 Identify different trades and non-trade occupations commonly engaged in residential building industry
1.3 List the processes that occur in order to progress a typical residential building from initial client enquiry to contract completion
2.1 Identify materials in common use in residential buildings in local areas
2.2 Research general characteristics of these materials
3.1 Develop an understanding of the basic characteristics of the processes and of how processes interrelate
3.3 Identify typical machinery and equipment required to complete or improve processes

Rendering and plastering

Rendering and plastering is a wet trade carried out by qualified rendering and plastering tradespeople.

Rendering is a rough cement and sand finish, while plastering is a smooth white finish. Most houses in Australia have the render applied under the smooth plaster finish.
Materials

Render

Render is a mixture of cement and clean fine sand mixed with water to produce a grey sandy paste. The proportions of the mix vary, depending on the background or substrate and how many layers are going to be applied. It is mixed on site in a mixer, and for small jobs it would be bought pre-mixed so that only the water has to be added.

In one-coat work to be followed by plaster, the mix would be one part cement to three parts sand. Lime is not required, but most renders do include lime, as it makes the mix more elastic and easier to work with.

External work generally only involves one coat. The mix is different, and should be as recommended by Cement, Concrete and Aggregates Australia.

Plaster

Plaster is a mixture of lime and water that produces a thick white paste.

As with render, it can be purchased pre-mixed so that only water needs to be added, or it can be pre-mixed with the water already added so that the plaster is ready to use.

If the water has to be added, it’s not mixed in a mixer but on a flat surface.
Applying the render and plaster

Render

The sandy grey render paste is flipped onto a trowel from the mixing tray, and then applied to the wall.

On the outside skin of brickwork, the joints must be left clean and tooled so that the render adheres well to the surface.

The brickwork inside, which is going to receive the render, is left a little bit rough to act as a key for the render.

The rendering coat has several names, including:

- base coat
- float coat
- sand finish.

The render coat is between 9 and 15 mm thick, depending on how rough the wall is.

If the external walls on a full masonry or brick veneer house were to be rendered, the process would now be complete.

The renderer has to take care around the services rough-in, because these mustn't be rendered over.

Plaster

The white plaster slurry is applied over the top of the rendering coat to give a smooth finish ready for painting. It is 3 mm thick and can also be called:

- finish coat
- setting coat
- skim coat
- top coat.
Plaster is applied the same way as render; however, more care has to be taken with the finish, as this is the final coat that will sit under the paint. A good plaster is very smooth and shiny.

The plasterer also has to take care around any plumbing or electrical cables protruding from the walls.

Activity 12.1 About render

Go to the Cement Concrete and Aggregates Australia website at www.concrete.net.au. Go to Concrete Structures > Residential > Render for Small Projects and answer the following questions.

1. What are two reasons to add lime to a render mix?
   a) ____________________________________________________________
      ____________________________________________________________
   b) ____________________________________________________________
      ____________________________________________________________
      ____________________________________________________________

2. Why is it advantageous to soak lime in an equal amount of water 24 hours before using?
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
3. What is an ‘admixture’?

4. How should pre-bagged render mixes, cement and lime be stored?

5. How many days should the render be left to dry before the plaster is applied?

6. What does the ratio 1:1:6 mean?
Plasterboard

Plasterboard is a flat sheet fixed to a frame made of timber or steel, used to stop dust and help to insulate the house. It is installed by plasterboard subcontractors and is referred to as a dry trade.

In a full masonry house, plasterboard is used on the ceilings. In a brick veneer or framed house it would also be fixed to the timber or steel wall frame.

Materials

Plasterboard is made of gypsum, which is a white rock ground to a powder. The gypsum is mixed with water and rolled out, sandwiched between two sheets of heavy-duty cardboard. It comes in 3000 mm long sheets, which when delivered to site must be stored flat and in a waterproof area.

The plasterboard described above is the standard sheet. Other types of sheets are available for different applications, such as acoustic, fire resistant, foil backed and wet area.

In a framed or brick veneer house, the lining on the walls in the wet areas isn’t standard plasterboard, because it’s not water resistant. In those parts of the house, wet-area plasterboard must be used.

Fixing plasterboard

The plasterboard sheets are put up on the ceiling joists, which have had adhesive applied to them.
This holds the sheets in place until they are either screwed or nailed onto the joists.

A plaster cornice is usually installed at the wall-ceiling junction.

After the sheets have been fixed, the joints and fixings are treated so that they’re no longer visible. A mesh-type tape is applied over the joints and a jointing compound similar to plaster is applied over the tape and fixings. After the jointing compound has set and dried, it’s sanded back and is then ready for painting.
Activity 12.2 Manual handling

Go to the Association of Wall and Ceiling Industries Australia and New Zealand website at www.awci.org.au.

Go to A Guide to Safe Site Delivery > Move it the GBMA way – A Guide to Safe Site Delivery of Plasterboard and Associated Products, and answer the following questions.

1. List two factors that need to be considered to make an internal and external site plasterboard ready.
   a) External
      i) __________________________________________________________
         __________________________________________________________
         __________________________________________________________
      ii) __________________________________________________________
          __________________________________________________________
          __________________________________________________________
   b) Internal
      i) __________________________________________________________
         __________________________________________________________
         __________________________________________________________
      ii) __________________________________________________________
          __________________________________________________________
2. Anyone unloading a truck on site should warm up first. What are the three exercises recommended before unloading a truck?

   a) 

   b) 

   c) 

3. There are restrictions on the number of sheets of plasterboard that can be stored flat on the floor. What is the maximum number of sheets that can be stored flat:

   a) on a timber floor?

   b) on a concrete floor on the ground?
Apply knowledge of residential building processes and materials
Section 13 – Construction: fixtures and cabinetry

Introduction

This is the last process of installing large items, and includes items such as the kitchen cupboards and the plumbing fixtures. This process needs to take place before the final finishes such as tiling, painting etc, and also before the final connection of the services such as light switches, taps etc.

The doors are also hung at this point, but the hardware comes later, and the skirting would also be fixed now (if skirtings are specified).

Performance criteria

1.1 Identify processes associated with construction of residential buildings
1.2 Identify different trades and non-trade occupations commonly engaged in residential building industry
1.3 List the processes that occur in order to progress a typical residential building from initial client enquiry to contract completion
2.1 Identify materials in common use in residential buildings in local areas
3.1 Develop an understanding of the basic characteristics of the processes and of how processes interrelate

Fixtures

The fixtures generally comprise all the items the plumber has to install and connect, such as:

- baths
- basins
- showers
- toilets
- laundry tubs
- kitchen sinks.
Cabinetry

Cabinetry is the kitchen cupboards, bathroom vanities and any other kinds of cabinets that the client has requested be supplied by the builder.

These items may have been custom made or bought ‘off the shelf’ ready for installation.

Materials

Fixtures are generally made out of porcelain, stainless steel or plastics. Cabinetry is generally made from plastics which have been bonded onto substrates of various types of timbers to suit the particular application, such as wet areas.

All of the above are complex materials not covered in this program.

Installation

The plumber will return to the site and install the fixtures. The taps will not be installed until after the tiling and painting have been finished.

If the cabinetry has been custom made, the cabinetmaker will do the installation. There are two options for installing cabinetry bought off the shelf:

• the builder’s carpenter may do the installation
• the retailer may have recommended installers.

Some of the cabinetry, such as the cupboards under the kitchen sink or bathroom basin, may contain plumbing fixtures – in that case, the cabinet installer and plumber must work together. Likewise, the electrician may have to work with both the plumber and the cabinet installer to connect the kitchen exhaust fan, dishwasher, oven and stove.
Section 13 – Construction: fixtures and cabinetry

Figure 13.1: The kitchen cabinetry includes the kitchen sink, for example, so the cabinet installer and plumber will work together to complete that part of the job.

