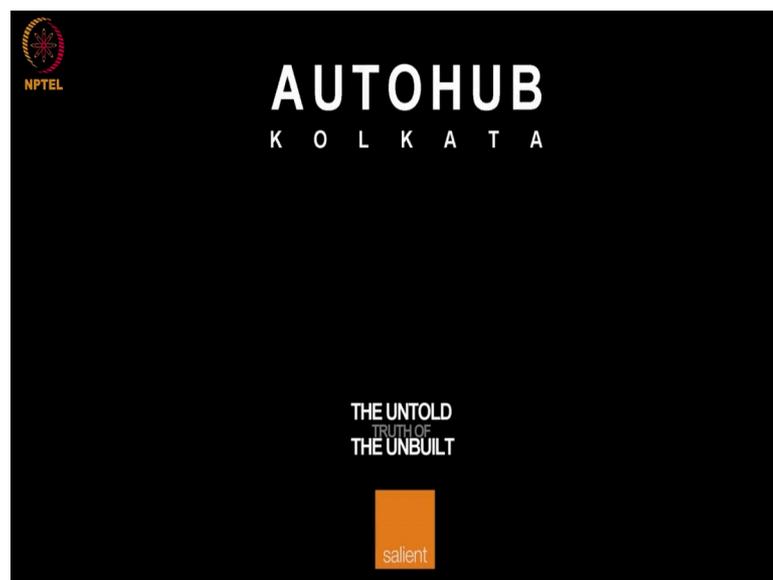


Glass in buildings: Design and Application
Prof. Vivek Rathore
Department of Civil Engineering
Indian Institute of Technology, Madras

Lecture - 86
Case Study: The Untold Truth of the Unbuilt

Welcome viewers, it is a great opportunity to present a thoughts in facades to Saint Gobain Glass Academy, I really want to congratulate the initiative by them. Well, today I will take you to 4 case studies which essentially we were thought that facade is not just a façade. It makes sense to the environment, to the building and its occupants. The 4 case studies, I will take it to one by one.

(Refer Slide Time: 00:55)



The first one is called Autohub that is in Kolkata.

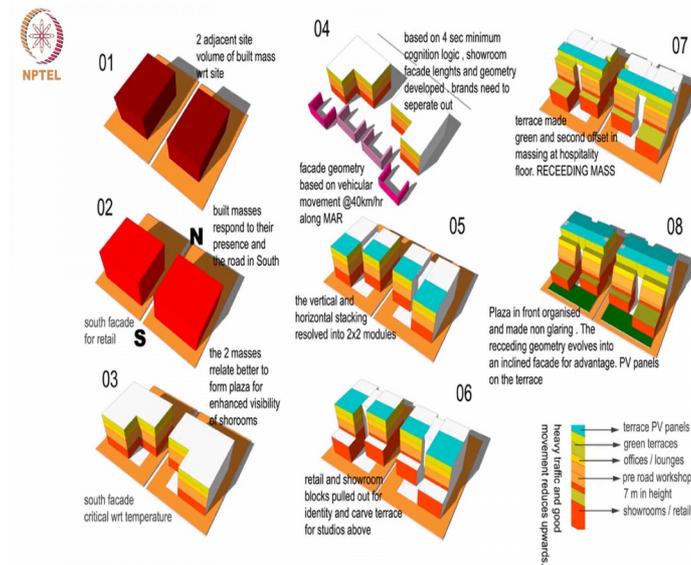
(Refer Slide Time: 01:04)



This is essentially automobile hub which will have showrooms, offices, designer studios all to let do automobiles first ok. FLV outlets and also have workshops basically it is about 3 road workshops, not the full fledged workshop. So, these were this was the kind of a program which was asked to location is Rajarhat. So, we have a client proposing to want to do this one, but the scale was quite small, it was only about one half acres of land. So, we suggested that why do not you make a substantial viable development and get your adjacent plot owner also to participate in a similar; together you make the entire mix more viable.

Well, that clicked and it worked very well, that was all about the program and a building. But the challenge was that the building had a south facade and as an automobile centre they want transparency. So, meaning transparency on a south facade was the first thing that occurred to aligned, that was very challenged to actually weave together. The other was how do we take the workshop in which is the high level, to have a facade which make sense to a car or a automobile.

