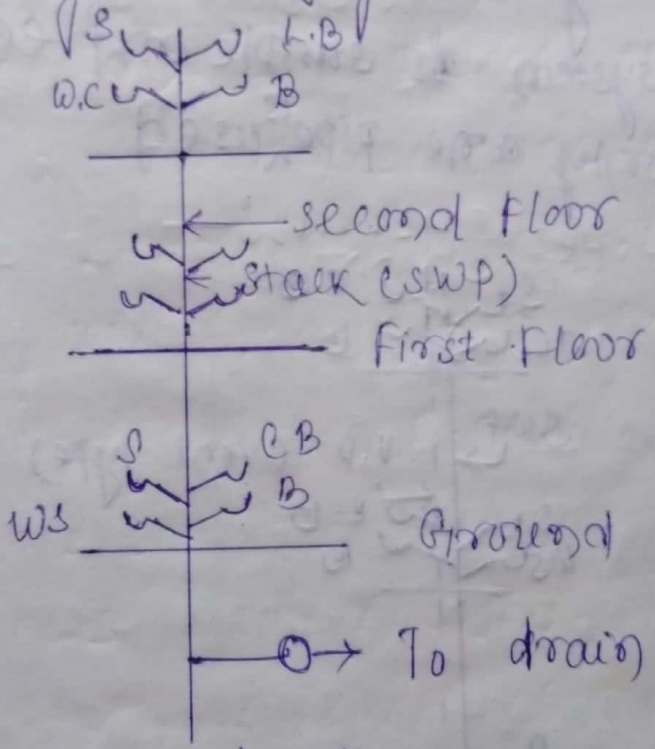
PART C

BUILDING SERVICES

(1) Sanitation :- Soil & Waste water installation in high rise buildings :-

There are four principal system of plumbing for drainage of Buildings

(i) single stack system
(ii) one pipe system
(iii) partially ventilated single stack system and
(iv) Two pipe system
(v) single stack system



W.C = Water closet
B = Basin
L.B = Lavatory Basin
S.W.P = soil pipe & wastewater
M.H = Man hole

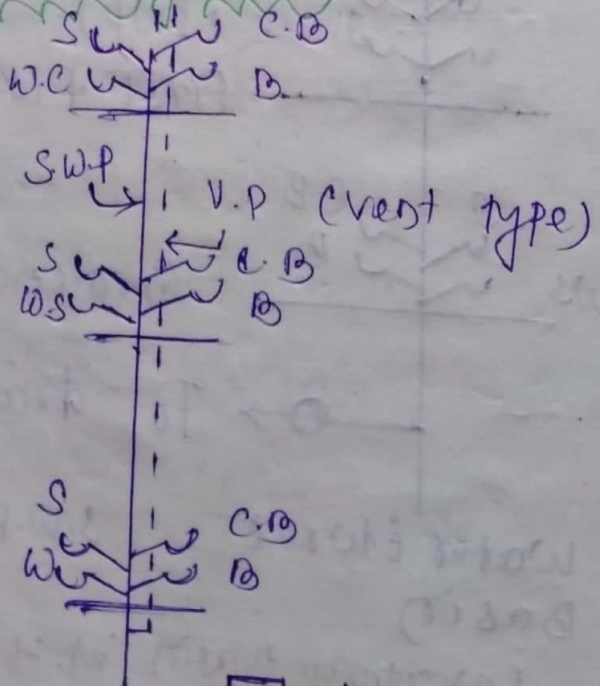
→ This is the simplest system in which the waste matter from baths, sinks etc as well as foul matter from the W.C are discharged in one single pipe, called the soil & waste pipe (S.W.P). This pipe terminates as vent pipe at its top and no separate vent pipe is provided.

→ The single stock system is effective only if the traps are filled width water seal of depth not less than 75 mm.

→ Gully traps and waste pipes are completely dispersed with.

