Safety in Construction
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Lecture-03
Role of Stakeholder in Construction

So, this lecture is on stakeholder's role in construction safety. There are so many stakeholders who come in the process of a construction project. And we are going to talk about whose role is predominantly necessary when it comes to construction safety.

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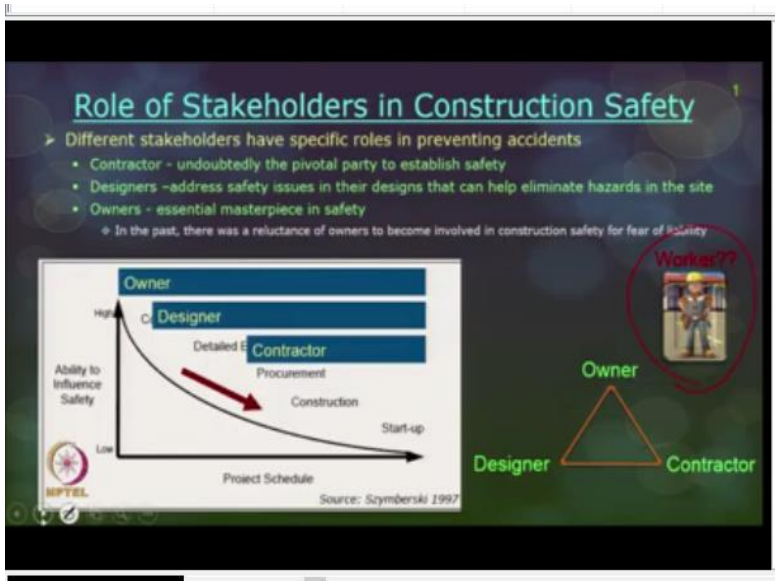

So, let us talk about the 3 key stakeholders, let me start in the order of their entry in a construction project starting from owner, who has an idea or vision to create a project and for whom a project is actually progressed and completed. Then next come designers, they are the ones who translate the owner's minds into technical format and pass it on to a contractor.

So, contactors are third key player. So, contractor is the one who actually know brings in equipment, labour, etc. And start putting in whatever designer has given into an actual construction. So, these are the 3 key stakeholders. If you look at the 3 key stakeholders, whose role is predominantly very critical for construction safety? I think the motto of construction safety is everybody is equally responsible for a safety in a construction site.

So, contractor undoubtedly, they are the one who is actually going to execute and they are the one who is very close with the hazards. So, contractor's role is very critical. Next come

designers. Designers are the one party who actually know puts in lot of owner's ideas into technical format. So, there itself they could have had lot of opportunities to create a design which is very safe to construct.

They can think of what can be the possible hazards and they could have given alternate solutions in design wherein the hazards can be minimized or at least eliminated or it can be replaced with something else. In the past, owners were never involved in safety and even in a construction project execution and owners always kept themselves away from a project execution.

Because they thought they are not technically expert, but owners have a very, very big and dominant role when it comes to implementing construction safety, that is what you will understand in today's class. So, this is a graph which shows what are the different stages in a project starting from conceptual design, detail design, procurement, construction and till close out and completion.

So, if you think this is the project schedule you can see here, actually now owner's role is from the start till the end. Designer's role starts from maybe from conceptual design and contractor's role is primarily after post design process execution. I am talking about traditional project delivery, there are other types of project delivery and this involvement of owner, designer, contractor will always change.

If you see the ability to influence safety so from the beginning of the project itself there is lot of ways and means in implementing safety. And once the owner or the designer fails to put it in proper place and when it comes to contractor, he will have very little options to put things to complete safe practices. Now this is a tripod on owner, designer, contractor relationships and some of them are contractual, some of the relationships are not contractual.

I am not talking about that, primarily I am talking about the 3 players who are actually the key players in implementing or in constructing a project. Now these 3 players are actually talking about the project or thinking of solutions and means and which are to be constructed with the help of workers. Now workers are the ones who are not involved in any policy making or any decision making on safety.

But the decision made by owner, designer or contractor will be implemented by a worker and all these safety and hazards whatever you call in the construction sites are primarily for the workers. So, now this is like an ironical statement. Workers are never involved in safety or they are not brought in forward and asked for suggestions or opinions and they are not consulted for any safety precautions in site.

But the decisions are made by some other party and who are actually making a site hazardous are very safe for a worker.

