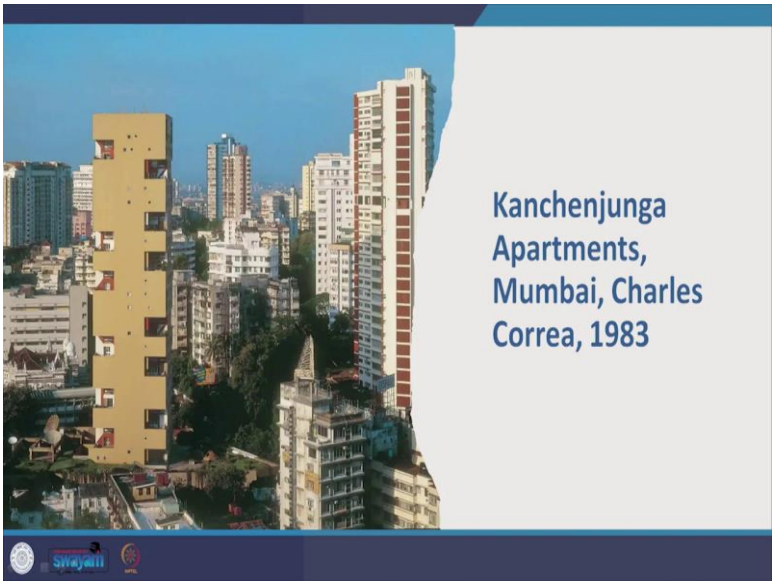
Modern Indian Architecture
Professor P. S. Chani
Department of Architecture and Planning
Indian Institute of Technology Roorkee
Lecture 30
Critical Regionalism in Indian Architecture - Part 3

(Refer Slide Time: 01:09)



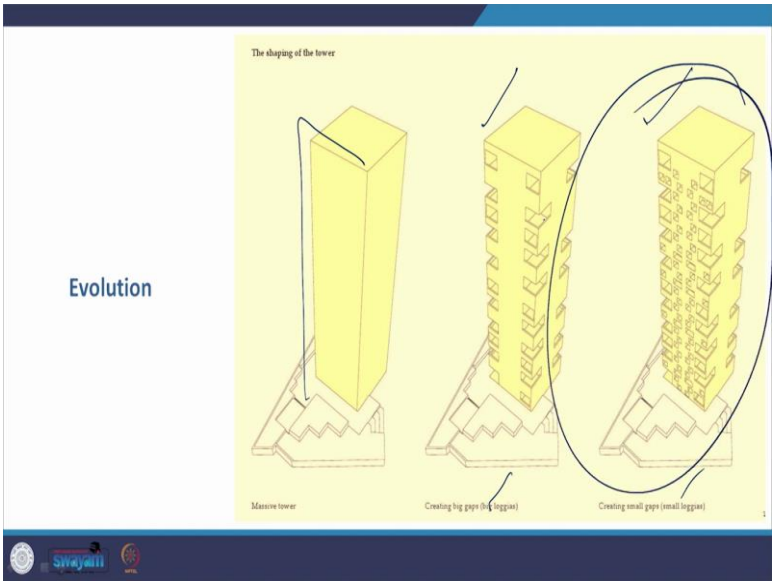
Hello students, we will come to part 3 of critical regionalism in Indian architecture and today we will start with the case study of what I believe to be one of the finest apartment buildings ever built in India. And trust me, I have seen quite a lot of modern Indian architecture in my studies, and I have rarely seen a building of the quality and the study material that I can derive from the Kanchenjunga apartments in Mumbai, by Charles Correa in 1983.

Tell you the truth if an architect would have to design only this one building in his lifetime only this one building, he will be well known. Charles Correa design many such buildings. That is why he is considered to be one of the greatest modern Indian architects. And there is one more thing I would like to tell you.

(Refer Slide Time: 01:17)

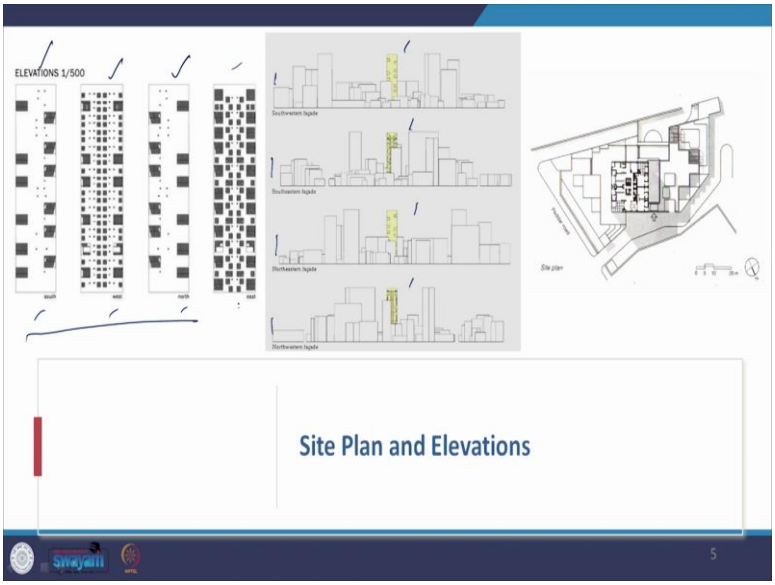
And let me make the point by coming to the elevations of the building. The Kanchenjunga apartment is a high rise apartment building, with Condominium of 32 luxury apartments, four different types of them from 3 to 6 bedrooms each. It is a pioneering exercise in bioclimatic design. It was also brutalist inspired building paying homage or a salute to Corbusier.

(Refer Slide Time: 01:41)



Now the evolution itself, so, you take the block, or cuboid, and you start developing the cut outs in that, and the cut outs, the big loggias and the small loggias all start coming together in the final form.

(Refer Slide Time: 02:00)



The point I want to make is here, the site plan and elevations. Let us look at the elevations. All four elevations speak to us differently. They are a tremendous exercise in composition. Each of them is a very simple cuboid. Each of them has a set of cut outs based on the side or the orientation of that particular part or that particular elevation.

And responding to that the sun path in that particular or responding to that particular orientation. This picture shows you how the building appears from the southwestern side, the south eastern side, the northeast side the north western side. These are the four facades. The south, west, north and east.

Now why is it important? If I were to design an apartment block today, much of my apartment block would have a very similar language more or less all around it. Maybe the variation would come because I would have balconies on a certain side. Maybe I would have a flush, closed wall on the other side. Much of it would be unremarkable. And to tell you the truth. Much of the apartment block construction today is unremarkable. It does appeal to you because of the kind of finishes that are being used, or some kind of aesthetic elements that are being used.

But when you draw closer to the building the wall that you feel when you study Kanchenjunga, it is amazing. It is, again, I will repeat the same word I used last time. It is a masterclass in understanding modern Indian architecture. Does it have flaws? Of course, all buildings have flaws in them.

But today we will focus on what we learn from this building. There is one more thing architects or rather, I do not say architects, I say that this is something of a thought, in the creative process fundamentally, is opposite to the scientific process that the creative process is fundamentally against or opposite to the scientific process. And in a sense, that is true. A scientist that is a technologist, is a doctor or an engineer has not much to do with creativity in his work, his work is there is a problem and the solution has to be found.

The artist on the other hand has very little to do with logic. If a painter is making a painting or a poet is writing a poem, there is called a poetic license or an artistic liberty that he has. He can paint the sky purple, he can paint the sky violet. If he is able to define the idea that he is trying to give to us. It is fairly subjective, the technologists work or the engineer or the scientists work is objective.

It can be quantified, this cannot be quantified, it can be evaluated numerically, this sign, this work, the creative artistic work cannot be evaluated creatively. But the architect is not just a creative person, the architect is also a scientist and an engineer. The closest an architect comes to in the world of creativity scientific, the closest he comes to is a craftsman a carpenter. A carpenter is a craftsman.

For example, when he designs a chair, he has to keep in mind that the chair has structured stability, otherwise, nobody would sit on it. I mean anyone sits on it, it will collapse, but it has to be attractive also, otherwise, nobody would want to sit on it. So, those both things, the artistic part and the scientific part come together in the work of a carpenter. Of course, a carpenter would generally be doing it more intuitively, he would have learned the craft from maybe a series of generations before him, and he would have understood the basic rules of load distribution et cetera more empirically more through experience.

Whereas, because of the very magnitude of the building, an architect has to learn that as a student scientifically in your structures classrooms, because you cannot do this intuitively. Of course, there is one segment that you need to also understand load distribution intuitively, to generally understand a building, if you want to do it, in a prelim form, just in as quickly as possible to, that is of course, this is there is a part that is necessary that you have to have intuitive understanding.

