PLUMBING INSTALLATION

LEVEL - III

Based on October, 2023, Curriculum Version II

Module Title: Preparing working Drawing

Module code: EIS PLI3 01 1023

Nominal duration: 100 Hours

Prepared by: Ministry of Labor and Skill

October, 2023

Addis Ababa, Ethiopia

Contents

ACKNOWLEDGMENT

Ministry of Labor and Skills wish to extend thanks and appreciation to the many representatives of TVET instructors and respective industry experts who donated their time and expertise to the development of this Teaching, Training and Learning Materials (TTLM)

Acronym

2D .....Two Dimensions

3D .....Three Dimensions

DWV.....Drain Waste Vent

GDT .....Geometric Dimension and Tolerance

ISO .....International Standard Organization

LAP-Test .....Learning Activity Performance

PVC .....Polyevencloride

Introduction to the Module

In construction filed; preparation of final working drawings developed from preliminary, conceptual sketches, design and notes prior to the development of detail drawings with proper graphic standards and presentation conventions for construction, prepare working drawing to compile technical documents comprising drawings and reports in hard copies.

This module is designed to meet the industry requirement under the drafting technology `occupational standard, particularly for the unit of competency Preparing Working Drawing.

This module covers the following units:

- Planning and Preparing for work
- Types of drawings and their functions
- Drafting and sketching working drawings

Learning Objective of the Module

- Planning and Preparing for work
- Identify types of drawings and their functions
- Apply drafting and sketching working drawings

Module Instruction

For effective use this modules trainees are expected to follow the following module instruction:

1. Read the information written in each unit
2. Accomplish the Self-checks at the end of each unit
3. Perform Operation Sheets which were provided at the end of units
4. Do the “LAP test” giver at the end of each unit and
5. Read the identified reference book for Examples and exercise

Unit One: Planning and Preparing for Work

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- drawings and technical documents
- preliminary drawings and Source of drawing information
- Drawing instrument

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Collect drawings and technical documents
- Identify preliminary drawings and Source of drawing information
- Identify Drawing instrument

1.1 Drawings and Technical Documents

Drawings are visual representations of an object, structure, or system created using lines, shapes, and symbols. They can be used to convey information about dimensions, materials, and construction methods.

Technical documents are written or visual materials that provide detailed information about a product, process, or system. Technical drawings are just one type of technical document used in the construction industry.

It includes specifications, calculations, schedules, shop drawings, and operation and maintenance manuals.

Technical documents are used to ensure that products and systems are designed, installed, and maintained properly.

Specifications: These documents provide detailed information about the materials, equipment, and installation methods required for a plumbing project.

Calculations: These documents show the calculations used to determine pipe sizes, flow rates, and other important plumbing parameters.

Schedules: These documents provide a detailed schedule of all plumbing fixtures, appliances, and other components required for a project.

Shop drawings: These documents provide detailed drawings and specifications for custom-made plumbing components, such as valves or fittings.

Operation and maintenance manuals: These documents provide instructions for operating and maintaining plumbing systems after they have been installed.

1.1.1. Collecting drawings and technical documents

All drawings and technical documents are collected. Technical documents are included but not limited to:-

- Document comprising drawings, bill of quantities, specifications and reports.
- Compressing reports in a soft or hard copies labeled accordingly.

Technical data

The design drawings and technical specifications should include

Design drawings – these set out design information and Procedures which are required to be used on the works.

Bill of Quantities – this itemizes the quantity of materials to enable a tenderer to accurately cost the work for which they are bidding.

Material specifications – such as diameter, type and grade of material for pipes (e.g. Polyevencloride pipes or PVC), joining

Methods (e.g. Electro-fused or compression fittings etc.), or 28-day compressive strength of concrete.

1.1.2. Source of drawing information

The source of drawing information can refer to any material or resource that provides guidance or instructions on how to draw. This can include books, tutorials, online courses, videos, and other forms of educational content that teach the fundamentals of drawing techniques, such as sketching, shading, perspective, and composition. Additionally, source of drawing information can also refer to reference images or models used by artists to create realistic or accurate depictions of their subject matter.

For example a plumbing fixture component in a bathroom design drawing would provide information about the type of fixture, its location, and how it is connected to the plumbing system. This information is important for ensuring that the plumbing system functions properly and efficiently.

Overall, drawing components play a critical role in communicating important information about a design or project, and ensuring that it is constructed correctly and safely

1.1.3. Interpreting the information

The information that is to be interpreted to drawing shall be identified and read from free hand preliminary drawing and notes.

When prepared the drawings first identifying the drawing information's and then collecting the information to ours drawings (gathering information from similar project to your project).

The followings are gathering information to the other project or drawing:-

- How to work the drawings.
- The purposes of the drawings.
- What information's shows to observer.
- Advantages and disadvantages of the drawings.
- Where the drawings are mistake or incorrect (used to this information gather not doing the problems to your drawings.) etc…

Generally solving the above questions and recording on your short not book (hand book). Finally collecting the information's to the new projects for correct and smart work (project).

1.1.3. Planning scope of drawing including layout

The planning scope of drawing refers to the process of defining the scope of a drawing project, including the objectives, deliverables, timelines, resources, and stakeholders involved. It involves identifying the purpose and requirements of the drawing project, determining the scope of work, establishing the budget and schedule, and identifying the roles and responsibilities of all parties involved. The planning scope of drawing is critical to ensure that the project is completed on time, within budget, and meets the expectations of all stakeholders.

The planning scope of drawing including layout refers to the process of determining the overall design and arrangement of facilities and equipment in a specific area or space. This involves identifying the purpose and function of the space, determining the size and shape of the area, and selecting the appropriate equipment and materials to be used. The layout includes the placement of equipment, fixtures, and furniture within the space, as well as the location of doors, windows, and other features. The planning scope also includes considerations such as safety, accessibility, and efficiency in order to create a functional and practical design.

1.1.4. Time schedule for specific work

Time schedule for specific works are basic necessary for drafts (architect) men b/c when completed the work for specific time. At this time:-

- The clients are satisfied and increase of the no of clients.
- Satisfy for our work.
- Finished the work on time.

Increased working time (year) for employer's company

Bill of materials included material list and specification.

Drawing Lines

- The types and description of lines shall be in accordance with ISO 128, with the addition of an extra-thick line.
- An extra-thick line shall be used to stress certain parts.
- The following thicknesses of lines shall be used:
    - Thin line — relative thickness 1;
    - Thick line — relative thickness 2;
    - Extra-thick line — relative thickness 4.
- On an individual drawing, two or three different line thicknesses may be used.

- Outlines of parts in section are generally drawn with thicker lines than those in view In order to distinguish parts in section from each other or parts in section from parts in view, different line thicknesses or hatching or shading of areas of parts in section may be used.

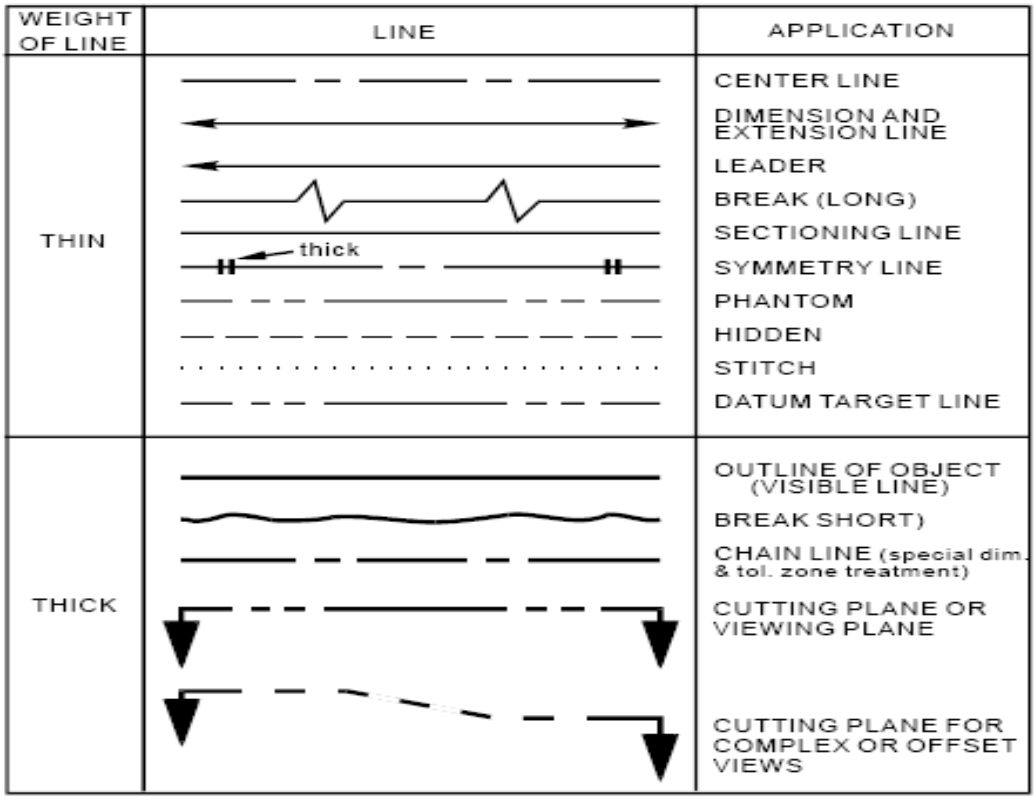


Figure 1. 1 Line types

1.2 Preliminary Drawings and Source of Drawing Information

Preliminary Drawings

Preliminary drawings in civil construction terminology refer to the initial sketches or plans created during the early stages of a construction project. These drawings are used to communicate the basic design concept and layout of the project, including the location of buildings, roads, utilities, and other infrastructure.

Preliminary drawings may also include rough estimates of materials and costs, as well as any environmental or regulatory considerations that need to be taken into account.

The reason we use preliminary drawings

- During the design phase of a project, preliminary drawings serve to layout the important issues, functionality, specifications, and preferences that are relevant to all the parties involved.

- Preliminary drawings precede the final construction drawings that are more costly to produce because final drawings go into the details necessary for construction contractors, architects, and engineers.
- The preliminary plans help visually establish a common understanding and convey what will be built so a transaction or project moves forward efficiently and cost effectively. The preliminary plans help establish the guidelines that serve to produce cost estimates, feasibility studies, final construction plans, or other analysis.

Drawing Standards

There are specific conventions for uniformity in conveying detailed technical information related to a part's complexities or components. These conventions are known as drawing standards. As per the facts, the most widely accepted set of engineering drawing standards in the United States is mentioned in the American National Standards Engineering Drawing and Related Documentation Practices

Tolerances

Sometimes it is not possible to produce parts exactly according to specifications. There is always a variance between the intended dimensions and the delivered parts. According to the industrial standard, tolerance is "the total amount a specific dimension is permitted to vary. The variance between the maximum and the minimum limits is tolerance.

1.3. Drawing instrument

A drawing instrument is a tool used to create drawings, sketches, or technical illustrations. These instruments can include pencils, pens, markers, charcoal, pastels, rulers, compasses, protractors, and other specialized tools designed for specific drawing techniques. They are used by artists, architects, engineers, and designers to create precise and accurate drawings that communicate ideas and concepts visually.

1.3.1. Selecting proper materials, tools and equipment

Proper materials, tools and equipment are selected and will be ready for the task.

Material: The material used in part or component is vital information necessary for the manufacturer. You can typically find it in the title block of the drawing.

Example

Sketching papers

- Graph papers
- Tracing paper
- Transparent flaxy glasses

- Leads in different grades
- Fix pencil
- Template
- Masking tape
- Markers in d/t colors
- Erasers etc…

Tools and equipment's

- Computer
- Scanner
- A3 & A4 printer
- Plotter
- Flash disk
- Letter guide
- Radiograph set
- Set squares
- Dividers
- Scientific calculator
- Scale etc

Drawing sheet sizes & references

The drawing sheet's size varies depending on the type of product to be designed. The usually accepted drawing sheet sizes are A0, A1, A2, A3 and A4. For your understanding, An A0 sheet has 1m² of drawing area available.

Next is the drawing sheet reference; many detailed designs require multiple sheets to define their content adequately. Numerous views, auxiliary views, sections, extensive title blocks and notes may require more space than is available on a single sheet. Therefore, multiple sheets are needed, and all should have specific reference to each other.

In Table 1 are shown the most widely used A and B Series of the ISO drawing sheet sizes, with A4 being the most popular size.

Table 1. 1 Drawing paper size

Series Designation	Trimmed Size, mm		Inside Border, mm	
	Y	X	H	W
A0	841	1189	821	1159
A1	594	841	574	811
A2	420	594	400	564
A3	297	420	277	390
A4	210	297	190	267
A4 Vertical	297	210	277	180
B1	707	1000	687	970

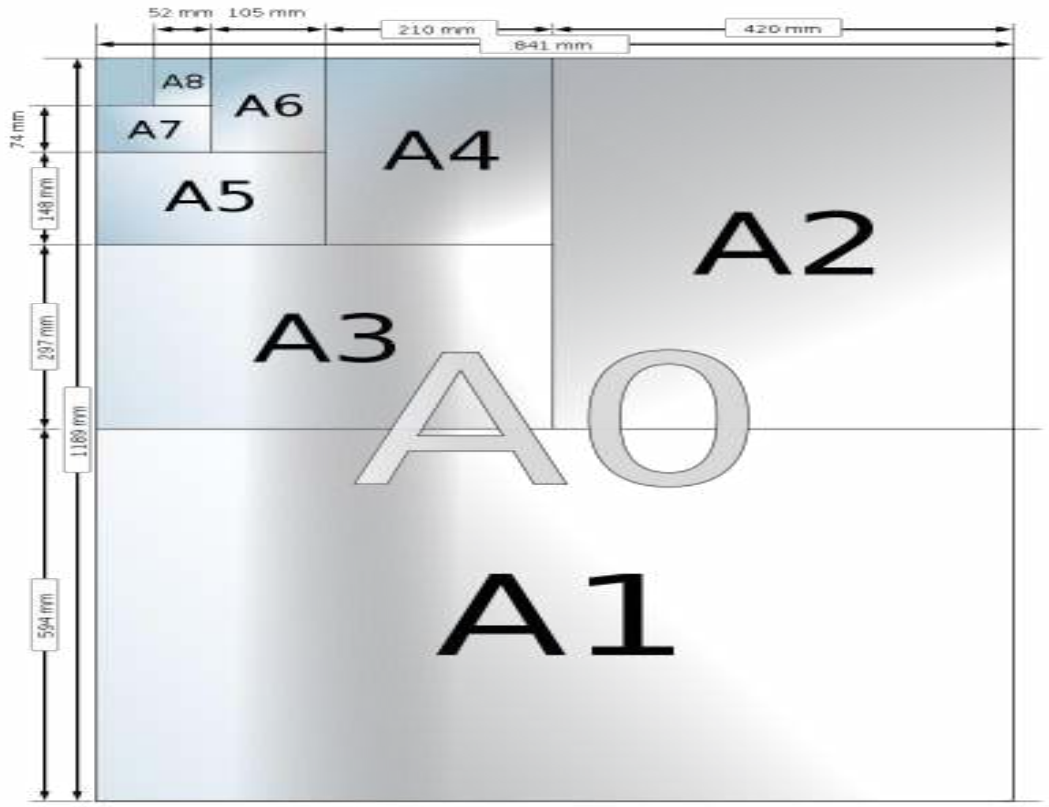


Fig. Paper size

Self-check-1

Part I Say true or False

1. Document comprising drawings, bill of quantities, specifications and reports are technical documents.

2. Time schedule is not necessary for drafts (architect) men.

3. Preliminary drawings are intended to be used for construction.

4. Technical drawings are just one type of technical document used in the construction industry

Part II Choose the best answer

1. All are drawing materials except----------?

   A. Sketching papers B. Fix pencil C. Flash disk D. Template

2. Which One of the following is drawing paper?

   A. A4 B. A10 C. A2 D. A&C

Part III: Short answer writing

Direction: Give short answer to the following question. Time allotted for each item is 2mniut and each question carry 4 point.

