BUILDING PLANNING AND DRAWING (SOC) SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES, CHITTOOR

(AUTONOMOUS)

Approved by AICTE, New Delhi, Affiliated to JNTUA, Ananthapuramu.

LECTURE NOTES

Subject Name: BUILDING PLANNING AND DRAWING (SOC) &23CIV234L

Year / Branch: IIB.TECH-III SEM

Regulation: R23

Prepared By: K.SUMALATHA

II B.TECH - III SEMESTER

23CIV234L	BUILDING PLANNING AND DRAWING (SOC)	L	T	P	C
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PRE-REQUISITES: A course on building planning and drawing

COURSE EDUCATIONAL OBJECTIVES:

1. Initiating the student to different building bye-laws and regulations.
2. Imparting the planning aspects of residential buildings and public buildings.
3. Giving training exercises on various sign sand bonds.
4. Giving training exercises on different building units.
5. Imparting the skills and methods of planning of various buildings.

Syllabus (Only manual drawing in charts)

1. Detailing & Drawing of Sign Conventions.
2. Detailing & Drawing of English Bond.
3. Detailing & Drawing of Flemish Bond.
4. Detailing & Drawing of Doors.
5. Detailing & Drawing of Windows.
6. Detailing & Drawing of Ventilators & Roofs.
7. Drawing of Line Diagram of Residential Buildings by using Building Bye-Laws.
8. Drawing of Plan, Elevation & Section from line diagram for a single Storey Building.
9. Drawing of Plan, Elevation &Section for Hospital Building.
10. Drawing of Plan, Elevation & Section for Industrial Building.

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Plan various buildings as per the building by-laws.	**PO1**
CO2	Distinguish the relation between the plan, elevation and cross section and identify the form and functions among the buildings.	**PO2**
CO3	Draw signs and bonds	**PO3**
CO4	Draw different building units	**PO4**
CO5	Learn the Skills of drawing building elements and plan the buildings as per requirements.	**PO5**

Text Books:

1. Planning, designing and Scheduling, Gurcharan Singhand Jagdish Singh
2. Building Planning and drawing by M.Chakraborti.
3. Building drawing, M G Shah, C M Kale and S Y Patki, Tata McGraw Hill, New Delhi.

Reference Books:

1. National Building Code 2016(Volume-I&II).
2. Principles of Building Drawing, M G Shah and C M Kale, Trinity Publications, New Delhi.
3. Civil engineering drawing and House planning, B. P. Verma, Khanna publishers, New Delhi.
4. Civil Engineering Building practice, Suraj Singh: CBS Publications, New Delhi, and Chennai
5. Building Materials and Construction, G. C Saha and JoyGopalJana, McGraw-Hill Education (P) India Ltd. New Delhi.

CO-PO MAPPING:

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-

BUILDING BYE LAWS

PURPOSE

- If certain rules and regulations are not made, house owner may construct residential building as per his whims and fancies.
- Hence it is essential to maintain and implement the bye laws to provide proper ventilation, privacy, security and safety between the neighbors.

PROBLEMS

If no proper bye laws are implemented than following problems are arise

- Irregular and narrow roads
- Frequent traffic problems
- Creation of noise and nuisance
- Problem in development of service like water supply, drainage, telephone, fire, electricity
- Poor lighting and ventilation
- Lack of recreational facilities

Definition

Byelaws:-The construction of any building, certain restrictions are laid down by Municipal bodies, Urban Development Authorities and other town planning trusts to clear open spaces to be left round the building.
Example:- Government Department, City Corporation,UDA,….ETC

What is building byelaws

Taking into consideration of local situation and the actual requirements of local people the local authorities or state government prepare certain rules for the building and for the development of town is known as building byelaws.

TYPESOF BUILDINGS

ASSEMBLY BUILDING:-Means a building or part there of where groups of people congregate or gather for social, religious, civil, travel and similar purposes.

➢Assembly building include buildings of drama and cinema theatres, city halls, town halls, auditoria, exhibition halls, museums, marriage hall, restaurants, eating or boarding houses, place of worship, dance halls, clubs,…etc.

BUSINESS BUILDING:-Means any building or part used for transaction of record for offices, bank,…etc.

EDUCATIONAL BUILDING:-Means a building exclusively used for a school or college, recognised by the appropriate Board or University.

➢Library, Staff Quarters can be considered as educational building.

HAZARDOUS BUILDING:-Means a building or part there of used for Storage, handling, manufacture or processing of materials, products, Chemicals,…etc.

INDUSTRIAL BUILDING:-Means a building or part there of where in products or, material are fabricated, assembled or processed, such as assembly plants, laboratories, power plants, refineries, gas plants, mills dairies and factories.

INSTITUTIONAL BUILDING:-Means a building constructed by Government, Semi-Government organisations, public sector undertakings, registered Charitable Trusts for their public activities, such as education, medical, recreational and cultural , hostel for working women or men or for an auditorium or complex for cultural activities

MERCANTILE BUILDING:-Means buildings used as shops, stores or markets, for display and sale of wholesale or retail goods or merchandise, including office, storage.

OFFICE BUILDING:-Means a building used for purpose of administration, clerical work, handling money, telephone, telegraph and computer operation, and clerical work" includes writing, book keeping, sorting papers typing, duplicating.

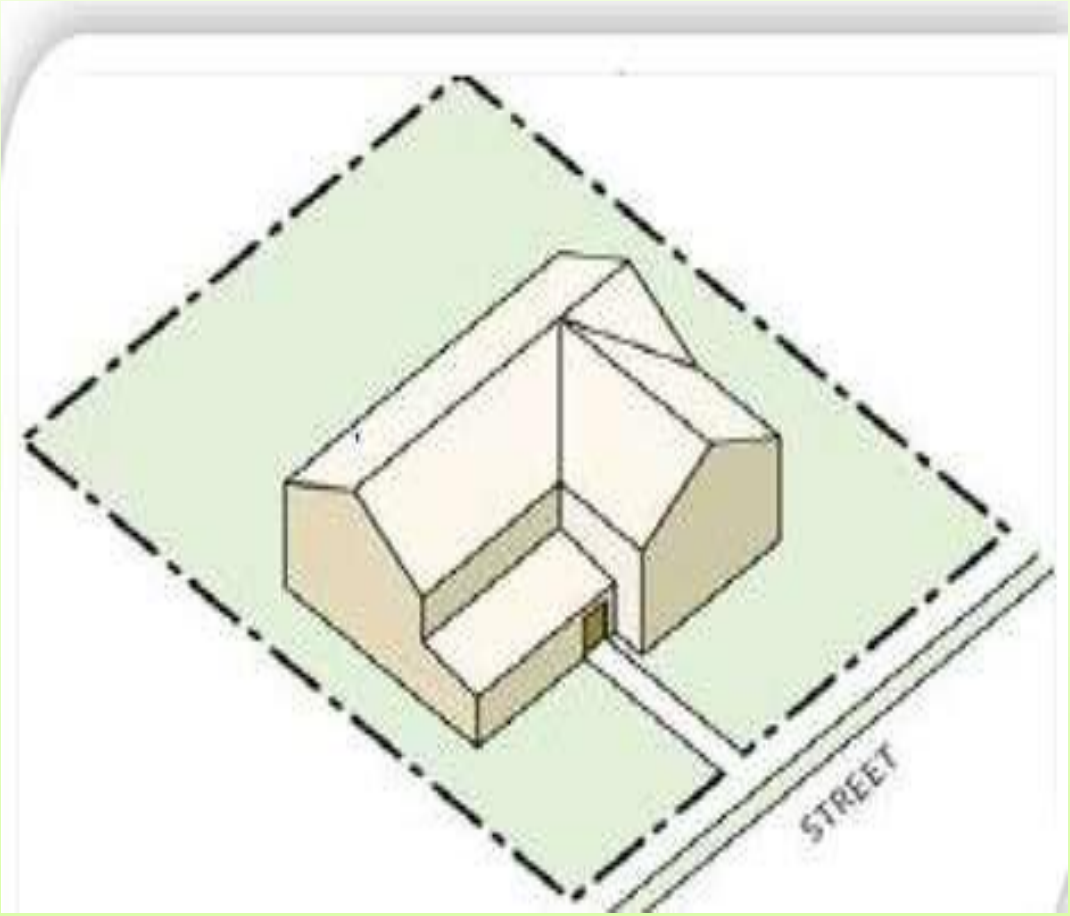
SPECIAL BUILDING:-Means a building used for the purpose of a drama or cinema theatre, picture a drive-in-theatre, an assembly hall or auditorium, town hall, lecture hall, an exhibition hall, theatre museum, stadium, community hall, marriage hall.

RESIDENTIAL BUILDING:-Means a building in which sleeping accommodation with or without cooking or dining facilities, lodging or boarding houses, hostels, dormitories, apartment houses, flats and private garages of such buildings.

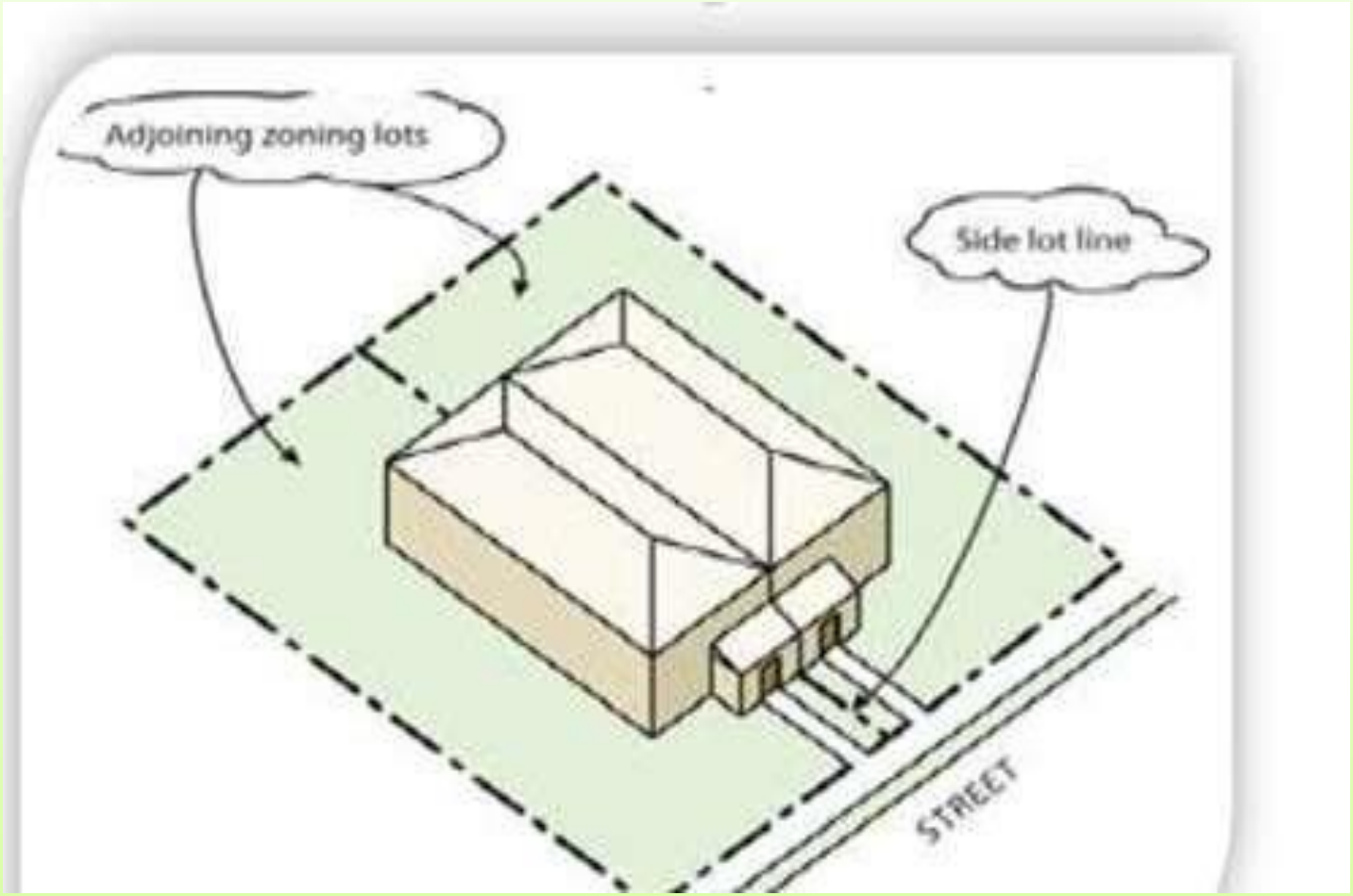
LOW-RISE BUILDING:- Mean a building having height up to 16.50 mts. and having ground floor plus four floors.

HIGH-RISE BUILDING:-Mean building other than low-rise building provided the maximum permissible height shall not exceed 40 mts.

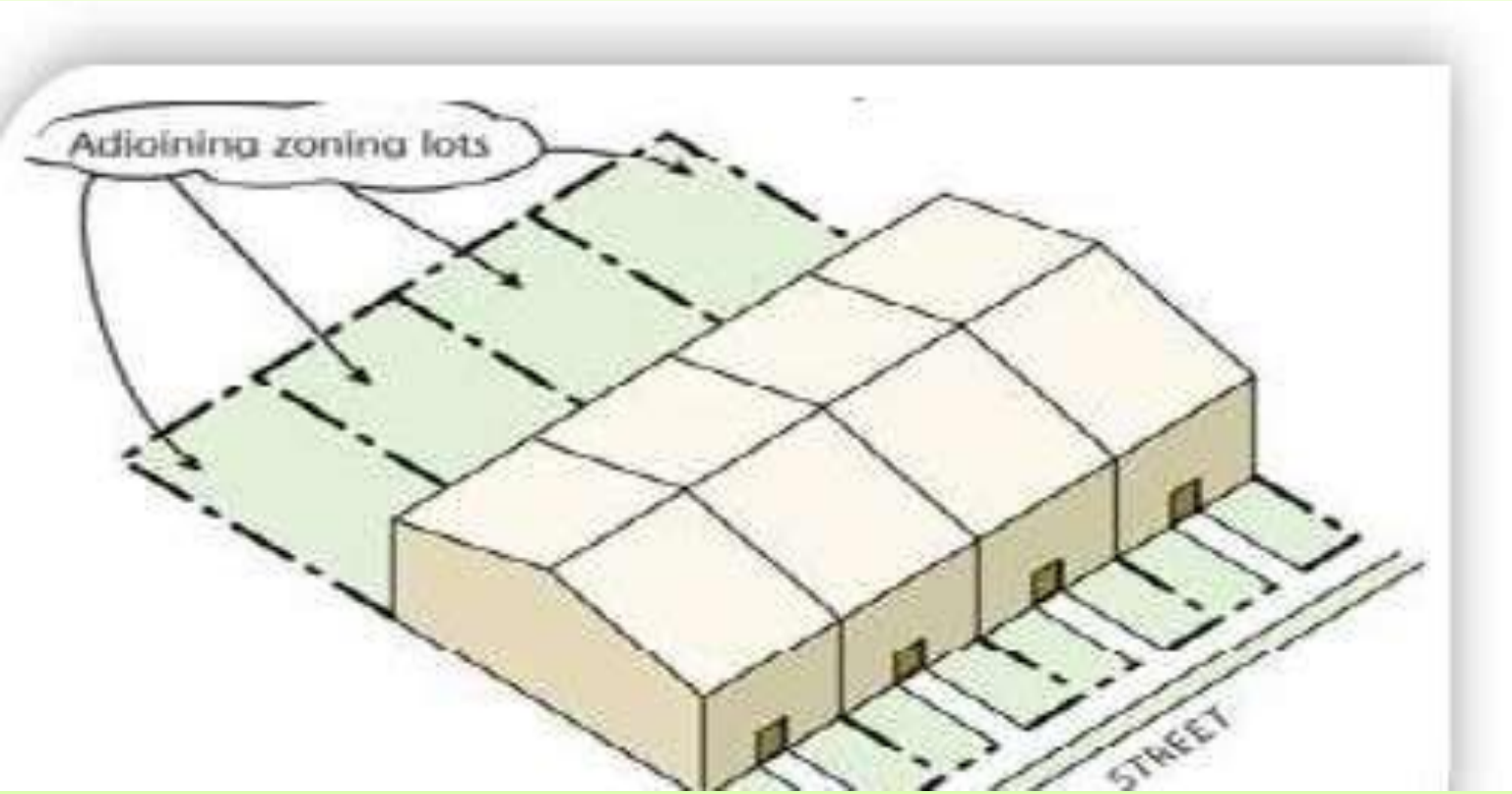
DETACHED BUILDING:-Means a building with walls and roofs independent of any other building and with open spaces on all sides. Plot Area:-More than 250 Sq.mtr



SEMI DETACHED BUILDING:-Means the building having one side attached with wall and roof with other building. Plot Area:-125 to 250 Sq.mtr



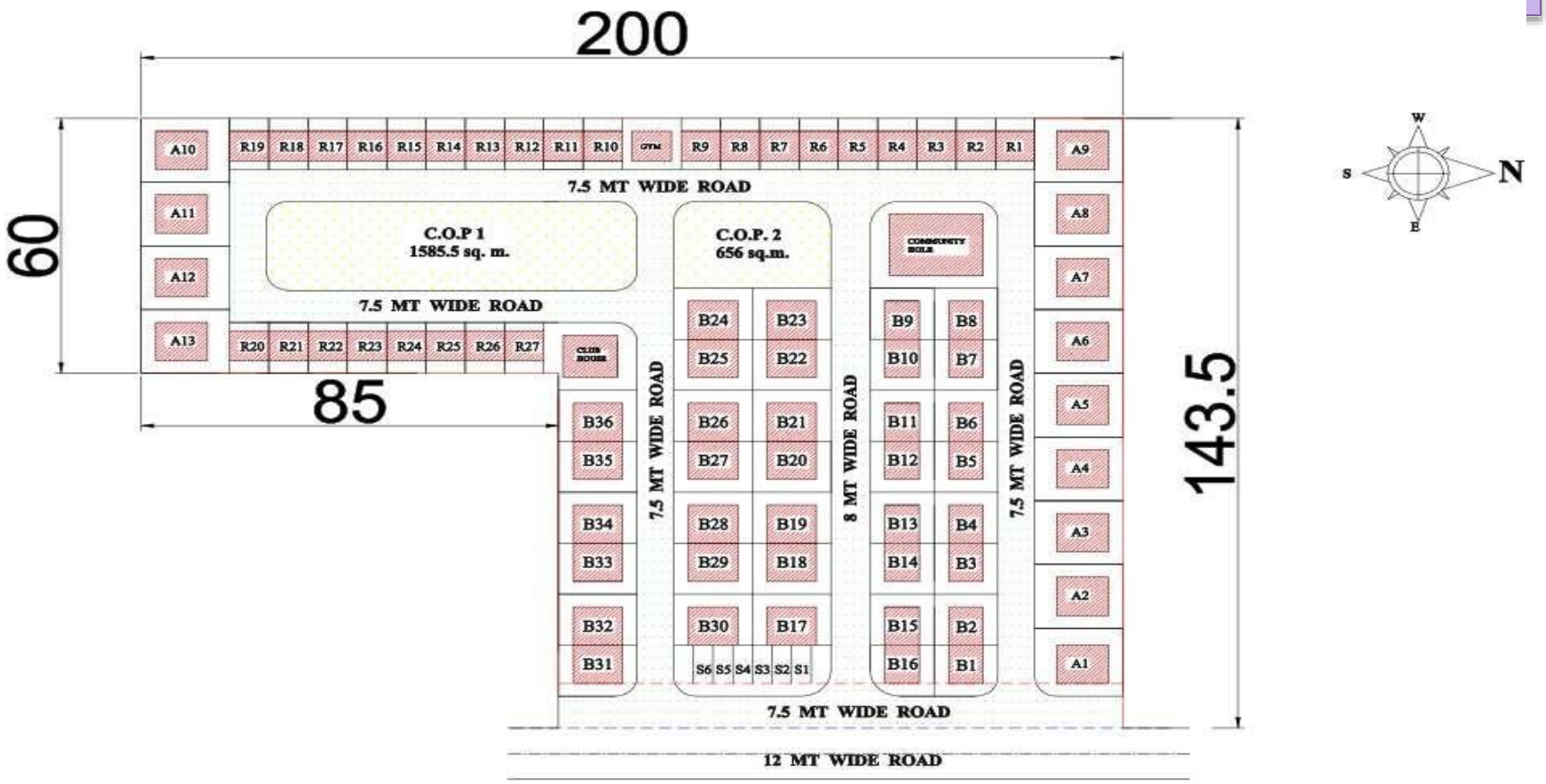
ATTACHED BUILDING:-Means the building having two or more side attached with wall and roof with other Building. Plot Area:- 50 to 125 Sq.mtr



Building Line:- It is a line upto which the plinth of a building adjoining a street may be law-fully extended.

This line shown in development plan of town planning scheme.

The building line may change from time to time as decided by the authority.

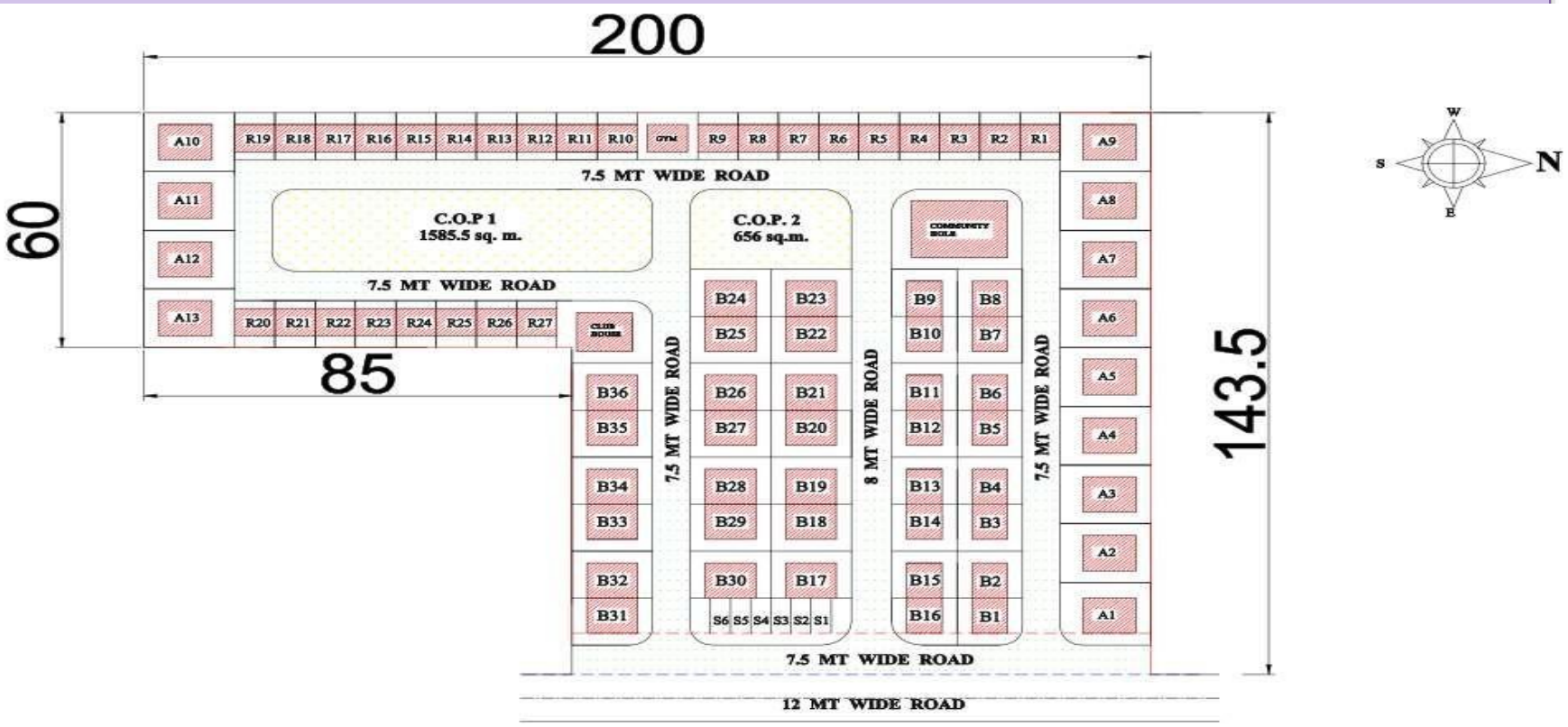


ALL DIMENSIONS ARE IN METER

Control Line:- Line parallel to the center line of road at a distance as decided by the authority.

Major public building like factory,hotels,hospitals etc.are not permitted between control line and center line of road.

Security cabin, parking space..etc may be permitted considering rules for building line

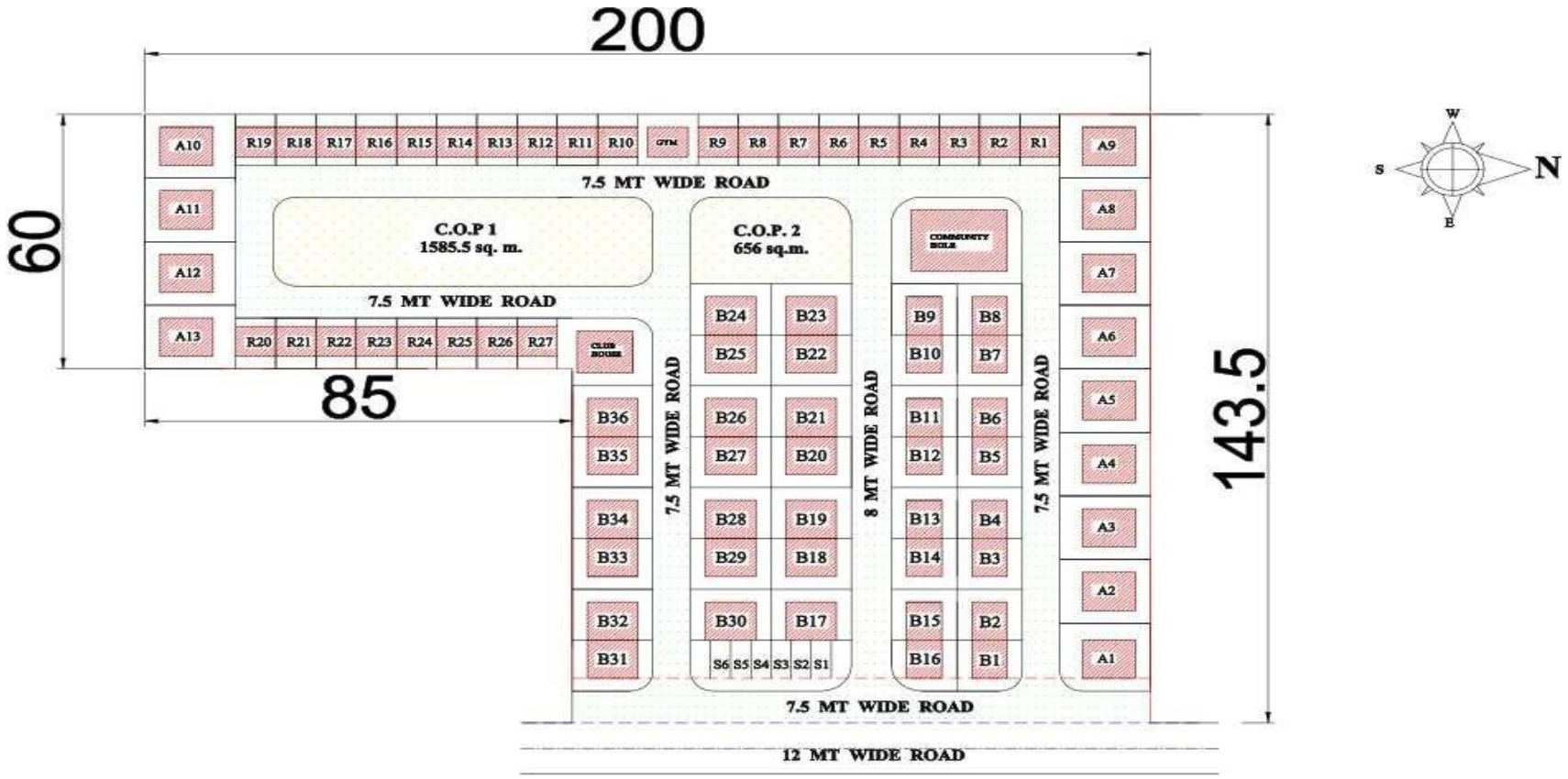


ALL DIMENSIONS ARE IN METER

Building Unit:-It is one or more than plots approved by the competent authority.
For width of plot less than 10.5 meter.

Types of Development	Area of Plot (in $m^{2)}$
Row Houses	50 to 125
Semidetached Building	125 to 250
Detached Building	More than 250

PLOT AREA



ALL DIMENSIONS ARE IN METER

Common Open Plot:- Shall mean a common open space exclusive of margins and approaches, at a height not more than ground level of the building unit.

- The common plot area shall be exclusive of approaches, margins.
- No projection shall be permitted in common plot.
- Minimum size of the common plot shall be 225 sq.mts with no side less than 10.50 Mts.
- No construction shall be permitted in the common plot. Only electric substation, over head water tank, underground water tank, watchman room, community hall, tube well.
- Minimum area should not be less than 10% or maximum 15% of respective common plot area.
- The area of this common plot shall be not deducted for the consideration of Floor Space Index of a building unit.

BUILT UP AREA:-Area of all floors above or below the ground level of the buildings.

❖ <u>It includes</u> Basements
Building structures
Out houses
Garages
W.C. and Bath
Servants rooms
Ramps
Ducts
Swimming pools
Covered cantilever portion

❖ <u>It is not includes</u>

Steps, Verandah, otta,Chokdi,Kundi,Soakpit, water tanks,Manhole,Fountains.