In addition, various miscellaneous items, such as doors and skirtings, are fixed at this time.
## Activity 13.1 Who installs what?

Listed below are some of the fixtures and cabinetry that would go into a standard house. In the trade(s) column beside each item, write down who would be required to complete the installation.

<table>
<thead>
<tr>
<th>Cabinetry</th>
<th>Trade(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kitchen cupboards</td>
<td></td>
</tr>
<tr>
<td>Kitchen sink</td>
<td></td>
</tr>
<tr>
<td>Dishwasher</td>
<td></td>
</tr>
<tr>
<td>Oven and stove</td>
<td></td>
</tr>
<tr>
<td>Kitchen exhaust</td>
<td></td>
</tr>
<tr>
<td>Toilet</td>
<td></td>
</tr>
<tr>
<td>Shower</td>
<td></td>
</tr>
<tr>
<td>Basin in bench</td>
<td></td>
</tr>
<tr>
<td>Laundry tub in bench</td>
<td></td>
</tr>
</tbody>
</table>
Section 14 – Construction: finishes

Introduction

Finishes include tiling and painting, to the design specifications decided by the client right back at the beginning of the process. The tiling is done on the walls and floors before the painting is done.

Performance criteria

1.1 Identify processes associated with construction of residential buildings
1.2 Identify different trades and non-trade occupations commonly engaged in residential building industry
1.3 List the processes that occur in order to progress a typical residential building from initial client enquiry to contract completion
2.1 Identify materials in common use in residential buildings in local areas
3.1 Develop an understanding of the basic characteristics of the processes and of how processes interrelate
3.3 Identify typical machinery and equipment required to complete or improve processes

Tiling

Tiling is generally laid in wet areas such as the bathroom, laundry and toilet, because it’s water resistant and easy to keep clean. Tiling can also be installed as a floor finish in other rooms, such as in kitchen and living areas. The joints between the tiles are filled with grout.

Materials

Tiles

Most tiles are made of baked clays in various shapes and sizes. They can have a glazed finish, which gives the colour and texture and makes them easier to clean and more water resistant. Tiles that are not glazed should be sealed to avoid staining, because they’re very porous.
Other materials used to make tiles include:

- natural stone such as granite or marble
- plastics
- glass
- superior-quality stainless steel that won’t rust.

The tiler will also use waterproofing materials on the background or substrate, as well as adhesives and grout. The grout is a wet paste and comes in a variety of colours to suit the colour of the tiles being laid.

Tile accessories

Tile accessories include soap holders, footrests, toilet-roll holders and towel rails.

Laying tiles

Before laying the tiles, waterproofing materials are applied to the walls and floors to the extent specified in the BCA, as only the tiles are waterproof – not the grout. The waterproofing material is generally applied with a brush and left to dry before the tiles are laid.

The tiles are laid on top of a tile adhesive, which is then left to dry and set so the tiles don’t move around while they’re being grouted.
Figure 14.1: The grouting is applied with a rubber trowel so as not to scratch the tiles, and is then sponged to ensure all the gaps between the tiles have been filled and there are no air bubbles. Air bubbles will burst later and expose the background, allowing water to penetrate under the tiles, which in turn will pop the tiles off.

The tiler must cut around all the services that have been installed but not yet connected.
Activity 14.1 Tiling

Go to Tips and Articles > How to Become a Tiler, and answer the following questions.

1. What skills are required to become a tiler?

2. What are the pros and cons of tiling as a job?

3. Who do tilers work with?

4. What are the steps to become a tiler?
Painting

Paint is applied to ceilings and walls not only because it makes them look better – it actually seals all the porous finishes such as plasterboard, render and plaster, making them easier to clean and more water resistant.

Materials

Paint

Paint can be either oil-based (enamel) or water-based (acrylic).

Enamel paints are tougher than acrylic paints but they're more expensive and harder to apply, and require turpentine to clean up. The smell from enamel paints during the drying time and clean-up is toxic. They also take longer to dry – usually 24 hours.

Although they're not as tough as enamel paints, acrylic paints have less smell and clean-up is easily done with water. Usually only two hours drying time is required between coats.

Paints are tinted to provide a large variation in the range of colours available off the shelf, which can be mixed further to suit the client's specific colour requirements. There's also a range of finishes, from high gloss to flat or matt, and even textures.

High-gloss paints will show any imperfections in the substrate as well as create glare, but they are easier to keep clean and more water and weather resistant.

Flat or matt paints help disguise imperfections and are easier to apply, because they don't show up the brush strokes as much as gloss paints do.

Application tools

Paint can be applied with a brush or a roller or sprayed. Each application tool has both limitations and advantages. Using a brush is very slow but gets into tight corners, whereas a roller is best suited to large, flat surfaces. The slight stippled effect from the roller also helps disguise imperfections in the background surface.
Applying paint

Surfaces have to be carefully prepared before applying the final coats of paint that contain the required colour. Preparation includes:

- cleaning off any dirt to ensure the paint will not peel off
- sanding back any rough surfaces
- sealing porous surfaces to ensure the final colour is even
- sealing materials that contain dies that may bleed through the final coats.

When the preparation is complete, the final coats can be applied using brushes and/or rollers.

Figure 14.1: Brushes are used to ‘cut in’ the edges and to paint smaller items, while a roller is used to apply the paint on large areas.
### Activity 14.2 About painting

Go to the Australian Paint Manufacturers’ Federation website at www.apmf.asn.au.
Go to Resource Centre and use the drop down-menu to choose Paint Facts Sheet > Before You Start.

1. **What are five things that you need to think about before painting?**
   1. ____________________________________________________________
   2. ____________________________________________________________
   3. ____________________________________________________________
   4. ____________________________________________________________
   5. ____________________________________________________________

2. **Open ‘Disposal of paint – the right way’ and write down the correct procedure to follow to dispose of water-based paints.**
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
Apply knowledge of residential building processes and materials

30010
Section 15 – Construction: fittings and services

Introduction

When the finishes have been completed and are dry, the fittings such as taps and the services such as water can be completed. These activities include plumbing, electrical and carpentry.

Performance criteria

1.1 Identify processes associated with construction of residential buildings
1.2 Identify different trades and non-trade occupations commonly engaged in residential building industry
1.3 List the processes that occur in order to progress a typical residential building from initial client enquiry to contract completion
3.1 Develop an understanding of the basic characteristics of the processes and of how processes interrelate
3.3 Identify typical machinery and equipment required to complete or improve processes

Plumbing

The plumber will return to the site and complete the following tasks.

- Fit the taps.
- Connect the hot water service (with the electrician).
- Connect the gas (if specified) to the stove and oven.
- Connect the dishwasher (with the electrician).
- Put on the gas bayonets for heating (if specified).
- Put on the toilet seat and lid.
- Check all taps for water supply and leaks.
- Check all wastes for leaks.
- Check hot water supply (with the electrician).
- Check that all gas appliances work and do not leak.
Electrical

The electrician will return to the site and complete the following tasks.

- Put on the power point covers.
- Put on the light switch covers.
- Work with the plumber on the hot water system.
- Work with the plumber on the dishwasher.
- Put up the lights.
- Turn on the power and check that everything is working and is safe.

Carpentry

The builder’s carpenter will complete the following tasks.

- Put on the door handles.
- Check that all internal hardware is working.
Activity 15.1 Research career options

You have been introduced to many professions and trades during this program. Choose one that you are interested in pursuing as a career, and search on the internet to find out what you would need to do to become qualified.

What is the career you’re interested in pursuing?

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

How would you become qualified?

