

Disaster Recovery and Build Back Better
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Lecture – 31
Guidance to DRR

Welcome to the course; disaster recovery and build back better, my name is Ram Sateesh, I am Assistant Professor in Department of Architecture and Planning, IIT Roorkee. Today, we are going to discuss about guidance to DRR; Disaster Risk Reduction so, here today in this lecture what I tried to do is I tried to compile at least showcase, different kinds of manuals or which is providing some guidance.

It could be a thumb rule guidance, it could be dos and don'ts, whatever you call it but it is showing some guidance; guidance to what, guidance to whom and guidance to which context so, when we say guidance to whom, this could be for the people who are working on the shelter practices whether it is an architect, whether it is a civil engineer, whether; so basically there is a group of built environment professions involved in the shelter recovery especially, in the humanitarian context.

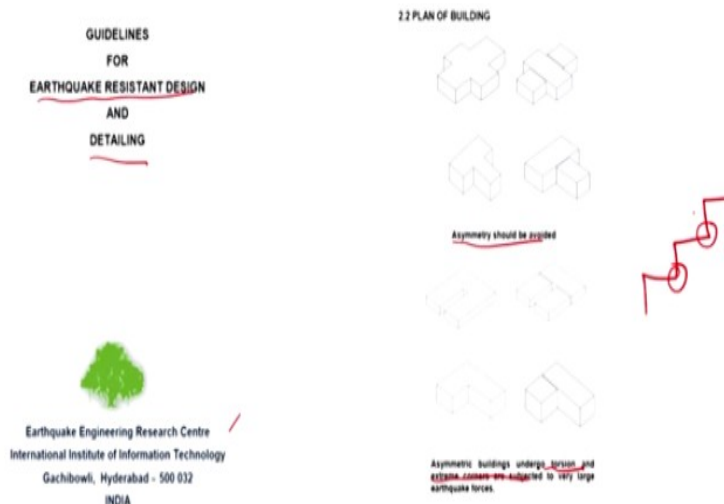
And the second aspect is; it is talking about certain principles of do's and don'ts, you know what to do and what not to do which is better, it's a very generic principles which is showing, it is not specific to the site but it will actually show some guidance to people working either on hilly areas or floodplain areas or an earthquake-prone area so, it is sometimes it is also specific to a disaster.

So, this particular manuals earlier, they were too technical to work on it and but as the time moved on, the visual aspect has improved quite a lot and because it has to reach to the common man, the most of the target group population who were often affected by the disasters, they are probably from the vulnerable areas especially, from the remote rural areas where you hardly get any technical manpower.

So, how this kind of guidance can show and these manuals can show your direction for the layman even to understand that what to do and what not to do and how to do, I will be showing a few guidelines and which has been developed by different agencies and what are

the focus lights on and how they have tried to demonstrate and what is that they are trying to give an information or to a guidance to the shelter makers.

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Now, for example, this was an a kind of guidelines which have been developed for earthquake resistant design and detailing and this has developed by ERC which is the Earthquake Engineering Research Centre, International Institute of Information Technology, this is where the IIIT in Gachibowli, Hyderabad have worked and they have also set up some lab on it and they have worked on the simulations part of it.

And finally, they have concluded with various evidence-based analysis, they try to develop a small manual about to you know, which gives the kind of thumb rules for example, how it will inform the built environment professionals for instance, in architects or a civil engineer who is constructing the housing. When we talk about very basic form of house compositions, planning of a house or a dwelling here, we follow certain elements of architecture and we follow certain principle; we apply the principles of okay.

And then we compose basically, what we try to do is we compose and in this composition process what in terms of the earthquake nature is concerned so, they are recommending that try to avoid the asymmetrical compositions in an earthquake-prone areas and because these asymmetric buildings undergo torsion and extreme corners are subject to very large earthquake forces.

So, obviously if you are talking about wings and keeping many officers in the building's obviously, there is a tendency that you know, there will be tendency, that these corners can break because most of the damages which we have noticed in the past earthquakes, they mostly occur in the corners, so that is where they try to suggest, try to avoid the asymmetrical buildings forms.

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Some of the other guidelines, which they talk on the site selection you know, so when you are constructing something for building try to avoid the sufficient away from the steep slopes okay and also in many cases what they do is; when you are cutting down and filling the soil especially, the filled up soil try not to make the foundations in this because that is going to have an implication that you know, it might come down and the whole load will collapse, there is a possibility that the building may collapse at the time of earthquake.

Because the forces it cannot be very much stabilized because of that fill soil and the shape of the building, they also suggest that very slender building should be avoided so, they also talk about the ratio, height and breadth should be less than four and also the inverted pendulum type buildings are unstable so, they always go with a kind of pyramidal type so the load is distributed and whereas, here it becomes difficult the more height you are going up, it becomes difficult.