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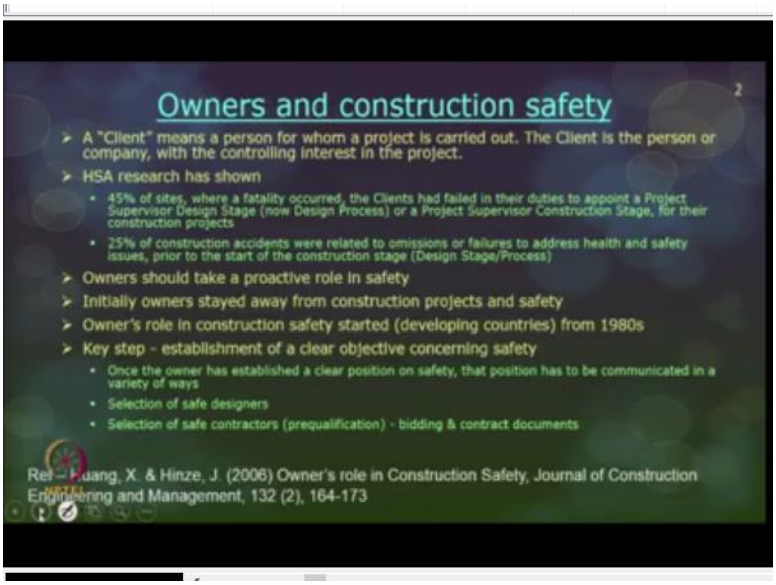

So, that is what is the background, you should keep in mind. Now let us start from the different key stakeholders. So, number 1 is owner. Owner or client. So, now who is a client or an owner, so they are the person for whom a project is actually carried out. So, the first person whenever you say project is initiated then owner is a first party with whom the project gets initiated.

So, there is a research article which says 45% of sites have lot of fatality had happened because the clients or the owners they had failed to put or support a project in terms of safety starting from the design stage or starting from the conceptual stage. So, under a lot of articles also show owners were very reluctant in the past to get involved in safety**.**

But the actual situation is owners should take a proactive role in safety and owner's role in construction safety started only from 1980s or so in many of the developing countries. And owners since they are the key players from the start of the project till the completion of a

construction project. So, they have all possible ways of implementing or enforcing safety in a construction site.

So, first of all, the owner should have a clear objective on safety and when he has a clear objective on safety that there should be no death or no major injury to happen in a construction site and this has to be communicated in the project through lot of ways. Now we are going to see what are all the different ways in which an owner is communicating the safety or importance of safety in a construction project.

And the major 2 issues are he can select a designer who knows how to design a project very safely, thinking of the hazards in execution or hazards in a construction site. The next one is selecting a safe contractor and who can take care of their workers. So, his primary role will be to select a safe designer and also to select a safe contractor.

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Now when it comes to selection of a safe contractor, designer there is not many principles available we will talk about designers little later. Now when it comes to selecting a safe contractor, how can an owner select a contractor or choose a contractor and then assume that he is very safe or he is going to execute the project safely in a site. So, there are some statistic measures and there are some means by which it can be done.

Number 1 is the olden time or the traditional time of awarding a project to L1 is no longer valid right now. Many owners are really keen in promoting quality, safety, performance and so on. There are lot of new normal performance indicators available in so many projects

which are coming up recently. So, awarding a project to L1 who is primarily a low financial bidder is no longer a valid scenario right now.

So, now what are the different data you can collect from a bidder. So, during bidding stage itself you can evaluate or assess a contractor whether he will perform or whether he will execute a project safely in a construction site. So, some metrics which you can collect from a contractor or a bidder from the last 5 years of his work experience are injury incident rates or recordable injury rates.

First aid injury cases, then loss ratio or experience modification ratio, like this there are some statistics available and you can collect in the previous projects maybe for past 5 years are based on your project sensitivity and seriousness on safety can accordingly get the data required during the bidding stage itself from all the probable bidders. Then job site safety inspections and now once contractor assesses a contract bidder.

And selects somebody as a person who can execute a project safely; his role should not stop only just selecting a safe contractor. So, the assumption should not be selecting a safe contractor means he will implement safety in this particular project also. So, there are other ways of looking at the scenario. So, you can also get make the contractor get his own job site safety inspections, project safety plans that he submitted in the previous projects or may be accident history or records of OSHA citations and finds that he has done in the past.