(Refer Slide Time: 02:33)



It is a character, character which we do not even which (Refer Time: 02:36) which have to do something which technology. There were offices also, they were also looking because looking in front because all the adjacent plots have buildings and we did not want to look straight into the buildings neither did we have a liberty to carve into ourselves off sets of gardens and greens. So, there is almost like a tight site wanting it to say that I want to survive mathematics in depleting real estate.

So, there where a facade field in control and I want to take you to the journey. So, that entire thing started with a site of course, I told you they wanted a site and they wanted to watch one of the building to perform better. So, say green building is ok, but beyond green a lead certification what can we do. So, we try to say that you know let us get what the city lagged. The city lagged dreamed it all, we did not have green and this one and a half acres barely could provide any (Refer Time: 03:31) in green.

So, we looked also the program, can the facade also take care of green can we actually have substantial green on the facade without giving way to reduced affair. There was need to get little quality air induced into the building because, south was from the highway having the Rajarhat developing new town. We have more dust in the air which actually can be tapped in for fresh air.

So, we have to be some kind of filtering systems. So, when it came as massing we could work on the massing which could accommodate a lot of visual incidents to the highway

because, showrooms need to be looking straight more transparency is needed from the road side. So, that is imminent and we have to provide first for that same thing, well we try to push in idea of having the best performance glass. In terms of its UV, performance other ratings without compromising on the rendering factor and VLT.

Having said all these things we kept up with solar farm on the top, we have to make a facade in 3 distinct characters. The lower part was engaging itself with the roadside and at more transmits. The above had an offset to the terrace in green, but about that we had a workshop layer. The workshop which basically caters to the free road, (Refer Time: 05:14) to 7 meter heights which do not need as such a presence from the roadside. But, they were actually wanting to take in light and fresh air and they were not conditioned. And, above that we had offices which had the view as well as everything right in front facing south.

(Refer Slide Time: 05:27)



So, we took its story from the top we had offsets in stick take care of green, the green would take reduce the glare because, normally this huge extensive glass facades act to the glare on the road. So, while we are driving there would be a actually a sharp glare on your windscreen which might be our building; actually pushing our chance in a reflecting lot of sunlight and glare on your pedestrian traffic as well as the vehicle. To add to this we have also had a metro which was actually moving at a level almost about 11 meters from the ground level.

So, that is another kind of a sound that we have to noise that we have to cater to. So, we will actually looking for a kind of a opaque performing facade also. So, on the above levels with the offices we try to take care of layering of PVC cells and can the cell can be actually encapsulate a skin system which will have polymer solar cells that will add not only to their reducing the glare component or the insulation, they will also help in inducing energy.

So, as not to be too impervious (Refer Time: 06:57) to the view, in the lower level when we had the workshop we had a skin system which had an ExoSkin system, had GRC louvers. And, that actually broadly all that the massing was done in the and that they were formed building facades which would allow which is actually louver system which will allow the wind to pass through. In fact, the plantation above would actually increase and reduce the increase the green proportionate and reduced the glare to the reflective glarer skin.

(Refer Slide Time: 07:25)



And, the filter air which goes though those green louvered facade which we tapped and taken inside the workshop. And, they can be actually be allowed to take inside the air fresh air from there because, it was green we could expect certain amount of transpiration performance reducing the heat load. So, that would add to a little better performance in terms of the fresh air, reduce temperature. They are allowed to indoor air

quality and temperature both. In this entire effort we were giving birth to a huge green facade in the design and that was making the entire process interesting and intriguing.

(Refer Slide Time: 08:19)



And this would keep on growing over the years making it much more greener because, Kolkata the city we are lacking the green cover. And, the entire effort was can we add to a visual tree. GRC instead of aluminium help us to basically the louver system, held us to take care of the extreme heat because, extreme heat of metal would actually not allow the creepers and the green to grow all to them; GRC allows that happen. So, that was (Refer Time: 08:49). In the lower levels we had the deflecting water pool which actually enhanced the local performance in terms of temperature rating etcetera the plaza areas.