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________
Apply knowledge of residential building processes and materials
Section 16 – Construction: completing the external works

Introduction

The site is nearly ready to hand over to the client. The external works now have to be completed, including the following tasks:

- paving
- builder’s clean-up
- landscaping
- fencing
- putting up the clothes line
- installing the letterbox.

Performance criteria

1.1 Identify processes associated with construction of residential buildings
1.2 Identify different trades and non-trade occupations commonly engaged in residential building industry
1.3 List the processes that occur in order to progress a typical residential building from initial client enquiry to contract completion
2.1 Identify materials in common use in residential buildings in local areas
3.1 Develop an understanding of the basic characteristics of the processes and of how processes interrelate
3.3 Identify typical machinery and equipment required to complete or improve processes
Paving

Materials

There are many materials used for paving. Clay, concrete, natural stone and reconstituted limestone are the most common materials, and all are available in different sizes and shapes.

Laying the paving

A paver (usually subcontracted to the builder) will do the laying. The site has to be clear of all rubbish in the areas where the paving will be installed. The soil under the paving has to be compacted – the same way it was before the slab could be poured.

A drainage system has to be installed prior to the paving being laid, just as the plumbing pre-lay was done before laying the footings and slab. Pavers have to be laid in such a way that there’s a slight slope to drain the rainwater away. A roof plumber will install the underground drainage.

In sandy soils, soakwells are installed, and in clay soils the system is connected to a stormwater system in the street. In either case the paving will have grates laid in it to drain away the water.
After the base has been compacted, string lines are put up for the paver to follow.

![String lines for paver](image1.png)

**Figure 16.1:** The paver follows string lines as the pavers are laid. The body tiles are laid first, followed by the cutting in around the borders and drains.

When all the pavers have been laid, sand is swept into the joints to pack the pavers together so they don’t move. Then the paving is manually compacted, usually with two passes of a manual compactor.

![Manual compactor](image2.png)

**Builder’s clean-up**

It is now time for the builder to clean up – especially if he or she has not been engaged to do the landscaping, fencing or other miscellaneous items such as the clothes lines and letterbox.

The builder’s clean-up is split into two categories: internal and external.
Internal clean-up

The internal clean-up includes removing all rubbish and dust and washing the windows. The builder may hire someone to do this work, or it may be done by the builder’s labourer.

The house only has to be left in a clean state ready for a domestic clean, which will be done or organised by the client after practical completion has taken place.

External clean-up

The external clean-up includes the following tasks:

• removing all rubble and rubbish
• removing site sheds, including the site toilet
• removing any equipment
• disconnecting temporary services, such as the temporary power supply
• cleaning the windows.

The builder’s labourer will do this work, with help from the carpenter.

Landscaping

The landscaping may have been designed by a landscaping architect or by a landscaping contractor. In either case, the soil is prepared first and if a sprinkler system is to be included in the contract then it’s installed before the plants go in.

If the sprinkler system is to be connected to an electric timer, the electrician will return to the site and do the connection.

Lastly, the plants and lawns are put in.
Fencing

Fencing can be made out of:

- bricks
- stones
- metal
- timber
- brushwood.

All of these materials can be used for fencing in a variety of patterns and heights. Different trades will install the different types of fences – for example, a bricklayer will build a brick fence, a stonemason will build a stone fence.

Clothes line

Usually, the builder’s carpenter will put up the clothes line.

Letterbox

This item may not be in the builder’s contract, but if it is then this is when it would be installed.

If it’s a pre-fabricated ‘off the shelf’ letterbox, usually the builder’s labourer will install it. If it’s a brick letterbox, the bricklayer will have built it while on site and it will have been rendered (if specified) while the renderer was on site.
Activity 16.1 External works

On the plan provided on the following page, draw in your design for the:

- letterbox
- clothes line
- paths and paving
- fences
- garden areas
- lawn areas.

When doing this activity, think about the following.

**Letterbox**
- Must be on the front boundary

**Clothes line**
- Should be in the backyard, with perhaps some screening of shrubs or a fence

**Paths**
- House to letterbox
- Driveway at carport to front door
- House to clothes line

**Paving**
- Under clothes line
- Small area at front door
- Perhaps a patio area outside the dining and/or living rooms

**Fences**
- Side and rear boundaries
- If you would like a fence on the front boundary, it will need a gate for the car and a path to the house, and the letterbox will still need to be accessible from inside and outside the fence
- Would you like a fence between the house and the side boundary if you are not putting up a front boundary fence, and should this fence have a gate in it?

**Gardens and lawn**
- Design these around the items you have located above
Apply knowledge of residential building processes and materials
Section 17 – Construction: variations

Introduction

Variations are changes to the contract, and occur for various reasons throughout the course of construction. They are logged by the builder for adjustment to the contract sum and to track any delays in time.

Performance criteria

1.1 Identify processes associated with construction of residential buildings
1.3 List the processes that occur in order to progress a typical residential building from initial client enquiry to contract completion
3.1 Develop an understanding of the basic characteristics of the processes and of how processes interrelate
3.2 Seek information on how long processes take and what could determine variation in time

Types of variations

Variations cost money and time. They can occur for a variety of reasons, which could include the following.

Client requests a change

If the client requests a variation, the builder charges for estimating the cost of the change, as well as the cost of any additional work over and above the original contract sum. When the cost of the variation is given to the client for approval, it includes any delay in time, which the client may also be charged for if it holds the builder up from starting another contract.

Client changes may also hold up other processes and so affect the progress of the subcontractors. The other factor that comes into play with client variations is at what stage during construction the request is made.

Builder requests a change

The builder may also request a variation. This is usually for an extension of time because of wet weather.
Drawings were wrong

Any mistakes on drawings may be discovered before to the activities it affects have been carried out. This does not mean it does not involve cost and time delays.

If a mistake is not discovered until after work has started, work may have to be demolished to make the corrections, which again will involve costs and delays. If the client and builder wish to, they can recover the costs from the designer, who would be covered by insurance.

Builder makes a mistake (including subcontractors’ mistakes)

These variations fall into two categories.

Builder’s mistake

The subcontractors may have to be paid to redo the work, and the client may charge the builder for costs associated with delays. For example, if the client is renting while the new house is being built and their lease has to be extended, the client may charge the builder for the additional rent, or it can be subtracted from the contract sum.

Subcontractor’s mistake

The builder can charge the subcontractor for any variations in the construction time if delays are incurred. As the client does not have any contact with the subcontractors, if it is going to cost the client money then a claim will be made to the builder, who will back-charge the subcontractor.

Unforeseen circumstances

This is a complicated situation, and all parties must work together to resolve the issues cost effectively and as quickly as possible to avoid delays.

An example of unforeseen circumstances would be where ‘bad ground’ is found while digging the trenches for the footings. This may result in the footings having to be redesigned, approval from council having to be obtained for the revisions, which would incur additional fees, and the client, builder and subcontractors being delayed.
**Activity 17.1 Variations**

The plan shown here includes some mistakes and missing items. Put a circle around each mistake or missing item on the plan.

List the mistakes and missing items on the chart below the plan, and identify the trade(s) that would be affected.

<table>
<thead>
<tr>
<th>Mistake or missing item</th>
<th>Trade(s) affected</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>
Activity 17.2 Variation request

The house is now complete to lock-up. At this stage the client has decided they would like the side walls in the carport to be enclosed with brickwork.

With the help of your lecturer, write a variation to the builder asking for:

- a price to make the change
- whether an extension of time will be required.
Section 18 – Post-construction: pre-handover inspection, handover and final completion

Introduction

All of the above processes need to be carried out to ensure that both parties – the builder and the client – are satisfied that the obligations in the contract have been fulfilled.