1. List at least three technical data
2. List types of drawing sheet sizes

Self-check-2

Part I Say true or false

1. Drawings have a legend to indicate what the symbols used on the drawing mean.
2. Abbreviations are used when there is no space to show a symbol.
3. Symbols are used instead of words on drawings to save space.

Part II Matching

Abbreviation	Full name
1. DP	A. Face Brick
2. DW	B .Floor Area
3. FA	C. Finished Ceiling Level
4. FB	D. Finished Floor Level
5. FCL	E. Vent Pipe
6. FFL	F .Window
7. VP	G .Vinyl
8. W	H. Downpipe

Part III Short answer

1. List at least five types of floor plan symbols
2. List at least 3 building stone requirement.
3. Identify the advantages of drawing specifications

Unit Two: Types of Drawings and Their Functions

This unit to provide you the necessary information regarding the following content coverage and topics:

- Main Types of Plans and Drawings
- Quality Requirements
- Issuing and Filing Drawing

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify main types of plans and drawings
- Apply quality requirements
- Issue and fill drawing

2.1. Main Types of plans and drawings

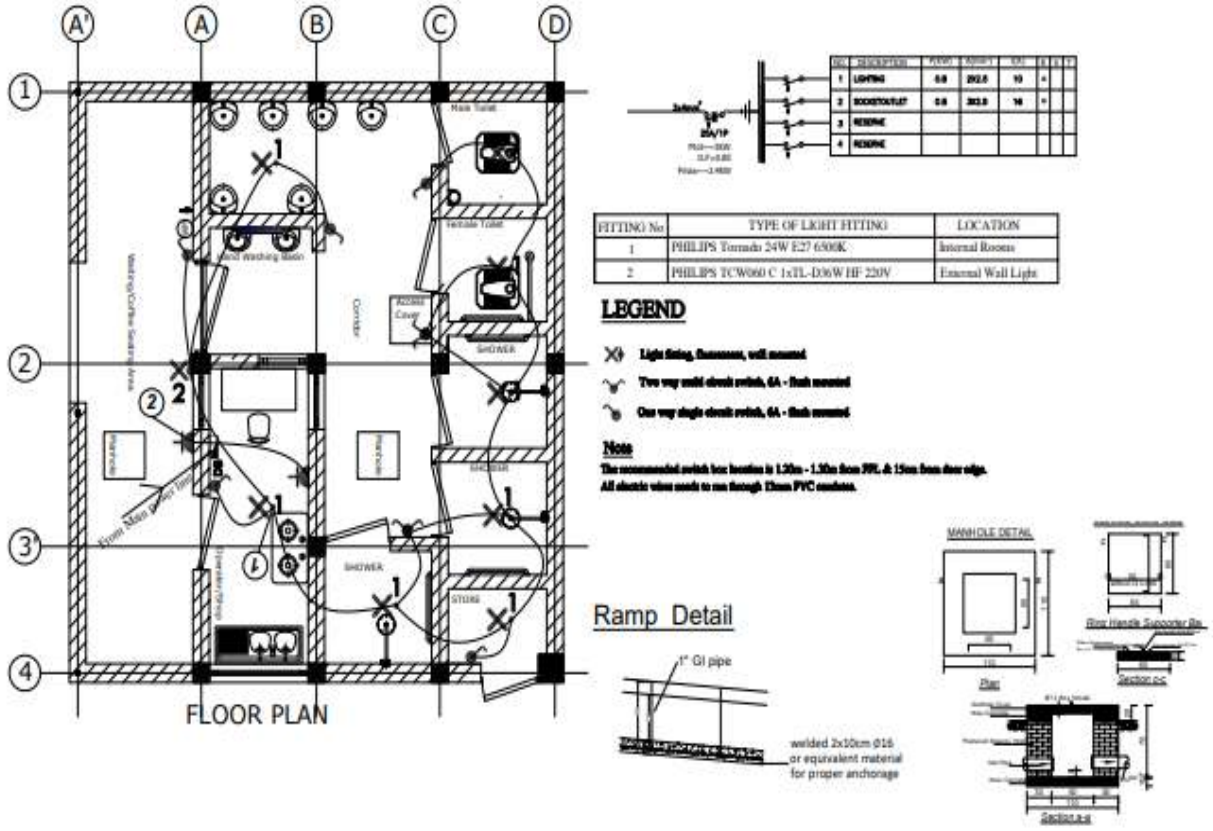
Main types of plans and technical drawings used in the civil construction sector of the industry are Include:-

- Architectural drawings (AR)
- Structural drawings (ST)
- Electrical drawings (EL)
- Sanitary drawings (SN)
- Mechanical drawings (ME)

Architectural drawings (AR): Architectural drawing is the special language of the architect, which he uses to convey to his client impressions of how a contemplated building will appear when completed. It is also used to convey to the contractors and workmen who perform the work of erection the information regarding size, form, materials, dimensions, etc. necessary to enable them to estimate the probable cost of the building, and to erect the building as the architect conceives it in his own mind.

Structural drawings : Shows the details of concrete cross section and reinforcement are for d/t RC members of the building; such drawings footings, columns, beams, slabs, stairs, shear walls and others and draw the general structure of the building e.g. made wood structures and steel structures such as wall, roof, etc.

Electrical drawing : Shows the electrical installation and power supply of the building (socket, bell, TV, etc.) how to install and written the description for all materials.



FITTING No	TYPE OF LIGHT FITTING	LOCATION
1	PHILIPS Tornado 24W E27 6500K	Internal Rooms
2	PHILIPS TCW060 C 1xTL-D36W HF 220V	External Wall Light

LEGEND

Sanitary drawing: Sanitary (plumbing) drawing is a technical overview of the system that shows the piping for freshwater going into the building and waste coming out.

It should be noted here that a plumbing plan system is very advanced, and its elements completely depend upon the environment and what kind of building you are currently working on.

Typically, in every plumbing drawing, you will find some of the additional elements, like:

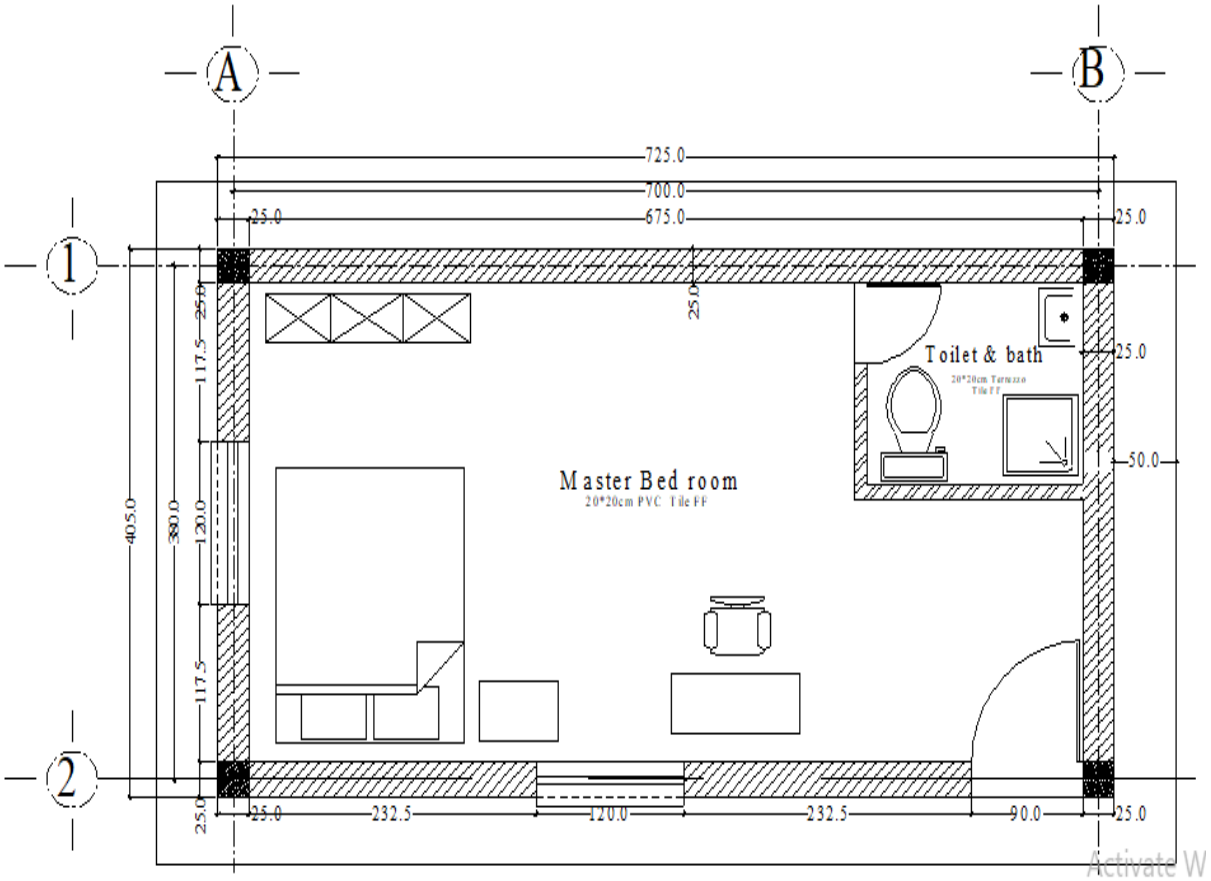
- A layout with dimensions, lines, and symbols representing all of the piping.
- Fixture schedules are properly marked, specifying the manufacturer and model for each item.
- All piping sizes include the layouts for cold/hot water, sanitary, vent lines, and more.
- A detailed document is about information related to the water heater, building plan, and requirements.
- One of the most important parts of a plumbing diagram is symbol legend, general notes, and specific keynotes.

In addition to this, other important information can be included in your plumbing system, like designs for special equipment, fire-protection notes, fire-sprinkler notes, drawings of water heater and floor drains, natural gas lines, and more.

3.1. 1 Types of Plumbing Plan

I. Water Supply Plumbing & Piping System

In a building's architecture, a plumbing system consists of an underground tank with supply lines and a supplied water system. A well-defined water supply plumbing and piping system are responsible for delivering the water to your bathroom (showers, toilets, basin, and bathroom) other house appliances (water heater, washing machine, and gardening).



II. Drain-Waste-Vent Plumbing & Piping System

In any household design or a commercial property, the most important plumbing system is the one that takes away the waste solid or liquid out of the building in the most effective way possible. As you see, the Drain-Waste-Vent or DWV plumbing system's job is to carry wastewater and sewage from sinks, toilets, showers, and other water-using appliances to the public sewer or septic tank.

III. Kitchen Plumbing & Piping System

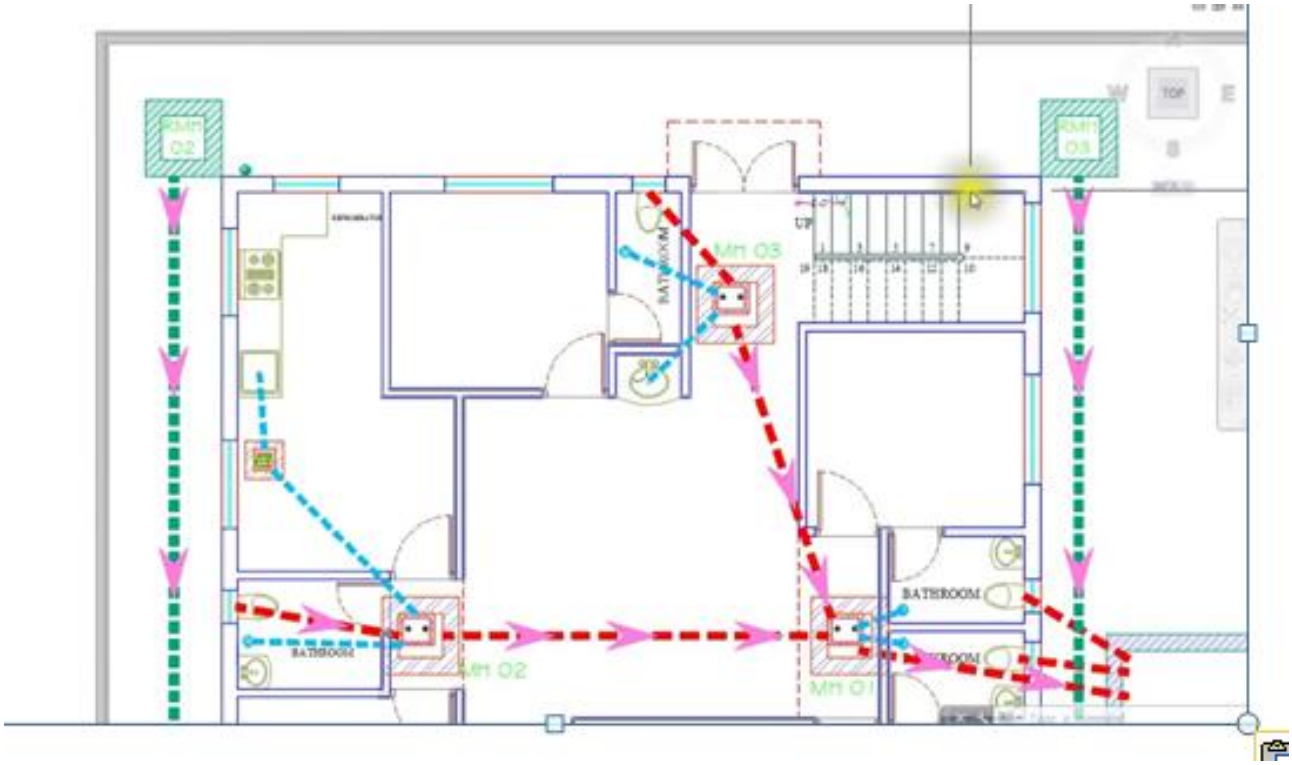
The kitchen plumbing and piping system are straightforward. it should include hot and cold water supply lines to the basic faucets.

IV. Bathroom Plumbing & Piping System

The bathroom is the primary area that uses most of the water in the house. In order to make the bathroom plumbing and piping system work, you should have two different types of plumbing installed one that will handle the water supply inside the bathroom area, and the second one is dedicated to drain-waste-vent.

