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→ Wooden partition wall : Made from wooden studs and pannels, these wall are durable and can be used to create decorative division.

→ Acoustic Partition wall : Made from sound absorbing material such as acoustic pannel and sound proofing material these wall are used to reduce noise level.

→ Modular Partition wall : Made from pre-fabricated modules these wall are easy to install and can be estamized to meet specific needs.

* Dry wall construction Structural glazing :

- A dry wall construction method use pannels made of gypsm woods or other material are attached to a metal or wood frame.

- Fast installation cause effective and provide a smooth surface for finishing.

- May not be suitable of load bearing application, prone to damage from moisture and impact.

* Structural glazing :

- A construction method that uses glass as a structural element, obtained in conjunction with metal frame.
- Provide sleek moderns appearances allow a natural life transmission and can be use for load bearing application.
- can be expensive required specialized labour and equipment may have thermal performance issues.

* Aluminium Paneling :

- A construction method that uses aluminium panels, often in conjunction with a metal frame.
- Provide a durable surface and can be used for exterior and interior application.

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- may be prone to dents and scratches.
require specialized labour and equipment
and can be expensive.

* Infill walls :-

- A construction method that uses a frame and fills it with material like glass, aluminium, masonry etc.
- provide a strong durable structure along for flexibility in design and can be used load bearing application.
- May be prone to water infiltration
require specialized labour and equipment
and can be expensive.

* Envelopes :-

- A construction method that refer to exterior shell of a building including walls, window and grooves.
- provide weather protection and can enhance the energy efficiency building appearance.

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- can be expensive required specialized labour and equipment and we have maintenance issue.

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Construction Techniques (code : CIV 303)

1) Describe the technical term with sketch used in stairs, Arches and openings.

Stairs :

A stair is a set of steps that connect two or more floors or levels in a building. It is a structural element that provides a safe and accessible means of vertical transportation between floors.

A stair typically consists of a series of horizontal steps (treads) and vertical risers that connect the treads. The stair may also include landings, which are flat areas that provide a resting place between flights of stairs.

Stairs can be made from a variety of materials including wood, steel, concrete and glass. They can also be designed in different styles, such as straight, curved, spiral or helical.

* Requirements of a good stairs :-

Stair is the means of vertical transportation between the floors. It should therefore be designed so as to provide easy, quick and safe mode of communication between the floors. Following are the general requirements which a stair should fulfill.

1. Location :-

- It should be located so as to provide easy access to occupant of the building.
- It should be so located that it is well lighted and ventilated directly from the exterior.
- It should be so located as to have approaches convenient and spacious.

2. Width of stairs :-

It should be wide enough to carry the user without much crowd or inconvenience. Width of stairs depends upon its location in the building and the type of the building itself. In a domestic building, a 90 cm wide stair is sufficient while in public building 1.5 to 1.8 m width may be required.

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3.4 Length of flight :

From comfort point view, the number of steps are not more than 12 and not less than 3.

4.4 pitch of stairs :

The pitch of the stairs should match with the french theory the labour of moving vertically is about twice that of moving horizontally, if the average human stride is taken as 23 inches.

5.4 Head Room :

The clear distance between the tread and soffit of the flight immediately above it should not be less than 2.0 to 2.2 m so that even a tall person can use the stair with some luggage on their head.

6.4 Balustrad :

Open well stair should always be provided with balustrade, to provide safety to the users. wide stair should have hand rail to both of sides.

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* Technical terms of stairs :

Shows the section of a stair technical terms associated with the design and construction of stair are define below :

↳ Structural Components :

I. Stringer :- The horizontal beam that supports the treads and risers.

II. Tread :- The horizontal surface of a step.

III. Riser :- The vertical surface between two treads.

IV. Newel post :- The vertical post that supports the handrail at the top and bottom of the stairs.

V. Baluster :- The vertical post that supports the handrail between newel posts.

↳ Stair configuration :

• Flight :- A series of steps between two landings.

• Landing :- A flat area between flights of stairs.

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- Winder : A step that is wider on one side than the other, used to change direction in a stair.
- Quarter-turn stair : A stair that turns 90 degree between flights.
- Half-turn stair : A stair that turns 180 degree between flights.

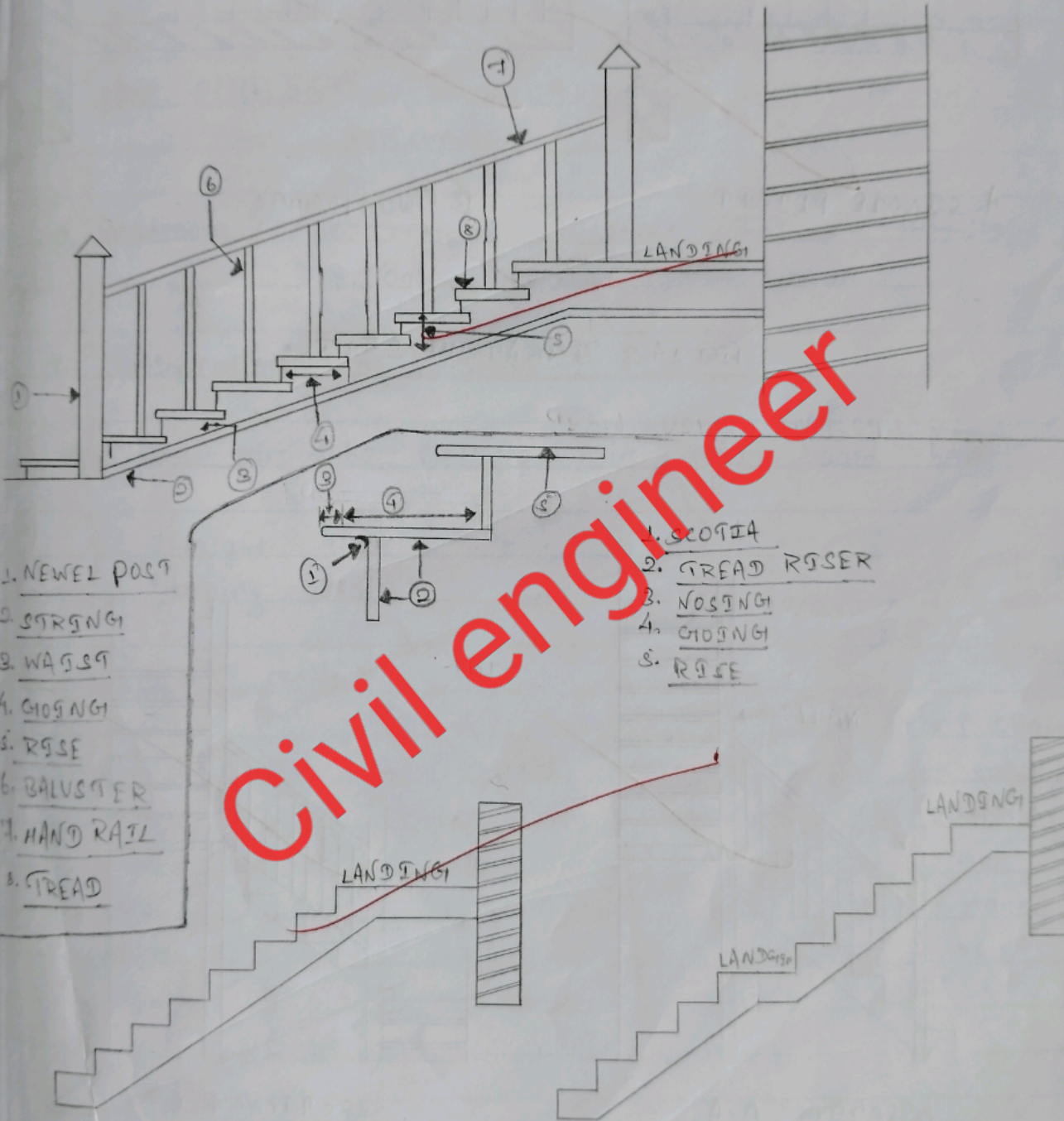
→ Handrail and Guardrail :

