Building Services I

Lecture 6

Urinals

It is a soil appliance it is connected to pipe after a suitable trap, with adequate provision for flushing apparatus, so the figure giving this is the Urinal and this is the flushing apparatus that we have here. So these urinals they come with different forms and shapes but for classification we have basically two category

Bowl type or basin type urinals

Stall type or slab type urinals

This bowl urinals are used for private use and stall type we used in the public buildings, install type will have partitions in between them.

So these partitions and slab at the back, the slab at the back in the sense here there either of slate or marble and the bowl is made of porcelain. So totally it has to be impervious end and smooth material so that it is easier to clean and maintain.

They may be flushed like a closet, generally it is provided with automatic flushing cisterns. When you go for stall in public building, see there will not be flushing system here it will be automatic, so every ten or fifteen minutes it will be automatically it will be flushing here otherwise they use censors in urinals. So after the person use the urinals the flushing will automatically take place but there is also the model were you have a flushing apparatus which can be operated manually.

WASH BASIN

So Wash Basin is similar to our sink but it is provided wash basin will be provided again with two tapes one for the cold water and one for the hot water but depending on the climate you may also only one tap for cold water. Wash Basin also coming with various shapes , various types of installations it can be like wall mountain what we say is like it will be fixed to the wall or it can be pedestal water where it is fixed to the floor.

So When you take the wash basin here is the mouth of the outlet so when you see inside the wash basin you can see a actually see the in this picture I can show you that there is the outlet you have a grating. So this grating will be brass or nickel. So this is to stop any large substances going in to the pipeline and the outline pipe discharges through the trap. Here you have the trap discharges to a tap to the exterior lines. So here you have the water supply line that is coming inside and it will be connected to the tap here, the valve here controls the incoming

water, this is the elbow, elbow is something's trap to the outlet connection and this is the drain pipe we see here.

WATER CLOSET

So Water closet is basically a bowl to receive the excretory matter and it is a trap and a flushing apparatus. So all this things together we call the water closet and sometimes people also called wherever we have a water closet the whole room is also called as the water closet.

So it is recommended to always to provide a ablution tap adjacent to the water closet preferably on the right hand side wall because mostly people right hand users. So ablution tap also is recommended to give

So coming to classification we have two major type is Indian Type water closet and European water closet.

INDAIN TYPE WATER CLOSET

This is the model of Indian type water closet most of us come across this,

So this is fixed the floor levelwhere you have a squatting or sitting position.

It is usually made of porcelain and it has pan and the trap for separate in the water closet.

So the thing is like the excreta directly fall into the trap, so what happens is more possibility of the excreta to become fall when it is in the pan so if it start flush properly it will be a problem in this type of water closet.

EUROPEAN TYPE OF WATER CLOSET

European water closet is sitting on a chair that is how you use that. This is also completely made of porcelain and you have the seat and cover for the closet so you see here this is the closet so you have a seat and cover and it is usually having a flushing apparatus.

So this particular water closet that advantages is that the excreta matter will directly fall in to the trap, so there is less chances of the pan being uncleaned, so the pan is always clean have one flush itself it is mostly clean.

FLUSHING CISTERNS

Flushing Cistern is to flush water closets and union urinals always have a flushing system that is very necessary to install. So this is like when you see you have a handle for this and when you just pull down the handle or press down some types it will be top on the system or when you press down or pull the handle depending on the type of the system the flushing will happen.

The position of the flushing system will be generally 2m for like urinals and for even the Indian water closet people have used flushing apparatus so that will be 2m from the floor level for EWC that is European water closet even 600mm from the floor level is enough the picture which we saw earlier is proof for that.

So there are four main parts in flushing cisterns. It was in the principle of siphon. So the major parts are

The Bell connecting the flush chain, so if you see here there is the bell here this is the form of a bell so we call it as a bell and it is connected to the flushing chain, this is the flushing chain, this is the handle that we pull to flush the water. So this is the major part.

Then you have a float in this, this is the ball float is called in this form of ball it is called as ball float

We have inlet and outlet

Then you have the casing, casing is the enclosure.

