CONSTRUCTION AND ALLIED MATTERS

A few more issues relevant to architecture are discussed in this chapter which generally fail to find a place in literature on museum architecture. Besides knowing about the philosophy, concept, planning, designing and aesthetic aspects of building ; it is imperative for a museologist to know about the basics of the techniques of construction, properties/nature of material used for construction (commonly known as construction material), post construction care or maintenance etc.; to ensure that 'building project' constructed with due care, meticulous planning and immense resources are taken care of; to last for prolonged periods.

Maintenance:

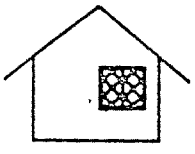
Maintenance of the building after construction is equally important as building tends to become dull after a few years of its construction due to natural, physical and mechanical factors, that cause wear and tear. The new sheen of the building fades away with the passage of time leading to dull, run down, unattractive and inconspicuous appearance. But, this common feature resulting out of aging could be countered by proper upkeep and maintenance of the building.

Cleanliness should be the first and foremost consideration of a museum building. Dust accumulated in a museum is both aesthetically displeasing and scientifically harmful to the objects. As a general practice, all the leading museums follow a regular programme of cleaning the floors of the museum and a weekly programme of dusting the showcases and objects displayed within and them at frequent and regular intervals of time depending upon the need and conditions. Further, mopping of the floors and cleaning the moulds on the walls and ceiling should be carried out at periodic intervals. Based on the nature of museum and its collection, the intensity and importance of cleaning programme varies. It goes without saying, with art collection it is not only important and primordial for scientific reasons but also augments the overall appeal. Even the mere tidy and orderly arrangement of display will help to enhance the appeal and popularity of exhibits, specially of this category; with the public. So what appears to be a commonly known and all familiar thing has its significance in museum context which not only has to be noted but strictly followed for its multiple advantages. While working on this project the author took a special notice of this aspect at all the museums surveyed. This is a routine matter with almost all the museums, where as some museums take it

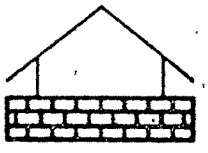
seriously, which reflect in their get up. Prince of Wales Museum is an example for this. It not only has a programme of daily cleaning of floors but also a penchant for it which is revealed in its religious practice of strict adherence to this programme. The museum building enjoys a special status of being declared as a monument by the local heritage trust. This is accorded to prestigious buildings of the city known for one or several coveted attributes such as a style reflecting architectural beauty, grandeur, perfection of a period and excellence in design and functioning and for being an aesthetic landmark on urban landscape etc. The staff being made aware of the added virtue to the museum as a result of its acclaimed features, are trained to take special care with regard to the general maintenance of the building and its premises. Quality and standard of cleanliness are subjective matters concerned to the governing authorities of a museum who may formulate a policy matter appropriate to the needs of the respective institution. Even in cases where it has great importance, affordability of it need to be thought over and adequate arrangements have to be made to meet that expenses in terms of the manual labour and equipment.

To elaborate the point mentioned above, regarding the practice of regular cleaning, it may be stated that at most of the museums floor is cleaned in morning before the museums are opened for the public. This is done to facilitate thorough and uninterrupted cleaning by the sweepers and janitors of the museum staff. If it is to be carried out during visiting hours, it may interfere with the free movement of the visitors and cause inconvenience to them. So, the general practice in vogue facilitates mutual convenience of both the functioning of household staff of a museum and that of the visiting public. However where unwarranted, there are exceptions to this norm. Depending upon the climate of the region and the nature of building, the timings or the frequency of cleaning may vary. Though moderation is exercised regarding a job of this kind, at any museums, situations may compel to follow practices which may appear as extreme. One such seemingly extreme measure of getting the museum floor mopped eight times a day was noticed at the Palace Museum, Mysore. Visitors are expected to enter barefoot into this museum. At any given point of time during visiting hours, one could notice a portion of museum getting mopped. Needless to say, the museum is immaculately clean. Cleaning job however is not confined merely to floors. It should be extended to exhibits, exhibit cases and other furniture such as pedestals, panels, frames etc. However, since the discussion is about the cleaning of a museum building, one should include other structures of a museum building such as walls, ceilings etc. Unless special attention is paid, it is a common feature