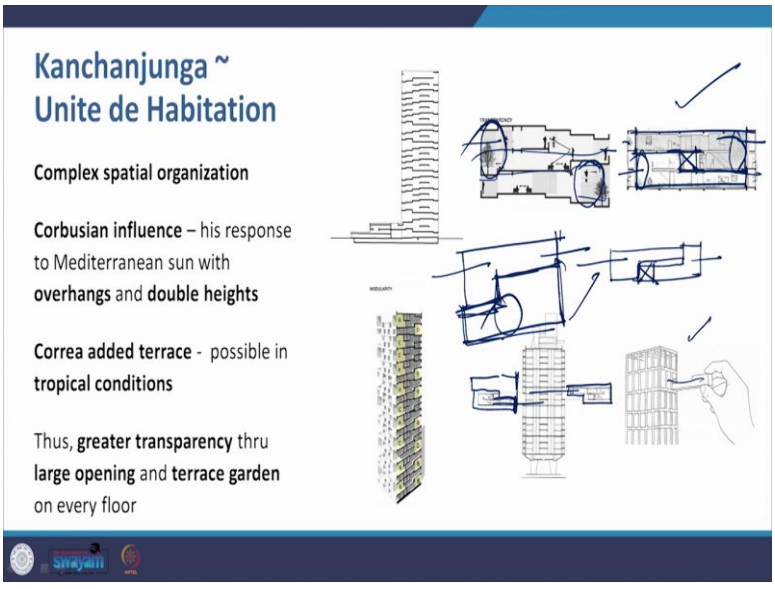
But you have to have a scientific understanding also. Why am I what am I trying to say here? The scientific constraints of a project, climatic constraints, for example, are a set of scientific constraints have actually led to very innovative and beautiful architectural solutions.

But where the constraints have been fed to the wind, and have not been taken care of solutions have been very generic and unremarkable. Science, actually, what I am trying to make a point is science actually leads to a more interesting, aesthetically pleasing, better building than non-science, this is a fact.

It may not be that the scientific part of the design of Kanchenjunga is right in front of you. It is right like It is well documented. No, of course not. Because at the time, like I said, it was more experiential, it was more empirical. It was more based on the understanding of a local climate, and then building around it, but still, in a sense, it was scientific, because that data of the climate had to be used to create the building.

If you still do not agree with me, look at some of the best buildings being made today by architectural firms like morphogenesis or the form of Raj Rewal et cetera. Amazing buildings, which are strongly rooted either in strong structural data, or strong climatic data. No doubt about it. Hall of nations is such a beautiful project simply because it is such an innovative structural project. The STC building by Raj Rawal is such an amazing project, because it is a Vierendeel girder that has been used in such an interesting way. It is a structural innovation that leads to such a remarkable building.

(Refer Slide Time: 08:56)



Let me continue further. Let us see the comparison between Kanchenjunga and Unite d' Habitation design which by Le Corbusier in France, and the complex spatial organization of both the buildings, if you look at Unite de habitation, it is basically two sets of apartments or rather two one and a half apartments one full floor and one half floor, in this manner, they are plugged into the building.

So, therefore, they become one on top of the other, they become they come together like this, and this part is the corridor in between them. And therefore, they both have complete glass access or complete fenestration access on either one of the two sides. And so here is the picture showing this plugging in of the apartment into the structural grid of Unite de Habitation.

Now, Charles Correa adopted the same idea in Kanchenjunga. Of course, with a little more complexity, the apartments again come together. This is one apartment, and this is the other. But the amazing thing here, and of course, even here, I am sorry, I did make a mistake here, in trying to, it should have been more clear. This is how the apartment would come together. If I would to draw it again, this is how the apartment would come together. If this is your apartment, and then this is the next one on top of it. This is a way it is.

And somewhere in between I am sorry, I am missing out on the corridor part of it. But there is a corridor part of it in between what I am really saying is there are openings on both sides. There are fenestrations on both sides of Unite de Habitation.

Now the same thing happens in Kanchenjunga , there are fenestrations on both sides. This is the section of Unite d' Habitation, as you can see. Now this is I would have, I should have referred to it in the beginning only, this is one apartment. I am sorry, please forgive me for that mistake.

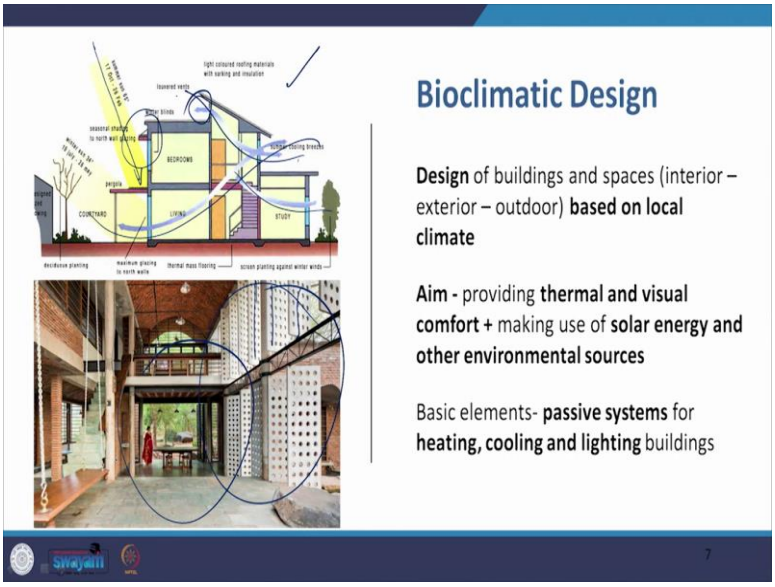
So this is the other apartment. And this is the corridor in between. So there are fenestrations on either side and either side and you have a double height space here and a double height space here. And similarly you have a double height space here and a double height space here. In the case of Unite de Habitation being made in France in a cold climate, the windows were enclosed from both sides, both glass trying to bring in maximum amount of light and sun into the building.

In the case of Kanchenjunga hot and humid climate, there instead of the double height space actually became a terrace or an open verandah or an open balcony. And that became a big sit out that we look at. So, the Corbusier influence was called Corbusier response to the Mediterranean sun, with the overhangs and the double heights in the Unite de Habitation.

And Correa added the terrace in the double height space, which is possible because of the tropical conditions and there was greater transparency through these large openings and

terrace gardens on every floor. Every single apartment has these terraces these private terraces or private verandas or private terrace gardens on every floor.

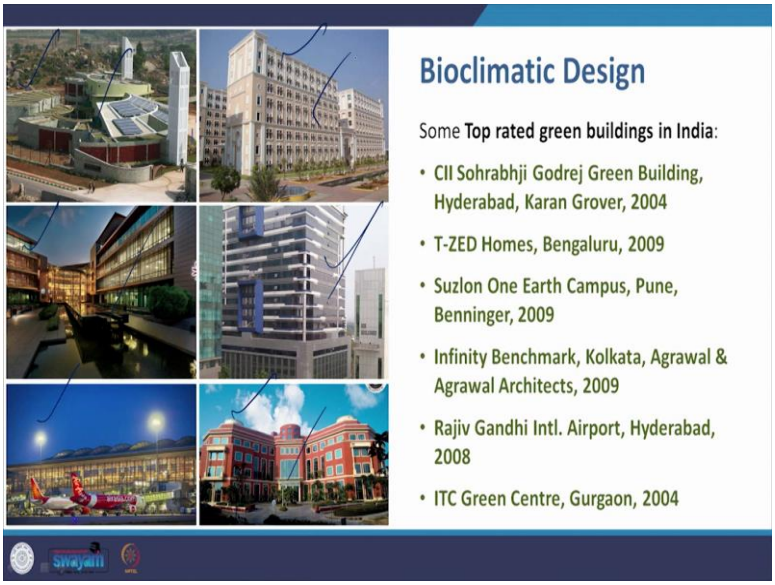
(Refer Slide Time: 12:39)



Now, what is bioclimatic design? That design of buildings spaces that is based on the local climate and the aim is to provide thermal and visual comfort by plus making use of solar energy and other environmental sources. So, if I were to take a section of a bioclimatic house, it would have the breeze flowing in through and through it would have the use of the sunlight, use of proper shading devices et cetera etcetera.

Use of for example, this kind of ventilation, this kind of a louver vent here at the top to allow for the hot air to move out of the building. Or for example, this work by I believe Anupama Kundoo in Auroville, and here again you find these louvers, these concrete louvers that are movable and that help in controlling the microclimate or the indoor thermal comfort conditions of the space. The basic elements are passive systems for heating, cooling and lighting of buildings.

(Refer Slide Time: 13:45)



Now, there are some top rated green buildings , when I say bioclimatic design, I am primarily referring to what we call is green buildings today. So we have the CII Sohrabhji Godrej Green Building in Hyderabad by Karan Grover. We have the T-Zed Homes in Bangalore in 2009. We have the Suzlon complex by Christopher Benninger in 2009. We have this apartment this infinity benchmark corporate building in Kolkata by Agarwal and Agarwal architects in 2009.

We have the Rajiv Gandhi International Airport in Hyderabad in 2008. And we have the ITC Green Centre in Gurgaon in 2004, what do you find here? These are buildings spread all over the landscape of our country, buildings in Hyderabad, in Kolkata, in Pune, and in Gurgaon, in Bangalore, everywhere.

These bioclimatic responses are being done by architects who are making that extra effort to try to make their buildings energy efficient climatically responsive. Let me also tell you one thing, this is not going to be an either or situation tomorrow. It is not going to be a matter of choice but a matter of necessity. You will be required to design energy efficient carbon neutral buildings in the days to come.

There will be a tremendous amount of push in every industry because we have to meet our targets of carbon neutrality. If Europe is targeting 2050 India is targeting 2070, do not forget there is also a sub target India has to meet by 2030 and the sub target is that we have to nearly bring down our carbon emissions by half by 2030.

We are around 2.4, 2.5 billion tonnes carbon emissions per year, we are targeting to come down to about 1 billion tonnes by 2030. So it is not just the end goal at 2070. There is also the sub goal in between. Now these targets are going to be written in concrete from tomorrow.