V. Sanitary layout

A sanitary layout is a design and arrangement of facilities and equipment that promotes hygiene and cleanliness. It includes features such as separate handwashing stations, easily cleanable surfaces, adequate ventilation, and proper waste management systems. In a kitchen or food preparation area, a sanitary layout involves separating raw and cooked foods and ensuring that all equipment is regularly cleaned and sanitized**.**



VI. Mechanical drawing

Show the machinery used of the build such as lift shaft and other mechanical materials sizes material types and how to install of the building.

VII. Architectural drawings

Architectural drawings categorized in to two broad divisions. Presentation drawing and working drawing.

A. Presentation drawing

Communicate the form of the building interims of shape, color and texture.

Such drawing presented to:-

- Planning regulation offices for design approval.
- The client
- To help him in understanding of the program.
- To show to him the relationship of spaces and the general concept of the design.
- To illustrate to him the general appearance of the building. (The accommodation provided. The effect of the overall scheme on the environmental.)
- To get approval from him.
- The public
- Produced for use in periodicals, magazines and other publications.
- Jury members in the evaluation of design computation award.

Presentation drawings are also classified in to two:

I. Schematic drawings

Concerned with the preliminary investigation process for a design. Provides, information about: the site, immediate surrounding (adjoining structures, roads, services etc…)

- Development the entire site, like circulation pattern.
- Rough idea of the functional.

II. Design drawing

- Those concerned with the presentation of design solutions.
- Provide information about:

  Basic room arrangement

  - Exterior features
  - Immediate surrounding etc…

Such drawings more need to convey information about appearance because they presented for less technically minded people. So the presentation should be easily understood and preferably three dimensional (like- perspective),etc…

B. Working drawing

Drawing from which a design is constructed often called detail drawings because describes and give the dimensions of the details building parts being presented.

It is a developed work from preliminary, conceptual sketches, design and notes prior to the development of detail drawings with proper graphic standards and presentation conventions for Construction, read and interpret plans and specifications, to compile technical documents comprising drawings bill of quantities and reports.

Function provided by building (working) drawing during the realization of the project

- Communicate technical information though out the building team.
- To show how to design is to materialize.
- Convey information's for peoples concerned in erecting the building.
- Give information's to specification writer.
- For instructing the contractors and other members of building team.
- Means of obtaining official approval.
- Helps in the analysis of cost factor.
- Establish use of materials.
- Provides for tendering.
- Indicate contractual committeemen.
- Indicate degree of supervision.
- Demonstrate constriction details.
- Assist in the measurement of progress.
- Forms parts of documentation in site meetings.
- Establish type and amount of labor requirement.
- Basic for ordering materials and component

Contents of working drawing

The finished drawings made by the architect, which used by the contractor that working drawings includes the following sheets.

- Title page and index
- Floor plans
- Elevations
- Sections
- Roof plan
- Site plan
- Typical details
- Reflected ceiling plan
- Schedules
- Electrical requirement
- Plumbing (sanitarian plan)
- Structural etc...

As working drawing is actually the end result of the entire drafting and design effort let us have basic information's which shall be included on the above listed drawings.

Floor plans

The most important architectural drawing is the floor plan. It contains more information than all the other working drawings. The floor plan represents a tremendous amount of the project designers' time spent in analyzing and meeting the needs of the client.

Basically, the floor plan is a horizontal sectional view of the building taken about 150 cm above the floor line.

Floor plan helps the contractor to install the floor and to layout and construct walls and partitions. Floor plans help the development of other working drawings. Because all other architectural and engineering design is done.

Fully diminished, showing interior and exterior dimensions, wall thickness and room space sized.

Indicate partitions locations, positions of built in cabinetry and plumbing fixtures, doors swings etc…

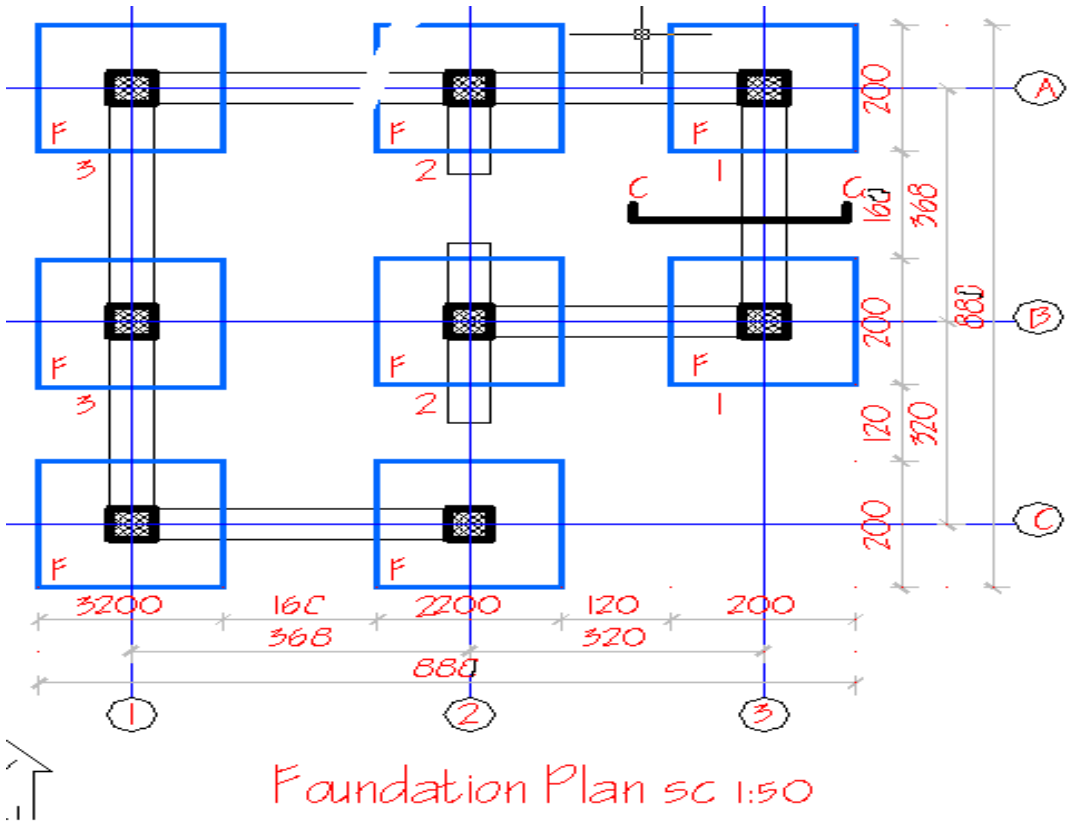
Foundation plan

Foundation plan is a dimensional drawing showing the site and configuration of the floor plan.

- it Is a drawing that shows the location of foundation wall concrete footings, concrete piers etc
- Purpose:-
- Shows the entire foundation system at point just after the back filling is completed.
- Shows all components such as the foundation wall, footings, grade beams and any substructures elements.
- Basic for the design of the structure frame working of the building.
- Foundation plan:-is drawn at level of the basement of subbasement floor. No first floor of basement construction is shown in foundation plan the entire dimension in foundation plan should coordinate with floor plan dimensions.
- Usually drawn with the same scale to the "floor plan".

Foundation plan should show

- Grid or modular planning lines.
- Datum level for excavation.
- Foundation of walls relative to foundations.
- Indication of existing foundation earth works to be removed.
- Position of walls relative to foundations.
- Dimensions of new foundations
- Levels of top and / or under side of foundations.
- Position of services of is installed below ground level.
- Location and size of holes left through foundation for service pipes,
- Drain and man hole foundation and levels.
- Typical details of foundation excavation.



Elevation plan

An architectural elevation is a view of a building containing a height dimension. When elevations show the inside of a building, they are called **interior elevations**, when they show the outside, they are called simply elevations.

Exterior Elevation

The exterior elevations will:

- Describe the exterior materials found on the structure.
- Provide a location for horizontal and vertical dimension.
- Show the relationship of two elements such as height of the chimney in relationship to the roof of structure.
- Incorporate reference bubbles for building, window or door.
- Show any exterior design elements.
- Necessary to the satisfactory appearance on a building as the floor plan is to its satisfactory functioning.

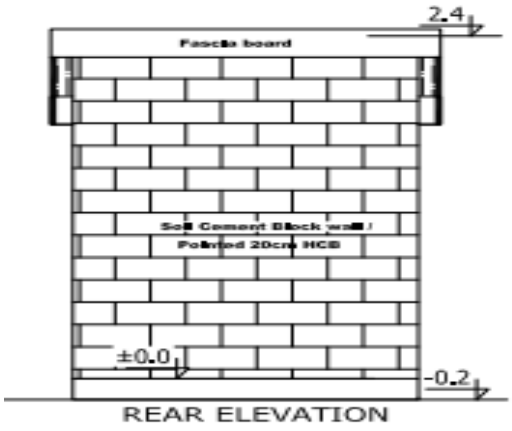
Interior elevation

Needed to explain the appearance of the components of the interior wall, the wall of the kitchens, bathrooms, and fireplace walls and other walls with permanently installed on the walls such as bookshelves and openings.

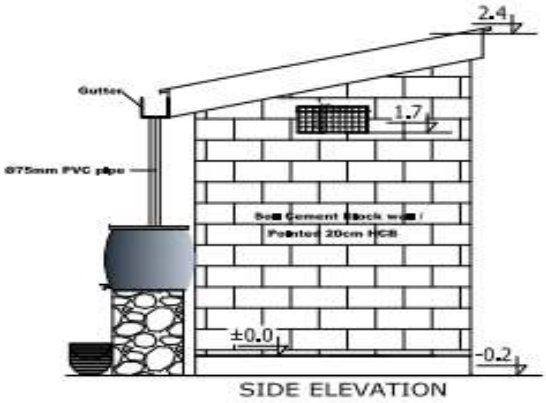
Generally, elevations are particularly useful for construction purposes. They are drawn in scale and all vertical and most horizontal lines are true length lines. The true relationship between features appearing on any vertical plan that is parallel to the viewing plane is shown. This is important to the builder.

Two methods are used to label elevation views

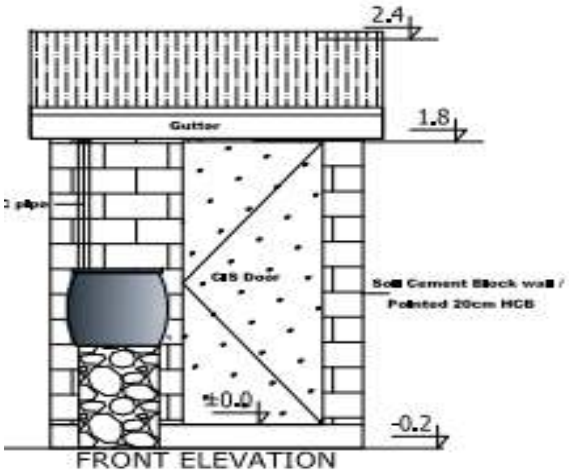
- Related to the main gate to the house
    - Front elevation
    - Rear elevation
    - Right side elevation
    - Left side elevation



REAR ELEVATION



SIDE ELEVATION



FRONT ELEVATION

Section plan

Sections: -Are an orthographic projection that has been cut apart to show interior features. (Vertical views Slicing the building or wall).

Purpose:-

- Describe the construction materials of the structure.
- Describe method of construction. (internal and external assembly of different parts)
- Show interior design elements.
- Clearly depict the structural conditions existing in the building.

Generally, section drawings describe constructions material and methods especially those things hidden by wall or ceiling sheathing and are often the easiest way to describe a complex detail to a contractor.

Roof plans

Roof plan: - The top view of a building.

Purpose: - Explains the overall configuration of the roof plan elements that penetrate or rest on, the roofing membrane.

Drawing: - A roof plan is usually one of the simplest drawings to do and is drawn at the same scale as the floor plan.

Types of roofs

There are two mainly used roof types. These are

- Flat roof- a roof with a slope range from 2% up to 10%
- Sloping roof- a roof with a slope that ranges from 10% to 100% (45^{o}).there are two types of sloping roofs these are
  - Low slope roofs from10% to 25%
  - Medium to high slope roofs 25% to 100% (45^{o})

There are many types of sloping roofs (pitched roofs).some of them are

- Hip roof
- Gable roof
- Shed roof
- Mansard roof
- Gambrel roof

Reflected ceiling plans

Reflected ceiling plan is the plan produced with the reflection see in a mirror placed directly below the ceiling. It contains all items in ceiling but nothing above the ceiling is included.

- A ceiling is an overhead interior surface that covers the upper limit of a room. It is generally not a structural element, but a finished surface concealing the underside of the floor or roof structure above.
- A reflected ceiling plan is the reflection that would be seen in a mirror placed directly below the ceiling but noting above the ceiling is included. It is a reflection of ceiling on a mirror that is put below it on the floor.

3.1.2. Site plans

Definition: - site plan is the top view of a building which shows the location of the house on the site to get her with information on terraces, walks, drive ways, contour, and elevations.

Check list: site plan show

- Properly lines –lengths each side, direction.
- Adjoining buildings streets, sidewalks, parking, curbs, and park ways.
- Existing structures and proposed structure.
- All utility lines (sewer, electric, telephone)
- Contours, existing and new contour elevations.
- Dimension

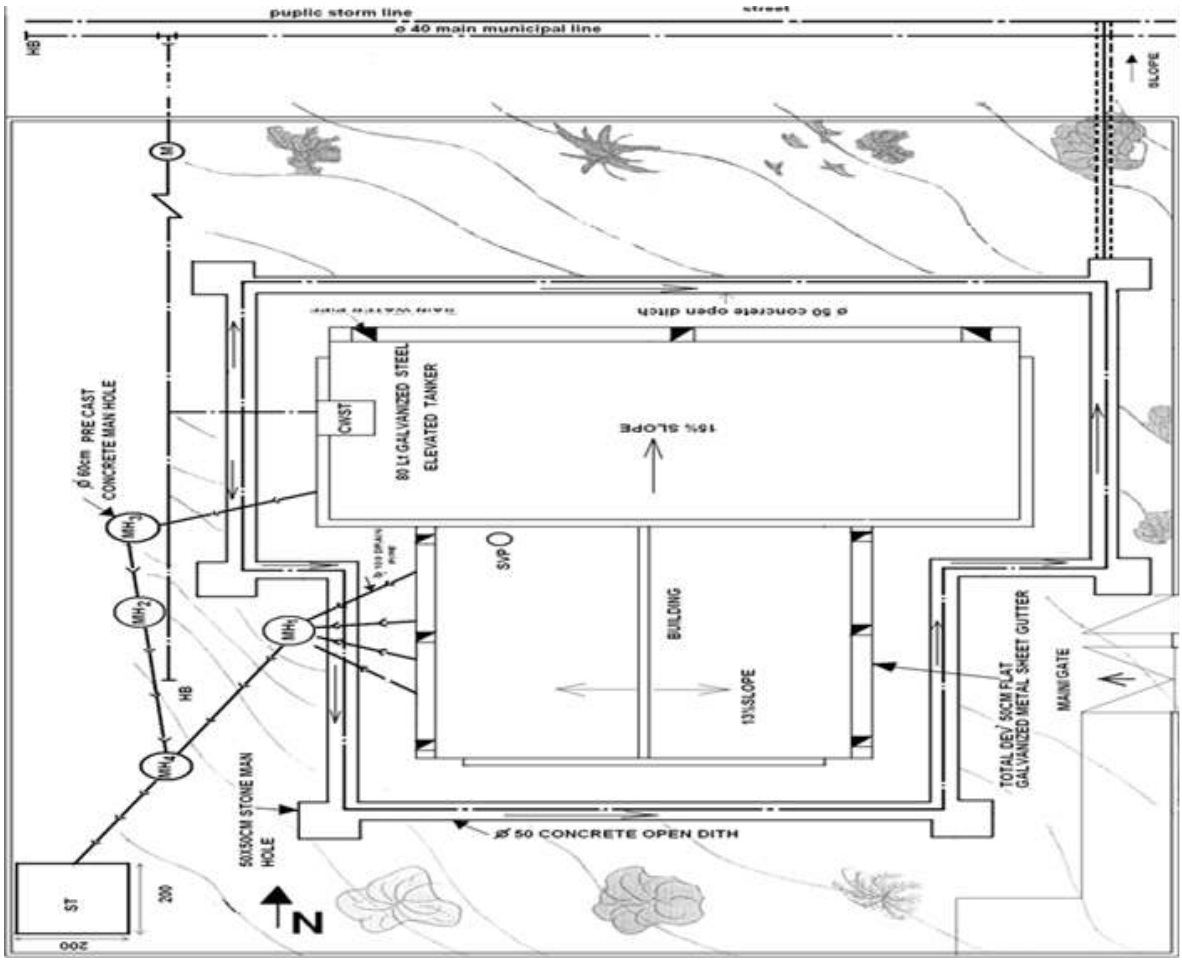


Fig. site plan

3.2. Quality Requirements

General aspects relating to building drawing

Working drawings should be:

- Clearly representative.
- Easily under stood.
- Comprehensive.
- Free from unnecessary notes (repetitive details).
- Accurately drawn (proper also in line work).
- Drawn with appropriate symbols and proper convention.
- Dimensional well.
- Drawn by referring building code.
- Proper in graphical representation.
- Proper titled (information panel).
- Logically and rarely arranged to give a balanced layout on the short paper.
- Drawn in appropriate scale.