A few aspects of maintenace of a building



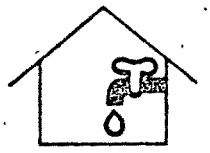
WINDOW GRILLS



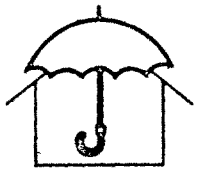
COMPOUND WALL

TUBEWELL

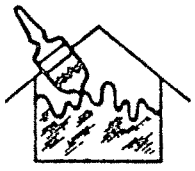
ELECTRICAL WORK



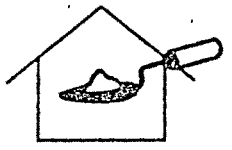
PLUMBING



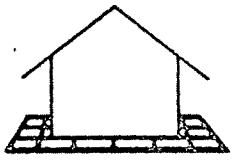
WATER PROOFING



PAINTING

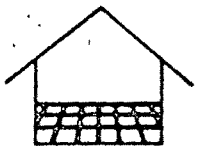


PLASTERING



COMPOUND PAVING

ROOFING



TILING

A patched-up portion needs to be coloured in an exhibition area before it is reopened for public view. Otherwise it may diminish the aesthetic value of the exhibits displayed near to it.

When a gallery is closed for public view for renovation, a notification should be made for the convenience of the public.

Orderliness generally results out of proper planning, designing and construction of a suitable and ideal museum building. Of course, it needs to be combined with efficient functioning of the staff. The picture shows a step ladder being left unremoved in front of a showcase (during visiting hours) may indicate either callousness on the part of concerned museum staff or inadequacy of space within the museum building to store such equipment.


NO ENTRY
अंदर जाना मना है।

Warped wooden panel background to a sculpture at the Asutosh Museum when it was located in the Centenary Building of the Calcutta University.

to notice moulds in the corners of the walls at the top and on the ceiling. Due attention need to be paid to this seemingly trivial matters as in practice these often miss the deserved attention resulting in unsightly scenes and repelling appearance. Besides cleaning, there are other matters of maintenance of a museum building which merit attention.

Peeling or fading of paints and wall colours of any building is another common feature. So, the building and the galleries need to be repainted periodically. Cracks in the walls and chipping of portions both from the wall and the ceiling are not uncommon with the old buildings. So, repair and renovation need to be carried out as and when necessary. The patched up portions need to be retouched at the earliest, especially when they are open to people and are exposed to public view. Otherwise they mar the appearance of an exhibition area. (fig.)

Seepage is another common problem with buildings. Warping of wood panel used as a background to a sculpture was noticed at the Asutosh Museum of Art (fig.), because of seepage of the wall on which the panel is mounted. An adjacent gallery to this wherein stone sculptures were on display was completely vacated of exhibits and was closed down for viewing by visitors because of the problem of acute leakage of the roof. On a prolonged request and continued persuasion, the author was allowed to observe the gallery. Perhaps an illustration could have provided a better explanation, than the words, about the plight of that gallery on that rainy day. It was unbelievably porous with no square meter of the roof of entire gallery being free of dripping. On entering the gallery, the author's primary concern was to protect his camera from becoming wet and the resultant fungal attack of its lens. So, it was not possible to provide a picture of the disastrous situation. There were only a few, small pockets in that gallery which were dry and free of the leakage problem. This problem not only causes immense damage to objects, specially to sensitive ones; but also causes acute inconvenience to visitors. (However, it may be noted that the museum was located at the Centenary Building of the Calcutta University, which was its temporary abode and was about to be shifted to its newly built premises in March 1991.) Seepage and leakage problems with buildings are common during monsoon because of rains, but it could be due to leakage of the drainage and intake pipes also during other seasons of an year. Whatever may be the source of the problem, it needs to be solved at the earliest.