PLOT AREA AND BUILT UP AREA

AREA OF PLOT IN M^2	MAXIMUM PERMISSIBLE AREA ON ANY FLOOR . % OF PLOT AREA
18 to 25	75%
25 to 50	75% or 19 m^2 whichever is more
50 to 90	75%
90 to 150	60 %or 67.5 m^2 whichever is more
150 to 250	50 %or 90 m^2 whichever is more
More than 250	45% or 150 m^2 whichever is more
High rise building having 1500 m2 or more area	25%

FLOOR AREA:-It is the usable area on each floor

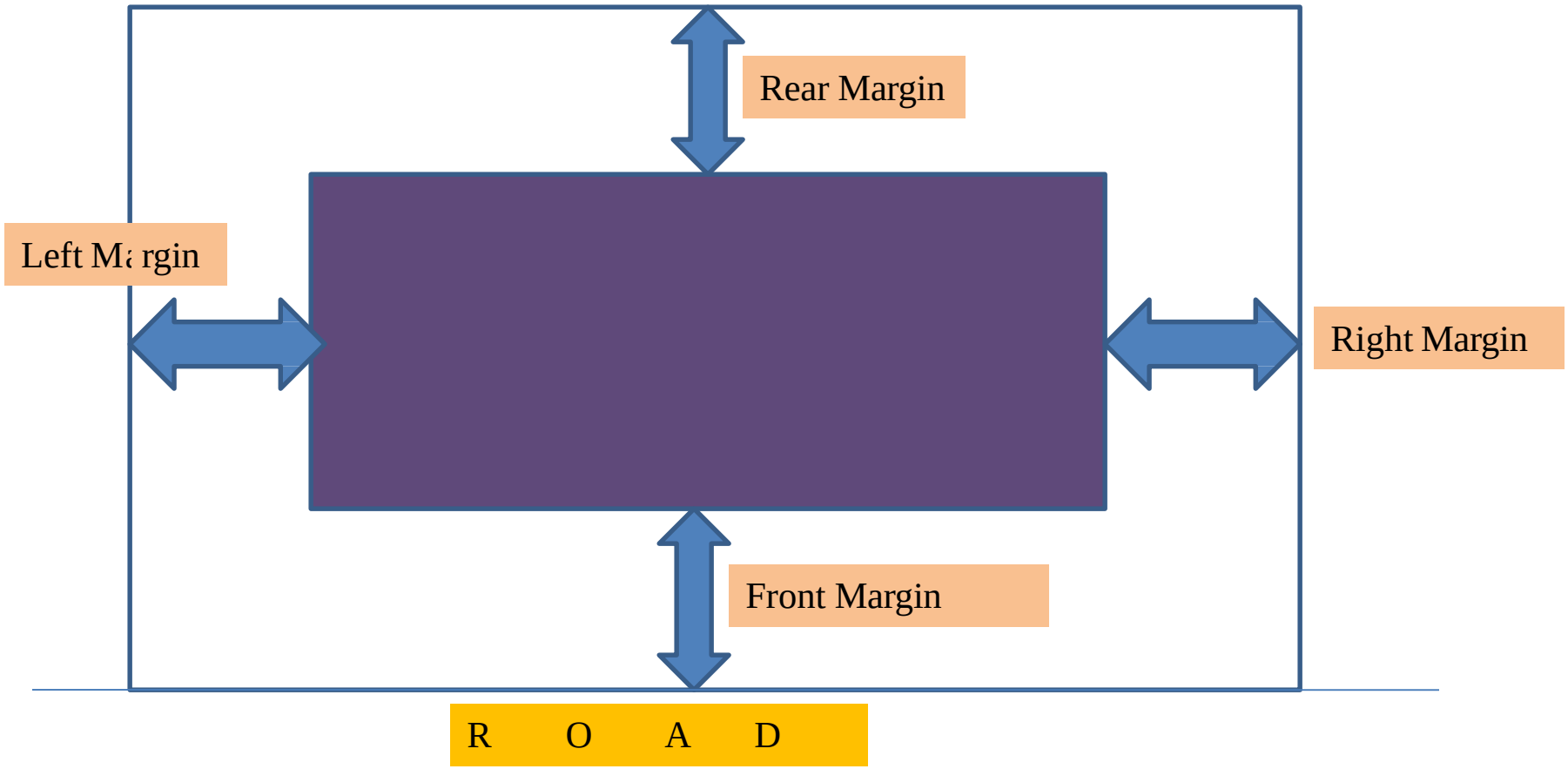
CARPET AREA:- Net usable area within building which exclude areas that is covered by walls.

- Following area is deducted verandah, passages, porch, lift, w.c, Bath, Kitchen, Canteen, Store, Open to sky, thickness of wall.

PLINTH AREA:-Area of each floor covered by roof.

BASEMENT:-It is the cellar below the ground level OR lower storey of a building having minimum half the clear floor height of the basement.

MARGINS:-It is the space left from the plot boundary to the building



MARGINS

FRONT OR ROAD SIDE MARGINS

WIDTH OF ROAD	ROAD SIDE MARGIN
9.0 m or Less	3.0 m
9m to 12m	4.5 m
12m to 18m	6.0 m
18m to 30m	7.5 m
30m to 60m	9.0 m
More than 60 m	12.0 m

Landscape Style – formal and informal-Types of garden – Egyptian , Roman, Chinese, Hindu- Buddhist Mughal and Japanese

Formal And Informal Landscaping

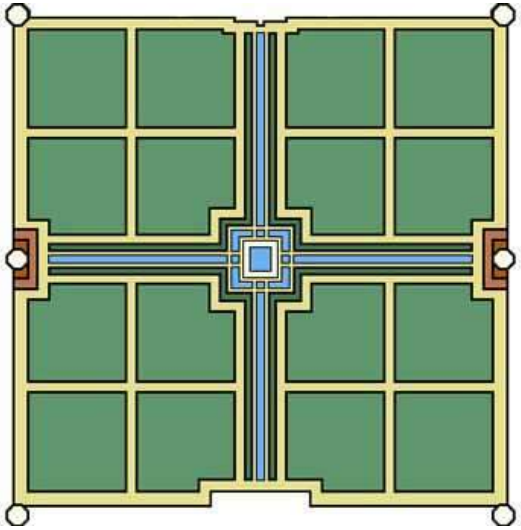
Formal Landscaping

Formal landscaping is best described as structured, orderly, perfect or clean.
Hedges are often used in formal landscaping.
Some hedges are straight, some have curves, but they tend to have a great sense of symmetry and balance.
Formal gardening attempts to fight with nature to make it stay growing and stay perfect.

This image of a Formal Landscape Example is a Garden Design that fits a formal colonial home- the hedges are equally spaced on both sides of the walk. The planting design is symmetrical and both sides of the walk match.

FORMAL GARDEN AT RASHTRAPATI BHAWAN, DELHI

MUGHAL GARDEN AT TAJ MEHAL , AGRA



Informal Landscaping

Informal landscaping is more relaxed than formal landscaping.

If hedges are used at all, they are not sheared flat, but instead they are left fluffy and soft.

Informal landscaping is more in-step with nature, it looks more natural.

Informal Landscaping include the organic form.

GARDEN DESIGN

A **garden** is a planned space, usually outdoors, set aside for the display, cultivation, and enjoyment of plants and other forms of nature. The garden can incorporate both natural and man-made materials.
Gardens include- Residential garden, Zoological garden, Botanical garden, Zen Garden, Xeriscape Garden etc.

The history of ornamental gardening may be considered as aesthetic expressions of beauty through art and nature, a display of taste or style in civilized life, an expression of an individual's or culture's philosophy, and sometimes as a display of private status or national pride—in private and public Landscapes.
The earliest gardens were grown for practical reasons. People grew herbs or vegetables. However when man became civilized an upper class emerged with the leisure to enjoy purely decorative gardens. They also had servants (or slaves) to do the gardening for them. After the emergence of the first civilizations, wealthy individuals began to create gardens for purely aesthetic purposes.

Garden design is the art and process of designing and creating plans for layout and planting of gardens and landscapes.

ZEN GARDEN

XERISCAPE GARDEN

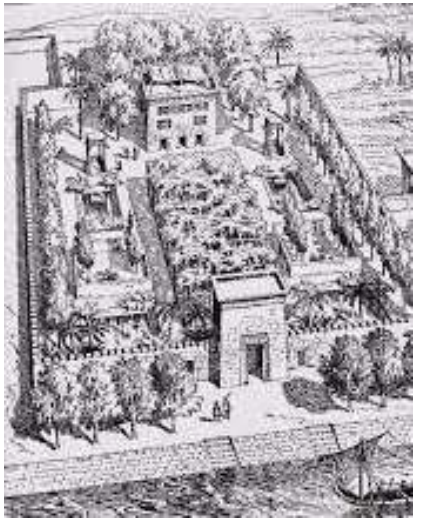
ZOOLOGICAL GARDEN

BOTANICAL GARDEN

Egyptian GARDEN

The gardens of ancient Egypt probably began as simple fruit orchards and vegetable gardens, irrigated with water from the Nile. Gradually as the country became richer, they evolved into pleasure gardens, with flowers, ponds and alleys of fruit and shade trees. Temples, palaces, and private residences had their own gardens, and models of gardens were sometimes placed in tombs so their owners could enjoy them in their afterlife.

A funerary model of a garden, dating to the Eleventh dynasty of Egypt, circa 2009–1998 BC. Made of painted and gessoed wood, originally from Thebes



Rectangular fishpond with ducks and lotus planted round with date palms and fruit trees, in a fresco from the **Tomb of Nebamun**, Thebes, 18th Dynasty

Egyptian GARDEN

❑In the hot and arid climate of ancient Egypt rich people liked to rest in the shade of trees. They created gardens enclosed by walls with trees planted with trees in rows. Sometime the Egyptians planted alternating species.

❑ They grew trees like **sycamores, date palms, fig trees, nut trees and pomegranate trees**. They also grew **willows**. The Egyptians also grew vineyards. (Although beer was the drink of the common people the rich liked drinking wine).

❑The Egyptians also grew a wide variety of flowers including **roses, poppies, irises, daisies and cornflowers**.

❑Egyptians also liked their gardens to have rectangular ponds. Sometimes they were stocked with fish.

❑The Egyptians also liked to grow fragrant trees and shrubs.

❑The Egyptians believed that the gods liked gardens and so temples usually had gardens by them. In ancient Egypt gardens also had religious significance as different trees were associated with different Gods.

❑However in Egypt there was no strict division between gardens for pleasure and gardens for produce. As well as being beautiful gardens were used to grow fruit and vegetables and to produce wine and olive oil.

COMMON TREES OF ANCIENT EGYPT

The date palm, used by the Ancient Egyptians both as a food and for making wine.

The Persea indica tree, in the same family as the avocado, once common in Egypt, has vanished there.

The sycamore (Ficus sycomorus) was often planted for shade. It was also often planted at temples, and its wood was used for making coffins for mummies.

Tamarisk tree, used for shade

The *Acacia* tree was associated with Iusaaset, the primal goddess of Egyptian mythology.

Fruit of the Pomegranate tree, introduced during the New Kingdom, used as a medicine against tapeworm various infection

Egyptian blue lotus, found in garden ponds

Cyperus papyrus was used as a writing material, for making boats, and even eaten

GREEK AND ROMAN GARDEN

GREEK GARDENS

- The Greeks were not great gardeners. They sometimes planted trees to provide shade around temples
- and other public places but pleasure gardens were rare. The Greeks did grow flowers but usually in containers.
- Although Greek travelers admired the gardens of the east, in Greece gardens were usually grown for practical reasons.
- The Greeks grew orchards, vineyards and vegetable gardens.

ROMAN GARDENS

- When they conquered Egypt in 30 BC the Romans introduced eastern ideas about gardening. Rich Romans created gardens next to their palaces and villas. The Romans were masters of the art of topiary.
- Roman gardens were adorned with statues and sculptures.
- Roman gardens were laid out with hedges and vines. They also contained a wide variety of flowers including acanthus, cornflowers and crocus, cyclamen, hyacinth, iris and ivy, lavender, lilies, myrtle, narcissus, poppy, rosemary and violet.
- In the towns wealthy Romans built houses around a courtyard. The courtyard usually contained a colonnaded porch, a pool and a fountain as well as beds of flowers.
- After the Romans conquered Britain they introduced a number of new plants including roses, leeks, turnips and plums. They may also have introduced cabbages.

❑The garden was a place of peace and tranquillity – a refuge from urban life – and a place filled with religious and symbolic meanings. As Roman culture developed and became increasingly influenced by foreign civilizations through trade, the use of gardens expanded and gardens ultimately thrived in Ancient Rome.

Mughal GARDEN

PERSIAN GARDENS → ISLAMIC GARDEN → MUGHAL GARDEN

Persia is located in west and south-west Asia. At the height of the empire it stretched from Egypt to India. It was conquered by Alexander the Great between 334-331 B.C.

Persia was the official name of **Iran** until **1935**.

The dry arid climate of Persia had enormous impact on the designs of their garden paradises. Persian gardens may originate as early as 4000 BCE.

EVOLUTION OF PERSIAN GARDEN

❑The Persian garden was an answer to the aridity of the local climate where the high walled garden and the shady trees with its air cooled by streams and fountains, was a simple recipe for paradise. Mediterranean and hence all Western Gardens have their origins in Egypt between three and four thousand years ago. Since Egypt is a natural desert depending on the Nile for its fertility, its gardens were planted along reservoirs and irrigation canals.

❑Two main waterways divided the garden into four – representing it as the four quarters of the universe. The centre of the cross was often a brimming tank lined with blue tiles. In larger gardens subsidiary canals subdivided the garden. Small jets of water made sounds such that water was heard and seen

ELEMENTS OF THE PERSIAN GARDEN

❑**Sunlight** and its effects were an important factor of structural design in Persian gardens.

❑Textures and shapes were specifically chosen by architects to harness the light.

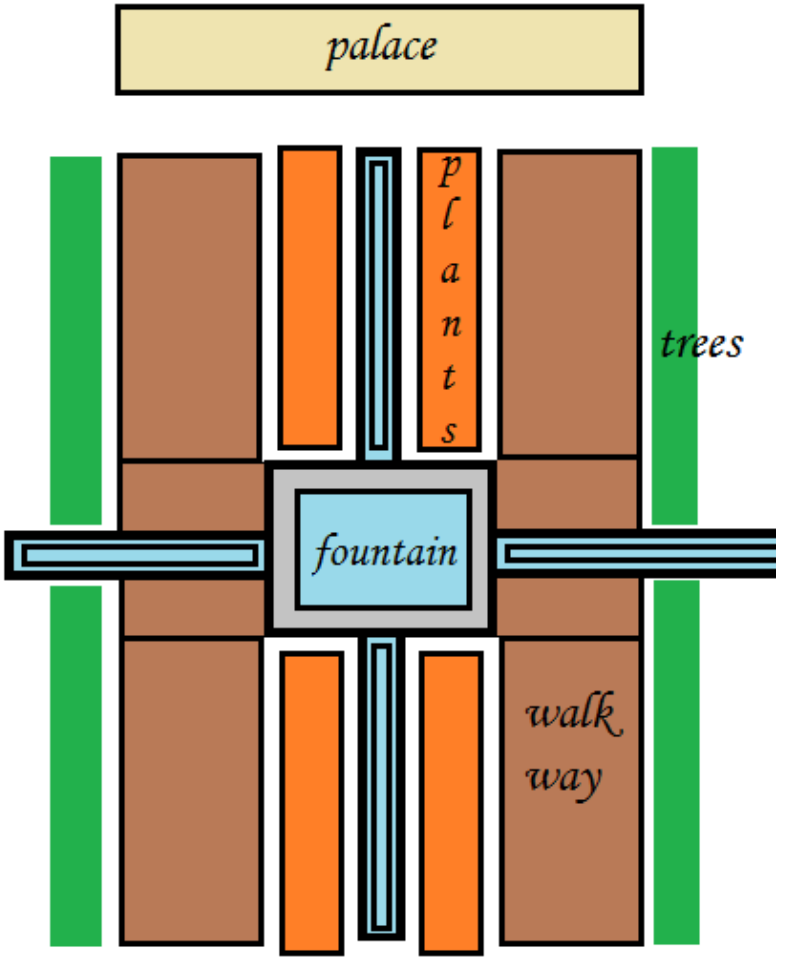
❑Iran's dry heat makes shade important in gardens, which would be nearly unusable without it. **Trees** and **trellises** largely feature as biotic shade; **pavilions** and **walls** are also structurally prominent in blocking the sun.

❑The heat also makes **water** important. A form of underground tunnel below the water table, called a qanat, irrigates the garden and its environs.

❑Well-like structures then connect to the Jannat, enabling the drawing of water wheel .

❑The Persian style often attempts to integrate indoors with outdoors through the connection of a surrounding garden with an inner courtyard.

❑Designers often place architectural elements such as vaulted arches between the outer and interior areas to open up the divide between them.



❑The key to the gardens of the Islamic world was the idea of an oasis. All around stretch bare hills in the burning sun. Within the garden wall, the essentials are cool shade and the sight and sound of water.

MUGHAL PERIOD

Babur ➡ Humayun ➡ Akbar ➡ Jahangir ➡ Shah Jahan ➡ Aurangzeb……

…….. Bahadur Shah Zafar






- The Mughal architecture flourished in the Indian subcontinent during the Mughal rule (1526-1857).
- It was a combination of **Indo, Islamic** and **Persian style of art**.
- The use of running water in their palaces and pleasure resorts was a special feature of the Mughal garden.
- The Mughal Gardens introduced by Babur to India was used extensively used to decorate the surrounding of these buildings.
- A notable feature of the Mughal architecture was the use of red sandstone.

MUGHAL GARDENS

- Mughal gardens are a group of gardens built by the Mughals in the Islamic style of architecture.
- This style was influenced by Persian gardens and Timurid gardens.
- Significant use of rectilinear layouts are made within the walled enclosures.
- Some of the typical features include pools, fountains and canals inside the gardens.
- The famous gardens are the Char Bagh gardens at Taj Mahal, Shalimar Gardens of Lahore, Delhi and Kashmir as well as Pinjore Garden in Haryana.

MUGHAL LANDSCAPE-ORIGIN AND CONCEPT

- The description of paradise in the 'Koran' served as the basis for design of gardens all over the Muslim world.
- The most famous description of paradise is found in Suratar Rahman. "Gardens under which rivers flow" is a phrase used in the Koran more than 30 times to describe Paradise.
- The Muslim rulers of subsequent times tried to create manmade reflections of the Koranic images of Paradise on earth. Cool pavilions, flowing springs, rivers, gushing fountains, shady and fruit trees, mentioned in the Koranic description of Paradise, are essential features of Mughal gardens like Islamic gardens elsewhere.

CONDITIONS UNDER WHICH LANDSCAPE DEVELOPED

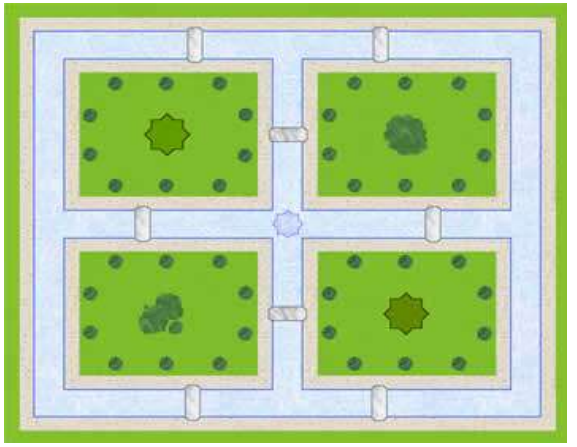
❑The founder of the Mughal empire, **Babur**, described his favourite type of garden as a **Charbagh.** This word developed a new meaning in India, because as Babur explains, India lacked the fast-flowing streams required for the Central Asian charbagh From the beginnings of the Mughal Empire, the construction of gardens was a beloved imperial pastime.

❑Babur, the first Mughal conqueror-king, had gardens built in Lahore and Dholpur . Humayun, his son, does not seem to have had much time for building—he was busy reclaiming and increasing the realm—but he is known to have spent a great deal of time at his father's gardens.

❑Akbar built several gardens first in Delhi, then in Agra, These tended to be riverfront gardens rather than the fortress gardens that his predecessors built. Building riverfront rather than fortress gardens influenced later Mughal garden architecture considerably. Jahangir's son, Shah Jahan, marks the apex of Mughal garden architecture and floral design.

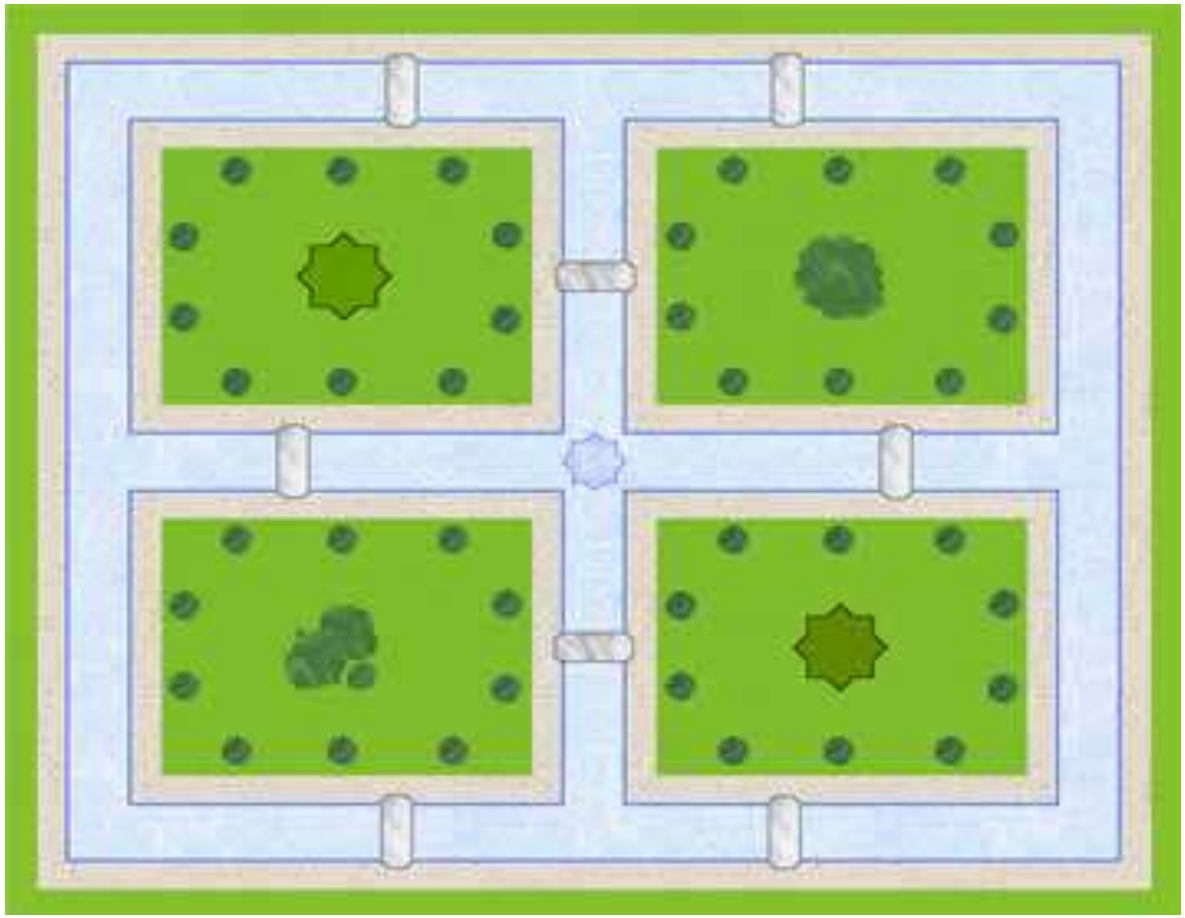
SALIENT FEATURES

- ❑Site and Style of Design
- ❑Walls
- ❑Gates
- ❑Terrace
- ❑Canals of running water,
- ❑ Fountains
- ❑Baradari or pavilion
- ❑Mosque
- ❑Tree, flowers and birds



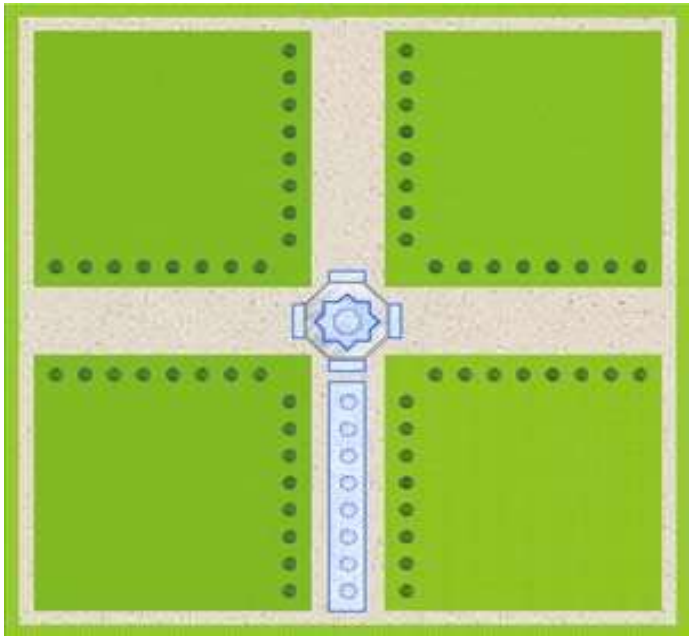
PLAN 1

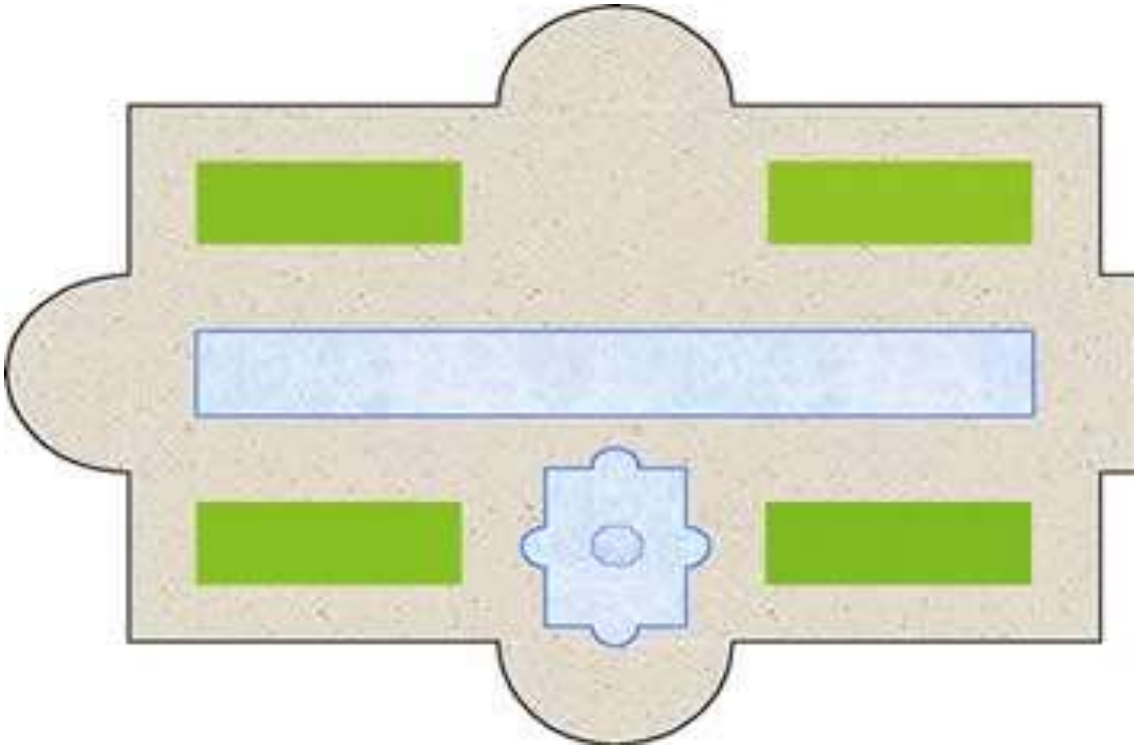
Complete, ideal Char Bagh with four channels of water flowing out from fountain in the centre to channels round edge of garden. The garden is divided into four parts, linked by bridges over the water channels.



PLAN 2

Only one arm of this Char Bagh is a water channel. The other three arms are tree-lined paths, plus little pools on the edge of the central pool. But the garden is still divided into four parts.



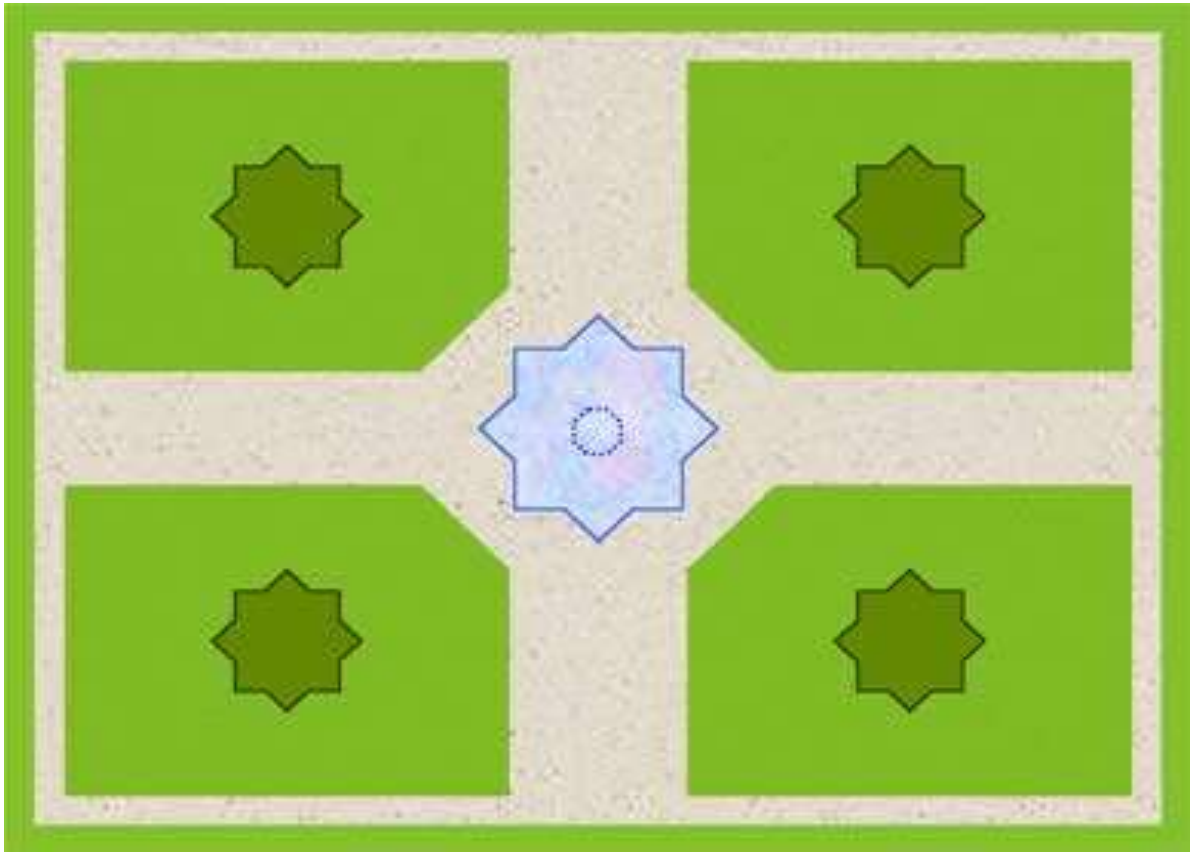


PLAN 3

Another Char Bagh plan which does not have the full four water channels. This plan is from a famous medresse in Isfahan, Iran.