- Handrail : The railing that provides support and balance for users.
- Guardrail : The railing that prevents user from falling off the stairs.
- Balustrade : The assembly of balusters, handrail, and newel posts.

→ Others terms :

- Nosing : The rounded edge of a tread.
- Riser height : The vertical distance between two treads.

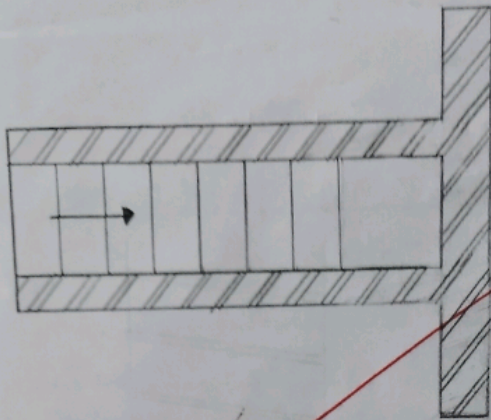
Fig: Terms Used in Stairs



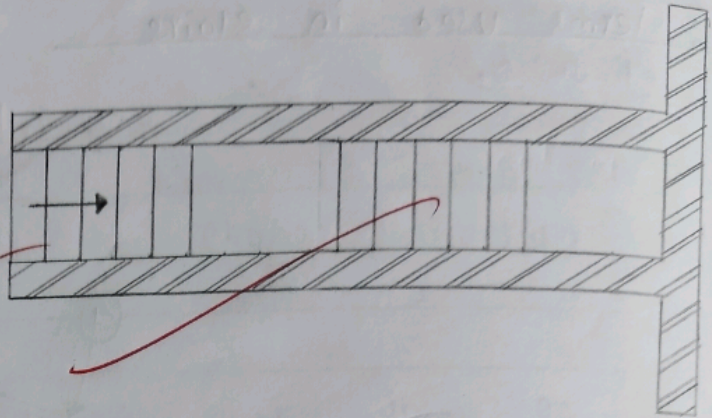
1. NEWEL POST
2. STRING
3. WASS
4. GOSING
5. ROSE
6. BALUSTER
7. HAND RAIL
8. TREAD

1. SCOTIA
2. TREAD ROSE
3. NOSING
4. GOSING
5. ROSE

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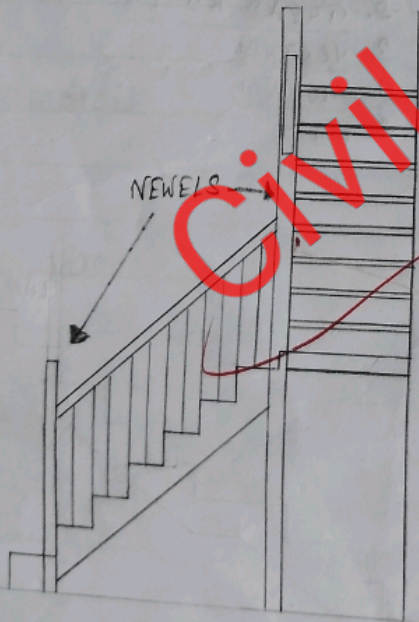


A. SINGLE FLIGHT

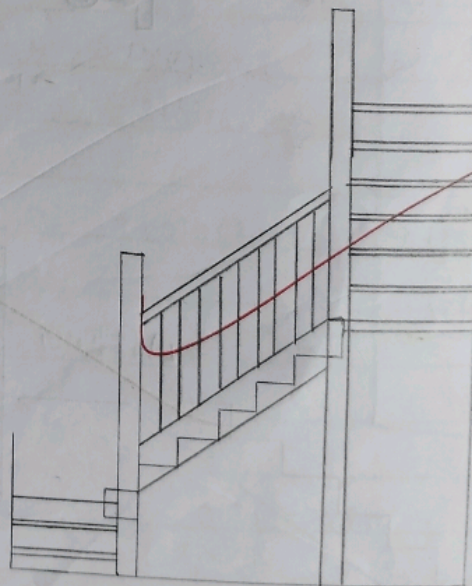


B. TWO FLIGHTS

FIG 14.3 STRAIGHT STAIRS



SECTIONS A-A



SECTIONS B-B

TURNING STAIRS

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- Tread depth :- The horizontal distance between two risers.
- Stair Pitch :- The angle between the stairs and the horizontal.
- Headroom :- The vertical distance between the stairs and any overhead obstruction.

* Classification of stairs :-

→ Stairs can be classified in two broad heads :-

- (i) Straight stairs
- (ii) Turning stairs

1. Straight stairs :-

In this type this stair runs straight between the two floors. It is used for small houses where there are restrictions in available width. The stair may consist of either one single flight or more than one flight (usually two) with a landing as shown in fig 14.8

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iv) Turning Stairs :-

A quarter turn stair is the one which changes its direction either to the left or to the right the turn being affected either by introducing a quarter space landing or by providing winders [fig :- 14-4].

