



WORKBOOK

CPCBC 4012A
Read and interpret plans and specifications

ACKNOWLEDGEMENTS

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Acknowledgement

This work has been produced initially with the assistance of funding provided by the NSW Department of Education and Training, Industry Programs, through the **Skills Enhancement Program** with advice from the Project Steering Committee.

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PART A ABOUT THIS GUIDE

This Guide outlines activities that you can undertake in your workplace and off-the-job to develop the knowledge and skills required for the units outlined on the previous page. Your trainer, assessor or supervisor will provide you with resources to also assist you.

The guide consists of four parts:

- Part A – About this Guide
- Part B – Information about the Unit of Competency
- Part C – Learning Resources and Learning Activities
- Part D – Assessment Activities

Part A provides details about this guide.

Part B provides details of the unit of competency setting out information relating to who is best suited to complete the unit, what the aims of the unit are and what areas are covered, what the entry requirements will be, how the course is delivered, how the learning activities are completed and how assessment is conducted.

Part C of the guide outlines topics and then asks you to complete an activity following each topic. The information you obtain from these activities will assist you to complete the Assessment Tasks associated with each unit of competency.

Part D of the guide will contain an Assessment Task. The Assessment Task is aligned with the critical aspects to demonstrate competency in this unit.

PART B

INFORMATION ABOUT THIS UNIT

CPCBC 4012A – Read and Interpret Plans and Specifications

This unit is a **core unit** of competency within the following qualifications:

- CPC40508 Certificate IV in Building and Construction (Site Management).
- CPC40708 Certificate IV in Building and Construction (Trade Contracting).

This unit is an **elective unit** of competency within the following qualification:

- CPC40108 Certificate IV in Building and Construction (Building).
- CPC50509 Diploma of Fire Systems Design

Who is this unit for?

This unit of competency supports the needs of designers, site managers, forepersons, estimators, builders, managers and other building and construction industry personnel who have a responsibility for ensuring the currency of plans and specifications and for reading and interpreting these for application to estimation, planning and related supervisory activities.

What are the aims of the unit?

This unit specifies the outcomes required to read and interpret plans and specifications in order to inform estimation, planning and supervisory activities.

What areas are covered?

- Identification of the types of drawings and their purposes.
- Application of commonly used symbols and abbreviations.
- Allocation and identification of key features on a site plan.
- Allocation and identification of key features on drawings.
- Reading and interpreting specifications.
- Allocation and identification of non-structural aspects to the specification

What are the entry requirements?

It is expected that you would have basic numeracy and literacy skills. (If you think you need further assistance in this area refer to the Introduction Guide for a list of organisations who maybe able to provide assistance).

It is important that you are employed in or have access to a building and construction site to be able to complete authentic assessment tasks and projects.

How is the unit delivered?

This Candidates Guide is a key resource and contains information, activities, readings and assessment tasks for you to carry out and complete.

The training is designed for flexible delivery and is delivered in the following way:

- *By Distance Learning.* If you are a person who can study independently this could be to your advantage. Study at home with the support from your trainer/assessor, workplace coach and workplace colleagues.

▪ **Learning Activity Summary**

Learning Activities have been designed to assist you to develop the skills that are necessary to demonstrate consistent achievement of the workplace outcomes covered by each of the units of competency.

They are also designed to allow you to work through the activities at your own pace. If you need assistance talk to your trainer or your workplace coach who will assist you.

To complete this unit you will need to undertake the following activities:

- Read the Learning Resources.
- Conduct the nominated research.
- Discuss the topic with your colleagues.
- Review how the process is completed in your workplace.
- Talk to people in the industry who know how to carry out each task.
- Investigate how things are done in other organisations.
- Discuss the topic with your workplace coach, trainer and/or assessor.
- Complete the Learning Activities shown in Part C.
- Complete the designated Assessment Task set out in Part D.

Learning Activity Summary

Topic	Description
Topic 1	Construction Drawings. Activity No. 1 Description and purpose of the construction drawings.
Topic 2	Drawing Symbols and Abbreviations. Activity No. 2 Symbols and Abbreviations.
Topic 3	Specifications Activity No. 3 Specifications.

Assessment Process

The assessment task will be practical and based on the learning activities completed within this unit of competency.

The assessment process is in 3 parts:

1	Assignment (Workbook Activities) You are required to complete the activities contained in this workbook.
2	Written (or Verbal) Questions You are required to answer a range of questions.
3	Project Interpret a set of plans/drawings and specifications relating to a construction project

Outcome

The successful completion in ALL 3 of the Assessment Tasks will result in the issue of a Statement of Attainment in:

CPCBC 4012A – Read and Interpret Plans and Specifications

Other Information Sources

Along with this guide you will need to find information from various sources. You may find copies of relevant legislation, codes, standards etc at the public library, on the internet, or you may already subscribe to the Australian Standards or Building Codes Board.

Web-sites can be another source of relevant information. Further website links, reference material and recommended reading will be noted throughout the booklet under each topic.

