Role of Craft and Technology in Interior-Architecture

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Lecture - 24
Craft and Technology in Interior Architecture:

Transformation through Time (Part-II)

Namaste! Hello everyone welcome to the NPTEL course Role of Craft and Technology in Interior-Architecture. Today we are going to discuss module number 24, and it is an extension to the previous discussion that we had on the Transformation of Materials through Time and Technology and how it reflects on building crafts and interior architecture.

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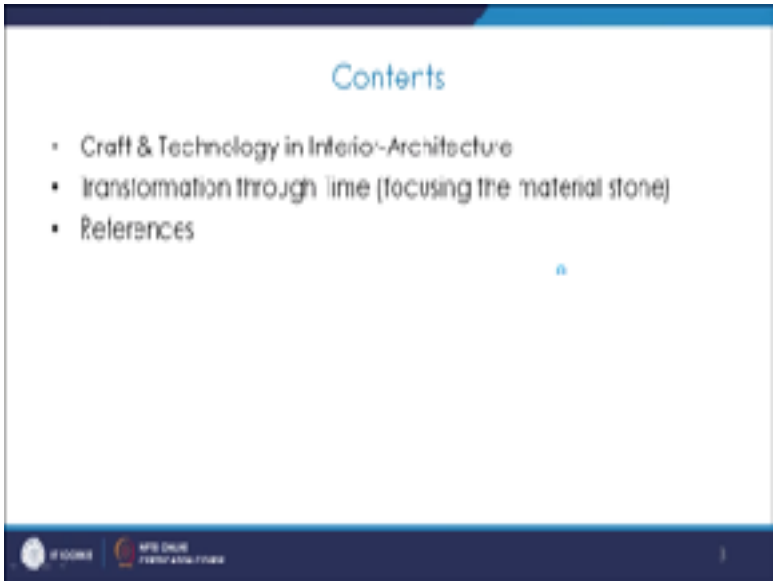

So, on the previous turn we discussed about the material terracotta and this time we are going to talk about stone.

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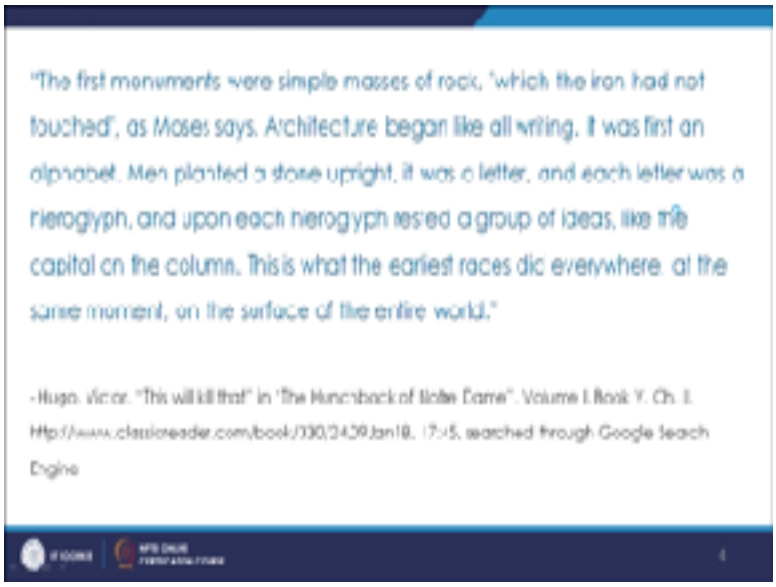

So, before beginning anything let me just read out this because it is very important to establish the importance of stone as a material. “The first monuments were simple masses of rock, “which the iron had not touched”, as Moses says. Architecture began like all writing. It was first an alphabet. Men planted a stone. So, there is a mention of stone men planted a stone upright, it was a letter and each letter was a hieroglyph, and upon each hieroglyph rested a group of ideas, like the capital on the column. This is what the earliest races did everywhere, at the same moment, on the surface of the entire world”.

So, there is a very predominant and profound mention of the material stone and how initially all the architecture began just by putting pieces of rocks together or just by keeping a piece of stone up right, there was no metal, there was no joinery and how just by the interlocking mechanism there was the creation of habitation. There was a creation of objects, there was a creation of tools using stone as a material, which is naturally available which is abandoned, which has so many different properties that facilitate its use for different purposes and human needs.

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So, here we see the Stonehenge the very famous historically significant example of any stone architecture or structure made in stone and this is the UNESCO world heritage site. And we see it lying at the centre of an outstandingly rich archaeological landscape and it has been studied several times and it just gives the traces of the interior architecture and human civilisation and evolution and since very old times.

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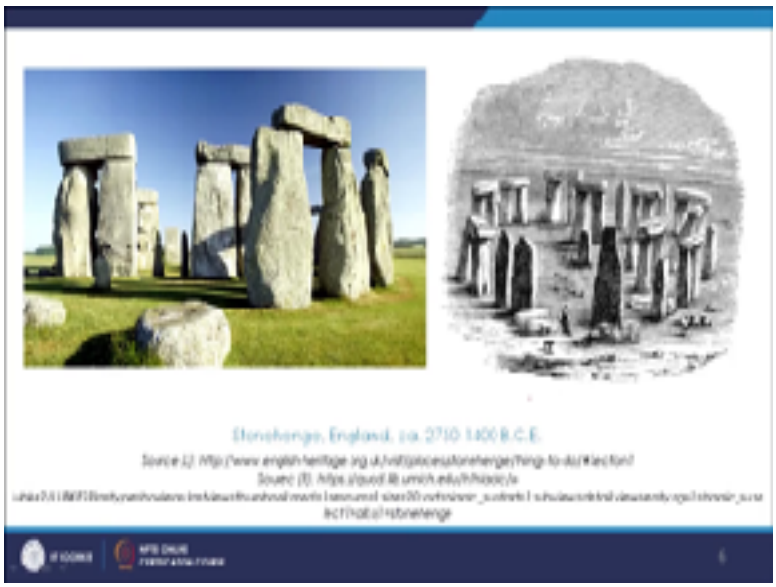

There are some more pictures and this is from the library of university of Michigan and they have very nicely documented and catalogued few of the historical monuments and given all the details about it.

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So, this Stonehenge these all the monuments, the site and the surroundings they were added to the UNESCO's list of world heritage in 1986 and it has a history spanning 4,500 years and its very crucial because the main site and the surrounding structures they give a glimpse of human civilisation, evolution, knowledge of the material, how the structure was created, and for what purpose it was used.

So, they help us understand Neolithic and Bronze Age ceremonial and mortuary practices. Thats one important thing about the Stonehenge. And collectively all these building which we see on the side they demonstrate around 2000 years of continuous use and monument building. So, in a way they also represent a unique embodiment of our collective heritage.

So, I am starting from the start you know how stone got introduced in interior architecture and what kind of buildings and monuments do we come across when we talk about stone. And we will see slowly that how this heavy structure is slowly with time

getting transformed into a lightweight structure and there are different purposes which could be solved by stone as a material.

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So, continuing a little bit more on Stonehenge. It is the most architecturally sophisticated and only surviving lintelled stone circle in the world. The earliest stage of the monument is one of the largest cremation cemeteries known in Neolithic Britain. The stones were brought from very long distances like almost over 150 miles away.