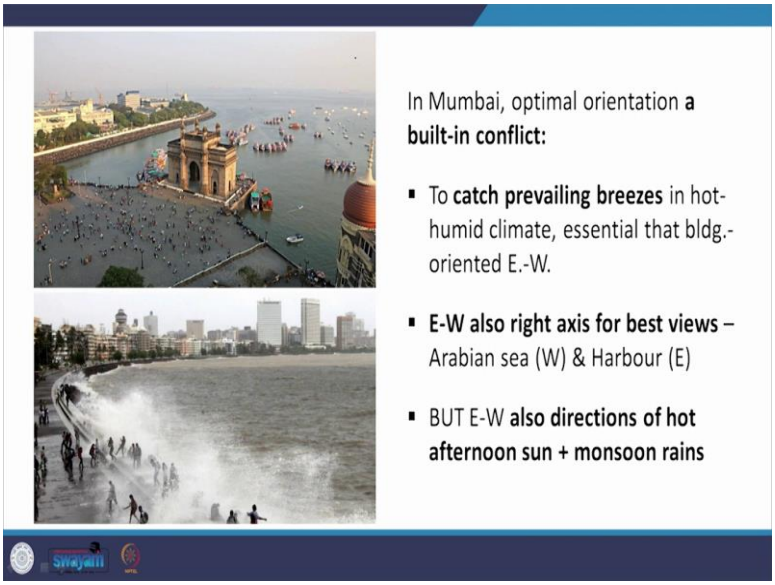
There will be so strongly needed, because we simply cannot afford to allow this kind of climate change and global warming thats going on. What is the code red? I may have talked to you earlier about it, code red was mentioned a few months back when COP26 took place. I just I think just before that, just during that time, that if we exceed 1.5 degrees Celsius rise in temperature from pre industrial levels, we will reach a situation which will lead to near irreversible climate change globally and global warming on an unprecedented scale.

You have already seen the impacts , things that have never happened before flooding in Frankfurt , droughts, they were never been droughts, melting of glaciers , rising of sea levels , a very genuine, a very genuine concern today, that which was only in people's minds few years back a few decades back this might happen, sea levels will rise, islands will sink is now becoming a reality.

It is not something that will happen 30 years from today, it may happen 10 years from today, 5 years from today. So, as an architect, one of the critical areas that you will be required to work in is energy efficiency and climate responsiveness. Of course, there are many other issues that are coming up because many other issues are becoming important. Resilience, mental resilience is becoming important. Universal access of buildings is becoming important.

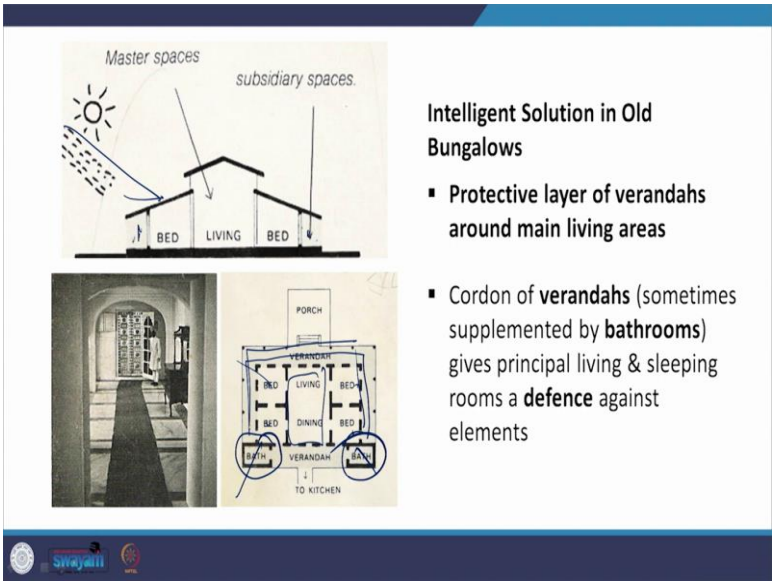
These are all scientific things, these are all scientific things. And the architect tomorrow will have to have a very strong scientific mind set. Of course, creativity has to be there, but please remember, as I will keep on emphasizing this, please do not neglect the scientific subjects in your studies.

(Refer Slide Time: 18:04)



In Mumbai the optimal orientation is a built in conflict and what is the conflict that to catch the prevailing breeze in this hot humid climate of Mumbai we have it is essential that we have the building orientation east west. But east west is also the right access for the best views from the Arabian Sea in the west side and the harbour on the east side. But east west is also the direction for the hot afternoon sun and the lashing monsoon rains of Mumbai.

(Refer Slide Time: 18:20)



What is the intelligent solution? The intelligent solution I believe came up in the colonial times with what came to be known as the bungalow. Bungalow is coming from the word Bangla and I believe it is coming from somewhere in the western regions of India and or

rather the eastern regions of India towards Bengal and the idea was very simple. You have a house which is got this verandah running all around it.

And as a consequence of that, all your living areas, never get direct glare of the sun it is completely cut off. This is the verandah and it is cut off. So, now, these living and dining spaces for example in this bungalow are in between the bedrooms are on the periphery and the fact the verandah is on the periphery.

Now, why treat the bedrooms in such a manner? I mean true that the veranda would cut off the sun. But why have the living dining in the centre and the bedroom inside? Very simple living dining are spaces that will be more used during the daytime when the sun would be at its peak.

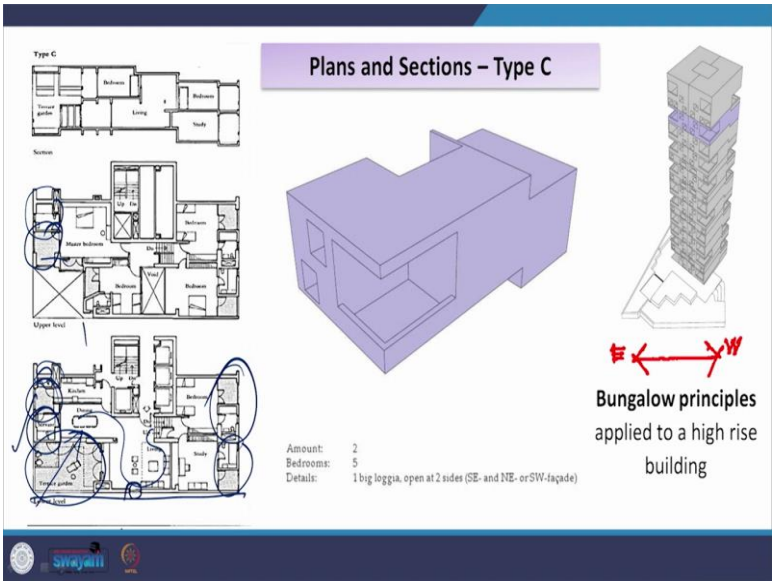
The bedrooms would be more use in the night time and therefore keeping them on the outer side would allow for the night breeze to come in the sun is not there at all. So as it is the verandah is taking care of the glare of the sun. There is another addition that they have done they provided the bathrooms on the other side that also cut the sun as much as possible and provide a defence against these elements.

So now, this kind of a configuration works well against the solar glare, it works well against the monsoon rains, it allows for maximum natural ventilation for the breeze to blow in, through and through the house.

(Refer Slide Time: 20:19)

These are some of the traditional Indian bungalows that we see. This, of course, is a modern derivation of a traditional bungalow.

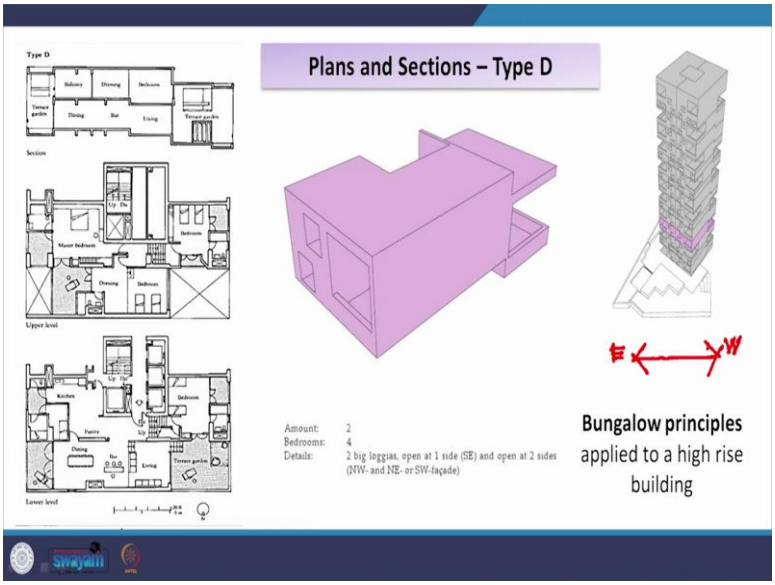
(Refer Slide Time: 20:25)

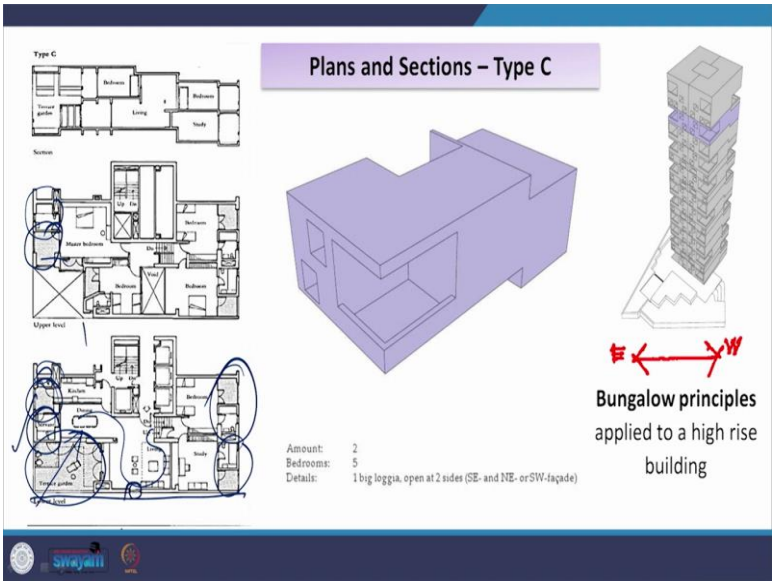


Now, coming to the plan itself of the apartments of Kanchenjunga, we find the bungalow principle applied to this, let us look at it. This is the ancillary space the washrooms or let us come to the lower level of this apartment. We have got terrace garden here, we have got a servants room, we have got a bathroom, then there are other facilities and this is the interior of the building.

