Building Services I

Lecture 5

Sanitation

What do you mean by Sanitation basically is it is by definition it generally refers to the provision of facility and services. For the safe disposal of human urine and faeces from the building. So this is the very basic definition but it also like inadequate sanitation is a major cause of disease that to be spread world-wide, so improving sanitation is known to have a very significant beneficial impact and both the households and across communities. So sanitation we now refer to the maintenance of hygienic conditions in general through services such as garbage disposal and waste water disposal. There are certain basic principles that we followed during the planning stage itself we can give a better sanitation for the buildings like

BASIC PRINCIPLE

The following are the fundamental principles

- Collection and Conveyance
- Interior decoration
- Orientation of building
- Prevention of dampness
- Supply of water
- Treatment of waste

SANITATION – BASIC PRINCIPLE

- The basic thing in sanitation is we have to remove any waste matter as early as possible.
- So the early we remove it the easier it becomes to render it harmless.
- So these waste matters can any form like solid, liquid and gaseous. So the collection and conveyance should be very effective

INTERIOR DECORATION

Before we go for Interior Decoration of any particular building we should have a very serious thought what we are going to put in the rooms, so if we are going to put substances which are going to collect catch dust or collect dust you need not be placed in that room better to avoid such things. If you have to play such thing then you have to do a regular periodic cleaning has to be made for that

ORIENTATION OF BUILDING

This is very basic for any building so when we design the building itself, Orientation should be such that you achieve maximum lighting and ventilation to the building depend upon the existing condition of the place because the local climate varies if to each and every place. So with respect to local climatic conditions when we orient the building will have proper lighting and good circulation of fresh air that is what we called ventilation. So when we have these both we have a healthy living conditions.

PREVENTION OF DAMPNESS

So whatever the living conditions is it has to be damp proof so because if the surroundings is going to be damp there is always a possibility of harmful pathogens to develop and that will lead to the dettoriationof human health. So prevent if you have to take care there is no damp surroundings within the living area. Preventive measures should be taken that the building is damp-free, so when we are constructing the building itself we have to use proper damp proof material so that the living condition is very dry.

SUPPLY OF WATER

Sufficient water should be available at all times because the scarcity of water only leads to unhygienic conditions. When we go before we start eating we have to wash hands like after we use are water closets wash hands so each and everything abundant water should be there so that you have a hygienic lifestyle

TREATMENT OF WASTE

How we are going to treat the waste which is coming out of the building, so it should be only disposed after treatment you cannot directly dispose any waste directly to the environment. So we called effluent from the sewage plant shall be disposed in natural river or stream after given proper treatment. So when we follow these basic principles we can have the maximum sanitation and hygienic conditions for our community.

VARIOUS SYSTEMS OF SEWERAGE DISPOSAL

So what is basically Sewerage system disposal is it is the whole system with various infrastructure and it steps like collecting the sewage treating it and disposable of storage and all these things coming into picture, so for do this we have basically three sewerage system one is separate system, second is a combined system then we have a partially separate system. So we will see all those things in detail coming now

SEPARATE SYSTEM

When we say separate system we will have two sets of source like in this picture you can see one is sewer pipe and other is for the storm drain tunnel. So when we have two different sets the pipe sizes have, there are many advantages

Advantages

- Like the load on the treatment unit is less
- Natural water is not polluted, natural water in the sense we mean here is the storm water drain that is coming that is separate so that will directly lead it together natural reverse and streams, so that will not be polluted because the sewage water and this is separate. So because we were separating this water need not be treated again the storm water is not needed to be again so the treatment planned as load is also less.
- The Sewers also relatively small in size, so this is very economical when you consider the pumping of the sewage and the treatment of the sewage

Disadvantages

- The cleaning of sewers is difficult because the sewers size is going to be very small
- The maintenance cost is very high
- Self-cleansing velocity is not achieved because of the smaller size
- When we say two sets of sewers, then you have to two sets of pipes and everything laying and everything is going to cost so it's going to be costly
- These storm water drain particularly only during the monsoons will be the water will be flowing in this pipe, so other time in this periods, so this particular storm water drain might be like a dump area for garbage and all those things. So these are the disadvantages in the separate system.