So, we can imagine how in that time you know without any technology and advancement in the transportation, these stones were brought from far off places and they were put together and the circle was created. The stones were dressed using sophisticated techniques and erected using precisely interlocking joints. So, thats the beauty, how they were put together and how the interlocking joints were created to put that stones in place.

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Then we see this, another great piece of architecture the Great Hypostyle Hall this is in Egypt and it is also constructed out of stone. And we see after seeing this you know building one could completely understand the proportion, the scale, how the building massing happens. How the circulation is taken into consideration and how stone as a material is doing justice not just to create a space, but also to create an iconography and to create a sort of a symbol of you know humanity and power and civilisation.

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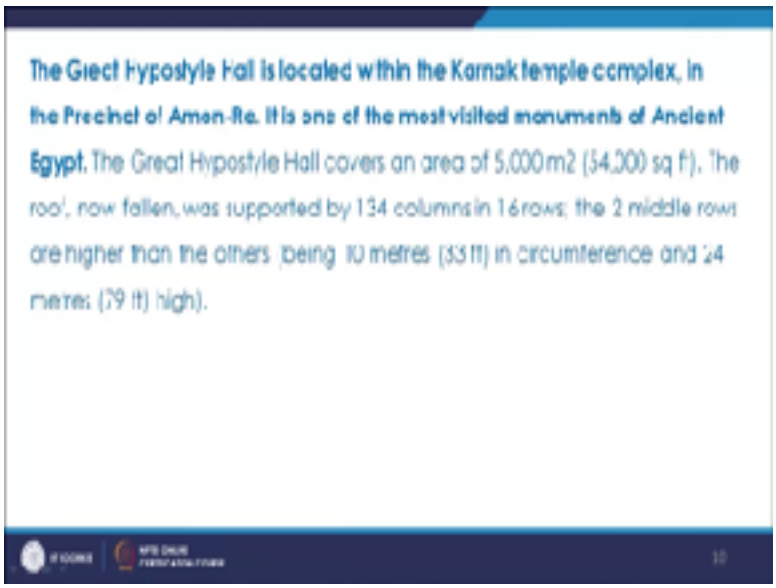

So, again we see that this hall is located in the temple complex, in the Precinct of Amon-Re Egypt and it is one of the most visited monuments of ancient Egypt. It is very famous and there are lot of footfalls that happened, lot of tourists come to visited from different parts of the world and it has a beautiful interior architecture with a very significant history.

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This is another example, the very famous Notre-Dame Cathedral, which is also called as the Chartres Cathedral, It is in Paris and we see the elaborate architecture here all in stone, here, some ornamentation as well. So, the building form as well as the small elements and the details that are done, they are all done in stone and it is very exquisite over here, over here. And the structural details, how the entire structure is put in place its a remarkable piece of architecture and also a story of stone craft. How the building crafts are communicated through the medium of stone and how this entire form follows function works over here.

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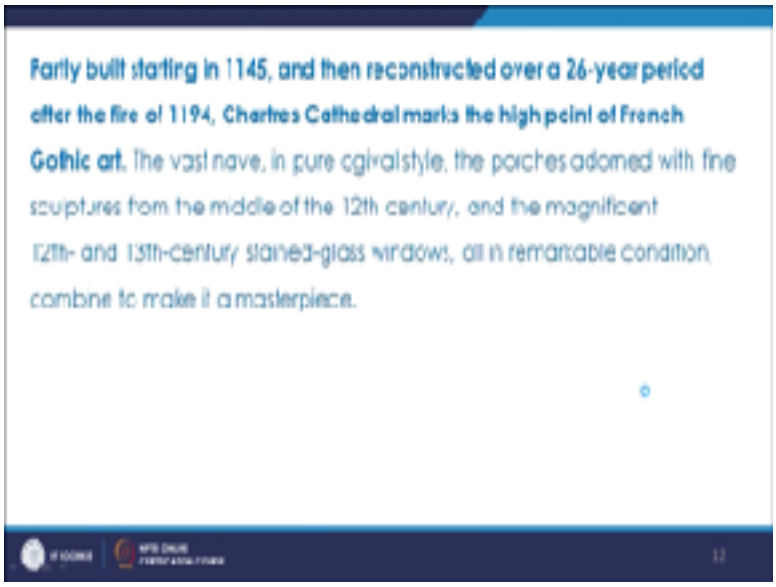

So, partly built starting in 1145 and then reconstructed over a 26-year period, it took a really long time after the fire of 1194. This cathedral marks the high point of French Gothic art. So, it also creates a piece of an iconography it talks about is distinct significant architectural style and its still standing, lot of people go there and researchers have documented it.

And this structure is still understood and studied to get the idea of the construction techniques and how the material was used in those times. When probably there was not so, much technology that we have today at our disposal, but then there was a wisdom how to use the material in what way

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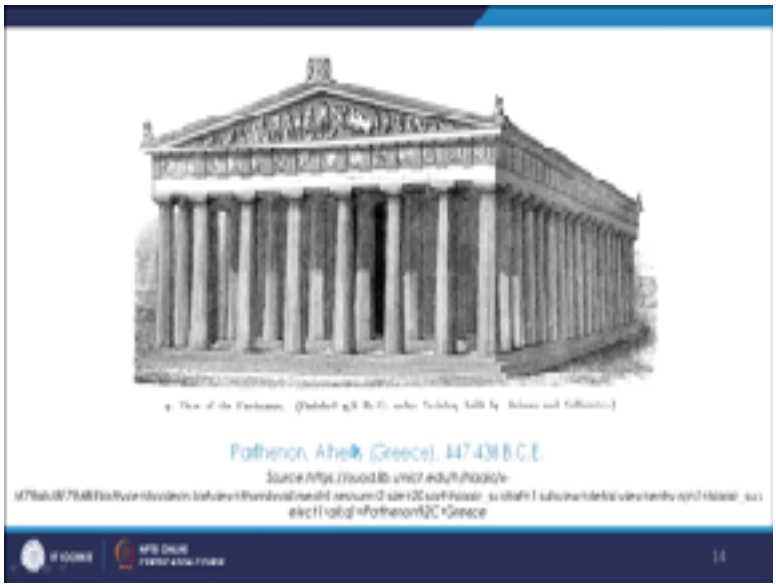

Here we see the Parthenon, the very famous Parthenon and this is another picture and where we see the proportions and the use of stone and how the entire detailing is done. The structure is made, and then the further ornamentation, and the motives, and the details are done. So, this is again very significant piece of architecture.

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So, Parthenon is the temple which is dedicated to goddess Athena, and it is the most important survival surviving building of classical Greece. Generally, considered the zenith of the Doric order; we discuss a little bit about the Doric and the Corianthan column in one of the presentations.

So, again this building marks the zenith of the Doric order. Its decorative sculptures are considered some of the high points of Greek art. And stone as a material has facilitated the doing of all those cultures, and details, and the motives, and the artwork along with the building form and the construction.

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We have another example, Pyramids at Giza and how many times do we talk about the pyramids, and what is the stable geometry, how were they constructed and how they have been so, wonderfully conceive in that era.