Weeds, as an unwanted and destructive vegetative growth pose another type of problem, specially with the old buildings. They mar the appearance

of the building and also weaken the structure by penetrating their roots into it and thereby causing cracks. Banyan and pipal tree saplings are the notorious of these higher plant species (though it is common observation to notice saplings only, there is every possibility if not noticed and the structure is weak, they can grow in no time into full sized trees sometimes gape opening the wall or portion of the building on which they are rooted). Where as there are smaller plants which also cause a different type of damage. Smaller plants such as moss grow on moist walls and external steps of the buildings, there by causing stain and making the staircases slippery. Unless there is a periodical check-up for deweeding and control the nuisance that may result out of these, it may cause serious loss at a later stage.

According to Hebditch,[1] 'any building needs maintenance requiring both organization and money. In most public authorities the organization will be in the hands of an architect or surveyor in charge of the authority's property. It is essential that adequate funds are provided for the purpose, if expenses of a major nature is not to arise at some future date to rectify a serious defect. In looking at maintenance, it is necessary to consider a number of elements and make financial provision accordingly'.

Regarding 'maintenance' Satya Prakash[2] opined, 'in the case of a museum having been offered a building which is in disrepair, the in-charge of the museum must consult a qualified architect to study the building in relation to the museum's basic requirements and to suggest the capital expenditure involved in the additions and alterations to be affected within it and also the annual cost of maintenance and subsequent repairs and replacements. it has to be ascertained, if the liability is the museum's, whether the museum's annual income can afford to incur such an expense'.

Nina Shah [3] in her recent report on Museum and Picture Gallery Baroda, wrote 'about Rs. 100 lakh have been proposed for restoring the museum. Of this Rs. 25 lakh have been sanctioned'. She further quoted Curator

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[1] . Max Hebditch, The management of premises, *Manual of Curatorship*, Butterworths, London, p.503.

[2] . Dr. Satya Prakash, Small Museums : Building and Allied Requirements, *Small Museums*, Museums Association of India, New Delhi, 1975, p.12.

[3] . Nina Shah, Princess battling for survival, *The Times of India*, 8-9-1998, Ahmedabad.

Sadasivan as "There is a lack of skilled workers for restoration. The labourers can not be paid to access the high ceilings of the museum. Also the 85 strong staff are insufficient for maintenance of the 60,000 exhibits which the museum harbours. These are only 12 reserve stores in the building and not enough space for storage, as only 10,000 odd exhibits are on display at a time. According to him, more stress is laid on the revenue policies of the Central and State Governments and the culture based conservation aspect is ignored."

Security:

Security aspect of the building is another important factor. It should be in terms of physical, biological, mechanical, climatic, natural and man-made damages.

Physical aspect: There should not be any tall tress in the near vicinity of a building, through which an intruder may have access to the building. Similarly, there should be no other tall or overlapping structure on the building from the surroundings which offers accessibility to the building. Drainage pipes of the old buildings used to be protected outside. They should be covered with barbed wire. Any structural or ornamental projections and obscure corners of the building both inside and outside that provide easy lending or hiding to thieves should be properly checked if it is inside and guarded when it is outside during closing hours and night time.

Markham and Hargreaves[1] stated, 'such evidence as has come to our notice shows that there are relatively more museum thefts in India than in any other area covered by our surveys. This may be due to several reasons, the first being that the buildings are not as secure as those of Europe or America;

Stating his opinion about 'protection against theft' Bhoumik[2] said, 'security experts should be consulted before a new museum building is constructed, because the design and structure of the museum building

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[1] . Markham and Hargreaves, *Museums of India*, The Museums Association, London, 1936, p.52.

[2] . S. K. Bhoumik, Design of a museum building and preservation, *Conservation in the tropics*, International Centre for Conservation, Rome and the National Museum, New Delhi, 1972, p.78.

constitute its first line of protection against theft. A museum should be located in a building where the architecture and the internal plan can provide adequate guarantee to safety of the museum collection. The doors, windows, ventilators, staircases and all openings should be well secured. Thick grills should be provided for the windows and ventilators. Barbed wire should be used to cover all pipes for water supply and drainage, so that all such access to a museum building can be closed. A museum should have two doors, one for entrance and other for exit, side by side so that mischievous elements can be checked. Iron bars of adequate thickness should be provided for all glass windows and doors to prevent entry into the museum building by breaking the glasses'.

Biological aspect: Buildings when constructed should be made pest proof, by giving proper treatment to the base. This controls pests such as termites. Further use of some more devices as inverted bowls, at the base of any projecting pillar or pipe like structure connected to the main building checks the entry of rodents.