COMBINED SYSTEMS

This is only one sewer is there and both the sewage water and the storm water is laid into the one particular pipe itself.

Advantages

See from here you have the sewage and from the storm water enough so everything is combined and is taken to the treatment plant and it goes to the and then it network to the river. So what happens in this particular system in both the things are in one particular sewer it is the size will be very large, when the size is large it is easy to clean and the maintenance cost will be reasonable, when storm water will reduce the dilution strength that is the another advantage and it is economical because it is only one set of sewers

Disadvantages

Since the storm water is also coming along with this so we have to consider the monsoon times, when there is going to be heavy rains, if the sewer cannot take up this thing it is going to be a huge load on the treatment plant and it might overflow also, during extraordinary heavy storms and it gets silted easily because the self-cleansing is dependent on the storm water runoff that is only happening during the monsoon periods so the other dry seasons the thing the sewer line may be foul during the dry weather and since the both the things are coming in one line load on the treatment plant is more that will increase the sewer size will be more so we have to have large diameter pipes and too much of length and this storm water when it is directly laid to the natural streams it is not polluted now it is mixed with this that is every chance of getting polluted. So when we consider the pumping of the sewage and treatment of sewage this system might prove to be uneconomical then comes the partially separate system. This is similar to the previous combine system but here is only one difference here so the sewerage comes from the building and the storm water comes both the things come in one pipe but there is a overflow option given here, so normally this will be going to the one pipe and it will go to the treatment plant led to the thing during monsoon time that is heavy rains or going to come beyond a certain limit the storm water will be directly laid into the river. So early washing will be entering the sewers when it exceeds the limit it is conveyed into the open drains.

Advantages

- The advantages since it combines both the systems it has
- Various advantages like the storm water it will avoid the silting in the sewer
- Disposing of storm water from houses is simplified because it is connected to the normal sewage system.
- The sewers are of reasonable size overflow is being led out to the natural streams

Disadvantages

- The Quantity of storm water which is led to increase the load on the sewerage units again because it is a combined system and since it depended on the monsoon rains during the dry season the velocity of the flow will be less so that is the negative two points for particular system.

So these are the three basic systems that we have which system we are going to select so we have to follow certain or have certain points in mind for selecting the sewerage system like some of there are two sets of pipes

- It is difficult in congested because you need space to let two pipes and laying two pipes also costly because the material cost, labor cost will go high
- The two sets of pipes will avoid the treatment of storm water , so the load on treatment plant will go down it will be less
- We don't have any look for any gradients when you are doing two sets of pipes because there will be any backup of sewage because there is sewer line going to be separate
- When you consider one pipe system that is combined system it is very economical in terms only one pipe is going to be there and it is economical in those terms but this particular system we have to lay it in steeper gradients you need to have steeper gradients if you use this type of system in flat, then it is going to stilt and the thing might long
- So when you go for steeper gradients then we have to pump the sewage so that is also increase the cost and large treatment capacity also needed because it's a combined system, so when you consider the pumping and the treatment and this particular system is going to be a uneconomical
- So we have to work both the systems, calculate the cost how it is going to work out depending on the topographical conditions, we have to decide on the system we cannot say this is the best and this is what we can use so each and everything has worked out clearly and then the selection of the system can be done.

Model Bye-Laws for Sanitation

So NBC is the National Building Court by 2005 edition. There are certain drainage and sanitation requirements they have framed for sanitation specifically

It is like there should be at least one water tap and the arrangement of the drainage is going to be vicinity that is the nearby to each water closet or a group of water closet in all buildings that should be there. So one water tap and arrangements for drainage so to drain the water closet and when coming to dwelling units, each family dwelling unit when it is aborting the sewer where you can drain the sewage and waste water or you have going to a private disposal system either of the two if we have that dwelling unit should have one water closet and one kitchen type sink in the premises that is with inside the building itself, so this is the very basic requirement. A bath or shower shall also be installed be the basic reminds so additionally you can also have a bath or shower within the building if possible so that you have a better personal hygiene.