So, again this is done in stone, and how stone as a material you know it just tells us the story of civilisation. So, story of stone is the story of civilisation, it is one of the oldest materials that is available to us and then we see all these historic examples. How the material stone has been used in the construction in different forms, in different scales and in different ways.

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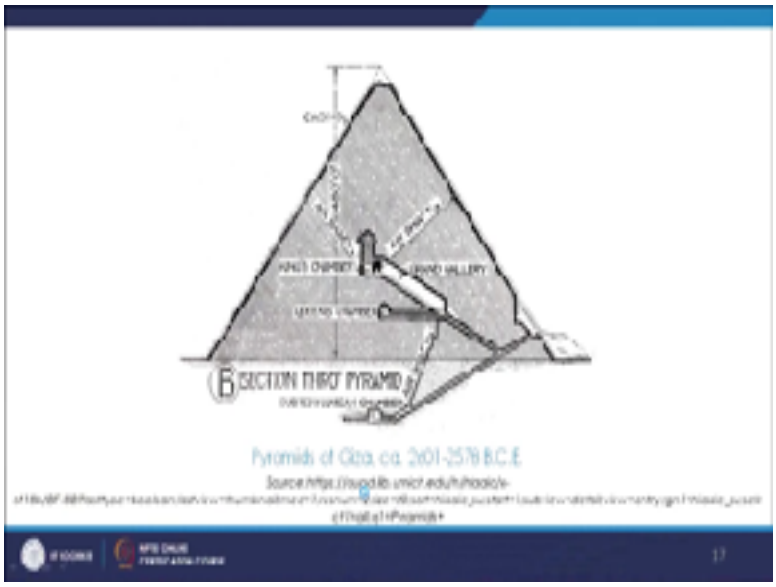

This is again a drawing which explains the entire detail of the construction.

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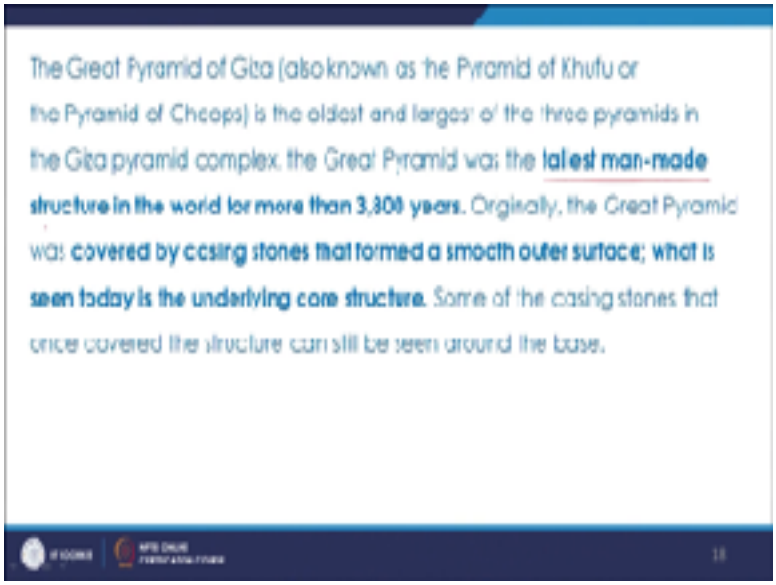

So, this great pyramid was the tallest manmade structure in the world for more than 3,800 years. And originally the great pyramid was covered by casing stones that formed a smooth outer surface; what is seen today is the underlying core structure. Some of the casing stones that once covered the structure can still be seen around the base.

So, we still have the evidences and the proof that is you know the stone was used for making the structure. So, this is another great example when we talk about stone as a material.

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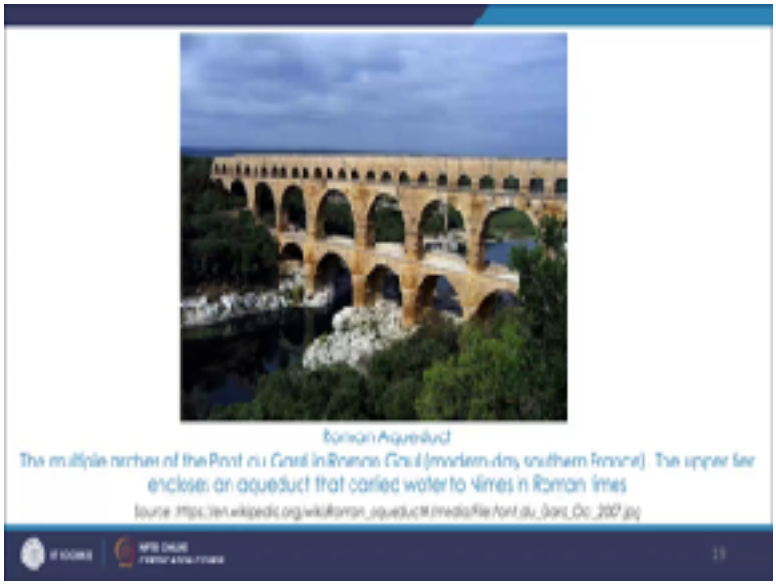

If we shift our focus to another example and function then we talk about aqueducts. So, the Roman Aqueducts also we see great examples which were constructed in stone. Here we see the Pont du Gard in Roman architecture where we see the Aqueduct been made and we see this tier system. So one tier, and second tier, and then these arches, and columns.

So, this aqueduct was constructed, and the upper tier here encloses an aqueduct that carried water to Nimes in Roman times. So, how the water was carried and it was brought to the city, for that purpose the aqueduct was conceived and constructed, and the material which was found suitable for that was stone. It was available, it also allowed that kind of the function to prosper and how the water was channelise from far of water bodies and brought into cities for different purposes of day to day life, and human needs. So, that was a sort of a marvel how this architecture was created.

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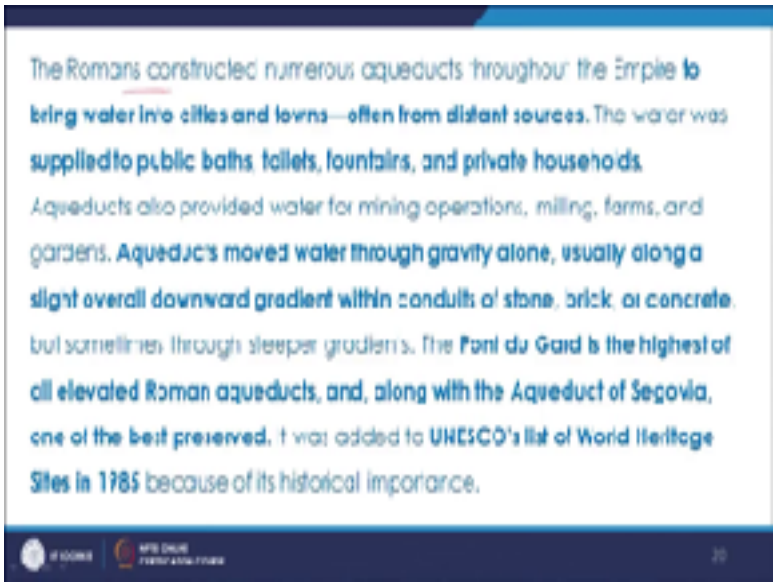

So, the Romans constructed numerous aqueducts throughout the empire to bring water into cities and towns-often from distant sources. Now, this water was supplied to public baths, toilets, fountains, and private households. Aqueducts moved water through gravity alone, usually along a slight overall downward gradient within conduits of stone, brick or concrete, but sometimes through steeper gradients.