3.2.1 Issuing and Filing Drawing

Issuing

Issuing a drawing refers to the process of distributing the finalized drawing to relevant parties such as manufacturing personnel, suppliers, or customers. This involves ensuring that the drawing is properly labelled and that all necessary documentation is included. The purpose of issuing a drawing is to ensure that all parties involved in the project have access to accurate and up-to-date information regarding the design and specifications of the product.

- Assign a Unique Identifier: Each drawing document should be assigned a unique identifier such as a number or code that can be used to easily identify and locate it.
- Review and Approve: Before issuing the drawing document, it should be reviewed and approved by the relevant parties such as architects, engineers, or project managers to ensure accuracy and completeness.
- Distribute: Once the drawing document is approved, it should be distributed to all relevant parties such as contractors, subcontractors, and suppliers.
- Track Distribution: Keep track of who has received the drawing document and when it was distributed to ensure that all parties have access to the latest version.
- Set a Deadline for Response: Set a deadline for response from the recipients to ensure that they acknowledge receipt of the drawing document and understand its contents.
- Update the Index: Update the index or database of all the drawing documents and related documents, including their unique identifiers, categories, and locations, to reflect the issuance of the new document.
- Archive Old Versions: Archive old versions of the drawing document to ensure that only the latest version is being used by all parties involved in the project.

Filing

Filing drawing document refers to the process of organizing and storing drawings and related documents in a systematic manner for easy retrieval and reference. This involves assigning unique identifiers to each drawing, categorizing them based on their type and purpose, and storing them in a secure location. The purpose of filing drawing documents is to ensure that they can be easily accessed and reviewed by relevant parties at any time during the project lifecycle.

Assign Unique Identifiers: Each drawing should be assigned a unique identifier such as a number or code that can be used to easily identify and locate it.

Categorize Drawings: Categorize drawings based on their type and purpose. For example, architectural drawings, structural drawings, electrical drawings, plumbing drawings, etc.

Store Drawings in a Secure Location: Store drawings in a secure location that is easily accessible to relevant parties. This could be a physical location such as a filing cabinet or a digital location such as a cloud-based storage system.

Label Drawings Clearly: Label each drawing clearly with its unique identifier and category to ensure easy retrieval and reference.

Create an Index: Create an index or database of all the drawings and related documents, including their unique identifiers, categories, and locations.

Establish Procedures for Adding and Removing Drawings: Establish procedures for adding new drawings to the system and removing outdated or obsolete drawings.

Regularly Review and Update: Regularly review and update the filing system to ensure that it remains organized and relevant to the project.

1. **Separate documents by type**

Sort your physical documents into categories such as reports, client documents or billing invoices. You can further separate each category into levels of subtypes. For example, you can sort client documents based on each client before organizing a single client's documents into reports, correspondence and more. This layered sorting strategy can help you identify what documents to keep and organize for easy access.

If you find documents that don't fit into a major category, make a miscellaneous stack along with a pile of documents you intend to shred or recycle. It's also wise to make a stack of documents that you want to convert into digital files. Starting with a simple survey and categorization of your documents can help initiate the filing process.

2. **Use chronological and alphabetical order**

Some documents are time-stamped and dated to keep track of activities and decisions within the organization. Once separated by type and subtype, consider sorting each document in chronological order if applicable.

Filing cabinets and drawers can offer customizable storage space. Use file folders to store groups of documents based on their type and subtype. You can continue using chronological or alphabetical order when placing folders into cabinets or drawers. For example, you can sort alphabetically by client name or chronologically by the most recent client you acquired. Storing paperwork away from your workspace helps keep your desk clear for you to complete tasks more efficiently.

3. Colour-code your filing system

Visual markers, such as coloured tabs, can save you time when browsing for documents. You can use different coloured folders for your various types and subtypes of documents

4. Label your filing system

Labelling your document categories can help you quickly identify your intended folder. Some folders come with paper to make your own labels.

5. Dispose of unnecessary documents

Creating an organized filing system can help you reduce the amount of paperwork you store. Recycle documents that are no longer relevant in order to reduce clutter, or shred them for extra security.

6. Digitize files

1. Sort by type and subtype.
2. Use chronological and alphabetical order to organize files.
3. Colour-code by type and subtype using the file colour or flag feature on your operating system.
4. Label documents clearly with type or subtype and document date, if applicable. An efficient document titling system might look like this: “Client.

Self-check-3

Test I choose the best answer for the following question

1. The type of drawing used to communicate the form of the building in terms of shape, colors & texture is?

   A. working drawing C. schematic drawing

   B. design drawing D. none

2. The type of working draws in most important & contains more information than all the other working drawing is _____.

   A. Site plan B. Floor plans C. Section D. Elevations

3. Which one is different from the anther?

   A. sofa set B. bath tub C. water closet D. hand wash

4. The instrument used for drawing furniture on floor plans is _____.

   A. French curves B. Scale C. Tracing paper D. Template E. None

5. _____is the top view of a building.

   A. Site plan B. floor plan C. roof plan D. ceiling plan E. None

6. _____is an architectural view of a building containing a height dimension?

   A. Section B. Elevation C. Wall section D. None

Operation sheet-3

Operation Title: - Preparing working drawings

Purpose: - To understand how prepare working drawings

Instruction:-Redraw the given drawing with in the given scale

- Floor plan in 1:50
- Elevation in 1:50
- Sanitary layout in1:50
- Site plan in 1:50
- Foundation plan in 1:50

Tools and equipment:

Pencils (soft and hard), Paper (A3), masking tape, eraser, eraser shield,

Drawing boards, donkey chairs, set-square, T-square, scale, Templates, compass, dust brush

Procedures

Step 1. Drawing floor plan

Step 2. Draw Elevation plan

Step 3 Sanitary layout

Step 4. Draw Site plan

Step 5. Draw foundation plan

Precautions:

- Keep oneself from sharpen things like cutter
- Be clean

Quality Criteria

The drawing must be neat

- Lines must be straight
- All requirements must be presents accurately

Lap Test-3

Task 1. Clean all drawing materials and equipment's

Task 2. Set the paper on the drawing table using masking tape

Task 3. Make a title block and a border line on a drawing paper

Task 4. Take the measurements from the given drawing

Task 5. Draw it with the required scale

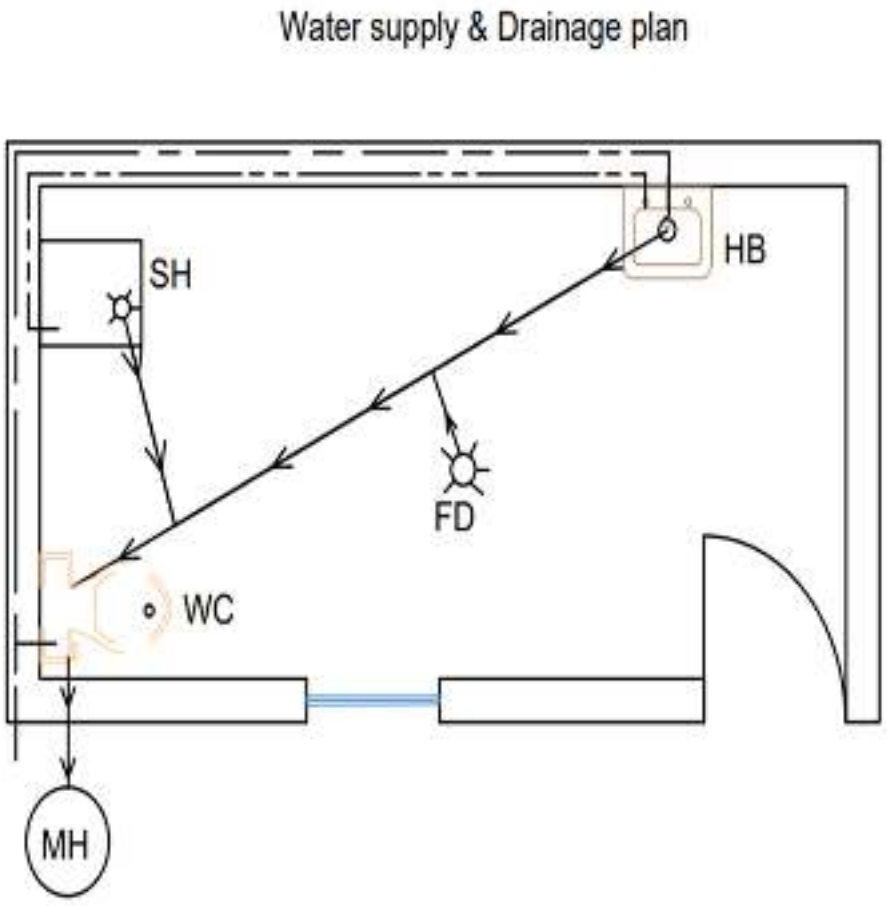
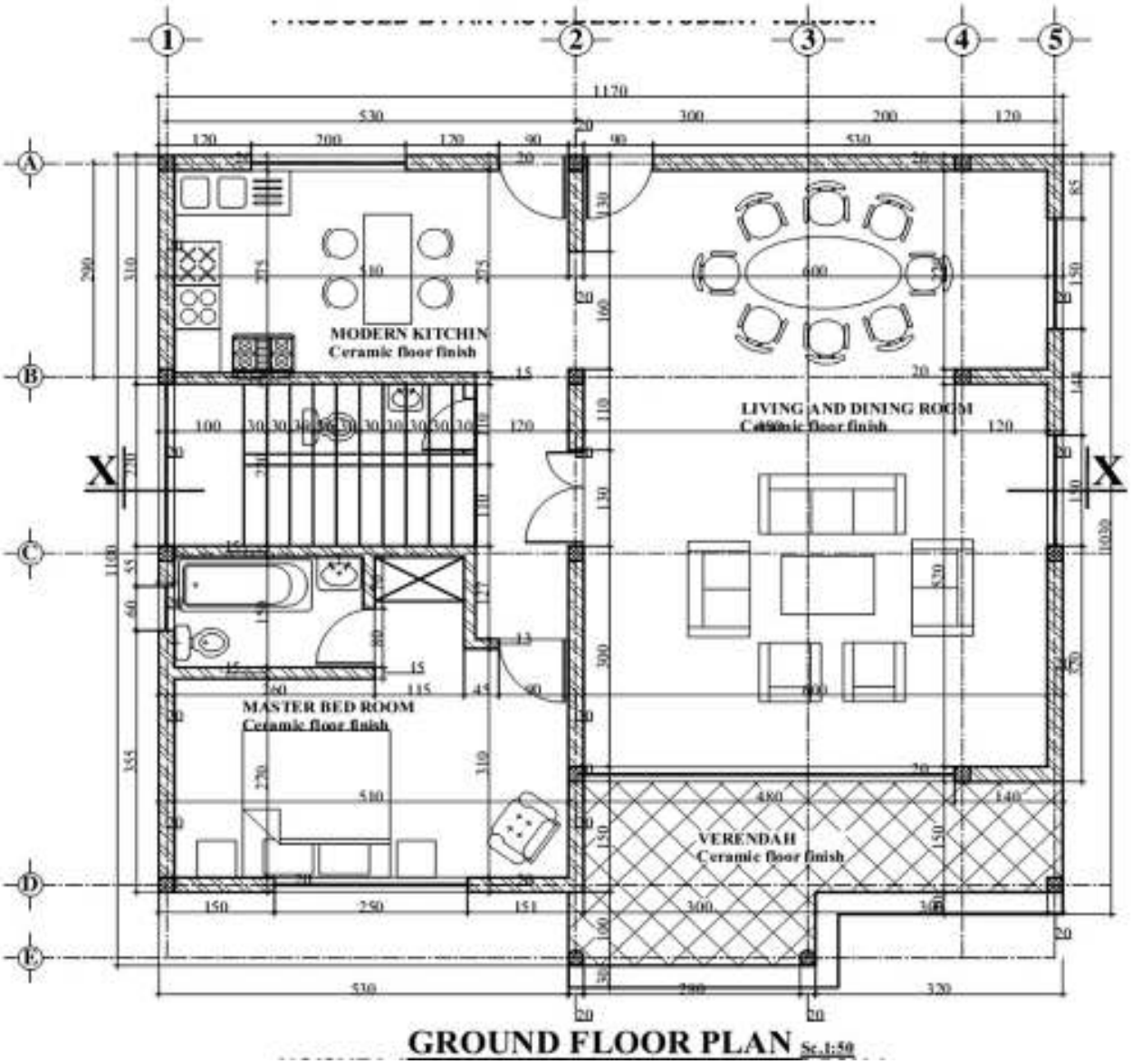
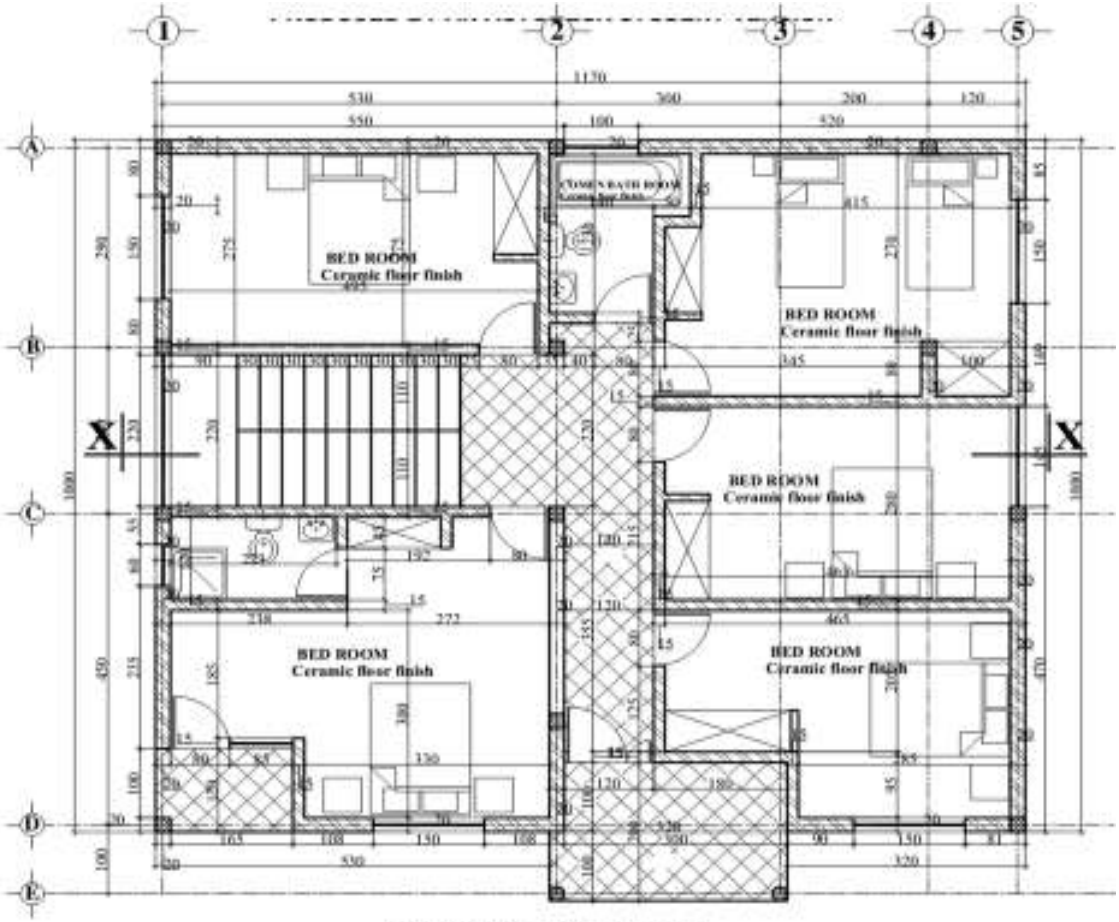
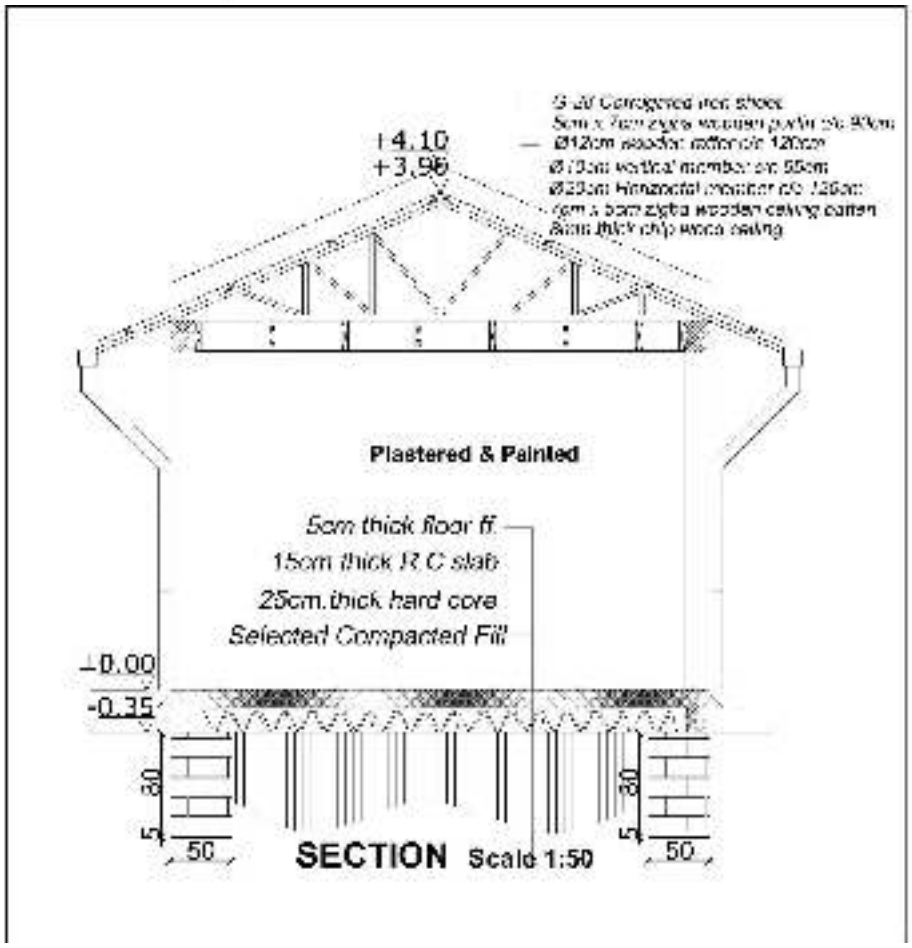