(Refer Slide Time: 09:06)

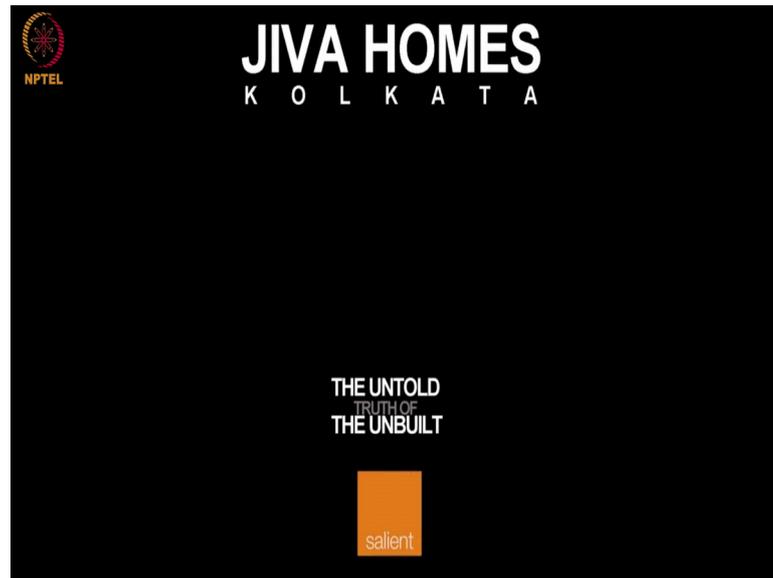
LEED 86/110

| Sr. No. | Category | Total Points | Targeted Points | Not Targeted |
|---------|------------------------------|--------------|-----------------|--------------|
| 1 | Sustainable Sites | 26 | 23 | 3 |
| 2 | Water Efficiency | 10 | 10 | - |
| 3 | Energy and Atmosphere | 35 | 29 | 15 |
| 4 | Materials and Resources | 14 | 8 | 6 |
| 5 | Indoor Environmental Quality | 13 | 13 | - |
| 6 | Innovation and Design | 6 | 6 | - |
| 7 | Regional Priority | 4 | 4 | - |
| | TOTAL | 108 | 83 | 25 |

The plaza was done basically having two in the building block structure themselves making a big plaza which would take care of the second show, it will actually a second cars open air showroom (Refer Time: 09:15) or a free market kind of the system. So, not only they were selling new cars they will also add up to allow Wednesdays or maybe Thursday evenings to have seconds open car layout in the entire front area.

So, it is a building which will actually bring in a culture of how we see cars and how we actually associated cars. And when we have hybrid cars, we are having cars which will go in electricity which is also have buildings and facades which will generate more electricity, reduce glare, produce more green and have a character which is not more sensitive and future progressive.

(Refer Slide Time: 09:59)



The next project is for Jiva Homes it is essentially a residential development, but it is interesting because most of the developments make it very intense to the land. And, we often aim in compromising the natural habitats. In Kolkata we have lot of ponds and water bodies. So, building developers intent actually it will it will humbly they often make mistakes in taking over a smaller pond, filling it up. But, here we had a development which was initiated in restoring one such large pond and that became the heart of the (Refer Time: 10:45).

So, this facade is how an intense social housing would actually be centered around restore a water body. Along with how does a facade becomes important in building a common character rather than a very intense housing, they have usually a flat and very boring facades. And, facades need to either rate to be expensive or such social housing lack the beauty of facades. So, here we took a and that is a idea to present this facades discussion to you by taking you to the journey of the project.

(Refer Slide Time: 11:33)



We essentially have a tight sight of 1.63 acres 43 percent was the existing water bodies which you want to restore, it resulted biodiversity. Let us (Refer Time: 11:43) tight land area, you can understand when 40 percent goes to the water bodies. We have to keep our super built loading very tight, we have to comply to residential Vastu-Shastra and that is would (Refer Time: 11:58). And, we were developing the builders developers wanted to sell the property at 4000 below square feet.

That means, our construction cost should be very well within 2000 plus the land another cost would that your financing in other costs would actually be substantial cost about 3300 to 3400; to save a small margin of 5 600 rupees such as development. So, that is what the idea and the parking requirement was also very critical about 1.5 hours per unit where, highest restriction of 40 meters which bring. And, if you want to come in the full affair is going to be very intense development that design.

So, site was a kind of a triangular emphasis, it had thought water bodies has seen here we did not have much conducive views all around. So, but we have little low height development road as development. So, we were essentially building a view in the centre. So, the heart was becoming a water body with this biodiversity which biodiversity was becoming very important in terms of giving a view.

Thought to have ventilation systems that was very important from the ventilation system works. The green engagement was very important, that was it how we wanted to make a focal point.