The Pont du Gard is the highest of all elevated Roman aqueducts, and along with the Aqueduct of Segovia, one of the best preserved. This is also UNESCO’s world heritage site and it was added in the year 1985 because of its remarkable historical importance.

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Let us see some another examples. So, we see here the Baths of Caracalla and here also we see the entire structure over here done in stone.

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This is one regenerated drawing where we see this very elaborate interiors, which are very exquisite, very aesthetic, and the kind of scale that is achieved over here, and the kind of detailing that is done. So, this is again all stone that we see. We see some very timeless examples in stone which have been historically seen in architecture, and we will

see some examples from India also. So, across the world, throughout the civilisation in different parts of the world we see very significant use of stone as a material for building construction.

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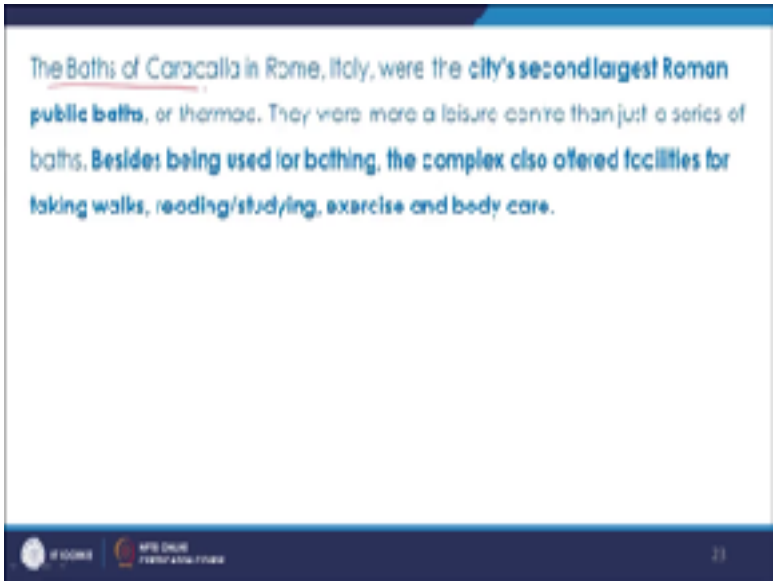

So, the baths that we just saw they were the city's second largest Roman public baths and besides being used for bathing, the complex also offered facilities for taking walks, reading, studying, exercise and body care. So, this was like a lifestyle you know sort of an area where one could just rejuvenate with exercise, take care of the body and do some reading and studying. So, there was a sort of a reading section and a library as well.

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We have another very famous example of Saint Peter's Basilica. It is again architectural marvel, the kind of details that we see here, not just the proportions, the verticality and the horizontal band. The kind of details in stone we see, the kind of column details, column capitals, and the kind of frames that we see over here, all the details done in stone. This is again a very significant example, and this has been constructed over a very long period of time.

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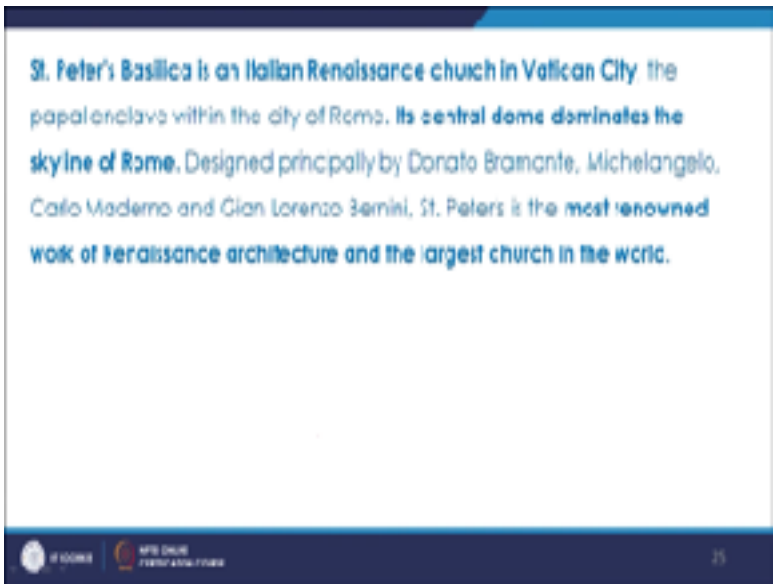

So, this Basilica is an Italian Renaissance church in Vatican City. It is central dome dominates the skyline of Rome and it sort of stands out as a landmark, and there are lot of tourist who come to visit this place because of his grander and beauty and construction details and the history associated with it. And this is the most renowned work of Renaissance architecture and the largest church in the world. So, it is very famous.

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Now, if we talk about India. Stone has been used significantly as a building material as well as for decoration and ornamentation. In India, one specific reason for its acceptance other than the availability is the material property, and quality of stone suitable for carving.

So, when we talk about the Indian context and we specifically talk about varied temples and not just temples the other religious buildings. So, we see a very elaborate use of stone craft, be its stone carving, be its stone inlay and different another forms. So, that is again very ornamental, decorative and there is a lot of eye for detail. In fact, it was the wisdom in the 'shilpi' tradition that allowed the craftperson to understand the composition of stones, their material properties, have expertise in quarrying techniques and exploit the potential to the best.

So, we have a very profound shilpi tradition in the Indian architecture, in the Indian way of making things and there is also a mention that we have been discussing about it throughout the course. And there has been a mention about it in our Shastras and Vedas, and the craft persons who work with stone as a material, they had a very deep knowledge about it, you know what is the material composition, which stone is most suitable for carving and how do we work you know with how many pieces of a stone going in one arch. And how does it take the load and what kind of structure comes in and what kind of details and iconographic goes in it. So, that kind of knowledge system exists.

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Now, we will see some examples from India and starting from the very famous Ajanta Caves, in Maharashtra. When we talk about stone architecture, when we talk about India the mention of Ajanta and Ellora Caves has to be there and its a remarkable piece of architecture done in stone. And it is so significant from many different aspects and reflecting about Indian culture, identity, construction, knowledge of material.

And there are lot of people from different parts of the world who come to visit this again and when we talk about stone, when we talk about Ajanta and Ellora Caves, there is also an added layer of storytelling and narratives and that is what you know makes it even more interesting.

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So, the Ajanta Caves are about 29 rock-cut Buddhist cave monuments which date from the 2nd century BCE to about 480 CE in Aurangabad district of Maharashtra state of India. These caves include paintings and rock cut sculptures described as among the finest surviving examples of ancient Indian art, particularly expressive paintings that present emotion through gesture, pose and form.

So, these cultures and paintings they make these caves and the architecture even more interesting, because there are lots of stories which are depicted, there are lot of gestures and forms and intricate details that one sees when they visit the caves.