* Types of stairs :-

i) Straight Stairs :-

A single straight flight of stairs

ii) L-shaped Stairs :-

Two flights of stairs that meet at a 90° angle.

iii) U-shaped Stairs :-

Two flights of stairs that meet at a 180° angle.

iv) Spiral Stairs :-

A curved flight of stairs that rotates around a central axis.

v) Helical Stairs :-

curved, spiral shape with continuous handrail.

iii) Half Turn Stairs :

Half turn stair is the one which has its direction reversed or changed for 180° . Such stairs are quite common. There may be three types :-

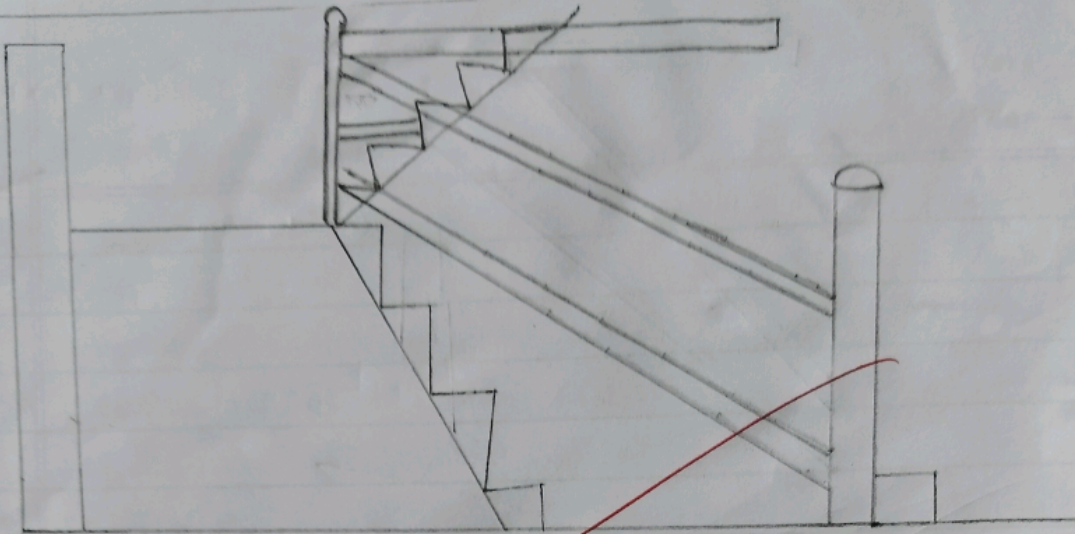
- a) Dog - lagged or newel half turn stairs.
- b) Open newel half turn stairs.
- c) Geometrical half turn stairs.

iv) Three Quarter Turn Stairs :

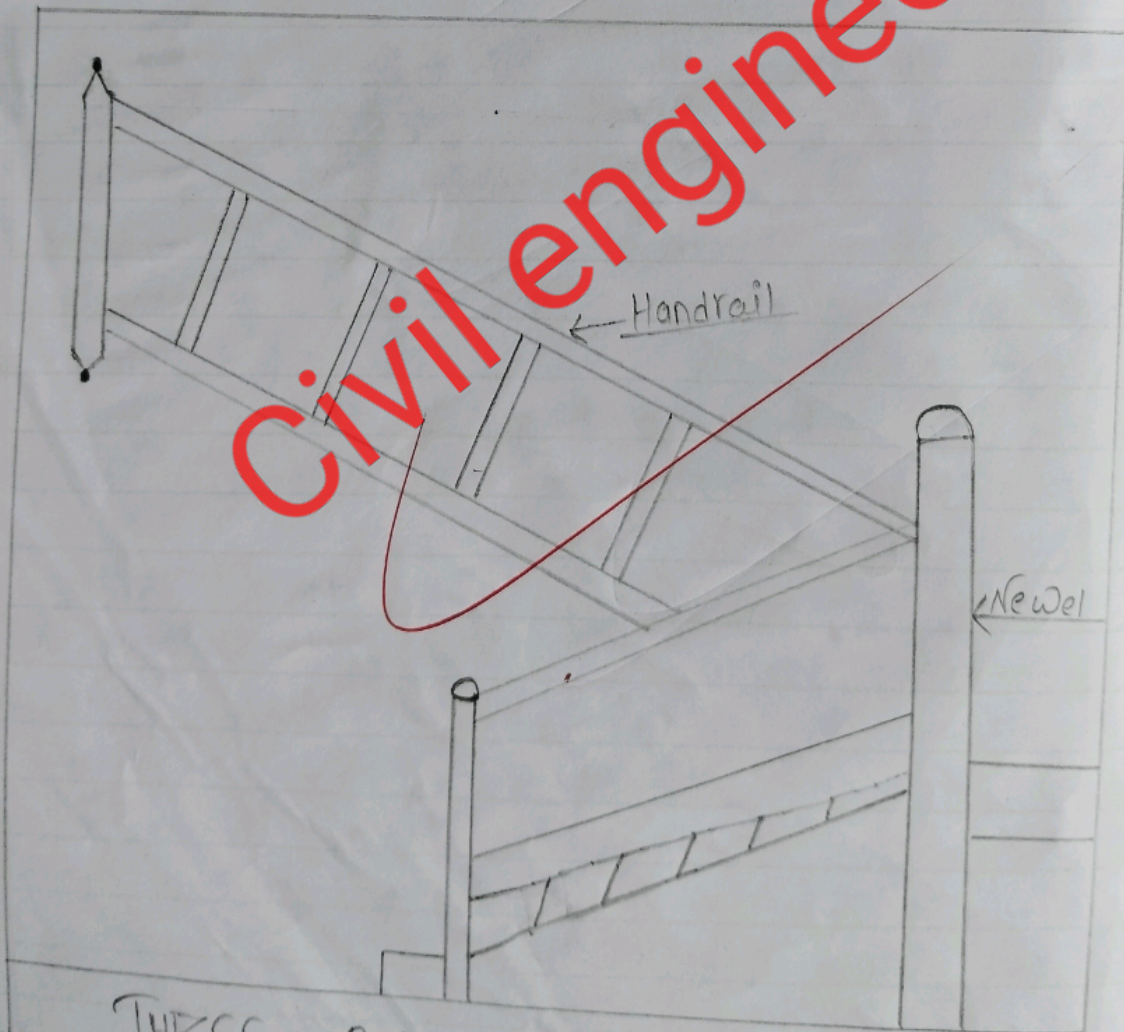
A three quarter turn stairs has its direction changed three times with its upper flight crossing the bottom one. It may either be newel type or open newel type. Such type of stair is used when the length of the stair room is limited and when the vertical distance between the two floors is quite large.

v) Bifurcated Stairs :

This type of stair is commonly used in public buildings at their entrance hall. The stair has a wider flight at the bottom which bifurcates into narrower flights, one turning to the left and the other to the right, at the landing.