Litigation related to injuries whether he has been to court trials or maybe arbitration cases in the past due to some injuries or unexpected events which happened in the past. How has he trained the workers or staff and what is his control on sub-contractors, how is his equipments available and what are his maintenance policies on equipment because equipment malfunctions also can lead to lot of injuries.

Like this there are so many statistics and measures through which an owner can select a contractor who will be safe based on the previous experiences.

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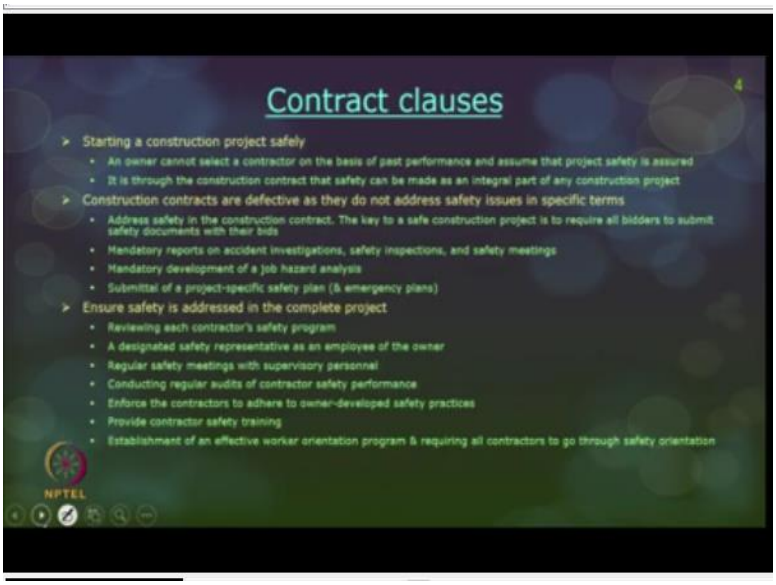

Now as I told you just because you select a contractor based on his past performance and you assume that he will be safe it does not mean you can just keep quiet and relax in the current project. Because there should be some means of enforcing the contractor to work safely in this particular project also.

One broad area or the place where an owner can touch upon safety in a construction project is contract clauses. So, what do you mean by contract clauses and what are the different ways with which an owner can enforce safety in the ongoing project? Number 1 is address safety in the construction contract. So, the key way is to get all the documents necessary in the bidding stage itself.

For example, how many times he has to do and job site inspections or safety trials, what are his plans for job hazard analysis. If there is an emergency or any hazard happen so what is his plans for an execution or evacuation plans. So, like this there can be so many ways of asking or implementing through contract clauses. Mandatory reports on accident investigations; safety inspections or safety meetings.

And also, the owner can provide adequate training to contractor. He can also give proper worker orientation program and also enforce the contractors to undergo the same orientation program. There can be regular audits on contractor safety performance there should be regular safety meetings supervisory personal also wherein the owner should also be participating with all these programs.

So, number 1 is if an owner can completely get himself involved in a project then with the safety caution in mind, I think safety can be really enforced in a project.

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Now the next player is designer. So, now do designer have a real role in safety or can they do something regarding construction safety, because they are ahead of construction project progress itself. Designers do have a role in safety because they are the one who is bringing out all the conceptual or the final structure of your model on a paper in terms of dimensions, in terms of specifications and everything.

But, unfortunately what happens is most of the designers do not want to be involved in safety because they say they do not have too much of information on design for safety ideas and the other reason is they are also scared of litigation, what if I do a design and if it is really turns out to be hazardous and there has been 1 or 2 injuries will I be liable for any litigation or any accusation.

So, that is the real fear behind these designers that they do not come forward in promoting a safe construction idea. That is what is happening and the main myth is many of the new design concepts are often rejected because they appear to be dangerous. For example, even the opening and closing of a door or a window can be altered in so many ways, so that some can be thought about for cleaning and for maintenance in future purposes.

But some options are generally rejected because they are too costly or they are little time consuming for installation erection. So, often their ideas are getting rejected. That is the real

scenario behind and the one issue is design decisions directly influence the safety because once a design is approved then there is nothing much you can play in a construction site, other than bringing in a different equipment or bringing in a different type of a formwork for execution you cannot have many options there in construction as such.