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Another picture here, we see the interior and this is one map which shows all the different caves, there are many caves over here and the numbering is done.

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Then here we see the Ellora Caves, again Maharashtra, and this is particularly what we see on the screen here is cave 16 of the Kailashnath Temple. And this is one of the most famous caves here in the entire group of caves that we see and here we can see the stone. Lot of small details, the entire form and the structure how intricately it is done and here all the details that we see, corner details, motives, and all the carvings that are done

So, it is very elaborate and quite exquisite. It is a pleasure to the eyes one if one visits these caves in person.

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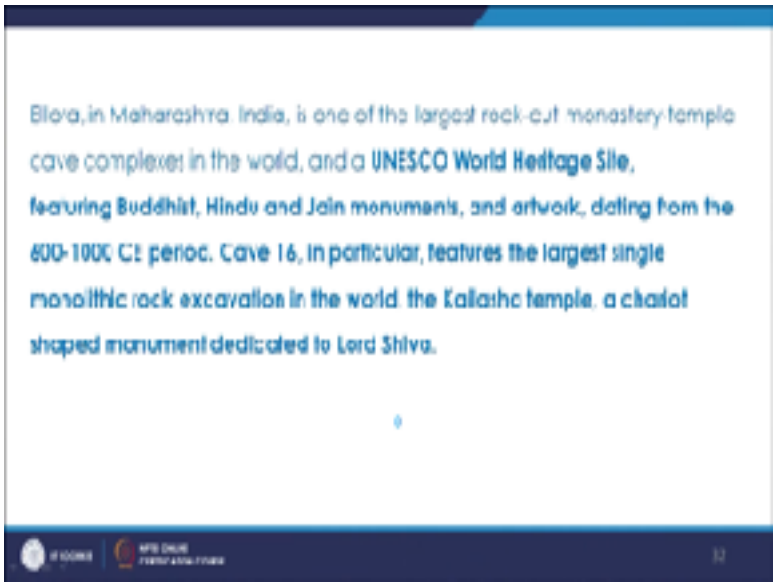

Ellora is one of the largest rock-cut monastery-temple cave complexes in the world, and its again a UNESCO World Heritage Site, featuring Buddhist, Hindu and Jain monuments, and artwork dating from the 600 to 1000 CE period. Cave 16, in particular that we just saw, features the largest single monolithic rock excavation in the world, the Kailash temple, a chariot shape monument dedicated to Lord Shiva. Thats what we saw, and its very significant and there is also a sort of a world record here that India holds.

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Now, these are some sculptures from the Khajuraho temples, M.P. India, and these are known for the sort of erotic stories that they tell and they are all been done in stone by hand, by lot of craft persons and by the Shilpis. And again its so intricately done that when one visits the temple complex, there are different bands, and different stories, and different characters within though stories that one tries to understand and gains knowledge about.

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So, the mid tenth century sculptures from the ancient temples of Khajuraho, represent the subtle warmth of classical Indian modelling. The harmonious integration of architecture to the sculptures, add to the rhythm of the monuments.

So, we see this constant harmony which is between the architecture and the sculpture so, the space and the artwork. Irrespective of one's iconographical understanding, one is still impressed by the unified design of the temple, with its horizontal bands of sculpture in perfect balance with the vertically towering building.

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So, this is very interesting how the verticality has been balance with the horizontal bands. Another significant piece of architecture from India where we see the elaborate use of stone and the kind of details that are present are marvelous. So, this is Rani-ki-Vav in Patan Gujarat and this is a stepped well very famous one.

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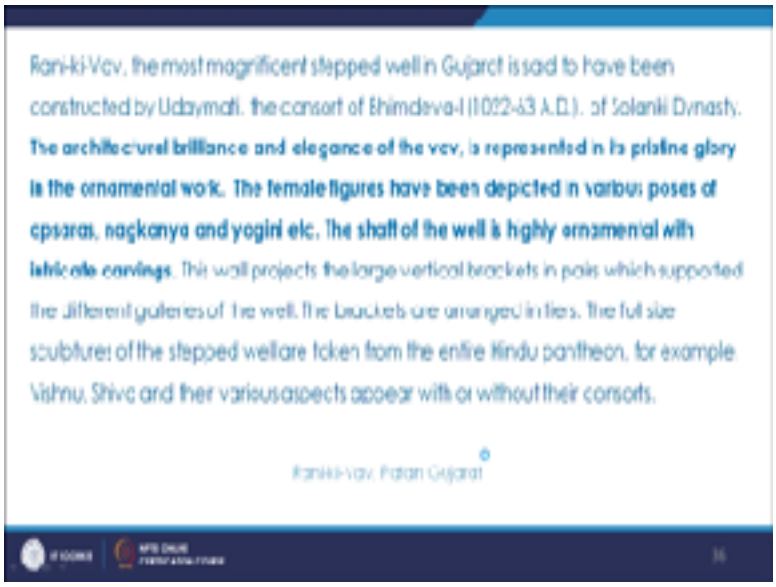

So, Rani-ki-Vav the most magnificent stepped well in Gujarat is said to have been constructed by Udaymati, the consort of Bhimdev, of Solanki Dynasty. And the

architectural brilliance and elegance of the vav, is represented in its pristine glory in the ornamental work. So, there is lot of ornamental work, and they began their discussion of using stone in Indian context with lot of details and ornamentation coming into picture. So, here we see lot of ornamental work. The female figures have been depicted in various poses of apsaras, nagkanya's, and yogini.

The shaft of the well is highly ornamental as well with intricate carvings. So, this is not just functionally a very sound piece of architecture; how a step well functions and how the entire idea or the concept of stepped well is conceptualised, and then it has been really made alive, you know using stone as a material, but it is also the brilliance of you know ornamentation and how the entire space is constructed to create user experiences.

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Another very interesting example Meenakshi Temple in Madurai, this is also a very intricately ornamental temple, one of the most you knows beautiful stone carvings could be seen here. And its again a very significant piece of interior architecture done by using the material stone.

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So, this is a historic Hindu temple located in the holy city of Madurai and the temple forms the heart and lifeline of the 2500 year old city of Madurai. And then the hall of thousand pillars, we saw one picture in the previous slide if I could just go back there, this one over here, this is the hall of thousand pillars, very interesting piece of architecture. There is also a science and technology applied here, you know there is a kind of music one listens when you just tap these pillars.

So, the hall of thousand pillars is a museum of icons, photographs and illustrations that itself is a sort of an illustration. According to the legend, Madurai is the actual site where the wedding between Shiva and his consort Meenakshi, took place and that is what this temple talks about.

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Now, we are talking about stone, we are talking about Indian interior architecture, we are also talking about building crafts. So, very significant example that I could put in here are the works of Dr. Vidya Dehejia, and she brings out the narrative character of the relief sculptures in stone, also in some cases paintings, but mostly stone, especially with reference to the Buddha's historic life, as prince Siddharth, and from his numerous jataka stories; jataka previous births.

So, Dr. Dehejia has done a lot of work on the jataka stories, and she brings out the narrative character of these relief sculptures which are done in stone. And she talks about varied modes of narration and different kinds of stories being told, we will not get into those details. But there are significant examples that we see in the you know the jataka stories and the kind of stone techniques which were used, the carving that was done and through this material how those stories were translated and transferred and communicated.