HALF TURN STAIRS



THREE QUARTER TURN STAIRS

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Archives :

An arch is a structure constructed of wedge shaped units (bricks and stone) jointed together with mortar and spanning an opening to support the wall above it along with other superimposed loads. Due to wedge like form the units support each other the load tends to make them to transmit the pressure downwards to their support.

* The following technical terms used in arch works:-

i) Intrados : This is the inner curve of an arch.

ii) Soffit : It is the inner surface of an arch. Sometime intrados and soffit are used.

iii) Extrados : It is the outer curve of an arch.

iv) Voussoirs : These are wedge-shaped unit of masonry forming an arch.

v) Crown : It is the highest part of extrados.

vi) Key : It is the wedge-shaped unit fixed at the crown of the arch.

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- vii) Spandril : This is a curved - triangular space formed between the extrados and the horizontal line through the crown.
- viii) Skew back : This is the inclined or splayed surface on the abutment.
- ix) Springing Point : These are the points from which the curve of the arch springs.
- x) Springing line : It is an imaginary line joining the springing points of either end.
- xi) Springer : It is the first voussoir at springing level immediately adjacent to the skew back.
- xii) Abutment : This is the end support of an arch.
- xiii) Pier : This is an intermediate support of an arch.
- xiv) Arcade : It is a row of arches in continuation.
- xv) Hauch : It is the lower half of the arch between the crown and skew back.

- xvii) Ring :- It is a circular course forming an arch.
- xviii) Impost :- It is the projecting course at the upper part of a pier or abutment to stress the springing line.
- xix) Bed Joints :- These are the joints between the voussoirs which radiate from the centre.
- xx) Centre :- This is the geometrical centre point from where the arcs forming the extrados, arch rings and intrados are described or struck.
- xxi) Span :- It is the clear horizontal distance between the supports.
- xxii) Rise :- It is the clear vertical distance between the highest point on the intrados and the springing line.
- xxiii) Depth or height :- It is the perpendicular distance between the intrados and extrados.
- xxiv) Thickness (or breadth of soffit) :- This is the horizontal distance, measured perpendicular to the front and back faces of an arch.

*. Classification of Arches :-

- (i) Shape
- (ii) Number of centres
- (iii) Workmanship
- (iv) Materials of construction

a) Classification according to shape :

(i) Flat Arch :-

A flat arch usually the angle formed by skewbacks as base with horizontal thus forming an equilateral triangle with intrados as the base.

(ii) Segmental Arch :-

This is the common type of arch used for building. The centre of arch lies below the springing line. The thrust transferred to the abutment is in an inclined direction.

b) Classification according to Number of centres :-

(i) Two-centred arches :-

Pointed arches comes under this category. semi-elliptical arch and florentine

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iii) Semi-Circular Arch :

This is the modification of segmental arch in which the centre lies on the springing line. The shape of the arch curve is that of a semi-circle. The thrust transferred to the abutments is perfectly in vertical direction since the skew skewback is horizontal.

iv) Horse Shoe Arch :

The arch has the shape of a horse shoe, incorporating more than a semi-circle. Such type of arch is provided mainly from architectural considerations.

v) Pointed Arch :

This is also known as Gothic arch. It consists two arch of circle meeting at the apex. The triangle formed may be equilateral or isosceles in the latter case it is known as lancet arch.

vi) Venetian Arch :

This is another form of pointed arch which has deeper depth at crown than at springings. It has four centres, all located on the springing line.

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viii) Florentine Arch :-

This is similar to Venetian arch except that the intrados is a semicircle. The arch has thus three centres all located on the springing line.

viii) Relieving Arch :-

This arch is constructed either on a masonry arch or on a wooden lintel to provide greater strength. The ends of relieving arch should be carried sufficiently into the abutments. The relieving arch may be used to replace a decayed lintel without disturbing the stability of the structure.

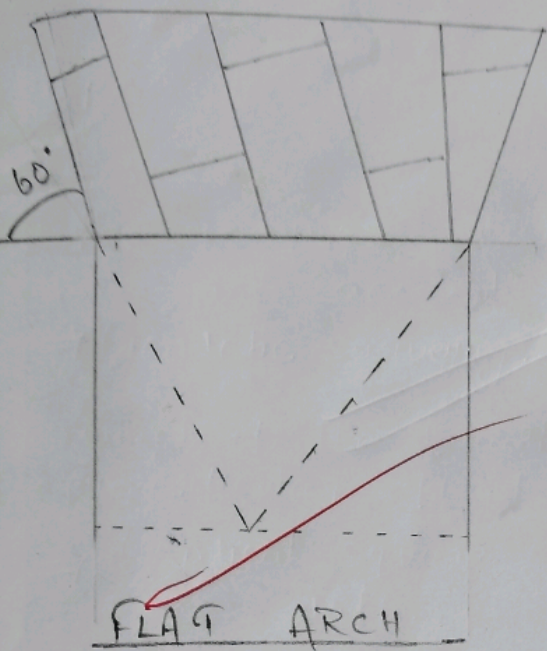
ix) Stilted Arch :-

It consists of a semi-circular arch with two vertical portions at the springings. The centre of the arch lies on the horizontal line through the tops of the vertical portions.

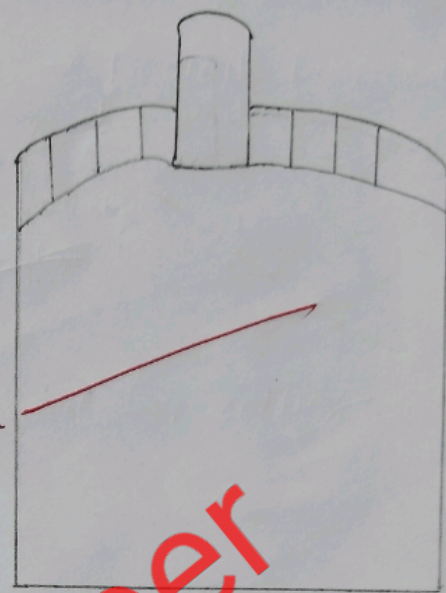
x) Semi-Elliptical Arch :-

The type of arch has the shape of a semi-ellipse and may have either three centres or five centres.