PLAN 4

This garden is divided into four parts entirely by paths, not by water channels. There is a fountain pool in the centre.



Indian architecture

Introduction

- The architecture of India includes present day India, Pakistan, Bangladesh and Sri Lanka.
- These countries later on got separated by political boundaries but, still share a common cultural heritage.
- The diversity of Indian culture is represented in its architecture.
- Indian architecture comprises a blend of ancient and varied native traditions, with building types, forms and technologies from west, central Asia, and Europe.

INDIAN ARCHITECTURE

- Indian architecture has influenced the surrounding regions of the world, especially eastern Asia, due to the spread of ideas with Buddhism.
- A number of Indian architectural features such as the *stupa* (temple mound), *sikhara* (temple spire), *pagoda* (temple tower), *torana* (and temple gate), have become famous symbols of Hindu-Buddhist culture, used extensively in East Asia and South-East Asia.
- Early Indian architecture is the story of how powerful and popular religions celebrated their beliefs through monumental design.

FORMATION AND DEVELOPMENT

Geographical condition:

- The rivers Indus and Ganges
- The Himalayas
- The Everest mountain
- Surrounded by seas and Indian ocean
- Many cities were founded on the banks of rivers

FORMATION AND DEVELOPMENT

Geological condition

- Timber was available in plenty in Indus and Ganges valleys
- Stone was ~~rare~~
- In some part of india white marble is available
- In some parts of india rock-cut temples were also available

FORMATION AND DEVELOPMENT

Climatic condition

- More than half the country lies in Tropic Cancer
- The climate therefore varies widely
- Wet in winter and dry in summer
- Buildings built to adapt the climate
- In north flat roofs were common, but steep pitched roofs were used in West coast due to heavy rain

Formation and development

Religious condition

1. Hindu
2. Buddhism
3. Jainism

Formation and development

- Hinduism
- The religion has evolved due to the combination of faiths of Aryans and Dravidians.

FORMATION AND DEVELOPMENT

- Jain; founded by Mahaveer or Vadhaman who was himself a Brahman, he was born around 599B.C.
- According to him the goal is 'Nirvana' or a state of pure rest without rebirth but no total destruction
- The religion teaches avoidance of injury to life, to observe truth, honesty, abstinence from worldly desire, gentleness, holiness, self-punishment, and restraint of mind tongue and body.

FORMATION AND DEVELOPMENT

1. Buddhist; Siddhartha (Gautama), the first Buddha

   - the religion teaches against animal sacrifice, to observe oneness, humanity, the deliverance from sorrow and all trouble and from ignorance through enlightenment to the ultimate 'Nirvana'

INDUS VALLEY CIVILIZATION

- The earliest known civilization in the Indo-Pak region of South Asia.
- The Indus valley civilization is dated around 3000 B.C.
- comprises many urban settlements, including the large cities of Harappa and Mohenjo Daro
- Characterized by a variety of house types, many of which had private baths connected to public drainage systems.

INDUS VALLEY CIVILIZATION

- The arch, a cornerstone of world architecture, was first developed by the Indus valley civilization, and would later be a staple of Indian architecture.
- The earliest production in the Indus Valley Civilization was characterized by well planned cities and houses where religion did not seem to play an active role.
- The presence of drainage systems and public baths showed advanced standards of hygiene and sanitation and ingenious planning.

Elements of Indian architecture

SIKHARAS

- These are the peaks of the towers rising from the core of Hindu temples
- These towers are always extravagantly decorated
- They vary in shape throughout the country

Elements of Indian architecture

Stupas

- The stupa is a shrine that represents the sacred Mount Meru, as well as providing a sanctuary for relics of the Buddha.
- They have four ceremonial gates to the shrine
- It was mostly a Buddhist art, though Jains also seemed to have built stupas.

Elements of Indian architecture

Symbolic layers

- The towers of Hindu temples tell stories as they rise skywards
- Each has its own distinctive "handwriting" and depicts the concerns of local cults as well as universal themes.

Elements of Indian architecture

Animal statuary

- To Hindus, all life is sacred and deserving of representation.
- Most of the temples show fine sculptures and carvings of animals

Elements of Indian architecture

Figurative decorations

- For Hindus, the carving of sacred images and figurines was an art form in itself, requiring years of disciplined training.

INFLUENCES

- Religion :Buddhism, Hinduism, Jainism, Islam
- Type of raw materials
- Royal patronage (support)
- Architectural influence from Persia, Greece…

Buddhist and Jain Architecture

- Buddhism gained prominence during the reign of the emperor Ashoka around the 3rd c. bc.
- It is primarily represented by three important building types- the Chaitya Hall (place of worship), the Vihara (monastery) and the Stupa (hemispherical mound for worship/ memory)-

Buddhist and Jain Architecture

- The Greek influence led the Indian architecture of the time, especially the rock-cut art, to fall under one of the two categories: the Mathura school of art and the Gandharva school of art
- The division of Buddhism into Hinayana and Mahayana phases also influenced the nature of rock-cut art, the former being represented by artifacts used by the Buddha, and the latter by images of the Buddha.

Hindu Temples

- The reference to temples in literature go back early to(520 BC - 460 BC)
- Early temples were rock-cut, later structural temples evolved.
- The temple is a representation of the macrocosm (the universe) as well as the microcosm (the inner space).

Hindu Temples (poetry in stone)

- Indian temple architecture has often been called sculpture on a mass scale rather than true architecture.
- They are designed as sculpture and are best experienced and understood from the outside.
- Interiors are very small and dark spaces which are not as impressive as the exterior

Hindu Temples

- A basic Hindu temple consists of an inner sanctum, the *garba griha* or womb-chamber, in which the image is housed, a congregation hall, and possibly an antechamber (entrance hall) and porch.
- The sanctum is crowned by a tower-like *shikara*
- The structural system of temples was essentially post and beam and with massive blocks of stone being the basic raw material for the local craftsman
- Decoration was fundamental to this type of architecture

Hindu Temples

- There were three major styles of temple architecture: the northern or **Nagara style**, the southern or **Dravida** and the **Vesara** or hybrid style but the most common are the Nagara and the Dravida.
- They are distinguishable by the shape and decoration of their shikharas or superstructures.

Hindu Temples

North Indian Temples <u>(Nagara)</u>

- The Nagara style which developed around the fifth century is characterized by a beehive shaped tower called a shikhara
- The plan is based on a square but the walls are sometimes so broken up that the tower often gives the impression of being circular.

Hindu Temples

South Indian Temples (Dravida)

- From the seventh century the Dravida or southern style has a pyramid shaped tower consisting of progressively smaller storeys of small pavilions, a narrow throat, and a dome on the top
- The repeated storeys give a horizontal visual thrust to the southern style.

INDO ISLAMIC ARCHITECTURE

Influence of Islam and the Mughal Architecture

- With the arrival of Islam, the previous Indian architecture was slightly adapted to allow the traditions of the new religion, but it remained strongly Indian at its heart and character.
- Arches and domes began to be used and the mosque or masjid too began to form part of the landscape, adding to a new experience in form and space.

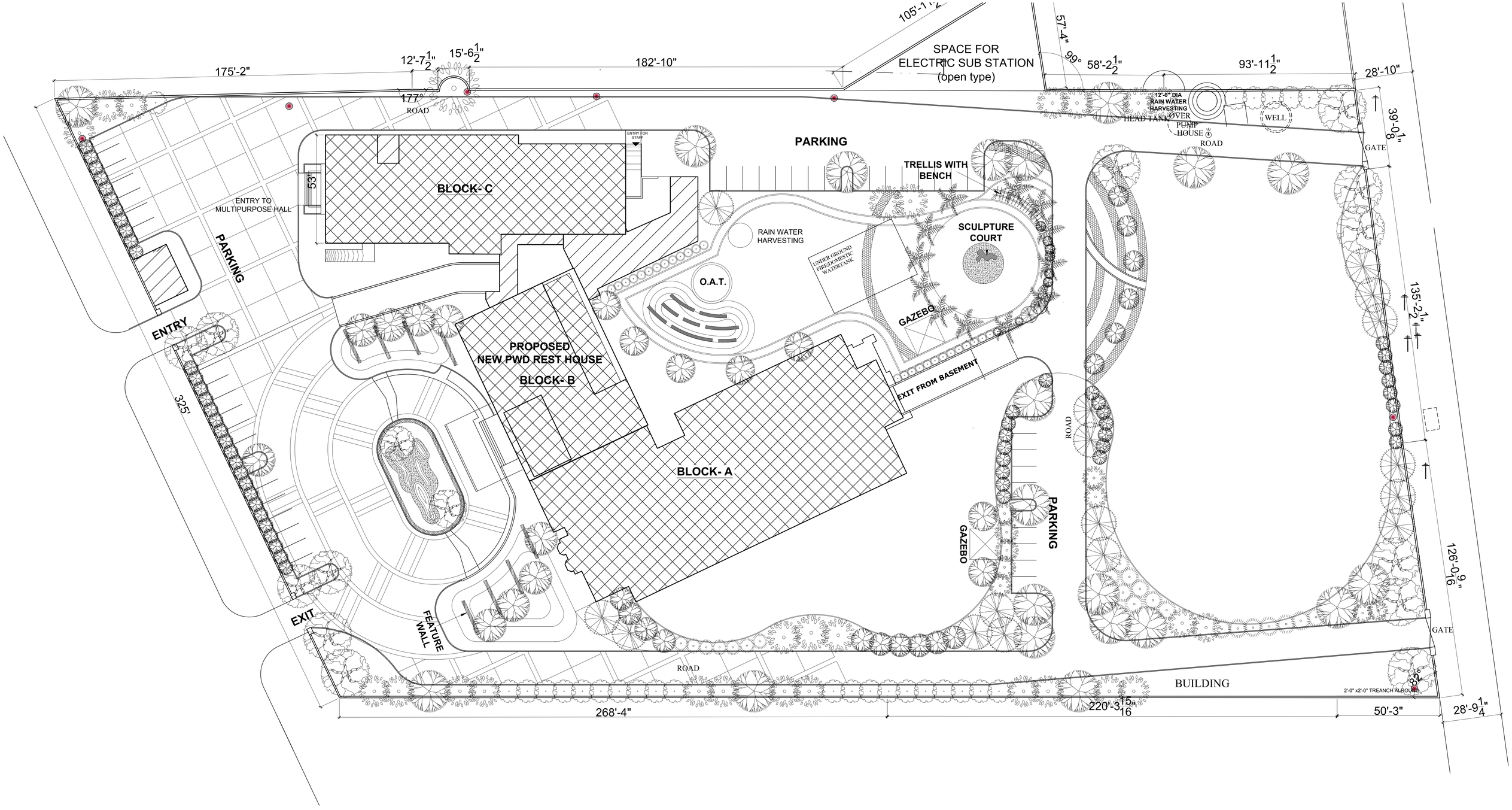
Indo Islamic architecture

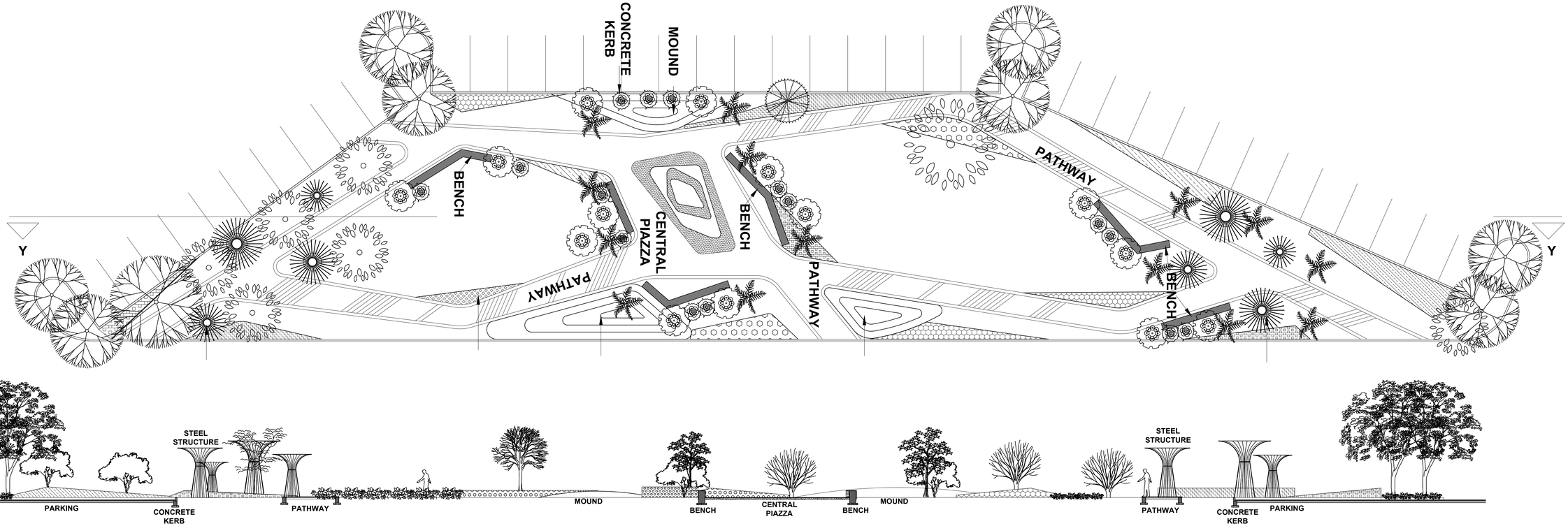
- The fundamental difference lay in the fact that Islam prohibited idol worship and therefore a concentrated point of focus such as the garba-griha was unnecessary.
- The most famous Islamic buildings in India emerged during the Mughal period.

- The Taj Mahal was built with a special Mughal (Mogul) type of architecture which is a combination of many different types of architecture including Persian, Central, Asian, and Islamic

Taj Mahal

- It was erected by Shah Jahan to the memory of his beloved queen, Arjumand Banu Begum, called Mumtaz Mahal
- A year after her death in 1631 he began the Taj & it took twenty-two years to complete with over 20,000 workers participating.
- The Taj Mahal stands in a walled enclosure measuring around 580x305m.


175'-2"
12'-7 1/2"
15'-6 1/2"
182'-10"
105'-1 1/2"
SPACE FOR
ELECTRIC SUB STATION
(open type)
57'-4"
99°
58'-2 1/2"
93'-11 1/2"
28'-10"
39'-0 1/8"
177°
ROAD
12'-0" DIA
RAIN WATER
HARVESTING
COVER
HEAD TANK
PUMP
HOUSE
WELL
ROAD
GATE
PARKING
TRELLIS WITH
BENCH
ENTRY FOR
STAFF
53'
BLOCK- C
ENTRY TO
MULTIPURPOSE HALL
PARKING
RAIN WATER
HARVESTING
SCULPTURE
COURT
UNDER GROUND
FIRE/DOMESTIC
WATER TANK
O.A.T.
GAZEBO
ENTRY
PROPOSED
NEW PWD REST HOUSE
BLOCK- B
EXIT FROM BASEMENT
325'
BLOCK- A
ROAD
PARKING
GAZEBO
135'-2 1/2"
EXIT
FEATURE
WALL
ROAD
BUILDING
GATE
126'-0 9/16"
2'-0" x2'-0" TREANCH ALROUND
83'
268'-4"
220'-3 15/16"
50'-3"
28'-9 1/4"



LANDSCAPE SECTION Y-Y

Roofing CONTENTS

- Different terminology regarding Roofing
- Types of Roof
- Different types of Roofing materials
  (like : ACC , GI , Concrete and Steel truss roof)
- Market survey on Roofing

Terminology regarding roofing

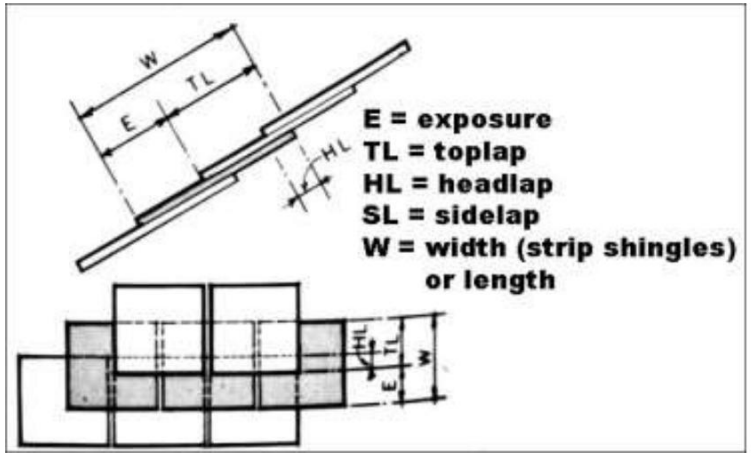
- Shingles : A Rectangular tile (wooden or asphalt) used on roof is called as shingles.
- Square : Material necessary to cover 100 sqft of roof surface.
- Length : Longitudinal parameter.
- Width : Lateral parameter
- Thickness : Vertical parameter

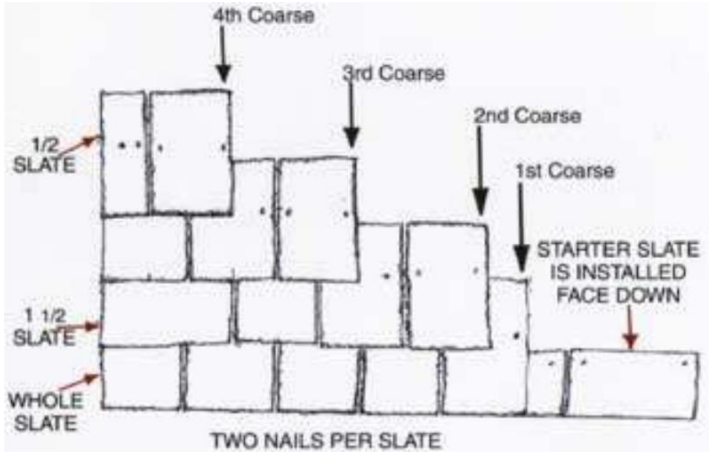
Terminology regarding roofing

- Pitch : Pitch is an important parameter in roofing decisions. Depending on the pitch/slope of a roof, certain materials can or cannot be used.
- The slope of a roof is split up into three categories.
- 1. Flat Roof: (Anything under a 2:12 pitch)
- 2. Low Slope: (A 4:12 pitch to a 2:12 pitch)
- 3. Steep Slope: (A 4:12 pitch to a 21:12 pitch)

Terminology regarding roofing

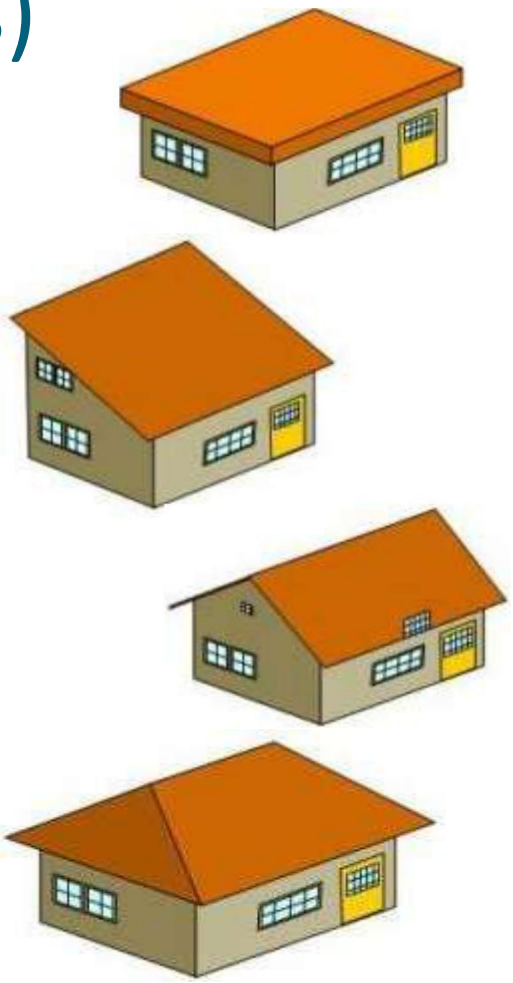
- Coverage : Number of layer of material that are applied
- Exposure : Number of cm (or inches) of Shingles left Exposed above bottom edge.
- Lap : Amount of material of a shingle covered by other shingle. (top lap , head lap , side lap)





Types of Roof (Roof Styles)

1. Flat : Flat roofs are the simplest roof to build because they have little to no pitch. (commercial buildings)
2. Shed : Shed roof is basically a flat roof having some pitch. (Staircase room)
3. Gable : Gable roofs are the simple style of the roofs. The gable roof are looks like an inverted alphabet V.
4. Hip : A hip roof style roof has four sloping sides. This type of roof is more difficult to construct compared to the above roof because they have a more complicated truss. (common residential style roof)

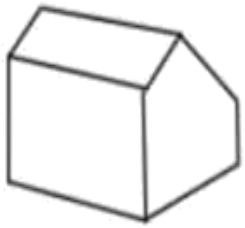


www.oneprojectcloser.com/roof-designs-terms-types-and-pictures/

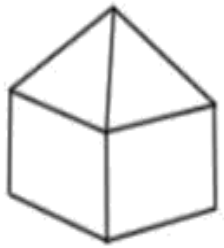
Skillion and Lean-to Roof

Open Gable Roof

Box Gable Roof



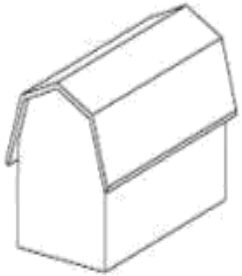
Saltbox Roof



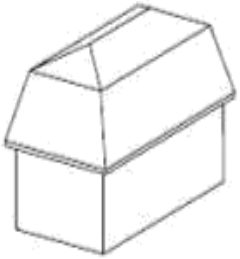
Pyramid Hip Roof

M-Shaped Roof

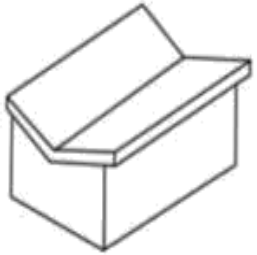
Hip and Valley Roof



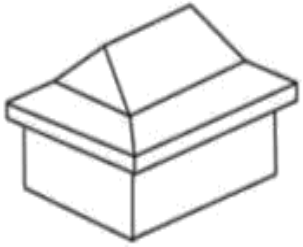
Gambrel Roof



Mansard Roof



Butteryfly Roof



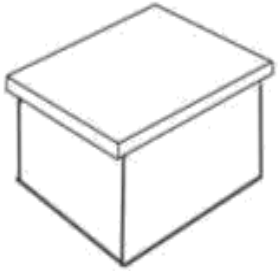
Combination Roof

Dormer

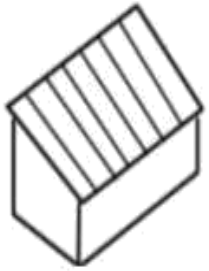
Dutch Gable Roof

Hexagonal Gazebo Roof

Jerkinhead Roof



Flat Roof



Shed Roof

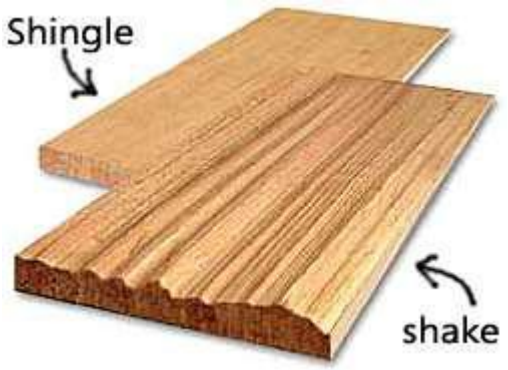
Different types of roofing material

- Asphalt shingles
- Wooden Shakes and shingles
- Slate
- Tiles (Clay & Cement)
- Concrete Roof
- Steel truss roof
- Fiber Roof
- ACC (Asbestos cement sheet)
- GI (Galvanized iron sheet)

Roofing Material

- Asphalt Shingles : An asphalt shingle is a type of roof shingles. They are one of the most widely used roofing because they have low cost and easy to install.

- Wood Shakes and Shingles : Wooden Shingles are thin, tapered pieces of wood primarily used to cover roof of buildings to protect them from the weather.



Roofing Material

- Slates : A slate is a fine-grained, foliated, homogeneous metamorphic rock used as roofing material.

- Tiles : A tile is a manufactured piece of hard-wearing material such as ceramic , stone, metal, generally used for covering roof

Roofing Material

- Concrete roof : A solid slab of concrete capping the top of house. Concrete roof protects building against storm winds.

Roofing Material

- Fiber roof : A plastic or fiber sheet of particular length and width and thickness is used as roofing material.

Roofing Material

Steel Truss roof :

1) **Planar truss** : A planar truss lies in a single plane. Planar trusses are typically used in parallel to form roofs.

Roofing Material

- Steel Truss roof :

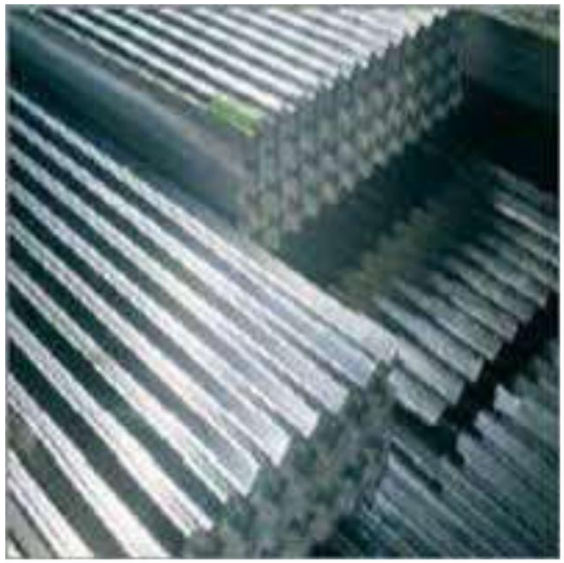
2) **Space frame truss** : A space frame truss is a 3D framework of members pinned at their ends.

Roofing Material

- ACC roof : Asbestos cement sheet roofing should consist of either corrugated sheets or semi corrugated sheets as specified. Normal slope for acc roof is 4 in 12 .

Roofing Material

- GI roof : **Corrugated** Galvanised iron sheet (CGI) is generally used in temporary roofing as well as permanent roofing (profile coated roof).



Market survey

- Asbestos cement sheet roofing.....
- Market value....

Length of Roof	Width of Roof	Price range
10 feet	3.5 feet	450 INR
8 feet	3.5 feet	350 INR
6 feet	3.5 feet	280 INR

Market survey

- Galvanised iron sheet roofing.....
- Available Lengths in market are 8, 10, 12, 14 feet.
- Available width are 2.5, 3, 4 feet.
- Market value....

Roof	Thickness of Roof	Price range
GI (8 feet)	0.40 mm	150-200 INR
GI (8 feet)	0.60 mm	450 INR
GI (color coated)	0.50 mm (3.5 feet)	95-100 INR per feet

Market survey

- Fiber roofing….
- Plastic roofs are available as 25 to 28 INR per sqft.

Thank You

• *Slave Dynasty*

Slave dynasty, (1206–90), line of sultans at Delhi, India, that lasted for nearly a century. Their family name was Muiʿzzī.

The Slave dynasty was founded by Quṭb al-Dīn Aibak, a favourite slave of the Muslim general and later sultan Muḥammad of Ghūr.

Quṭb al-Dīn had been among Muḥammad's most trusted Turkish officers and had overseen his master's Indian conquests.

He was eventually confined to being a purely Indian sovereign.

He died in 1210 as a result of a polo accident, and the crown shortly passed to Iltutmish, his son-in-law.

THE SLAVE DYNASTY : 1206 AD

- **Qutbuddin Aibak (1206-10 AD)**
- **Aram Shah Qutbuddin(1210-1211 AD)**
- **Iltutmish (1211-1236 AD).**
- **Rukhuddin Firoz Shah (1236 AD).**
- **Razziya Sultan (1236-1240 AD)**
- **Muizuddin Bahram 1240-1242 AD**
- **(Ghiyasuddin Balban. 1266-1286 AD**
- **Muizuddin Kaiquabad 1287-1290 AD)**

MONUMENTS BUILT UNDER THIS DYNASTY

QUTUB MOSQUE,DELHI 1195 CE

QUTUB MINAR,DELHI 1200 CE

ARHAI-DIN-KA JHOMPRA MOSQUE,AJMER 1205 CE

INTRODUCTION

The Khilji dynasty or *Khalji* was a Muslim dynasty of Turkic origin which ruled large parts of South Asia between 1290 and 1320.

It was founded by Jalal ud din Firuz Khilji and became the second dynasty to rule the Delhi Sultanate of India.