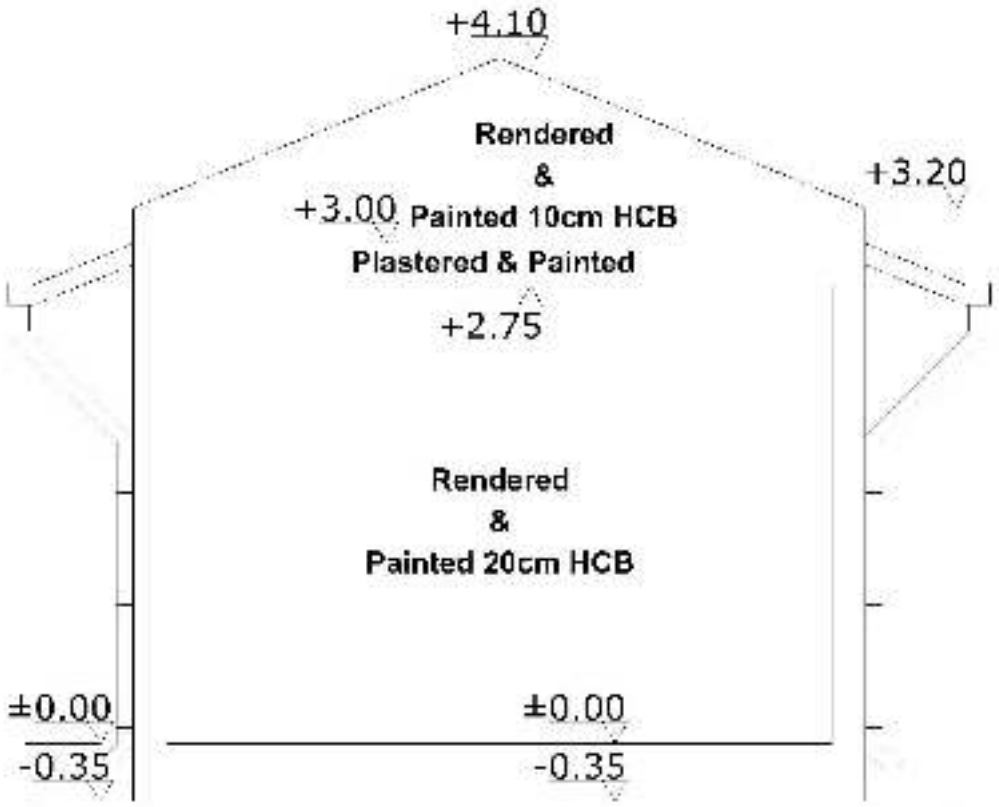
Fig. Sanitary layout


1
2
3
4
5
A
B
C
D
E
X
X
MODERN KITCHIN
Ceramic floor finish
LIVING AND DINING ROOM
MASTER BED ROOM
Ceramic floor finish
VERENDAH
Ceramic floor finish
1170
530
300
200
120
GROUND FLOOR PLAN Sc.1:50

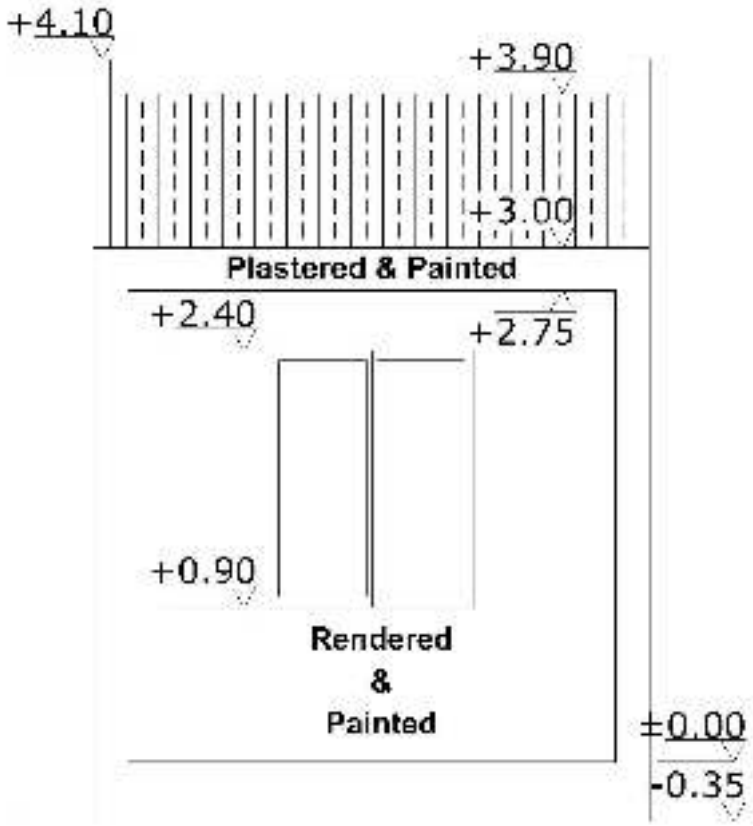


FIRST FLOOR PLAN Sc.1/50

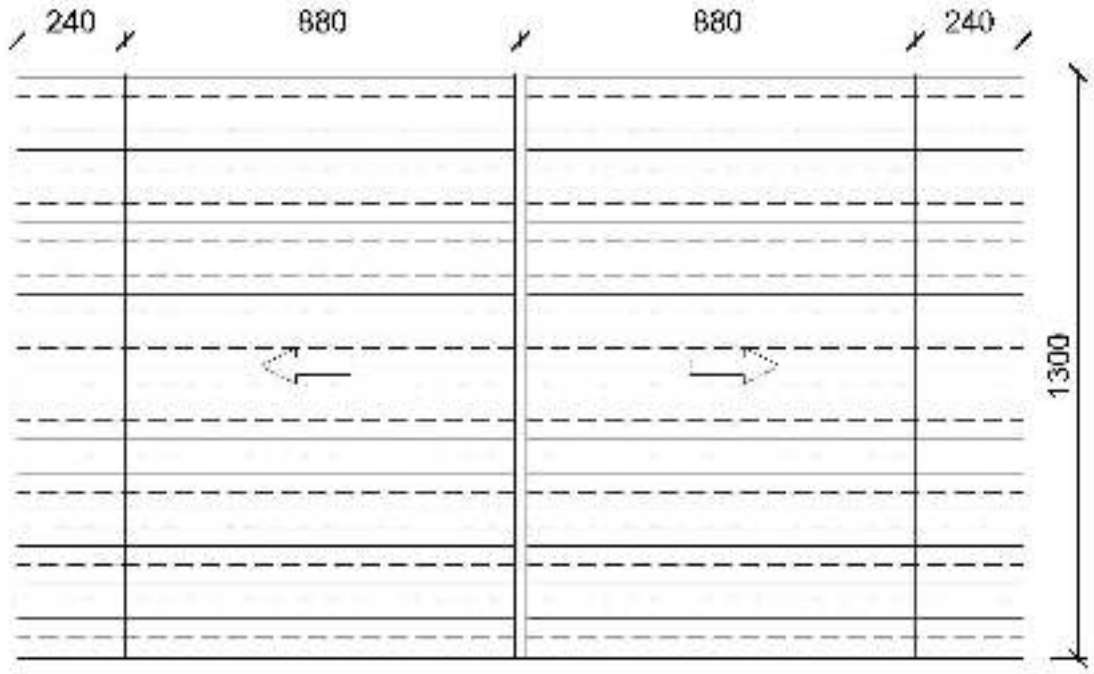

+4.10
+3.96
Plastered & Painted
5cm thick floor fi.
15cm thick R.C slab
25cm.thick hard core
Selected Compacted Fill
±0.00
-0.35
30
5
50
SECTION Scale 1:50



