

DEPARTMENT OF CONSTRUCTION TECHNOLOGY AND MANAGEMENT

ARCHITECTURAL PLANNING AND DESIGN COTM3091

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ARCHITECTURAL DESIGN

What is Architectural design ?

What are the Architectural design process ?

What is Architectural Drawing ?

Architectural design

- Is just a Concept that focuses on the components of elements of a structural or system and unifies them in to coherent and functional whole.

Architectural design process

- The **Design Process** is an approach for breaking down a large project into manageable chunks. **Architects**, engineers, scientists, and other thinkers use the **design process** to solve a variety of problems.

SITE SELECTION AND ANALYSIS

Numerous elements go into a given site analysis.

These elements include

- Location,
- Neighborhood context
- Site and zoning
- Legal elements
- Natural physical features
- Man-made features
- Circulation
- Utilities
- Sensory
- Human and cultural aspect
- Climate components.



1. SITE SELECTION ANALYSIS

- **Location** : The site should be related to major streets or landmarks previously existing.
- **Neighborhood context** : information of this type can typically be found at the municipal planning department of the site.

Features of this sort include

- Architectural patterns,
- Street lighting,
- Condition of existing buildings.
- Existing paths (pedestrian, cyclist, and vehicle),
- Landmarks and nodes.
- human and cultural, and climate components.



Site and zoning :

- These are obtained by taking zoning classifications from a zoning map, which can be located from the city planning department.



1. SITE SELECTION ANALYSIS

- Legal elements :

- The property description,
- Present ownership, and
- The governmental jurisdiction, and
- The city or county.

- Natural physical features :

From the topographic features on the site and a contour map

- Drainage problems
- existing natural features of trees,
- ground cover,
- ground texture, and soil conditions on the site.



1. SITE SELECTION ANALYSIS

- Man made features :

- Buildings,
- Walls,
- Fences,
- Plazas,
- Bus stop shelters

- Circulation :

- The uses of streets, roads, alleys, sidewalks, and plazas.



1. SITE SELECTION ANALYSIS

Utilities :

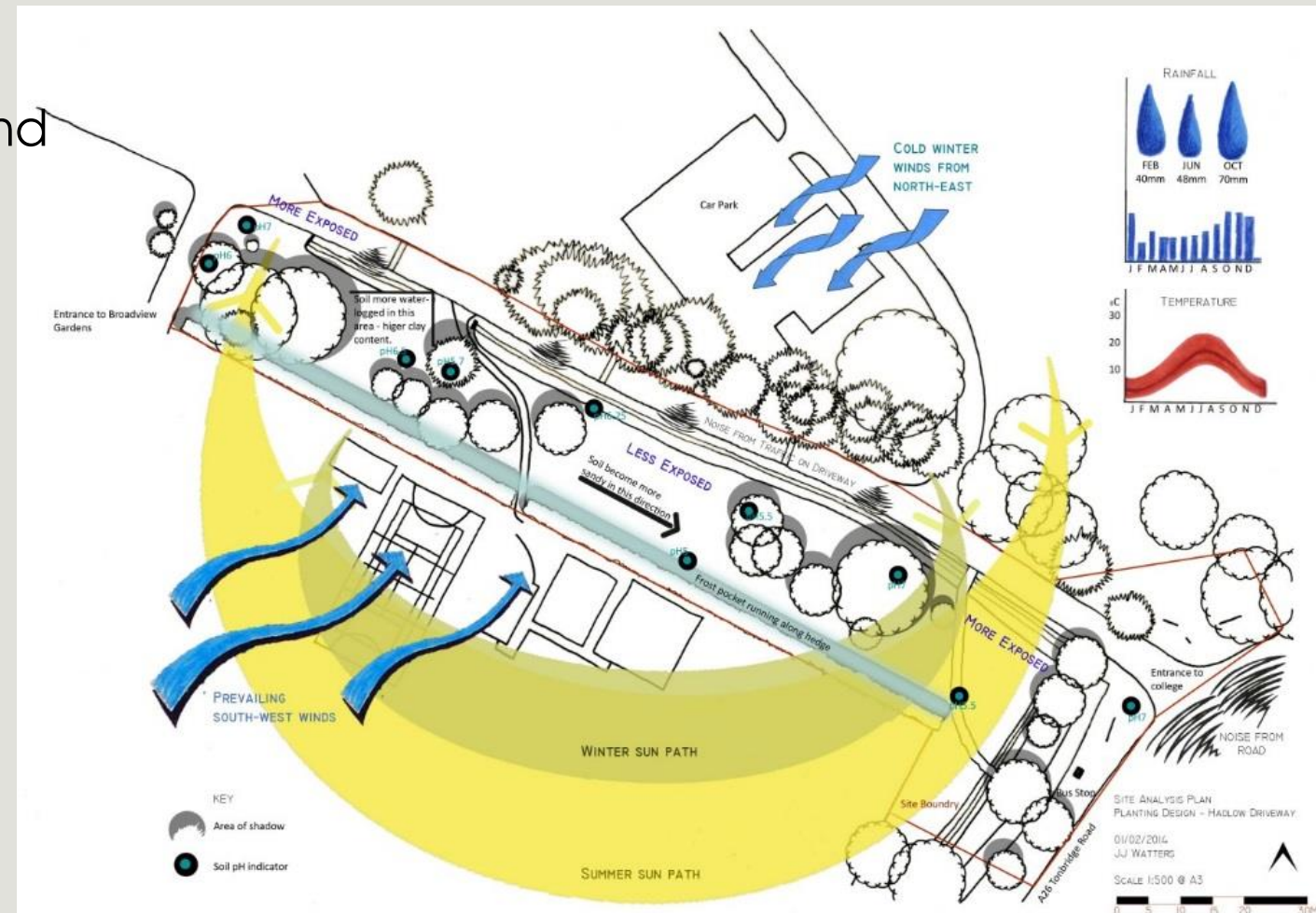
- the location of all utilities and their locations around or on the site itself.

Human and cultural :

- activities among people on the site and their relationships to these activities.

Climate :

- The sun-path and vertical sun angles throughout an entire year.
- Wind speed and direction
- rainfall,
- snowfall,
- humidity, and
- temperature over months.



Site location/ Context

The first consideration of the site analysis is to locate the site. Site location entails more than simply locating the site on a map. “Location” in this sense is referring to the site in terms of the project’s relationship to **the community**.

Zoning

Zoning maps provide an overview of the community’s vision for itself, showing not only how a site may be developed or used but also how surrounding sites might be. Zoning regulations may contain design criteria such as parking configurations, lot sizes, setbacks, road widths, road profile restrictions, and sign requirements.

Wind direction

Wind direction is one of the most important factors that affect the ventilation of the building therefore it is important to consider it before a building/ structure is constructed. This is achieved by orienting or aligning the building.

Note;

Mostly wind direction is in the direction of the sea or ocean near to the area where the building is to be located/or built.

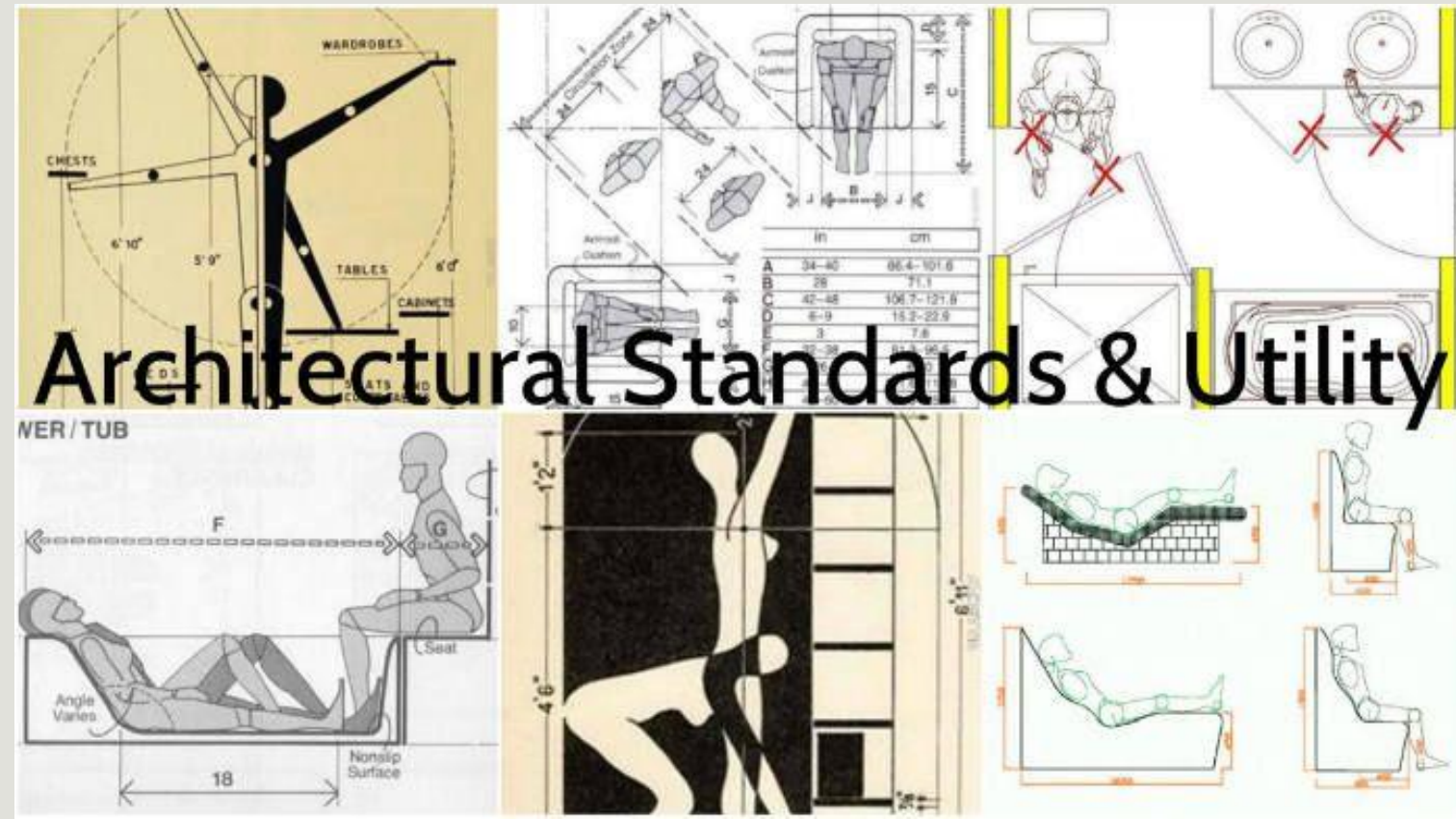
Northing

Northing is very helpful in determining the position of harsh sun so that we can arrange the functional rooms in a way that they are least affected by it.

2. INFORMATION GATHERING AND LITERATURE REVIEW:

In this stage of the designing process we gather information and standards on the project we are about to design.

- Standard room sizes/areas.
- Functions and utilities.
- Circulation area requirements, ventilation and lighting treatments.
- Room arrangements/adjacency



3. CASE STUDY

It connects the project with prior experience.

- We study on an already existing design.
- We explore the merits of the design and try not to repeat the demerits.
- This might include floor plans, site plan, elevations, and some important details of the existing design.



4. CONCEPT DEVELOPMENT:

The idea that makes your project unique.

- You might have an idea that you want to translate into a tangible form, or
- Your concept can also be functional.
- **Concept is a general abstract notion; a principle or central idea relating to a certain range of things.**



Pragmatic approach

Is a concept development approach by which a building is designed to satisfy it's function only. They don't worry about the external appearance as long as the building is designed to satisfy the intended function.

Note:

This architects are known as **functionalists**

Iconic approach

Is an approach in which building is designed to represent or look like something known by everybody . This includes benchmarks, obelisks, castles, landmarks....etc.

Example,

if somebody designed a building that look like Axum obelisks the approach followed is iconic.

Example; Grand Louvre, Paris(glass pyramid)



Analogy approach

Is an approach in which building is designed to look like materials (man made or natural), machines, equipment's,.....etc.