Under Ala-ud-din Khilji, the Khiljis became known for successfully defending against the repeated Mongol invasions of India

Monument under khilji dynasty

ALLA-UD-DIN KHALJI'S EXTENSION OF QUTB MOSQUE. 1300 CE

ALAI DARWAZA 1305 CE

MADARASSA

HISTORY

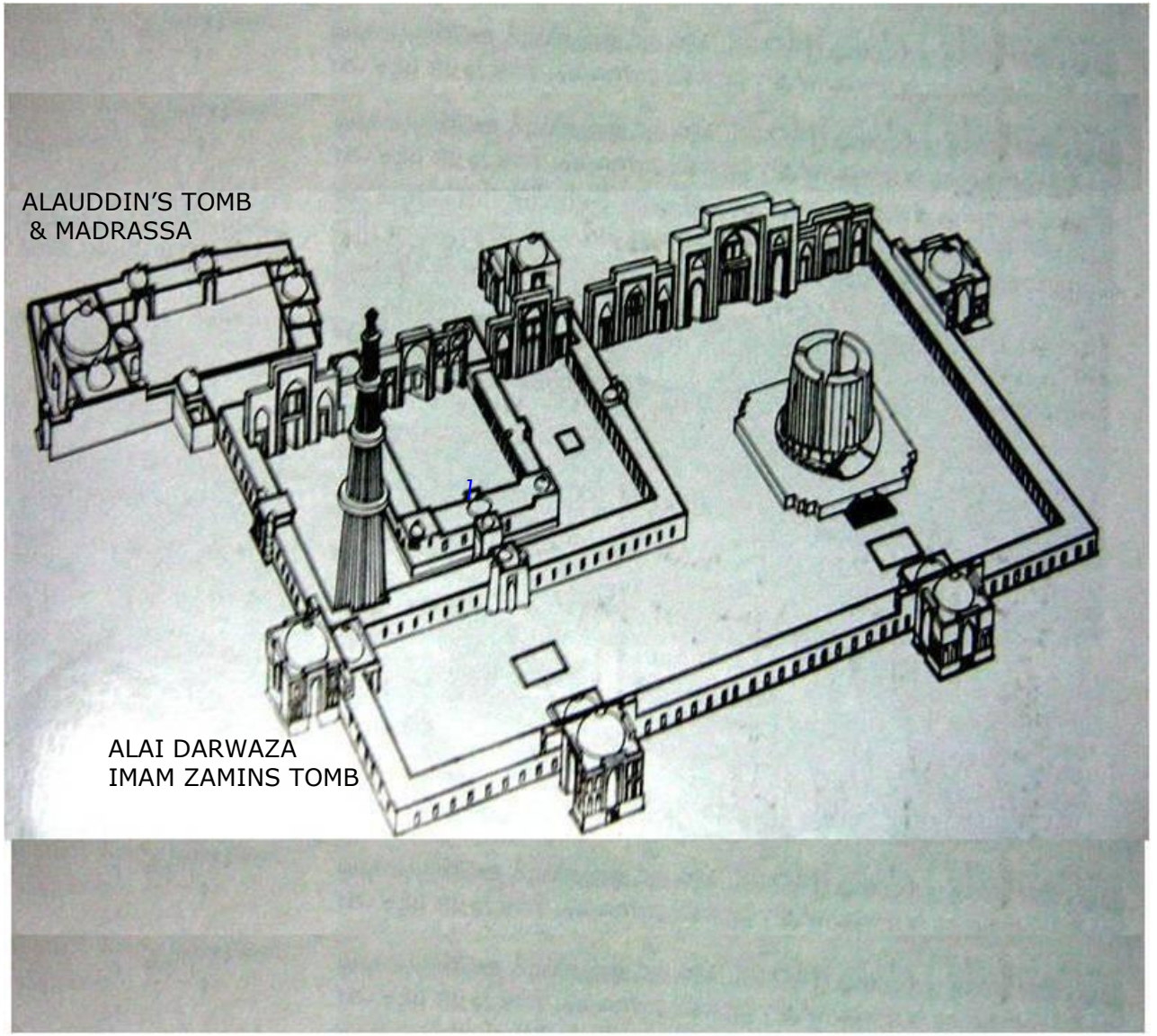
The Qutb complex was built by Qutb Ud-Din Aibak (1206 - 1211) who established the first Islamic sultanate in the Indian subcontinent in Delhi in 1192.

It is located within the citadel of Qal'a-e-Rai Pithora (Qila Rai Pithora) where Qutb Ud-Din also set up his administrative quarters and residence.

It is also known as Quwwat ul Islam, meaning the 'might of Islam,' the Qutub complex was created with the dismantling and reassembling of the 27 existing Hindu and Jain temples on the site.

QUTUB COMPLEX

QUTAB MINAR
QUWWAT-UL-
ISLAM
MASJID
SCREEN
IRON PILLAR
ILTUTMISH TOMB
ALAI DARWAZA
IMAM ZAMIN'S TOMB
ALAUDDINS TOMB
& MADRASSA
ALAI MINAR



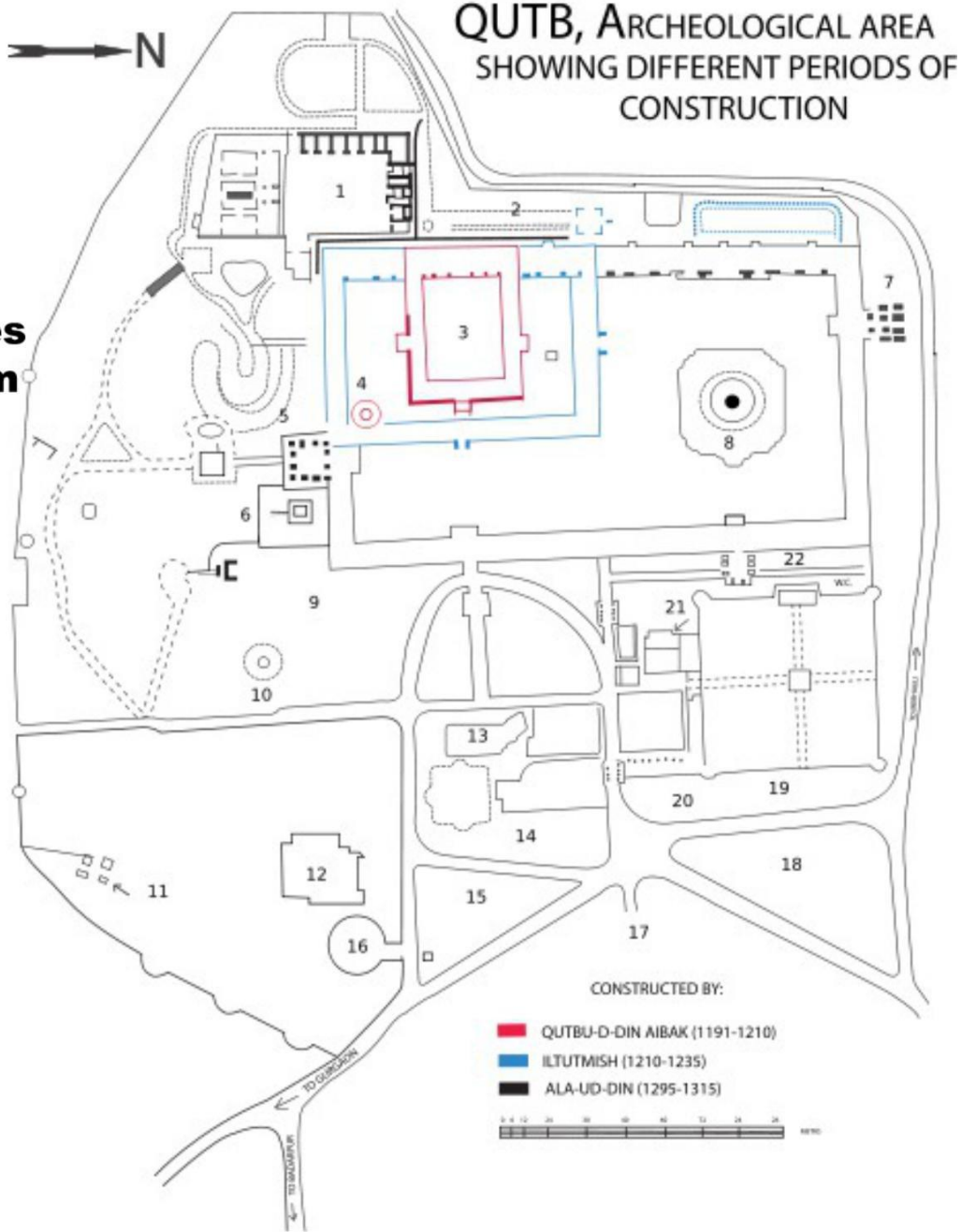
QUTB COMPLEX

Qutub complex consists of a mosque and two minarets enclosed within a series of cloistered precincts.

- **This rectangular complex measures about 235 m (north-south) by 155 m (east-west) along the exterior.**

It was entered via four monumental gates along the north, east and south walls, of which only the southern gate (Alai Darwaza) remains.

The mosque, known as the Qutb or Quwwat ul Islam Mosque, occupies the southwest corner of the complex.



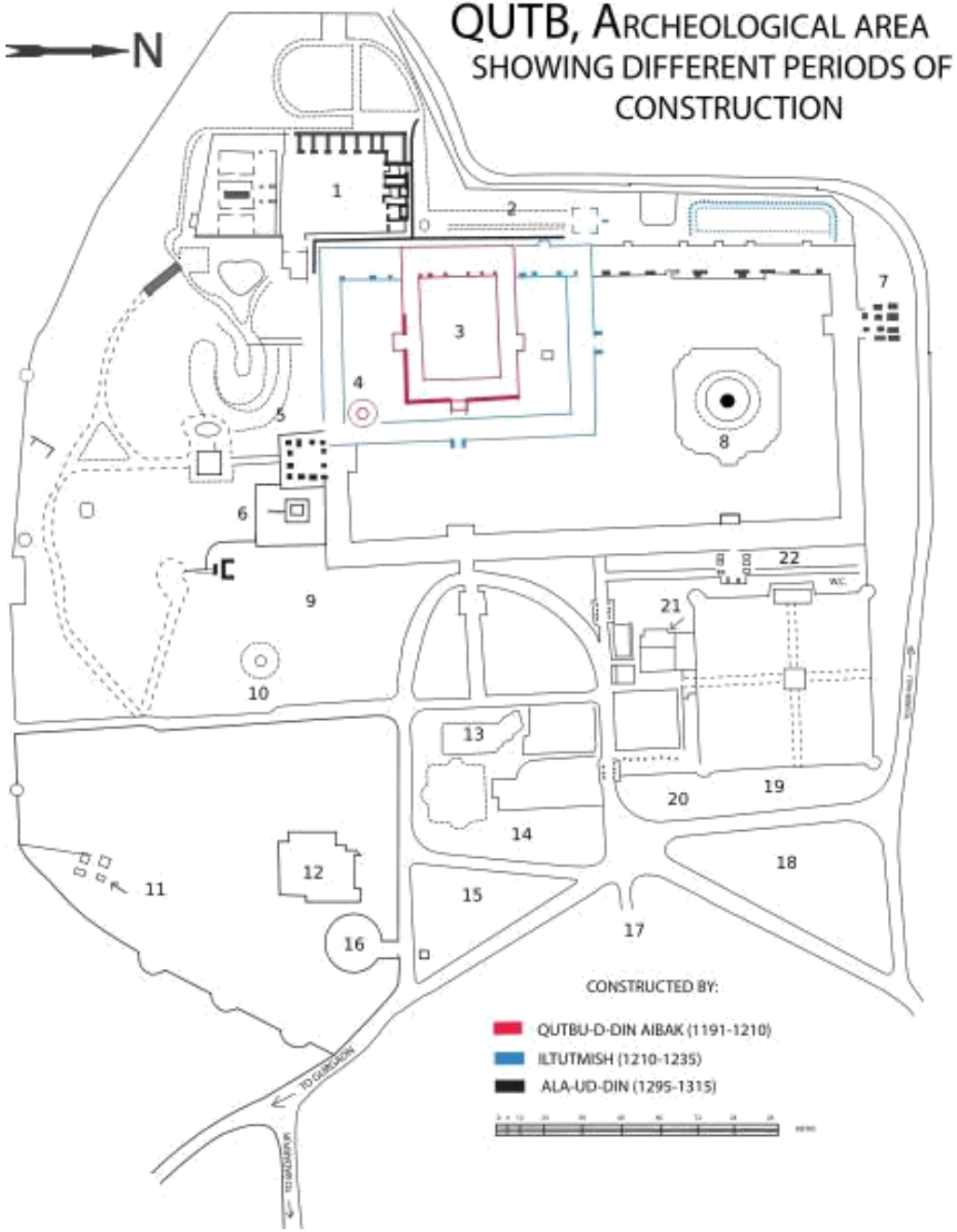
QUTB COMPLEX

A tall screen wall with pointed archways runs along the western edge of the precinct, creating a qibla wall for the prayer spaces.

In addition to these elements, the complex also contains several smaller buildings: the Tomb of Iltutmish, Ala al-Din Khalji's madrassa, and the Imam Zamin Mosque.

The Qutb Minar (minaret) stands in the southeastern part of this enclosure.

The unfinished Alai Minar (minaret) stands in the northeastern part of the complex.



QUTUB MINAR

Qutb Minar (Also called *Qutub* or *Qutab*, is the tallest minar (73 metres) in India originally an ancient Islamic Monument, inscribed with Arabic inscriptions, and is a UNESCO World Heritage site.

Qutb Minar is made of red sandstone and marble.

The stairs of the tower has 379 steps,is 72.5 metres (237.8 ft) high, and has a base diameter of 14.3 metres, which narrows to 2.7 metres at the top.

Construction was started in 1192 by Qutb-ud-din Aibak and was carried on by his successor, Iltutmish.

In 1368, Firoz Shah Tughlak constructed the fifth and the last storey.

Qutub Minar (Architecture)

FEATURES:

At the base, the diameter of the minaret is a little over fourteen meters and it tapers towards the top, where it is only slightly under 3 meters wide.

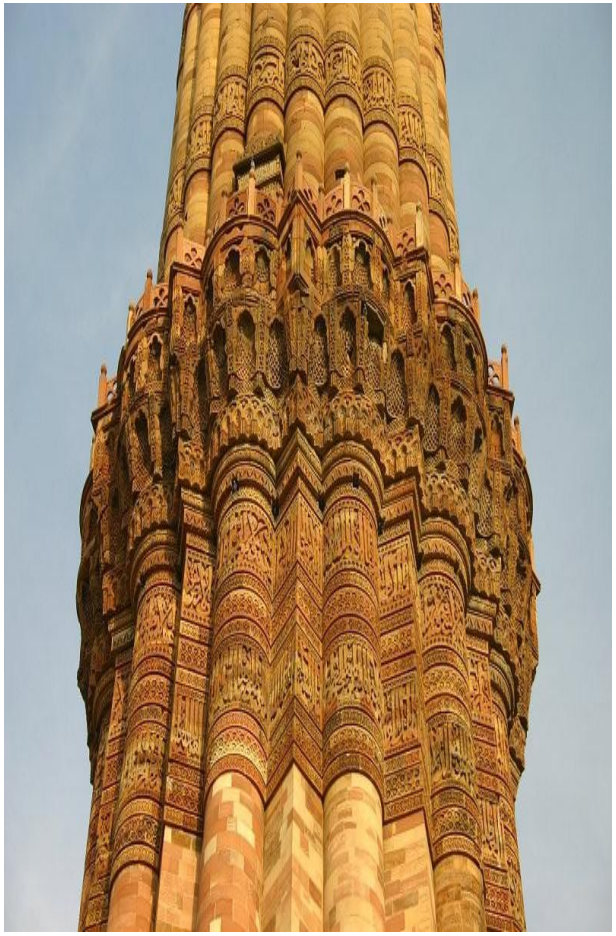
It has a circular stairway made of three-hundred-seventy-nine steps to reach the top for a spectacular view.

The Minar comprises of several superimposed flanged and cylindrical shafts separated by balconies.

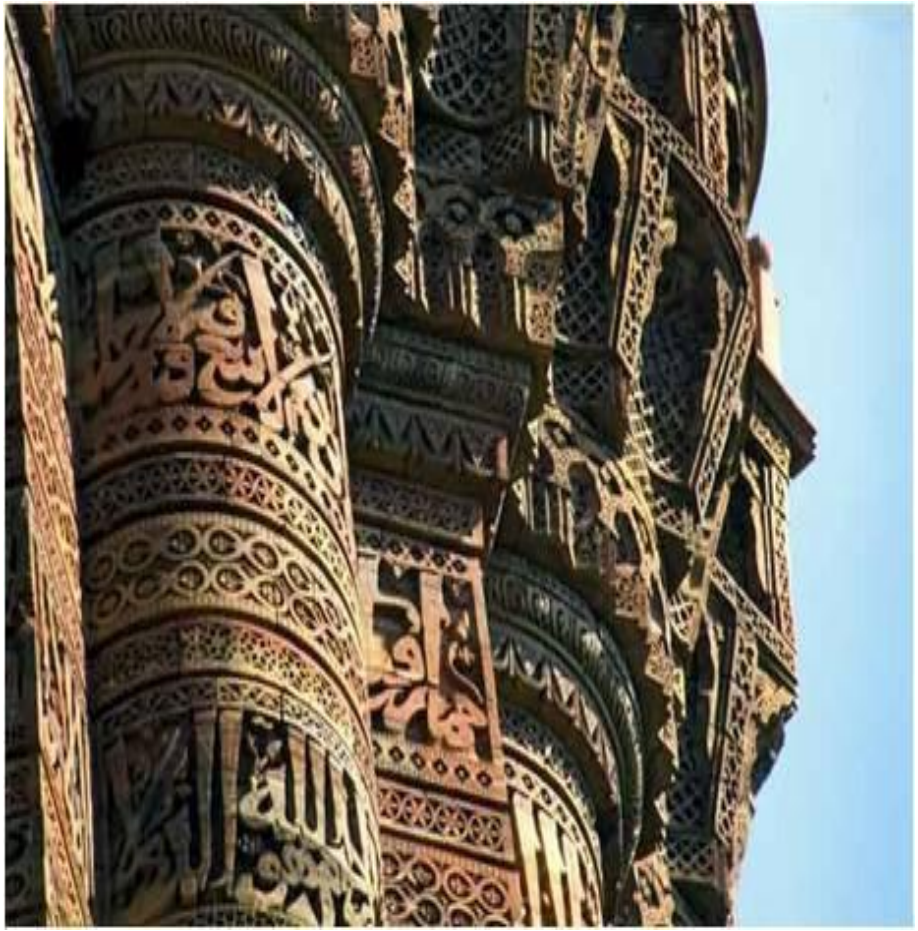
All the storeys have a balcony that circles the Minar with stone brackets for support.

The Minar is decorated throughout with floral motifs and arabesque. Also it bears inscriptions that are verses from the Koran and messages from the Sultans. .

The stone brackets are decorated with honeycomb design, more conspicuously in the first storey.



A CLOSE STUDY



MATERIALS:

The first three stories are made of sandstone and the next two of marble and sandstone.

Firoz Shah Tughlaq added marble to the top storey.

The Minar is in fact believed to have been built to aid the Muezzin of the mosque for prayer calls.

ALAI DARWAZA

It is the southern gateway of the Quwwat-ul-Islam mosque, and is a gem of Islamic architecture in India.

It was built by Alla-ud-din Khilji in 1311.

It is 17.2m square and pierced by arched openings that echo the contours of the covering dome.

The arch to the north is semicircular while the others are of pointed horse shoe shape.

It has intricate carvings in red sandstone and marble.

It has red stone jali screens.

IRON PILLAR

The Iron Pillar dates back to the 4th century BC.
It bears inscriptions that dedicate it as a flagstaff to honor the Hindu god Vishnu and in memory of Gupta king Chandragupta II (375-413 AD).
The pillar is a symbol of the progress of metallurgy in ancient India.
It is made of 98 percent wrought iron and has survived 1,600 years without rusting.

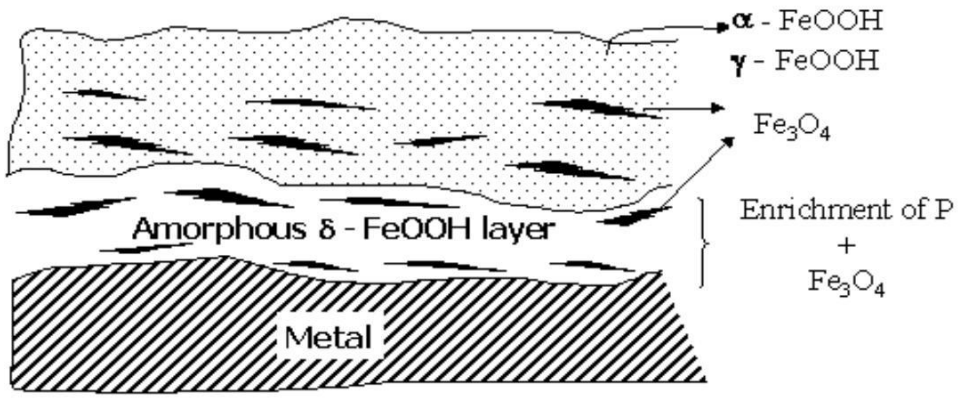
The pillar was cast in its present form not forged.

Length 7.2m of which 93 cm is underground.

Its Diameter is 0.41 m.

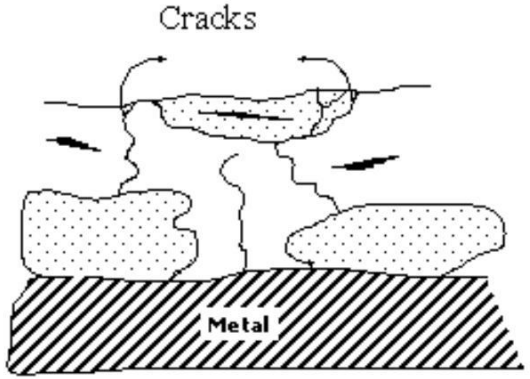
Garuda idol at top missing.

DELHI PILLAR IRON



δ FeOOH produced by catalytic action of PO_4^{3-}
δ FeOOH concentrated on metal surface
δ FeOOH cohesive and compact

MILD STEEL



δ FeOOH produced by dehydration-oxidation
δ FeOOH not concentrated on metal surface
Oxide readily cracks providing paths for water and O_2

ALAI MINAR

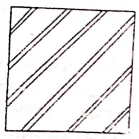
Ala-ud-Din wanted to build a second tower of victory twice as high as Qutab Minar but when he died the tower had reached only 24.5 meters and later no one was willing to continue his over ambitious project.

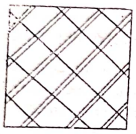
It stands to the north of the Qutab Minar and the mosque .It was to have ramps instead of stairs.

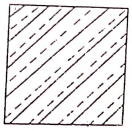
Windows are at regular quadrant heights, for a gradual ramp to be made.

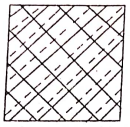
CONVENTIONAL SIGNS

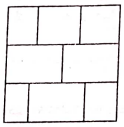
PLATE

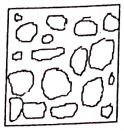

BRICK

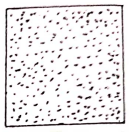

BRICK EXISTING

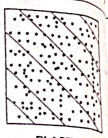

STONE

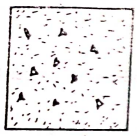

STONE EXISTING

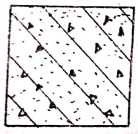

ASHLAR

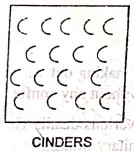

RUBBLE STONE

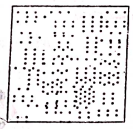

PLASTER

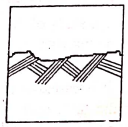

PLASTER EXISTING

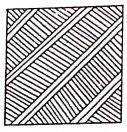

CONCRETE

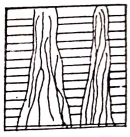

CONCRETE EXISTING


CINDERS

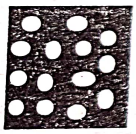

SAND

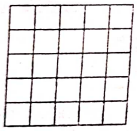

GROUND LEVEL

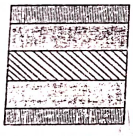

EARTH

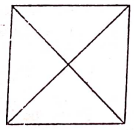

ROCK


CLAY TILE GLAZED


CLAY TILE UNGLAZED

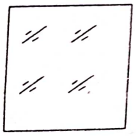

CERAMIC TILES

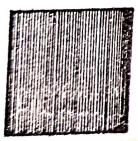

PLY WOOD

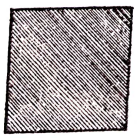

ROUGH WOOD

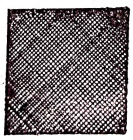

WOOD ACROSS GRAINS

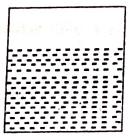

WOOD ALONG GRAINS

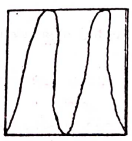

GLASS

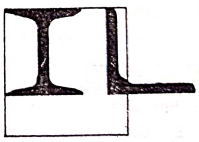

SHEET METAL


STEEL AND CAST IRON


ALUMINIUM


WATER, OIL, PETROL

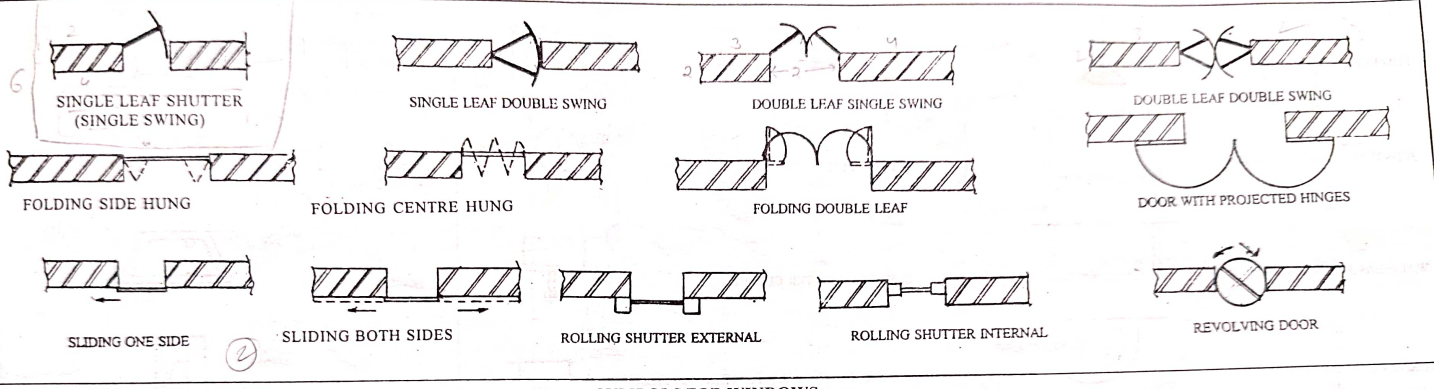

FIBRE BOARD AND INSULATING BOARD


STRUCTURAL SECTIONS

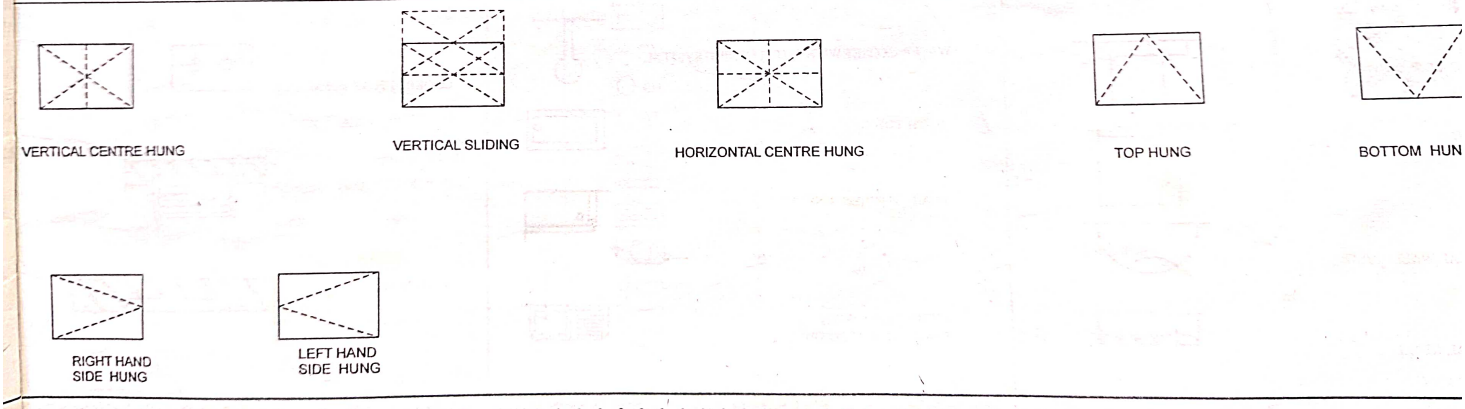

— STEEL

SYMBOLS FOR DOORS

PLATE : 1-B



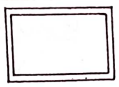
SYMBOLS FOR WINDOWS

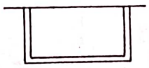


SYMBOLS FOR SANITARY INSTALLATIONS AND FITMENTS

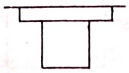
PLATE-1

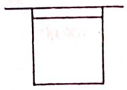
SHOWER HEAD 

PEDESTAL LAVATORY BASIN 

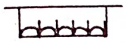
WALL LAVATORY BASIN 

CORNER LAVATORY BASIN 

W.C. LOW DOWN 

W. C. 

URINAL WALL HUNG 

URINAL STALL 

URINAL CORNER HUNG 

INDIAN TYPE W. C. 