Now when it comes to other structures other than residential buildings one water closet and one other fixture one more tap like fixture for cleaning purpose, this is the very basic

requirement and other than that the dwelling individual convenience we have everything for particular dwelling alone separately you will have one bathroom were you have a tap and a floor trap. One water-closet with flushing apparatus with an ablution tap and one tap with a floor tap and sink in kitchen, so these are the very basic things and also if there is one water closet to provide in the entire for the whole unit, it is better to provide separately water closet and the bath, it is better to have a separate things. When there is without individual convenience where the bathrooms and toilets are going to be common there one water tap with floor trap is needed and water closet with flushing is needed and one bath for every two tenements you should have one bath, so that is the requirement here and other than residence is main requirement is drinking fountains should be provide for drinking purposes that should not be installed in toilets that is one basic things then the buildings are going to be where there going to be exposure of since skin contamination like poisonous or infectious material or irritating material, the wash basin with eye wash let or the emergency shower should located which is accessible at all times. Any other building types individual toilets and pantry for executives, meetings, seminars and conference rooms it has to be separate. If the food is going to be consumed indoors within the building then water stations that is drinking water fountains has to be provided.

Planning Guidelines

Now coming to Planning guidelines again we go national building court 2005. This national building court they give the very minimum requirements. So if we giving this then we are full filling the minimum requirements and so it should be more than whatever it is prescribed here, so when coming to the planning guidelines the minimum requirement for floor area and the width of the bathroom so they have facility like there will be water closet, bath and washing and some places we separate the bath and the water closet so in that cases what is the minimum width required for the bathroom and the minimum floor area, so when you consider a water closet, bathing and hand washing all the three is coming inside in one bathroom then you have to go for a 1.25m minimum width should be there and the floor area should be $3m^2$. when you have water closet and bathing only 1m is the minimum width and $2.8m^2$ is the floor area and when we are going to provide the bath and water closet separately than for the bath alone it should be the minimum width should be 1, this minimum width will be on either one side of the room and the floor area will be $1.5m^2$ and for water closet is again 1m width and $1.2m^2$. When we are going to toilet for disable persons it should be 1.5m minimum width because for the wheel chair axis in all those things and the floor area will be $2.25m^2$, so this is the minimum area that you have to give and here planning for the bathrooms

The Next thing is now we looked at the Width and the area, now we coming to the height of the bathroom. So any bathroom toilet or water closet it should not be less than 1.25m, so the

height should not be 1.25m and this height is measured from the finished floor level to the lowest point in the ceiling. So why we say lowest point in the celling because sometimes in the upper floor in a giving toilet they might sink the floor area like the floor will be depressed in that area. So sometimes they might be a lower height, so the lowest point in the ceiling and the finished floor level the measurement should be 2.15m. When we are designing the bathroom or toilet if it is containing a water closet it should not open in to kitchen or any cooking space the door should not directly open into that. So you have to say the opening we mean to say can be a door, window, ventilator, fanlight or any kind of opening, it should not be opened to any kitchen hall cooking space, so if the room is going to any room which is going to contain a water closet it has to have a door which is completely closing the entrance to it. Then every bathroom or water closet these are the other points, So it has be situated so that at least one if its walls should be open to the external air. So the ventilator will be placed on the external wall and you have a better ventilation and it should not be directly over or under any other usable room, so it can be under or over another water closet, another washing place, any other bath or it can be a terrace but if you have planning a such thing you have to water closet over or under any room then you should have a water type floor for the bathroom. So and the platform or seat whatever we are using for the floor should be water tight absorbent material only should be used and he walls and partitions which is enclosing the bathrooms or toilets it should be finished with impervious material to a height of at least 1m from the floor. So we impervious material we can say any glazing tiled glazing or any other cladding of impervious materials should be used to height at least 1m we have to do that, this will all help in the dam proof thing, so by providing he impervious floor covering, sloping towards the drain with a suitable grade should be there so the drain of the toilet or the bathroom should have suitable grade, so it is all towards the drain and not towards the adjacent or adjoining the or veranda and you should have a window or ventilator, opening to a shaft or open space if we are going to have that the area should not be less than $0.3m^2$ and the side should not be 0.3 and less than 0.3, the shaft in the sense you see in mini apartments there might not be possible to give a external wall for some of the toilet so what they do is they provide a shaft and we call it as the OHT so we have shaft which will be open to sky and the ventilators will be placed on those walls so that kind of the shaft should not be less than $3m^2$ in area and the anyone side should not be less than 0.3m.