(Refer Slide Time: 13:22)



So, there were 4 blocks designed to have 2 flanks arranged in a pattern so that in the heart we can have the water body, the green and a biodiversity. We will keep the wind access the solar performance everything intact. So, we did not want much of the glass because he is my building. So, either he looking in to east or west ah, but we also wanted a shading device to become interesting. So, we took inspiration from the water itself.

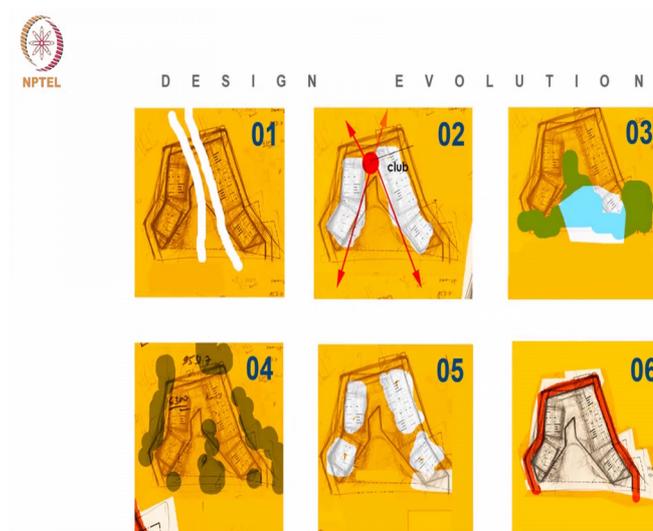
We start understanding how does the water behave when, its comes in contact with air and light. When it comes to contact with light it simmers, we know that when it connects to lower to the wind we have waves. Both of them were having a fantastic mathematics, they were all sinusoidal. The glitter was mathematics of lights and blinking which is again very harmonic and when it came to wind the waves we know a harmonic.

So, we wanted to have façade, can we have a facade which emulates and gives identity to this apartments in terms of its own green area, because, such buildings of social housing tend to very flat and completely dense. So, you want carve an apartment balcony and you know I am sorry add water and you know they would have their outdoor units coming and clean with facade itself. So, that becomes big problem. So, we have this kind of a step out balcony given to them 700 wide balcony which would add to the interest of

putting some green. If you want to put your outdoor unit you can put your outdoor unit with some (Refer Time: 15:03), you want to walk over and clean your facades you can also do that.

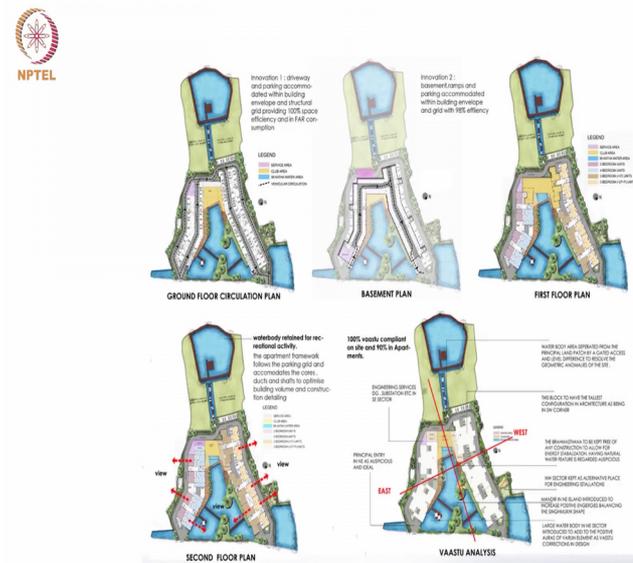
So, every apartment has this walk up ranging from 1.2 to 2.7 meter in terms of projection and that became my continuous step of balcony which was inspired by the sinusoidal waves. If the planning was very simple in terms of master planning and unit design essentially very compact, we did not want the utility balcony to be seen from outside; so you have all the utility balcony from inside. There is something very important that we understand that utility balconies we should not bring it above, because it is an essential component. But, it also has to be given the freedom of to become an ugly. You know it bounces to be that you cannot have control utility balconies, how do you contain them within the building envelope clearly want to control the facade that is more important.

(Refer Slide Time: 15:56)



In the planning that does not come by simply facade management, it comes within the planning. So, here you wanted to use this within the planning system. So, all are inside the core and, but the breathing itself each one breathe and well connected we. On the upper side comes the interesting sinusoidal balcony is going together each one each one of the apartment would have green personal green. In fact, we are intending we were intending to put these green in those bulges of the balcony.