Now we have got again these ancillary facilities on this side. And as a consequence of this, all your living spaces are within. You do get this diffused light from the terrace garden, and you do get light from other sources, but much of it is enclosed, and this wall is more or less blank with just this one small fenestration. So, he is attempting to create the same bungalow principle in the apartment block.

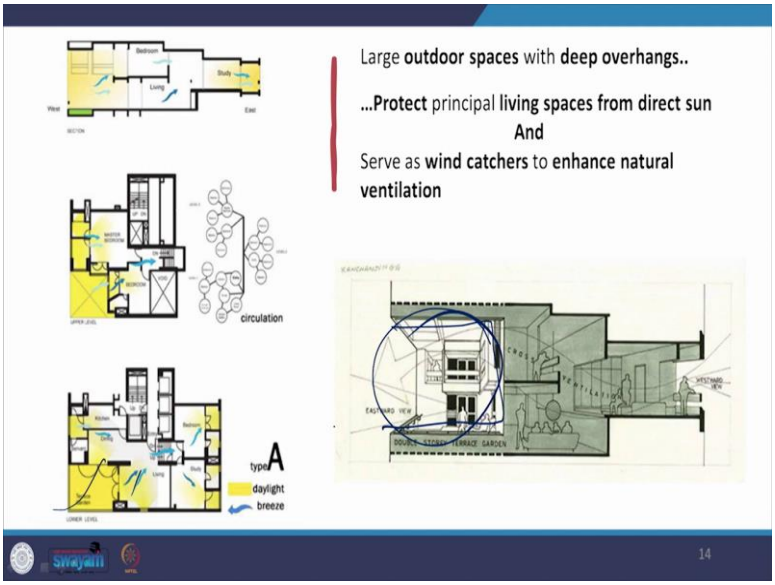
(Refer Slide Time: 21:21)

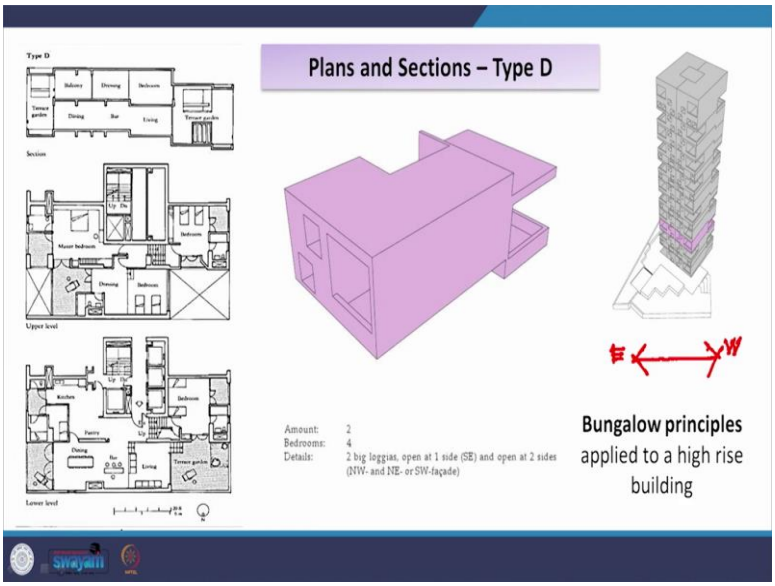




He does that in type C, he does that in type D, he is trying to keep the living spaces as protected as possible from the direct impact either of the monsoon rains, or the glare of the sun.

(Refer Slide Time: 21:39)

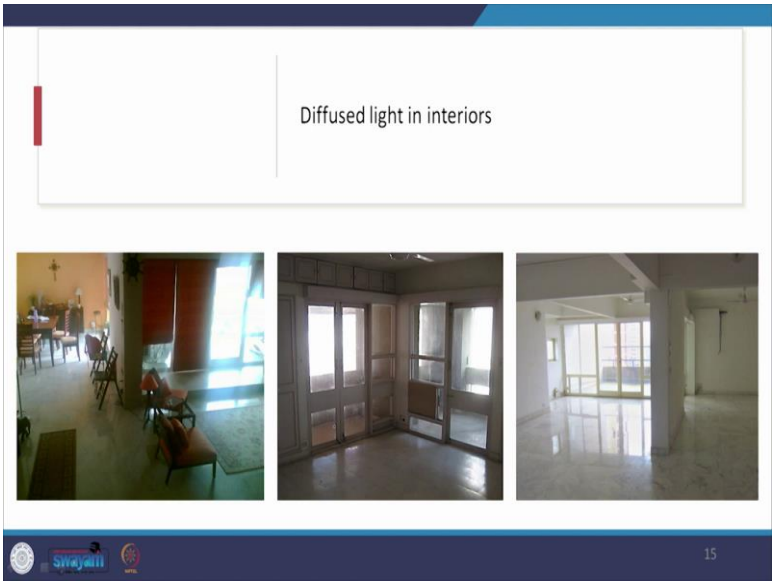




Because this orientation like this, the east west is like this in this case. Now, large outdoor spaces are provided with deep overhangs to protect the principal living spaces from the direct sun and also to serve as wind catchers to enhance the natural ventilation. So what he is done? He just provided the double height space that double height space in unite de habitation was the living area of the house, the living room of the house.

In this case, it becomes an open space , a verandah , a sit out. And this is how the daylight filters into the house. I am not saying glare, I am saying the daylight the diffused light. And then there is the action of the breeze within the house. And this entire volume it also serves like I said as a wind catcher, capturing the wind and pushing it into the dwelling.

(Refer Slide Time: 22:35)



And so when you look at the interiors you find diffused lighting coming in the dining area, the living area and the other spaces.

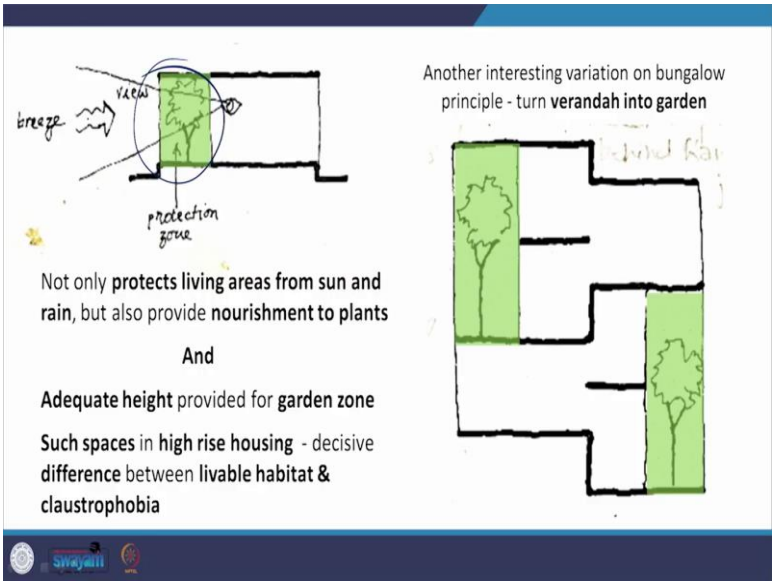
(Refer Slide Time: 22:44)

The outdoor space then becomes a garden terrace or a terrace garden which is a modern interpretation of the traditional Indian verandah. It is a double height verandah which has been taken out of the building corners. As a result of that you get views on two sides. And the small balconies overlook the terrace because the houses duplex.

So, these balconies overlook the terrace not only makes it a private space for the family and it is not like your neighbours are on the floor above and they are looking down a space that is your private space but this same family unit and it is their space looking down into the bigger

verandah. The sky verandah below and thus creating this intimate domestic scale in the giant order of the building know. So the apartment, as you sit out in this space, even though you are high up in the apartment, you still have a feeling of this, very, intimate scale.