→ The system is simple and economical since only one pipe is used

② One pipe system:—

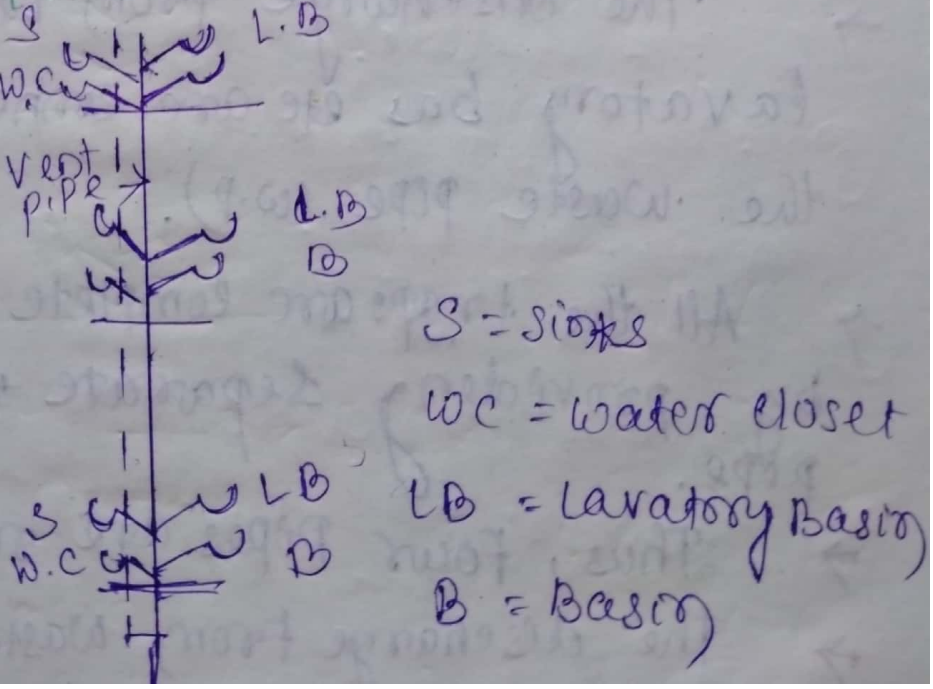


→ In this system, a separate vent pipe is provided, & the traps of all water closets, basins etc are completly ventilated.

→ In a multistoreyed buildings the lavatory blocks of different floors are situated one above the other so that waste water discharged from various units at different floors can be carried through common soil (or) waste pipe (S.W.P)

→ The system is costlier than the single stack system.

⑥ Partially Ventilated single stack system :



S = Sinks
WC = Water closet
LB = Lavatory Basin
B = Basin

→ This is modified from of the single stack system & one pipe system.

→ In this system the waste from W.C basines sinks etc is discharged on to one common soil & waste pipe (S.W.P)

→ However; in addition, a seliet vent pipe is also provides which provide ventilate to the traps of water closet.

→ The traps of basines etc. are not directly connected to the vent pipe.

④ Two pipe system:—

In this system, separate soil pipe (S.P) & waste pipe (W.P) are provide.

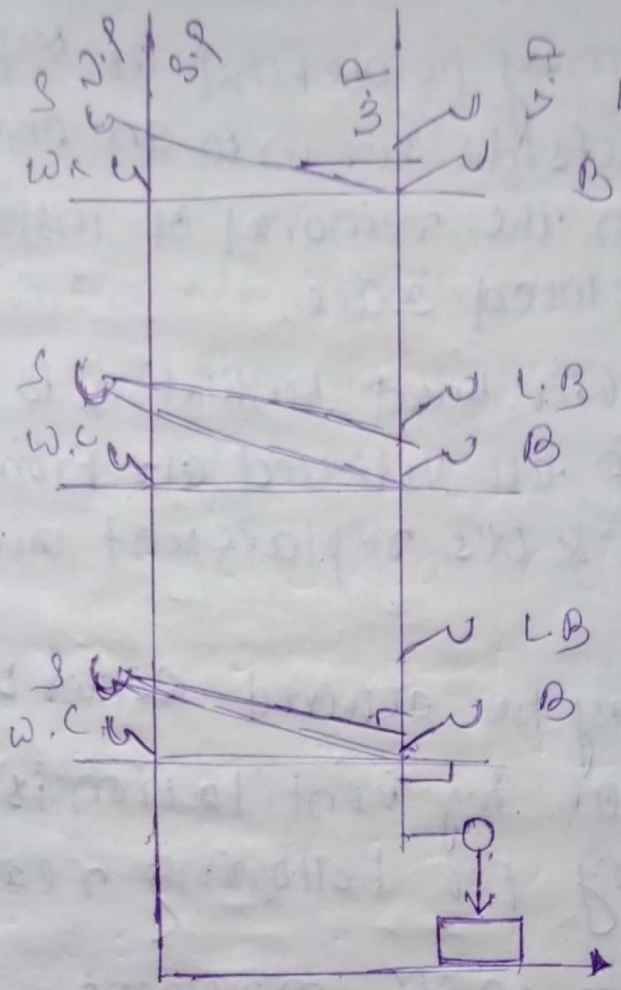
→ The discharge from baths, sinks lavatory bas etc are connected to the waste pipe (W.P).