It can be literal or intellectual

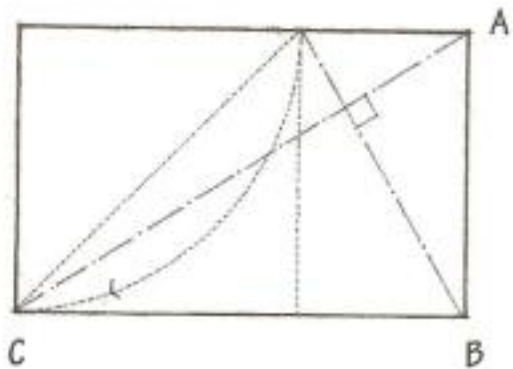


Canonic approach

it is closely related with *golden mean ratio* or *GOD's ratio*.

$$\frac{1}{\varphi} = \varphi - 1; \varphi = \frac{1 + \sqrt{5}}{2} \approx 1.618$$

This ratio is similar to that of the growth patterns of many spiral forms that occur in nature such as rams' horns, nautilus shells, fern fronds, and vine tendrils and which were a source of decorative motifs employed by Ancient Greek and Roman architects as particularly in evidence in the volutes of capitals of the Ionic and Corinthian Orders.



$$AB = a$$

$$BC = b$$

$$\emptyset = \text{Golden Section}$$

$$\emptyset = \frac{a}{b} = \frac{b}{a+b} = 0.618$$

5. PROGRAM DEVELOPMENT

On this stage of the design we make list of functions that you want to incorporate on your design.

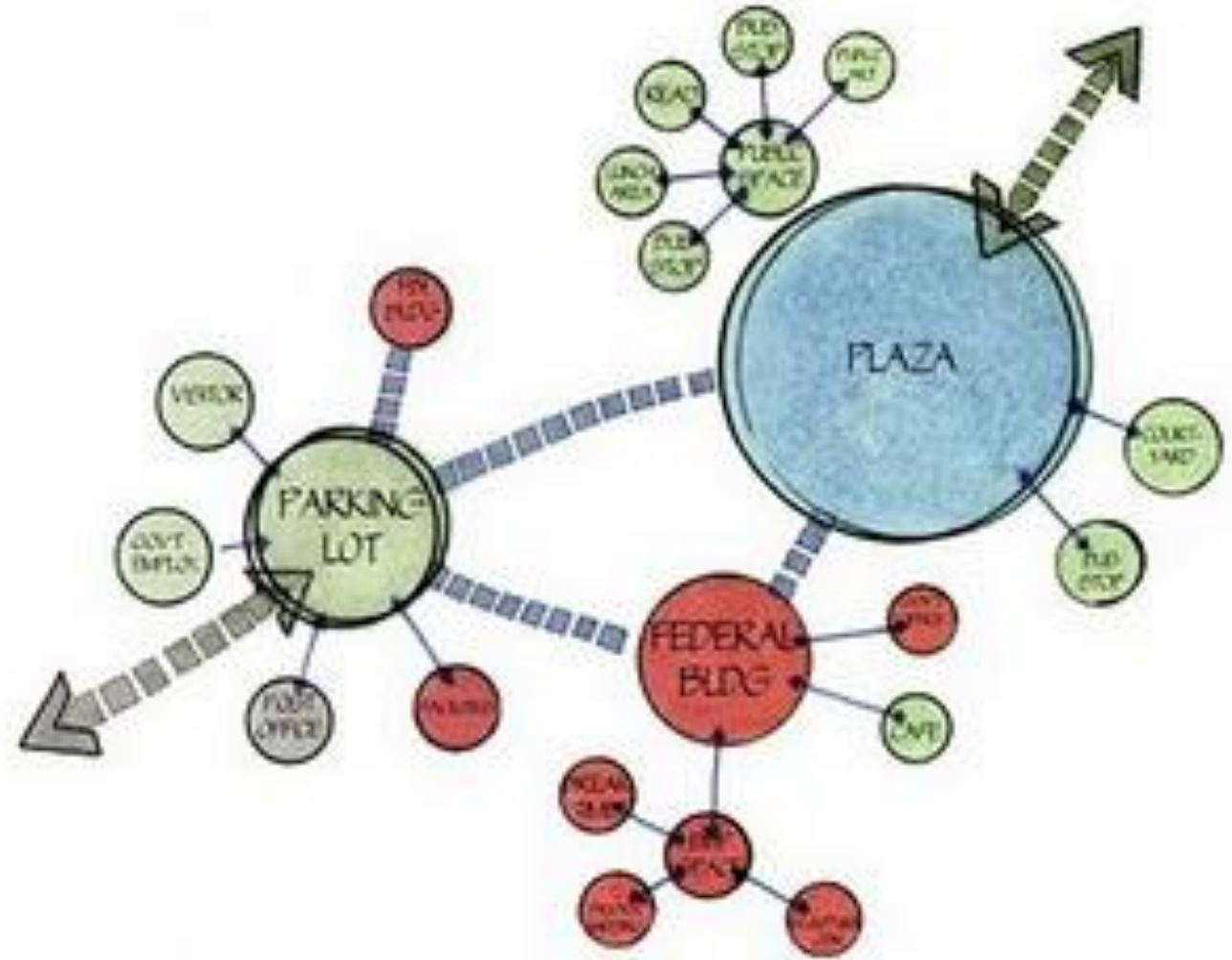
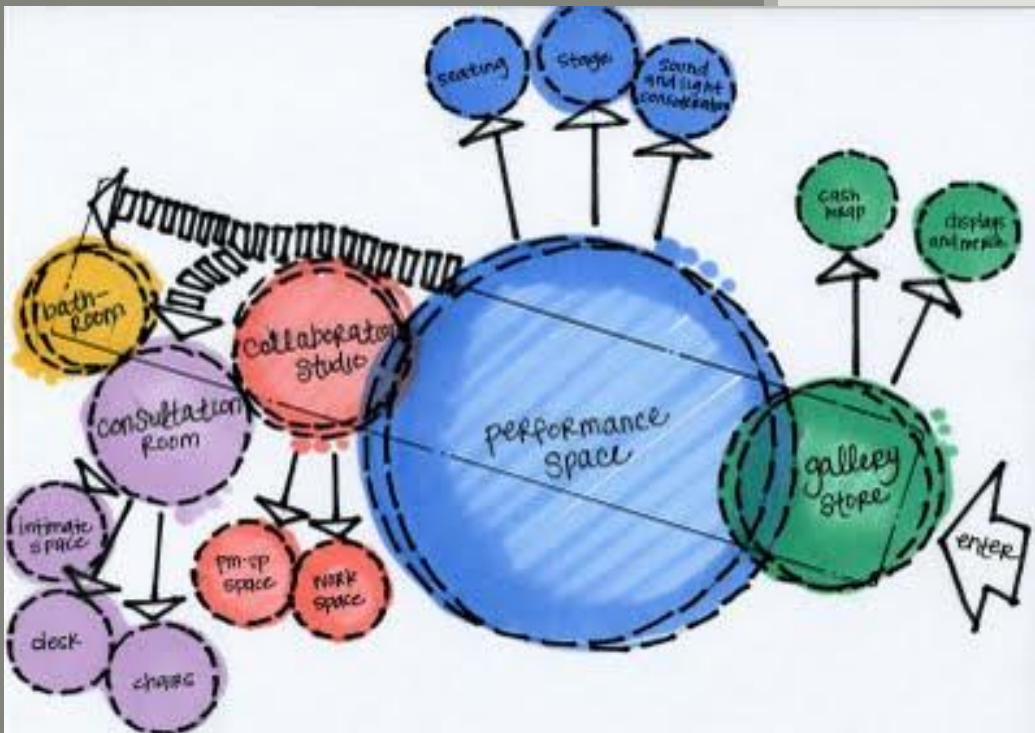
This include

- **Units:** number/amount of single unit in the whole structure.
- **Unit area(m²) :** the unit area of each unit.
- **Adjacency:** which units are adjacent to each other.
- **Natural light:** which units require natural lighting, you can label them with amount of lighting they require (from high to minimum)
- **Plumbing:** which units require sanitation lines. You can label them as a yes or no.
- **Remark:** any special treatments you want to apply

Original Architectural Program						
Room	Floor	Occupants	Quantity	Size (s.f.)	Total Size (s.f.)	% of Building
Lobby/Admissions	1	Personel	1	1000	1000	0.43%
Main Exhibition	1	Visitors	1000	30	30000	12.78%
Café	1	Visitors	1	400	400	0.17%
Gift Shop	1	Visitors	1	200	200	0.09%
Storage	1	Personel	1	200000	200000	85.22%
Mens Restrooms	1,2	Mix	4	150	600	0.26%
Womens Restrooms	1,2	Mix	4	175	700	0.30%
Security	2	Personel	1	300	300	0.13%
Administrative	2	Personel	1	1500	1500	0.64%
					Preliminary Area (s.f.)	234700
					Gross Factor	1.2
					Total Area (s.f.)	281640

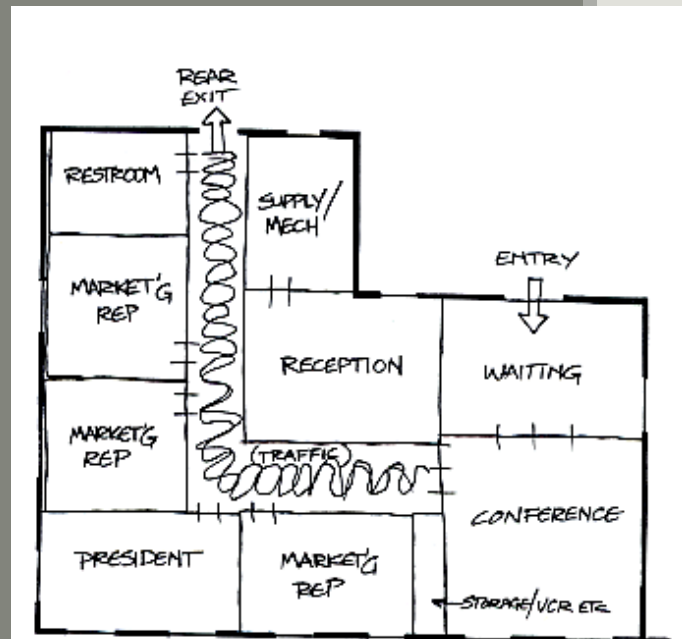
Simple diagram showing the connection between function

- Circulation
- Adjacency
- Entrances

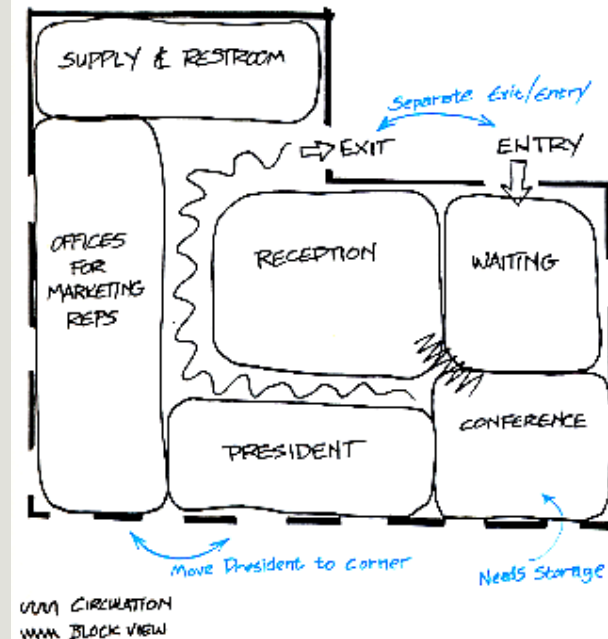


A scaled diagram showing the room arrangements.

- You arrange the room in such a way that they can produce the shape of the actual floor plan.
- You might indicate the location of door and windows and the external dimensions.
- No details and furnishing.