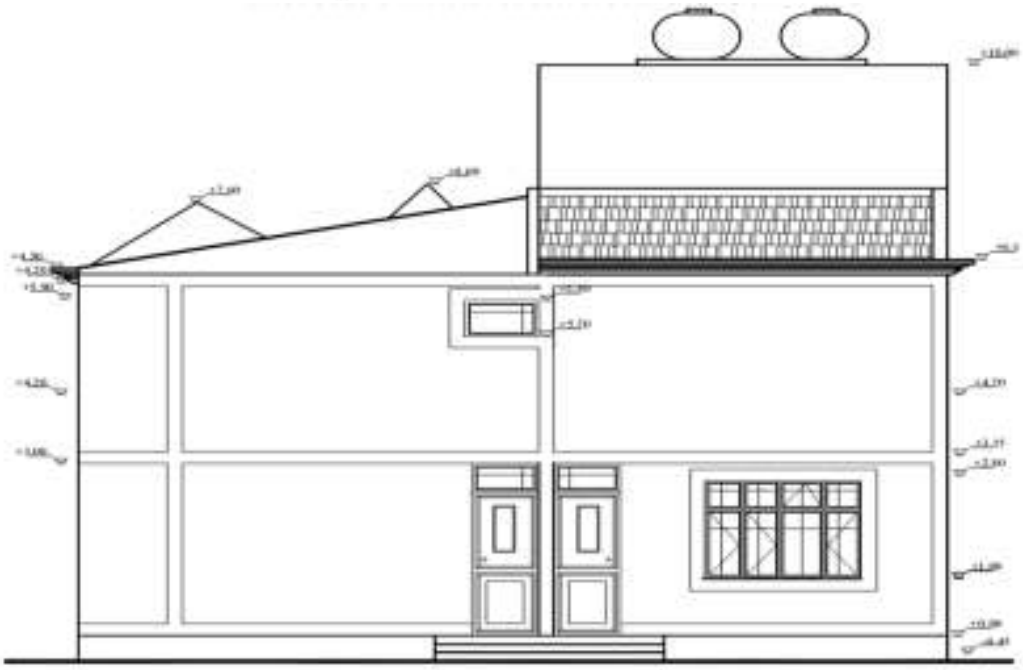
REAR ELEVATION Scale 1:50



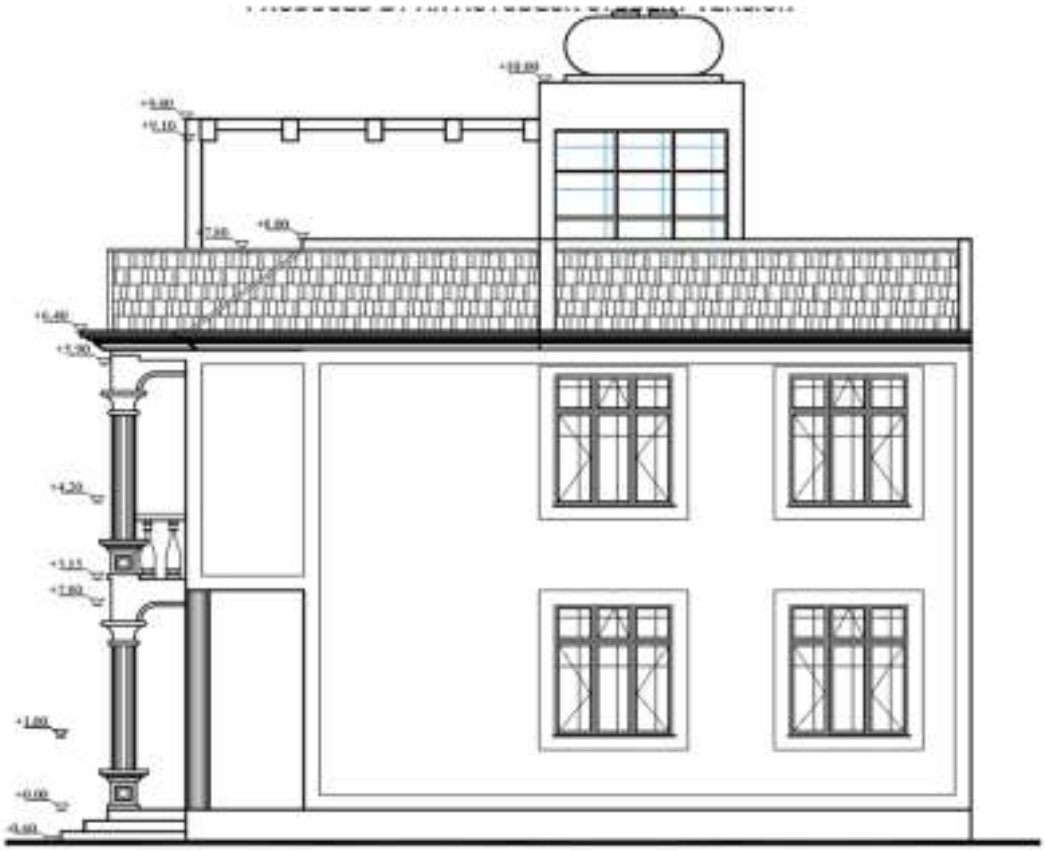
LEFT ELEVATION Scale 1:50



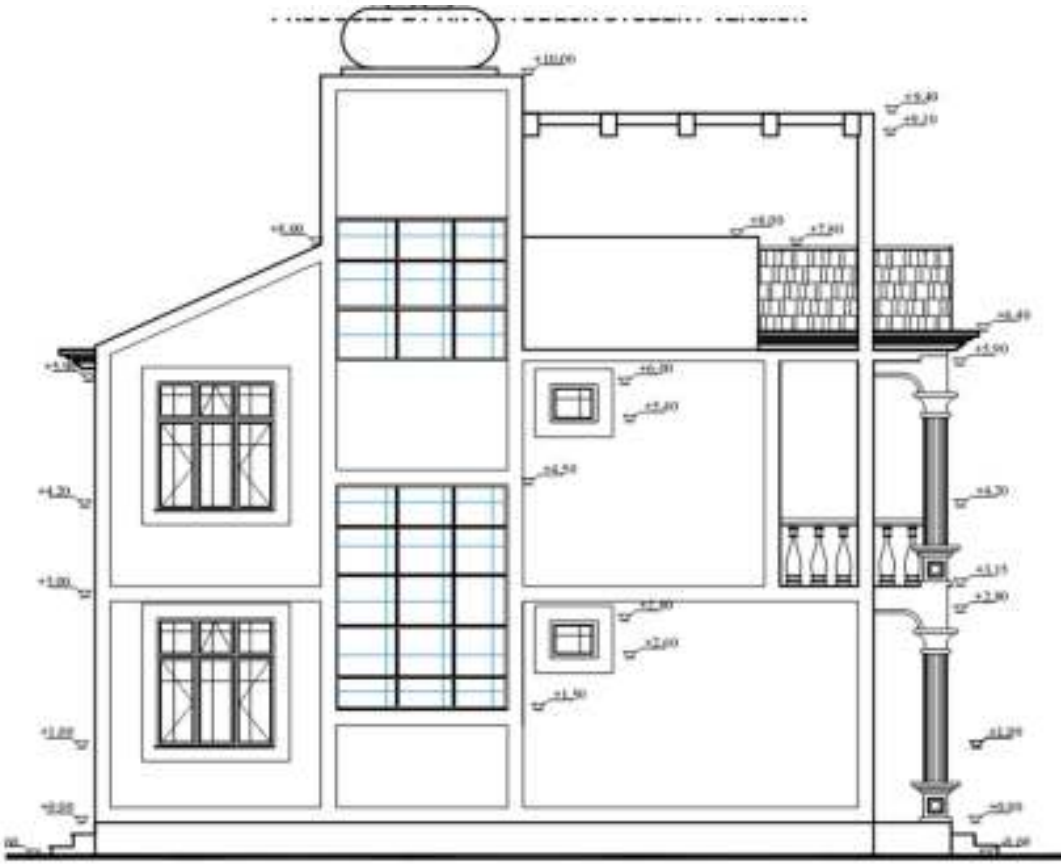
ROOF PLAN Scale 1:50



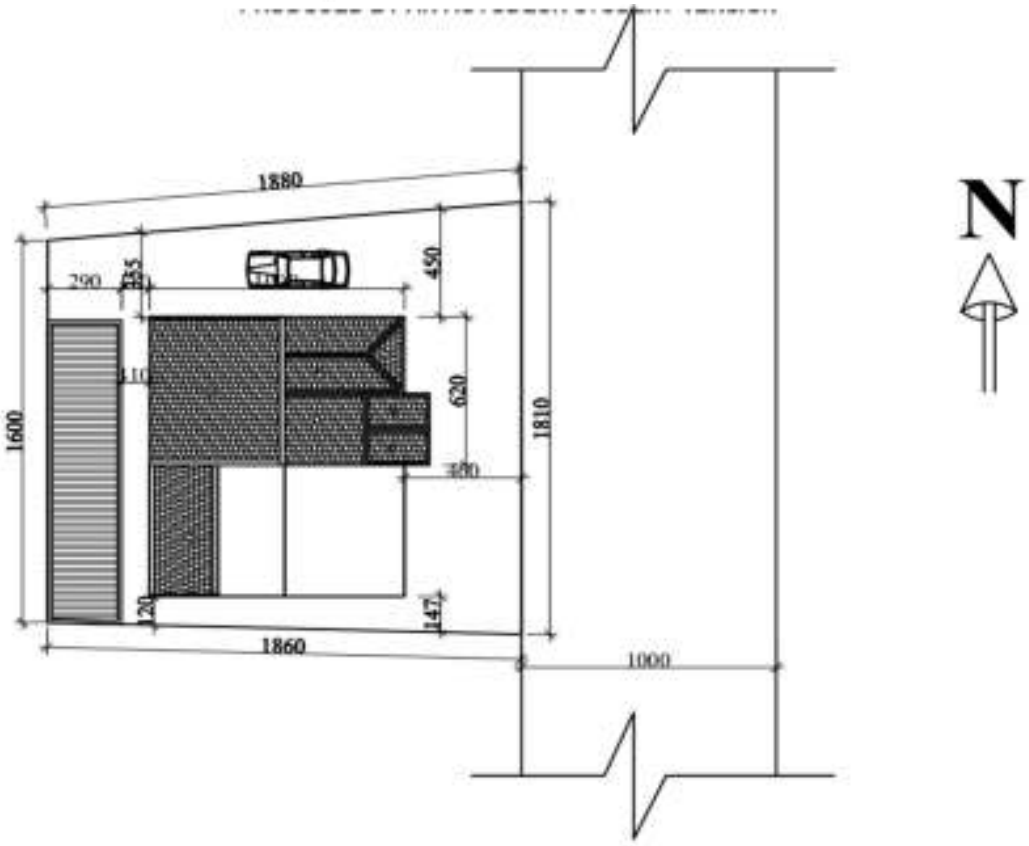
REAR ELEVATION



RIGHT SIDE ELEVATION Sc.1:50



LEFT SIDE ELEVATION Sc.1:50



Site Plan Sc.1:50

Unit Three: Drafting and Sketching Working drawings

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Dimensions and components. s
- Appropriate drawing symbols abbreviation.
- Amendments on specifications

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify dimensions and components.
- Apply appropriate drawing symbols.
- Amendments on specifications

3.1. Dimensions and Components

Dimensions: Drawing dimension refers to the numerical values or measurements included in a drawing that indicate the size, length, width, height, or distance of various components or features. These dimensions are typically represented using lines, symbols, and text, and are essential for ensuring that the design is accurate and can be properly constructed or manufactured. Drawing dimensions may also include tolerances, which indicate the acceptable range of variation for a particular measurement

Components of an Engineering Drawing

A drawing component refers to a specific part or element that is included in a drawing or design. It can be anything from a structural beam or column to a plumbing fixture or electrical outlet. Drawing components are typically represented by symbols or annotations on the drawing, and they provide important information about the design and construction of the project.

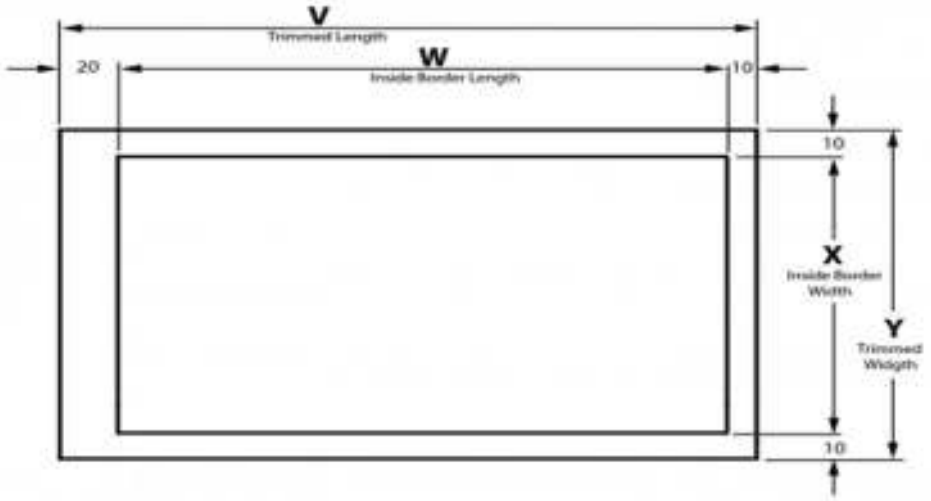
Every engineering drawing is different depending on its usability. But, owing to huge industries such as Oil and Gas, there is a prevalent use of detailed drawings due to complex equipment and processes.

A detailed engineering drawing consists of all the essential components of the object or part relevant from the manufacturer understands point.

The essential components of drawing

Orthogonal views: There are different views (front, side, top) in an engineering drawing. In a detailed drawing, one can expect a combination of views that accurately describes the component.

Border line: Borderlines are very thick, continuous lines used to show the boundary of the drawing or to separate different objects drawn on one sheet. They are also used to separate the title block form the rest of the drawing**.**

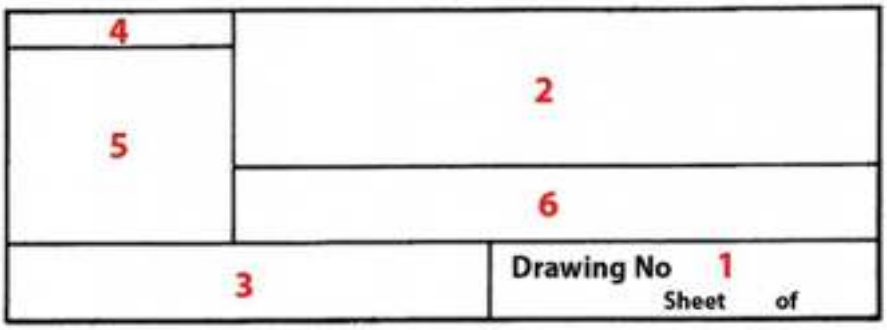


Title Blocks: Title blocks are used to record all important information necessary for the working drawings. They contain general as well as specific information.

The title block is normally located in the lower right corner of the drawing sheet.

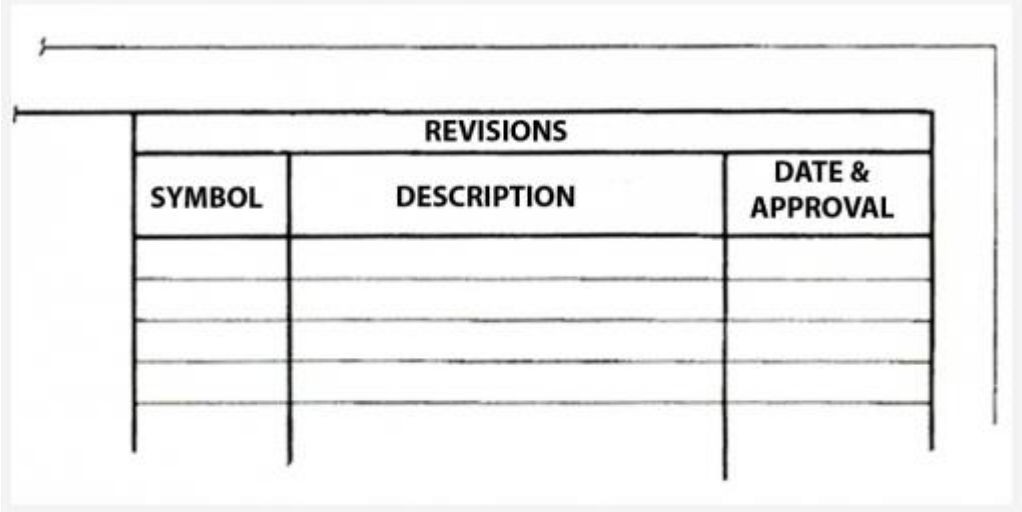
Though the arrangement and size of the title block is optional, the following information is considered mandatory:

- Drawing number;
- Title or description of the drawing (part name);
- Name of firm/organization (address, project affiliation – title or number, etc.)
- Original scale;
- General specifications and notes area (tolerances, finishes, etc.
- Drafter name area; signature, approval, etc.