General information and useful links specific to this unit of competency - CPCBC 4012A – Read and Interpret Plans and Specifications

<http://.lawsearch.gov.au/>

SCALEplus – Commonwealth Attorney-General's Department (for access to Commonwealth legislation).

<http://www.austlii.edu.gov.au/>

Australian Legal Information Institute (for access to Australian legislation).

<http://www.lawfoundation.net.au/legislation/>

Law and Justice Foundation of NSW (for access to Australian legislation and other links).

<http://www.abcb.gov.au/>

The Australian Building codes Board.

Specific Reference Material:

Australian Standard Method of Measurement of building Works – (Aust. Institute of Quantity Surveyors & Master Builders Australia Incorporated – Publishers Clark & Mackay – Brisbane, Aust.

TOPIC 1 - CONSTRUCTION DRAWINGS

In the development of architectural and building ideas two types of drawings are used:

1. Design or sketch drawings that set down ideas on room relationships, room sizes, the orientation of the house, the stylistic treatment of the house, colour schemes, possible furniture layout and landscaping ideas.
2. Working drawings or construction drawings that show the finalised design. They indicate the exact arrangement of spaces, their sizes, the materials of construction and specific details so as to enable the building to produce the house.

A set of drawings for a building would consist of the following:

- Site Plan
- Foundation Plan
- Floor Plan
- Elevations
- Sectional Elevation
- Section Details
- Bracing Plan
- Tie Down/Fixings
- Joinery Schedule
- Timber List

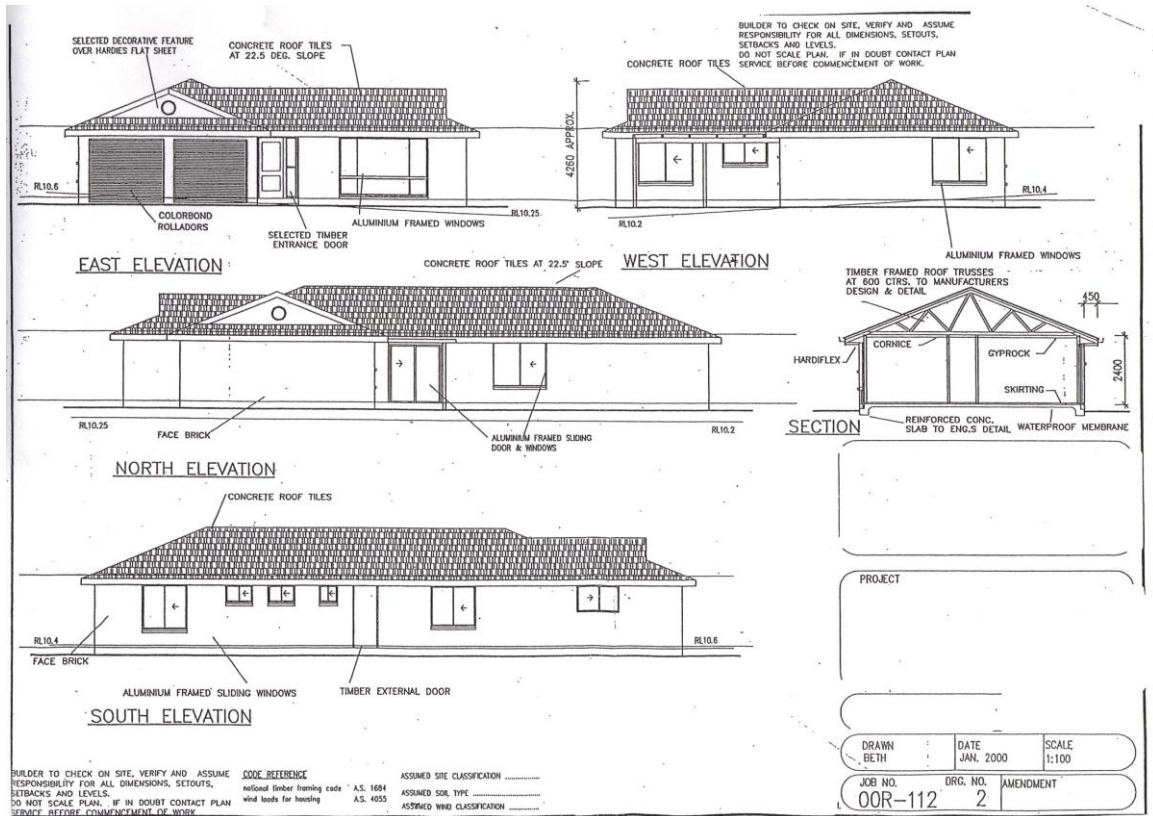
A description of a selection from the above list is as follows:

Plans

The term plan is generally spoken of in two ways. All of the drawings for a proposed house are known as “plans”. More accurately, a plan is a view which shows the layout or arrangement of rooms and other parts of the interior of a house.