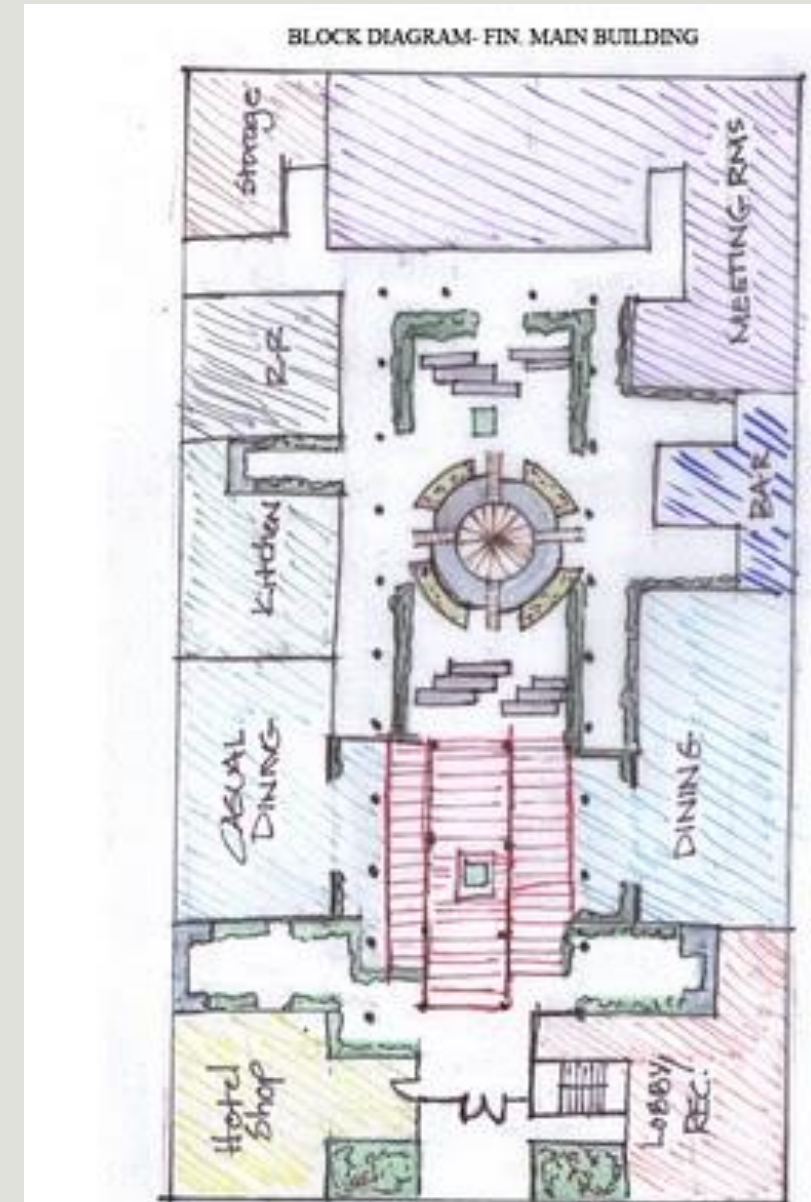


D.



E.

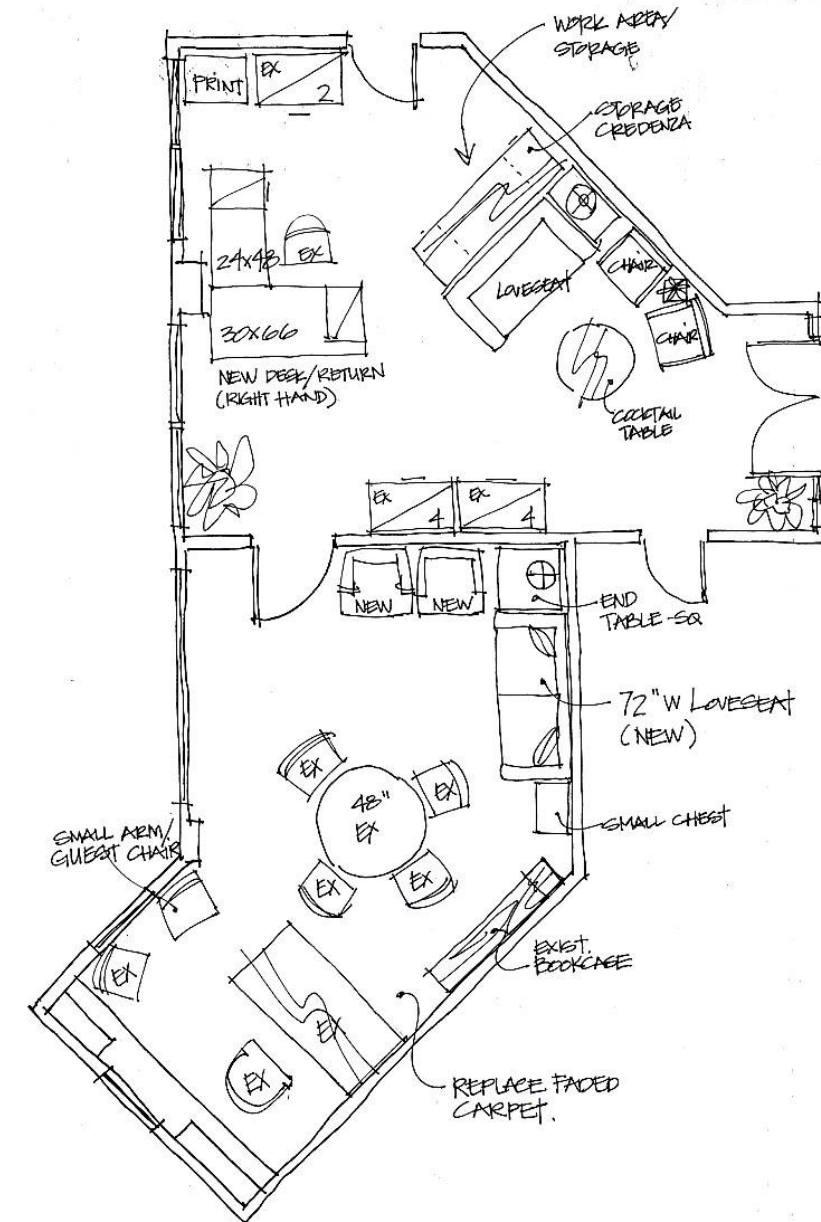
7. BLOCK DIAGRAM



- Single line floor plans, with all the windows, doors and dimensioning (both external and internal) and furnishing.
- Elevations /might not be dimensioned
- Sections/ might not be dimensioned
- Three dimensional form/ at least the outline.



8. SCHEMATIC DESIGN



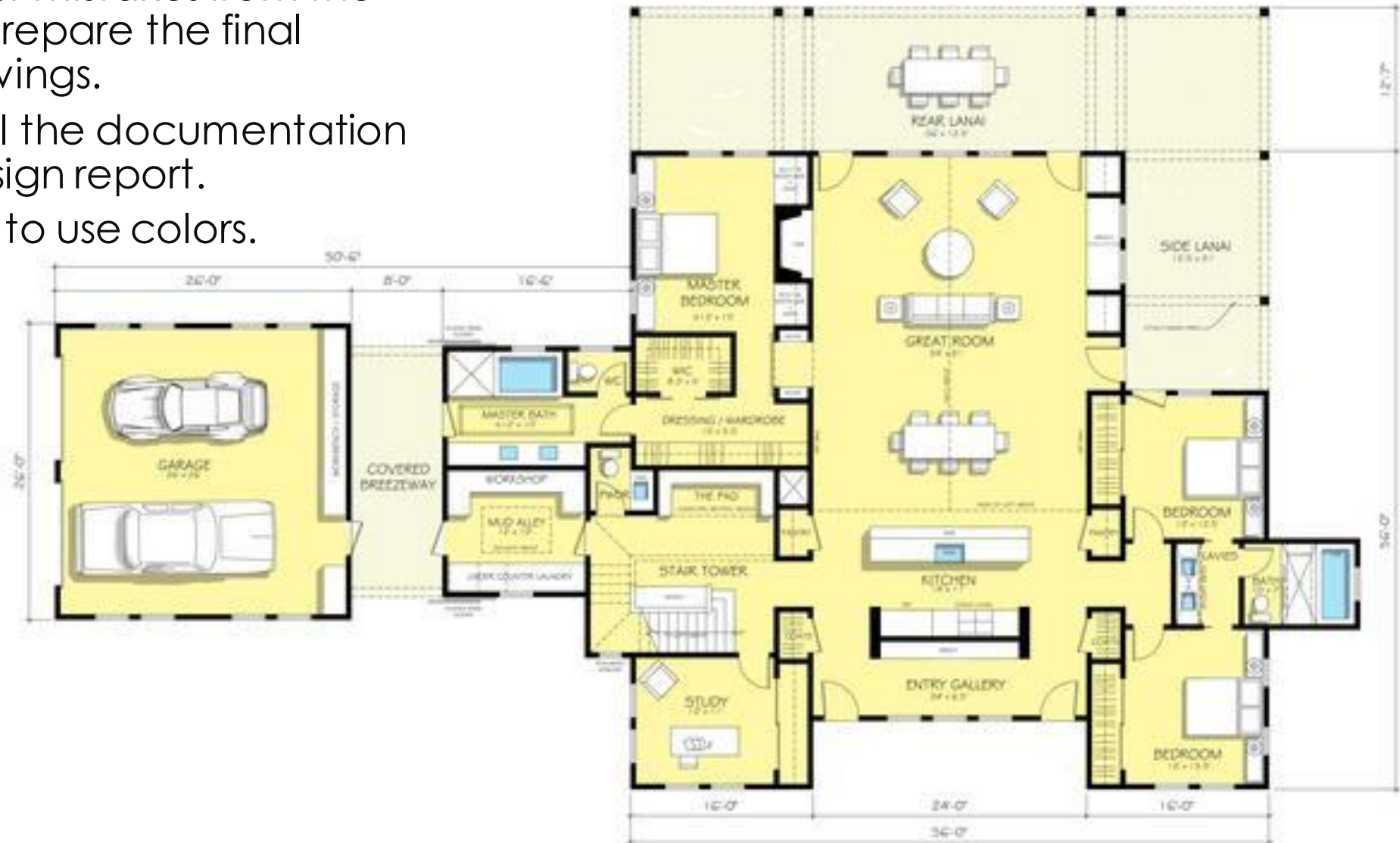
At this stage you should have a complete design.

-

This is more of a presentational stage.

10. FINAL DESIGN

- You will correct your mistakes from the consultations and prepare the final presentational drawings.
- You should have all the documentation ready including design report.
- It is more advisable to use colors.



FUNDAMENTALS OF ARCHITECTURAL DRAWINGS

Related Disciplines in the construction industry

Means of Communication



DRAWINGS

- Architect (Coordinator)
- UP and UE
- Surveyor & Geologist
- Structural Engineer
- Electrical Engineer
- Mechanical Engineer
- Sanitary Engineer

- Light Engineer
- Acoustics Engineer
- Interior Architect
- Landscape Architect etc.



Architectural Drawing ?



Architectural drawings

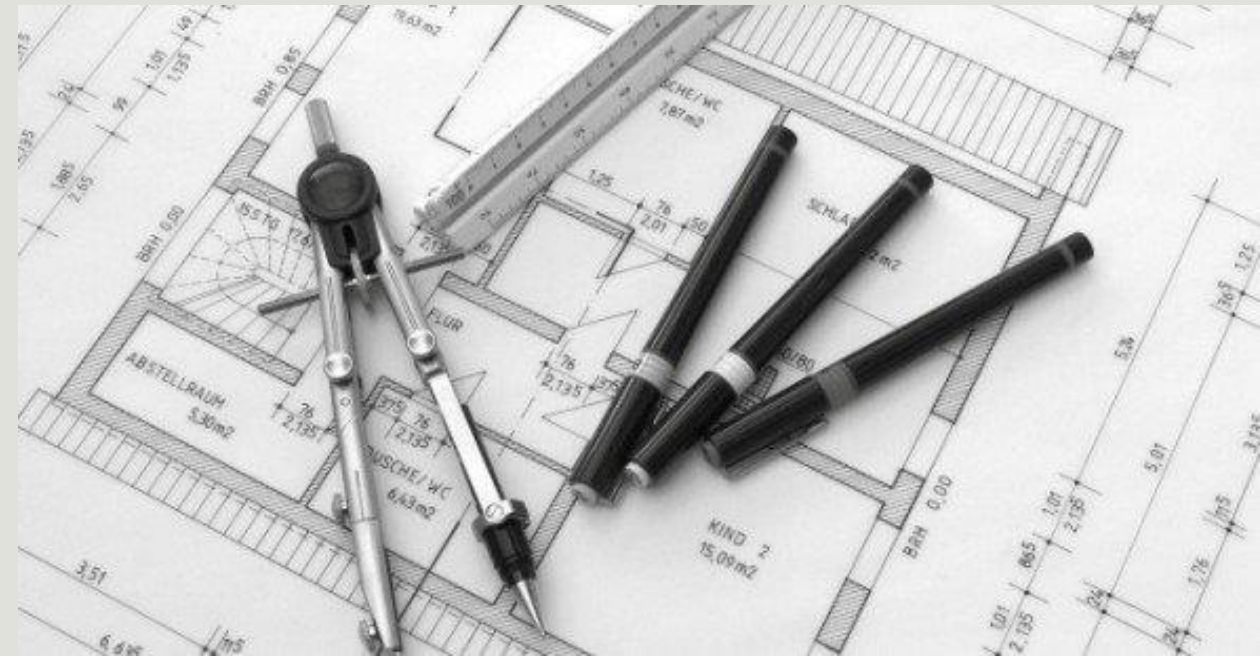
ARCHITECTURAL DRAWING is a technical drawing of a building project that falls within the definition of architecture.

Technical Drawing - is a plan that visually communicates how something functions or is to be constructed.