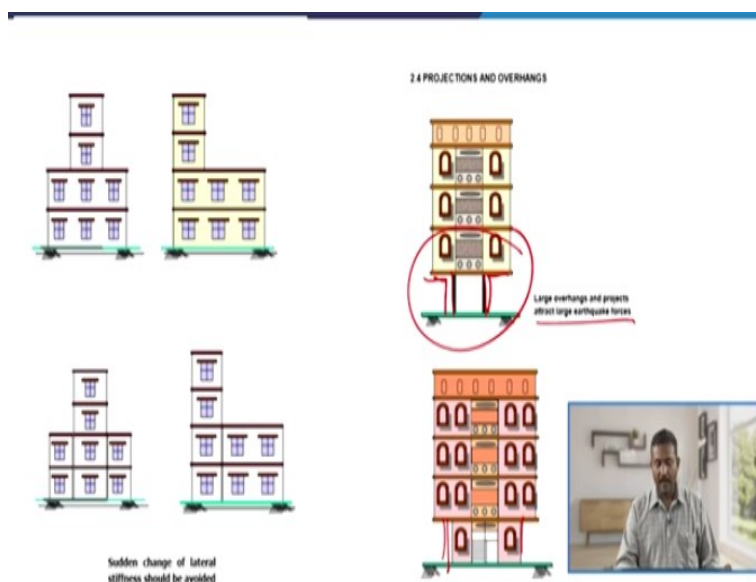
And there is also the wind movement, there is also the lateral forces which are actually applied on to the whole structure and how it can resist for instance, in Hyderabad is called we call as; nickname is a kind of Malkpet Bhuj, it's a kind of tall tower which has been built in a

place called Malkpet and you can see that 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 almost, 1, 2, 3, 4, 5, 6, 7, 8, 9 and with the ground floor G plus 9 floors and look at the volume of the building and look at the height and breadth of the building whether, in and also look at what is on the adjacent sides.

If some slight movement happens now, you can see that the next building is also coming on the similar heights so now, when certain towers are not considering and they are not leaving any setbacks and they are not leaving out any proportions you know how the proportions with the height and breadth has to work and this is where despite of the building regulations on what we have, the building bylaws, the permissible limits yes, he is going within that permissible limit.

But is it really worth enough and whether it can resist that earthquake forces during the time of an event so, these are all some mismatches between what the building by-laws permits and what the earthquake guidance is telling so, there is a consensus, there should be a consensus between the bylaws and as well as the structural measures which the guidance manual suggests.

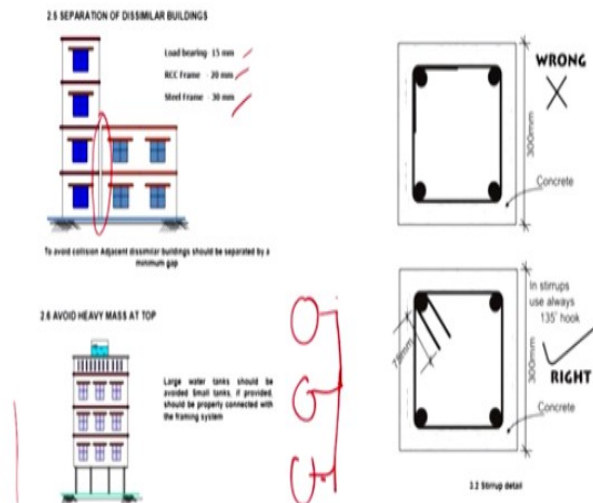
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And similarly, when we say about the sudden change of lateral stiffness should be avoided so, when you are talking about the you know, when we are improving the height so, you should not you know increase it, so that the sudden change of this lateral stiffness because it has to avoid this but otherwise, there is a chance of collapsing similarly, and the projections and overhangs.

So, now just on the two stilts, the whole building has been collapsed so, this is very unstable you know and so you need to have some kind of support system that is how in order to have this kind of large overhangs and then you are keeping load over a load and it may collapse that's what it says, large overhangs and projects attract large earthquake forces.

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Similarly, the separation of dissimilar buildings so, when you are talking about the two different buildings at least, you need to; if it is a load-bearing structure, you should have about 15 mm and if it is RCC frame, it should be have 20 mm and if it is a steel frame, it is about 30 mm so, at least this much gap should be left because in order to avoid the collision between these are dissimilar buildings and that should have a minimum gap.