EUROPEAN WATER CLOSET 

WATER CLOSET WITH FLUSHING SYSTEM 

WATER CLOSET WITH OUT FLUSHING SYSTEM 

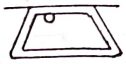
BATH TUB 

PLAIN KITCHEN SINK 

KICHEN SINK WITH
SINGLE DRAIN BOARD 

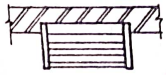
TOWEL RAIL 

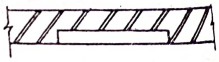
STOP VALVE OR
SLUICE VALVE 

WASH BASIN 

LADIES URINAL 

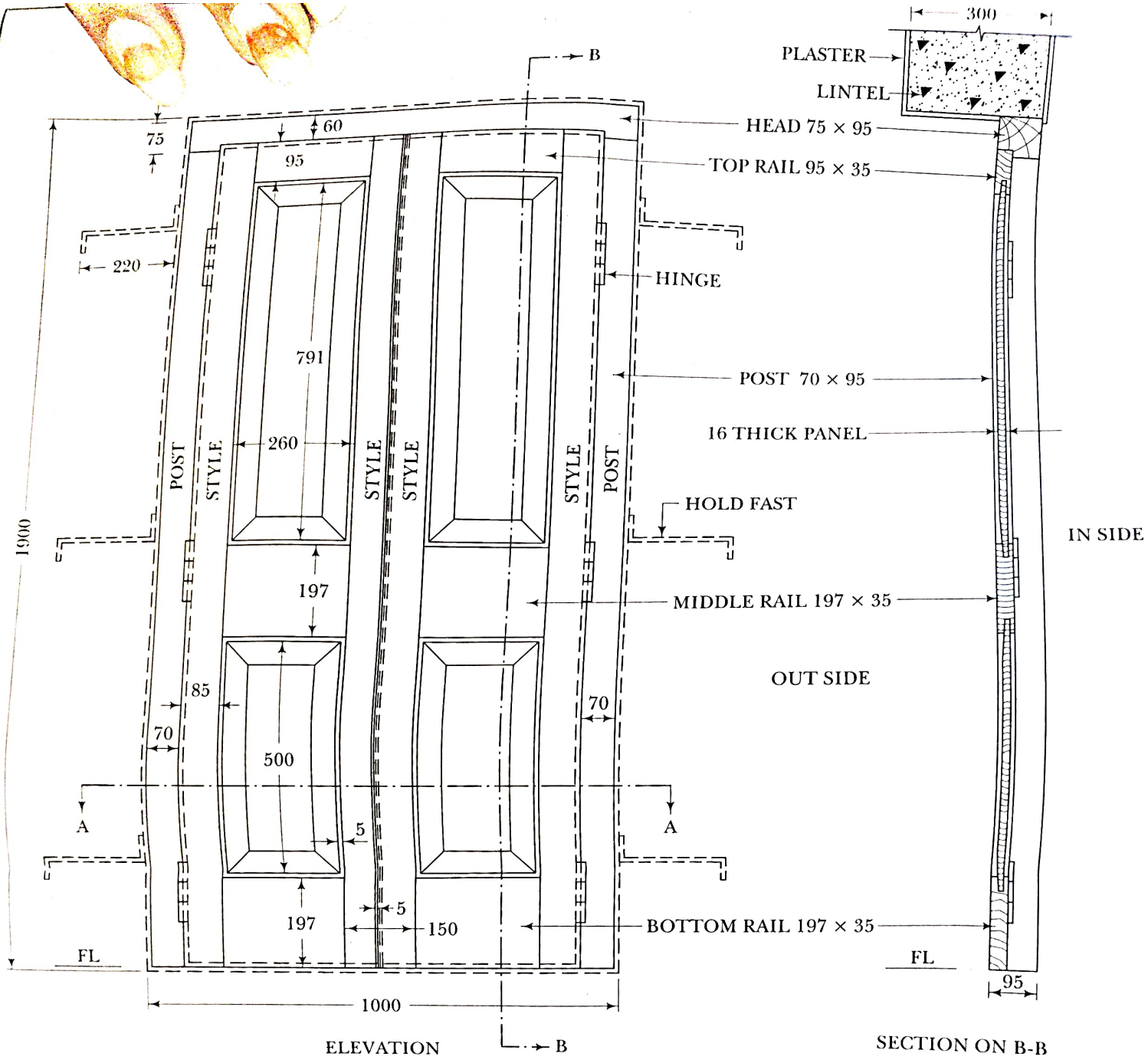
COOKING PLAT FORM 

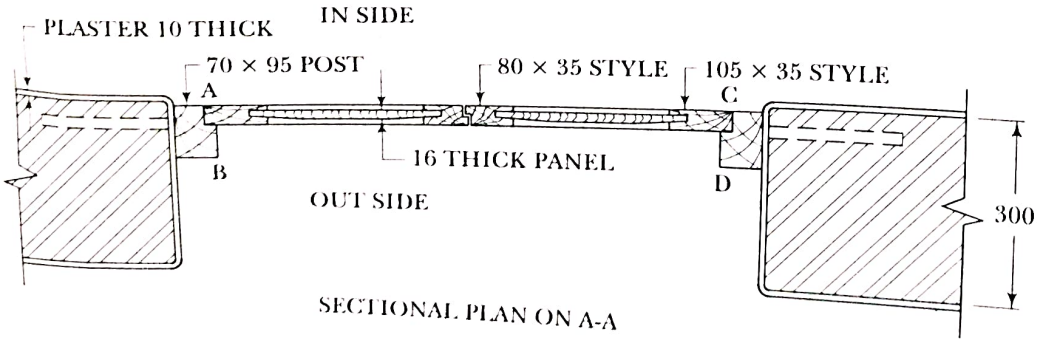
CUP BOARD (C.B) 

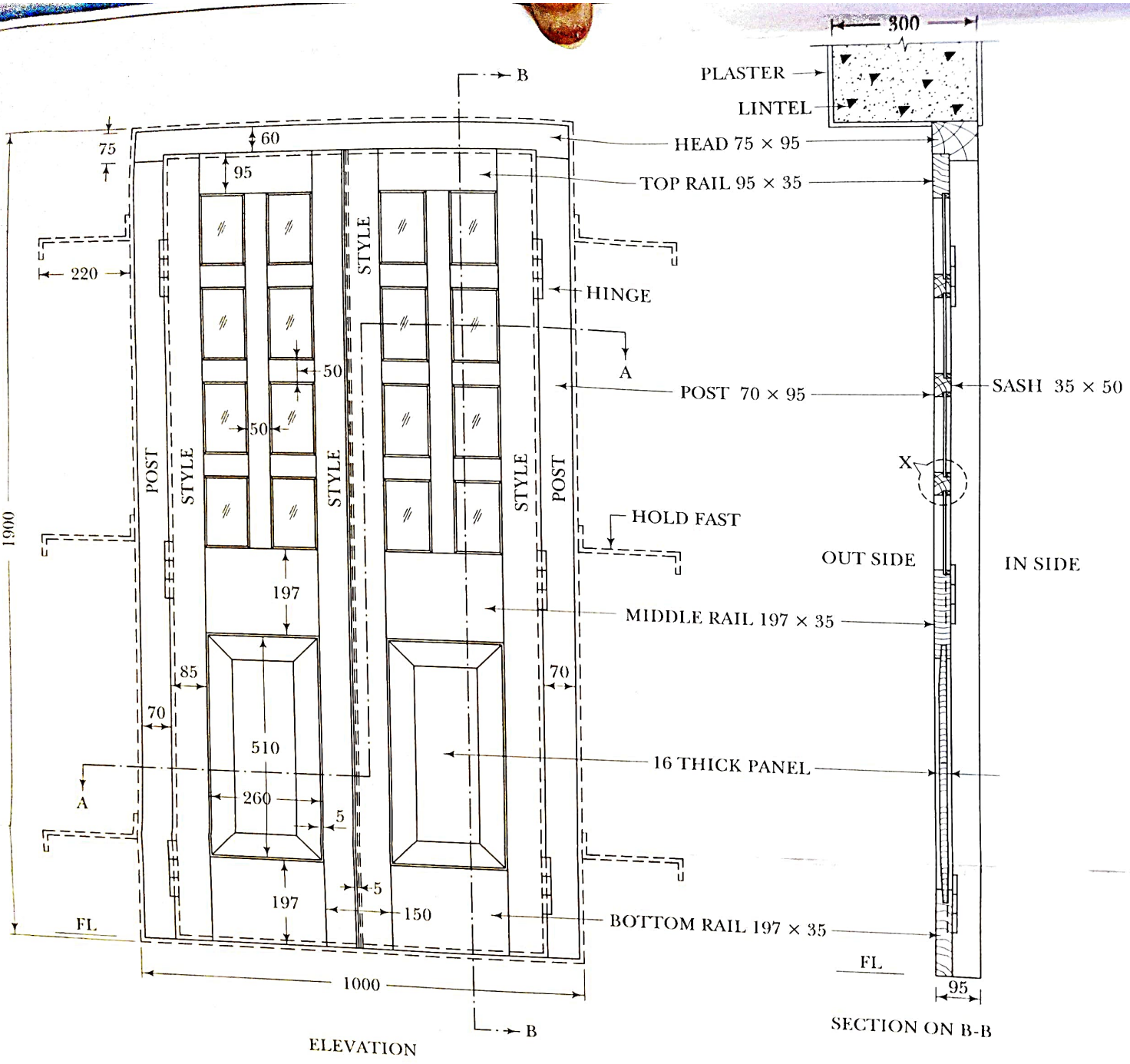
ALMAIRAH 

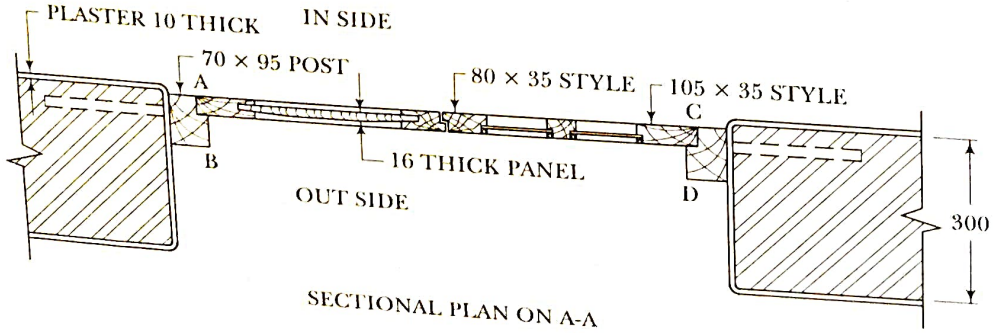
ELECTRICAL ENGINEERING SYMBOLS AS PER I.S.I — **PLATE : 1-D**

S.No.	Name	Symbol	S.No.	Name	Symbol
1.	Main fuse board with out switches, Lighting		21.	Thermostat	
2.	Main fuse board with Switches, Lighting		22.	Humidistat	
3.	Distribution fuse board with switches, Lighting.		23.	Bell Push	
4.	Power Plug		24.	Bell	
5.	Light Plug		25.	Telephone Instrument Point Internal	
6.	Main Switches, Lighting		26.	Telephone Instrument Point Public Service	
7.	Main Switches, Power		27.	Telephone Private Exchange Public Service	
8.	Meter		28.	Fire Alarm Push	
9.	Radio Receiving set		29.	Bell Connected to Fire Alarm	
10.	Television Receiving Set		30.	Amplifier	
11.	Light Bracket		31.	Control Board	
12.	Batten Lampholder		32.	Loudspeaker Outlet	
13.	Water Tight Light Fitting		33.	Aerial	
14.	Flourescent Light (Single)		34.	Ceiling Fan	
15.	Flourescent Light (Double)		35.	Bracket Fan	
16.	Convection Heater		36.	Exhaust Fan	
17.	Electric Unit Heater		37.	Pilot or Corridor Lamp	
18.	Immersion Heater		38.	Earth	
19.	Horn or Hooter		39.	One-way Switch	
20.	Siren		40.	Two-way Switch	

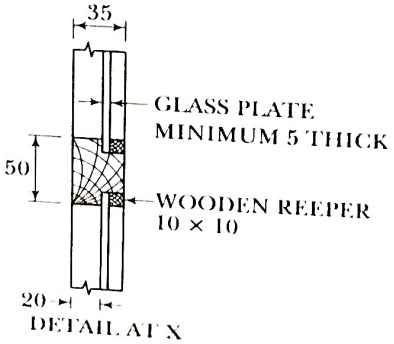

300
PLASTER
LINTEL
B
HEAD 75 × 95
TOP RAIL 95 × 35
75
60
95
220
HINGE
791
POST 70 × 95
16 THICK PANEL
260
POST
STYLE
STYLE
STYLE
STYLE
POST
HOLD FAST
IN SIDE
1900
197
MIDDLE RAIL 197 × 35
OUT SIDE
185
70
70
500
A
A
5
5
197
150
BOTTOM RAIL 197 × 35
FL
FL
95
1000
B
ELEVATION
SECTION ON B-B


PLASTER 10 THICK
IN SIDE
70 × 95 POST
80 × 35 STYLE
105 × 35 STYLE
A
C
B
16 THICK PANEL
D
OUT SIDE
300
SECTIONAL PLAN ON A-A



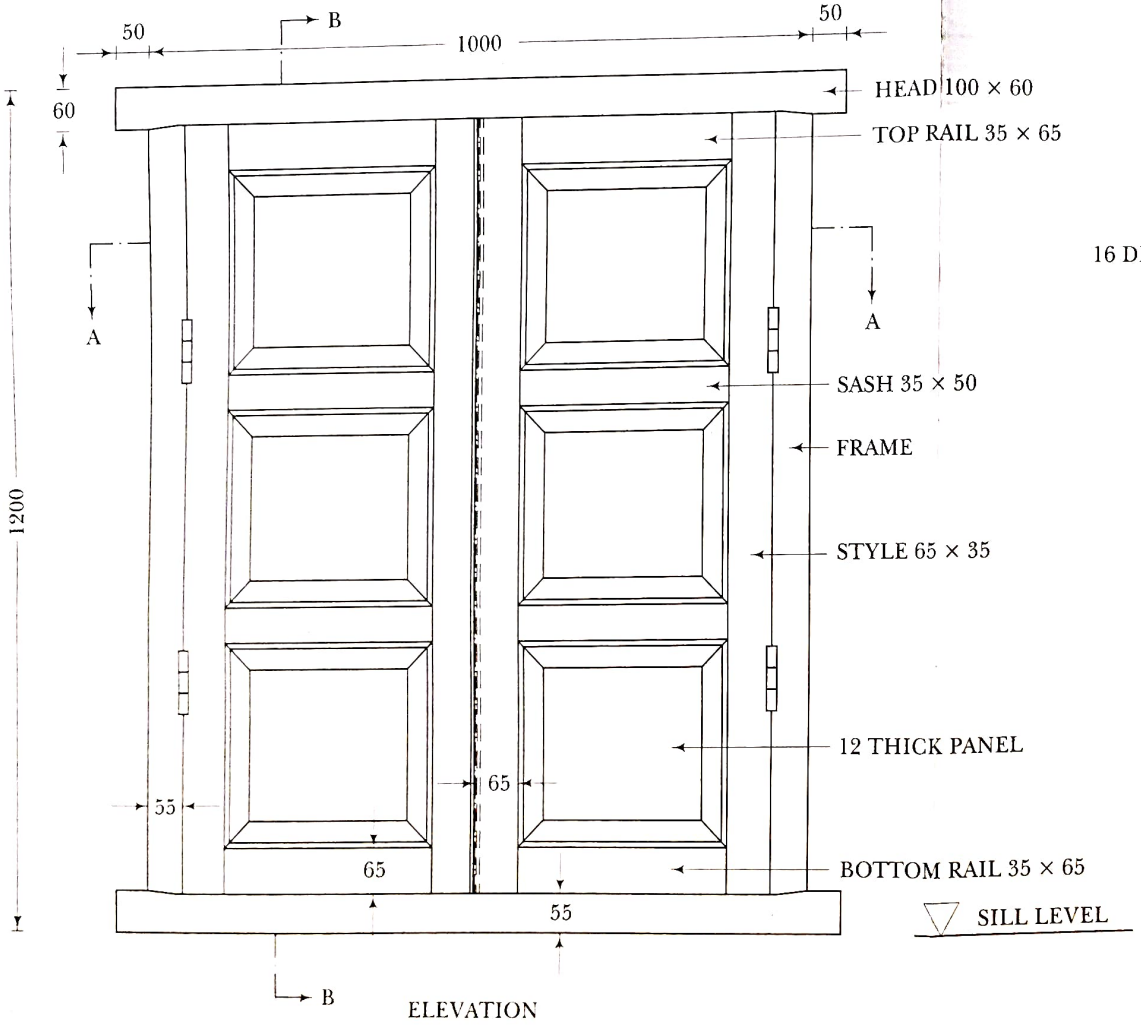


SECTIONAL PLAN ON A-A

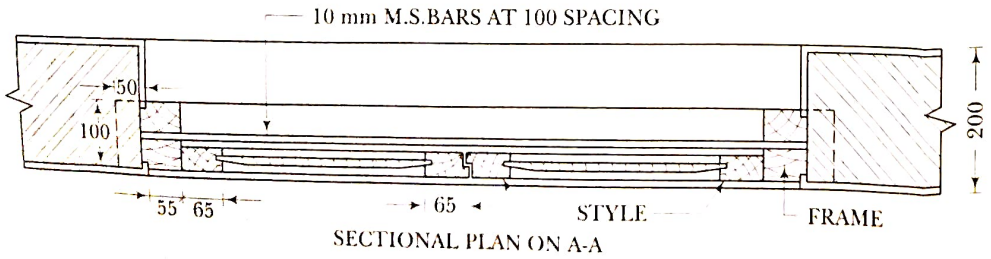


DETAIL AT X

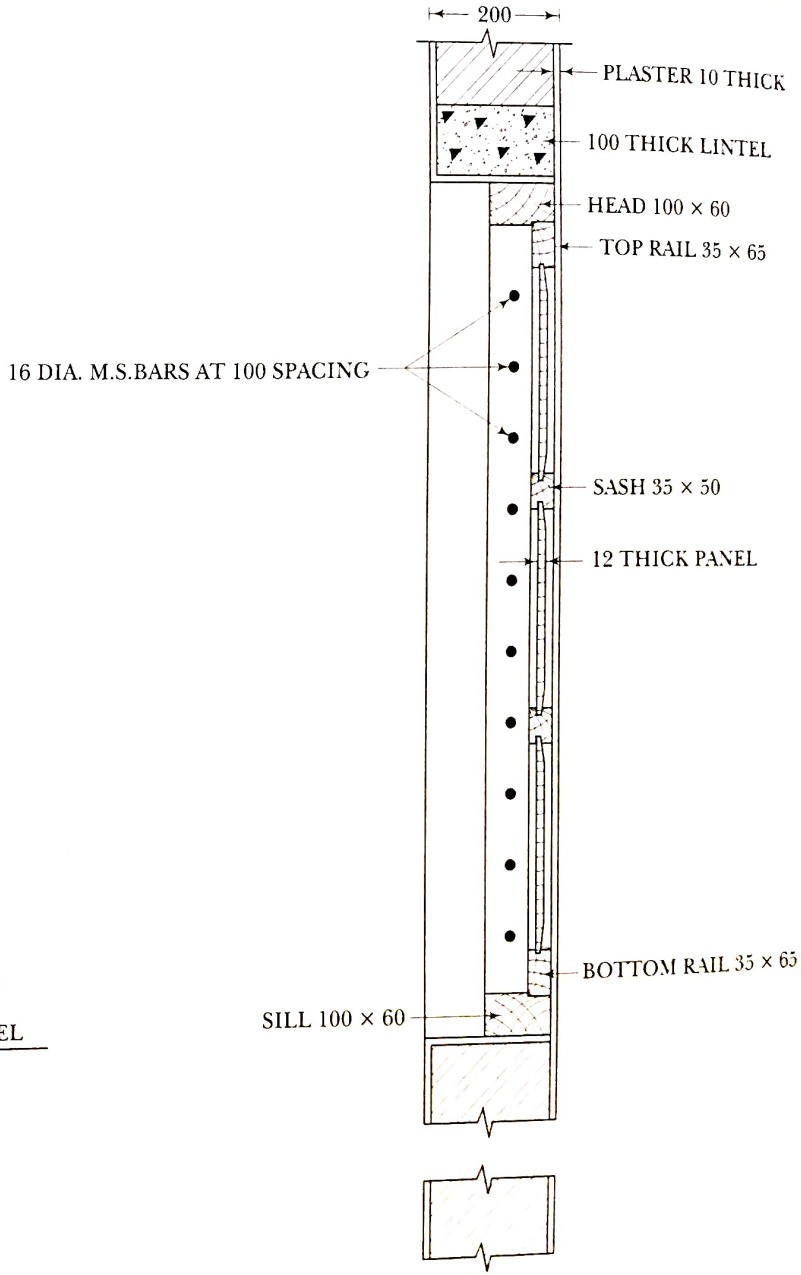
ALL DIMENSIONS ARE IN mm



ELEVATION



SECTIONAL PLAN ON A-A



SECTION ON B-B

THICKNESS OF SHUTTER = 35

ALL DIMENSIONS ARE IN mm

SCALE 1 : 100

PLATE NO. 20: PANELLED WINDOW

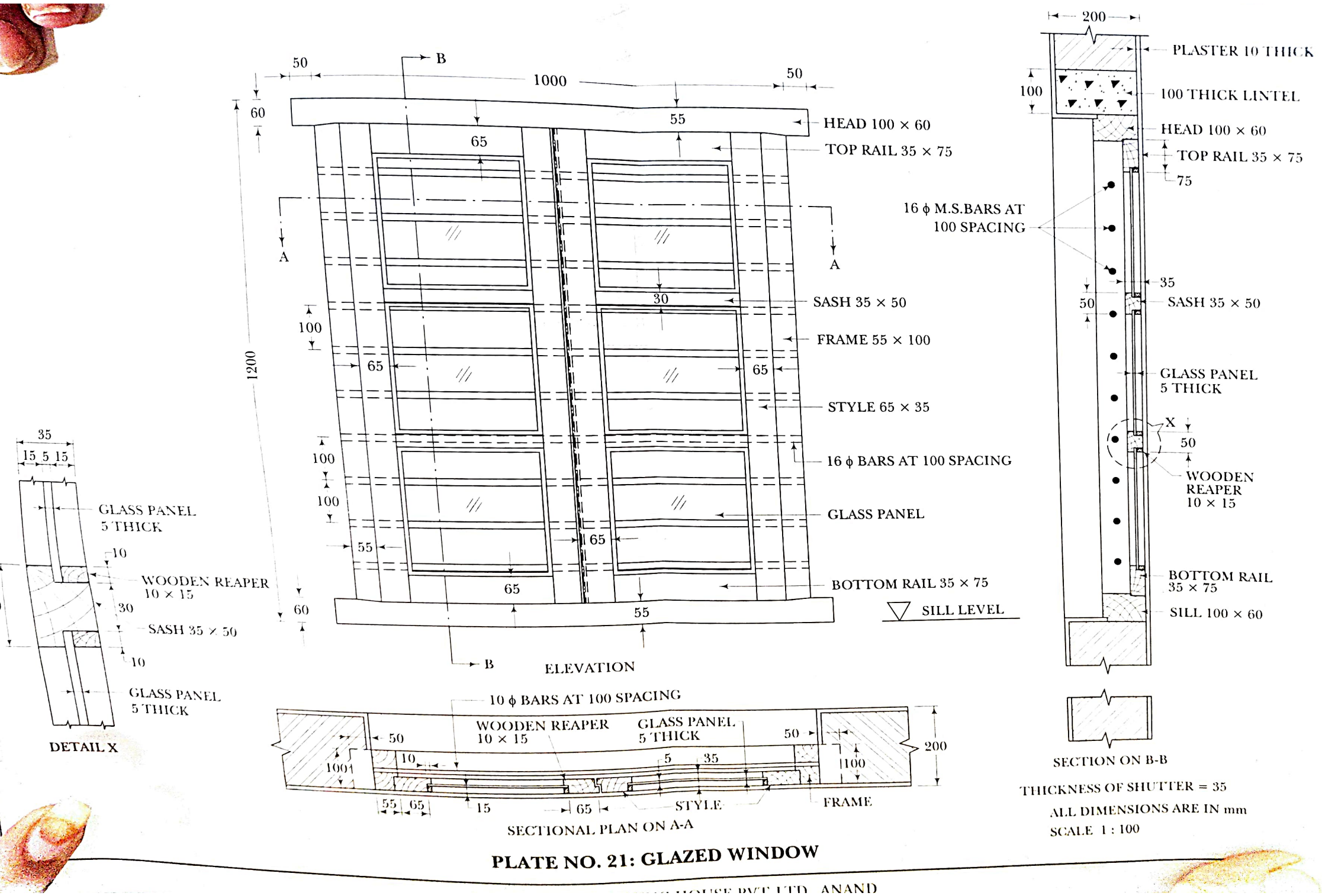
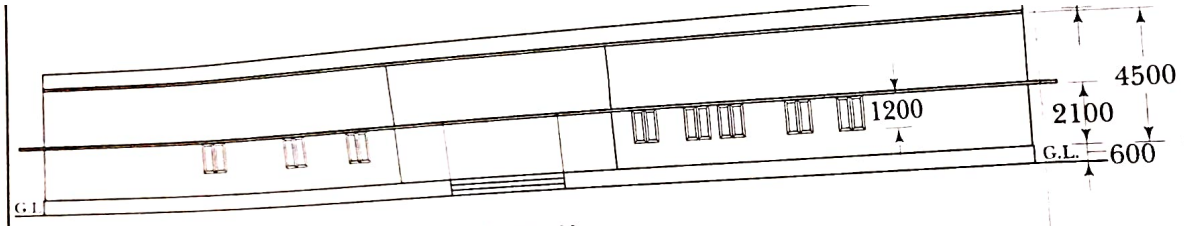
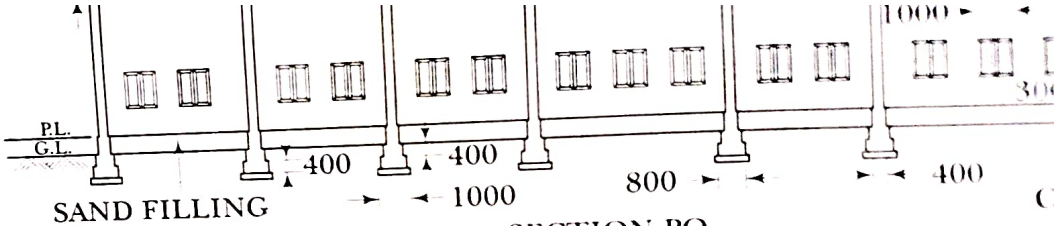


PLATE NO. 21: GLAZED WINDOW



ELEVATION

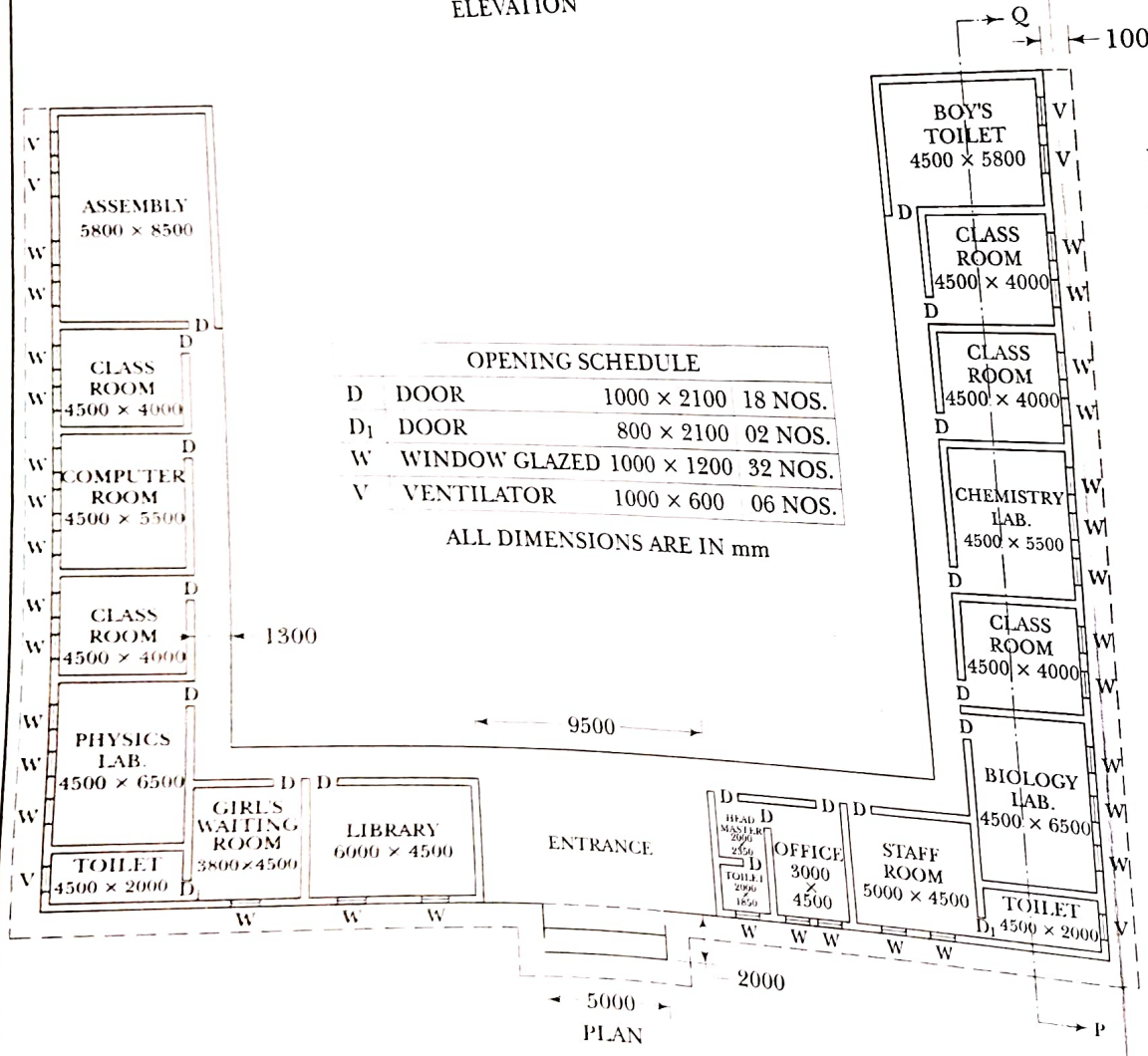


SAND FILLING

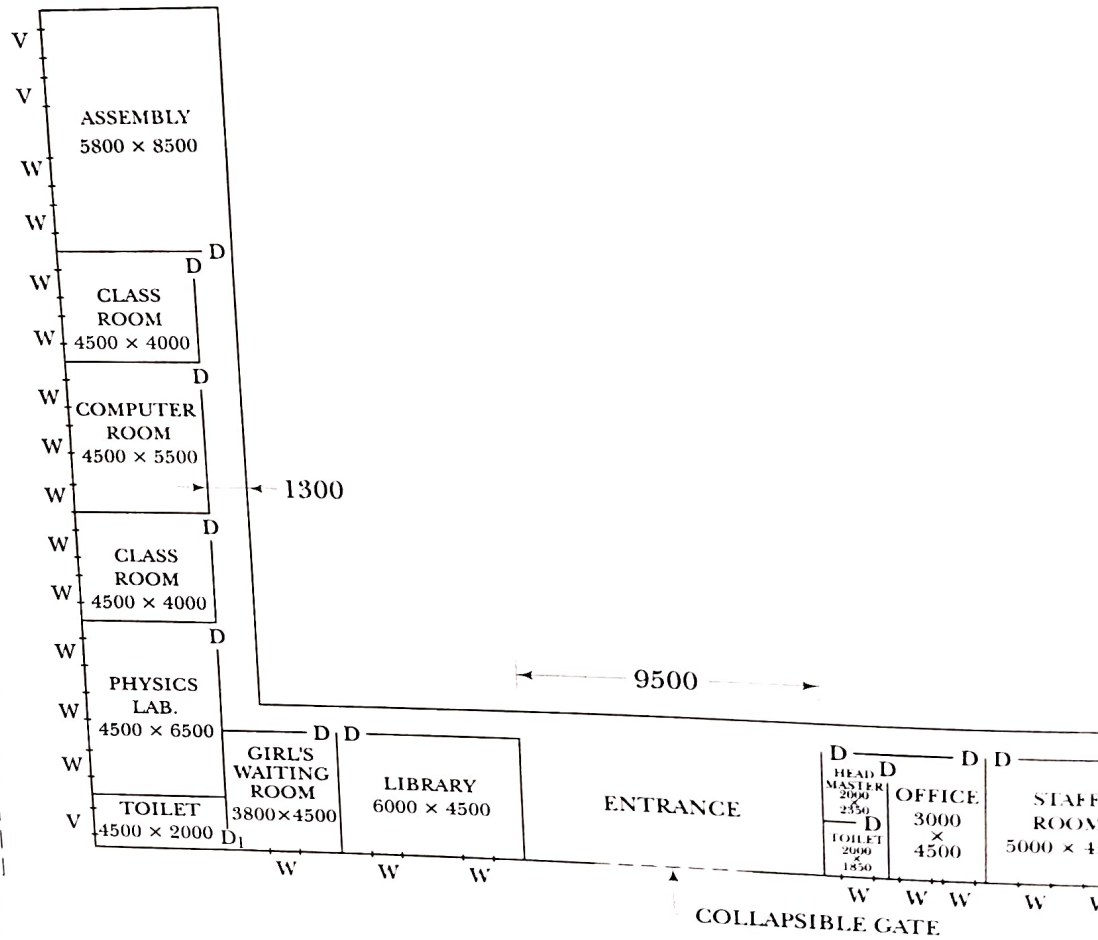
SECTION PQ

OPENING SCHEDULE			
D	DOOR	1000 × 2100	18 NOS.
D_1	DOOR	800 × 2100	02 NOS.
W	WINDOW GLAZED	1000 × 1200	32 NOS.
V	VENTILATOR	1000 × 600	06 NOS.