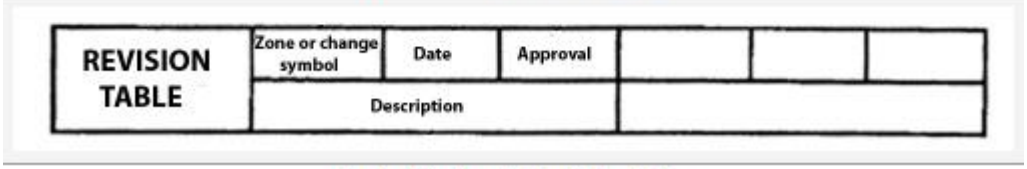


Revision Table

Drawings may carry a change or revision table, preferably on the right-hand side (vertical revision table) or at the bottom of the drawing on the left from the title block (horizontal revision table). In addition to a brief description of drawing changes, provision may be made for recording a revision symbol, zone location, issue number, date, and approval of the change.



Typical vertical revision table



Typical horizontal revision table

Fig. Drawing

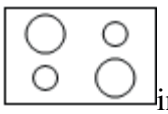
3.2. Appropriate Drawing Symbols and Abbreviation.

3.2.1. Construction symbols

Construction symbols are graphical representations used in construction plans and blueprints to convey important information about the design and construction of a building or structure. These symbols can include icons for different types of materials, dimensions, electrical and plumbing systems, and other important features. They are to ensure clear communication between architects, engineers, contractors, and other professionals involved in the construction process.

Types of floor Plan Symbols

Like abbreviations, symbols are used instead of words on drawings to save space. There are a lot of them, but they're standardized (drawn the same way) to avoid confusion, so don't worry. Some of them look a lot like what they represent. For example, the symbol:


indicates a hotplate in the kitchen.

Others are more obscure. The symbol:

indicates that this is 'window 8'.

Some cross-sections have a ‘filling’ that symbolizes what material is to be used. In drafting terms this is called ‘hatching’. For example, this hatching:

 indicates that it is a concrete member (perhaps a footing).

A client or a novice in the field of interior design, you may get lost in the sheer amount of architectural symbols, texts and numbers you see on an architectural plan. It could appear daunting to understand these symbols precisely. But it would help if you learned about them so that no miscommunication arises between you and the people you work for and with.

It could also be beneficial to you, as a homeowner, are dealing directly with a contractor and view construction drawings or a set of blueprints of your home design. Knowing how to read a floor plan can help you understand what you need and how your idea would look in reality.

A standard floor plan will show you structural elements like doors, walls, windows and stairs. The floor plan would also show other essentials like plumbing, electrical and HVAC systems. The blueprint symbols used are general outlines of what the actual object is. So, for example, you can observe signs of sinks, stairs and tubs that look like the accurate top view of the actual item.

Levels

Our floor plans will show finished floor levels, changes in levels, and ceiling heights. These can be demonstrated in a number of ways. An area of the plan that is clear to annotate, can simply have the word FFL: 0 (finished floor level), or a symbol marker can be used, see below.

If there is a small level change on the same floor plan, it is good practice to show the finished floor level for both sides of that level change.

Level Symbol Elevation symbol

Fig B . Level Symbol in floor plan and vertical view

Door Symbols

The doors are annotated by a large gap between the walls and a curved line that shows the direction of the swing. In addition, the path traced by the swing is shown in a dotted line showing the clear area the door would cover. However, there are different ways to show a door depending on the type of door that is to be installed.

For typical triple hinge door swings, the curved line makes a quarter circle arc indicating the extent of the swing (up to 90 degrees).

Double doors are indicated with a symbol like a letter M, with the two curved arcs meeting at the center.

When a sliding door or pocket door is shown, it is mainly indicated with a rectangle representing the door inserted into the wall and is attached to a dotted rectangle. The dotted area shows where the position of the door would be when closed.

Window Symbols

Windows are shown as part of the walls. They are symbolized by an empty rectangle inserted into wall with a solid hatch.

Sliding windows are symbolized by three parallel rectangles representing each sliding window panel joined at the edges below the other.

Casement windows look like mini doors, with an arc showing how much they protrude from the wall while they are open.

By windows are shown by breaking the straight line of the wall, and the face of the window is pushed outside.

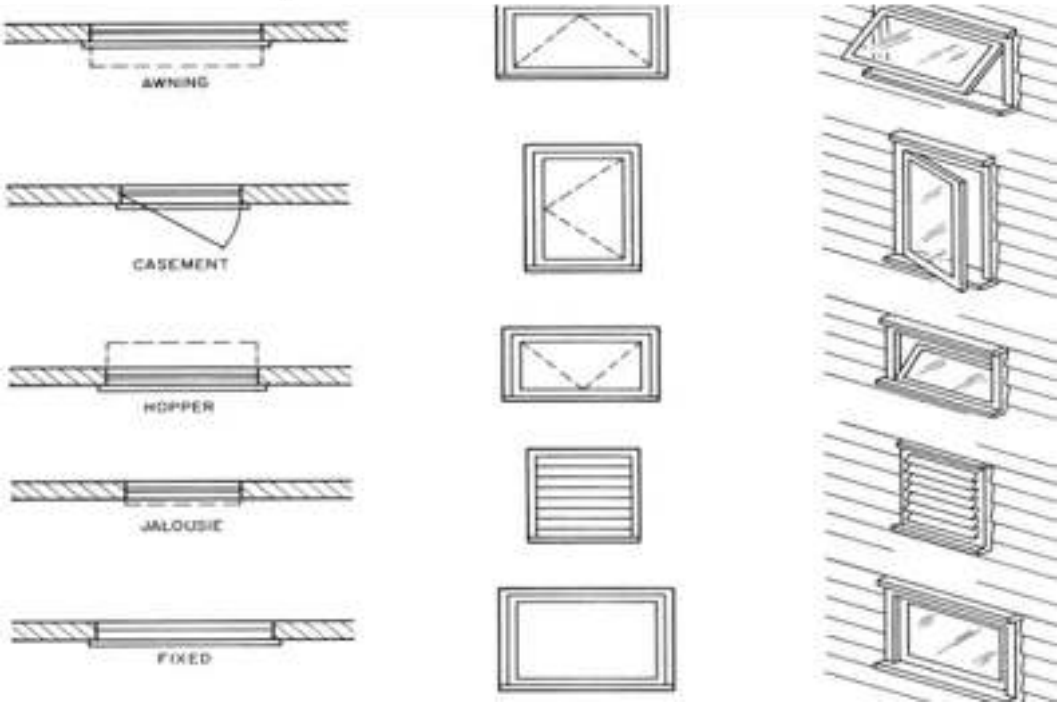


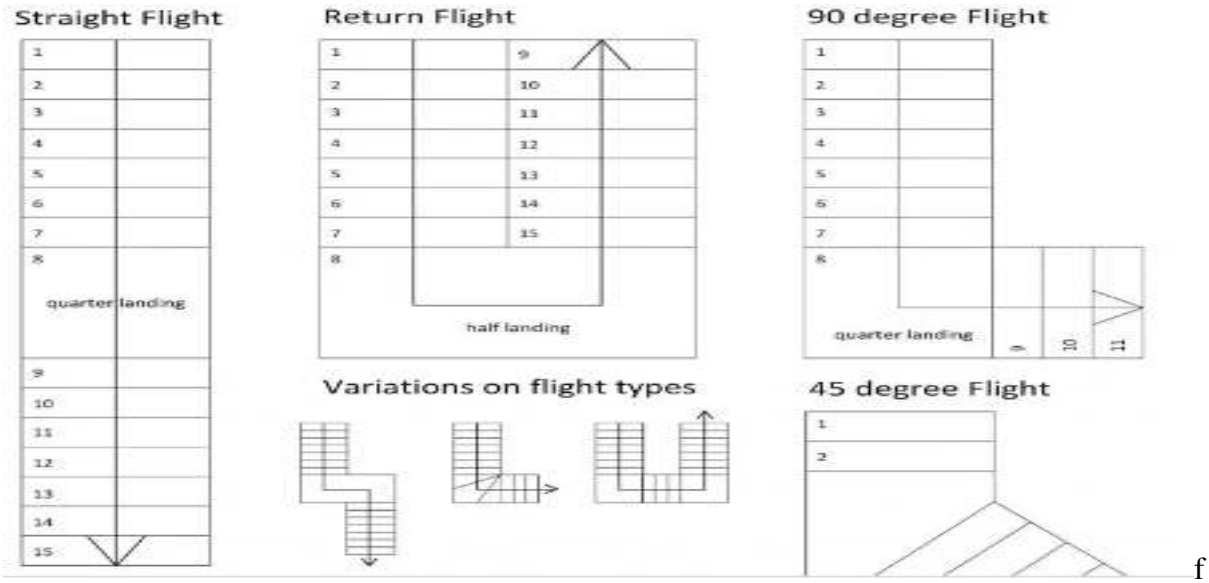
Fig . Window symbol

Stair Symbols

Like most symbols, staircases are seen parallel from the plan view. Simply put, they look like a series of rectangles attached from side to side. The rectangles can change to other geometric shapes depending on the design of the actual staircase.

Sometimes they are also indicated with a line running through the middle and an arrow at the top. This shows the direction of the staircase. The arrowhead indicates going UP. Mid landings are shown as large slabs of rectangles or squares as per design.

A curved staircase looks like a bicycle tire with all the sections attached to the central circle or pole.



ig. Stair symbol

Wall Symbols

The most basic and typical element of the floor plan is the walls. They would have a much-standardized representation worldwide unless something unique, e.g. a wall made up of glass bottles.

The intensity of the lines indicates the location of the solid wall. Thicker lines indicate the interior walls of the architectural plan, whereas exterior walls are shown by double lines or a thin black outline.

The material of the wall also plays a massive role in their representation. Brick or concrete walls are colored with hatches at 45-degree angles. Items like wood are shown in a brief depiction of wood grains. Insulated walls are indicated in spring like a pattern infused in the walls.

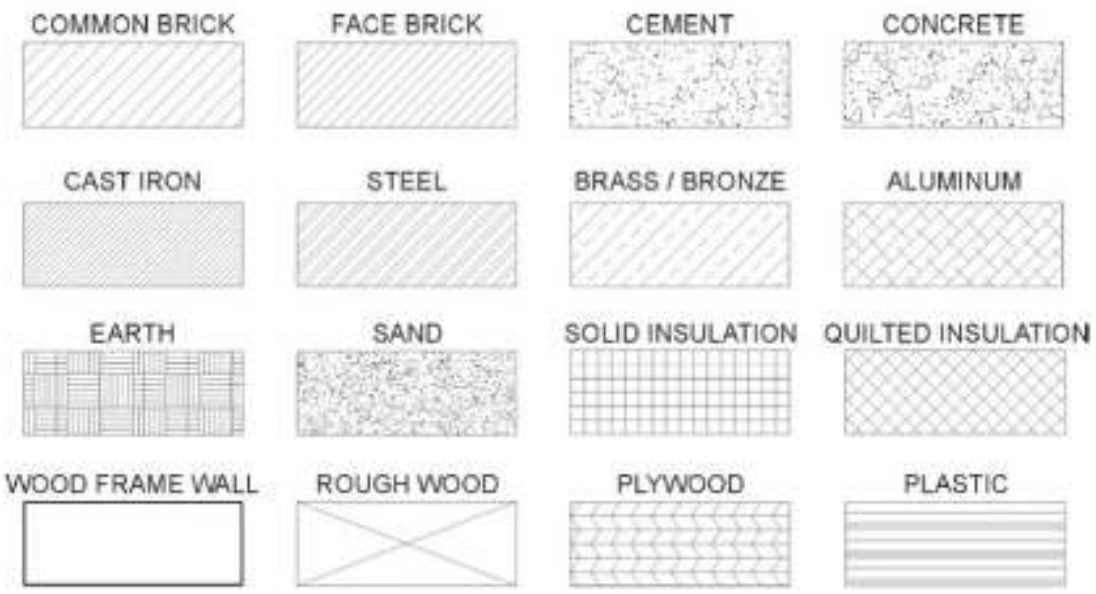


Fig .Wall Symbol

Plumbing Symbols

Plumbing fixtures are predominantly depicted as would be seen from the top in a parallel perspective.

They include items like a bathtub, toilet, shower and sinks. The sink sizes can change depending on what type it is, such as single vanity sink, cabinet sink, double sink, kitchen sink, freestanding sink etc.

Uncommon fixtures include items like urinals. Sometimes bathroom features are also depicted, such as towel racks.

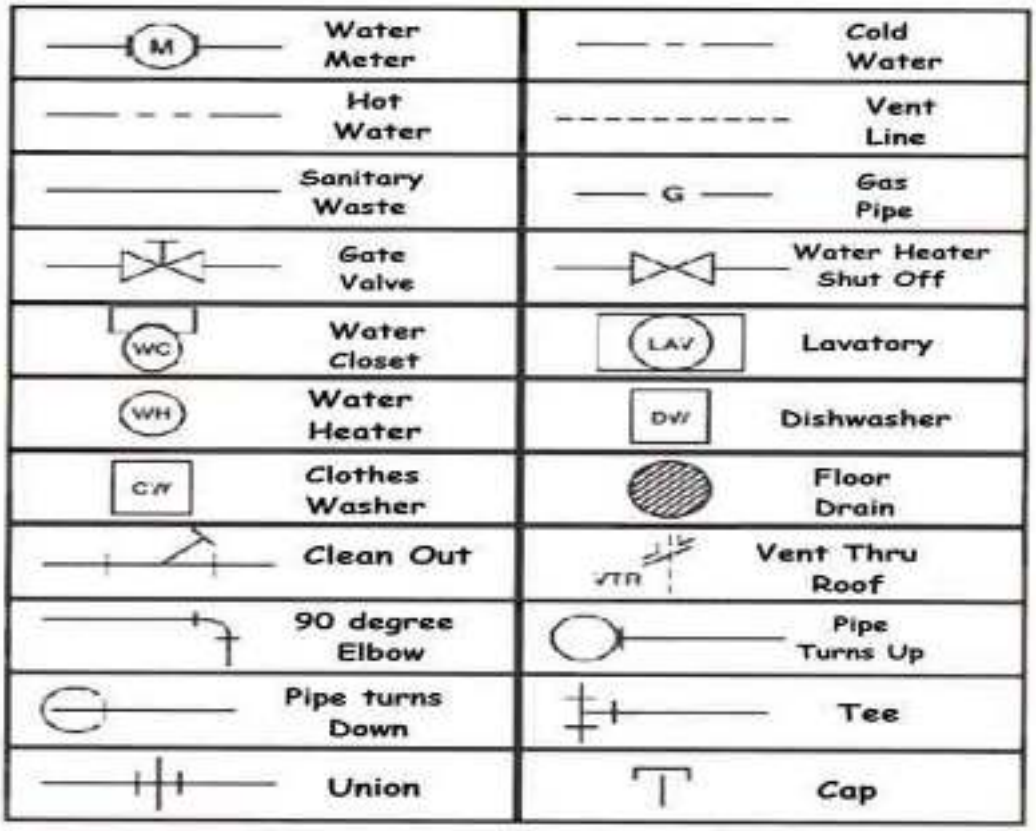


Fig. sanitary symbol

Electrical Symbols

Electrical plans will carry a host of symbols that will signify the lighting points, locations of wall jacks, thermostats, TV and switch outlets. They will also have markings of electrical items like ceiling fans denoted by a circle and three lines originating from the center like a propeller. The light point is represented by a small circle and crosshairs extending beyond the circle's circumference.