So, what do you mean by design for construction safety? So, there are alternate terms available here and there are lot of synonymous terms available and it is not that clear as to the start time of these terminology and why are all these terminologies available in the academia. Number 1 is PtD which is nothing but prevention through design, the other concept is DfCS which is nothing but design for construction safety.

And also, DfS, colloquially it is also called DfS design for safety. So, these are all policies of promoting or providing us a project which is assumed to be safe or at least the hazards are all pre understood and accordingly a new measure or device has been put in place. So, that the hazards are very minimal in the process. So, these are all some of the issues.

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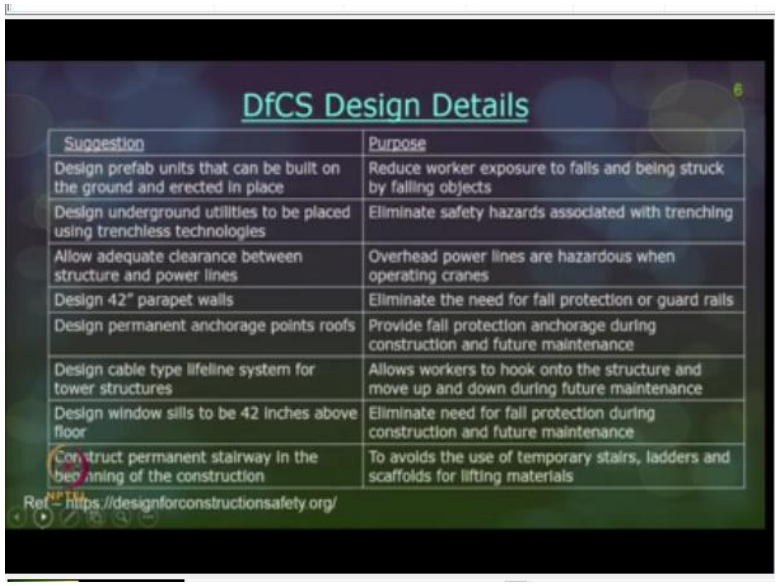

So, now let us look at some examples of DfCS and researchers say there are almost like 600 ideas or something on DfCS. But one suggestion for how to implement a design for safe idea is you can actually have a contractor involved in a project from the beginning. So, that the contractor will be sitting along with the designer and the hazards in the execution can be really thought about. And when the hazards are really thought about suggestions for eliminating or minimizing the hazard can be really worked out.

So, an alternate approach or methodology or a different system or a different material altogether can be easily worked out. Some examples here are design 42-inch parapet wall. So, that eliminates the need for fault protection or guard rails. Allow adequate clearance between structure and power lines, so that overhead power lines are hazardous when you are operating cranes. Then design underground utilities to be placed instead of trenchless technologies, eliminate the safety hazards associated with the trenching.

So, you can go really with no dig policy. Then design window sills to be 42 inches above the floor. So, that you can eliminate the fall protection itself, construct permanent starway in the beginning of the construction. So, that your fall hazards in terms of ladders, temporary stash, scaffolds, etc. can be totally eliminated. So, like this some examples are given and you can go through the website for many more examples like this.

Now the next is regarding your one more example. So, there is an Abu Dhabi's world trade center and here also the design was really out of the box, in the sense it was really very different design. So, when people were also asked about the building maintenance. In the sense the future maintenance and operation of the particular building. So many options came in especially for cleaning of the panels and the glass panels and facades.

So, some suggestions came in. So, the slanting sloping roof of the panel itself can be worked out for storing all the equipment. So, that it can be turned or tilted and it can be used for cleaning and maintenance of this particular structure itself. So, this idea was very well achieved and the person who developed this idea won the bid of the project. So, like this you can also track so many examples available in the public forum on safe ideas for construction and also for future maintenance.