Elevation views

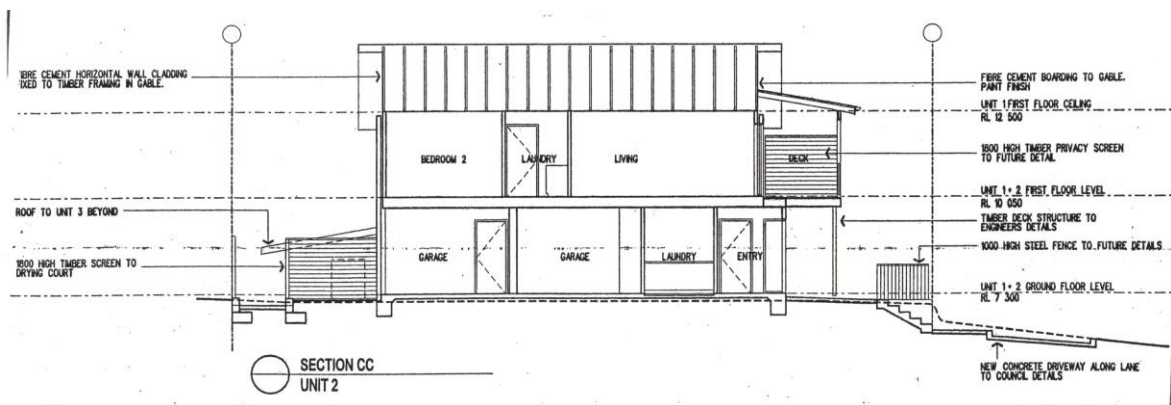
Face squarely and look at one after the other the four sides of an existing house. Each side is what is called an elevation view. In architectural drawing, architects refer to the sides of a house as elevations.



Elevation View of a Typical House with Double Garage

Section views

In most cases elevation and plan views cannot show sufficient information to enable a builder or tradesman to see exactly how the various structural parts of the house are to be built or assembled. The section is a view of the house after it has been cut vertically at some point. Like the floor plan it shows the size and thickness of structural members and relationships between spaces. For example, it shows the height from the ground to the floor, the height between the floor and the ceiling, and how the roof is to be constructed.



Section View of a 2 Storey Residence

Scales

General requirements for working plans are that they are drawn to scale.

On most drawings the scale used makes the drawings $1/50^{\text{th}}$ or $1/100^{\text{th}}$ the original size. This means that instead of drawing something one metre long it is drawn $1/50^{\text{th}}$ or $1/100^{\text{th}}$ of a metre long. The scales in most common use are as follows:

Location or locality drawings	1:2500
Site Plans	1:500, 1:200
Plan views	1:200, 1:100, 1:50, 1:20
Elevations	1:200, 1:100, 1:50, 1:20
Sections	1:200, 1:100, 1:50, 1:20
Detail drawings	1:10, 1:5, 1:2, 1:1 full size

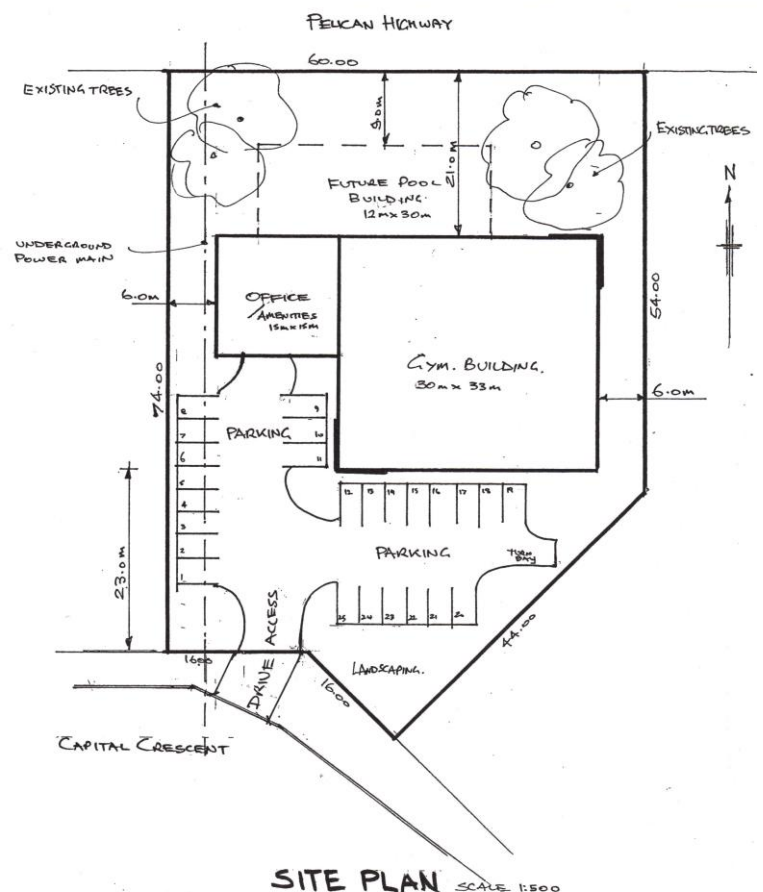
Contents of drawings

1. Survey Plan - Usually produced by a surveyor

- Existing site and surroundings.
- Position of major natural features, trees, ponds, rock outcrops.
- Sufficient spot levels and contour lines related to a specified datum (height above sea level).
- Dimensions of boundaries.
- Position of roadways, easements; existing drains and possibly service mains.