Performance criteria

1.1 Identify processes associated with construction of residential buildings
1.2 Identify different trades and non-trade occupations commonly engaged in residential building industry
1.3 List the processes that occur in order to progress a typical residential building from initial client enquiry to contract completion
3.1 Develop an understanding of the basic characteristics of the processes and of how processes interrelate

Pre-handover inspection

A pre-handover inspection is referred to in the contract as ‘Practical completion’.

Before the client can take possession the following must occur.

The builder and client prepare a ‘Defects list’, which is a list of outstanding items or items not functioning correctly.

Note: The items on the defects list do not necessarily stop the performance of the house as required in the BCA. A client should not take possession of the house if the toilet does not flush. If the client takes possession prematurely it is very difficult to prove that any defect is the builder’s error as opposed to the fault of the client.

An item such as the letterbox not being straight does not stop the client from leading a healthy life, but it must be on the defects list to be fixed if it was in the builder’s contract.

A date was set when the contract was signed for what is called the ‘Defects liability period’, which is the amount of time the builder has to fix any defects and outstanding items.
Handover

Handover is a very important process in the contract, as it means the client has ‘taken possession of the site and house’ which means that:

- the client has accepted the house is complete in terms of the contract with the builder
- the client now takes over the insurance
- the builder has been paid the amount required.

Final completion

Final completion is the date that was set for the builder to complete all work and to fix any defects that may have occurred during the defects liability period.

When both parties are satisfied that the contract has been completed, the builder receives the final payment (if any money was held back by the client while the defects were being rectified).

Summary

You have now completed 30010 Apply knowledge of residential building processes and materials.
Activity 18.1 Reflection on progress

Make a note below of the areas of knowledge that you now feel more confident about, and also any areas that you feel you would like to (or need to) find out more about, along with your strategy for how you will do that.

<table>
<thead>
<tr>
<th>I feel confident about</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>I would like to know more about</th>
</tr>
</thead>
<tbody>
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</table>

<table>
<thead>
<tr>
<th>I can learn more about the above by</th>
</tr>
</thead>
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</tbody>
</table>

Thank you for participating in this unit. We wish you well for your future career path, no matter which direction and career you choose.
Apply knowledge of residential building processes and materials

30010
Annex A – Unit details

<table>
<thead>
<tr>
<th>Unit title</th>
<th>Apply knowledge of residential building processes and materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Descriptor</td>
<td>This unit of competency specifies the outcomes required to apply knowledge of residential building processes and materials. This includes the processes themselves, the interrelationships between them and the major pre and post construction processes. An ability to apply knowledge of materials used in construction is also developed.</td>
</tr>
<tr>
<td>Employability skills</td>
<td>The following employability skills are an integral part of the delivery of this unit. They include: communication; teamwork; problem solving; initiative and enterprise; planning and organising; self-management; learning; and technology.</td>
</tr>
<tr>
<td>Pre/co-requisite units</td>
<td>Develop residential building industry knowledge</td>
</tr>
<tr>
<td></td>
<td>Carry out basic measurement and calculations for residential buildings</td>
</tr>
<tr>
<td>Application</td>
<td>This unit supports the attainment of a basic understanding and application of construction processes and materials to tasks such as estimating, costing and drafting.</td>
</tr>
</tbody>
</table>

Element 1 Develop knowledge of residential building processes

1.1 Identify processes associated with construction of residential buildings

1.2 Identify different trades and non-trade occupations commonly engaged in residential building industry

1.3 List the processes that occur in order to progress a typical residential building from initial client enquiry to contract completion

Element 2 Develop knowledge of common residential building materials

2.1 Identify materials in common use in residential buildings in local areas

2.2 Research general characteristics of these materials
Element 3 Identify the order, basic characteristics and interrelationships in processes

<table>
<thead>
<tr>
<th>3.1</th>
<th>Develop an understanding of the basic characteristics of the processes and of how processes interrelate</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2</td>
<td>Seek information on how long processes take and what could determine variation in time</td>
</tr>
<tr>
<td>3.3</td>
<td>Identify typical machinery and equipment required to complete or improve processes</td>
</tr>
<tr>
<td>3.4</td>
<td>Examine and follow documentation of examples of the timelines for a residential building project</td>
</tr>
</tbody>
</table>

Required skills and knowledge

**Essential knowledge**

Understanding of:

- materials used in residential buildings
- processes associated with residential building construction
- processes that precede and conclude residential building construction
- relationships between processes in the residential building industry

**Essential skills**

Ability to:

- communicate effectively
- read
- use numbers and units of measure
- plan and research gathering of information
- work within a team and share with others
Range statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

| Processes associated with construction may include: | • processes that precede construction  
  ◦ planning  
  ◦ surveying  
  ◦ drafting  
  ◦ estimating and costing  
  ◦ approvals  
  ◦ contracting  
  ◦ purchasing  
  ◦ scheduling  
  • processes during construction  
  ◦ site works  
  ◦ services  
  ◦ trades and other works  
    – bricklaying  
    – carpentry  
    – concreting, formwork, reinforcing  
    – solid plastering  
    – wall and ceiling plastering  
    – wall and floor tiling  
    – roof plumbing  
    – roof tiling  
    – electrical work  
    – paving  
    – fencing  
    – landscaping  
    ◦ supervision  
  • post building processes  
  ◦ clean up  
  ◦ practical completion and handover  
  ◦ defects liability |
### Materials in common use

- a representative sample of any materials used in the construction of residential buildings in the local area covering
  - foundations/footings
  - floors and coverings
  - walls, wall frames and coverings
  - ceiling framing and coverings
  - roof framing and coverings
  - joinery
  - fittings such as:
    - plumbing hardware
    - electrical fittings
    - doors, locks, hinges
    - shelving to built-in cupboards

### General characteristics

- nature of the material
- forms in which it is purchased, delivered and stored
- provision for on-site storage

### Basic characteristics of the processes

- general overview only of the:
  - function performed
  - qualifications required to do the task
  - legal or regulatory requirements
  - manner in which the service is provided

### Machinery and equipment

- equipment and/or machinery that may normally be on-site and either be:
  - supplied by the tradesperson, or
  - hired by the builder
    - storage sheds
    - lifts

### Documentation of examples of the timelines

- charts
- Gantt charts
- Printouts from project managements software
Evidence guide

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, Range Statement and Assessment Guidelines for this course.

### Critical aspects of assessment and evidence required to demonstrate this competency unit

A person who demonstrates competency in this unit must be able to provide evidence of the ability to:

- locate, interpret and apply relevant information
- understand fundamental processes, terms, concepts and principles related to residential building construction
- list materials and main equipment commonly used in residential building construction
- describe the nature and sequencing of fundamental processes in residential building construction
- engage in conversations with others
- generate brief notes on aspects of the residential building industry in relation to:
  - processes
  - materials, and their storage.

### Access and equity considerations

Reasonable adjustment may be made to meet individual learner needs.
### Context of and specific resources for assessment

This competency is to be assessed using standard and authorised work practices, safety requirements and environmental constraints.

Assessment of essential underpinning knowledge will usually be conducted in an off-site context.

Assessment is to comply with relevant regulatory or Australian Standards’ requirements.

Resource implications for assessment include:

- an induction procedure and requirement
- realistic tasks or simulated tasks covering the mandatory task requirements
- relevant specifications and work instructions
- support materials appropriate to activity
- workplace instructions relating to safe work practices and addressing hazards and emergencies
- research resources, including industry related systems information.