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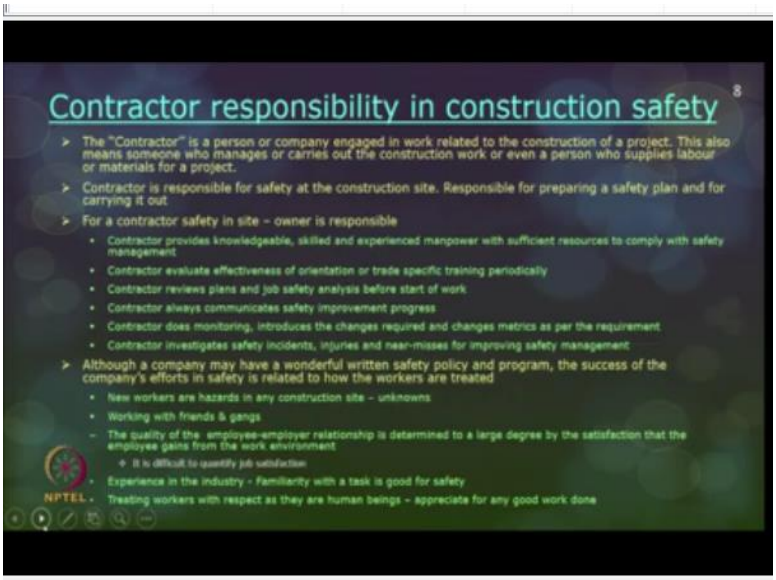

Now the third party whom we are talking about will be on contractor's responsibility in construction safety. So, contractor is a person who actually looks at the execution of a whole project and the contractor is responsible for safety in the construction site and also responsible for preparing a safety plan and also for carrying out the plans. So, now as far as contractor is concerned the procedure or plans of whatever the contractor does an owner is actually responsible for making the contract or implementing many of the issues.

For example, to provide proper orientation in the trade specific training periodically, all these contractors will be doing it, executing it, but the owner is responsible for forcing the contractor to execute all these in his sites. Communicating lot of safety improvement programs in the site, after investigating safety accidents injuries or you prefer for promoting safety in the construction sites.

And, contractor also does monitor safety progress from time to time. So, all these will be done by the contractor but under the headship of an owner. Now there are some issues with regard to workers**.** Now workers as I explained in the first slide, so workers are the ones for which the entire spectrum of safety in construction is revolving around. Now what are the different components of workers? Now if you look at those new workers, they always pose a threat in the construction site.

Because for new workers everything is new in the construction site for them; they do not know where to ask for, whom to report for in case of any emergency or in case of any hazards visible in the site. So, there may be so many, unknowns which partially will be rectified

through training and orientation but still new workers are like moving hazards in a construction site.

That is how you should treat a new worker unless he is familiarized with so many other options. Now working with friends, so when a worker starts getting involved in a construction site now what happens is, he starts getting mingled with the co-workers and they become friends and this may not be they work as gangs, this may not be a good sign when you talk about productivity.

Because lot of gossips, lot of chatting will go on, but when you think about safety no worker will try to make his friends get hurt. So, all the hazards will be communicated appropriately and they try to have a trust and friendship among them so that they maintain the safety in a construction site. So, when you think of safety it is always encouraged to allow the workers to move along as a gang or friends as a crew.

Now, the next issue is job satisfaction and loyalty to the employers. Suppose if the workers are not paid adequately what happens is they always try to know mess up with some equipment or they do not work properly or they do not take the training or the orientation very seriously. So, their mind is always in terms of switching over to another job and what happens here is these workers will not be taking care of reporting any faulty equipment or reporting any hazards and so on.

So, whenever a worker is recruited you have to keep in mind that he should be satisfied and he should be happy and the employer employee relationship should be maintained properly. So, but it is very difficult to satisfy a person in a job, this applies to any job and any person. For example, to a worker maybe provide 1-month additional salary and they will be very happy, for some workers, maybe some coupons on daily markets or something additionally, they feel very happy.

So, the different satisfaction levels are there for different workers. So, you have to also investigate that and the last one is treat the workers with respect and not after all they are doing a different job but they are also human beings with the same ego and hurt. So, when they do a good job, you should try to appreciate them, so that they are always happy and they start being loyal to the company and to the employer.