2.7



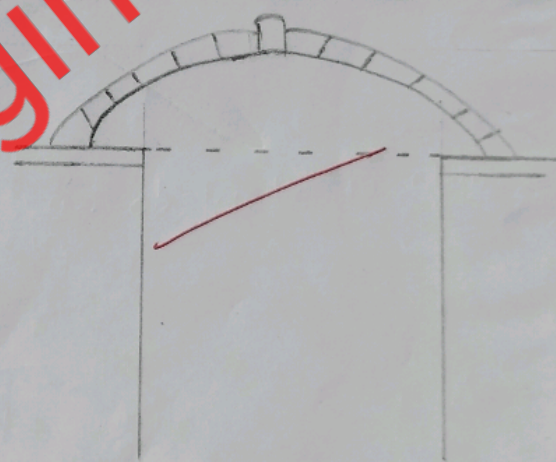
FLAG ARCH



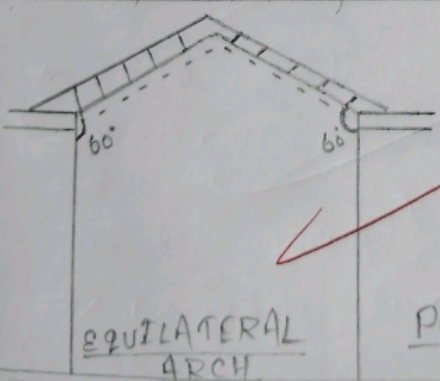
SEGMENTAL ARCH



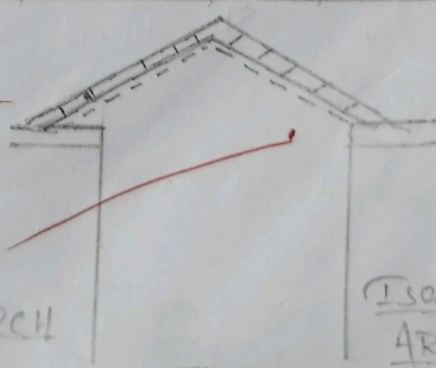
SEMI-CIRCULAR ARCH



HORSE SHOE ARCH



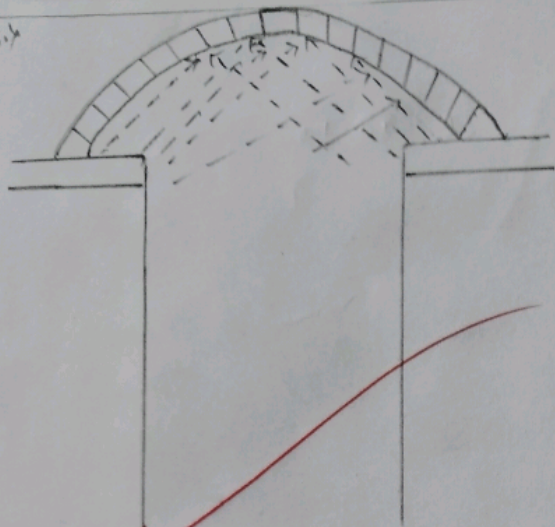
EQUILATERAL ARCH



POINTED ARCH

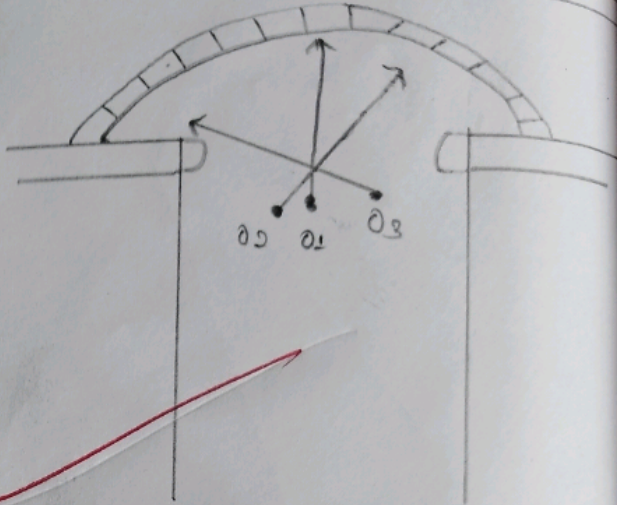
ISOSCELES ARCH

6.4



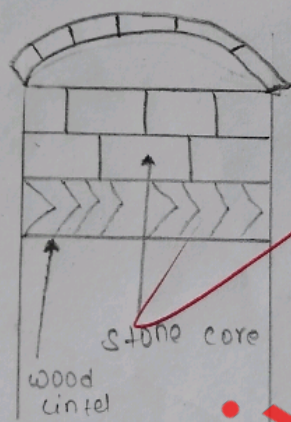
VENETIAN ARCH

7.4



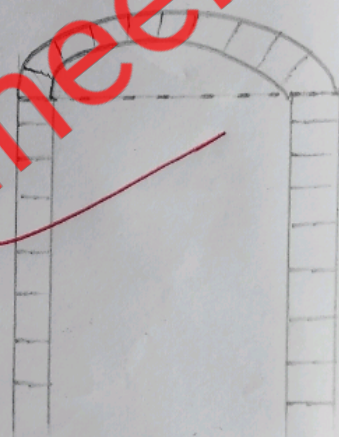
FLORENTINE ARCH

8.4



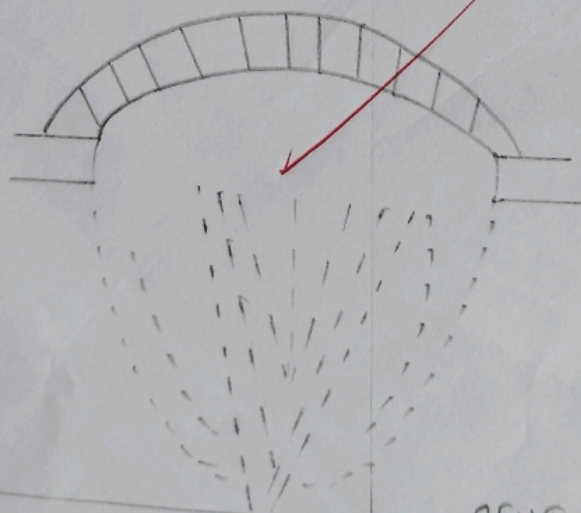
RELIEVING ARCH

9.4



STILTED ARCH

10.4



SEMI-ELLIPTICAL ARCH

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arch come under this category.