Reasonable adjustments for people with disabilities must be made to assessment processes where required. This could include access to modified equipment and other physical resources, and the provision of appropriate assessment support.
Method of assessment

<table>
<thead>
<tr>
<th>Assessment methods must:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• satisfy the endorsed assessment guidelines of the Construction, Plumbing and Services Integrated Framework Training Package</td>
</tr>
<tr>
<td>• include direct observation of tasks in real or simulated work conditions, with questioning to confirm the ability to consistently identify and correctly interpret the essential underpinning knowledge required for practical application</td>
</tr>
<tr>
<td>• reinforce the integration of employability skills with work place tasks and job roles</td>
</tr>
<tr>
<td>• confirm that competency is verified and able to be transferred to other circumstances and environments.</td>
</tr>
</tbody>
</table>

Validity and sufficiency of evidence requires that:

| • competency will need to be demonstrated over a period of time reflecting the scope of the role and the practical requirements of the workplace |
| • where the assessment is part of a structured learning experience the evidence collected must relate to a number of performances assessed at different points in time and separated by further learning and practice. A decision on competency should only be taken at the point when the assessor has complete confidence in the person’s demonstrated ability and applied knowledge |
| • all assessment that is part of a structured learning experience must include a combination of direct, indirect and supplementary evidence. |

Assessment processes and techniques should as far as is practical take into account the language, literacy and numeracy capacity of the candidate in relation to the competency being assessed.

Supplementary evidence of competency may be obtained from relevant authenticated documentation from third parties, such as existing supervisors, team leaders or specialist training staff.
Apply knowledge of residential building processes and materials
# Annex B – Learning plan

**Note:** Sessions are nominally two hours.

<table>
<thead>
<tr>
<th>Session</th>
<th>Performance criteria</th>
<th>Guide</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.1, 1.2, 1.3 3.1, 3.3</td>
<td>Section 1 – Pre-construction: part 1 Client–designer contact Design brief Survey • Activity 1.1 Design and documentation • Activity 1.2 • Activity 1.3 • Activity 1.4 • Activity 1.5 • Activity 1.6 Estimates • Activity 1.7</td>
<td>Learner’s guide Computer and internet access</td>
</tr>
<tr>
<td>2</td>
<td>1.1, 1.2, 1.3 3.1, 3.4</td>
<td>Section 2 – Pre-construction: part 2 Registered building contractor Subcontractors Quotes • Activity 2.1 Contracts Construction program and scheduling • Activity 2.2</td>
<td>Learner’s guide Computer and internet access Current construction program provided by your lecturer</td>
</tr>
<tr>
<td>Session</td>
<td>Performance criteria</td>
<td>Guide</td>
<td>Resources</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------</td>
<td>-------</td>
<td>-----------</td>
</tr>
</tbody>
</table>
| 3       | 1.1, 1.2, 1.3, 2.1, 2.2, 3.1, 3.3 | Section 3 – Construction: site preparation
Site set-up
• Activity 3.1
• Activity 3.2
Site works
• Activity 3.3
Plumbing pre-lay
• Activity 3.4
• Activity 3.5 | Learner’s guide
Computer and internet access |
| 4       | 1.1, 1.2, 1.3, 2.1, 2.2, 3.1, 3.3 | Section 4 – Construction: footings
Materials
• Activity 4.1
Building the footings
• Activity 4.2 | Learner’s guide
Computer and internet access |
| 5       | 1.1, 1.2, 1.3, 2.1, 2.2, 3.1, 3.2 | Section 5 – Construction: floor
The slab
Materials
• Activity 5.1
• Activity 5.2
Preparing for the slab
• Activity 5.3
• Activity 5.4 | Learner’s guide
Computer and internet access |
<table>
<thead>
<tr>
<th>Session</th>
<th>Performance criteria</th>
<th>Guide</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>1.1, 1.2, 1.3 2.1, 2.2 3.1, 3.3</td>
<td>Section 6 – Construction: walls Full masonry walls Materials • Activity 6.1 Building full masonry walls • Activity 6.2 Brick veneer walls Materials • Activity 6.3 Building brick veneer walls • Activity 6.4 Framed walls Materials Building framed walls • Activity 6.5</td>
<td>Learner’s guide Computer and internet access</td>
</tr>
<tr>
<td>7</td>
<td>1.1, 1.2, 1.3 2.1, 2.2 3.1</td>
<td>Section 7 – Construction: ceiling frame Materials • Activity 7.1 Building the ceiling frame • Activity 7.2 • Activity 7.3</td>
<td>Learner’s guide Computer and internet access</td>
</tr>
<tr>
<td>8</td>
<td>1.1, 1.2, 1.3 2.1, 2.2 3.1</td>
<td>Section 8 – Construction: roofs Materials Building the roof • Activity 8.1 • Activity 8.2 • Activity 8.3 • Activity 8.4</td>
<td>Learner’s guide</td>
</tr>
<tr>
<td>9</td>
<td>1.1, 1.2, 1.3 2.1, 2.2 3.1, 3.2</td>
<td>Section 9 – Construction: services rough-in Services • Activity 9.1 • Activity 9.2</td>
<td>Learner’s guide</td>
</tr>
<tr>
<td>Session</td>
<td>Performance criteria</td>
<td>Guide</td>
<td>Resources</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------</td>
<td>-------</td>
<td>-----------</td>
</tr>
<tr>
<td>10</td>
<td>1.1, 1.2, 1.3, 2.1, 2.2, 3.1, 3.3</td>
<td>Section 10 – Construction: roof finishes Materials Putting on the roof finish • Activity 10.1 Section 11 – Construction: roof plumbing Roof plumbing • Activity 11.1 Materials • Activity 11.2 • Activity 11.3 Assessment 1 due</td>
<td>Learner’s guide Computer and internet access</td>
</tr>
<tr>
<td>11</td>
<td>1.1, 1.2, 1.3, 2.1, 2.2, 3.1, 3.3</td>
<td>Section 12 – Construction: linings Rendering and plastering Materials Applying the render and plaster • Activity 12.1 Plasterboard Materials Fixing plasterboard • Activity 12.2</td>
<td>Learner’s guide Computer and internet access</td>
</tr>
<tr>
<td>Session</td>
<td>Performance criteria</td>
<td>Guide</td>
<td>Resources</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------</td>
<td>-------</td>
<td>-----------</td>
</tr>
<tr>
<td>12</td>
<td>1.1, 1.2, 1.3 2.1 3.1, 3.3</td>
<td>Section 13 – Construction: fixtures and cabinetry  Fixtures  Cabinetry  Materials  Installation  • Activity 13.1  Section 14 – Construction: finishes  Tiling  Materials  Laying tiles  • Activity 14.1  Painting  Materials  Applying paint  • Activity 14.2</td>
<td>Learner’s guide  Computer and internet access</td>
</tr>
<tr>
<td>13</td>
<td>1.1, 1.2, 1.3 2.1 3.1, 3.3</td>
<td>Section 15 – Construction: fittings and services  Plumbing  Electrical  Carpentry  • Activity 15.1  Section 16 – Construction: completing the external works  Paving  Materials  Laying the pavers  Builder’s clean-up  Landscaping  Fencing  Clothes line  Letterbox  • Activity 16.1</td>
<td>Learner’s guide  Computer and internet access</td>
</tr>
<tr>
<td>Session</td>
<td>Performance criteria</td>
<td>Guide</td>
<td>Resources</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------</td>
<td>-------</td>
<td>-----------</td>
</tr>
<tr>
<td>14</td>
<td>1.1, 1.3 &lt;br&gt; 3.1, 3.2</td>
<td>Section 17 – Construction: variations &lt;br&gt; Types of variations &lt;br&gt; • Activity 17.1 &lt;br&gt; • Activity 17.2 &lt;br&gt; <strong>Assessment 2 due</strong></td>
<td>Learner’s guide</td>
</tr>
<tr>
<td>15</td>
<td>1.1, 1.2, 1.3 &lt;br&gt; 3.1</td>
<td>Section 18 – Post-construction: pre-handover inspection, handover and final completion &lt;br&gt; Pre-handover inspection &lt;br&gt; Handover &lt;br&gt; Final completion &lt;br&gt; • Activity 18.1 &lt;br&gt; <strong>Assessment 3 due</strong></td>
<td>Learner’s guide &lt;br&gt; Questionnaire or survey provided by your lecturer</td>
</tr>
</tbody>
</table>
Annex C – Assessment plan

Introduction

You are required to demonstrate your competence in the elements of 30010 Apply knowledge of residential building processes and materials as listed in the unit details at Annex A by completing three assessments.