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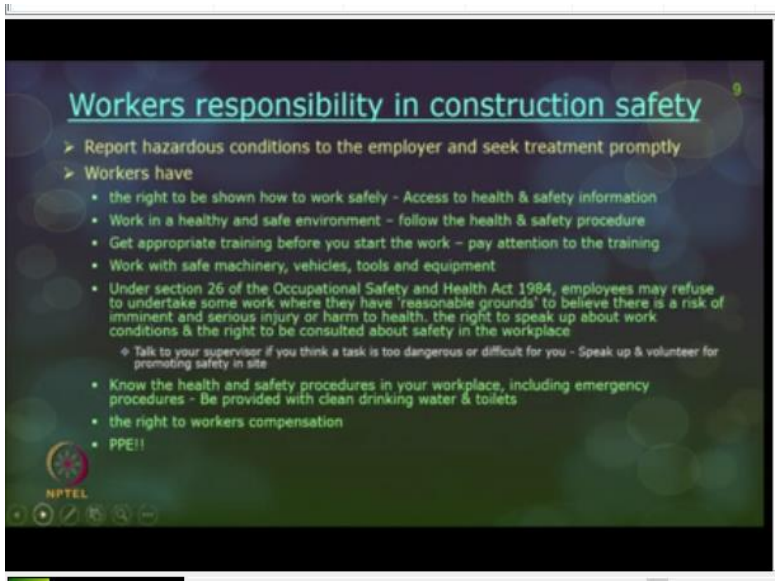

Now what are the workers responsibilities in a construction site? Workers are really the direct influence on any injury or accident when any accident or injury happens it is one worker or someone who is really involved in the scene and they are the first direct cause for any accident. So, now what are the different characteristics of the worker or how should the workers behave in a construction site?

So, the workers have the right to be shown to safety in the sense they should always have all access to health and safety information. And they should be working in a healthy and safety environment which implies all the safety and health codes procedures, standards, whatever guidelines given in the project everything should be followed with proper care. And they also have the right to get appropriate training when before they start the work.

And during the training they should also be very attentive in the training and listening to all the hazards and whatever is spelt out. And always work with safe machinery, vehicles, tools and equipment and whenever there is faulty equipment they have to also report to the supervisor and get it repaired. Now they should also be volunteering to talk about what is happening in the construction site.

They should be encouraged to speak up. So, they can also speak about a task which is too dangerous which they feel is difficult for them to progress and finish. They should be speaking up and even volunteering for somebody else also. That should be primarily

promoted in the construction sites. And they should also know the health and safety procedures in their workplace including emergency procedures.

So, those in terms of emergency they should know how to escape from the site and be safe. And also, they should be provided with clean drinking water proper toilets and so on. All these comes as health issues which the worker should be very clear at all points of time. And the last is the workers should have the rights to workers compensation and they should be wearing PPE at all times in the construction sites.

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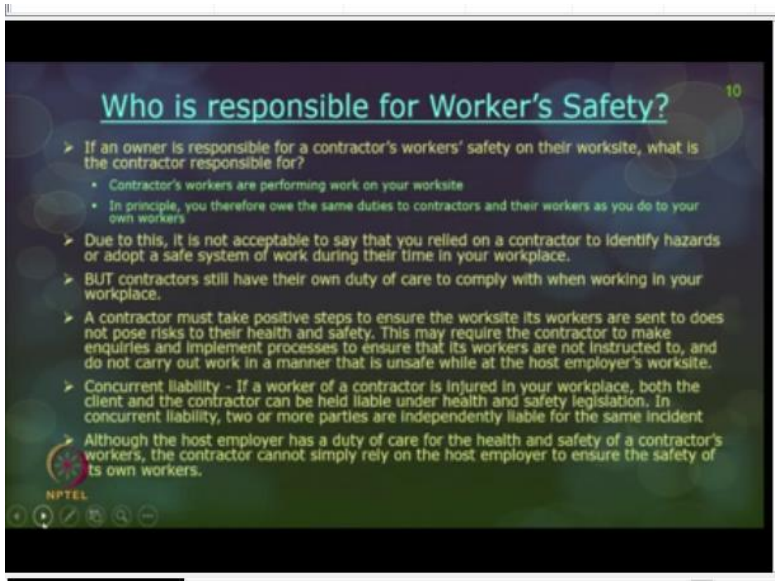

Now who is responsible for this worker safety? So, far we have talked about owner, contractor, designer, it looks like all 3 of them have equal role on worker safety. But who is really responsible for worker safety? Because the owners are the one who employed a contractor and the contractors are the one who are employing the workers. So, it is like direct-to-direct relationship.

Now if you look at this case, now will the owner be responsible for a worker safety or a contractor is responsible for a worker safety. That confusion happens many of the times and many of the times when a worker is injured the ball is now between owner and contractor as to who will take care of the responsibility and who will pay for the compensation to the worker.

So, now if you look at this scenario this is primarily called concurrent liability when 2 or more parties are employers then they should be providing a proper safe and healthy work

place to all the employees. From that particular point of view, so owner and the contractor both are really responsible for a safety of a worker. So, if you look at here so contractors, workers are performing the work on an owner's land.