Architectural Drawings Are Used By Architects And Others For A Number Of Purposes:

- To develop a design idea into a coherent proposal
- To communicate ideas and concepts
- To convince clients of the merits of a design
- To enable a building contractor to construct it
- As a record of the completed work
- To make a record of a building that already exists



- Architectural drawings are drawn according to a set of **conventions**, which include
 - **particular views** (floor plan, elevations, section etc.),
 - **sheet sizes**,
 - units of measurement and scales, annotations and cross referencing.
- **Convention** is a set of agreed, or generally accepted standards, often taking the form of a custom.



Different Between Presentation Drawing And Construction Working Drawing

PRESENTATION DRAWING:

Made to show ideas
Architectural concepts
Less precise
More photographic or artistic
Well rendered
Incorporates scale giving objects

- Human figure
- Greeneries
- Fixtures
- Backgrounds & foregrounds



PRESENTATION DRAWING:

Helps the participants to visualize the project

Little technical information

There are various ways of rendering presentation drawings

- Color pencils
- Water colors
- Ink and wash

Models can be used to convey the concept and idea of the design.



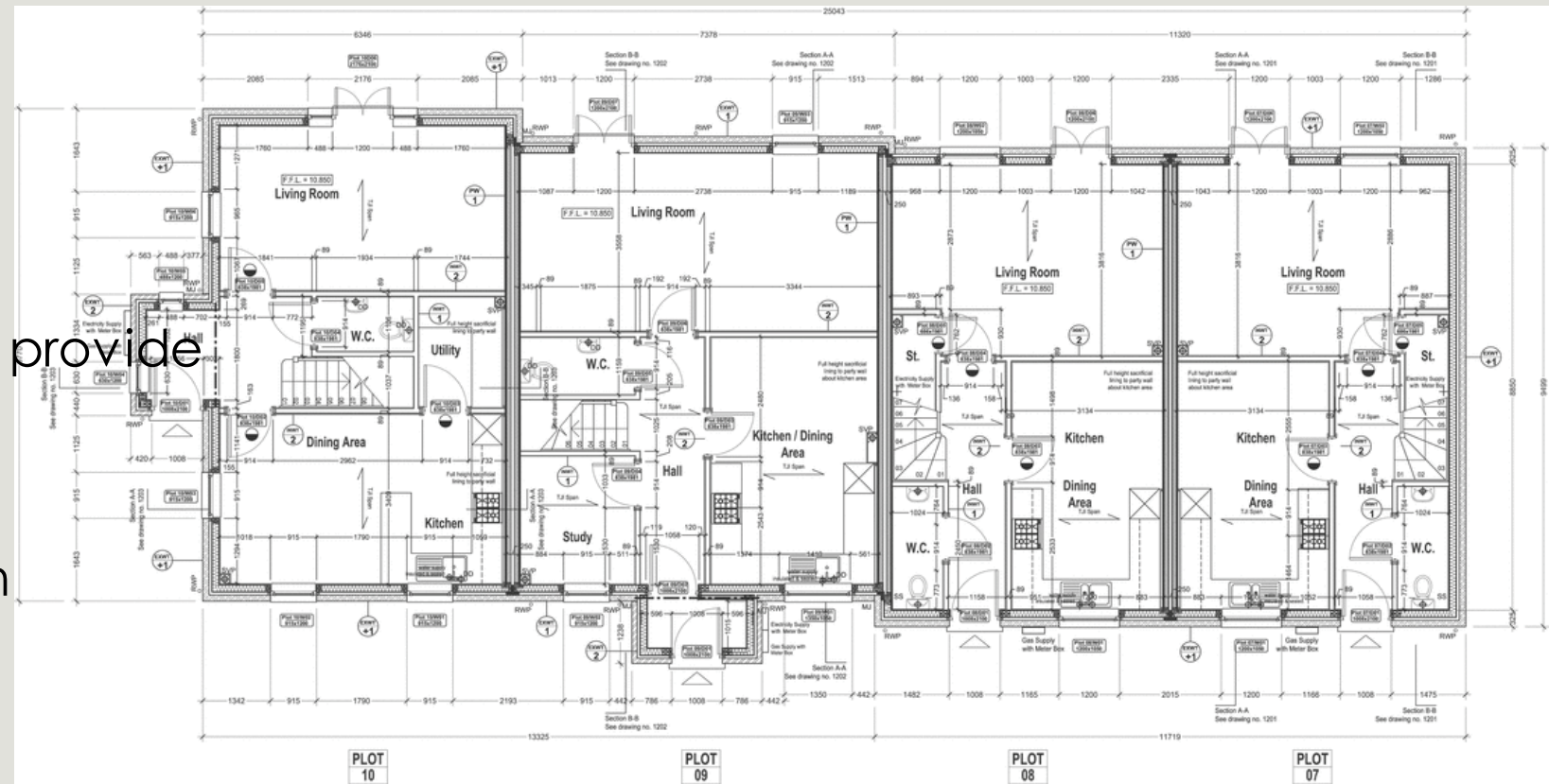
WORKING DRAWING

Are produced in order to communicate technical information throughout the construction team by using universally standardized conventions:

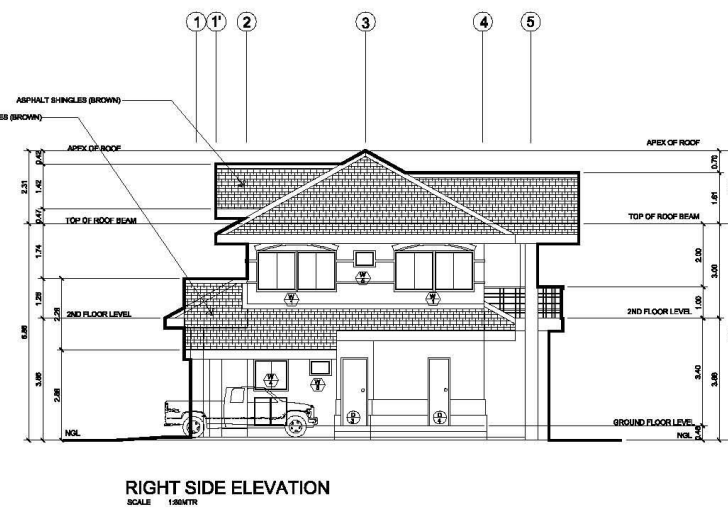
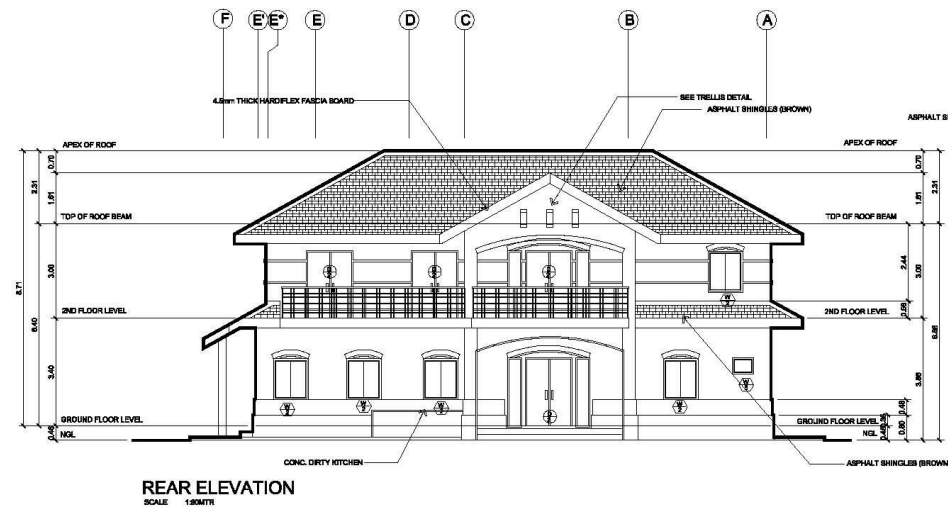
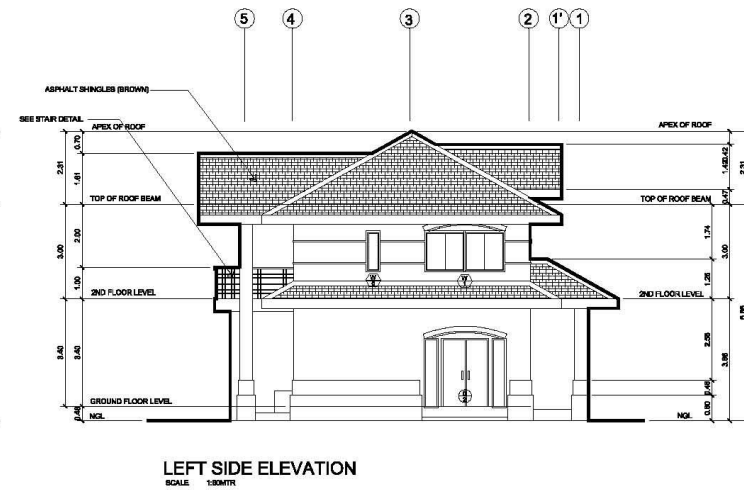
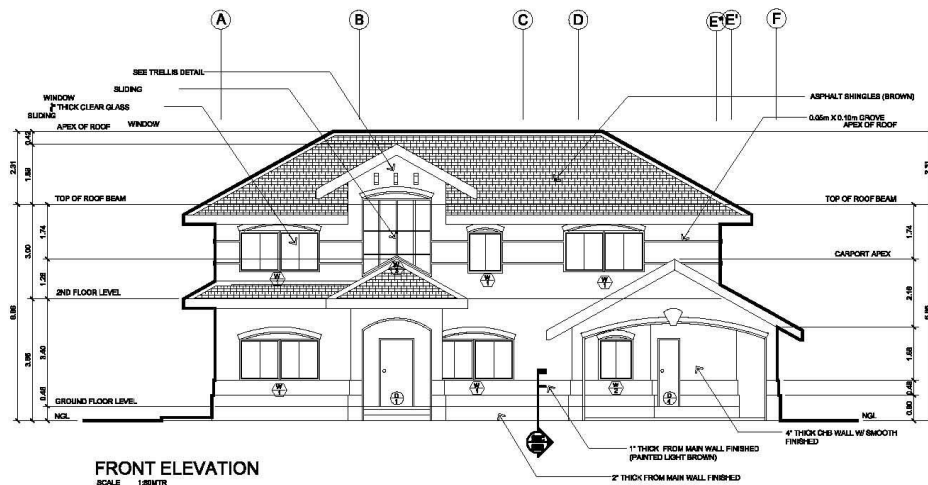
- Structural
- Sanitary
- Electrical

Working drawing are expected to provide

- Use of materials
- Construction details
- Contractual document
- Indication of degree supervision



Ground Floor Plan



Why do we prepare construction working drawings ?

- To communicate requirements in a clear, concise and unambiguous manner
- To prepare bill of quantities
- To use it as part of contract document

What are the requirements of construction working drawing ?

- Shouldn't be unnecessarily congested or complicated
- Clear to understand
- Descriptions be Brief
- Should be Consistent and complete
- Should be well dimensioned
- Should be drawn to scale