So how it is actually works this when you pull this handle down it actually lifts this bell so when the bell is lifted here there is the vacuum, so the vacuum is shifted and the water will flow inside and this is the inlet pipe. So the vacuum will push the water inside and the flushing happens here. So once all the water is drain out for that only we have this ball float here, this will pick keep on going down, once it reaches the bottom it will the inlet pipe water will come automatically and when it is come here the inlet will stop, so that is the two control the inlet pipe is the major purpose of this ball float. So this is our flushing system works.

Manholes

Whatever fittings where we look into these are the interior fitting which comes inside the building, inside the bathroom or the toilet. Now we will be look into the fittings which is outside the buildings like the Man Holes, traps and all those things which we generally don't see into day to day base, we don't notice generally. So what is the Manhole?

It is the construction basically; it is made to connect the ground level with the hole or opening made in the sewer line. Sewer lines are going to be laid under the ground. So this ground level should be connected to the sewer than only you can dispose the sewage. So they will make the construction so that the hole in the sewer line and the ground is connected so that is what we call it as a Manhole.

Main Objectives of the Manholes:

- A man should be easily and conveniently and safely enter through it because for cleaning should enter through it because for cleaning or inspection purposes should be able to enter it and carry out the usual maintenance operations.
- If there is any obstruction in sewage it's generally gets collected up in the manhole. So this manhole will be used to take out all the obstruction in the sewage.
- Then you have joining of the sewers. So this is the manhole is the place where different sewers will be connected in one point, so there also what happens is going to be a change in the direction or alignment we need manholes in the place
- Then manhole covers we have it will perforated so the undesirable gases will be coming out of it, so this is the natural ventilation process also the sewer lines will be naturally ventilated by this manhole covers
- Facilitate the laying of sewers line in convenient lengths. So you need not to be restricted to like from starting to end you cannot have pipelines. So these manholes serve as a helps as to break down the lines we can connect the pipes and laying the sewer lines is easier that way.

LOCATION

- So location of manhole where and all can you have this manholes. It is always provided at every bend, junction, change of gradient or diameter. So whenever there is going to be a bend in the line two or more lines are coming on forming a junction and when you are going to change the gradient or the pipe size that is the diameter means diameter of the pipe. There you provide the manholes.
- The sewer line between two consecutive manholes is laid straight
- The straight alignment of sewer line also requires manholes at regular intervals.

So when we are going to have two consecutive manholes in one sewer lines it should be laid straight we need as to be in line, so the alignment of the sewer lines also depends on this manholes it has to be kept at regular intervals so when you align the manholes the sewer lines automatically get aligned.

Now coming to the design principles, some few principles we have to follow when we are constructing a manhole

DESIGN PRINCIPLES

- First thing you should be structurally stable because it's going to be underground, so it's should be strong enough to resist whatever forces that is going to come upon them.
- It should allow the sewage to flow smoothly and easily, so there should not be any unnecessary foul in the manhole the sewage waste water, the sewage should not

stagnant in the manhole. So it should be constructed so that it is flowed it doesn't stay behind because which stage there will be foul in the manhole

- It should be safe for the workers to enter in the sense, if there is no foul there will be unnecessary gases will not be accumulated so this it will not affect the workers for go inside for the maintenance
- Then the walls and floors of the manhole should be impervious like it as be coated with cement plaster, impervious means water should not sip from the manhole to the outside because it may contaminate the water table also inside places depending on the depth of the manhole, so it as to be impervious.
- If inlet and outlet sewers are different diameters, the crowns should be kept nearly the same level, the crown in the sense the top most of the sewer I mean the manhole level, if the diameters are going to be different it has to be kept in the same level, so this can we achieve this necessary slopes. This will prevent any backflow of the sewage.

Coming to the classification you can actually classified based on the depth only because there is no other classification because it is manmade thing it is

- Shallow Manhole
- Normal or Medium
- Deep Manhole

What is the Shallow Manhole?