<table>
<thead>
<tr>
<th>Due</th>
<th>Assessment</th>
<th>Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session 10</td>
<td><strong>Assessment 1 – Materials and construction resource file</strong>&lt;br&gt;You are required to collect materials information for different construction types that will demonstrate your understanding of the characteristics of building materials and their appropriate application. The information is to be submitted in a resource file format.</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>Session 14</td>
<td><strong>Assessment 2 – Variations and construction program</strong>&lt;br&gt;You are required to compile a resource file of examples that demonstrates your understanding of building materials and construction types. The resource file you create will also be used to complete Assessment 3.&lt;br&gt;Assessment 2 uses Activities 2.2 and 17.1 to understand the impact variations have on a construction program.</td>
<td>1, 3</td>
</tr>
<tr>
<td>Session 15</td>
<td><strong>Assessment 3 – Selecting construction type and materials for a house</strong>&lt;br&gt;Assessment 3 uses the resource file from Assessment 1 to make specific selections for a house of your choice or as given to you by your lecturer. This will be submitted in an A3 collage format.</td>
<td>1, 2, 3</td>
</tr>
</tbody>
</table>

Individual learning and assessment needs

Everyone has different learning styles and needs. Please let your lecturer know if there is anything that may have an effect on your learning.

Results and appeals

There is a process to be followed should you wish to appeal the result of your assessment. Please ask your lecturer for more information about this.
Apply knowledge of residential building processes and materials
Annex D – Assessments
Apply knowledge of residential building processes and materials
30010

Apply knowledge of residential building processes and materials

Assessment 1 – Materials and construction resource file

Name ____________________________ Date ______________

I have received feedback on this assessment.

Signature ____________________________ Date ______________

Assessor’s initials
Apply knowledge of residential building processes and materials
Assessment 1 – Materials and construction resource file

Introduction

In this assessment you are required to compile a resource file of examples that demonstrates your understanding of building materials and construction types. The resource file you create will also be used to complete Assessment 3.

The resource file should contain (at least) pictures, samples and/or information relating to the following items.

1. Footings and floors
2. Full masonry walls
3. Brick veneer walls
4. Timber-framed walls
5. Windows
6. Doors and hardware
7. Roof types
8. Roof finishes
9. Gutters, fascias and downpipes
10. Ceiling linings
11. Internal wall linings
12. External wall linings
13. Kitchen cabinets
14. Bathroom fixtures
15. Laundry fixtures
16. Toilets
17. Render and plaster
18. Wall and floor tiles
19. Paints
20. Taps
21. Lights and light switches
22. Power points
23. Hot water units
24. Gas meters
25. Electric meters
26. Paving
27. Landscaping
28. Fences
29. Letterboxes
Requirements and format

The front of your file must contain a chart in the following format which demonstrates your understanding of:

30. the material
31. the trade that uses the material
32. whether the material is structural or cosmetic
33. how many days in total that trade was on site using the construction program given to you in Session 2.

Source the information from:

• The construction program given to you in Session 2.

An example of the format for the chart follows.

<table>
<thead>
<tr>
<th>Material</th>
<th>Trade</th>
<th>Characteristic of material</th>
<th>No. days on site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timber walls</td>
<td>Carpenter</td>
<td>✓</td>
<td>38</td>
</tr>
<tr>
<td>Wall and floor tiles</td>
<td>Tiler</td>
<td>✓</td>
<td>15</td>
</tr>
</tbody>
</table>

The submission must include the marking guide (see Annex E).

Materials and equipment

A suitable file
Pens, pencils, glue, etc

Source information from:

• manufacturers' websites
• association and institute websites
• builders’ magazines
• design magazines
• newspapers
• trade catalogues
• display centres and display homes
• local and college library
• photographs
30010

Apply knowledge of residential building processes and materials

Assessment 2 – Variations and construction program

Name _________________________________ Date __________

I have received feedback on this assessment.

Signature ______________________________ Date __________

Assessor’s initials
Assessment 2 – Variations and construction program

Introduction

In this assessment you are required to follow a construction program and demonstrate your understanding of the impact of variations on the timelines in the program.

This assessment will be completed in class in Session 14, and will combine Activity 2.2 with Activity 17.1.

In Activity 17.1 you identified the mistakes that had been made and items that were missing on the drawings provided, and which trades were affected by them. Assume that these mistakes were not discovered until after the walls had been built.

1. With the help of your Lecturer and using the construction program given to you in Session 2 list out the future trades that would be delayed while the mistakes and items missing were being fixed on site
2. Identify from the program any trades that had finished and will now have to return to site.
3. Attach Activity 2.2.

Requirements and format

1. The submission is to be an A4 document with an appropriate A4 cover sheet.
2. The submission should include:
   ◦ copies of Activities 2.2 and 17.1
   ◦ the lists created in 1 and 2 above, printed and stapled to the activities.
3. The submission must include the marking guide (see Annex E).

Materials and equipment

Pens, pencils, etc

Source information from:

• Activity 2.2
• Construction program
• Activity 17.1
Apply knowledge of residential building processes and materials
30010

Apply knowledge of residential building processes and materials

Assessment 3 – Selecting construction type and materials for a house

Name ___________________________________________ Date ____________

I have received feedback on this assessment.

Signature ___________________________________________ Date ____________

Assessor’s initials

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Annex D 11
Apply knowledge of residential building processes and materials
Assessment 3 – Selecting construction type and materials for a house

Introduction

In this assessment you will select the construction type and materials for a house, using the resource file you compiled for Assessment 1.

Speak to your lecturer before you begin, to find out whether you will choose the house for your assessment or the lecturer will provide one.

You will need a house plan and at least one elevation.

If you are to choose the house yourself, you may find suitable house designs in:

• display home centres
• design magazines
• newspapers
• photographs.

You should select construction types and materials as listed below.

1. Full masonry walls
2. Brick veneer walls
3. Timber-framed walls
4. Footings and floors
5. Windows
6. Doors and hardware
7. Roof types
8. Roof finishes
9. Gutters, fascias and downpipes
10. Ceiling linings
11. Internal wall linings
12. External wall linings
13. Kitchen cabinets
14. Bathroom fixtures
15. Laundry fixtures
16. Toilets
17. Render and plaster
18. Wall and floor tiles
19. Paints
20. Taps
21. Lights and light switches
22. Power points
23. Hot water units
24. Gas meters
25. Electric meters
26. Paving
27. Landscaping
28. Fences
29. Letterbox
Requirements and format

You are required to compile as part of the same collage AT LEAST 10 pictures of equipment and machinery that would be used on a construction site and name which trade would use that equipment or machinery.

30. Picture 1.
31. Picture 2.
32. Picture 3.
33. Picture 4.
34. Picture 5.
36. Picture 7.
37. Picture 8.

An example has been provided on the following pages

Fix the cut outs of your pictures onto A3 paper in a collage type format. This will require several pieces of paper which must be neatly numbered and each construction type or material labelled and the machinery and equipment labelled with a trade against the name. An example has been provided on the following pages.

The submission must be appropriately bound with an A3 cover sheet.

- The submission must include the marking guide (see Annex E).