SANITARY FITTINGS

When we come to Sanitary fittings, this fittings are generally the provision made is to reception of the foul liquids that is take up the foul liquids and carry it to outside of the building that is the main purpose of the sanitary fittings. So we have many sanitary fittings, very common fittings we have are

- Bath tubs
- Drinking fountains
- Sinks
- Urinals
- Wash basins
- Water Closets

These are the fittings which were commonly see in any building for matter which we will see each one in detail first will take bath tubs.

BATH TUBS

Bath tubs it can be cast-in situ or it can be precast. So this is like finished with dust be very smooth and it should not be any sharp projections or edges, so it is finished with marble chips and terrazzo, if it is going to be a cast-in situ. It is precast generally it will be are parceline or glazed then were. So it shall be made up of cast-iron, cement concrete or steel we also have a copper bath tub also, so it can be of any material basic provision being the inside of the tub is smooth and there are no any projections and the water should not it should be impervious to water, these are the main provisions , so when you consider the bath tub the sides of the bath tub you see this sides can be parallel or it can be tapering towards the down when it goes an it can be tapering down. The main feature of the bath tub is outlet pipe, the waste outlet and the overflow pipe so this both pipes will be attached together like it will be linked, so this is the overflow pipe lack one is the overflow pipe and this is below that we have the waste outlet, so this will be connected and it will be taken out as one single pipe so this will be usually 40mm, dia-pipes will be used for this

DRINKING FOUNTIAN

This is provided in buildings other than residences for supplying he drinking water. It is generally bowled this is the drinking fountain with the pedestal this is the line that is coming inside, this is the bowl we have here it as a push button and water bubbler or a tap, so you can see here this is the push button and this is the bowl and this is the bubbler or the mouth guard from where the water is going to or it can be a tap also from where the water will come out. So what happens is when you push the button the water will come out of the tap and after you consume it so see this kid doing it you pushes the button here and the water coming out from the spout or the tap and after consuming also the rest of the water fall into the basin itself. So it is taken by the drain and it is conveyed to the floor trap through grating. So this is how the drinking fountains are provided.

SINKS

Everybody would have seen as sink it is used in kitchens mostly and laboratory also use sinks. So the purpose of sink is to clean utensils or incase of the laboratory the apparatus and also to provide water for general usage. So when you take sinks is generally rectangular in shape mostly and it as a very flat bottom and when you see the edges are all will be rounded in the sense the edges will be round or smooth, curve linear for easy cleaning. Generally sinks initially it made of glazed then were cast-in situ also can be done, when you do cast-in situ has to be finished with terrazzo that is the tiles or marbles or mosaic. So nowadays we have stainless steel which is even more easier to clean and more hygienic. Now the sink size will depend upon the usage of the thing. So when we are using it for residences the size will be very small and if we are going to hotels or restaurants it is going to be very big. Hotel sinks in the sense where it is using for the kitchens. So when you take up sink this are the inside working of the sink, so you have a continuous waste line you have sinks chainer here, the cold water supply is coming from here from the bottom and the taps are connected here, so there is a hot water supply is also provided in a sink. So in cold countries not only for that in kitchens we will have greased utensils to wash that you will lead hot water. So generally nowadays people provide hot water as well as cold water connection to the sink and sometimes it can be only cold water also. The mouth of the outlet pipe is this one what we see here the drain here sinks chainer is given that is the mouth of the sink, so that is the grating it will made up of brass or nickel chainless steal for the purpose. It will have perforations so that any large substance that will not get inside or it will go inside the sink.

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