→ All the traps are complete ventilate by providing separate ventilating pipe.

→ Thus, four pipes are required,

→ The discharge from waste pipe is dis connected from the drain by

means of a gully trap.



C.I =

V. P

S. P =

W. =

VENTILATION

*. Ventilation :-

→ It may be defined as supply of fresh outside air in to an enclosed space on the removal of inside air from enclosed space.

→ In other word ventilation is the removal of all vitiated air from a building & it's replacement will fresh air.

→ It may be achived either by natural or by ventilation is necessary for following reason :-

① Creation of air movement.

② Prevention of reduce accumulation of carbon dioxide.

③ Prevention of flammable concentration of gas vapour.

④ Prevention of accumulation of dust and bacteria - carrying particles.

⑤ Prevention of oudour caused by decomposition of building material.

⑥ Removal of body smoke, odour caused by decomposition of building materials.

⑦ Removal of body heat generated/liberated by the occupants.

⑧ Prevention of condensation or decomposition of moisture on wall surfaces.

⑨ Prevention of suffocation condition in conference rooms, committee halls cinema hall, big room etc.

* Methods of ventilation :-

Method of ventilation devided into two catagories :-

(i) Natural ventilation

(ii) Mechanical ventilation or artificial ventilation

(i) Natural ventilation :-

→ It is the one in which ventilation is effected by the elaborate use of doors, window, ventilation & skylight.

→ However, it is not useful for big building office, conference halls auditorium, large factories .. etc.

→ In natural ventilation, cross ventilation merely refer to equipment is required for keeping the room ventilated

(ii) Mechanical or Artificial ventilation:

It is the one in which some mechanical arrangements are made to increase the rate of air flow.

→ The system is more useful for large buildings, assembly hall, Factories, theatres etc.

→ Through the system is more costly it results in considerably efficiency of the persons using the Buildings.

→ There are following system of ventilation :→ ① Extraction system ② plenum system ③ Extraction plenum ④ Air-conditioning.

In natural ventilation :-

The rate of ventilation depend upon the two effects.

ⓐ wind effect ⓑ stack effect.

* System of ventilation :-

It may be devided into

① Natural ventilation ② Artificial ventilation

* Natural ventilation :-

In this system ventilation is effected by doors, windows, ventilators skylights & other openings to the enclosed space.

The rate of ventilation depend on 2 effects.

ⓐ wind effect, ⓑ stack effect.

ⓐ wind effect :-

→ In this the system rate of ventilation depends upon the direction & velocity of wind outside & sizes & positions of openings. Such an effect is known as 'ventilation due to wind action.

→ When wind passed below at right angles to an face of a building, pressure difference are created.

→ positive pressure be produced on windward force & (-ve) pressure

(or suction) is produced on the leeward face.

→ If the type wind direction is at 45° to one of the face, (ts). pressure, will be produced on the windward faces and negative pressure ~~leeward face~~ on two leeward faces.

→ If the ~~wind direction is at~~ 45°

→ the figure shows the movement of wind through buildings.