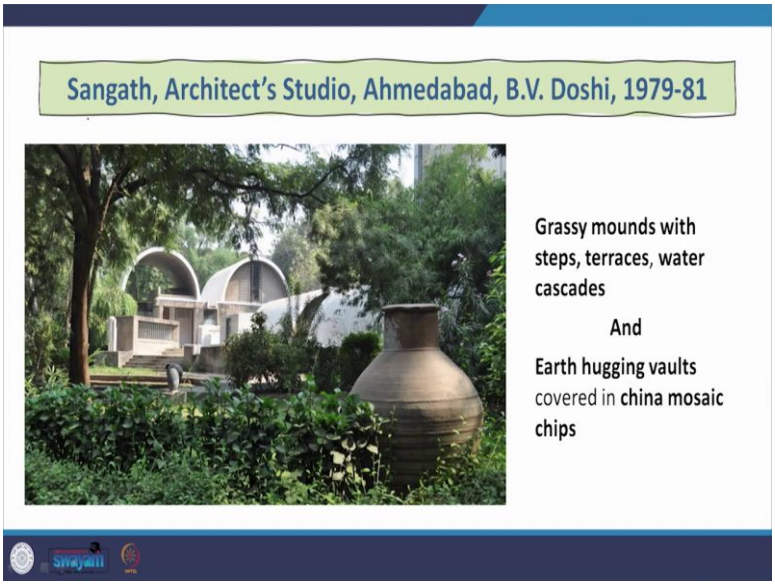
(Refer Slide Time: 23:42)



Now there is another interesting variation of the bungalow principle or variation on the bungalow principle rather and that is converting the verandah itself into a terrace garden. Now, this did not really happen in the sense that the idea was conceptually seen by the architect and that was that there would be a protection zone and a terrace a garden would be planted in this in this zone in the verandah space.

Not only because it protects the living area from the sun and the rain, but also because being this double height vast space, it would provide proper nourishment to the plants , adequate height for the garden zone and such spaces in high rise housing are important. Because this makes the decisive difference between actually making a habitat that is liveable or creating a claustrophobic environment. That you do find today in these tall high rise apartments closely packed together.

(Refer Slide Time: 24:45)

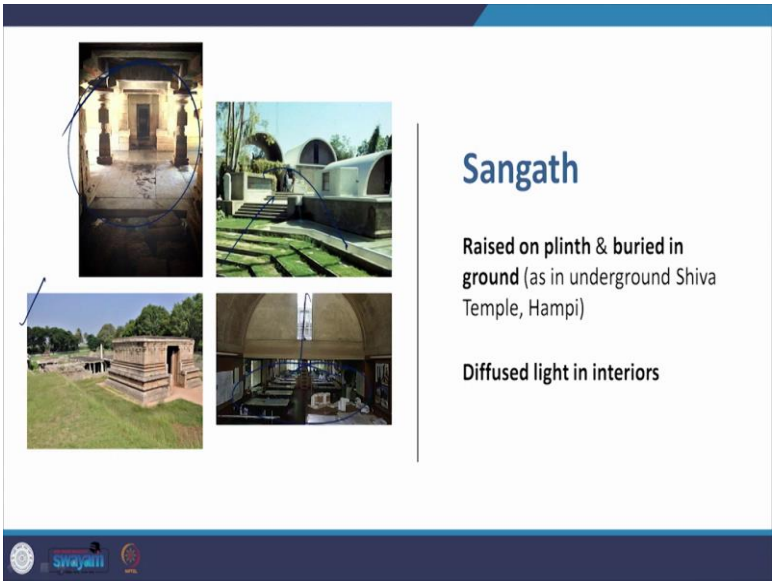


And then we come to one of the most interesting, remarkable buildings in modern Indian architecture. The Sangath , the Office of the architect B. V. Doshi from 79 to 81. Grassy mounds with steps, terraces, water cascades, making it a beautiful serene, harmonious environment with nature. And it is not the building that stands out as a remarkable form. But actually the building organically merges with the surrounding landscape. I am as if speaking the language of Frank Lloyd Wright and the earth hugging vaults, the structure is predominantly subterranean and it is covered with China mosaic chips on the top.

(Refer Slide Time: 25:29)

So this is a subterranean building. As you can see, this is the section and part of the building this much, it is underneath, it is cut into the earth, earth on both sides, and the barrel vault is on the outside.

(Refer Slide Time: 25:45)



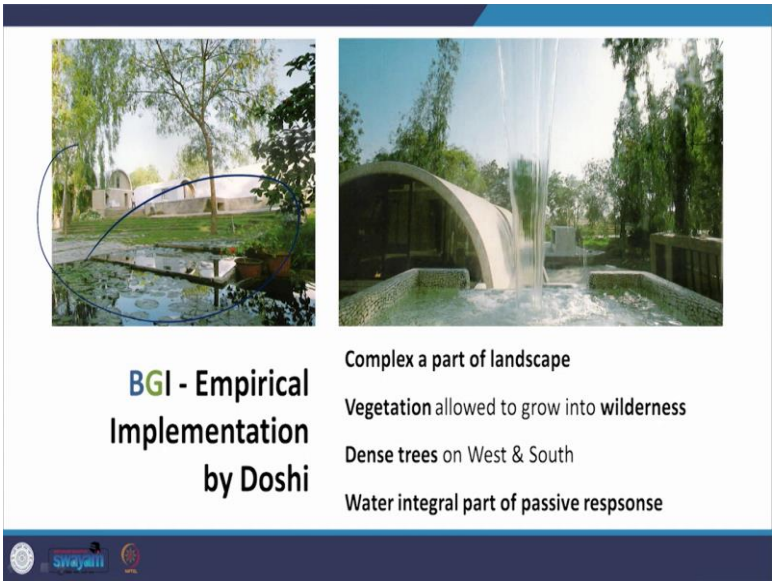
And then if you look in, it is raised on a plinth and buried in the ground, we also find the same principle in the underground Shiva temple at Hampi. And we get that diffused light in interior. So this is the Shiva temple at Hampi. This is the underground space that has been created in that temple. And here you find you rise up the plinth , then you go down into the subterranean structure. And this is the studio in the subterranean structure, and the light is filtering in from the barrel vault and it is a diffused light.

(Refer Slide Time: 26:17)

Now, what is I am just deviating a little bit to come back to Sangath and talk about right now, the upcoming concept of blue green infrastructure, I had to find a spot where I can bring this idea to you because this is a contemporary idea that is being talked about in modern day urban design and planning and large scale projects. The blue green infrastructure is a combination of blue there is a water and green that is a vegetation components versus the grey infrastructure of roads and settlements and canal.

So, extensive blue green infrastructure, or extensive blue green components within the grey infrastructure lead to a healthier environment. So in urban planning, where there are water bodies, and land which is interdependent, they grow with the help of each other, while offering environmental as well as social benefits. The important objective of the blue green infrastructure has been incorporated with the master plan or Delhi of 2041.

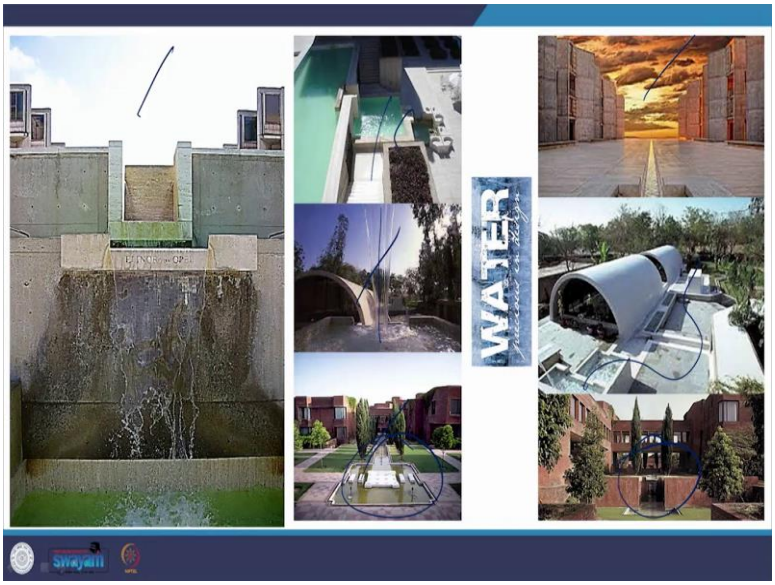
(Refer Slide Time: 27:22)



Now, Doshi, at that time, there was no such thing defined as blue green infrastructure, but he empirically applied it. Like Charles Correa empirically applied the green roof in the MRF building, Doshi applied the blue green infrastructure in Sangath. It is a complex is a part of the landscape, rather than the landscape being a part of the building or the building complex.

The vegetation is in fact allowed to grow into kind of a wilderness. It is not like properly demarcated and well aligned hedges, et cetera. There is dense trees in the west and the south, and the water is an integral part of the passive response.