Standard size of drawing papers

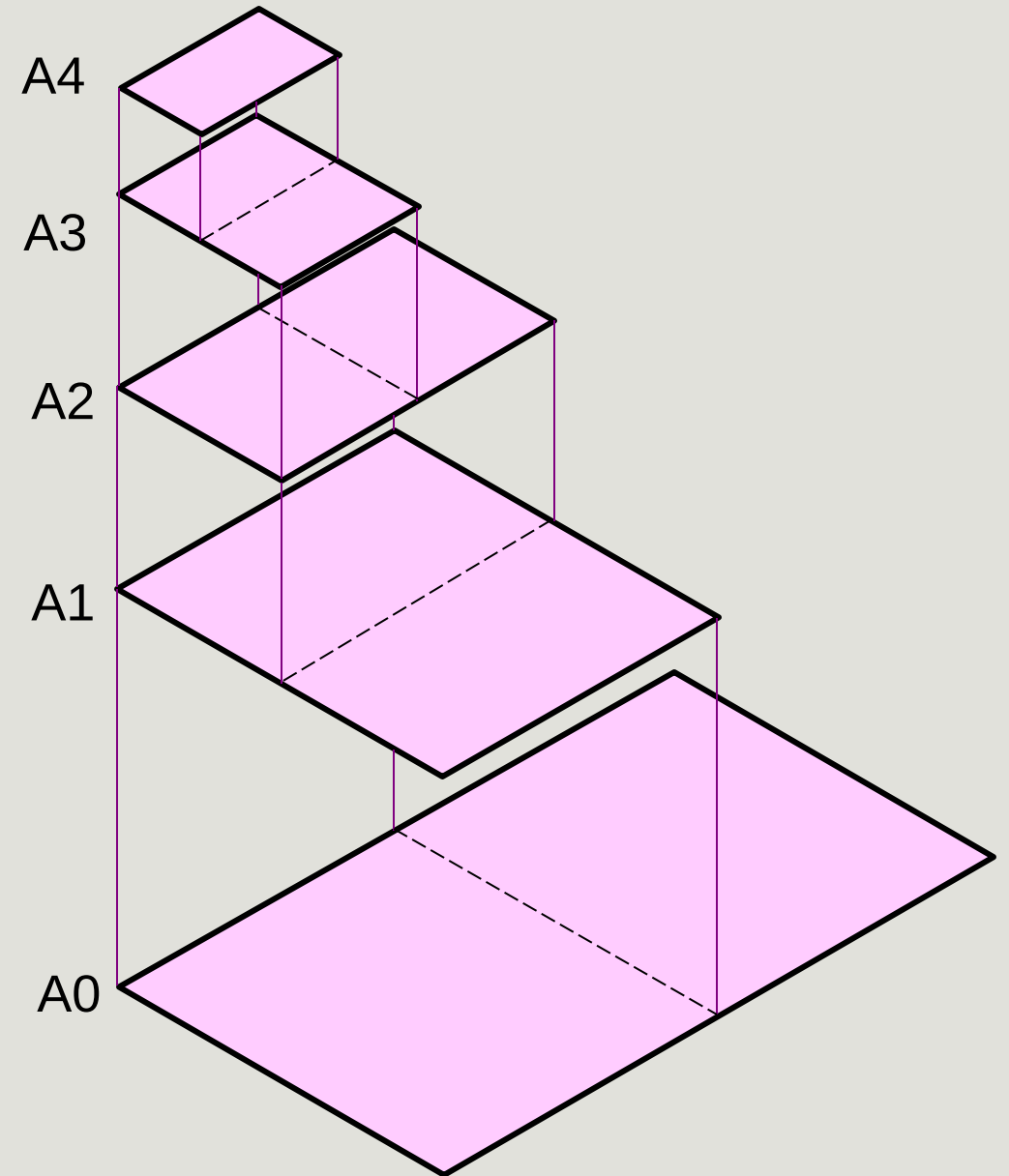
Generally it is advisable to use international standard-size papers.

Trimmed paper of a size A0 ~ A4.

Standard sheet size
(JIS)

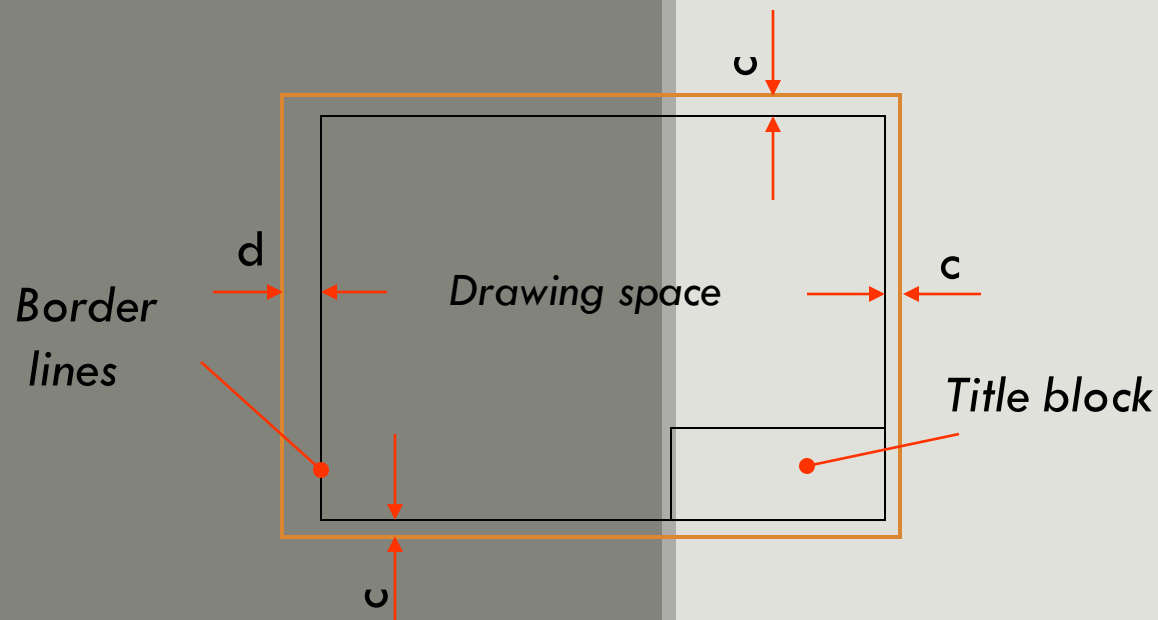
A4	210 x 297
A3	297 x 420
A2	420 x 594
A1	594 x 841
A0	841 x 1189

(Dimensions in millimeters)

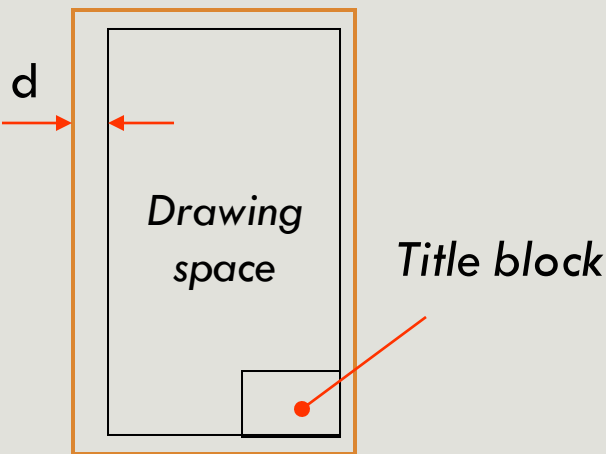


Orientation of drawing sheet

1. Type X (A0~A4)



2. Type Y (A4 only)



Sheet size	c (min)	d (min)
A4	10	25
A3	10	25
A2	10	25
A1	20	25
A0	20	25

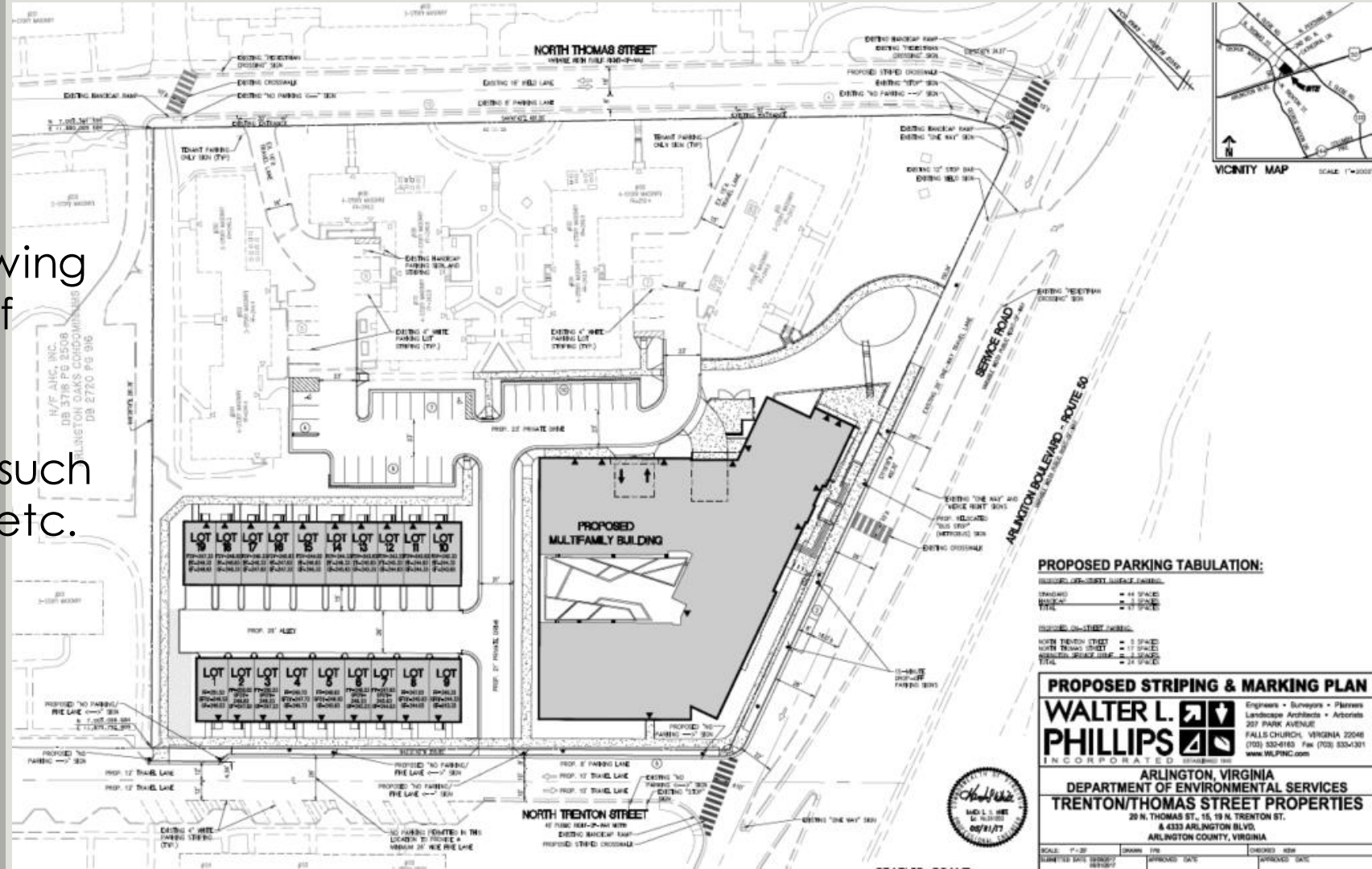
Architectural Drawings

- Site plans
- Roof plans (combined with site plans)
- Floor plans
- Sections
- Elevations
- Detailed drawings



Site plans

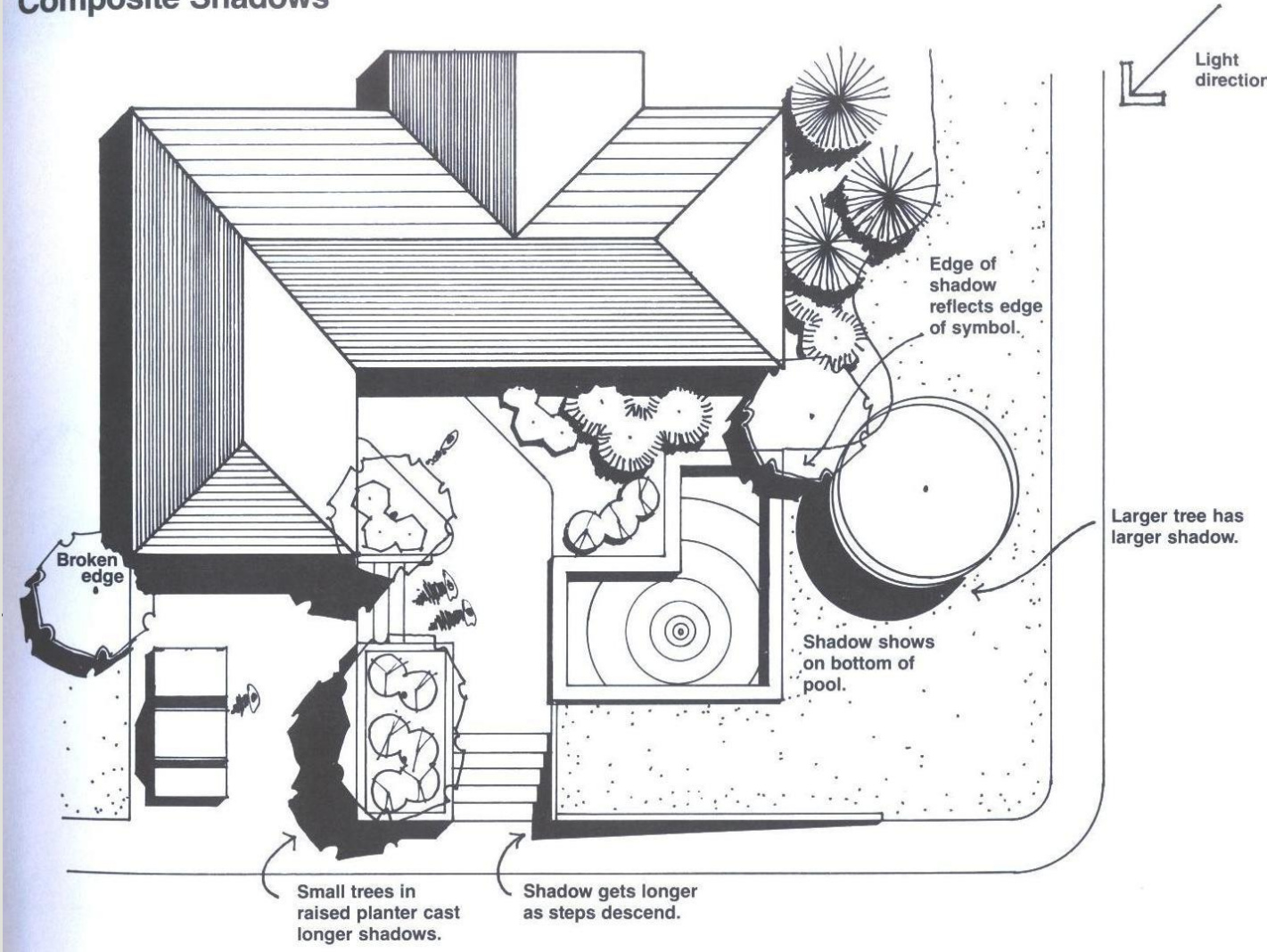
- A site plan is a drawing showing various properties in terms of their owners, locations, elevations, states of development and features such as roads, utility supply lines, etc.