ALL DIMENSIONS ARE IN mm

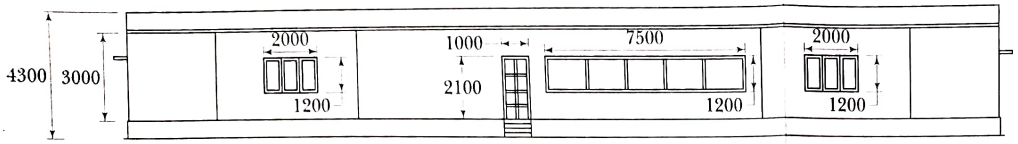


PLAN

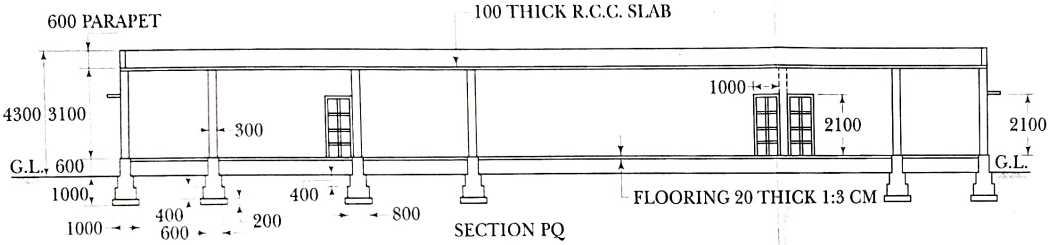


LINE PLAN

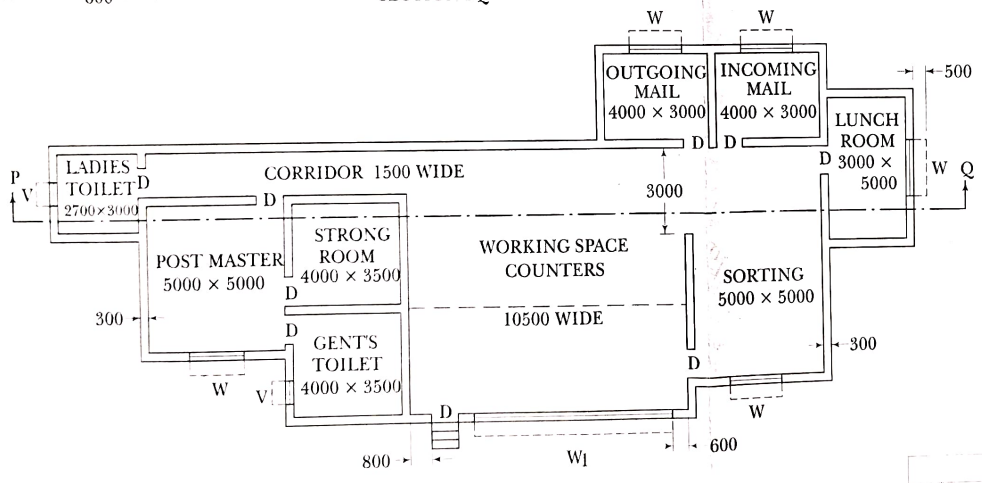
PLATE NO. 46: PLAN OF A SECONDARY SCHOOL



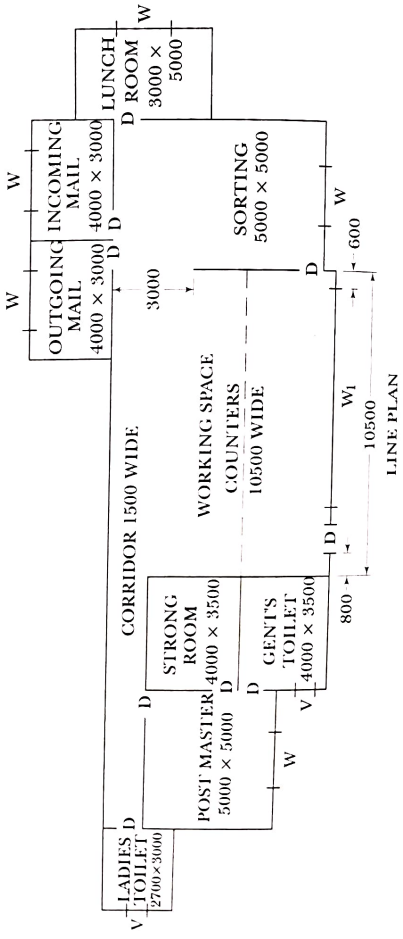
ELEVATION



SECTION PQ



PLAN



LINE PLAN

OPENING SCHEDULE			
D	DOOR PANELLED	1000 × 2100	9 NOS.
W	WINDOW PANELLED	2000 × 1200	5 NOS.
W1	WINDOW PANELLED	7500 × 1200	1 NO.
V	VENTILATOR	800 × 300	2 NOS.

ALL DIMENSIONS ARE IN mm
SCALE 1 : 2000

PLATE NO. 48: POST OFFICE

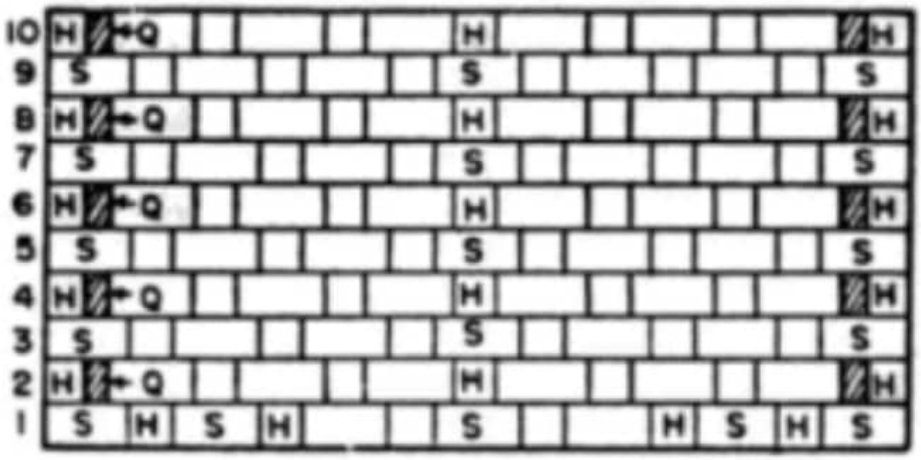
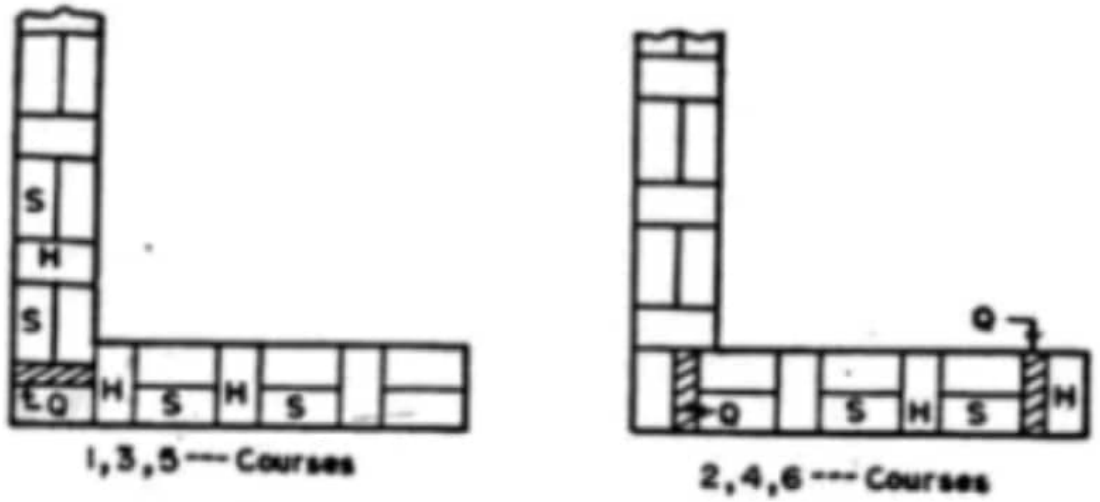
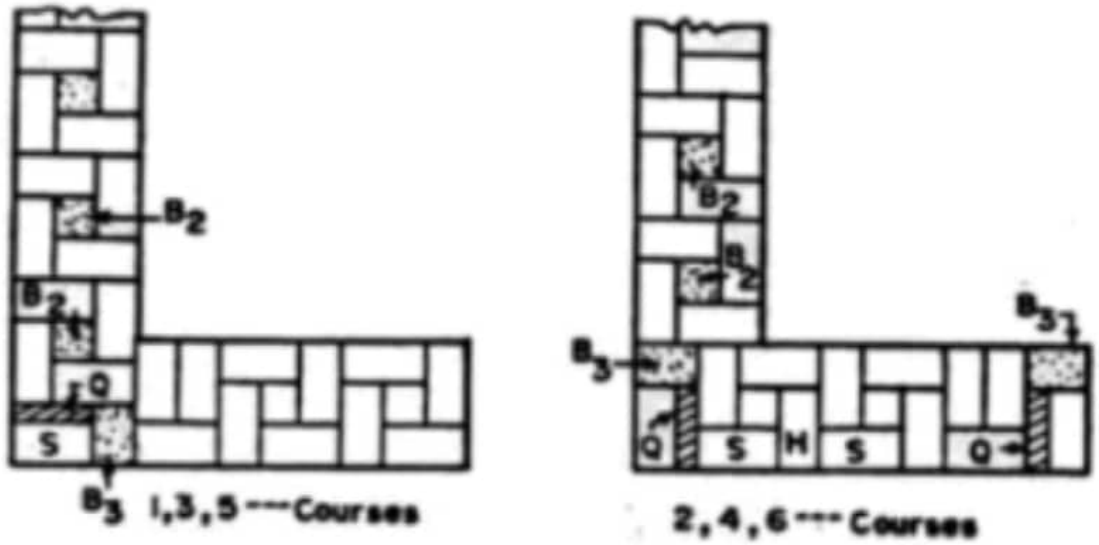


Fig.4. Double Flemish Bond in Brick Masonry

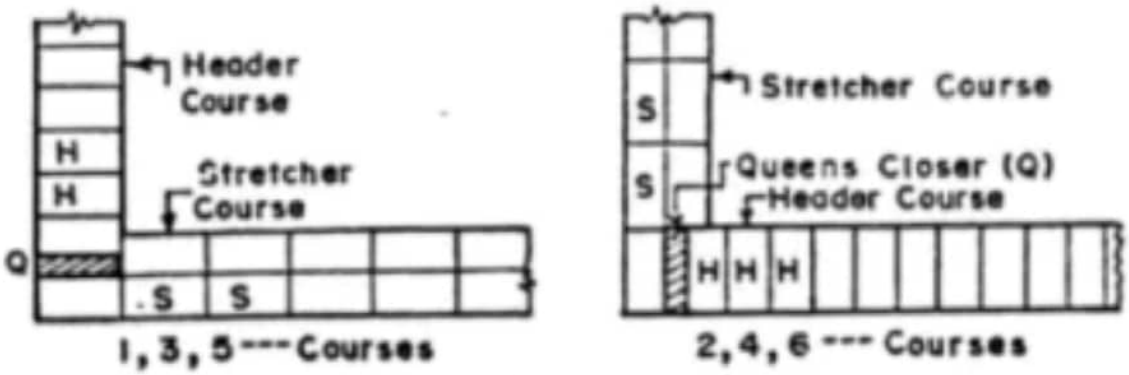


(a) Plan for one Brick Thick Wall

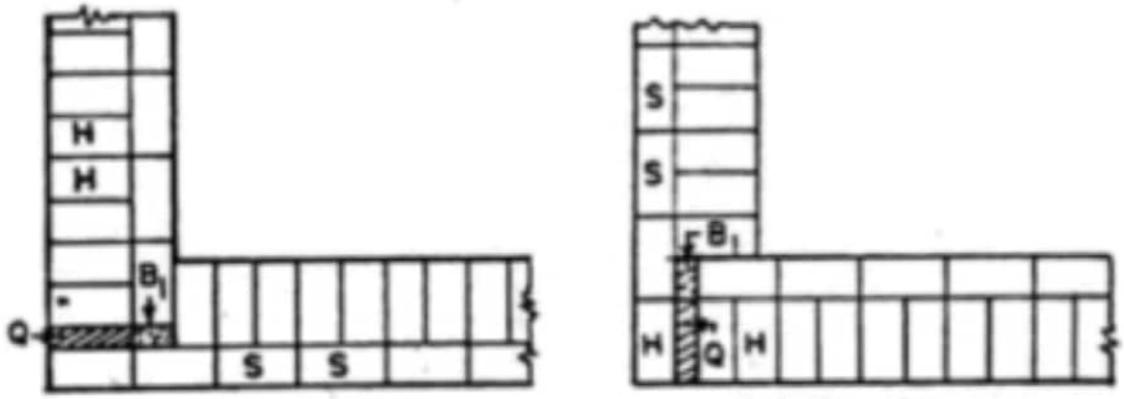


(b) Plan for $1\frac{1}{2}$ Brick Thick Wall

Fig.5. Double Flemish Bond

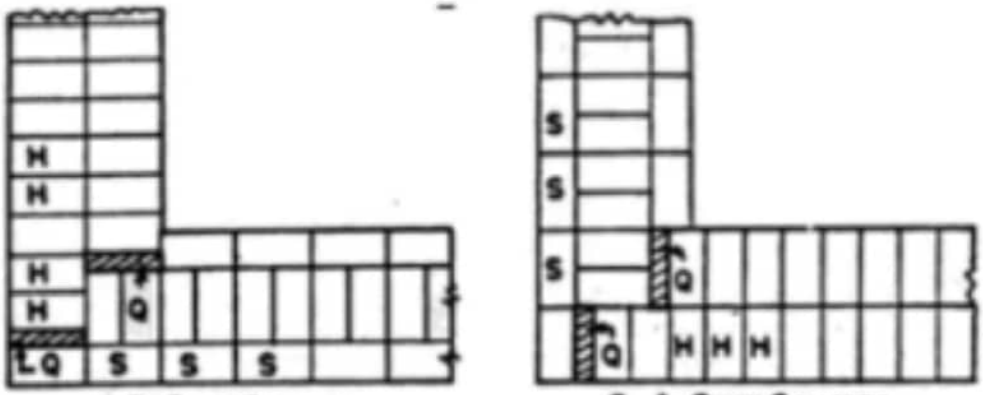


(a) Plan for 1 Brick Thick Wall

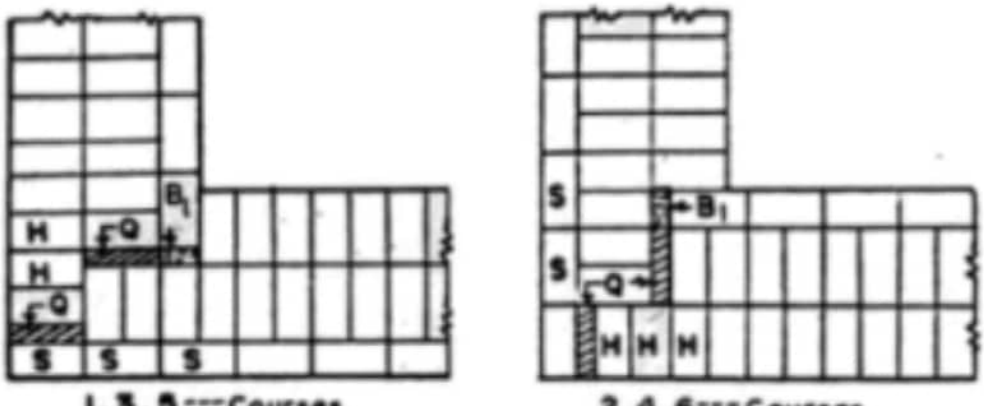


(b) Plan for $1\frac{1}{2}$ Brick Thick Wall

Fig.2. English Bond for One and One and a Half brick Wall Thickness



(c) Plan for 2-Brick Thick Wall



(d) Plan for $2\frac{1}{2}$ Brick Thick Wall

Engineering Drawings for Doors and Windows

(NOTE – Drawings required to be made on the drawing sheets are given in the end of the document. A totalof 4 drawing comprising of doors and windows are to be made on Drawing Sheets for the Lab Exp #2)

The **function of a door** is to give access to building and to different parts of the building and to deny the access whenever necessary. Number of doors should be minimum possible. The size of the door should be ofsuch dimension as will facilitate the movement of the largest object likely to use the doors.

In case of the residential buildings, the size of the door should not be less than 0.9 m × 2.0 m. larger doors may be provided at main entrance to the building to enhance the aesthetic view. Minimum sized doors are used for bath rooms and water closets. The size recommended is 0.75 m × 1.9 m. As a thumb rule height ofdoor should be 1 m more than its width.

Windows are provided to give light and ventilation. They are located at a height of 0.75 m to 0.90 m from the floor level. In hot and humid regions, the window area should be 15 to 20 per cent of the floor area. It is preferable to have at least two openings in two different walls. Another thumb rule used to determine the size of the window opening is for every 30 m3 inside volume there should be at least 1 m2 window opening.

Types of Doors

Various types of doors are in use which may be classified on the basis of arrangement of shutters, method ofconstructions, principles of working operations and materials used. Commonly used doors are briefly explained below:

1. Battened and Ledged Doors: Battens are 100 mm to 150 mm wide and 20 mm thick wooden boards. Theirlength is that of door opening. The battens are connected by horizontal planks, known as ledges of size 100 to 200 mm wide and 30 mm thick. Usually three ledges are used one at top, one at bottom and the third one at mid-height. This is the simplest form of door and the cheapest also. Battens are secured by tongued and grooved joint.

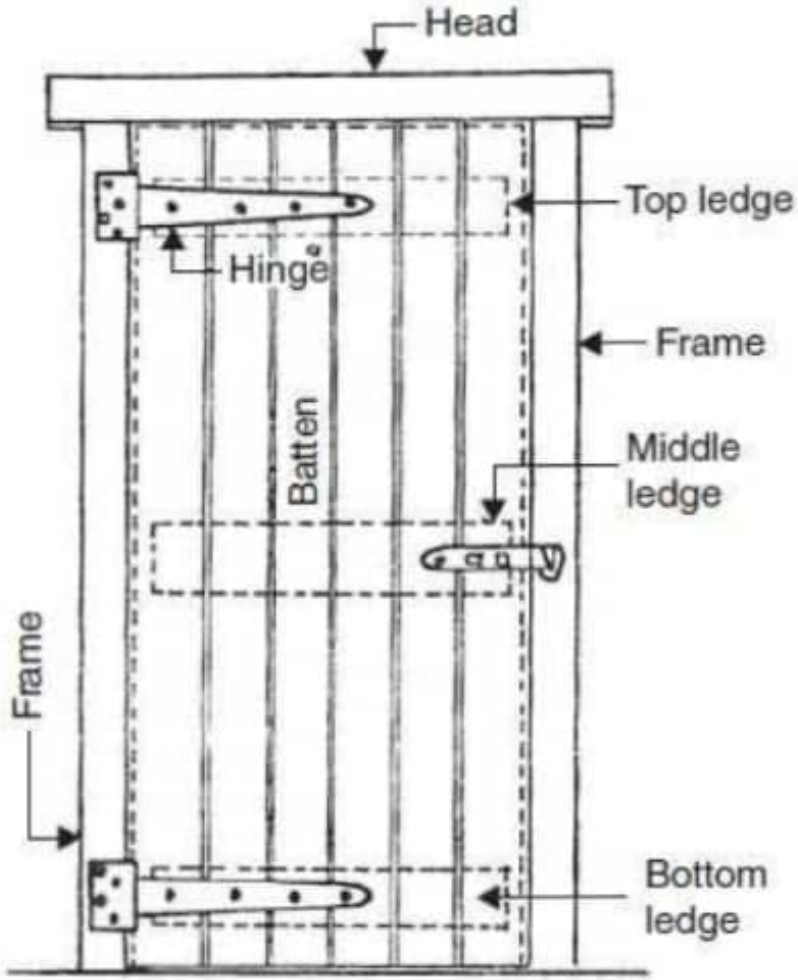


Fig. 8.21. Battened and ledged door

Battened, Ledged and Braced Doors: If doors are wide apart from using battens and ledges diagonal members, known as braces, are provided to strengthen the door. Figure 8.22 shows a typical battened,ledged and braced door.

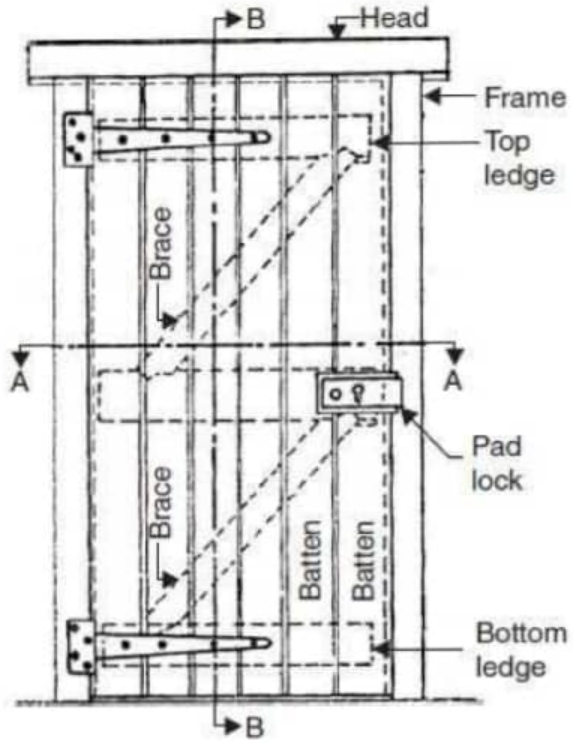


Fig. 8.22. Battened, ledged and braced door

Sometimes above two types of shutters are provided within wooden frame work and in those cases theymay be called as battened, ledges and framed doors.

3. Framed and Panelled Doors: This type of door consists of vertical members, called styles and horizontal members called rails. The styles and rails are suitably grooved to receive panels. The panels may be of wood,

A.C. sheet, glasses etc. The panels may be flat or of raised type to get good appearance. These are very commonly used doors. They may be of single shutter or of double shutter. Figure 8.23 show few types ofpanelled doors. If glass panels are used they may be called as glazed doors.

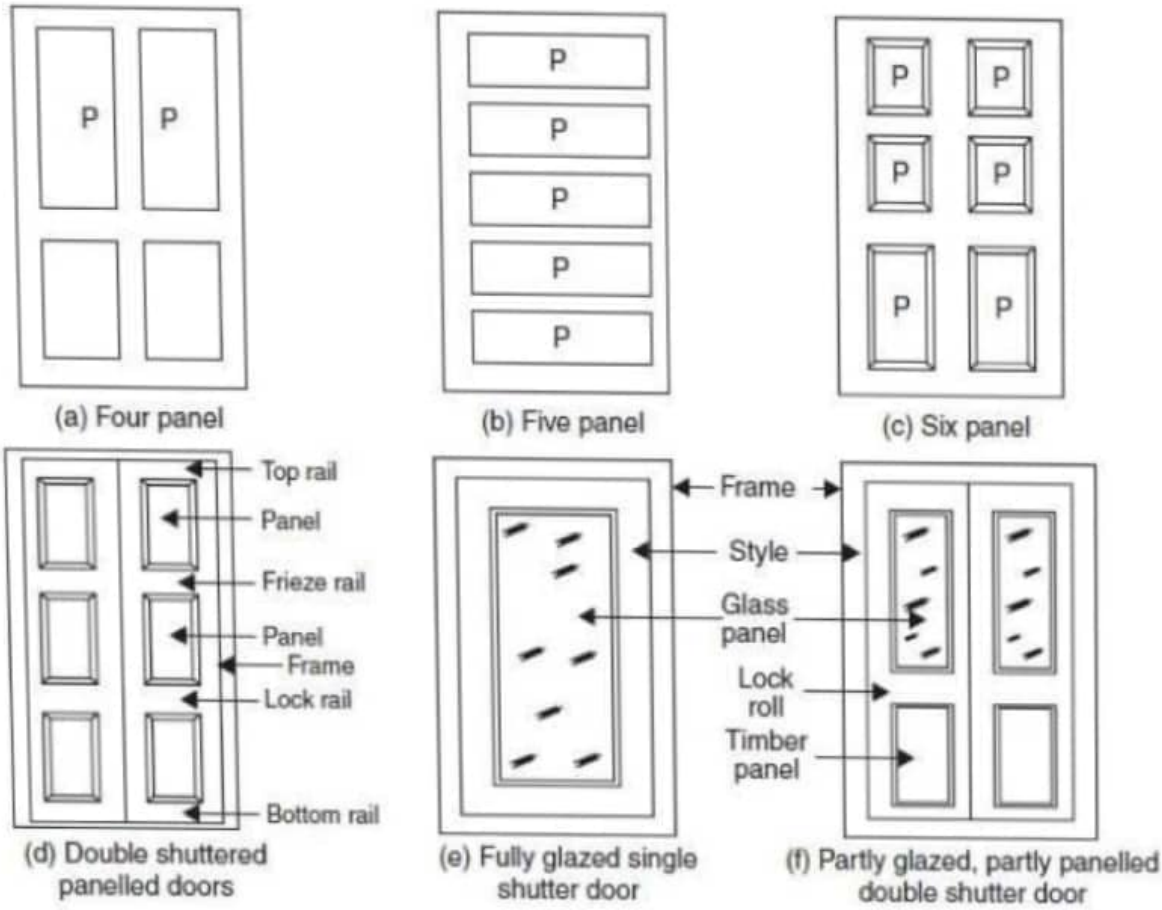


Fig. 8.23. Panelled and lazed doors

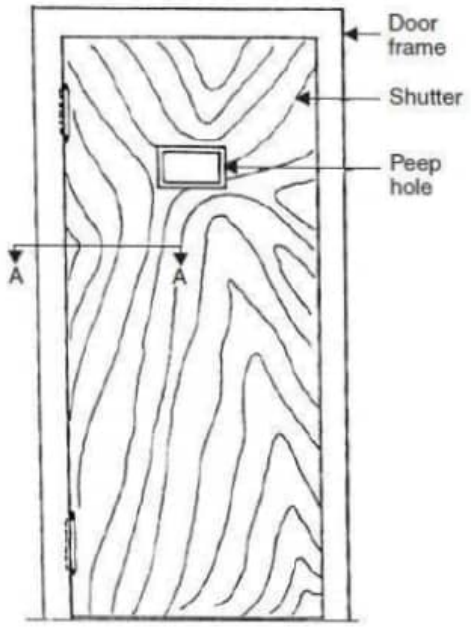


Fig. 8.24. Flush door

Flush Doors: The shutters of these doors are made of plywood or block boards. They are of uniform thickness. These shutters are available with different attractive vineer finishes. The time consumed in making such doors at site is quite less. These doors are suitable for interior portion of a building. Nowadaysflush doors are commonly used in residential and office buildings. Figure 8.24 shows typical flush door.