(Refer Slide Time: 28:10)

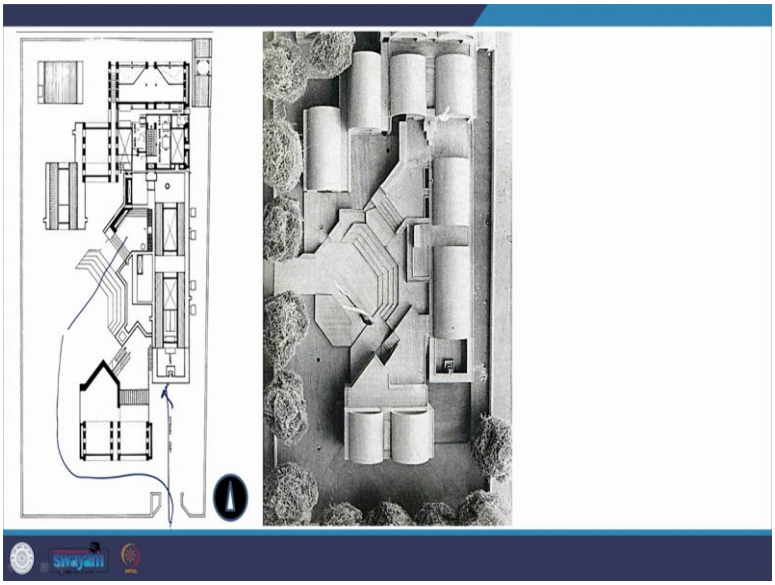


Water is now , this slide actually shows you different kinds of aesthetically beautiful look at water in projects in the Salk Institute by Louis Kahn in the Mughal Sheraton, where the response was based on Mughal architecture. And then you find it here in Sangath, where the water flows down the channel, and it goes all the way. And it is then reclaimed. It is a part of the rainwater harvesting cycle.

(Refer Slide Time: 28:44)

These are the water channel images of Sangath. And the slide itself makes you want to visit Sangath. It is such a beautiful building. So serene and so pleasant to look at.

(Refer Slide Time: 28:56)

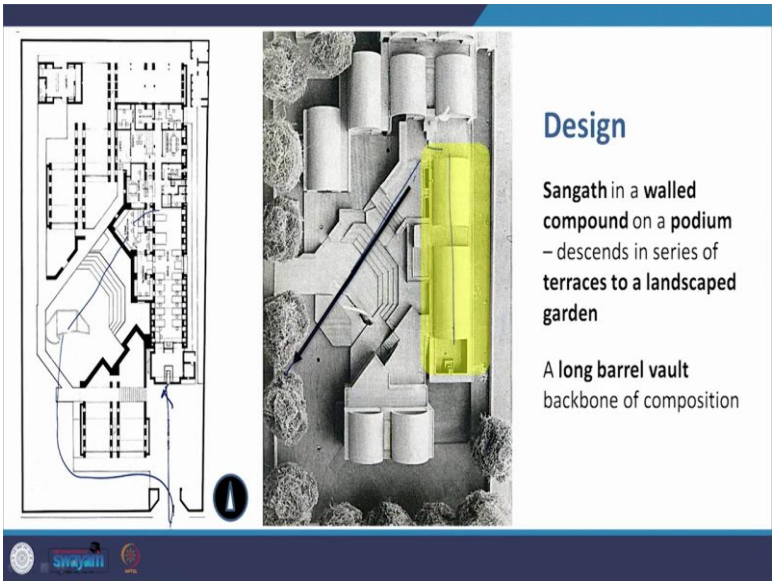


So here we have it. This is the plan of the building, as you are approaching the building. Now, there is something Japanese about this building, and what is that? You see, there was the classical processional approach in Greek architecture in Roman architecture that was also adopted by the European architecture and we found a reflection of that in modern architecture.

But in Japanese gardens, the approach is different in that there is no processional approach. There is no bang, big thing at the end of a road that leads to it. You are constantly drawing yourself towards that big image. But what is there is that it is a meandering pathway of a series of event. And you keep looking at that till you come to the end of your journey.

So when you do enter the Sangath, you assume that this is where the entrance is going to be, as you would assume naturally for any building. You come in, and bang in front of you is the entrance. No it is not. Because you actually have to deviate in this direction, go through the green area, climb up this open air theatre , these steps and then enter the building from behind.

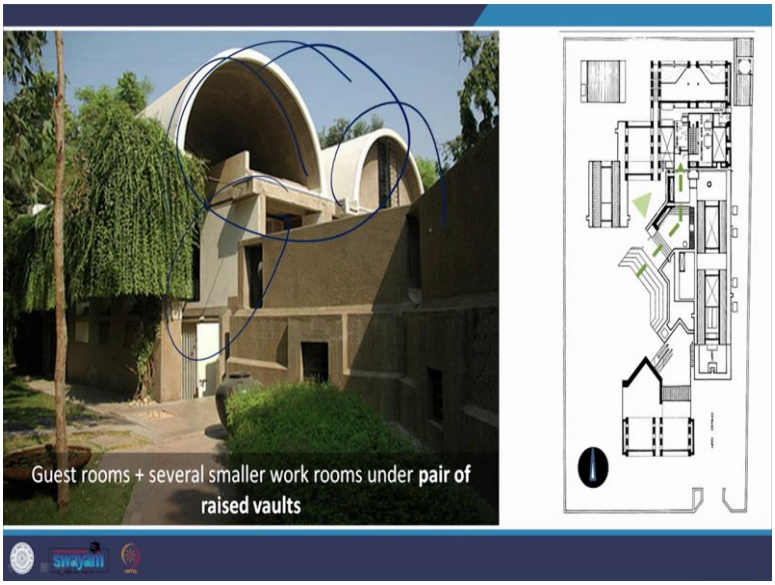
(Refer Slide Time: 30:13)



And this is the way I am sorry, I need to place it better, even I am mistaking the pathway myself, you need to actually correctly visualize it, because here it is the pathway in the model. And I believe that somewhere in the back you are entering into the building. So that is an amazing thing, that you do look at the building in front of you, but you do not enter it, you enter it somewhere from the back of the building.

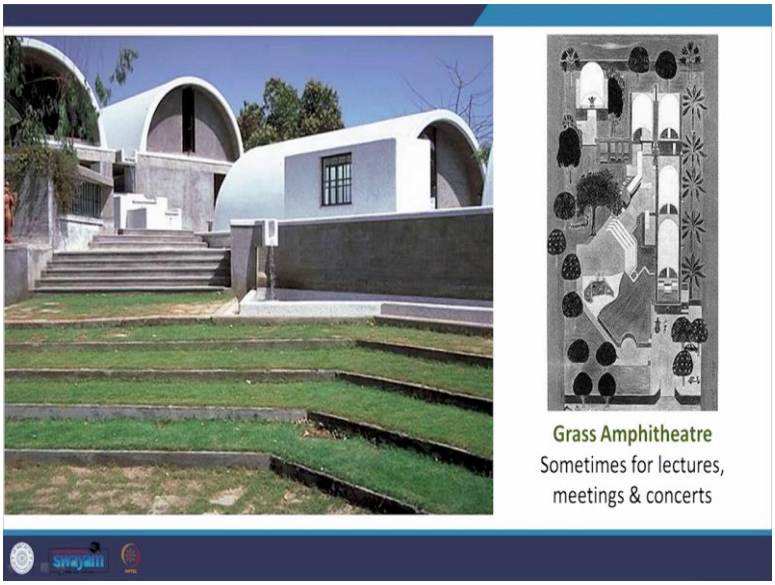
So, design of the Sangath is a walled compound on a podium that descends in a series of terraces to a landscaped garden here. So I climbed down towards the garden from the building itself. And there is this long barrel vault that forms the backbone of this composition.

(Refer Slide Time: 30:58)



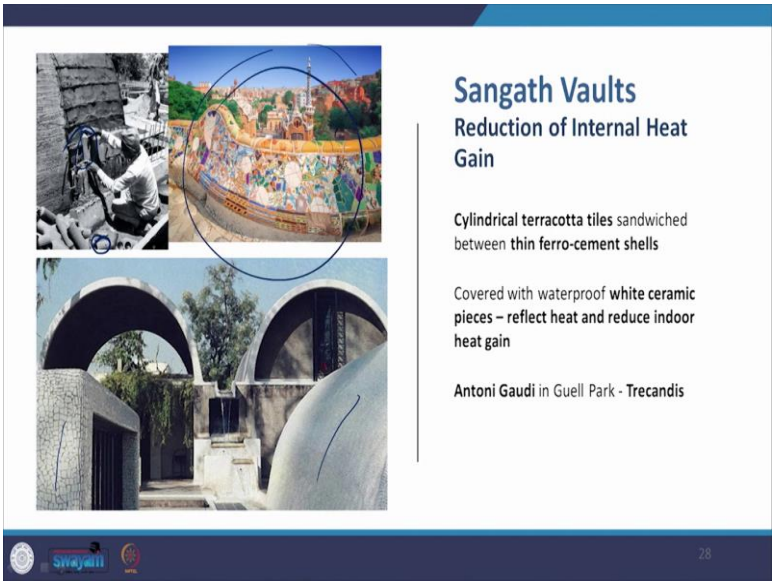
Now, these guestrooms are provided at the back. And there are several smaller work rooms that are under a pair of these raised vaults. So, the guest rooms here, these are the raised vaults at the back. In fact, if you do get an opportunity, please look at pictures of the vaults study that were done through some simple and crude model that were made for the Sangath project. And this is how we see this axial this movement here.

(Refer Slide Time: 31:27)



This is the grass amphitheatre which is also used sometimes for lectures and meetings and concerts.