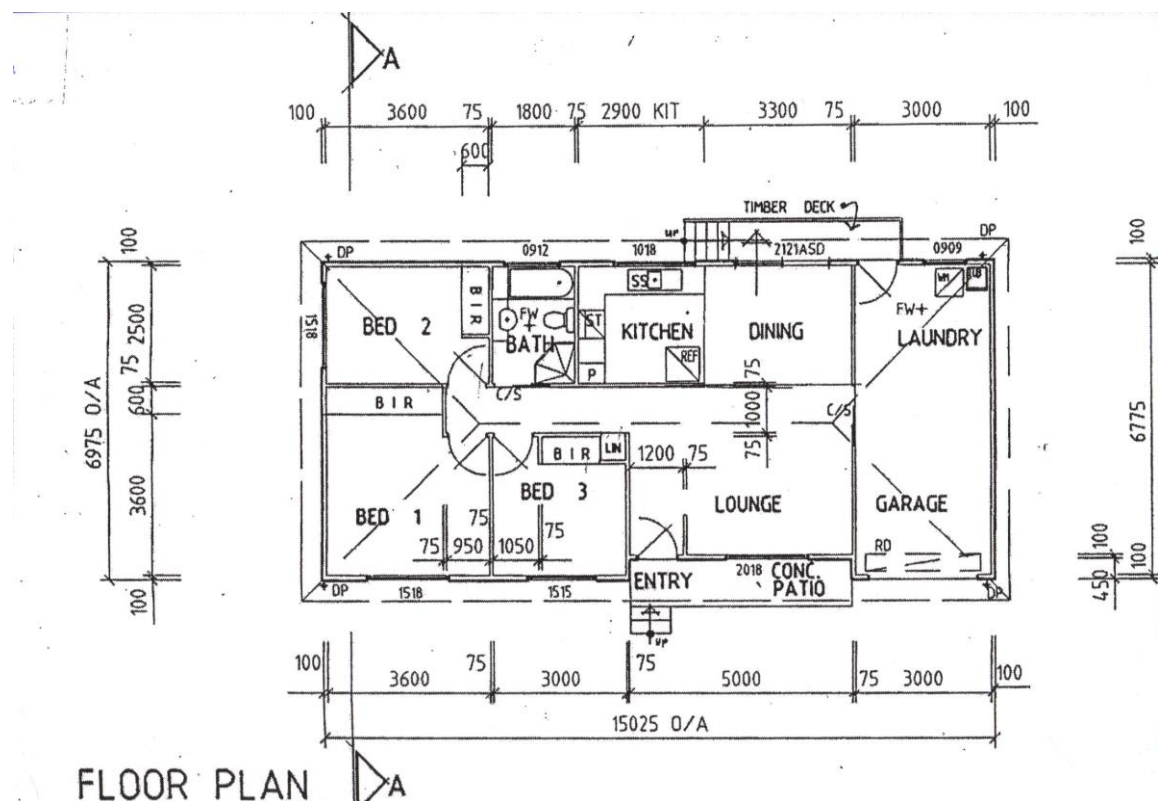
2. Site Plan

- Outline of site boundaries showing location of proposed building
- Position of boundary setbacks.
- Depths, where they may occur.
- New roads and pathways.
- Soil and surface water drains, complete with pipe sizes.
- Service runs from the house to mains.
- Location of utility services (sewer, water, gas, electricity).
- The point of connection of those services to the house itself.
- Indication of banking and cutting and areas for depositing and spreading surplus soil.
- New levels on the site in connection with the new house.
- Landscaping. Note, if the site is undulating or steep, section should be added to show principle areas of cutting and filling.



3. Floor Plan

- Overall dimensions.
- Dimensions of openings.
- Internal dimensions so far as necessary to establish positions of internal walls or fittings.
- Thickness of walls.
- Door swings.
- Windows.
- Location of fittings and fixtures.
- Names on all rooms.
- Floor finishes.
- Position of stairs and number of stair treads.



Floor Plan of a Typical 3 Bed Single Storey Home

Other Plans

Used either where requested or for more complex houses:

- Footing Plan
- Roof Plan
- Services plan

Sections and Elevations

- a. Elevations of all parts of the building.
- b. Size and shape of openings.
- c. External finishes.
- d. New and old ground levels showing cut and fill
- e. Position of floor level, ceiling level

The examples shown in these notes are basic formats only. Your Employer/Workplace Coach – Trainer/Assessor will provide current drawings of projects being constructed or completed by the organisation.

BUILDING ORIENTATION

The orientation of the walls and windows affects the amount of heat entering and leaving a home. The general rule is to orient the house so the main wall and window areas face north, also minimise windows to the west and, to a lesser extent, to the east.

In Australia the sun travels in the northern sky in winter. By placing living areas and windows to the north it allows rooms to be heated during the day thereby reducing the need for artificial heating at night.