Louvered Doors: Whenever privacy as well as ventilation is required such doors can be used. Louvers are theglass, wooden or A.C. sheet strips fixed in the frame of shutter such that they prevent vision but permit free passage of air. The doors may be fully or partially louvered. Such doors are commonly used for public bathrooms and latrines. [Fig. 25]

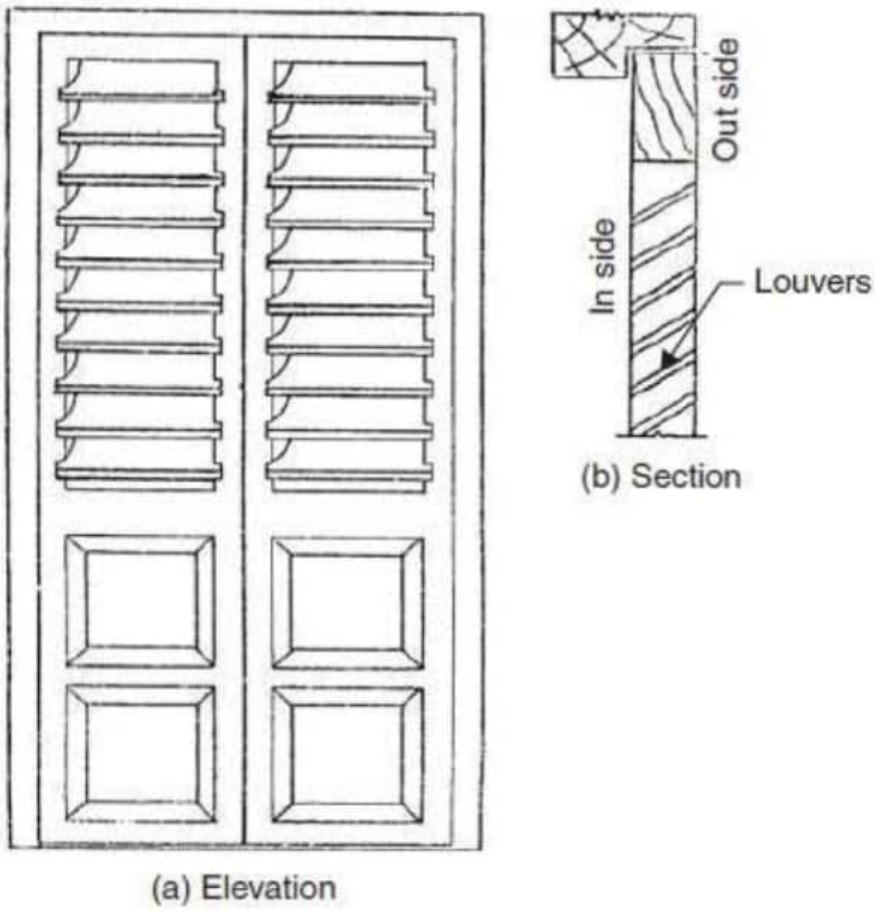


Fig. 8.25. Louvered door

Revolving Doors: It consist of a centrally placed pivot to which four radiating shutters are attached. The central pivot is supported on ball bearing at the bottom and has a bush bearing at the top. The shutters maybe partly or fully madeup of glass. A circular space of entrance is provided within which

shutters rotate they give entrance on one side and exit on other side. These doors are preferred in public buildings like stores, banks, hotels, theatres where continuous use of doors is necessary. They are very muchrequired in entrance to air conditioned public buildings. Figure 8.26 shows a typical revolving door.

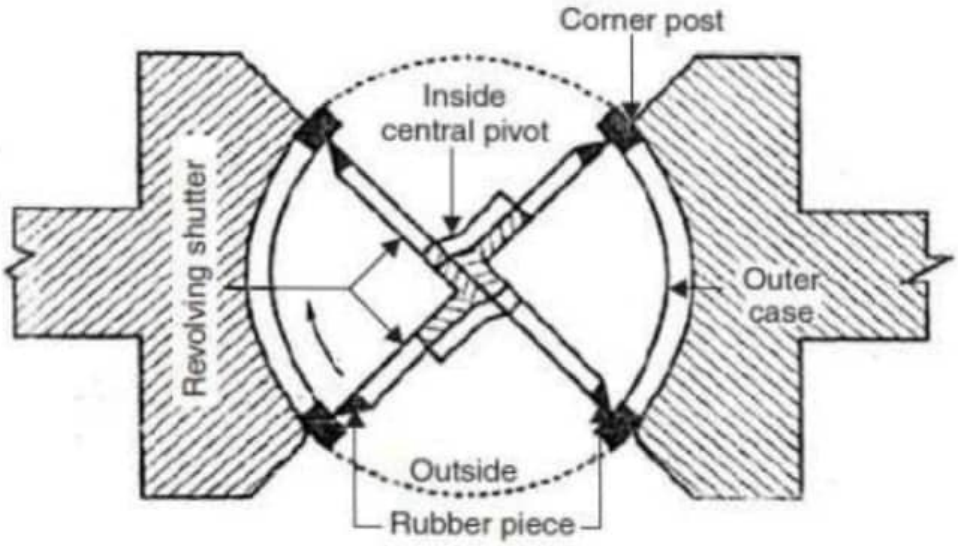


Fig. 8.26. Revolving door

Swing Doors: Swing door has its shutter attached to the frame by means of double action springs. Hence shutter can move both inward and outward. They may be single shuttered or double shuttered. Such doorsare preferred in offices and banks. Since these doors can open on both sides it is desirable to provide glass panels or peep holes to enable user to see the persons from other side. [Fig. 8.27]

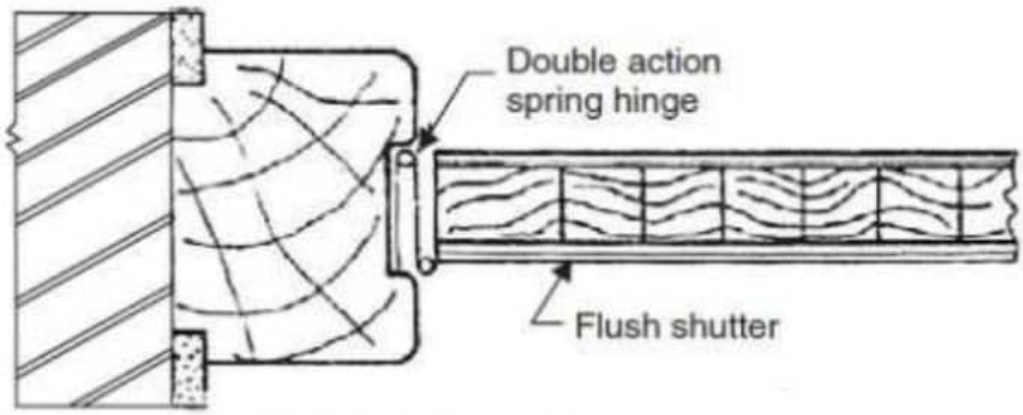


Fig. 8.27. Plan of swing door

Sliding Doors: In this type of doors, shutter slides on the sides. For this purpose runners and guide rails areprovided. Sliding shutters may be one, two or even three. Such doors are used in banks, offices etc. The arrangement of such shutters in plan is shown in Fig. 8.28

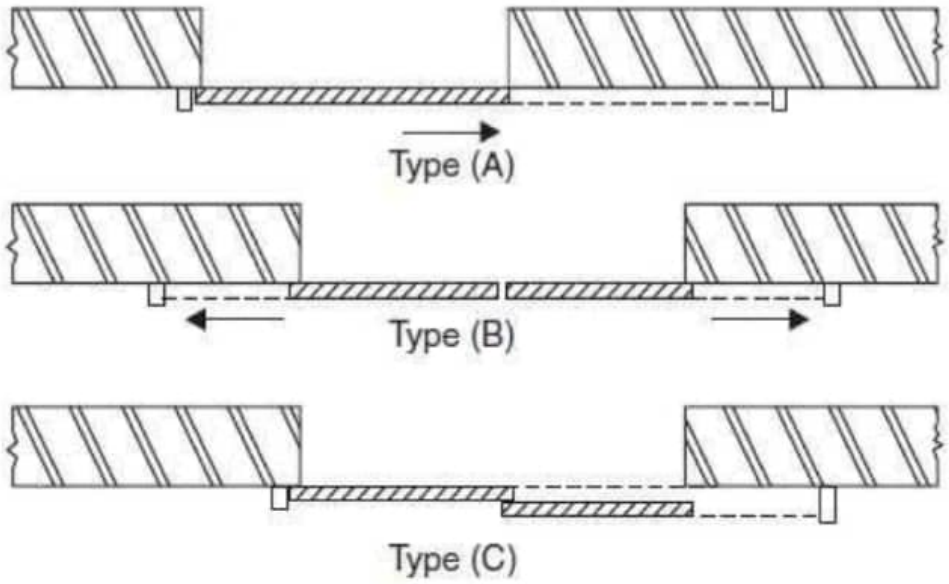


Fig. 8.28. Plan of sliding door

Collapsible Doors: Steel channels 16 to 20 mm wide are used as verticals. They are placed with 12 to 20 mmgap. Steel flats 16 mm to 20 mm wide and 5 mm thick are hinged to them

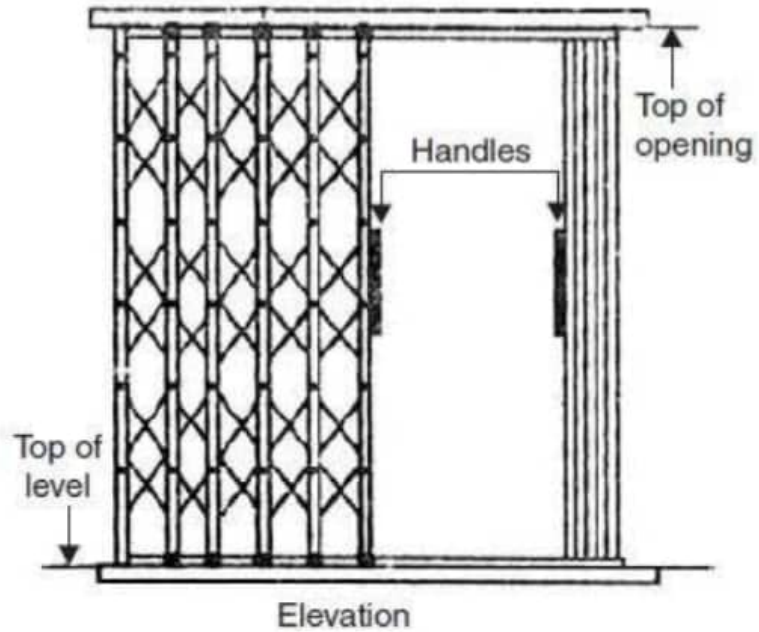


Fig. 8.29. Collapsible steel door

as shown in Fig. 8.29. The rollers are provided at their top as well as at bottom so that shutter can be pulledor pushed side ways with slight force. There may be single or double shutters. Usually these doors are used for additional safety. They are commonly used for front doors, bank locker rooms, school and college entrance doors.

Rolling Shutters: Figure 8.30 show a typical rolling shutter door. It consists of a frame, a drum and a shuttermade of thin steel plates. The width of the door may vary from 2 to 3 m. The shutter moves on steel guides provided on sides and can easily roll up. For this counterbalancing is made with helical springs on the drum. The shutter can be easily pulled down. This type of doors are commonly used as additional doors to shops, offices, banks, factory, buildings from the point of safety.

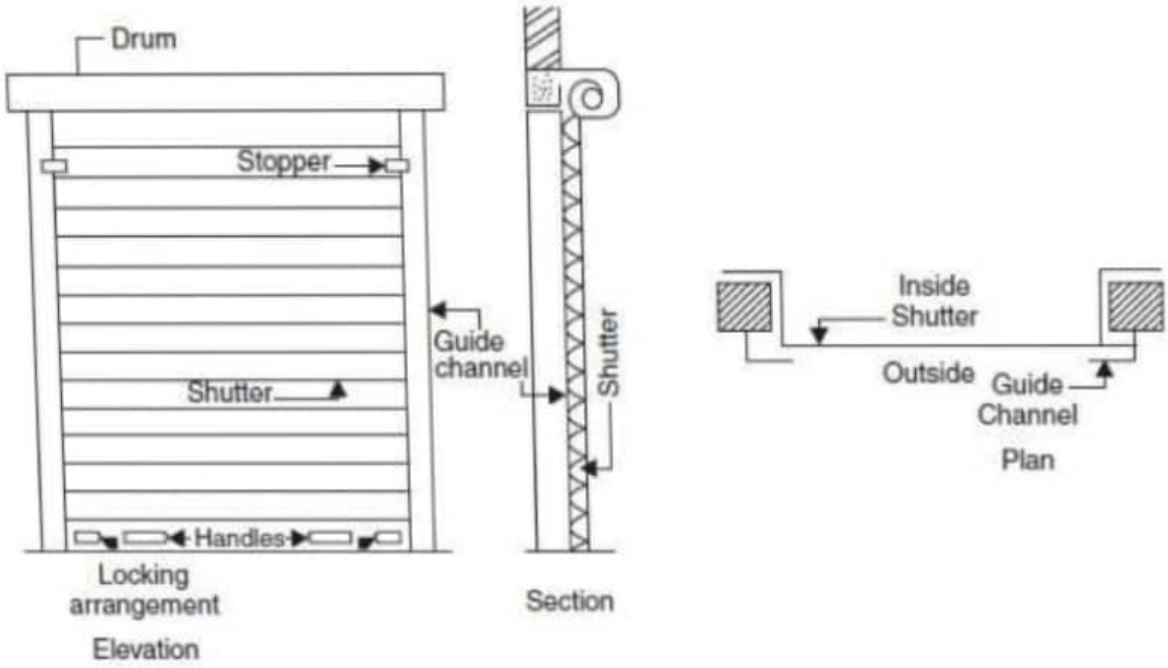


Fig. 8.30. Rolling shutter

Table 8.7 gives the differences between collapsible and revolving doors.

Table 8.7 gives the differences between collapsible and revolving doors.

Table 8.7. Difference between collapsible and revolving doors

S. No.	*Collapsible Doors*	*Revolving Doors*
1.	These doors do not provide privacy inside a room.	Provide privacy inside a room.
2.	These doors operate side ways.	These doors revolve
3.	These doors provide exit and entry from same side.	These doors provide exit from one side and entry from the other side
4.	These doors are not suitable for entry to air conditioned halls.	These doors are suitable for A.C. halls.
5.	These doors do not close automatically when not in use.	These doors close openings automatically when not in use.

Types of Windows

Various windows used may be classified on the basis of materials used, types of shutters, types of openingsof shutters and the position of windows.

Timber, steel and aluminium are commonly used to make window frames. Timber may get termite attacks,steel may rust but aluminium do not have any such defects. However they are costly. Shutters of windows may be panelled, glazed or louvered. Louvered windows are generally used for bathrooms and toilets where vision is not to be allowed but ventilation is required. Lower parts panelled andupper parts glazed windows are commonly used. Instead of panelled one may think of using translucent glasses. Figure 8.31 show a louvered windows.

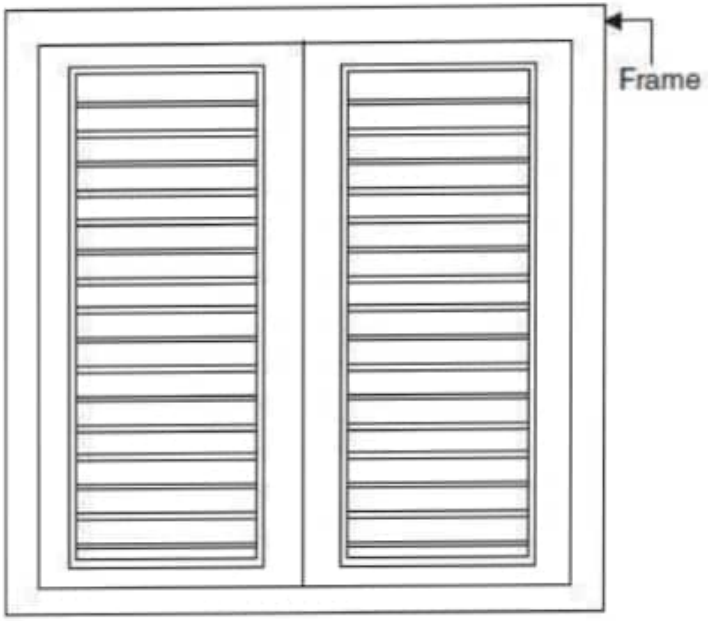


Fig. 8.31. Louvered window

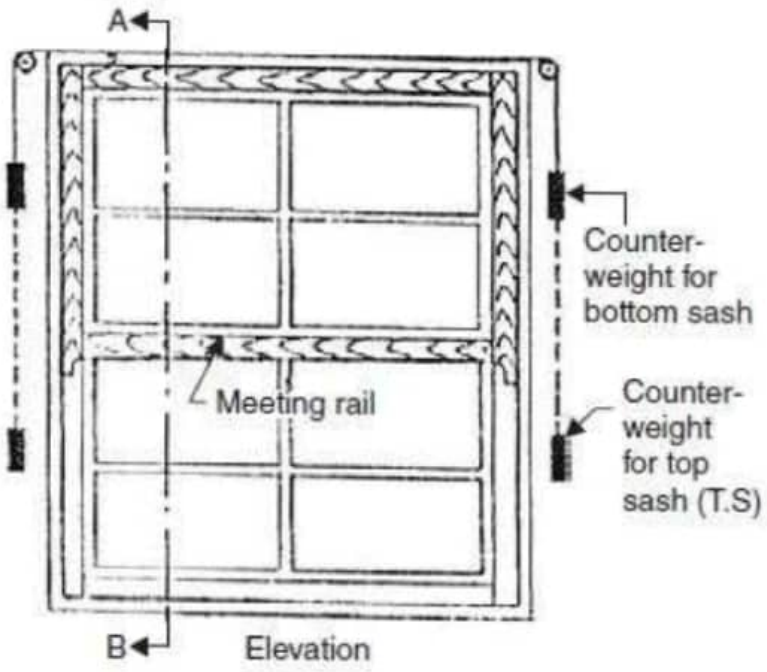


Fig. 8.32. Double hung window

Depending upon the position of windows, they may be classified as:

(a) Casement windows

(b) Bay windows

(c) Corner windows

(d) Clear storey windows

(e) Gable windows

(f) Sky light windows

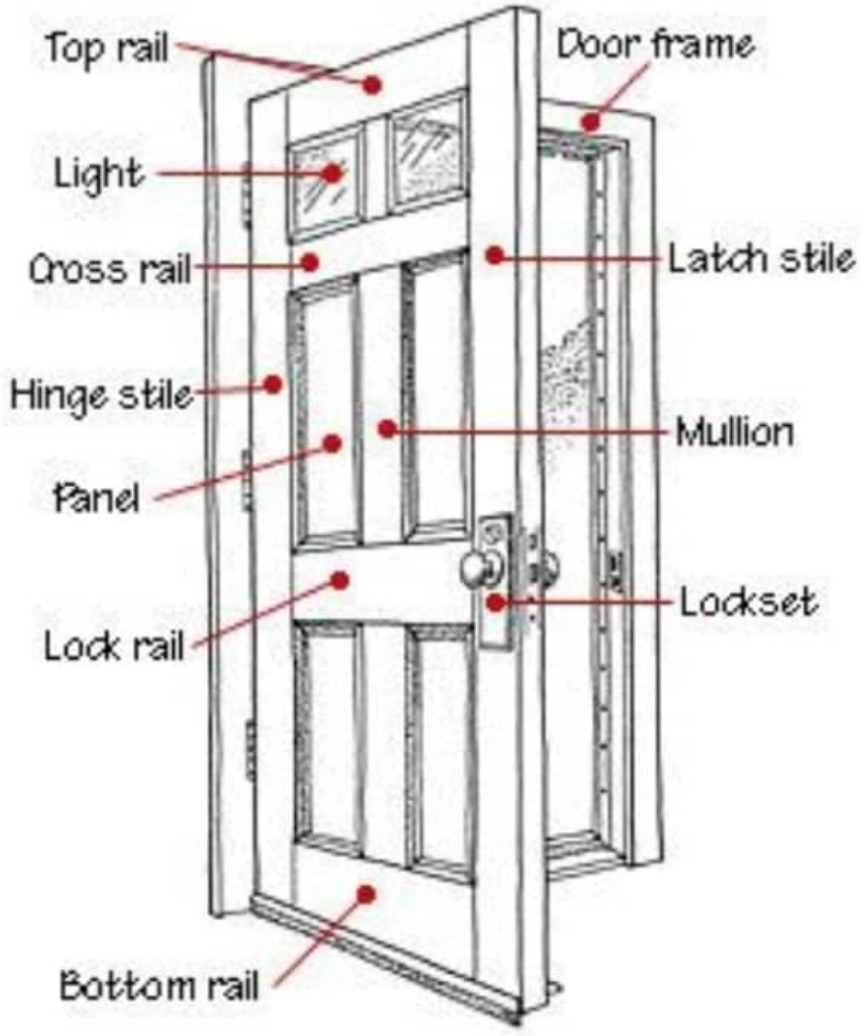
(g) Dormer windows

(h) Ventilators

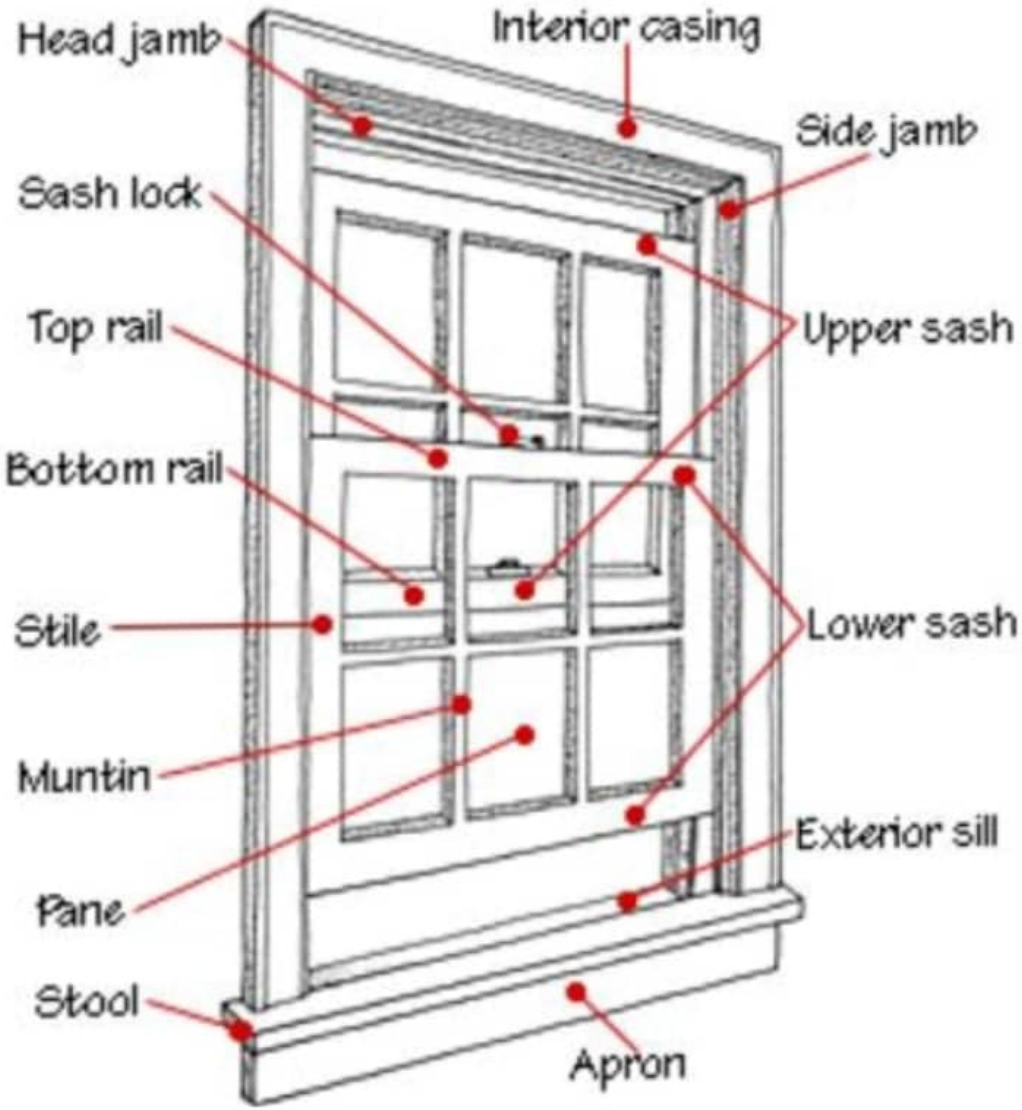
1. Casement windows are common type of windows, provided in the outer walls. They areprovided over 50 to 75 mm sill concrete at a height of 750 to 900 mm from floor level.
2. Bay windows are provided on the projected portion of walls.
3. Corner windows are provided in the corner of a room. They need heavy lintels. Corner post of window should be strong enough to take load due to deflection of lintel and impact load fromthe shutters.

4. Clear storey windows are provided when the height of the room is much more than adjacent room/varandah. It is provided between the gap of low height room and the top of roomwith greater height.
5. Gable windows are provided in the gable portion of the building. They are required in the stair casesor in the halls with gable walls.
6. Sky light windows are provided on a sloping roof. It projects above the top sloping surface.The common rafters are to be trimmed suitably.
7. Dormer windows are vertical windows on the sloping roof.
8. Ventilators are provided close to roof level or over the door frames. They help in pushing out exhaustair. They may be provided with two split and separated glasses or with hung shutters.

DRAWINGS to be Drawn on sheets and later to be practiced on AutoCAD: -



Drawing 1. Labelled Diagram of a Wooden Door



DRAWING 2: Labelled Drawing of a Wooden Window

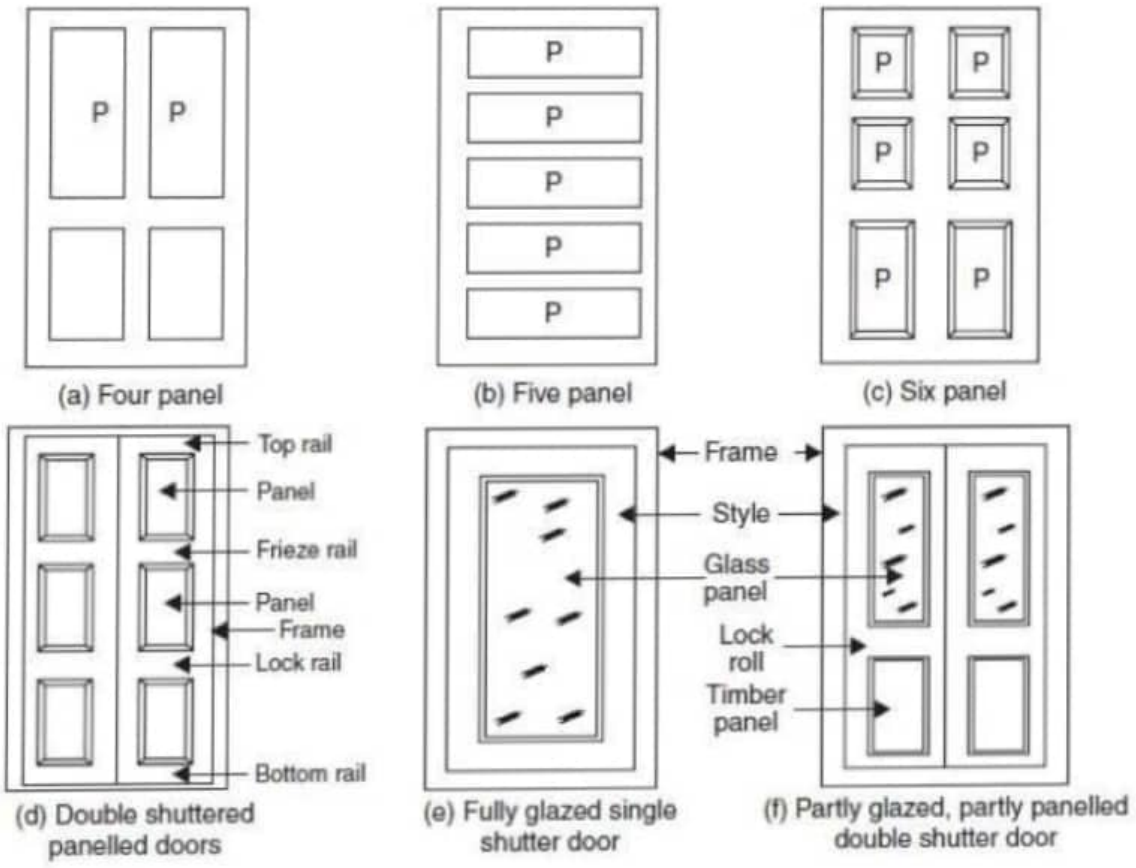
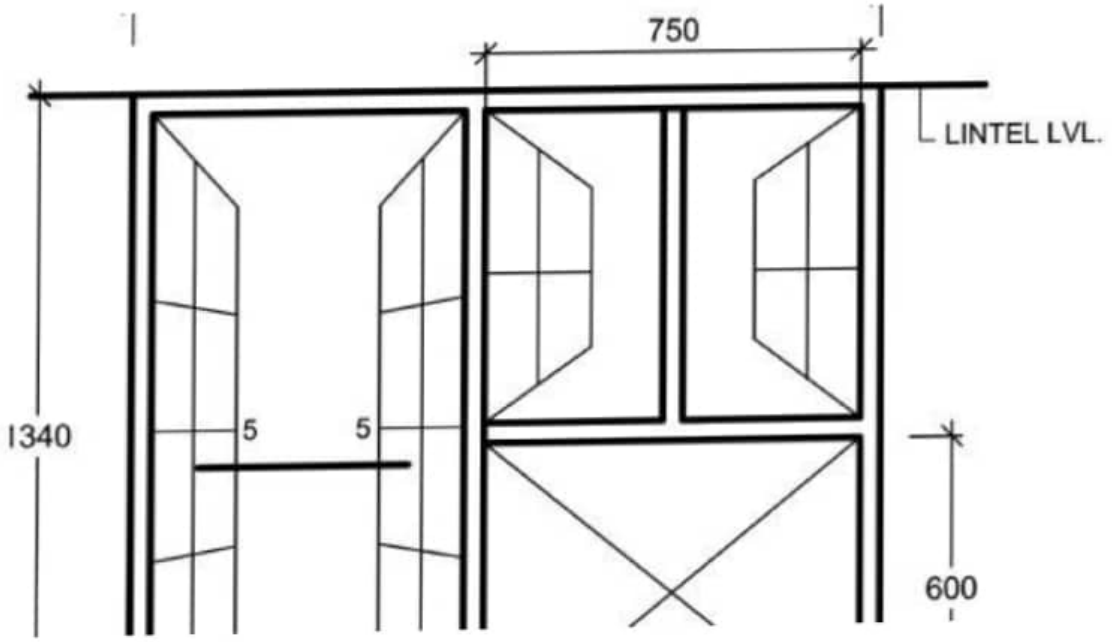
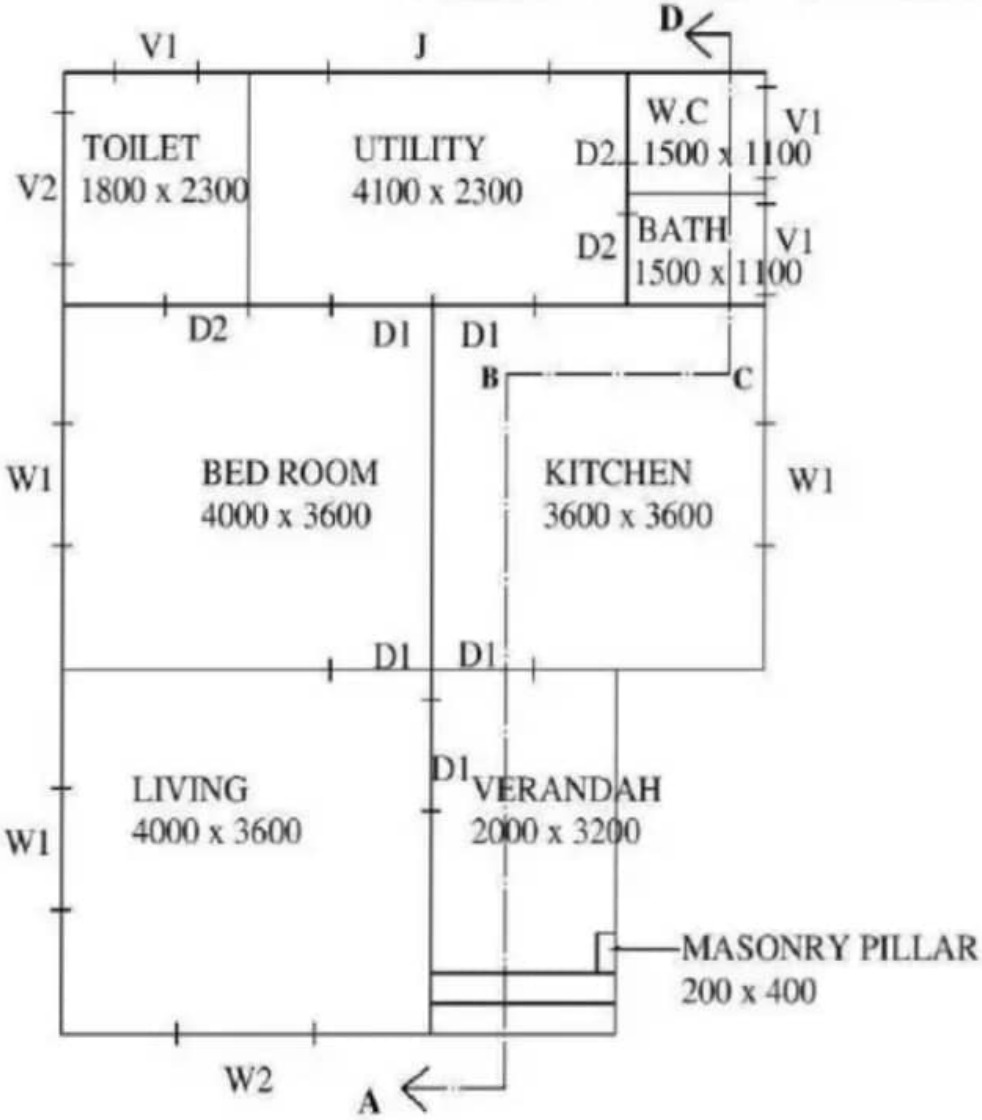


Fig. 8.23. Panelled and lazed doors

DRAWING 3: Labelled Drawings of various types of Doors.