Electrical floor plans always include a legend since there are a lot of symbols that you would need to keep track of. Sometimes along with the item name, a small note on the feature is also written if it requires further explanation, such as the wattage of a particular light.

Furniture Symbols

Furniture symbols are almost always self-explanatory. Depending on the draughtsman, they can draw items like sofas and tables in simple rectangles or extensive details. Sometimes it

becomes mandatory to consider the detailed furniture drawings of the couch and armchairs to overlay them into the standard home plan.

Sometimes draughtsman also draws plants and props on top of the table for artistic effect. This is mainly done when the floor plan is made for sale or marketing purposes.

Most commonly used symbols in the common areas like the living room and dining room range from sofas, armchairs, and dining tables, dining chairs, sideboards, cupboards to smaller items like tempos, puffs and side tables.

Hatching Symbol

Hatching is used to represent the material being sectioned. In many cases hatching is not possible because the drawing is too small. It is time consuming, even when done using a computer program, and should only be used when it assists in the understanding of the drawing detail.

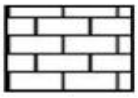
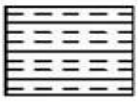
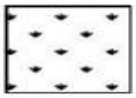
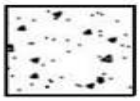
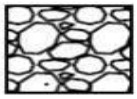
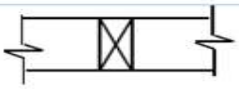
Material	Hatching	Material	Hatching
BRICKWORK		INSULATION	
DOLOMITE		GRASS	
CONCRETE		ROCK	
GRAVEL		PAVING - HERRINGB	
FILL		STUD WALLS	

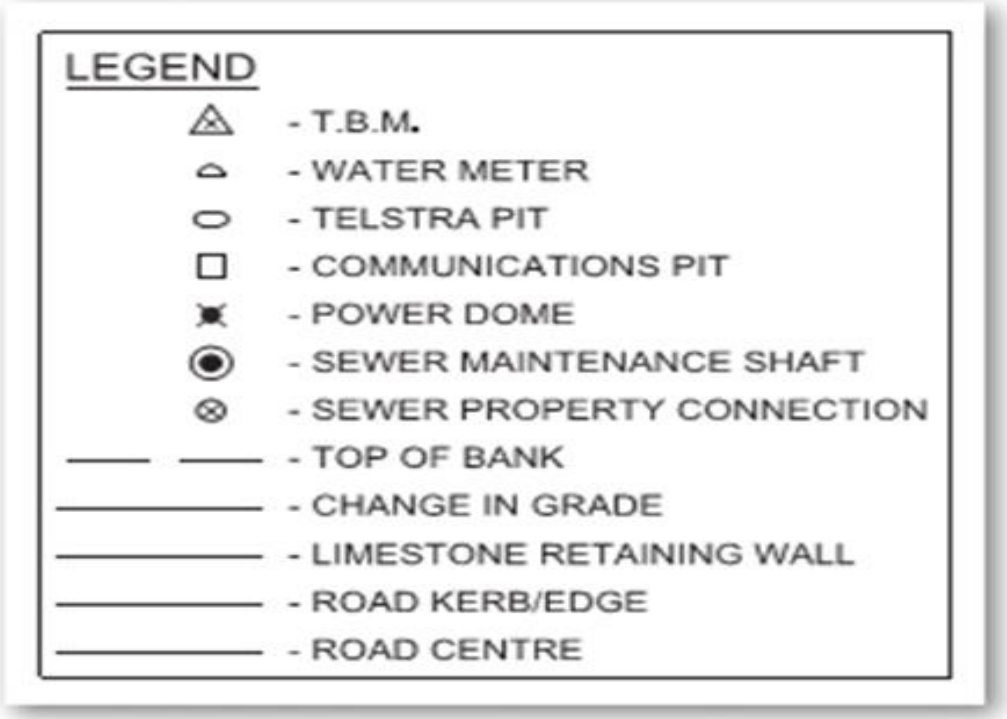
Fig. Hatching Symbol

Legend symbol

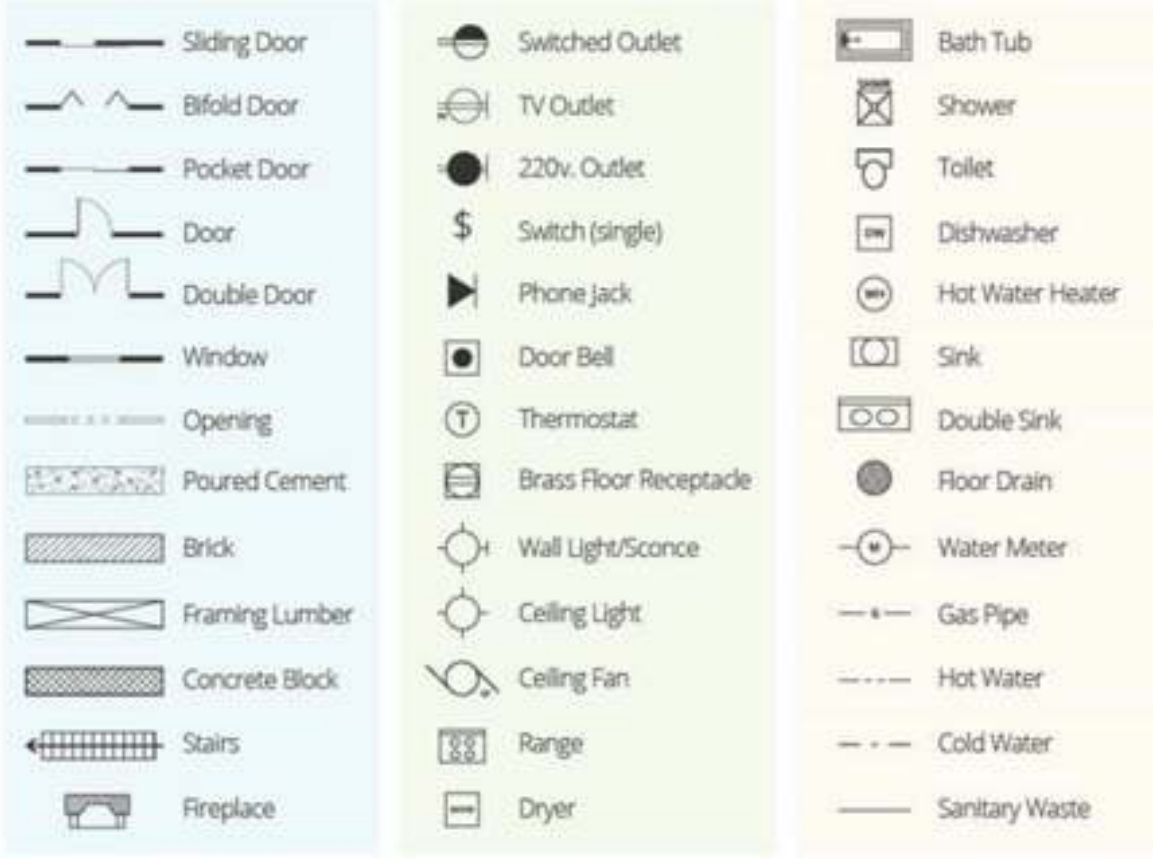
Some drawings have a legend to indicate what the symbols used on the drawing mean.

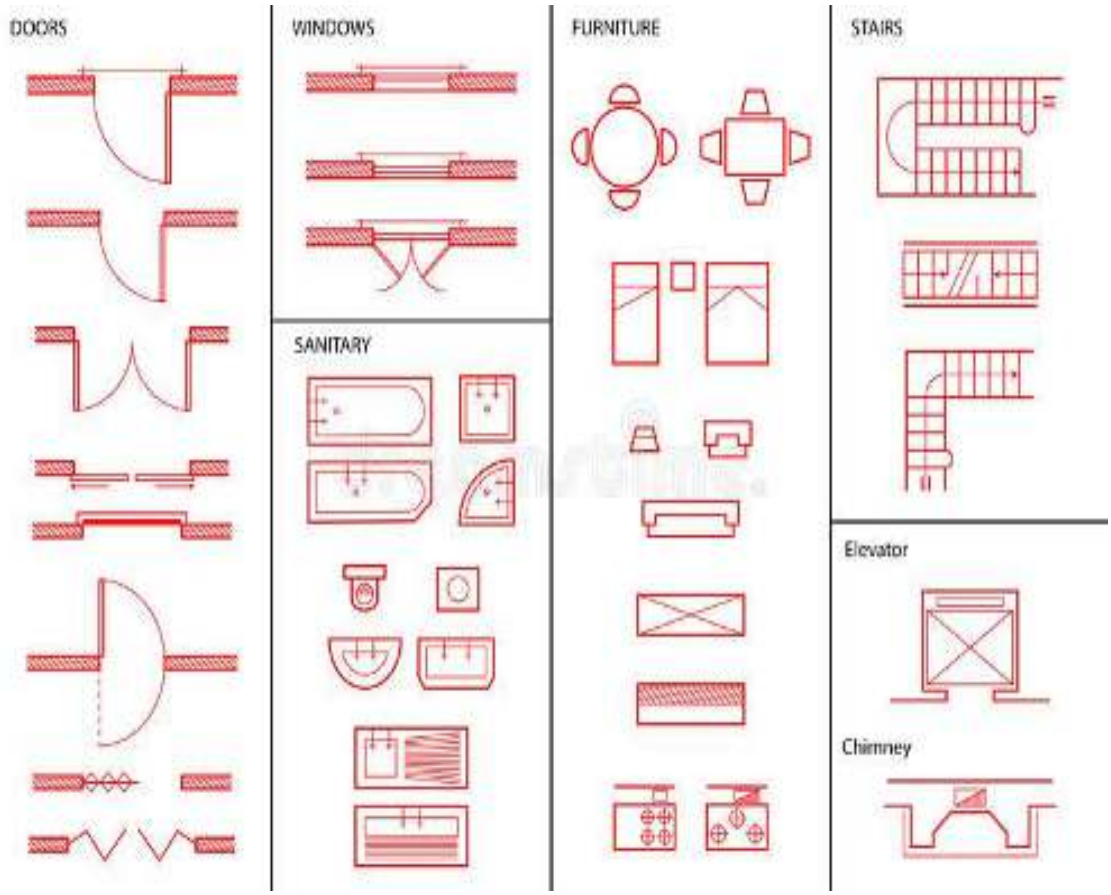
The legend shown in Figure 3.12 is from a site plan. Without this legend, the symbols on the drawing could be misinterpreted.

Electrical, hydraulic and engineering drawings commonly have legends on them.


LEGEND
- T.B.M.
- WATER METER
- TELSTRA PIT
- COMMUNICATIONS PIT
- POWER DOME
- SEWER MAINTENANCE SHAFT
- SEWER PROPERTY CONNECTION
- TOP OF BANK
- CHANGE IN GRADE
- LIMESTONE RETAINING WALL
- ROAD KERB/EDGE
- ROAD CENTRE

Architectural	Electrical	Plumbing





3.2.2. Construction abbreviations

Construction abbreviation is a shortened form of a word or phrase commonly used in the construction industry to save time and space in written or verbal communication. Examples include "HVAC" for heating, ventilation, and air conditioning, "CMU" for concrete masonry unit, and "OSB" for oriented strand board.

Drawing abbreviations

Apart from just symbols, floor plans also carry many characters in the form of abbreviations. Abbreviations are used when there is no space to show a symbol, or there is a lack of space to denote it, especially in the case of some technical drawings. Some of the commonly used ones are listed below. It could be an abbreviation for either the item or a type of material as well depending on the use:-

Table 2.1 Floor Plan Abbreviation

2. AL – Aluminum	3. HTR – Heater
4. AP – Acoustic Plaster	5. HW – Hot Water unit
6. ASPH – Asphalt	7. INSUL – Insulation
8. AT – Acoustic Tile	9. KIT – Kitchen
10. B – Basin	11. LIN – Linen Cupboard
12. BC – Bookcase	13. LVR – Louvers

14. BHD – Bulkhead over	15. M – Meter
16. B/I – Built-in	17. MSB – Master Switch Board
18. BK – Brick	19. O – Oven
20. BV – Brick Veneer	21. PBD – Plasterboard
22. BWK – Brickwork	23. R / REFRIG – Refrigerator
24. C – Cooker	25. RL – Reduced Level
26. CAB – Cabinet	27. RS – Roller Shutter
28. CBD / CPD – Cupboard	29. RWH – Rainwater Head
30. CD – Clothes Dryer	31. RWP – Rainwater Pipe
32. CF – Concrete Floor	33. RWT – Rainwater Tank
34. COL – Column	35. SC – Stop Cock
36. CORR – Corrugated	37. SD – Sewer Drain
38. CR – Cement Render	39. SD – Sliding Door
40. CT – Ceramic Tile	41. SHR/SH – Shower
42. CW – Cavity Wall	43. SS – Stainless Steel
44. D – Door	45. TC – Terra Cotta
46. DG – Double Glazing	47. TEL – Telephone
48. DH – Double Hung (windows)	49. TRZO – Terrazzo
50. DP – Downpipe	51. TV – Television
52. DW – Dish Washer	53. U/S – Underside
54. FA – Floor Area	55. V – Vinyl
56. FB – Face Brick	57. VENT – Ventilator
58. FCL – Finished Ceiling Level	59. VP – Vent Pipe
60. FFL – Finished Floor Level	61. W– Window
62. FL – Floor Level	63. WB – Weatherboard
64. FW – Floor Waste	65. WH – Water Heater
66. GM – Gas Meter	67. WC – Water Closet

3.1 Drawing specifications requirement

Drawing specification requirements are the specific details and criteria that must be met when creating a drawing. These requirements may include the dimensions, proportions, materials colours, and other technical specifications that are necessary to accurately represent the subject matter. Drawing specification requirements may also outline any special techniques or tools that must be used to create the drawing, as well as any quality control measures that need to be implemented to ensure the final product is accurate and meets the intended purpose. Overall, drawing specification requirements are essential for ensuring that the final drawing is of high quality and meets the desired standards.

Specifications

• Specifications are agreed upon defined requirements for a product

• Specifications are a type of Standard defined by a governing body

• Specifications may have embedded drawings but may focus more on text

• There are effectively two types of specifications;

• 1. Design or Product Specifications (what is wanted)

• 2. Application Specifications (how something is to be done in order to achieve a specific goal)

These specifications are detailed descriptions prepared by an architect or engineer for the contractor, indicating all the requirements that cannot be represented or described clearly in drawings.

- A project is only accepted if it meets design specifications. In other words, they are mandatory for the corresponding project, even if their requirements exceed local construction codes.
- The opposite does not apply: Architects and engineers cannot design a project that falls below the minimum performance requirements in applicable building codes.
- Without specifications, client requirements cannot be communicated effectively to contractors. In addition to being code compliant, design documents must also provide clear instructions to complete the project as visualized by the owner. Make sure your project design is well documented.

- Project specifications are contract documents, which gives them legal character. They are also useful after project completion: property managers use them as reference for maintenance and building upgrades. Ideally, all building modifications should be reflected in drawings and specifications so that they remain useful - outdated documents are not very helpful in a building that has been modified extensively.
- Well-written specifications also improve project communication: misunderstandings between the client and the contractor less likely if they have a clear reference document.

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