(Refer Slide Time: 17:40)



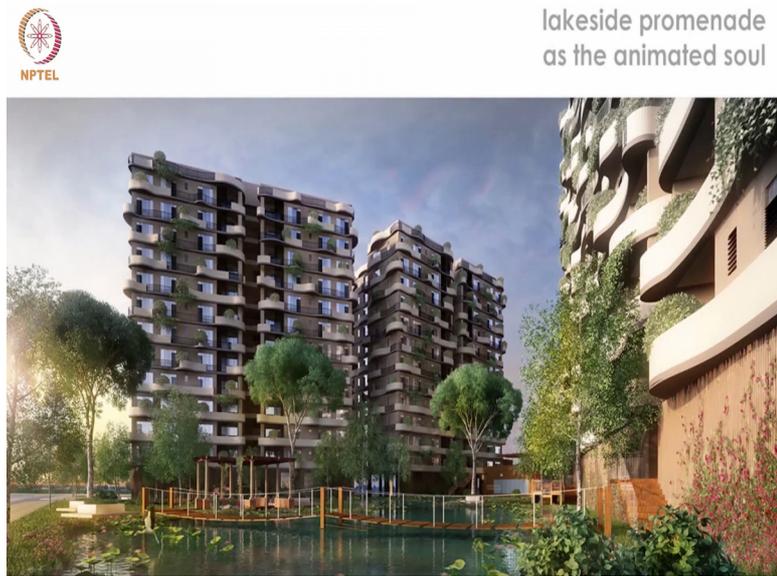
Without an additional cost they were giving a character and we actually want magnet outputs of mathematics. So, they were basically a program run for the facade to come to a character in terms of design.

(Refer Slide Time: 17:52)



So, we made a small equation out of these waves and try to apply it in 4 levels and see how does it work. So, it came out of a little program that we started working on.

(Refer Slide Time: 18:07)



And then this became an interesting thought process which can be actually taken by many such high density development, by introducing a small step of balcony not only that that they will add to a shade factor.

(Refer Slide Time: 18:19)



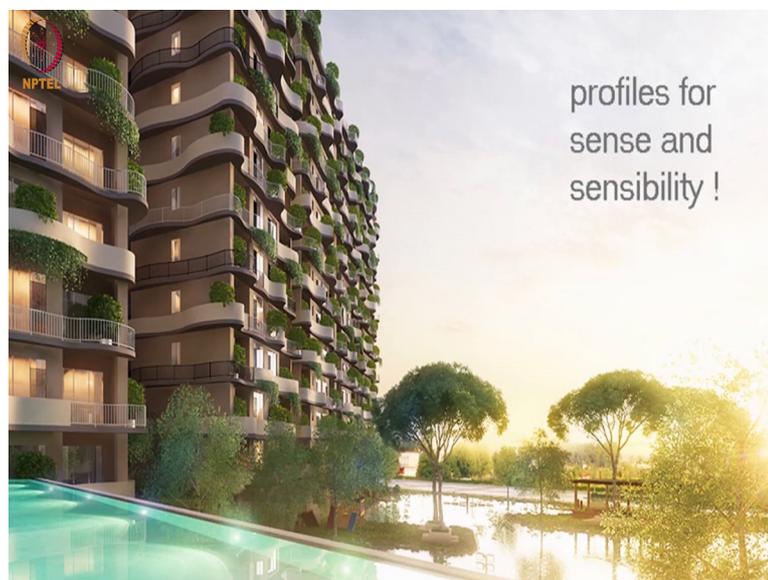
They would add a chajja to let a facade cutting off the glare, but they will all can also add a character which can be sensibly used and not and used for both for use greens as well as personalizing. So, we can expect one person to have (Refer Time: 18:32) villa, the other person to have something green.

(Refer Slide Time: 18:34)



And that would add a lot of interesting facade by fauna. First we have to provide for it and then the world says yesterday and that is the reason we thought that is this let us share with you.

(Refer Slide Time: 18:47)



And that is a adds a lot of sense and sensibility to our design and that would actually facades which are more sensible. And, give sense to the city and people around should be done rather than just graphic interventions.

(Refer Slide Time: 19:02)

Summary:

By the end of this module, you have learnt about the:

- Case Study 1: Autohub, Kolkata
- Case Study 2: Jiva Homes, Kolkata