When the depth of the manhole is 750mm to 900 mm, so we call it as a shallow manhole, it is generally used in the beginning of branch sewers in the places where there is no heavy active traffic in there is very light traffic there you can use a shallow manhole. So this is also called as an i9nspection chamber and the cover will be a very light cover, the light cover in the sense the weight of the manhole cover will be less

Normal or Medium Manhole

- This will be about 1500m that is 1.5m depth will be there for this manhole and the size will be like 1m×1m or 0.8m×0.8m
- If it is going to be a rectangle or square in shape whatever the shape you take up the section is not reduced and only the depth of the manhole will be different.
- This particular manhole will have a heavy cover at the top will be weight of the manhole cover will be more.

Deep Manhole

- This will be more than when you have the depth of the manholes more than 1.5m and the size of the manhole, the section of the manhole increases then we call it as a deep manhole.
- This manhole like the upper portion will be reduced and there will be an offset in that. So you see in this picture, so this is the deep manhole so you see in the top portion it is resist like it is an arrow and then you have a working chamber we called working chamber here you have a broader area
- So this is like it's a facility to go down and up to the bottom and this will have a very heavy cover, this manhole will have a very heavy cover and coming to the components of manhole generally you have a access shaft that is the major thing this is the access shaft then you have the working chamber and this is called benching , then this is your branch sewer which is coming into the manhole the walls and you have the concrete base for the manhole and you will have the steps or rungs are ladder to climb up and down, this is the offset to be do it using the brick, arch or corbelling use that

So the major six parts is

- Access shaft
- Bottom or invert
- Cover with frame
- Steps or ladder
- Walls
- Working chamber

Access Shaft

- So access shaft there is the upper portion of the deep manhole
- For rectangular it will be 750×600mm and if its going to be the circular the diameter will be 600mm to 750mm
- Now this depth only the circumference we can say depends on the depth of the manhole depending on the proportionately that will be done.
- This access shaft it also be later converted as a working chamber if you remove this wall and you put it here the whole thing will become a working chamber.
- The bottom or the invert,
- So it is constructed by cement concrete or brick paving will be done here
- As I told you the sewage water will not stagnant here this has to be smooth and it has to be free flowing. So you should have suitable gradient, this thing the semi circular or U

shape will be maintained here and sloping sides will facilitate the entry of sewage to the main channel easily. This thing is called benching and you have the branch over here.

Cover with Frame

- So this is provided here, so this is the cover this perforation is shown here, this is your manhole cover, this is provided the top and it is made of cast-iron.
- The depth of this frame will be 200mm to 250mm and this will be about 100mm wide.
- The frame will be embedded in the pavement and the cover will rest on top of that because the cover alone we can remove and use it
- Now this weight of the cover and frame depends on the traffic that is going to subjected to this cover, so and it as to be standardized the covers whatever manual covers we are giving it as to be standardized because in future or there is any repairs or damage or even if gets stolen because its cast iron. You should be easily replaceable and the stop of the thing because this is the iron metal this should be rough surface it should be given so that it not slippery.

Steps or Ladder

This is easy for in and out of the manual is made of cast iron and generally it is s staggered like when you take of the center 200mm it is staggered this way and that way but if the width is double you need not staggerate it can be normal steps. When the depth is going to be more a ladder is more preferable than a staircase because when the depth is going to be more people tend to climb down using a ladder then feel the convenient than getting down by steps.

Walls

The walls can be made of brickwork, stonework or cement concrete can be either or but brick walls are generally common for manholes and the minimum thickness for brick walls it will be 200m. If you are going to use cement concrete for the walls the thickness can be even more less.

Working Chamber

This is the lower portion of the deep manhole where people are going to work there so what you have to do is this is giving the space for carrying out the maintenance that is cleaning or sewer lines all those things happen here. So people have to stand here and works for the height the clearance should be 1.8m and the minimum size for this kind of a chamber will be like it is going to be square or rectangular will be 0.9m×1.2m and it is going to be circular, it will be 1.2m in diameter.