So, indirectly owner and contractor together are responsible for safety in a construction site. So, it will be unacceptable to say that you relied on a contractor to identify hazards but still the owner also has to take care of all the positives steps and measures to see to that the workers are safely working in the site. And contractors also have to see to that the workers are given a safe place of work and they are not asked to work in an unsafe place and mess up with something.

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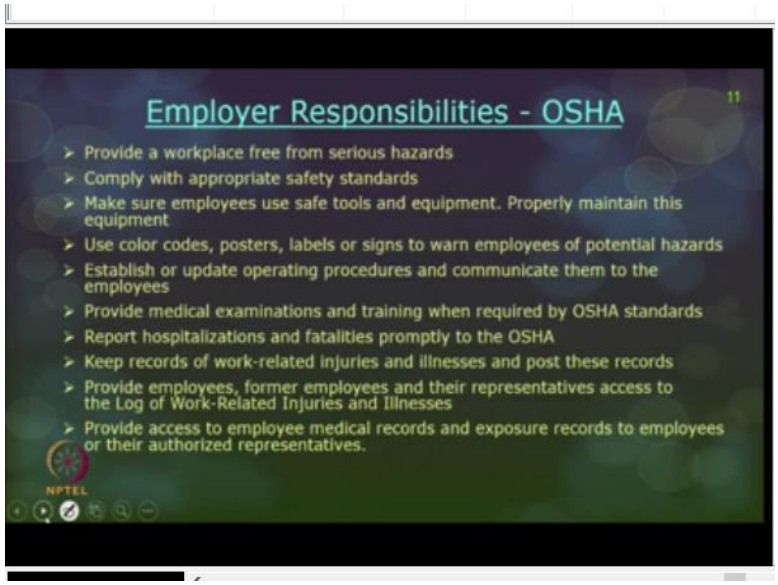

So, now let us move on to employer responsibilities. It applies to either owner or the contractor, both of them are responsible as per the OSHA guidelines provide a workplace which is free from serious hazards, comply with appropriate safety standards, make sure employees use safety tools and equipments and they should also know how to properly maintain the equipment.

Use color codes, posters, labels or signs to warn the employees of any potential hazards. Provide medical examinations and training when required by OSHA standards. Then keep records of any injuries and illnesses and post these records and also provide access to these records to the employee. So, that they know what are the hazards available and how many people in the past had an injury or met with an accident in the past.

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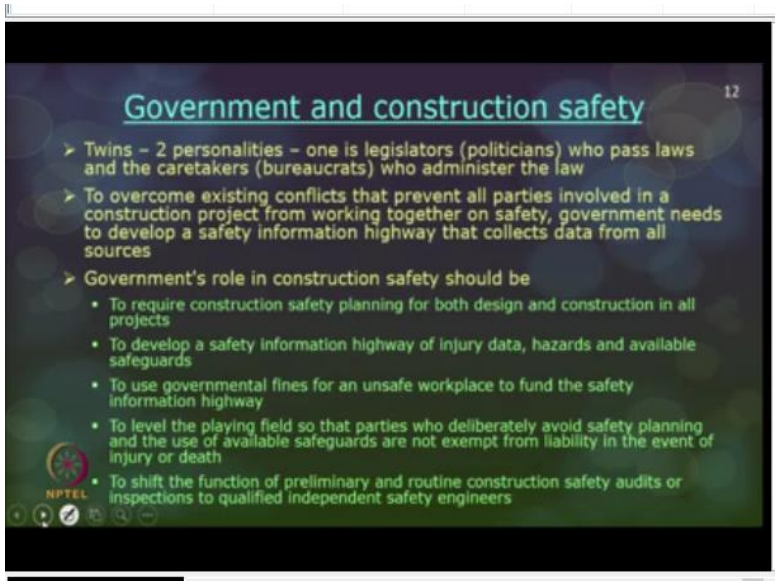

Now let us talk about government. So, is government really responsible for construction safety? From the beginning I have been telling, so, everybody is responsible for construction safety. Now what about the government? So, this is not with respect to public or private project. In general, government also has a responsibility on safety. So, primarily in 2 forms, one is they serve as legislators.