Materials and equipment

A3 paper

Pens, pencils, glue, scissors, etc

Source information from:

- builders’ magazines
- newspapers
- photographs
- websites.
Collage example

Roof tiles

Timber frame

External timber weatherboard

Section

SLAB EDGE AND FOOTING DETAIL

REINFORCEMENT

WATERPROOF MEMBRANE (WPM)

REINFORCEMENT

FoOTING

FL 00C

GL

PARGETING

SLAB

Plan

Elevation

Sheet 1
Collage example continued

Electric saw – Carpenter

Compactor – Paver

Welding torch – Plumber

Trench digger – Excavator

Sheet 2
Annex E – Marking guides
Apply knowledge of residential building processes and materials
Assessment 1 – Materials and construction resource file – Marking guide

<table>
<thead>
<tr>
<th>Learner to complete</th>
<th>Assessor to complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name:</td>
<td>Assessor:</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>1st submission date:</td>
<td>Assessment: (circle)</td>
</tr>
<tr>
<td>/ /</td>
<td>Competent</td>
</tr>
<tr>
<td></td>
<td>Resubmit</td>
</tr>
</tbody>
</table>

Instructions for learners

Tick the boxes on the left once you are happy with that aspect of your assessment and before you submit it.

Instructions for assessors

Place a cross in the boxes on the right only if the item is not acceptable or not competent.

This assessment will assess Elements 1, 2 and 3.

Presentation

<table>
<thead>
<tr>
<th>Overall neatness</th>
<th>Assessment format correct</th>
<th>Assessment submitted on time</th>
<th>Marking guide attached</th>
</tr>
</thead>
</table>

File contains several examples or types of:

1. Footings and floors
2. Full masonry walls
3. Brick veneer walls
4. Timber-framed walls
5. Windows
6. Doors and hardware
7. Roof types
8. Roof finishes
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>9.</td>
<td>Gutters, fascias and downpipes ...............................................................</td>
</tr>
<tr>
<td>10.</td>
<td>Ceiling linings .............................................................................................</td>
</tr>
<tr>
<td>11.</td>
<td>Internal wall linings ..................................................................................</td>
</tr>
<tr>
<td>12.</td>
<td>External wall linings ..................................................................................</td>
</tr>
<tr>
<td>13.</td>
<td>Kitchen cabinets ..........................................................................................</td>
</tr>
<tr>
<td>14.</td>
<td>Bathroom fixtures .........................................................................................</td>
</tr>
<tr>
<td>15.</td>
<td>Laundry fixtures ...........................................................................................</td>
</tr>
<tr>
<td>16.</td>
<td>Toilets ...........................................................................................................</td>
</tr>
<tr>
<td>17.</td>
<td>Render and plaster .......................................................................................</td>
</tr>
<tr>
<td>18.</td>
<td>Wall and floor tiles ......................................................................................</td>
</tr>
<tr>
<td>19.</td>
<td>Paints ............................................................................................................</td>
</tr>
<tr>
<td>20.</td>
<td>Taps .............................................................................................................</td>
</tr>
<tr>
<td>21.</td>
<td>Lights and light switches ...........................................................................</td>
</tr>
<tr>
<td>22.</td>
<td>Power points .................................................................................................</td>
</tr>
<tr>
<td>23.</td>
<td>Hot water units ............................................................................................</td>
</tr>
<tr>
<td>24.</td>
<td>Gas meters ....................................................................................................</td>
</tr>
<tr>
<td>25.</td>
<td>Electric meters .............................................................................................</td>
</tr>
<tr>
<td>26.</td>
<td>Paving ............................................................................................................</td>
</tr>
<tr>
<td>27.</td>
<td>Landscaping ..................................................................................................</td>
</tr>
<tr>
<td>28.</td>
<td>Fences ..........................................................................................................</td>
</tr>
<tr>
<td>29.</td>
<td>Letterboxes ...................................................................................................</td>
</tr>
</tbody>
</table>

File contains chart showing:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>30.</td>
<td>Material ........................................................................................................</td>
</tr>
<tr>
<td>31.</td>
<td>Trade ..........................................................................................................</td>
</tr>
<tr>
<td>32.</td>
<td>Structural/cosmetic ....................................................................................</td>
</tr>
<tr>
<td>33.</td>
<td>Total number of days trade on site .........................................................</td>
</tr>
</tbody>
</table>
Note: Your assessor may provide specific notes on your submission as an alternative to completing the feedback section below.

Feedback: ...........................................................................................................................................
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Assessment successfully completed:  

Yes  /  No
Apply knowledge of residential building processes and materials
**Assessment 2 – Variations and construction program – Marking guide**

<table>
<thead>
<tr>
<th>Learner to complete</th>
<th>Assessor to complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name:</td>
<td>Assessor:</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>1st submission date:</td>
<td>Assessment: (circle)</td>
</tr>
<tr>
<td>/ / /</td>
<td>Competent</td>
</tr>
</tbody>
</table>

**Instructions for learners**

Tick the boxes on the left once you are happy with that aspect of your assessment and before you submit it.

**Instructions for assessors**

Place a cross in the boxes on the right only if the item is not acceptable or not competent.

This assessment will assess Elements 1 and 3.

**Presentation**

- Overall neatness .................................................................
- Assessment format correct ..................................................
- A4 cover sheet .................................................................
- Assessment submitted on time .............................................
- Marking guide attached ....................................................

**Submission contains:**

1. List of trades delayed ......................................................
2. List of trades to return to site ...........................................
3. Activity 2.2 ......................................................................
4. Activity 17.1 ....................................................................
Note: Your assessor may provide specific notes on your submission as an alternative to completing the feedback section below.

Feedback: ...........................................................................................................................................
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Assessment successfully completed: Yes / No
Assessment 3 – Selecting construction type and materials for a house – Marking guide

Learner to complete  | Assessor to complete
---|---
Name: | Assessor: | Date: / /
1st submission date: / / | Assessment: (circle) | 2nd submission due date: (if required) / /
 compelent | Resubmit

Instructions for learners
Tick the boxes on the left once you are happy with that aspect of your assessment and before you submit it.

Instructions for assessors
Place a cross in the boxes on the right only if the item is not acceptable or not competent.

This assessment will assess Elements 1, 2 and 3.

Presentation
- Overall neatness .................................................................
- Assessment format correct ......................................................
- A3 cover sheet ...........................................................................
- Assessment submitted on time ....................................................
- Marking guide attached .............................................................

Collage includes the following construction type and materials for a specific house
1. Full masonry walls .................................................................
2. Brick veneer walls ...............................................................  
3. Timber-framed walls ..............................................................
4. Footings and floors ............................................................... 
5. Windows .............................................................................
6. Doors and hardware .............................................................
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>7.</td>
<td>Roof types ..........................................................................................................................</td>
</tr>
<tr>
<td>8.</td>
<td>Roof finishes ......................................................................................................................</td>
</tr>
<tr>
<td>9.</td>
<td>Gutters, fascias and downpipes .........................................................................................</td>
</tr>
<tr>
<td>10.</td>
<td>Ceiling linings ....................................................................................................................</td>
</tr>
<tr>
<td>11.</td>
<td>Internal wall linings ...........................................................................................................</td>
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<tr>
<td>12.</td>
<td>External wall linings ..........................................................................................................</td>
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<tr>
<td>13.</td>
<td>Kitchen cabinets ..................................................................................................................</td>
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<tr>
<td>14.</td>
<td>Bathroom fixtures ...............................................................................................................</td>
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<tr>
<td>15.</td>
<td>Laundry fixtures ..................................................................................................................</td>
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<tr>
<td>16.</td>
<td>Toilets ..................................................................................................................................</td>
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<tr>
<td>17.</td>
<td>Render and plaster ...............................................................................................................</td>
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<td>18.</td>
<td>Wall and floor tiles ............................................................................................................</td>
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<tr>
<td>19.</td>
<td>Paints ...................................................................................................................................</td>
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<td>20.</td>
<td>Taps .....................................................................................................................................</td>
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<td>21.</td>
<td>Lights and light switches ....................................................................................................</td>
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<td>22.</td>
<td>Power points ........................................................................................................................</td>
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<td>23.</td>
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<td>24.</td>
<td>Gas meter .............................................................................................................................</td>
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<tr>
<td>25.</td>
<td>Electric meter .......................................................................................................................</td>
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<tr>
<td>26.</td>
<td>Paving ..................................................................................................................................</td>
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<tr>
<td>27.</td>
<td>Landscaping ........................................................................................................................</td>
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<tr>
<td>28.</td>
<td>Fences ..................................................................................................................................</td>
</tr>
<tr>
<td>29.</td>
<td>Letterboxes ..........................................................................................................................</td>
</tr>
</tbody>
</table>

**Collage includes pictures of machinery and equipment used by a particular trade**

<p>| | |</p>
<table>
<thead>
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<tbody>
<tr>
<td>30.</td>
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<tr>
<td>Trade for 30</td>
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</table>
34. ............................................................................................................................................
Trade for 34 ................................................................................................................................