ROOF PLAN

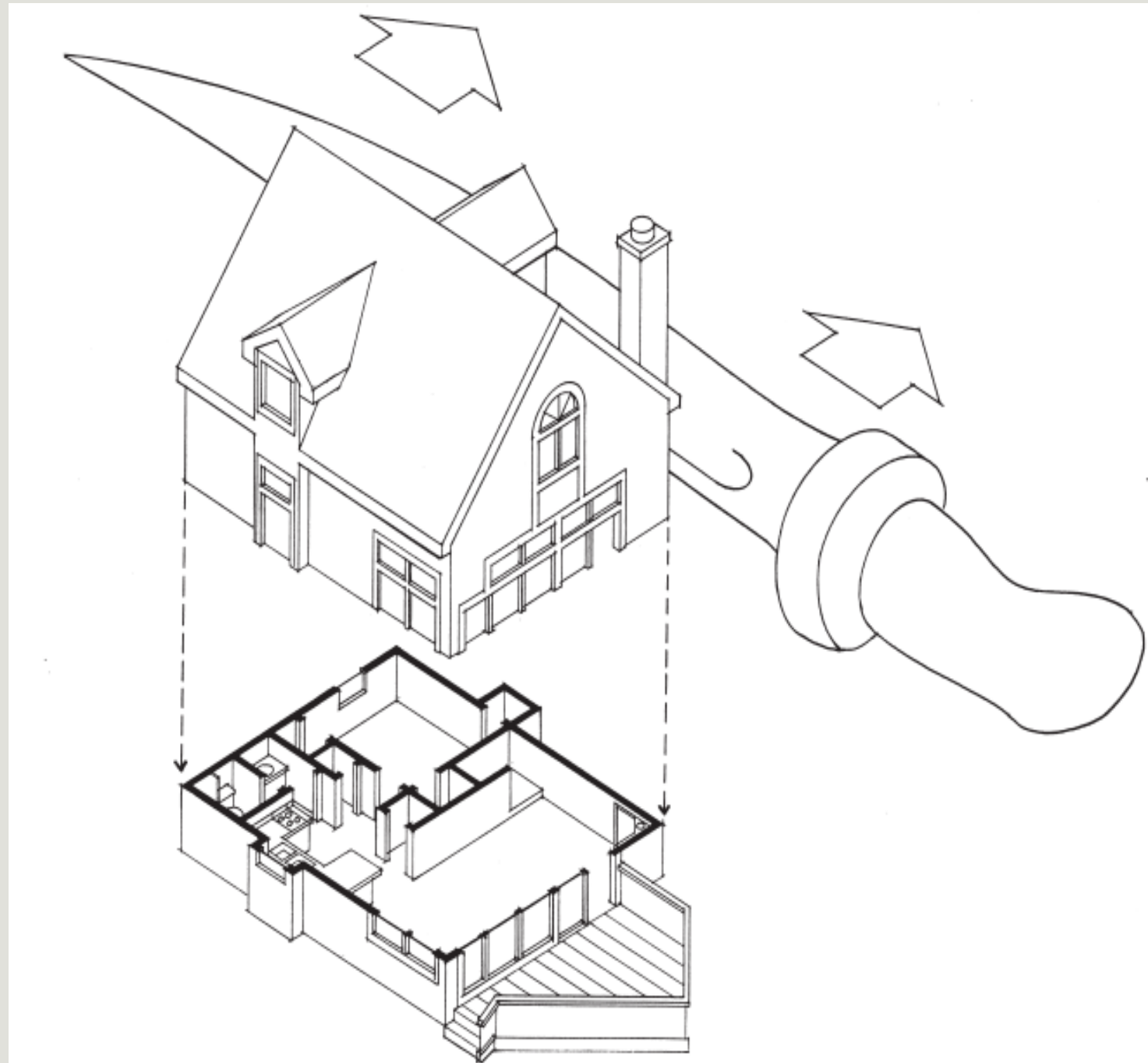
- A roof is defined as the upper most part of the building, provided as a structural covering, to protect the building from weather.
- A roof consists of structural elements, which support roof coverings.
- The structural elements may be trusses, beams, slabs, shells or domes
- The roof coverings may be corrugated metal sheets, RC slabs, tiles, etc.

Composite Shadows



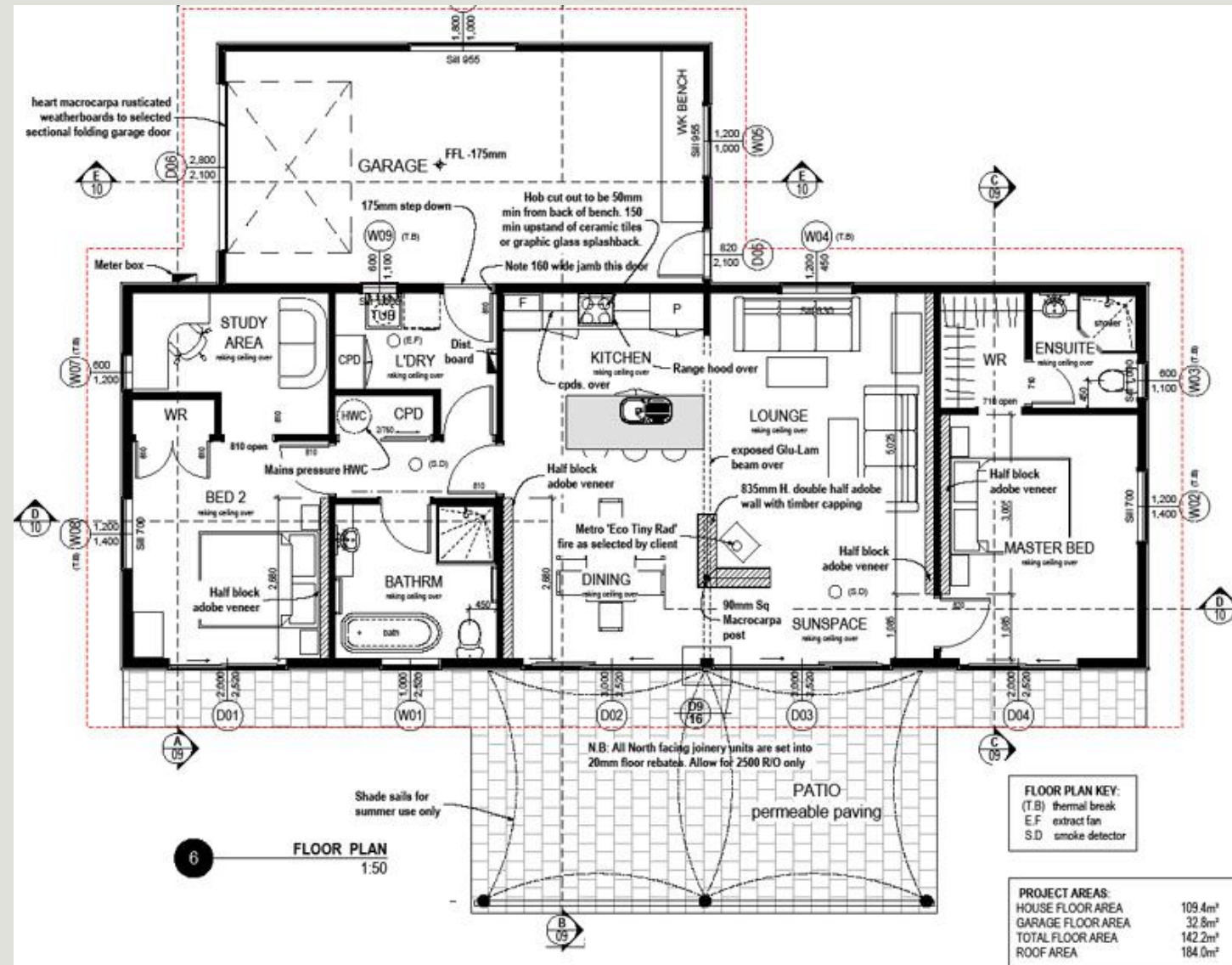
FLOOR PLAN

- A floor plan is an orthographic view of a total building or an area within a building, seen as if a horizontal cutting plane were passed through it at a height of approximately (150 cm) above the floor.



FLOOR PLAN

- Floor plans usually show the layout of rooms,
- key dimensions and levels, and
- may also use conventions and symbols to show materials and locations of fittings and appliances.



FLOOR PLAN

The functions of floor plans are:

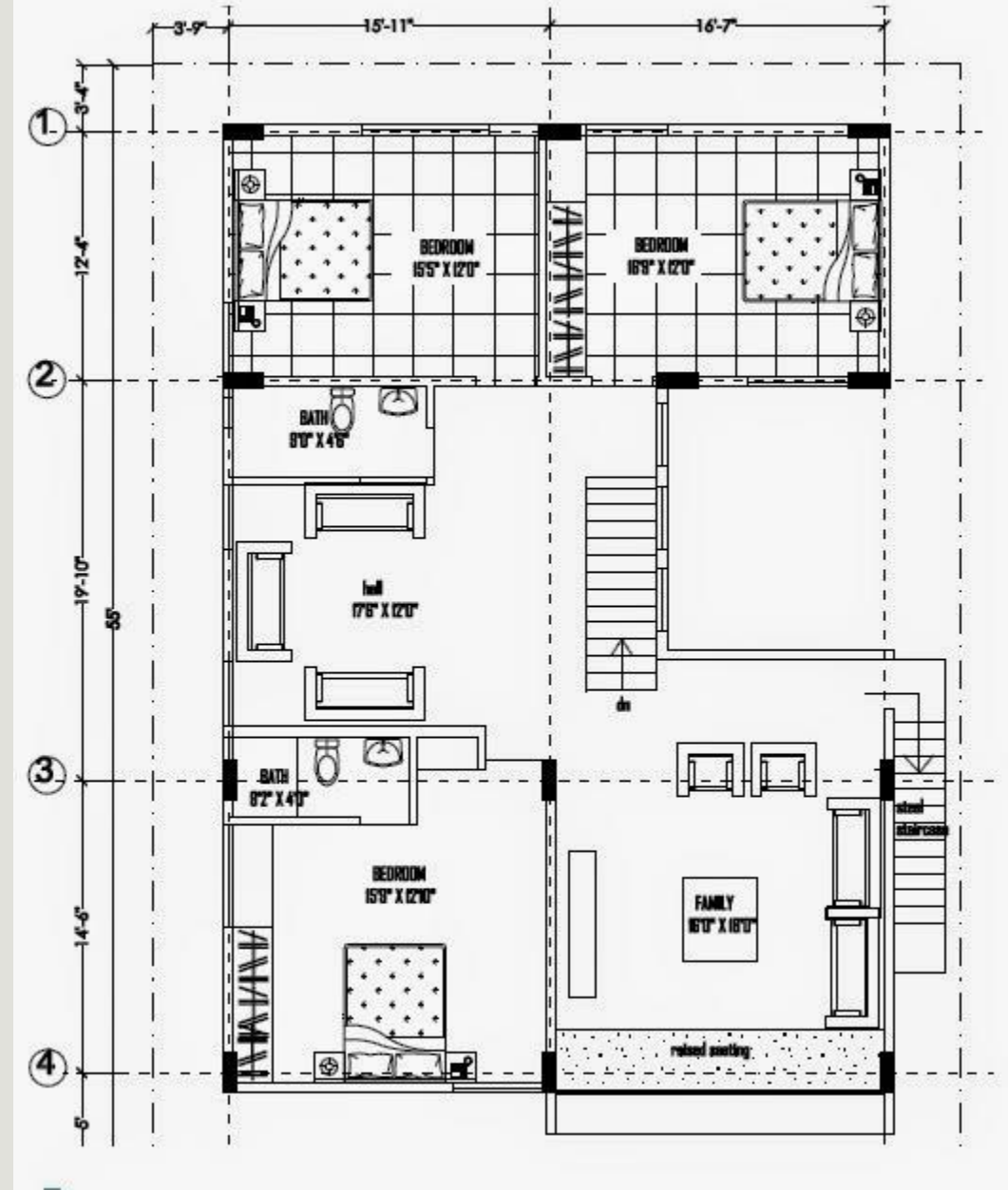
- To guide the construction team to layout and construct;
 - Floors,
 - Columns,
 - Walls,
 - Openings,
 - Stair cases,
 - Fixtures,
 - Partitions etc.
- To helps the design team to develop other working drawings such as;
 - Sections,
 - Elevations,
 - Site plan,
 - Roof and ceiling plan etc.