General Instructions for all Activities

Follow the *Activity Directions* and provide a written outline of your findings and outcomes – send the outline to your trainer by email, fax or mail, the trainer will provide you feedback and guidance on the materials presented.

The outline may be in your own handwriting, a computer print out is not essential however the written outline must be legible.

Note: You may complete your outline by using the Result Sheet provided with each Activity OR provide the Activity Results using your own stationery. Attachment of extra notes and support documents may also be provided



TOPIC 1 - ACTIVITY 1

Description and Purpose of Construction Drawings

ACTIVITY DIRECTION

From the notes provided and the discussions held with the group – and/or your trainer/assessor, prepare an outline setting out a brief description/its purpose and content of the following types of drawings/plans:

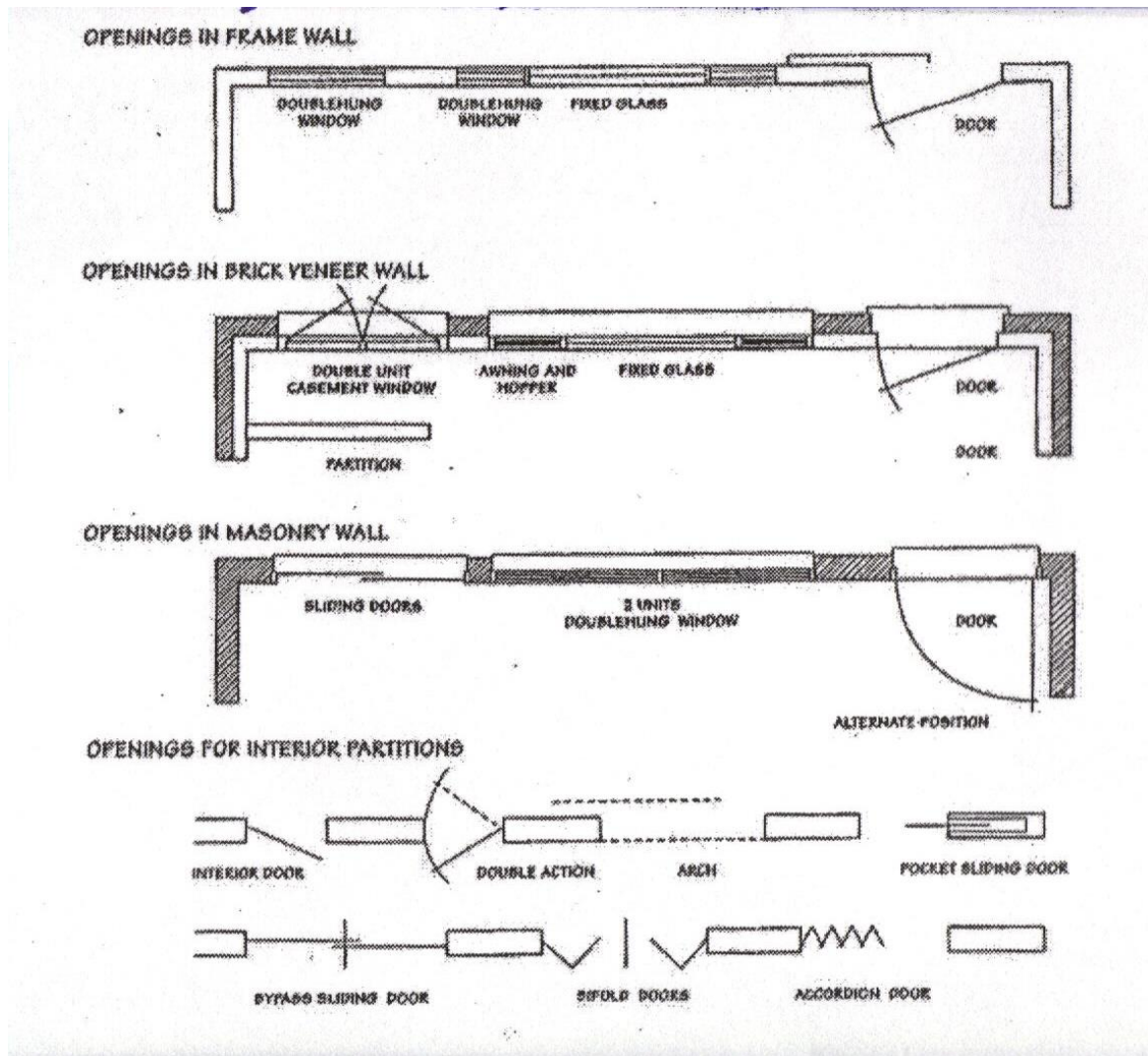
- Section View
- Elevation View
- Site Plan
- Floor Plan