(Refer Slide Time: 31:33)



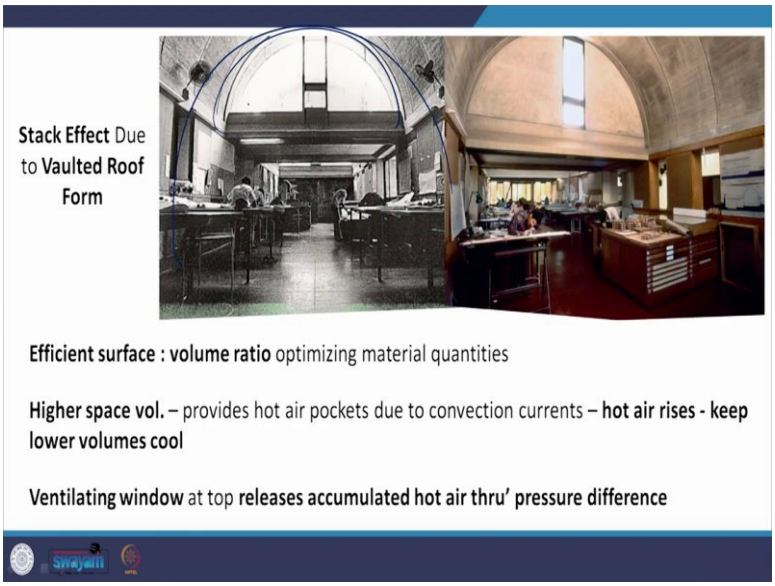
And then there is the reduction of the internal heat gain. Now, if you watch very carefully this picture, this barrel vault that is being created in the barrel vault, there is one layer beneath

over this these elements this terracotta elements are being placed, cylindrical terracotta tiles are being sandwiched between these thin ferro-cement shells.

Then, after the ferro-cement shells have been laid, they are covered with white ceramic, broken tile pieces, as you can see here, here, they reflect the heat and thus reduce indoor heat gain. So the ceramic tiles do the job of reflection, but whatever is able to go through is then fended off by the air gap that is created because of these cylindrical terracotta tiles. So, because they create that air gap in between the two layer of the ferro-cement shells.

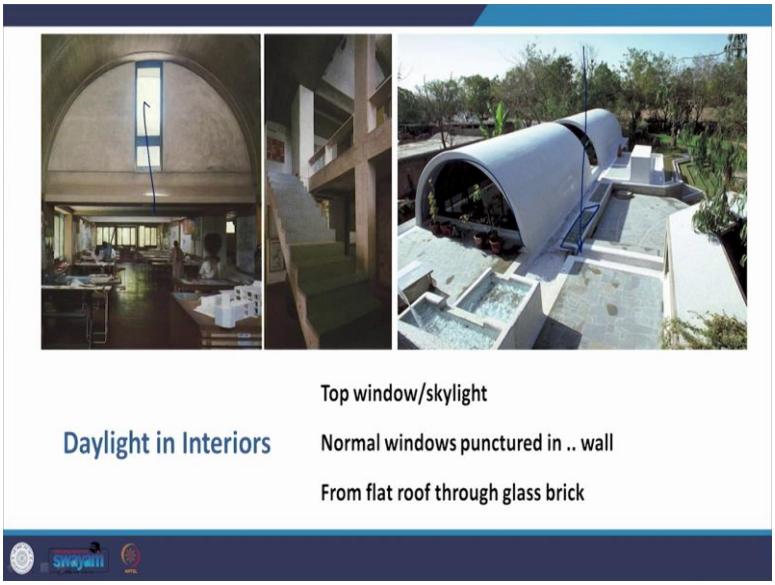
Now this work of broken ceramic tiles is called is trecandis and trecandis was first , we find it its major use in modern architecture by Antonio Gaudi in, for example, the Casa Batllo a house that he did, or even in the Guell Park. This is the example of broken ceramic tiles coloured ceramic tile is being used in the trecandis there.

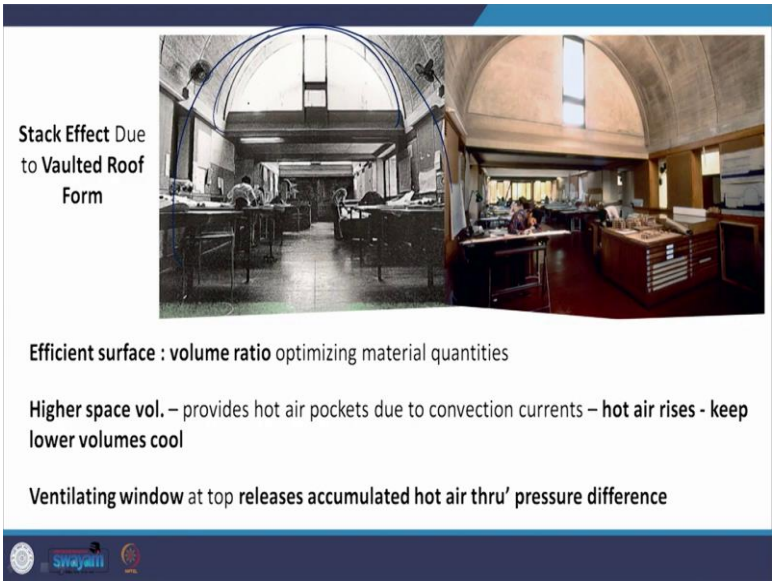
(Refer Slide Time: 33:06)



Now the stack effect is also being created. A convection current is being generated in the workspace and because of the vaulted form above. So there is an efficient surface to volume ratio, which optimizes the quantity of materials that is used. This high space volume like I said, is one of the vital one of the important things we need to generate that convection current and the stack effect and provides the hot air pockets that rise up and they move out from the openings in the barrel vault and the lower the cooler air moves in.

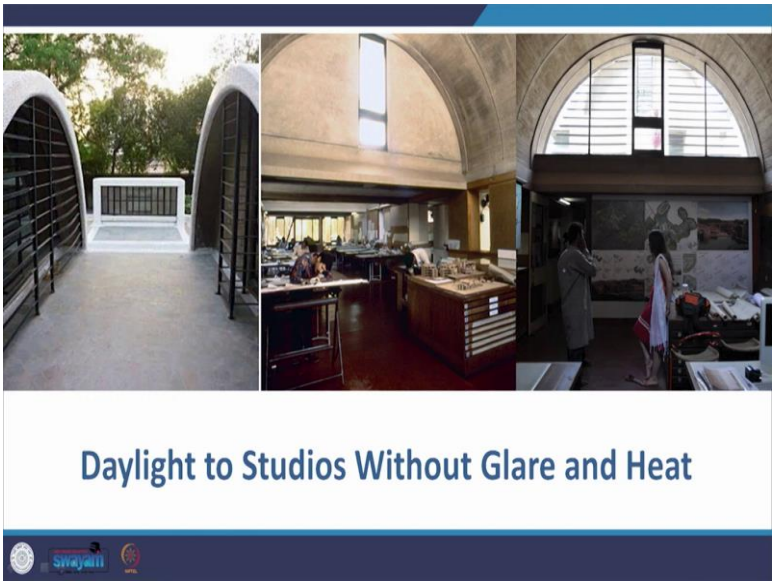
(Refer Slide Time: 33:49)





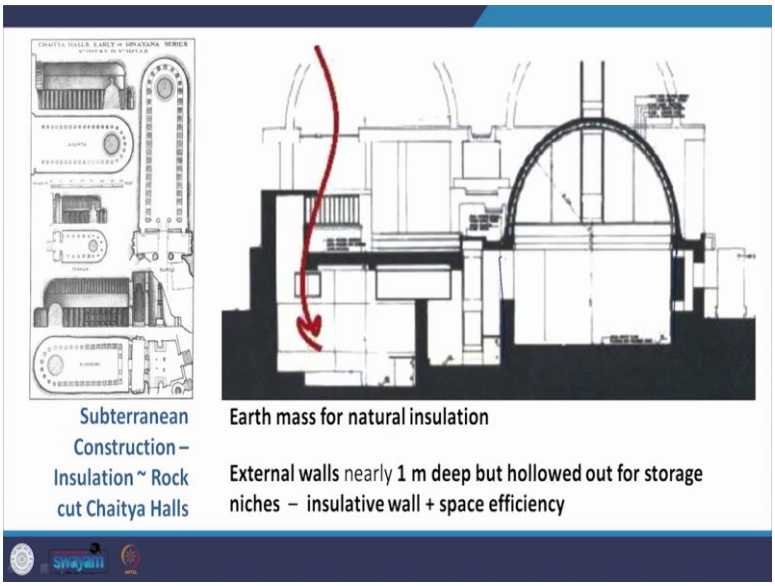
So the daylighting in the interiors is diffused. It pulls in from the skylights that are there in the barrel vault. And even there is a full window here. If you just go back you see the full window here. It is pulling in the light and the normal windows, they are punctured into the wall. And there is also this flat roof in which there are these glass bricks provided and light filters in through this also. And over these glass bricks the following water is passing.

(Refer Slide Time: 34:22)



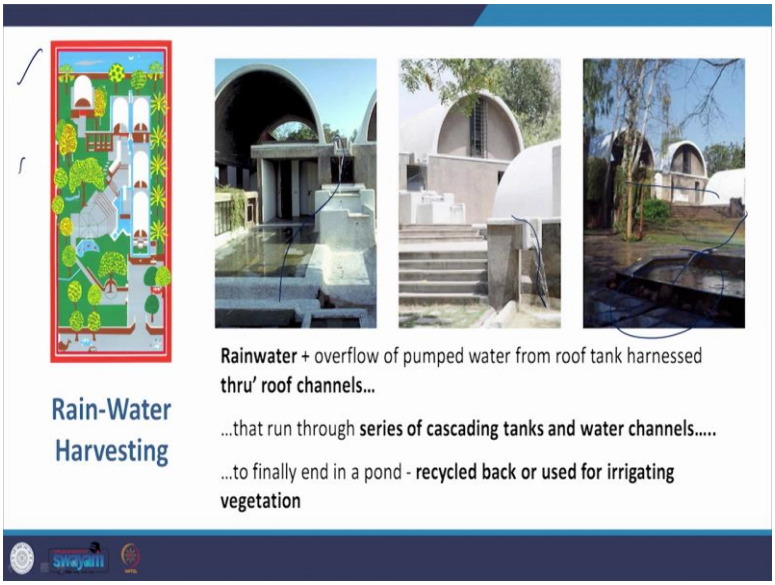
So daylight to the studios is without glare and heat.