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So, here we see this panel. So, this is a story and there is this numbering done. So, there is a sequence and this is the story of Nanda and we see here, you know this is all done in stone and these sort of pillars over here, they act as the framing devices, and we see narration happening here, different kinds of stories been told here. Sometimes they are sequential, sometimes they are not sequential and they are different modes of narration. So, this is all stone and this is historically very significant and it tells with us about Prince Siddhartha and several jataka stories associated to him.

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Some more examples: the Departure of Buddha; Sanchi. We see very elaborate story telling in stone here, here we see this monkey jataka in Sanchi and we see the narration happening and everything all the details here in stone, this trees in stone. So, these kinds of narrative examples we see throughout the history.

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Some, more very significant examples: Lord Rama here, this is again a stone plaque, here also again we see one jataka story and all these details, very intricately done in stone, this done in stone, we see the tree over here done in stone.

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So, all these examples we see, and the very famous Taj Mahal; how can we not talk about it, it is entirely done in stone, the white marble. And this is one the wonders of the world and our heritage site itself and everything from the structural detail, the form, the space making elements, the kind of inlay work here, the artwork that we see and here its not visible in the photograph, but the kind of you know mathematical and geometrical composition and the details that one sees inside so, everything is done in stone.

And its so, pristine and its such a grandeur and very intricately, elaborately, painstakingly done over a very long span of time. And it has some timelessness it is still standing and we keep talking about it, we keep going in back to it to understand the structural concepts, to understand the Mughal architecture, to understand the role of mathematics and geometry in architecture, to understand the building crafts, to understand stone as a material, its properties and how it has survived all these ages. So, again a very timeless piece of interior architecture that helps us understand also stone as a material.

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So, it was designated as the UNESCO world heritage site in 1983 and it is regarded by many as the best example of Mughal architecture and symbol of India's rich history. So, it is very important for us.

Now, we had seen some example so for and just very quickly telling about now you know what is the composition and what is the stone as a material.

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So, if we talk about the origin, basically we talk in terms of rock. So, there is sedimentary rock, and there is metamorphic rock, and there is igneous rock, and within that, we have different kinds of stones. So, there is marble here and then there is slate, granite. So, different kinds of stones we see and we get it from the different rocks from nature and they have different properties and they are used accordingly.

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Also, on the basis of finish, we could talk about different kinds of stones. So, there is acid wash finish, this is the saw cut finish, here we see the flamed finish, this is the brushed finish and here this is the polished finish. So, there are different kinds of finishes also available in stone. It is use structurally as well as for cladding, for making objects, for furniture, for different purposes, at different scales.

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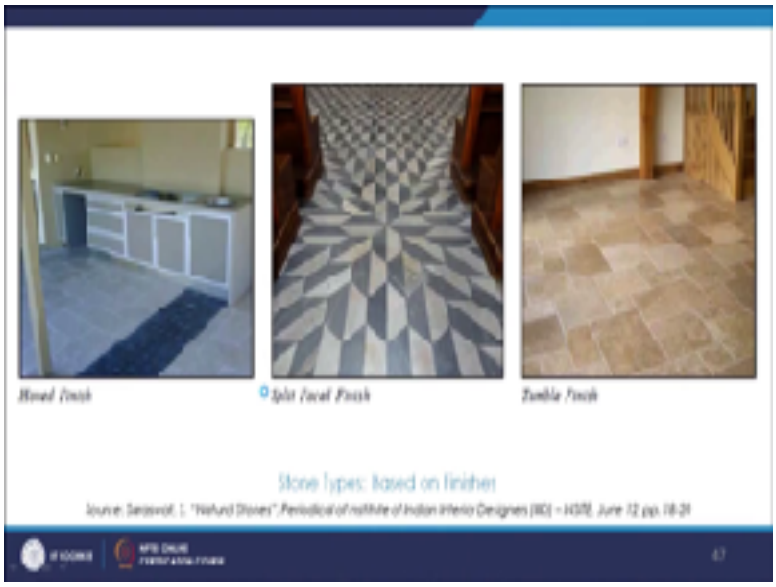

Also, there are different kinds of more finishes so, this Split Faced finish over here, there is this Tumble Finish, and see this Honed finish over here, there are even more which are may not be listed over here. The different kinds of stone finishes which are now available lot of experiments are being done, different kinds of stones have come up. So, it is all possible.

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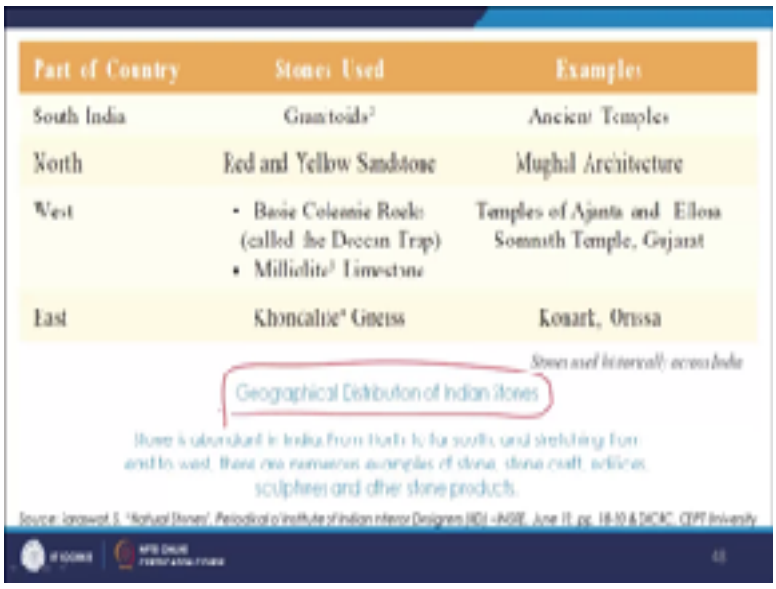

And if we talk about the geographical distribution of Indian stones; then across the geographical boundaries; north, south, east, west, we find different kinds of distinct stones which define the critical regionalism and the geographical you know vocabulary of architecture within that region.

So, here we see this table I am not going to describe in detail and there are some examples over here. So, in the north we see this Mughal architecture done in this sandstone basically. South India also we see lot of ancient temples and how the kinds of stones which were suited for that were chosen. In the west India, again we have certain examples for which we just saw, and east again we have different kinds of stones, and we see different examples of architecture.

So, any country geographically it spans over so many you know thousand kilometers and its huge. And, every region has a specific soil and rock formation and a different kind of climate and that is how different kinds of stone pieces are you know studied and used for the purpose what you know a client wants and what an architect wants.