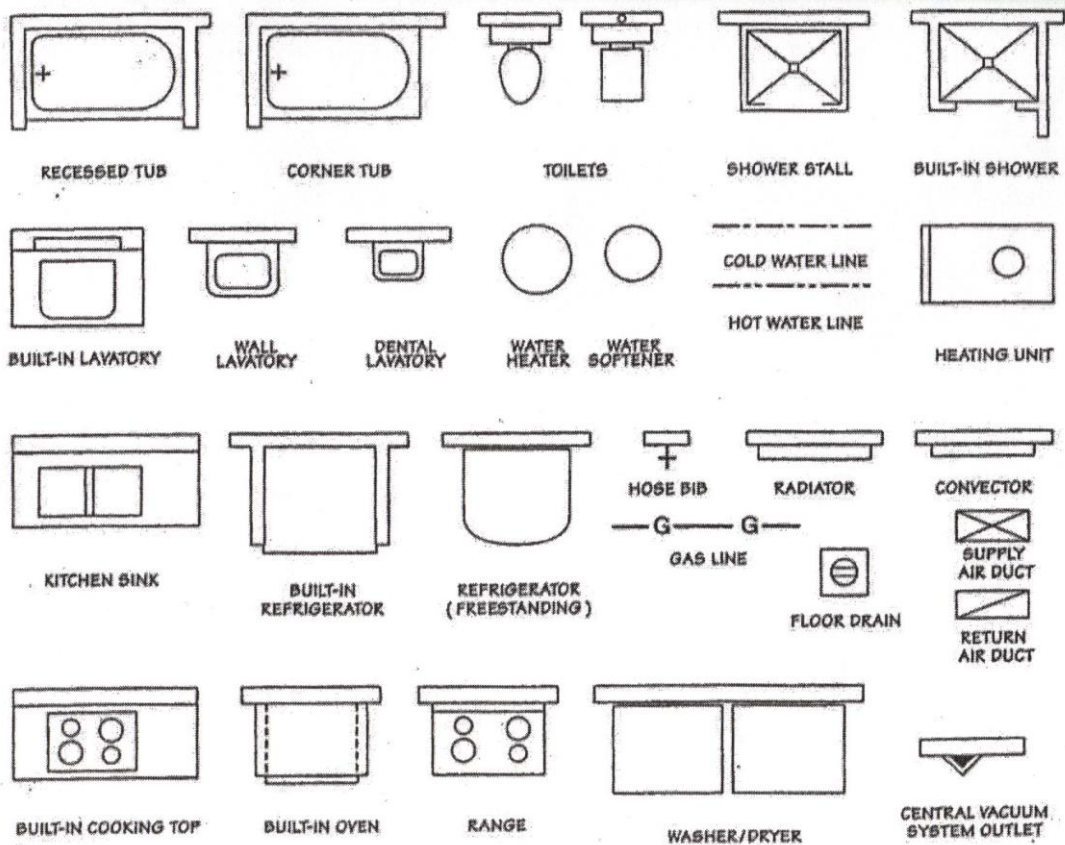
RESULT SHEET





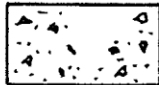

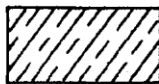



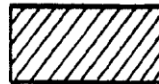
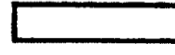






▪ Section View
▪ Elevation View
▪ Site Plan
▪ Floor Plan

TOPIC 2 – DRAWING SYMBOLS & ABBREVIATIONS

Shown on the following pages are symbols currently found on drawings and plans associated with the Construction Industry.





	BRICKWORK Elev: Light Red Sect: Vermilion	EARTH Sepia	
	CEMENT RENDER Terra Verte	EARTH FILL Raw Umber	
	CONCRETE Hooker's Deep Green	ROCK Vandyke Brown	
	CUT STONE MASONRY Emerald Green	HARDCORE	
	PARTITION BLOCK Indian Red	INSULATION Cerulean Blue	
	CONCRETE BLOCK Green	GLASS Cobalt Blue	
	STRUCTURAL STEEL Prussian Blue	TIMBER Yellow Ochre	
	SANITARY FITTINGS French Ultra-marine	SAWN TIMBER Chrome Yellow	
	ROOF TILES Cadmium Red	DRESSED TIMBER Burnt Sienna	

ABBREVIATIONS

Compare the 2 examples below. Example 1 is taken from a set of Architectural Designed Home Drawings. Example 2 is a list of common abbreviations used on construction drawings.

The abbreviated letters are an acronym of their meaning – for example - Wall Oven = WO