Traps

This is the another important fitting in Sanitation

- A trap is a depressed or bent sanitary fitting which always remains full of water. So this is water traps looks like, this is actually a dip trap, so this is the entry and this is going to be the outlet.
- So in between this there is the water this is what we call it as water seal. So this water seal it is measured from the its vertical distance between the crown and the dip of the seal. This distance is the seal this is the dip of the tap, so this is the water seal .
- This water seal the measurement is important because depending on the type of the fitting that are going to use the trap and depth of the seal will differ.
- So the trap will always have this water and this is the water seal, so the basic function of the trap is to prevent the foul gases entering into the rooms or the areas you have the fittings. So it is to prevent the passage of foul air or gases through it. Through the trap the foul gases should not come inside. So for that only we use this water seal.

The Requirements of a good

So what are the requirements when we use a trap, what are the requirements of good trap is

- It should be capable of being easily cleaned. There should be regularly cleaned because it is a bend shape there we should able to easily clean it
- It should be easily fixed with the drain
- It should be free from any projections inside the trap there should not be any projections because it will abstract the passage of the flow of sewage
- It should be very simple and construction and have a self-cleansing property
- It should also possess adequate water seal to fulfill the purpose of its installation that's what I role depending on the type of installation the depth of the water seal will vary and it has to adequate water seal to depending on the installation
- The internal and external surfaces should be of smooth finish whatever the trap is internal and external should be of smooth finish for easy flow of the waste water or solid waste

CLASSIFICATION OF TRAPS

According to the shape and the use, you have two types. According to the shape of the trap you call it as P-trap. Q-trap and S-trap and according to the use you have the floor trap, gully trap and the intercepting trap.

So when you say P-trap it's in the shape of the letter P, so this is the P-trap, so you see in the letter P shape so that's why you called as P-trap and the main thing is like legs will be at right angle to each other. So this is what is the P-trap.

When you say Q-trap again in the shape of the trap is again going to be Q shape, it's going to be Q kind of a shape but here the angles are not be a right angles because it will be different angles because of the shape.

S-trap: The trap will look like S in shape and here the legs are parallel you can see here the legs are parallel so it forms a S shape. So this is why the traps are called Q, P and S.

Depending on the Use

Floor Trap

On the use if you see we have a floor traps. Floor traps is like it is made of cast iron and is put in the point of entry of the installations. Basically the floor traps you can see it in bathrooms, kitchens, sinks and wash basins you can see this floor trap. It is embedded in to the ground I mean floor. So this is the starting point of waste water flow. So the other sentry fittings whichever it is a collecting point and this is the starting point from where the waste water starts to flow. So in a floor trap you see you will have a grating at the top and then this is the water seal and the thing collected here and goes to the suilage pipe.

So this grating as a cover, this can be removable purpose of the grating is any large substance should not go inside because it is going to be large it will choke the pipe, so this grating is provided for that purpose and it can be removed and then you can clean if you need to

Gully Trap

This is generally made of stoneware or cast-iron. The floor traps are nowadays it comes in stainless steel and plastics also but gully traps are made of stoneware and then the gratings and top is provided by cast-iron. This fitting is always inside a masonry chamber and it is the starting point of horizontal floor, so you can see this only always in the exterior of this, so this is your floor level and grating is here and this grey color thing is a gully trap. So this is situated near the external face of the wall you keep it slightly higher or in line with the pavement. This will either directly lead to the sewer or to the inspection chamber or to the manhole. So it can be anything but it is not necessarily the end point of here buildings and drainage system. So this is what a gully trap looks like, so when you see here you can serve two or three connections at a type but we have to make sure that when we separately connect the sullage water and the soil wastes, we don't want to mix the sullage and soil water that is not advisable.

Intercepting Trap

This is the final trap which will convey the sewage to the public sewer. So this is going to be the final point of sewage system for a building. This is usually found inside manhole so this will particularly have a seal of 100mm because this is the maximum water seal because the foul gases from the public sewer line should not enter the premises. So this is how it usually inside the thing you can see. So now this will have an inspection arm, so this is the intercepting trap you have the manhole cover here, the inflow is this way, this is the intercepting inspection arm we call it will have a plug here and you have the rodding arm and this goes to the sewer and this whole this is the intercepting trap. This is inside the manhole so as I told this inspection arm per cleaning in inspection so we go inside the manhole and this arm only we use for cleaning and inspecting any blockage or anything. This is closed by a plug or cock; there should be a fresh air inlet. This is the fresh air inlet should be there for this manual.