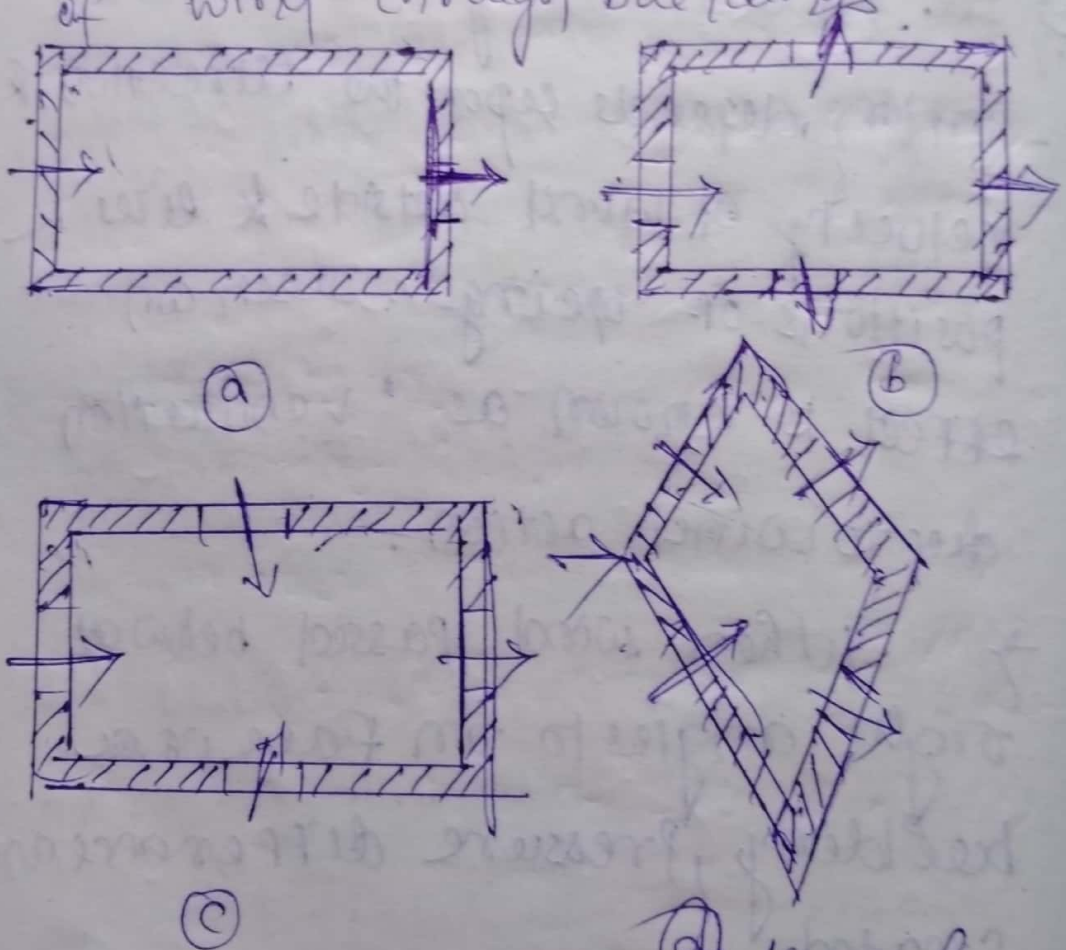


Fig. Movement of wind through buildings.

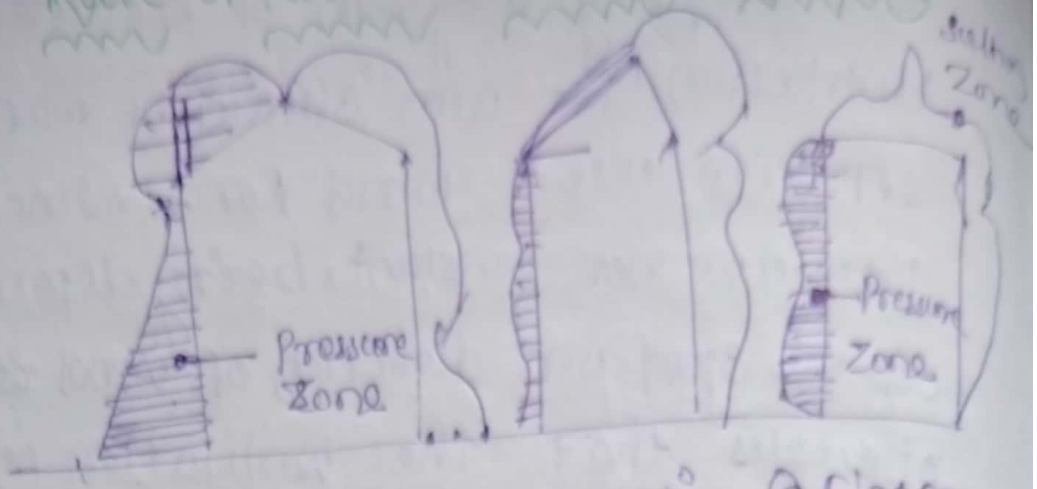
→ In designing a system of natural ventilation the aim should be make effective use of wind forces. Since these are not constant, being dependant on the speed and direction of wind it obvious that the ventilation is likely to be variable in quantity.