Example 1 – Architectural Drawings

AL	Aluminium	JT	Joint
AT	Acoustic Tile	LG	Louvre Grille
AW	Aluminium Window	LT	Laundry Tub
B	Basin	M	Mirror
BB	Bagged brickwork	MB	Metal Balustrading
BP	Brick Paving	MDF	Medium Density Fibreboard
CBK	Concrete Blockwork	MC	Metal Cladding
CMC	Coloured Metal Capping	MIX	Mixer Tap
CMR	Corrugated Metal Roofing	MO	Microwave Oven
CO	Custom Orb	MPB	Moister Resistant Plasterboard
CONC	Concrete	MT	Mosaic Tile
CP	Concrete Paving	PB	Plasterboard
CPT	Carpet	PBR	Painted Brickwork
CR	Cement Render	PBK	Painted Blockwork
CR/S	Cement Render/Set	PL	Plastic Laminate
CT	Ceramic Tile	PPF	Polyurethane Paint Finish
D	Dryer	PTD	Paper tissue dispenser
DP	Downpipe	REF	Refrigerator
DW	Dishwasher	RF	Resilient Flooring
EH	Exhaust Hood	S	Sink
F	Fixed Window Pane	SD	Soap Dish
FB	Face Brickwork	SK	Skirting
FC	Fibre Cement Sheeting	SR	Shower rose
FG	Fixed Glazing	SST	Stainless Steel
FS	Fly Screen	T	Taps
FW	Floor Waste	TB	Timber Boarding
GL	Glass Louvre	TBV	Timber Veneer
GNT	Granite	TR	Towel Rail
HC	Hose Cock	TRH	Toilet Roll Holder
HCD	Hollow Core Door	WM	Washing Machine
HD	Hand Dryer	WO	Wall Oven
HP	Hot Plate		

Example 2 – Common Abbreviations

AL	Aluminium	OH	Overhead
AS	Australian Standards	PF	Pad Footing
AUX	Auxiliary	PTN	Partition
B	Basin	P	Pier
B	Beam	P/F	Plan of Sub-division
BRR	Bearer	PBD	Plasterboard
BLK	Block	PG	Plate glass
BDYL	Boundary Line	PF	Portal Frame
BT	Boundary Trap	PCC	Precast Concrete
BRKT	Bracket	RAD	Radius
BK	Brick	RF	Raft Footing
BV	Brick Veneer	RHT	Rail Height
BWK	Brick Work	RWH	Rain Water head
BLDG	Building	RSC	Rolled Steel channel
BL	Building Line	RSJ	Rolled Steel Joist
CBL	Cable	R	Roof
CAB	Cabinet	SD	Service Duct
CAN	Canopy	SEW	Sewer
CI	Cast Iron	SD	Sewer Drain
CW	Cavity Wall	SHR	Shower
CEM	Cement	S	Sink
CM	Cement Mortar	SQ	Square Tube
CR	Cement Render	SPR	Sprinkler
CRS	Centres	SF	Strip Footing
CL	Centre Line	SWD	Storm Water Drain
CHY	Chimney	SWBD	Switchboard
CCT	Circuit	TC	Terra Cotta
CD	Clothes Drier	TR	Trench
CW	Cold Water	TM	Trench Mesh
COL	Column	TRH	Trough
C	Cooker	T	Truss
CONC	Concrete	U/C	Under Construction
CC	Concrete Ceiling	U/G	Underground
CF	Concrete Floor	UB	Universal Beam
CTR	Contour	UR	Urinal
CORR	Corrugated	V	Vent
DW	Dishwasher	VER	Verandah
D	Door	VERT	Vertical
DP	Down Pipe	WBD	Wallboard
DGE	Drainage	WP	Waste Pipe
FHT	Floor Height	WC	Water closet
FW	Floor Waste	WPM	Waterproof Membrane
G	Gas	WM	Water Meter
HW	Hot Water Unit	WR	Weather Resistant
MH	Man Hole	WRC	Wester Red Cedar
OUT	Outlet	W	Window
OA	Overall		



TOPIC 2 - ACTIVITY 2

Symbols and Abbreviations

ACTIVITY DIRECTIONS

- From the drawings provided list and describe a minimum of ten (10) symbols and abbreviations shown on the drawings.

RESULT SHEET

SYMBOLS

Name	Description
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

ABBREVIATIONS

Abbreviation	Name	Descriptions
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		



TOPIC 3 – ACTIVITY 3

Specifications

A specification sets out the technical requirements of the work. It is a direct explanation of the drawings and with them serves three purposes:

- First, as a full description of the project.
- Second, as a mandatory requirement for materials and quality of workmanship during construction.
- Third, as legal evidence in the event of litigation.

The specifications also form part of the tender documents both of which are part of the Contract Documents.

Construction specifications fall into three categories:

1. Materials
2. Workmanship
3. Machinery.

Material Specifications

These cover the type and quality of each material required in the project together with its treatment and testing by the supplier.

Workmanship Specifications

These cover the use of these materials in the project, their fabrication into the structure, the method and order of their installation, the quality of labour to be employed, the standard of workmanship required, and the tolerances permitted.

Machinery Specifications

These cover the capacity, performance, and operation of all permanent plant to be installed under the contract, and the commissioning tests necessary to demonstrate its adequacy.

A specification may comprise at least three or four parts:

- a) General Clauses covering the scope of the work, any special conditions, design criteria, and the like.
- b) Materials, including tests.
- c) Construction workmanship and tests.
- d) Machinery and commissioning tests.

In each part the sections of work are dealt with in some predetermined sequence; the actual sequence is of no importance, nor is the arrangement of the various parts of the specification, but consistency throughout the document makes for easy reference and clarity of expression.

In some types of contract the methods of measurement and payment must also be specified.

Set out in this example is an extract from typical specification.

Your employer, Trainer-Assessor may be able to provide a copy of a recent projects specification.