(iii) Three-centred arches :-

Elliptical arches come under this category.

(iii) Four-centred arch :-

It has four centres. Venetian arch is a typical example of this type. Another example are the Tudor arch.

(iv) Five-centred arch :-

This type of arch having five centres gives a good semi-elliptical.

c) Classification based on material and workmanship :-

On the basis of material of construction and workmanship, arches may be classified as follows :-

(i) Stone arches :-

(i) Rubber arch

(ii) Ashlar arch

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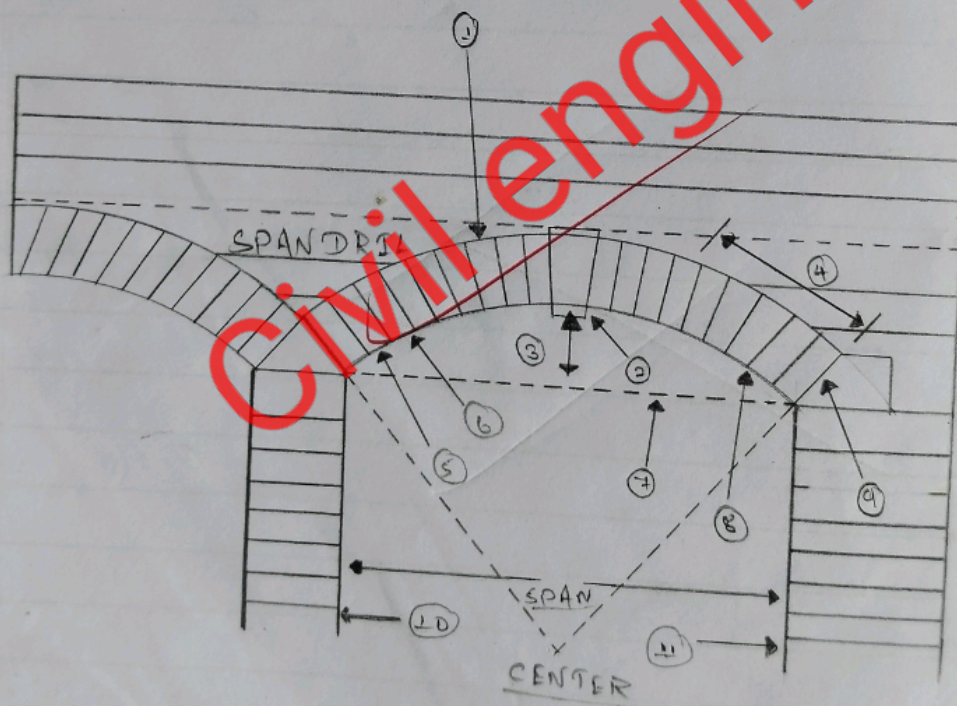
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1. Brick arches :-

- (i) Rough arch
- (ii) Axed or rough-cut arch
- (iii) Gauged arch
- (iv) Purpose made brick arch.

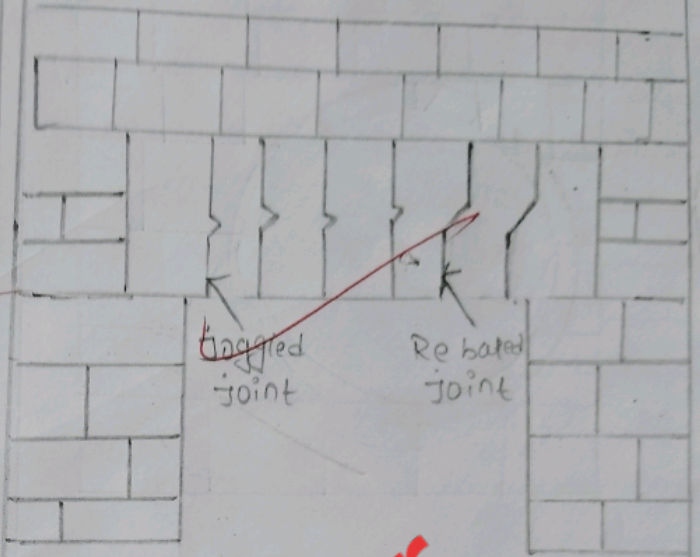
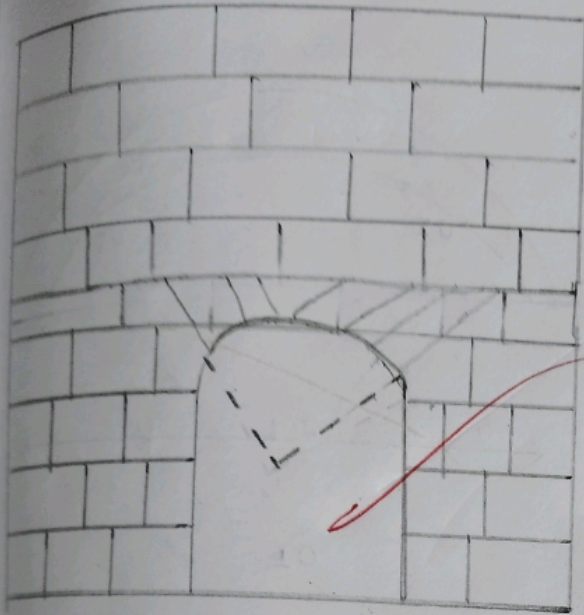
2. concrete arches :-