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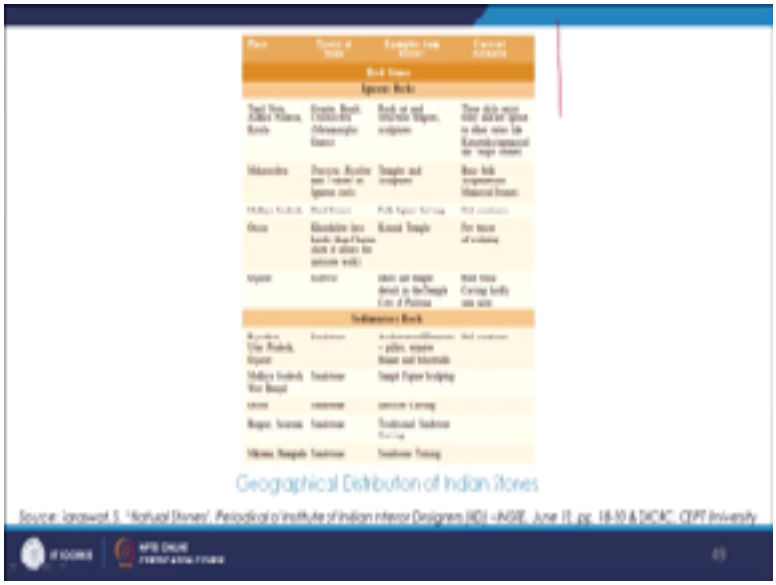

This is some more elaborate detail on the geographical distribution of Indian stones and, here we are also talking about the hard stones and sedimentary rocks, igneous rocks

within the hard stones. And then we see lot of examples throughout history over here and whether the historical practice, it still continues or there are you know some differences.

So, we see this kind of detail when we do the mapping and it is significant for us to understand, you know which state, which part of the country has which kind of stone, and then what are the kind of interior architecture examples which have been noted and what is the current scenario.

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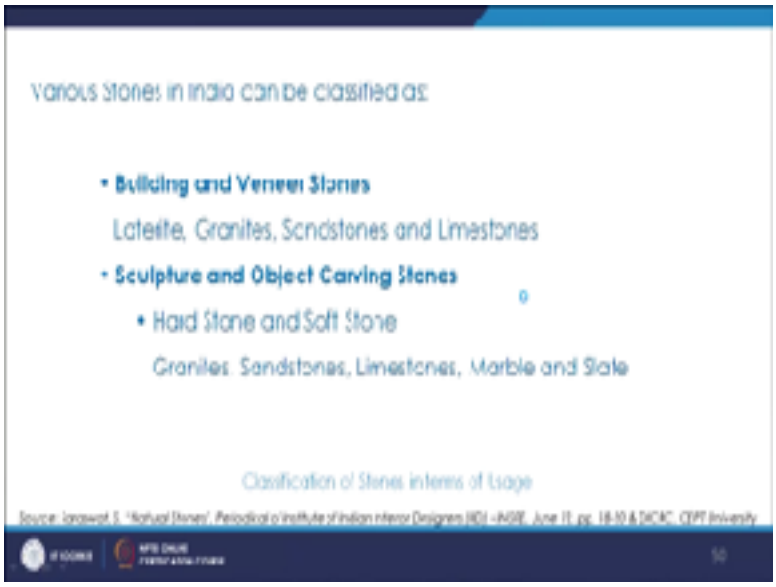

If we talk about the broad classification, we could talk about stone in terms of building and veneer stones, and sculpture, and object carving stones.

So, when we talk about the building and veneer stones, we see examples like laterite, granites, sandstones and limestones. And when we talk about, mostly ornamentals, sculpture and carving work, again there are hard stones and soft stones within that, and we see the use of granites, sandstones, limestones, marble and slate. So, there is a huge palette available and there are different kinds of stones for different purposes; one just has to understand which stone could be utilised for which purpose.

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Now, if we talk about certain applications or uses of stone traditionally and contemporary times, when we see a sort of a list here. So, traditionally they were used for kitchen products, architectural elements, products for rituals, accessories for personal use, products for public use, and there is also an application in terms of sculptural and architectural carving. So, we see the shilpi tradition followed, vastu followed, we see traditional architecture principles being applied, and we see lot of sculptures and iconography.

And if we talk about today or let us just say contemporary times, then we could see in terms of products, kitchen products, table top products and ritual products, again some personal accessories, furniture definitely, and also some fixtures. Architectural use again folk, formal temple elements. So, there are elements which are being made, sometimes they are even standardized and put in the market. Sculptural use, so traditional and contemporary, and also there could be a mix of both, little eclectic.

So, these kind of uses of stone we see and not just the building that we saw, but in different other forms here. And buildings also they were like really heavy structures earlier and now they are translated into lightweight structures, with the help of technology, with changing time with the discovery of more kinds of stones available, or technology that allows us to use stone in different ways, which were not available earlier.

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So, I will just give a quick run through you know of these palettes which have just been compiled, how the stone was used in different ways. So, these are varied applications of stone and this is one palette from Gujarat and we see the Mosque Dholka here and how the stone was used for construction. So, these kinds of details, even these furniture details here that we see, all those examples we see.

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There are some contemporary examples here; the garden seating, the stone chair and you know this kind of also the craft that happens over here. So, this functional purpose as well as there is slightly decorative purpose also attached.

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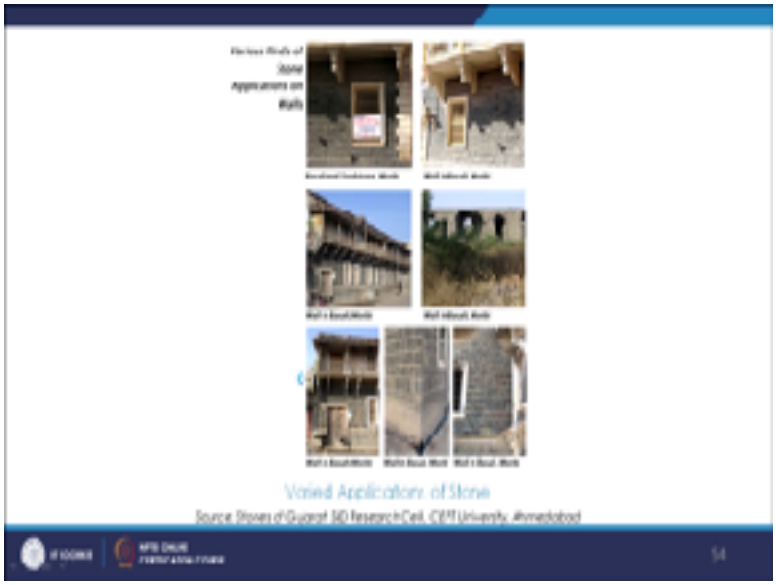

Some more examples here we see, the usage of stone, here as a space making element which is structural also, the brackets.

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Now, traditional stone flooring we have seen this in one of the previous slide so, stone was used for that.

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Again we see the examples of flooring here, here.

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Then also in certain temple elements like we were discussing. So, marble how it is turned through this lathe machine and how these elements are created, and they are used for very different purposes, here for temple and this is the storage underneath the temple.

Here there is this pivotal joint and this could be open and this could be for storage kind of interlocking joinery that is happening here.

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The stones are getting used in many different ways and when we talk about stone there are particular kinds of tools that are used for the stone, you know working while working with the stone. And we see this documentation, this is again done at DICRC and I was a part of this workshop, the stone craft workshop. Then we see these different kinds of tools and what are they called locally there in Gujarat.