DRAWING 4: Elevation of Door and



LINE PLAN

ALL DIMENSIONS ARE IN mm

REFERENCE

TYPE	DESCRIPTION	SIZE
D1	Panelled Door	1100x2100
D2	Panelled Door	900x2100
W1	Panelled Window	1200x1200
W2	Glazed Window	1500X1200
V1	Ventilator (glazed)	900x450
V2	Ventilator (glazed)	1500x450
J	R.C.Jolly	2400x1200
CB	Cup Board	300 depth
S	Shelf	200 depth
	Steps:	
	Rise	200
	Tread	300

Aim:

- To draw the Plan, elevation and Front elevation of a Single Storey Building

Theory and Scope:

A building that consists of a ground storey only. Basements are not counted as storeys in a building (see Appendix D). A separated part that consists of a ground storey only, with a roof to which access is only provided for repair or maintenance, may be treated as a single storey building.'

Procedure:

- The Units and limits have to be set for the drawing.
- The drawings has to be drawn using the draw commands and modify commands
- Annotation has to be done using dimensioning commands.

Diagram:

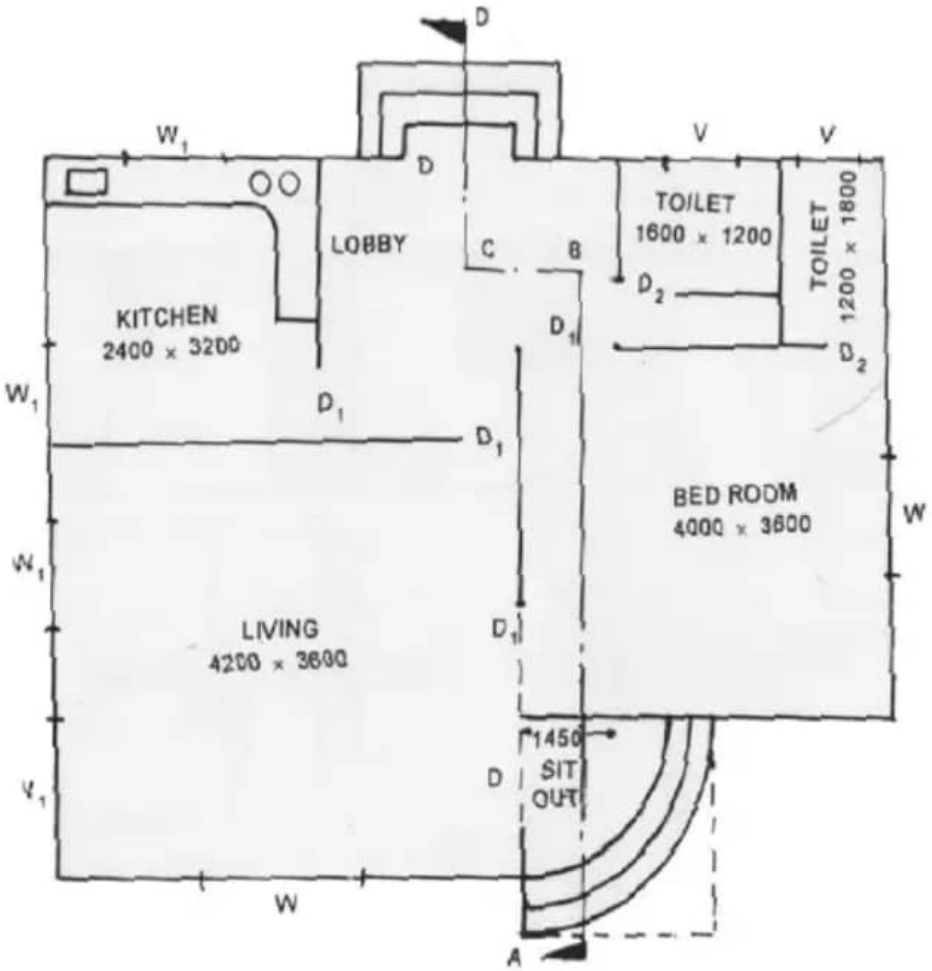
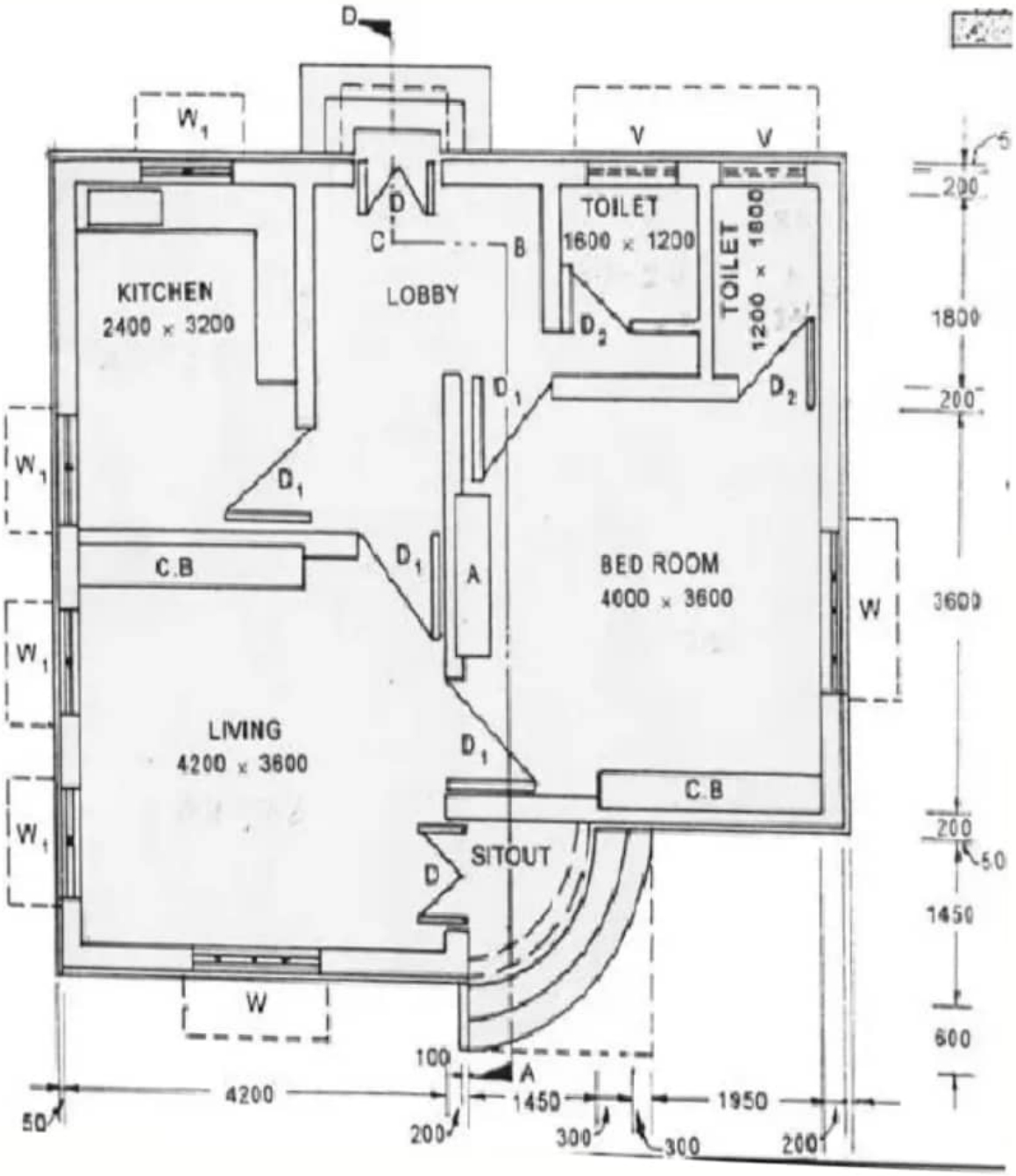
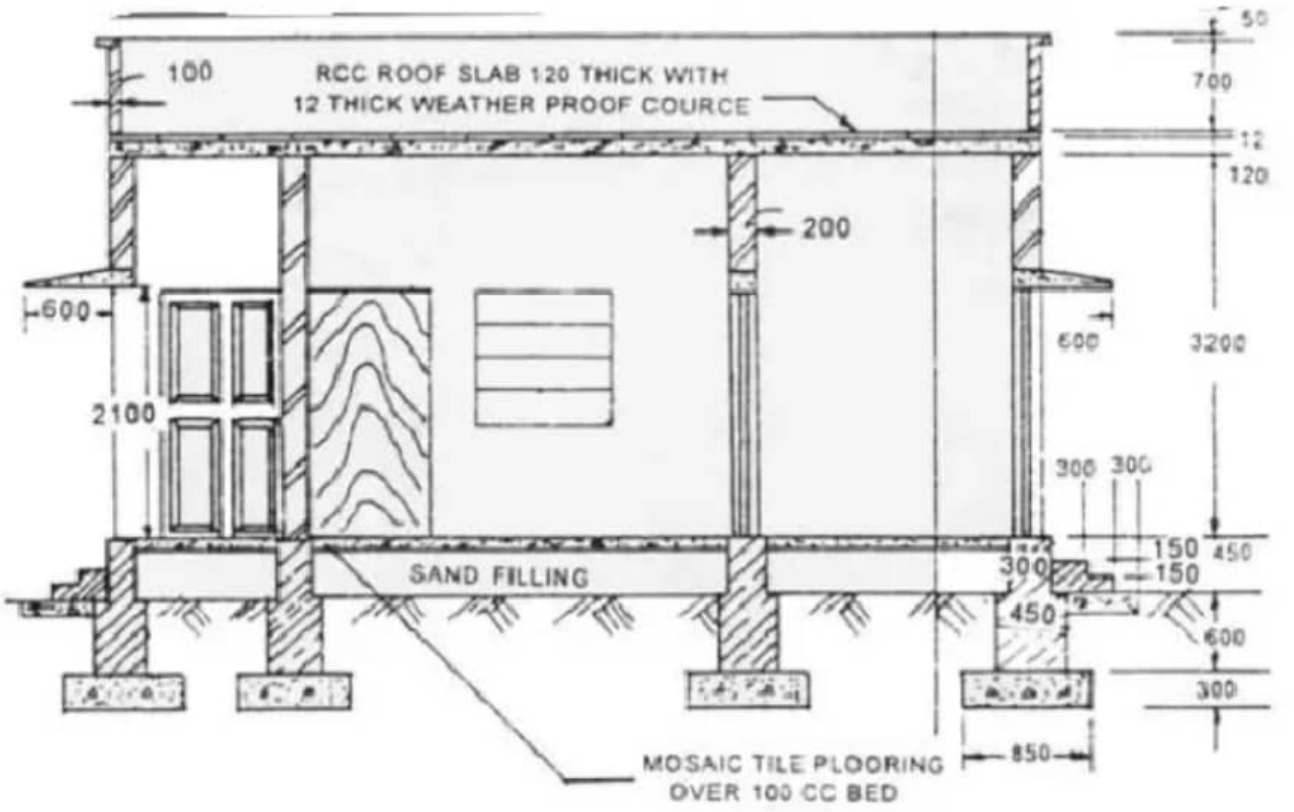
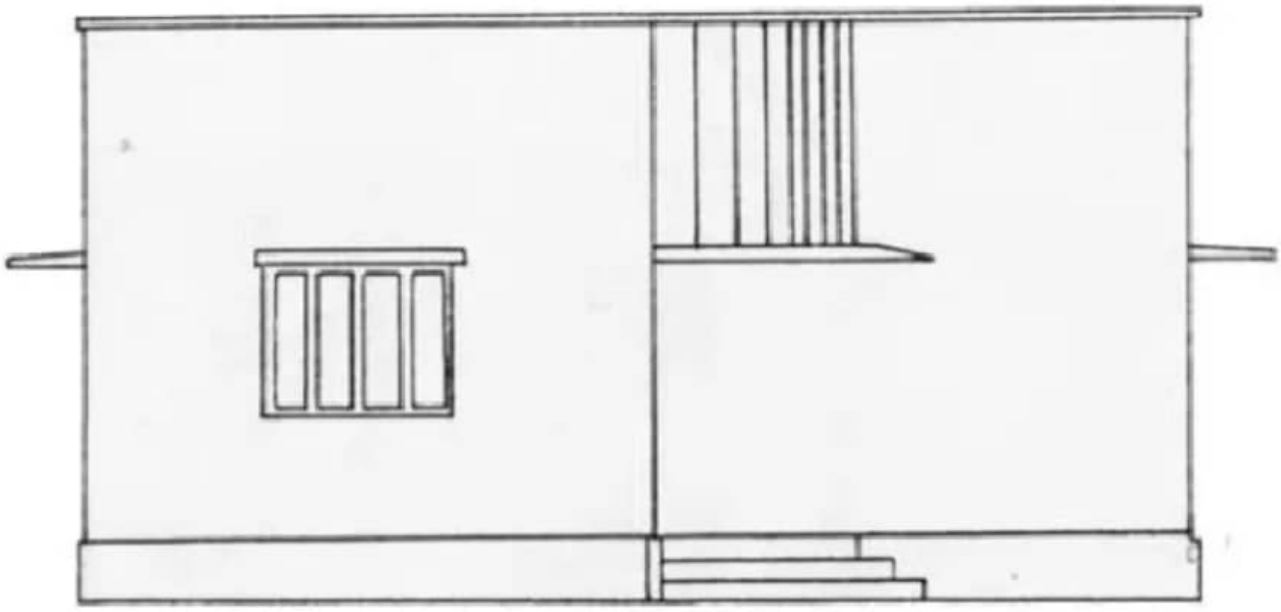


Figure: Line Diagram for Single Story Building



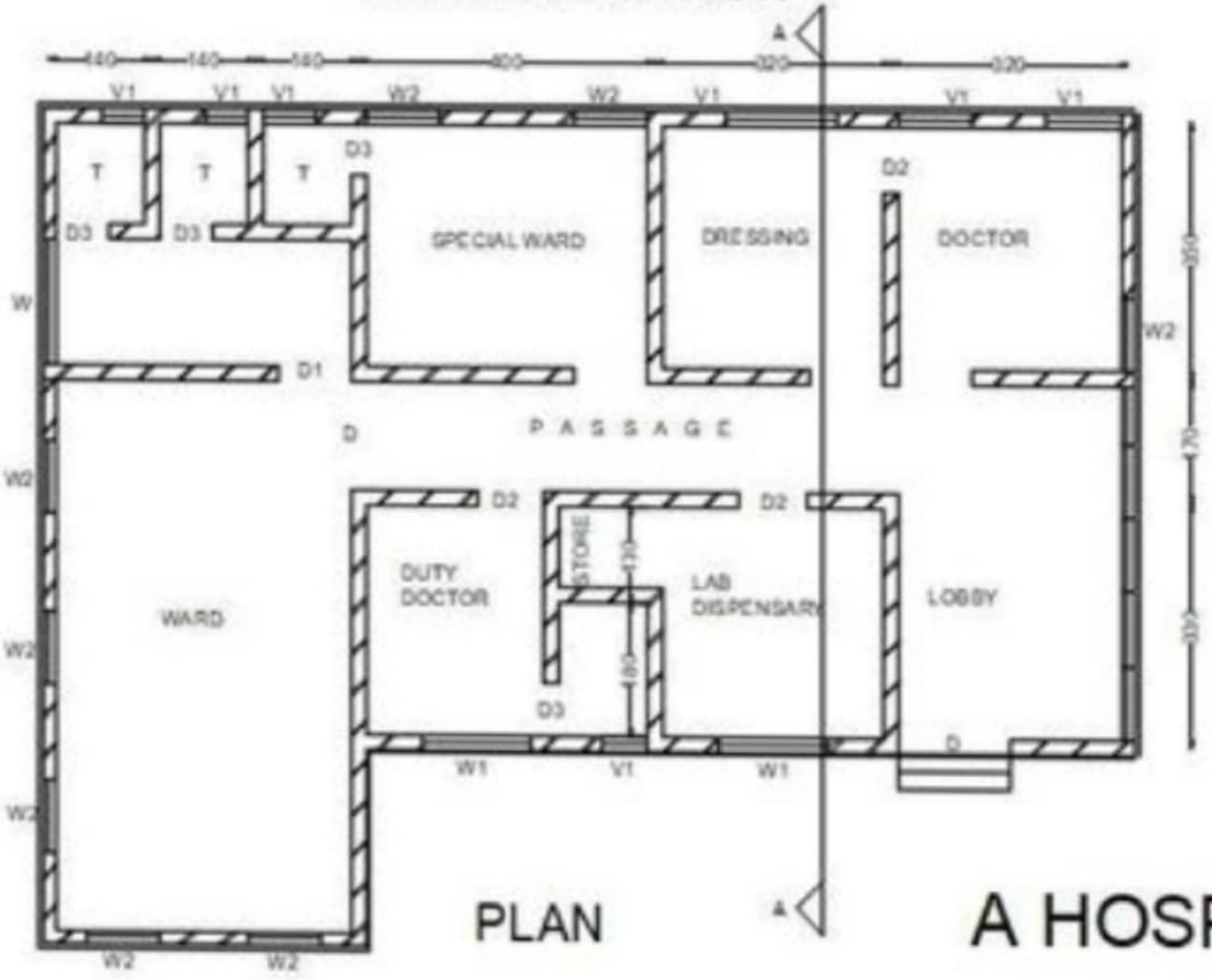


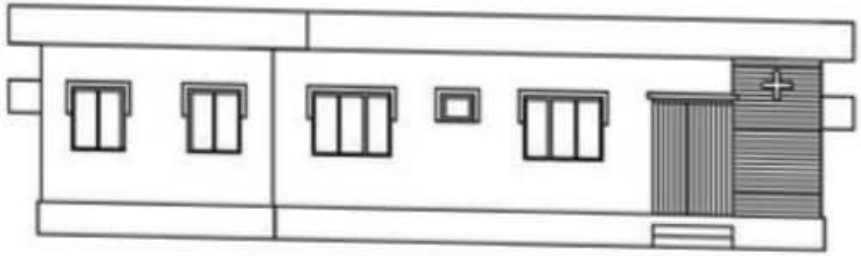
SECTION ALONG 'A B C D'



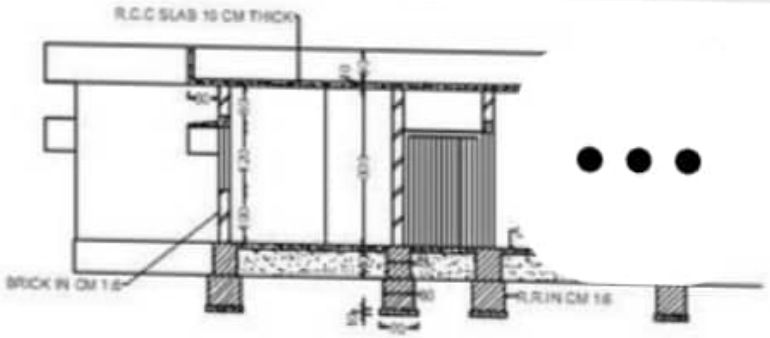
ELEVATION

SIDE ELEVATION

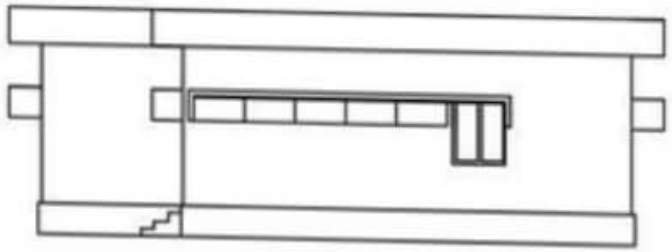




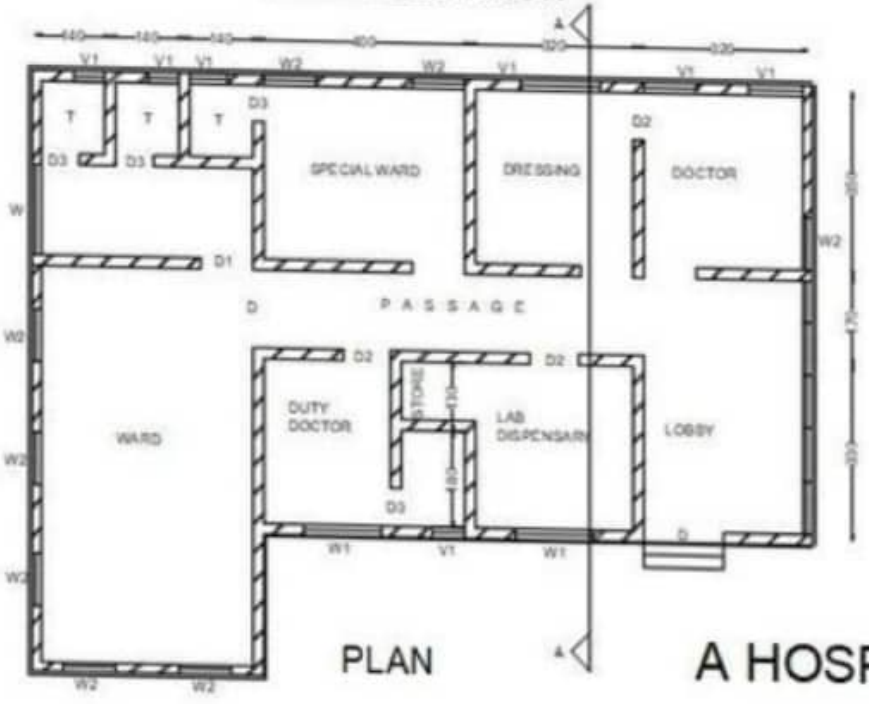
FRONT ELEVATION



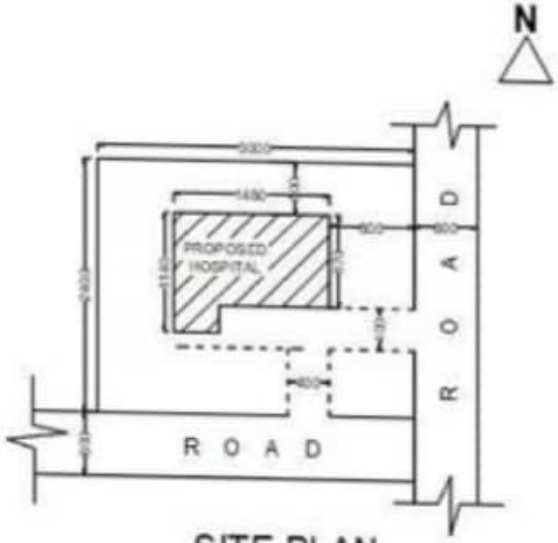
SECTION AA



SIDE ELEVATION



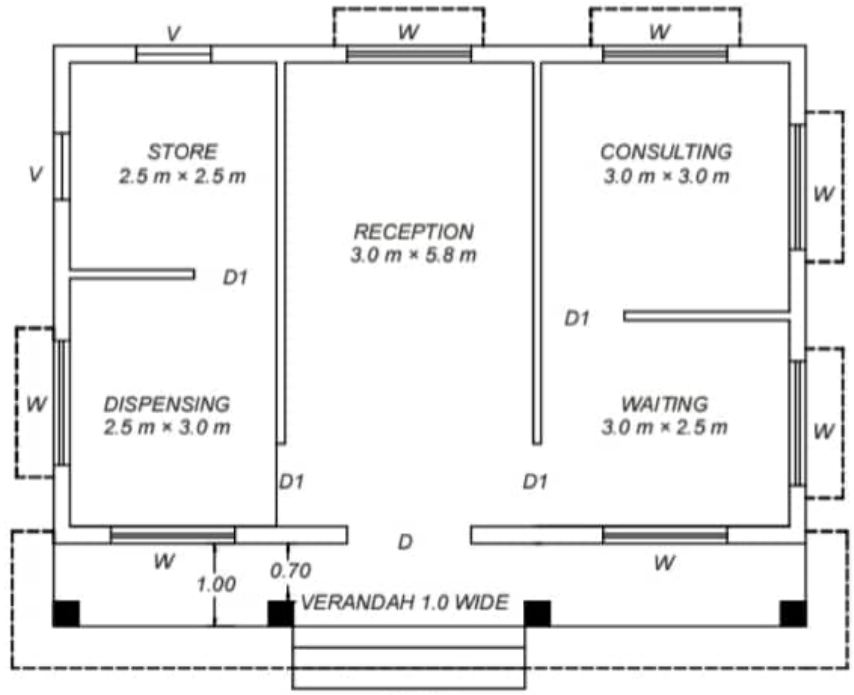
PLAN



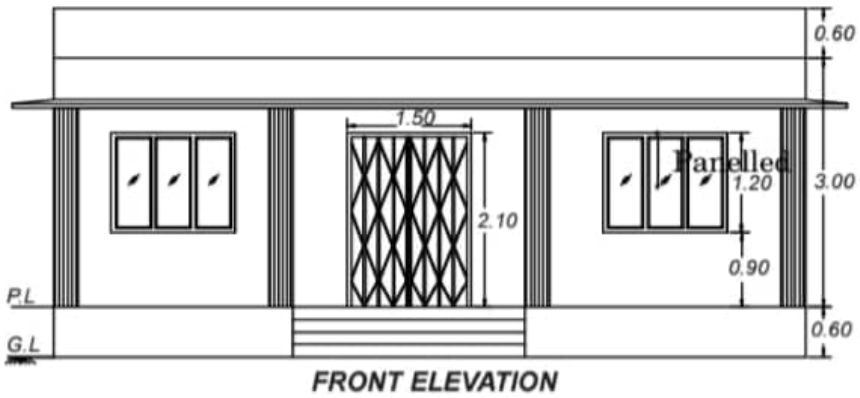
SITE PLAN

A HOSPITAL

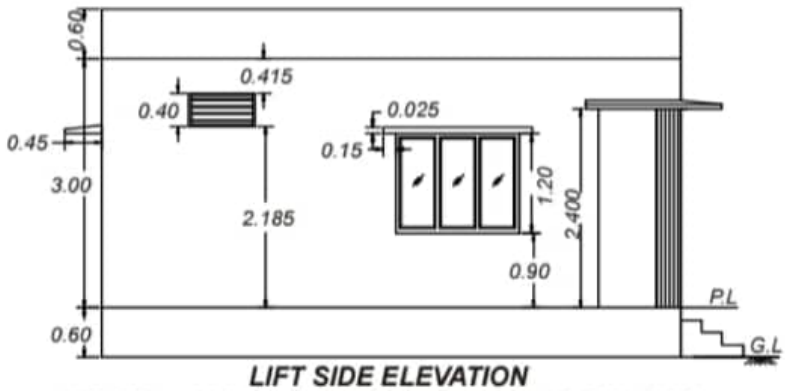
The doors are panelled and the windows and ventilators are glazed.



PLAN



FRONT ELEVATION



LIFT SIDE ELEVATION

PLAN, FRONT AND SIDE ELEVATION OF FIG. 1.36.