- (i) concrete block - unit arch
- (ii) Monolithic arch

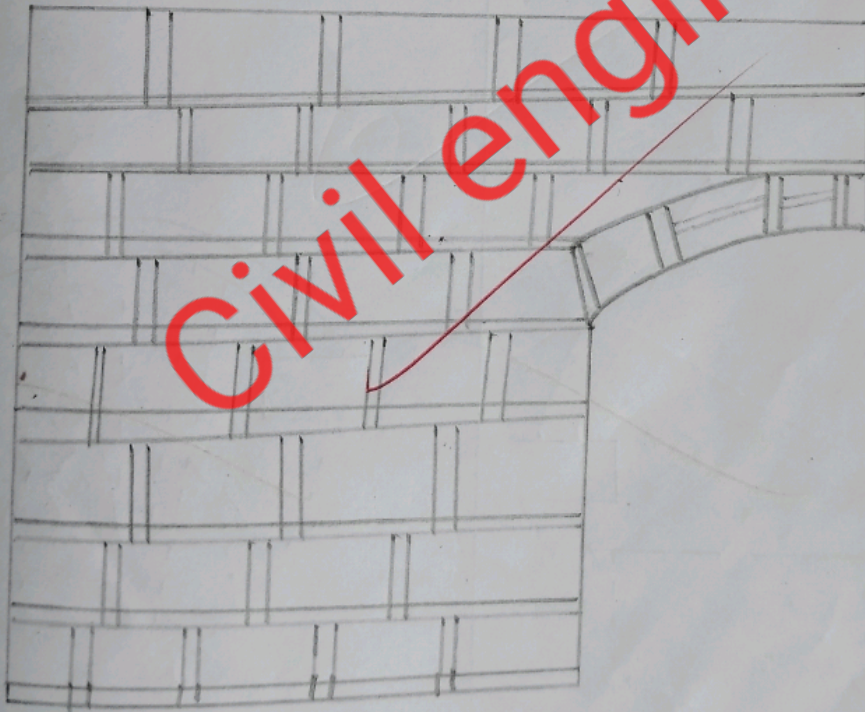


- 1. EXTRADOS
- 2. KEY
- 3. RISE
- 4. HAUNCH
- 5. SPRINGER
- 6. INTRADOS
- 7. SPRINGING LINE
- 8. VOSSOIRS
- 9. SKEWBACK
- 10. PIER
- 11. ABUTMENT

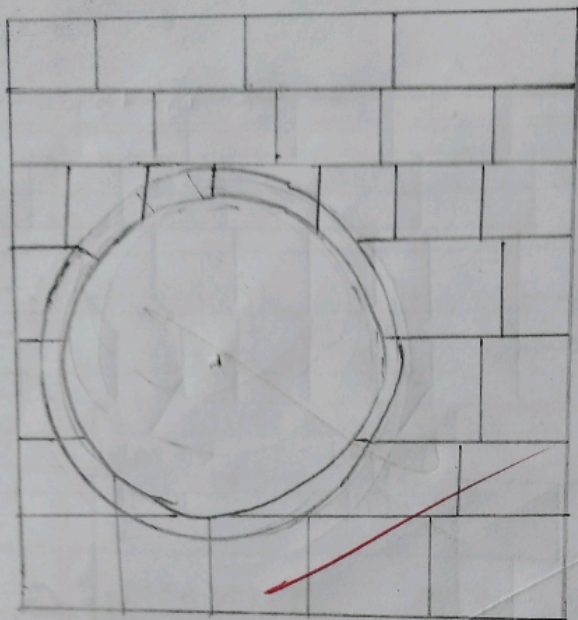
ELEMENT OF A SETTLEMENT ARCHES



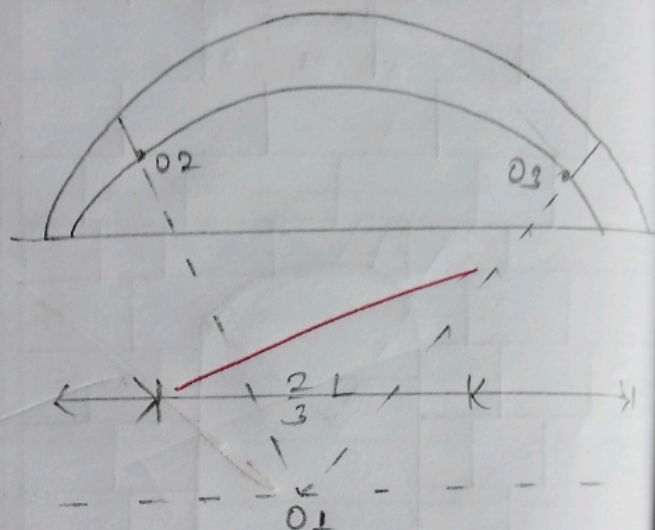
ASHLAR STONE ARCHES



BRICK ARCH



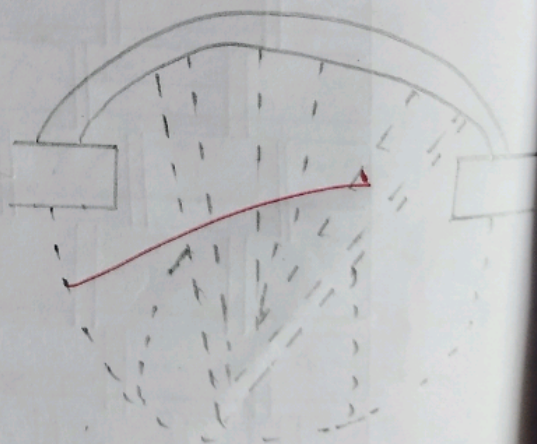
BLUE EYE ARCH



THREE CENTRED ARCH



FOUR CENTRED ARCH



FIVE CENTRED ARCH

Openings :-

Openings in architecture refer to gaps or voids in walls or structure to allow the passage of light, air or people. These openings are typically framed by certain elements. Below are the key technical terms associated with openings with a description of each :

* Technical term used in openings :-

(i) Lintel :-

A horizontal beam placed above an opening such as door or window to support the weight of the wall above. Lintel can be made of stone, concrete, steel or wood.

(ii) Sill :-

The bottom horizontal part of the frame of a window or door. It sits at the bottom of the opening and helps to direct water away from the interior.

(iii) Casting :-

A move involving the king and a rook, providing safety for the king and connecting the rooks. eg :- Kingside, casting.

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(iv) Pawn structure :-

Refers to the arrangement of pawns on the board and how they affect the position. A solid pawn structure is key in the opening.

(v) Opening Variants :-

Specific lines or sequences of moves within a particular opening.

(vi) Tempo :-

A measure of time gained or lost in an opening, gaining tempo means moving a piece more than once to improve position.

(vii) Tactics :-

Short term maneuvers aimed at gaining an advantage in the opening such as forks, pins and skewers.