FLOOR PLAN

The functions of floor plans are:

- To show the dimensions of exterior features and interior contents
 - room sizes,
 - exterior wall,
 - columns,
 - partition walls material and thickness,
 - rooms name & size.
- To indicate the location and the materials of a building component, and its contents.



FLOOR PLAN

The functions of floor plans are:

- A construction working drawing of a floor plan conveys a significant amount of information to the builder,

such as:

- Dimensions,
- Door/window locations,
- Cabinetry,
- Section line
- Leveling
- Furnishings and
- Some other symbols

How to draw floor plan

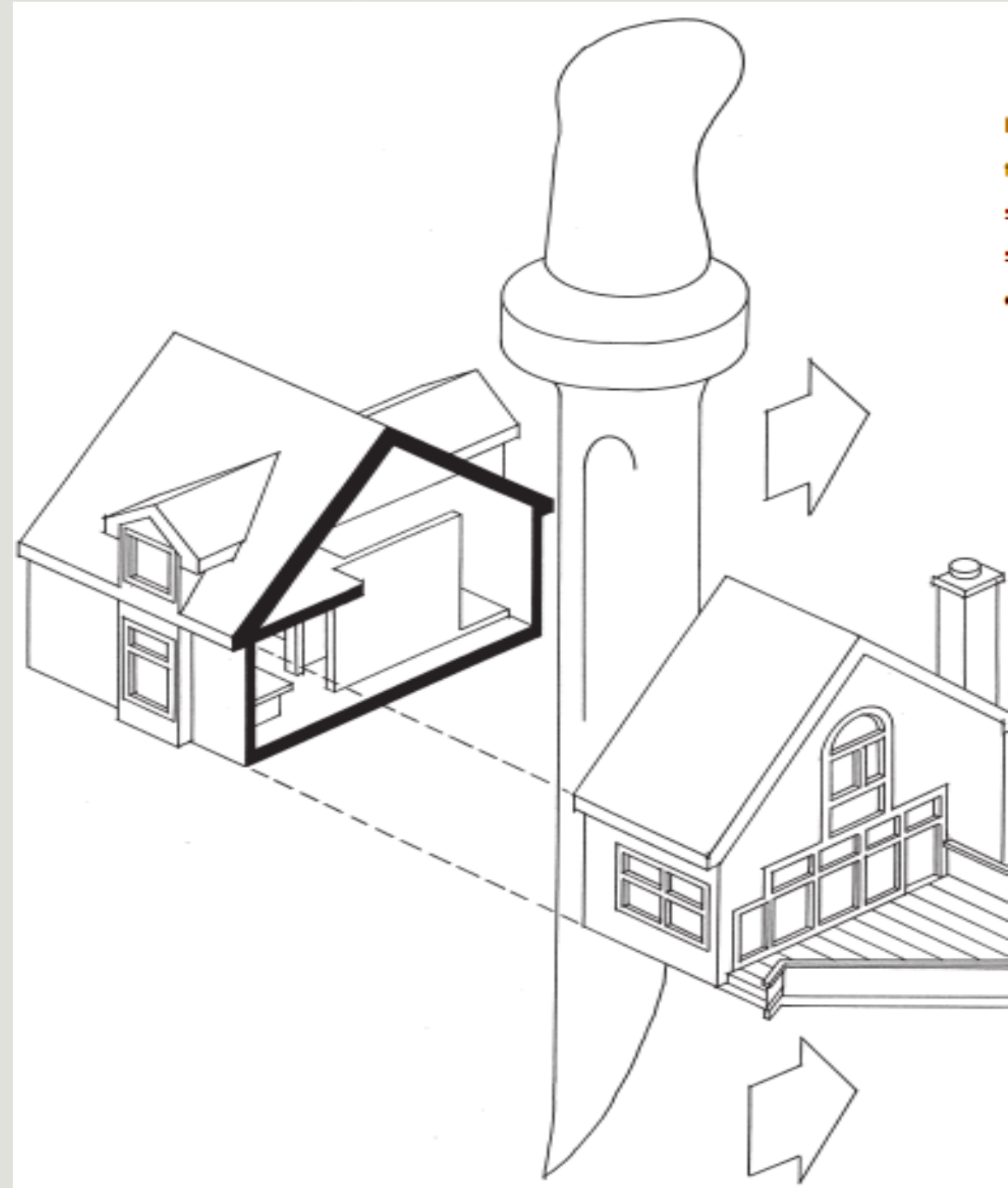
The major steps in floor plan drawings preparation are:

- Laying center line of walls,
- Locating of Columns at the intersection of center line
- Marking wall thickness,
- Marking window and door openings,
- Locating furniture positions,
- Indicating material type,
- Adding measurements and other details.

SECTIONS

A section drawing takes an imaginary vertical slice through a structure, showing its materials and components.

A section is a view of a building or object obtained by making an imaginary cut through it.

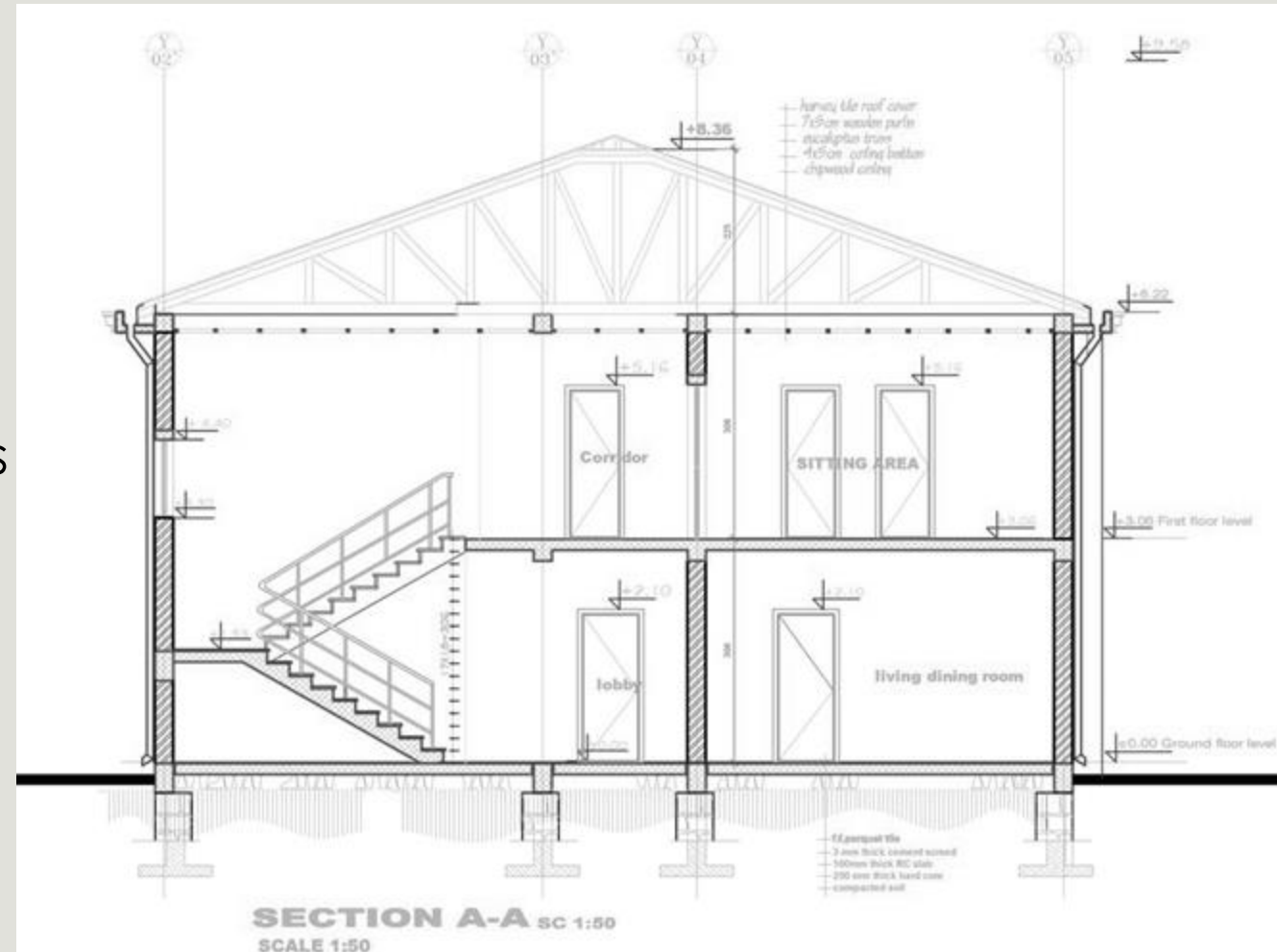


SECTIONS

A vertical section through a building will show details of the construction of the foundations, walls, floors, roof and other parts.

The number of sections required of a building will depend on its size and complexity.

Generally there will be at least two sections across section, across the width of the building.
a longitudinal section, along the length of the building.



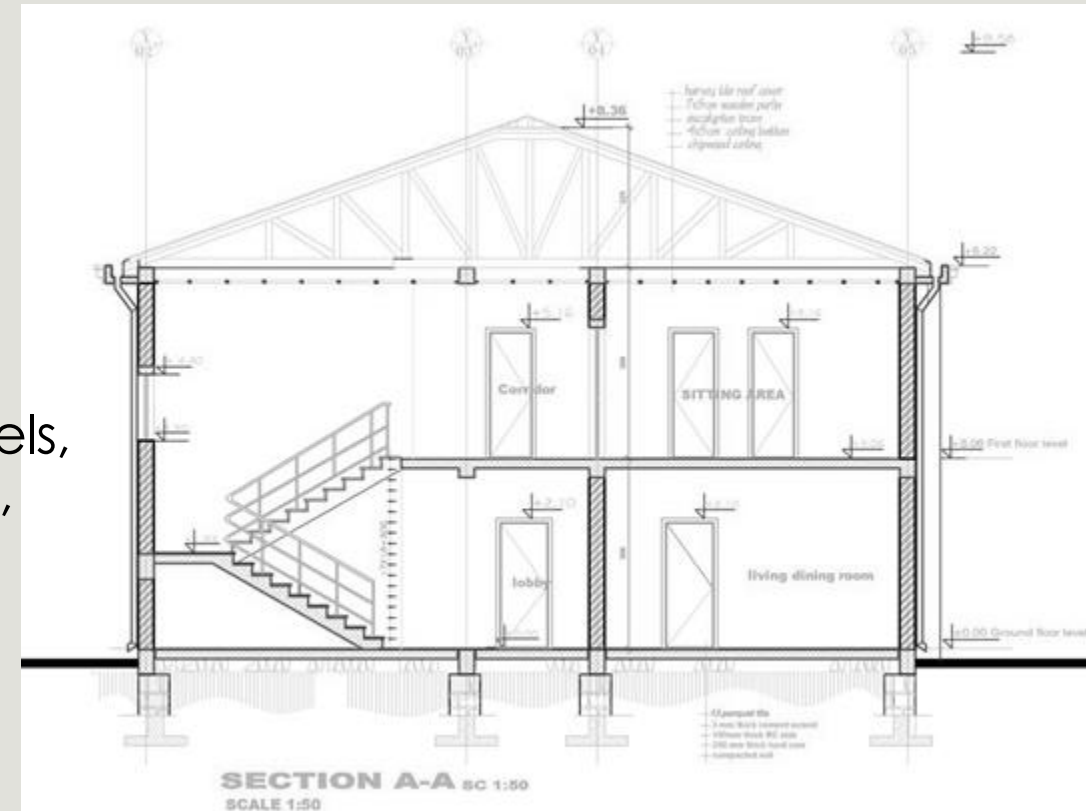
SECTIONS

It is recommended for the location of Cutting Plane to pass through:

- Stairs: to show vertical circulation.
- Openings: to show details in windows and doors.
- important interior spaces: to show interior rooms content Info.