→ For design purposes, the wind may be assumed come from any direction with in 45° of the direction of prevailing wind.

→ In the case of pitched roof, the pressure will depends upon the pitch of the roof. It is so that the roof pressure in general are ~~with~~ positive on the wind ward side of the roof will shape grater that 30°.

→ Wind will below from wind ward side the other side of there is an opening.

*. Rate of air flow for wind effect:



(a) $\alpha > 30^\circ$ (b) $\alpha < 30^\circ$ (c) flat roof

Fig. Wind pressure & suction Zone

→ Considering the simple case of an isolated enclose in which are provided in each of two opposite walls, the rate of air flow through an opening due to wind blowing on the wall containing the opening is given by expression.

$$Q = K \cdot A \cdot V$$

Where Q = The rate of air flow in m^3/h.

K = Co-efficient of effectiveness

A = Area of smaller opening in m^2

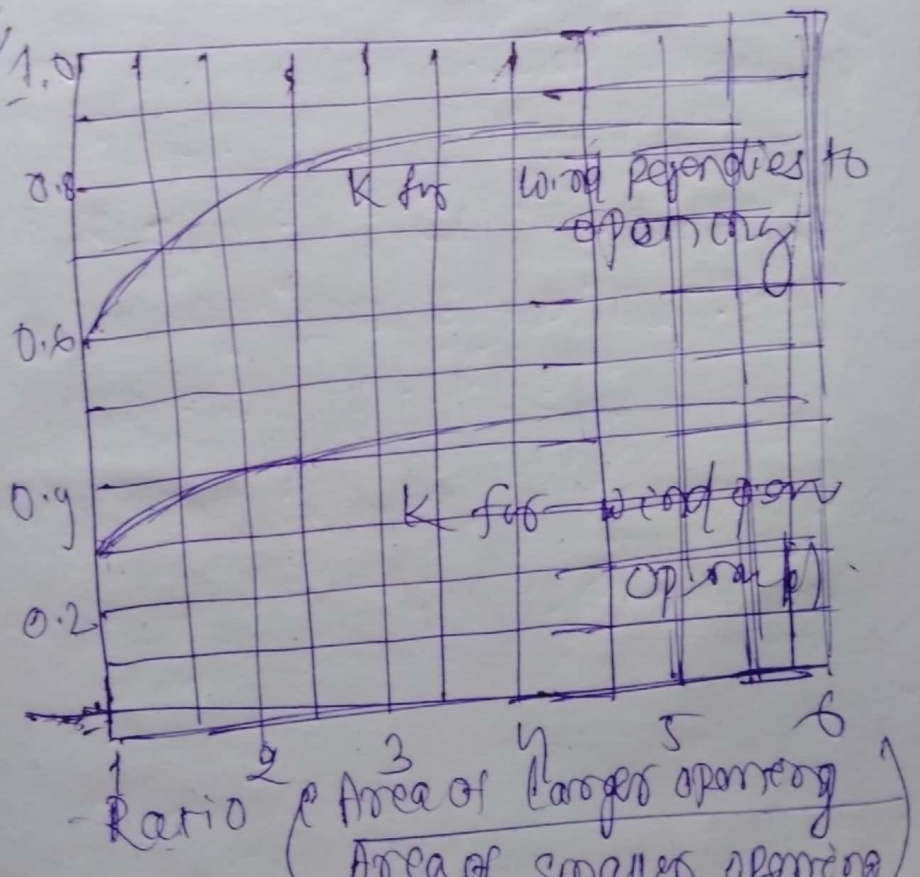
V = Wind speed in m/h.

→ The co-efficient of effective K depends upon the direction of the wind relative to the opening & on the ratio of

the areas of the two openings.

- It is maximum when the wind blows directly on it is increases with the relative size of the larger opening

- Thus, the flow through two square opening of size 0.36 m a wind of 8 km/hr blowing inclined of 45° to the opening will be equal to 0.3 (0.36 × 0.36) × 5000 = 194.4 m³/hr. This is sufficient for a room of (4×4×4 m³ in size giving about three air changes per hour.



Value of Co-efficient of effective for flow through openings.