And the other one is the act as bureaucrats or caretakers. One is they serve as legislators or politicians who pass laws. So, they can actually know enforce safety through those laws and the caretakers are the bureaucrats who administers a law. So, the government's role should be to require construction safety planning for both design construction in all projects.

To develop a safety information highway of injury, data, hazards and available safeguards, they can maintain a portal on safety data. So, that it is available to everyone and people can think about promoting safety in future projects, to use governmental fines for an unsafe workplace to fund or to fund the safety information highway. And also, to level the playing field so that the parties who deliberately avoid safety planning.

And the use of safeguards is not exempt from liability in the event of injury or death. So, it will also help to punish or correct someone who has done faults routinely. And to shift the function of preliminary and routine construction safety audits or inspections to qualified independent safety engineers.

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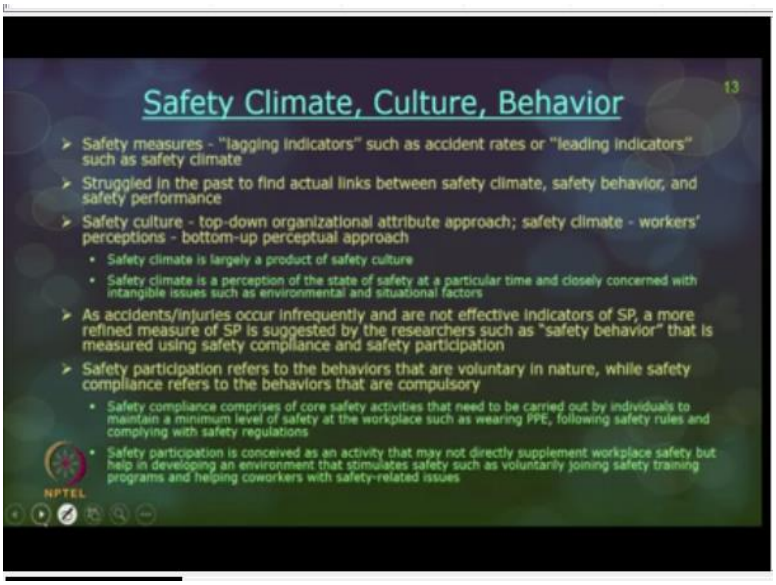

So, government also has a serious concern on safety. Now if you see this picture, so workers are at the real last level and owners are in the real first level and government is little at a higher level. Now we are not going to include government in this picture now. Now if you look at owner, designers and contractors, so there is something with regard to safety emphasis now.

So far, safety is measured in terms of negative indicators which are also called lagging indicators which implies accident. If you want to see safety in terms of positive side then there should be some leading indicators. There are some leading indicators which are available in safety research these days starting from safety climate, safety culture, safety behavior and so on. Now what are these terminologies?

Most of these terminologies are little confused and interchangeably used in literature. But there is a slight difference and there is a regular definition for each of these terms which we are going to see in today's class. So, safety culture is always a top-down approach. So, top-down organizational chart you have right. So, that is what is a safety culture. So, safety culture starts from the top management and it starts flowing down into the complete organization.

Safety climate is actually the workers perception, so it starts going from the bottom up approach or the perceptual approach. So, safety climate is actually like a byproduct of safety culture only. So, when the accidents are injuries, they occur frequently and are not effective

indicators of safety performance there is a different sort of a safety performance called safety behavior which is actually measured in 2 forms.

One is safety compliance and the other one is safety participation. So, safety participation is nothing but voluntary in nature. What do you mean by safety participation is joining in orientation program? Joining in a training program and giving your best in learning and getting knowledge on safe procedures in construction site. So, safety participation is primarily a self motivated or a voluntary stuff.

Safety compliance is like a mandatory stuff, wherein if there is some standard, some codes and whether if you want to wear PPE, all these has to be done in accordance with the loss or safety regulations or safety standards available in a particular place. So, safety compliance talks about a particular activity of a worker or a group and who has to follow some procedure or some behavior in a construction site.

So, now if you see here safety culture is primarily top down, safety climate is bottom up. Top-down means owner influenced organizational attributes and safety climate is primarily from worker influence bottom-up attitude and safety performance is actually into 2 terms compliance and participation. So, compliance is nothing but your mandatory stuff which you have to follow or it shows a behavior of a person in a construction site.

And participation is more voluntary and it also shows how you will behave, show behaviours, later on as a result of participating in lot of programs in the sites. So, with this I am just winding up. Thank you.