WALL FRAMING

Plates are to be trenched to a depth of approximately 10 mm to provide uniform thickness where studs are to be fixed. Where plates are machine gauged to a uniform thickness trenching may be omitted. Each wall section is to be diagonally braced and studs are to be trenched accurately to receive braces which are to finish flush with the faces of studs. Wall framing is to be seated on top of floor joists/.....; erected plumb and straight, and securely fastened at all parts.

Provide a clear space of 25 mm between the outer wall frames and internal face of brick veneer walls. Secure frames to the veneer walls by stapling the galvanized wire ties (as specified under "Bricklayer") to the studs. Ties are to slope downwards towards the veneer wall.

Unless otherwise specified wall framing is to be Hardwood/.....

Bottom and top plates.—To be in long lengths and halved at joints and intersections.

For 100 mm studs provide 100 mm x 50 mm/..... stress grade F8/..... plates.

For 75 mm studs provide 75 mm x 50 mm/..... stress grade F8/..... plates.

For tiled roofing, where roof trusses are placed more than 50 mm from a wall stud, the thickness of the top wall plate shall be not less than 75 mm.

Studs.—To single storey or upper storey of two storey building and not exceeding 3 000 mm in length, provide 100 mm x 38 mm/..... stress grade F4 to F8 studs spaced at a maximum of 450 mm/..... centres.

To lower storey of two storey building and not exceeding 2 700 mm in length provide 100 mm x 38 mm/..... stress grade F8/..... studs spaced at a maximum of 450 mm/..... centres.

Well block and securely fasten studs at all wall angles and intersections.

Studs to each side of openings to be of thickness shown below.

Clear opening	Thickness of studs	
	For single or top storey	For lower of two storey
Up to 900 mm	50 mm	50 mm
1 200 mm	50 mm	75 mm
3 600 mm	75 mm	100 mm

Studs are to be checked to receive heads over openings and trimmers under windows.

Heads.—To be Hardwood/..... and have a stress grade of F8 or better.

Where depth exceeds 150 mm, timber is to be seasoned having a maximum moisture content of 18 per cent. Heads are to be placed on edge and be checked or housed into studs and be not less than the sizes indicated below.

Where practicable and for openings 3 600 mm and over heads are to be carried through and fixed to the adjoining stud or a secondary stud.

Where supporting conventional roof construction.

Spec	For tiled roof construction	For sheet roof construction (metal or asbestos cement)
	mm	mm
Up to 900 mm	75 x 50 or 100 x 38	75 x 50
1 200 mm	75 x 75 or 100 x 38	75 x 50
1 500 mm	125 x 50 or 100 x 100	100 x 38
1 800 mm	175 x 50 or 150 x 75	125 x 50 or 100 x 100
2 100 mm	200 x 50 or 175 x 75	150 x 50 or 125 x 75
2 400 mm	225 x 50 or 200 x 75	175 x 50 or 150 x 75
2 700 mm	250 x 50 or 225 x 75	200 x 50 or 175 x 75
3 000 mm	300 x 50 or 250 x 75	225 x 50 or 200 x 75

DESIGN SPECIFICATIONS.

These are necessary when structural or other engineering design forms part of any contract. Hence the full criteria governing the design and safety of the works should be precisely defined, together with the owner's requirements for submission of detailed specifications, and so on.

REFERENCE TO CODES AND STANDARDS

Whatever the category of specification, standard codes of practice and a multiplicity of materials specifications published by the various governmental, standards authorities and materials suppliers are of great assistance. They are incorporated into the project specifications by reference only, thus reducing the volume of that document.

BUILDING CODE OF AUSTRALIA

Whenever construction is undertaken in Australia there is a requirement to conform to the Building Code of Australia - normally Local Government through the relevant enabling Act or Regulation brings this about through the adoption of the BCA.

In NSW the administrative provisions are currently contained in the Local Government Act 1993 and regulations.

Any provision of the BCA may be overridden by, or subject to, State or Territory legislation. The BCA must therefore be read in conjunction with the legislation. Any queries on such matters should be referred to the State or Territory authority responsible for building regulatory matters.

TERMINOLOGY WITHIN SPECIFICATIONS

Prime Cost Item (P.C.)

A monetary allowance for net trade price of articles (supply only) of a tentative nature at the time of tender. Articles may be completely stated (brand, type, quality, etc.) or left for the selection by owner or architect.

Provisional Sum

A monetary allowance which the tenderer is directed to include in his tender to provide for the cost of work, usually labour and materials, i.e.: special fitments, air conditioning, etc.

Provisional Quantities

A monetary allowance for certain components of the works when the exact quantities are unknown at the time of tendering and adjusted according to agreed rates on performance of the work.



TOPIC 3 – ACTIVITY 3
Specifications

RESULT SHEET

The essential elements that relate to the estimate
How are the essential elements communicated to the relevant personnel
Why are the essential elements communicated to the relevant personnel



TOPIC 3 – ACTIVITY 3

Specifications

How are the Building Codes identified and how do they affect the work to be undertaken.

How are the Australian Standards identified and how do they affect the work to be undertaken.

What are the non structural aspects of the specification.