And they are used for different purposes, and this entire set comes into picture when one is working with stone at different stages they would be used in some or the other way. So, these tools are important when we talk about the material.

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This is the entire palette, we also see the different kinds of tools within one family and how the dimensions change and lot of them are used for different purposes. So, sometimes on the surface, and sometimes when one has to go deep into the surface and do more detailing than another tool with another dimension is used. So, all those kinds of palettes

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This again the same one the picture from the top.

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Here again we see the same collection.

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Now, when we talk about the transformation through time and technology; most definitely when we talk about the transformation of a material we also talk about the change in the tools and technique and technology. So, when we used to see those kinds of set of tools that we just saw on the previous slides, they were mostly assisting the handwork.

Then there are some power tools that help which are partly you know the hand work is partly done and then the power tool enhances it. And then we have like very sophisticated and advance tools like these here that we see, the CNC machine, and the CAM. So, CNC and CAM and we see these different kinds of modern tools, different kinds of ways of doing things, the cutters and different kinds of these tips, and you know the nozzles.

So, now we have technology stone could be cut in different ways, we could have lot of laminates out of it, we could do cladding out of it. So, there are different ways of doing also the programmable carving, there are ways of doing you know robotics, with stone and getting work done by the robots. So, all that is happening a lot of changes coming up.

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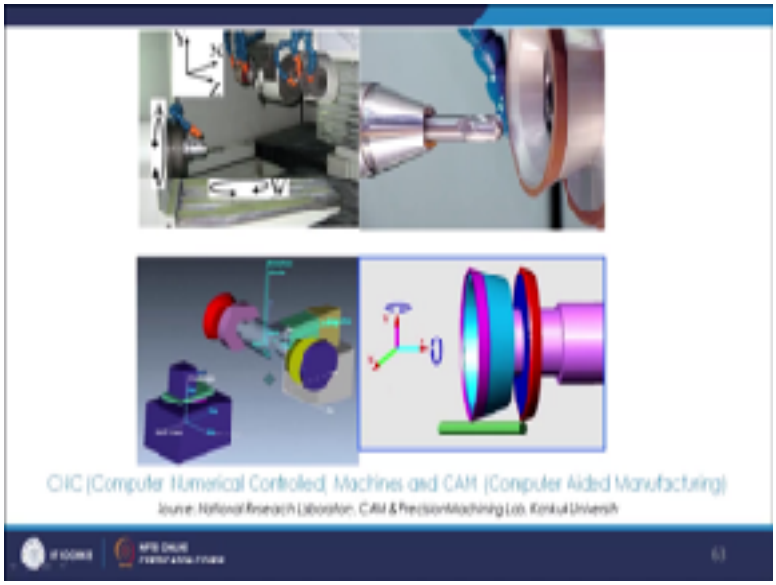

These are another examples. So, we have now the machinery that can work in 3-axis, 5-axis, 7-axis and can do lot of work which the hand cannot do. Now, there is a sort of a debate here whether this is good or not, whether this takes over the craft sector; that is another thing we are not discussing that, we are only seeing this transformation and we are not really debating about anything, at least for this lecture today.

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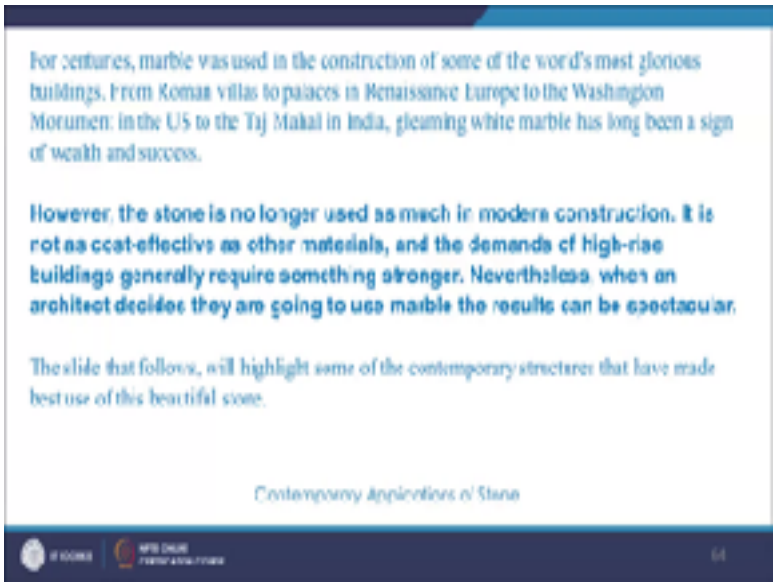

So, there are lot of reasons why modern construction stone is not getting used anymore, lot of people refrain from using it because of the cost reasons, because of the weight and the load it you know has, and the non availability at times. But still there are lots of people who have still stuck to it, and there is a beauty in this material, and there is a distinct charm of using it, and many of them use it in the interior architecture and we are going to see some examples.

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So, here we see contemporary applications of stone and, here we see this lightweight natural stone ventilated rainscreen facade. So, this is one contemporary application that we see over here.

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There more examples of contemporary applications; this is the Oslo Opera House in Norway, and we see lot of use of stone in very different ways, in a very contemporary, in a very stylistic manner.

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Again, here we have this energy centre in United States and there is a lot of usage of stone here as well very simple white sheet.

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Then again, we see some more examples this is this Venus Marble Headquarters in Greece, and we see the different kind of usage of stone.

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This is one temple from India Prem Mandir, Vrindavan and here they have used very advanced new methods and machinery. In total 30,000 tons of marble was carved using a combination of advanced robots and over 1,000 artisans.

So, they have tried to balance it that there are artisan also who were working, and also there are some robots with this kind of new different CAM and CAD control machines also. and this combination works and this gives us this magnificent temple in today's time which is entirely done in stone.

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We have some more examples, this is the Stone Pavilion, and it is a very interesting exploration that has been done and it was exhibited in a pavilion in an exhibition recently that was organised.

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We have another very interesting example here, this is the Stone Vault Prototype and it claims that there was no material which was wasted here. So, we see this contemporary explorations, where there are different concepts also in place which talk about no wastage or recycling and things like that energy efficient.

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This is the use of granite to you know very elaborate use of granite and this is the library building and this is very contemporary and it as a very simplified look.

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And this is another example here, we see these towers. So, this is a Foster & Partners building and there are staggers they are staggered these limestone towers to create roof towers sorry terraces. And here also lot of stone has been used, as cladding.

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And this is one of the most recent examples this is the Apple store in Singapore and they have this hand carved staircase inside which create this beautiful volume within the interiors and they have also applied stone in their store.

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And we also see this palette of furniture where we see some interesting contemporary designs here. So, here the stone has been used quite extensively in combination with other materials also at places.

So, this was I mean it is very difficult to talk about one material and its transformation in just one module; I have just tried to briefly put certain things.

And in the next module we will just discuss the summary about all the previous modules that we covered, and lets also see some references now.

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So, this is an exhaustive list of different websites that you would encounter when you would search on stone. So, these are going to be very beneficial.

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And then, some books that we have been seeing already but significantly important for this lecture because we are talking about the stone. So, mostly which are talking about the stone those books I have put here.

Thank you.