(Refer Slide Time: 34:26)



When we talk of the subterranean structure we are also reminded of the Chaitya halls and the rock cut chaitya halls. And here we have it. Because of the earth mass on either side it creates natural insulation. But they have taken advantage of these thick external walls which are nearly one meter deep by hollowing them out and creating storage niches in them. So it is insulating, as well as there is space efficiency through that.

(Refer Slide Time: 34:53)



Now rainwater harvesting in cycle. This of course, is a classic example of B. V. Doshi making the drawing of the building as a Rajasthani painting. As you can see it lacks perspective, it does not have the feeling of depth in it, it is flattened out as it would be in Rajasthani painting.

Now, the rain water and the overflow of the pumped water from the roof tank is harnessed through these roof channels, it runs through the series of cascading tanks goes on and then through an underwater channel, it comes into this pond here and that is recycled back and it is used for irrigation of vegetation. Now, please remember this is a project in the beginning of the 1980s ended up in 1981. The idea of rainwater harvesting as a necessary concept in buildings has really caught on in the 21st century, when we are focusing on sustainability and green building design.

In fact, it is one of the critical principles for green building design today. And in some cities you cannot have the building be passed without a proper rainwater harvesting mechanism. Something that came organically to B. V. Doshi in Sangath in the 1970s, late 70s, early 80s.

(Refer Slide Time: 36:16)

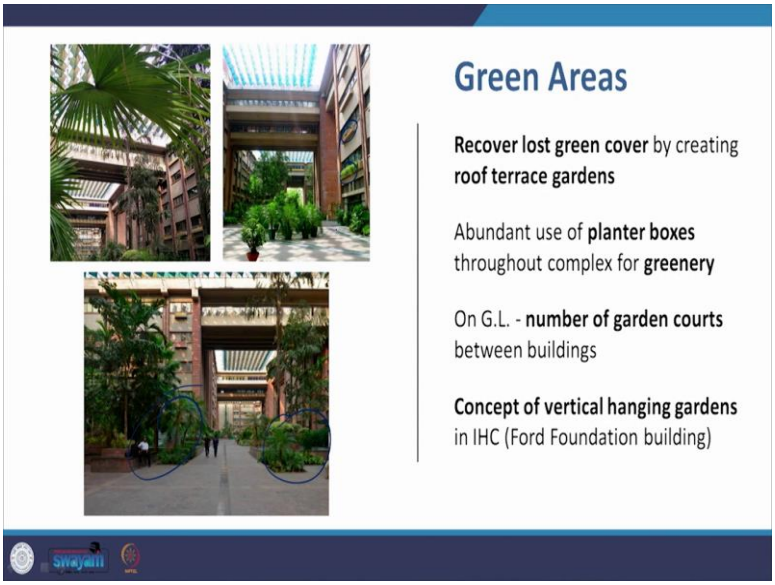
And why, simply because they were trying to make the buildings responsive to the climatic conditions. So when we now go to the India habitat centre by in New Delhi by Stein, if you just look at the climate response and this was done in 1993, it is again by non-mechanical means. Now the interesting part is that by this time , economic liberalisation had already happened in India. Of course, the building began before the liberalisation actually happened, but we were already in the throes of beginning to use active systems in our buildings.

But India habitat centre continue to depend on predominantly at least in the over the courtyard planning et cetera. The non-mechanical means dominating the building for climate control to reduce solar heat gain , the buildings are placed around shaded courtyards and the courtyard itself become ideal interactive spaces, something that was an exceptive thing in traditional Indian architecture. The courtyards , the verandas automatically used to become spaces in the daytime during the hot sun, where people would congregate together for a cup of tea or for a discussion.

So the courtyard was an ideal interactive space , IHC as many of you might have seen the pictures and many of you might have visited is a typically modern building. It is a typically modern convention centre, exhibition centre, seminar centre. But the overall space organization is so traditional, this massively beautiful courtyard, which many of you might have actually visited is covered with this louver, which is mechanically movable, and it generates amazingly interesting spaces within.

There is a huge this amount of greenery used there , landscape elements used and is a completely pedestrian complex as all the traffic is diverted to the basement right from the entrance of the IHC.

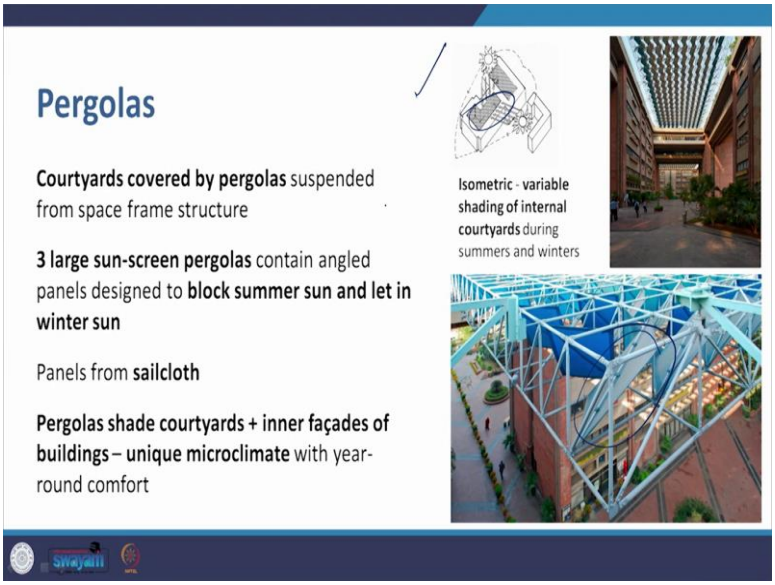
(Refer Slide Time: 38:20)



Not the green areas. We recover the lost green cover in this building by creating terrace gardens, by abundant use of planter boxes throughout the complex. On the ground level there are a number of garden courts in between the buildings and there is also the concept of vertical hanging gardens.

These elements, these planter boxes that you see, which is also found in the Ford Foundation building done by Stein, I showed in the picture earlier. This idea of recovering lost green cover through terrace garden is again a fundamental principle of green building design, which was then done organically by Stein.

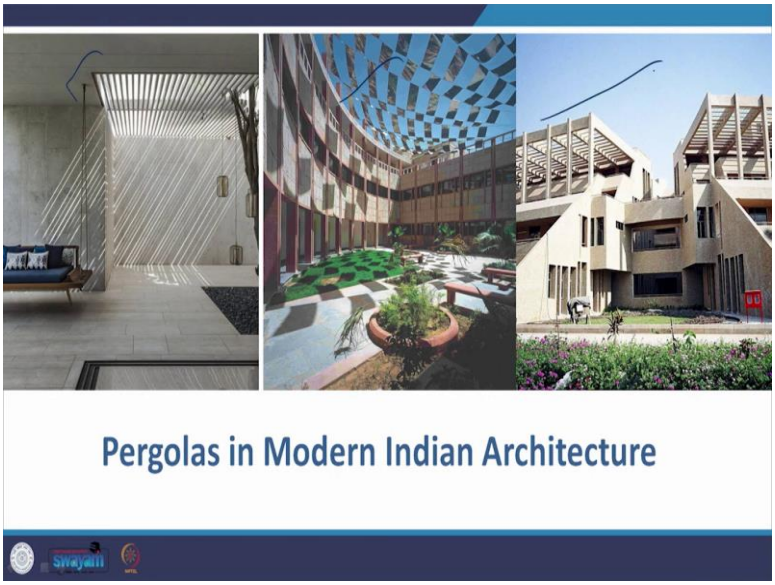
(Refer Slide Time: 39:03)



And the pergolas. The courtyards are covered by a pergolas suspended through a space frame structure. So, the idea is coming from earlier, but now the technology being used is a modern technology. There are three large sunscreen pergolas that contain these panels which are angled and they block the summer sun and let in the winter sun and the panels are made of sailcloth.

Now if you see the isometric here for example, there are variable shading of internal courtyards during the summers and the winters and the pergola the shade, the courtyards, the shade the inner facades of the buildings and thus create a unique microclimate here in here out. If you have visited as I have had the fortune of visiting the courtyard space, it is an amazing space. It has its own microclimate. You walk out the hot sun of Delhi, you step into the courtyard, you step into another world altogether.

(Refer Slide Time: 40:07)



These are some of the pergolas as they are being used in modern Indian architecture today. And the pergola though being an idea that evolved much earlier is now being used in our buildings in a completely new way with the kind of materials we have today.

I will stop here. Thank you so much for joining me today. And we will continue with some more case studies. And we will try to look at other aspects also along with climate responsiveness as we continue to study one of the most important segments of Indian architecture, critical regionalism. Thank you.