To prepare a section the following information are needed ;

the building vertical dimensions and heights, site levels, the building structural systems, wall and roof systems, some mechanical information, windows and doors types, major building finishes.



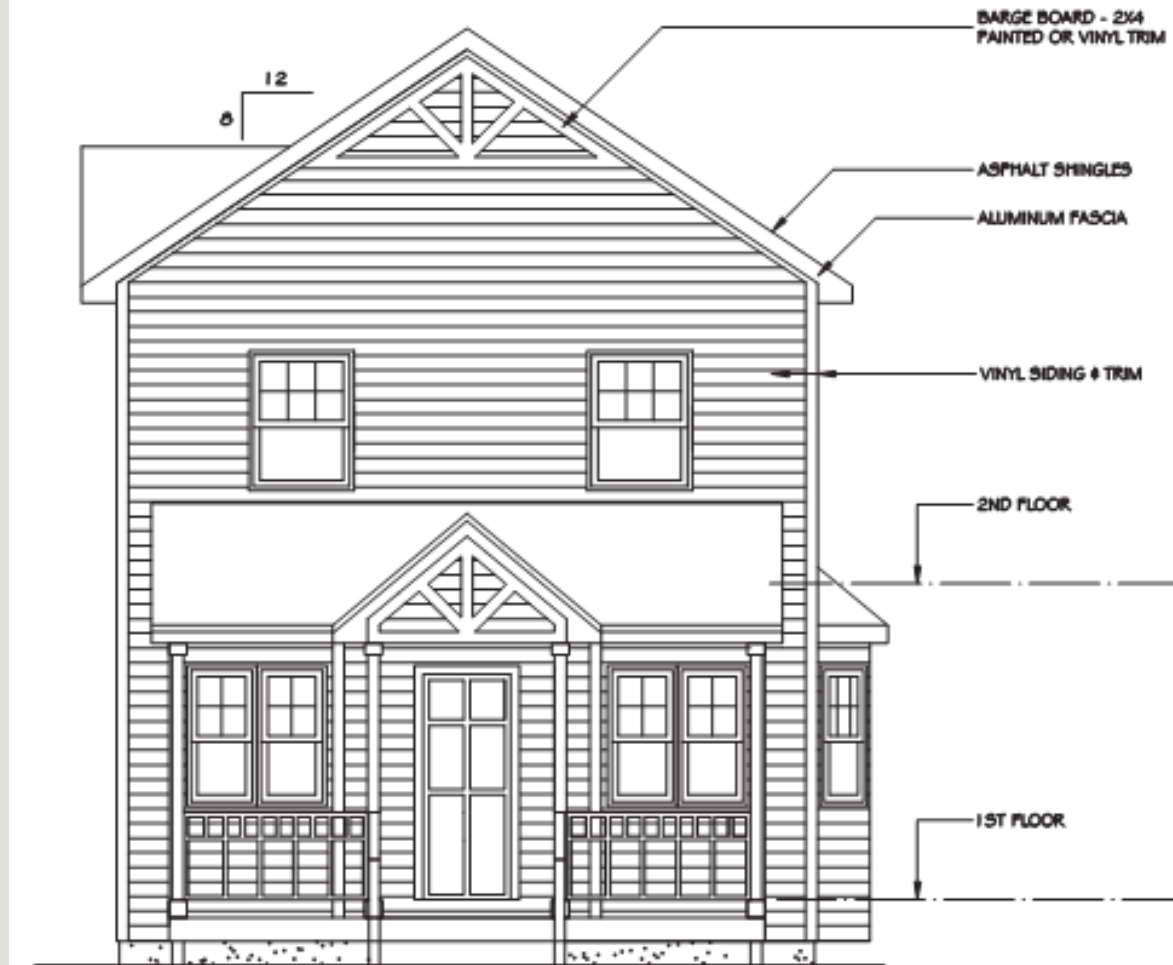
ELEVATION

An elevation is a scaled drawing that shows a vertical surface or plane seen from a point of view perpendicular to the viewer's picture plane.

An elevation should give an impression of how one face of the building will look from the outside.

Exterior elevations illustrate the finished appearance of an exterior wall of a building. They convey the;

Types of materials proposed,
Types of doors and windows,
The finished grade,
Roof slope . etc.



FRONT ELEVATION

SC: 1/4" = 1'-0"

ELEVATION

How To Draw Elevation ?

Elevation drawings are projected from the floor plan of an architectural drawing. When drawing an elevation you need to take the horizontal dimensions from the plans and the vertical dimensions from the sections.

The major steps in projecting elevations are:

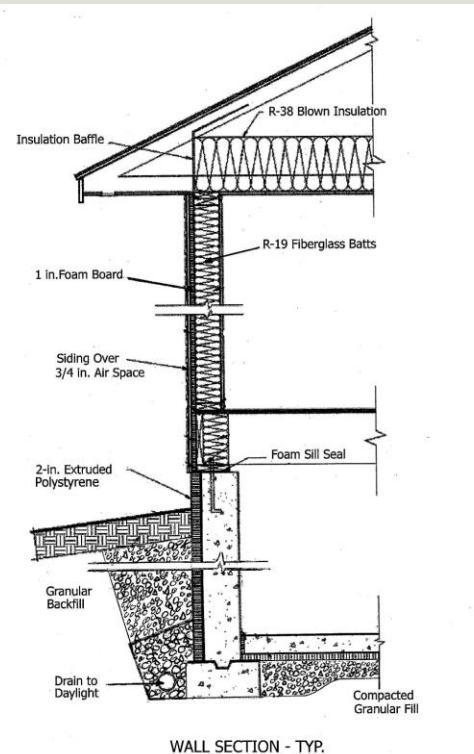
- Projecting horizontal lines
- Projecting vertical lines
- Locating roof lines
- Adding elevation symbols
- Providing elevation dimensions
- Description of material used and finishing type

DETAILED DRAWINGS

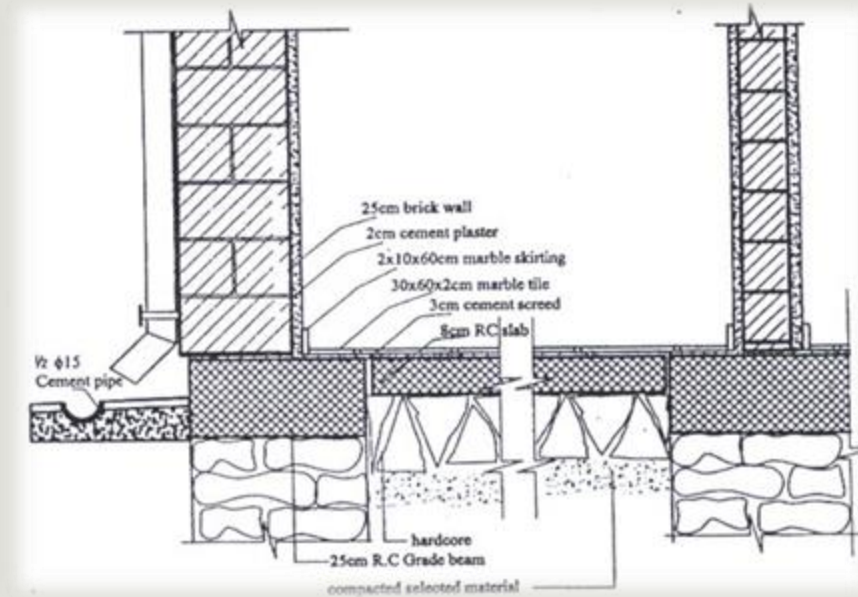
They usually show specific details, such as in stair cases, gutter to down pipe connections, wall to foundation connection, metal and wood joineries etc.

They are prepared to the extent necessary and depending on the complexity of the building. The recommended is scale of 1:1, 1:5, 1:10, or 1:20.

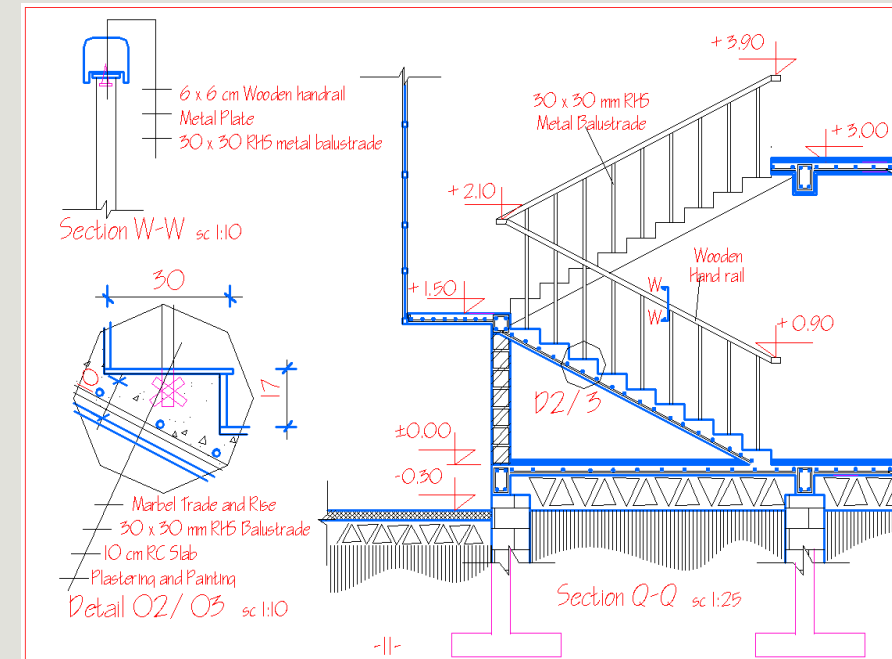
Wall section detail



Wall to foundation connection detail

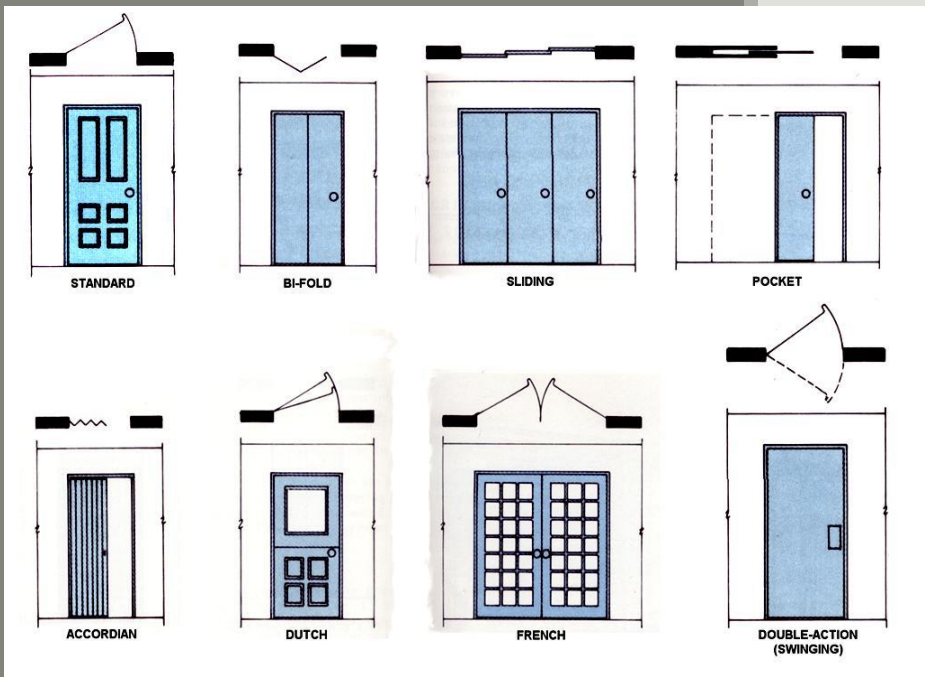


Stair detail



ARCHITECTURAL SYMBOLS

All drawings use a common set of symbols



Bathroom

27 bath
75 x 170, 85 x 185

28 sit-up bath
70 x 105, 70 x 125

29 shower
80 x 80, 90 x 90, 75 x 90

30 corner shower
90 x 90

31 wash-basin
60 x 60, 60 x 70

32 two wash-basins

33 twin wash-basins
60 x 120, 60 x 140

5 Single-leaf door

11 Swing door

Kitchen

39 single sink and drainer
60 x 100

40 twin sinks, single drainer
60 x 150

Bedroom

22 bed 95 x 195
bedside table 50 x 70, 60 x 70

8 sofa 80/1.75

11 television

ANNOTATIONS

Working drawings include dimension
They specify:

room size
wall lengths
door and window locations



Quiz I (5 point)

20 min

1) What are the Architectural design processes ?

List and discuss each of them.

2) What are the six Architectural drawings ?

List and discuss each of them.

Thank you.