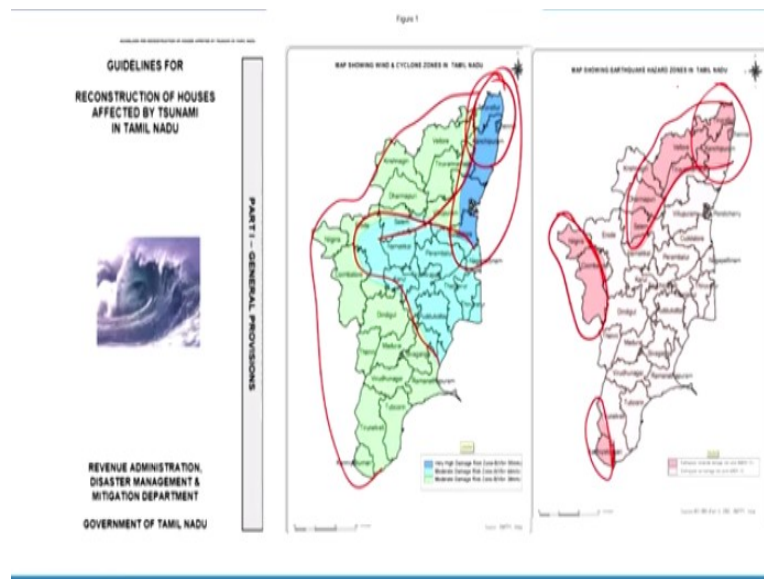
Also, we should try to avoid the heavy mass at the top because normally, in the previous building culture, what they do is they try to build the overhead tanks at a heavy volumes but then during the movement you know that is where it can also give a load and it can also can be a cause of that particular you know, when the movement is happening obviously, it can bring instability in that whole structure.

So, that is why what the advice is you can have instead of a large tank, what you can do is you can have a smaller tanks and the water distribution system could be connected, so that at least on that note you will not get any load aspects into it also, these technical manuals also talks about the even the type of reinforcement, the connection details you know so, for

example, they will talk about when we say the one foot beam or that is where the reinforcement.

Basically, how even the stirrups, how the clear cover has to be done so, you know the stirrup details will also have been given as guidance, how to mould them how to consider and what to do and what not to do.

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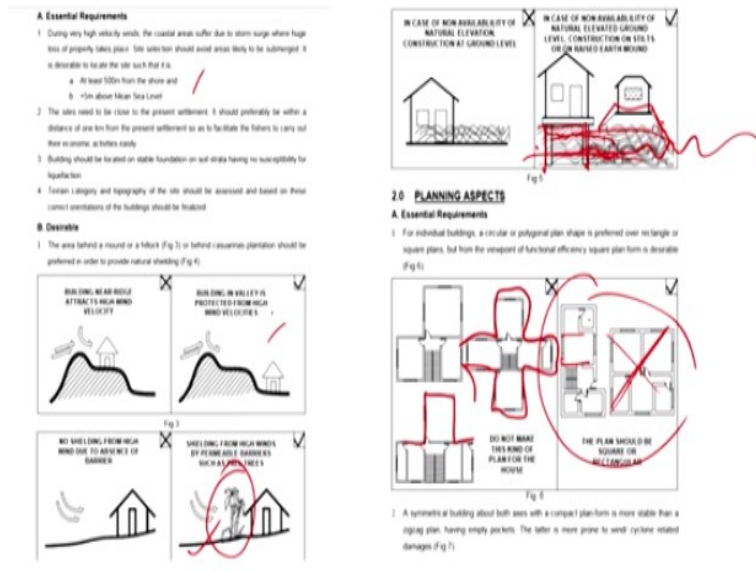
So, after the Tsunami, government of Tamil Nadu and with the help of Revenue Administration Disaster Management and Mitigation Department, they have also developed certain guidelines of reconstruction of houses affected by tsunami in Tamil Nadu. I will show you a brief about what is there in the guidelines and like that, I will keep discussing about various guidelines.

Now, they also talk about the you know, the cyclone zones; the wind and cyclone zones, for instance, this is the most high damage risk zone which is more towards the Chennai and this is the moderate and this is much more beyond the cyclone aspect but whereas, in the earthquake if you look at it that is where this zone is more of an earthquake vulnerable zones.

Also, the hilly areas about the Nilgiris and a little bit of the Kanyakumari and the part of Kerala, where the Western Ghats are also meeting at some point near Nagercoil and other places so, these are developed so but one has to look at when you see these kind of maps, they should not look that in an isolated manner, you have to also consider the multi hazard prone aspect.

So, at the same district, it might be a cyclone like for instance, if you look at this, it is also a cyclone-prone, it is also an earthquake hazard zone, so in that way, one has to look from that perspective.

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And similarly, they also talk about the CRZ regulations, the implication of the CRZ, which is a coastal regulation zone implication like they talk about at least 500 meters from the shore and plus 5 meters from the main sea level so, you know they also talk about because if you don't raise it, either you improve the height of the plinth of the building, so that if the water comes there is a tsunami then or you raise the plinth, so that at least this will be taken care of.

And similarly, there is about the desirable conditions when you talk about building near a ridge attracts high wind velocity but buildings and valley is protected from a high wind, I think, in this case, I would also bring a counter aspect of it, it is also depends on where how the make-up of the hill and the landscape is all about because even in sometimes, imagine if you have an another hill that becomes a tunnel effect you know, so in that way the wind will get channelled much fiercerful.

So, no shielding from high wind due to absence of barrier because that is where you need to talk about the landscape, you know, how we can promote the landscape, so that it can actually reduce the velocity of wind and can have a control mechanism over there and as I discussed you as an earlier report, which talks about the planning requirements of what kind of plan forms, don't make an asymmetrical plans.