35. ............................................................................................................................................
Trade for 35 ................................................................................................................................

36. ............................................................................................................................................
Trade for 36 ................................................................................................................................

37. ............................................................................................................................................
Trade for 37 ................................................................................................................................

38. ............................................................................................................................................
Trade for 38 ................................................................................................................................

39. ............................................................................................................................................
Trade for 39 ................................................................................................................................

Note: Your assessor may provide specific notes on your submission as an alternative to completing the feedback section below.

Feedback: ....................................................................................................................................
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Assessment successfully completed: Yes / No
Apply knowledge of residential building processes and materials
Annex F – Design and build a house flowchart

Pre-construction
- Client–designer contact
- Brief for design
- Survey
- Design and documentation
- Estimates
- Builders
- Subcontractors
- Quotes
- Contracts
- Construction program and scheduling

Construction
- Site preparation
  - Site set-up
  - Site works
  - Plumbing pre-lay
- Footings
- Floor
- Walls
  - Full masonry
  - Brick veneer
  - Framed
- Ceiling frame
- Roof
- Services rough-in
- Roof finishes
- Roof plumbing
- Linings
  - Render and plaster
  - Plasterboard
- Fixtures and cabinetry
- Finishes
  - Tiling
  - Painting
- Fittings and services
- Complete external works
  - Paving
  - Builder’s clean-up
  - Landscaping
  - Fencing
  - Clothes line
  - Letterbox
- Variations during construction

Post-construction
- Pre-handover inspection
- Handover
- Final completion
Annex G – Personnel involved in residential building processes

Table G.1: Building processes personnel involved in pre-construction, construction and post-construction in the residential building industry.

<table>
<thead>
<tr>
<th>Process</th>
<th>Personnel involved</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-construction</strong></td>
<td></td>
</tr>
<tr>
<td>Client contact with designer</td>
<td>Client</td>
</tr>
<tr>
<td></td>
<td>Project home builder, architect, designer/draftsperson</td>
</tr>
<tr>
<td>Preparation of brief for the design</td>
<td>Client</td>
</tr>
<tr>
<td></td>
<td>Project home builder, architect, designer/draftsperson</td>
</tr>
<tr>
<td>Survey</td>
<td>Registered surveyor</td>
</tr>
<tr>
<td>Design and documentation for building</td>
<td>Project home builder, architect, designer/draftsperson, council</td>
</tr>
<tr>
<td>approval</td>
<td></td>
</tr>
<tr>
<td>Estimates</td>
<td>Project home builder, architect, designer/draftsperson or estimator</td>
</tr>
<tr>
<td>Builders</td>
<td>Project home builders</td>
</tr>
<tr>
<td></td>
<td>Registered builders</td>
</tr>
<tr>
<td></td>
<td>Owner-builders</td>
</tr>
<tr>
<td>Subcontractors</td>
<td>Excavators, concreters, plumbers, electricians, bricklayers, carpenters,</td>
</tr>
<tr>
<td></td>
<td>renderers, plasterboard installers, roofing finish installers, tilers, painters</td>
</tr>
<tr>
<td>Quotes</td>
<td>Builders, project home builders, subcontractors</td>
</tr>
<tr>
<td>Contracts</td>
<td>Client, builder, project home builder</td>
</tr>
<tr>
<td></td>
<td>Builder, subcontractors</td>
</tr>
<tr>
<td>Construction program and scheduling</td>
<td>Selected builder</td>
</tr>
<tr>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Site preparation</td>
<td>Builder</td>
</tr>
<tr>
<td></td>
<td>Demolition contractor</td>
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<tr>
<td></td>
<td>Excavator</td>
</tr>
<tr>
<td></td>
<td>Plumber</td>
</tr>
<tr>
<td>Footings</td>
<td>Reinforcement subcontractor</td>
</tr>
<tr>
<td></td>
<td>Concreter</td>
</tr>
<tr>
<td>Floor</td>
<td>Reinforcement subcontractor</td>
</tr>
<tr>
<td></td>
<td>Concreter</td>
</tr>
<tr>
<td>Walls</td>
<td>Bricklayer</td>
</tr>
<tr>
<td>Ceiling frame</td>
<td>Carpenter</td>
</tr>
<tr>
<td>Roof</td>
<td>Carpenter</td>
</tr>
<tr>
<td>Services rough-in</td>
<td>Plumber, electrician</td>
</tr>
<tr>
<td>Roof finishes</td>
<td>Roof tiler</td>
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<tr>
<td></td>
<td>Sheet metal roofer</td>
</tr>
<tr>
<td>Roof plumbing</td>
<td>Roof plumber</td>
</tr>
<tr>
<td>Linings</td>
<td>Renderer, plasterboard installer, solid plasterer, wall/ceiling lining subcontractors</td>
</tr>
<tr>
<td>Fixtures and cabinetry</td>
<td>Plumber, cabinetmakers</td>
</tr>
<tr>
<td>Finishes</td>
<td>Tilers, painters</td>
</tr>
<tr>
<td>Fittings and services</td>
<td>Various</td>
</tr>
<tr>
<td>Completion of external works</td>
<td>Builder</td>
</tr>
<tr>
<td>Variations during construction</td>
<td>Client, builder, subcontractors</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Post-construction</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-handover inspection</td>
<td>Client, builder</td>
</tr>
<tr>
<td>Handover</td>
<td>Client, builder</td>
</tr>
<tr>
<td>Final completion</td>
<td>Client, builder</td>
</tr>
</tbody>
</table>
This learner’s guide will take you through the building process from initial contact between the client and the designer through to building completion and handover to the client. It contains a mix of content and hands-on activities that support the unit 30010 *Apply knowledge of residential building processes and materials* from Certificate II in Building and Construction (Pathway – Paraprofessional). The course, and this guide, focus on the skills and knowledge required to get your career started as a paraprofessional in the residential building industry.

The topics covered in this guide include:

- contracts and agreements
- the role of tradespeople and others in the building industry
- the building schedule
- paper sizes and common scales used
- materials used in the construction of residential buildings
- communication, teamwork, problem solving, planning and organising.

You will also learn the basic characteristics of building processes and how they interrelate. Assessment activities are also included.

**EDITION**
Edition 1, 2012
Unit and course codes updated 2014

**COURSE/QUALIFICATION**
Certificate II in Building and Construction (Pathway – Paraprofessional)

**UNIT**
30010 *Apply knowledge of residential building*

**RELATED PRODUCTS**
This resource is one of a series that covers all 12 units of the Certificate II in Building and Construction (Pathway – Paraprofessional) qualification. Please refer to our product catalogue for more information.