* Types of openings :-

(i) Door opening

(ii) Window opening

Fig: Double hung windows

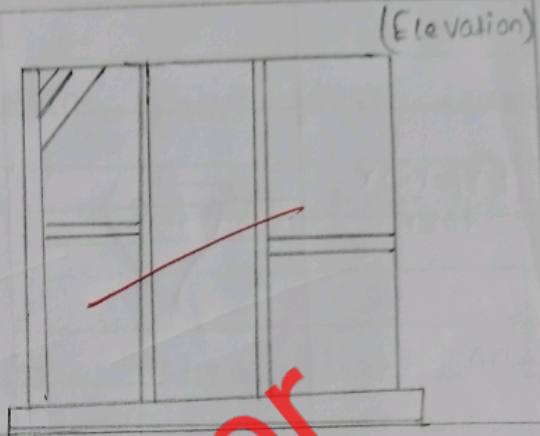
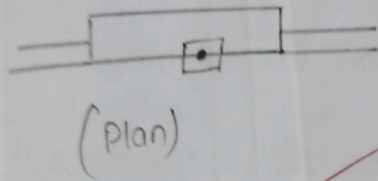


Fig: Corement windows

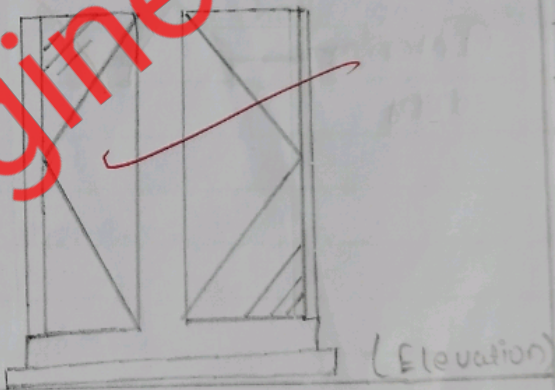
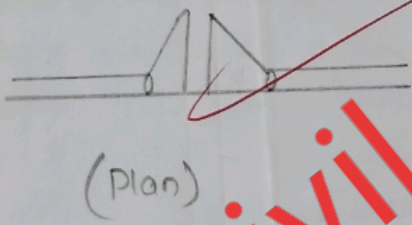
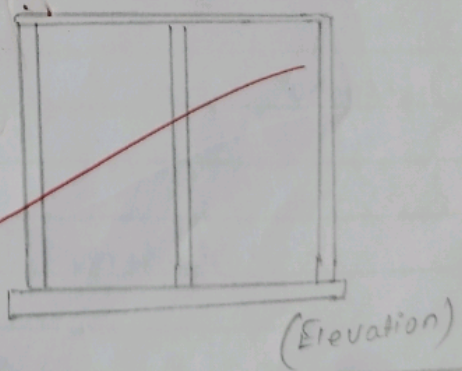
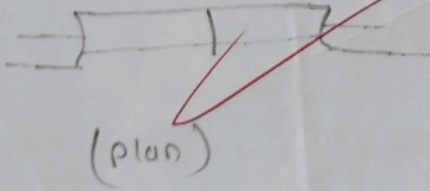


Fig: Sider



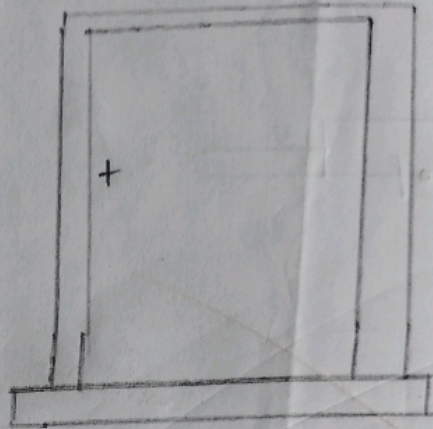
→ Above door, windows (Opening)
→ Made of concrete

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Exterior
door



Interior
door



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(i) Door opening :

Entrance point with door frame.

• Sketch : Rectangular frame with door swing indicated.

(ii) Window opening :

Opening for natural light and ventilation.

• Sketch : Rectangular frame with sill, head and Jamb.

* Component of Penings :

i. Head : Top horizontal member.

ii. Sill : Bottom horizontal member.

iii. Jamb : Vertical member on sides.

iv. Threshold : Bottom member of door opening.

↳ Sun breaks : horizontal or vertical.

↳ Canopies : → roof structure
→ above door, windows (opening)

→ made of concrete

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Q. Describe the purpose of ventilation and air pattern in buildings :

* Ventilation :

Ventilation may be defined as supply of fresh outside air into an enclosed space or the removal of inside air from the enclosed space. In other words Ventilation is the removal of all vitiated air from a building and its replacement with fresh air.

* Ventilation is necessary for the following reasons :

- (i) creation of air movement.
- (ii) Prevention of undue accumulation of carbon dioxide.
- (iii) Prevention of flammable concentration of gas vapour.
- (iv) Prevention of accumulation of dust and bacteria carrying particles.
- (v) Removal of smoke, odour and foul smell generated.

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(vi) Removal of heat generated by the occupants.

* Purpose of ventilation :

i. Air Quality Improvement :

Ventilation removes indoor air pollutants (such as carbon dioxide, volatile organic compounds and other contaminants) and replenishes the indoor air with fresh outdoor air, ensuring healthy indoor air quality.

ii. Moisture Control :-

It helps controls humidity levels preventing the build up of moisture that could lead to mold, mildew and other water-related damage.

iii. Odor Removal :-

It helps removes unpleasant odors from indoor spaces such as those from cooking, cleaning products or body odors.

iv. Temperature Regulation :

Ventilation can contribute to maintaining a comfortable indoor temp. by allowing for heat exchange between indoor and outdoor air.

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* Purpose of Air Pattern :

The purpose of air to manage patterns in building is to manage and control the movement and flow of air within indoor spaces, insuring comfort, health and efficiency.

(i) Thermal Comfort :

Proper air patterns hot distribute air evenly avoiding hot or cold spots in a room and insuring that temperature levels are consistant and comfortable for occupants.

(ii) Air Quality control :

Effective air movement insure the even distribution of fresh air and the removal of contaminants, odors and pollutants. It helps prevent the accumulation of carbon dioxide or harmful particles in stagnant areas.

(iii) Moisture control :

Correct air pattern can help prevent excess moisture accumulation in certain areas reducing the risk of mold growth, condensation or water damage by promoting better airflow.