Markham and Hargreaves[1] reported, 'the treatment of exhibits brings up again the question of pests and pest control in India, and more than this perhaps in the case of much of the material, the taking of adequate precautions to counteract climatic effects. Even when a curator has taken every precaution against pests or climatic effects there remains the further question of avoiding thefts or losses due to human agencies, or even acts of God'.

Protection Against Termites

Though termites are a common pest in India very few museums incorporate protective measures against their attack. At the time of construction of a museum building, the architect should plan safety and precautionary measures against biological hazards, especially due to insects. Amongst the insects, termites are very common and at the same time very destructive. They generally live in the wood of dead trees, or in the dead parts of living trees in small colonies. Colonies of subterranean termites are usually found underground beneath piles of old wood or wooden stacks, and may extend to a considerable distance from the nest. While constructing the foundation, the soil must be sterilized with effective stable anti-termite non-volatile insecticides. Coal-tar can also be poured

[1] . op.cit., Markham and Hargreaves, p.51.

along the foundation wall of the building so that a thick layer of it may form a boundary line to prevent entry of white-ants from outside.

Site Clearance

All areas surrounding the foundation of the building should be completely cleared. All roots, dead wood and other organic debris should be removed. If termite colonies are found in the area, insecticides should be used to destroy them completely.

Soil Treatment

When the site has been cleared, treatment of the soil beneath the building and around the foundations with an insecticide is an effective preventive measure. This treatment creates a chemical barrier between the ground and the building.

Most of the chemicals used for this purpose are not lost by evaporation. Being insoluble in water, they are not leached out by underground water.

O.P.Agrawal[1] stating about security devices said, 'a physical barrier placed between the ground and the structure of the building can prevent termites from entering it. If dense concrete or other types of solid foundations have been used, termites cannot penetrate them. It is only through cracks and holes that they enter the buildings.

Metal termite shields are also used for termite control. These consist of sheets of copper or galvanised iron, placed over the foundation walls, piers and footings of partition walls at the plinth level.

Treatment of Buildings

In buildings where termite-proofing has not been done prior to construction, it may be necessary to apply treatment is inspection of the building to find out whether any termites are present. A study of the foundations and the ground floor will reveal the routes of entry of termites. Parts of buildings which are moist are especially attractive to them. If any termites are discovered in the building, they should immediately be killed

[1] . O.P. Agrawal, Climate and Environment, *Care and Preservation of Museum Objects,* National Research Laboratory for Conservation of Cultural Property, New Delhi, 1977, pp-38-39.

with insecticides. Soil surrounding the building and adjacent to it should be treated with the chemical toxicants. Trenches should be dug around the walls, exploring the foundation to a depth of 15 cms., with holes drilled 15 cms. apart, near the foundations. Half the total quantity of the insecticide to be used should be poured into these holes and the rest should be mixed with the earth used to refill the trenches. Chemicals should also be injected into the soil through the cracks on the floor surface'.

Markham and Hargreaves[1] opined, 'Information regarding the destruction caused to the art collections of the Prince of Wales Museum, Bombay, by white ants, and how these termites were suppressed, was given in the Annual Report of this museum 1929-30.

One of the surprises of India from the museum point of view is the amount of damage done by birds. At Jaipur, for instance, the museum is very definitely a pigeons' home, whilst at Raipur sparrows have unlimited access and, like the pigeons at Jaipur, are a great nuisance. However enthusiastic a bird lover a curator may be, such enthusiasm seems to pass curatorial limits when birds are permitted to make their nests inside the museum. Many other instances might be quoted of the defacement of archaeological pieces exhibited in verandahs, etc., by pigeons and sparrows, and whilst it may not be possible to keep such verandahs clear of birds it should be quite easy by judicious use of wire netting to keep the interiors of a museum free from these pests'.

Mechanical aspect: Short circuit due to overloading or old wiring is a common source of accidents. A minor fire accident took place at the Picture Gallery of Baroda due to this reason in the past and a possible major disaster was averted due to timely detection and immediate counter action taken by the alert and responsible staff members of that museum.

Markham and Hargreaves are of the opinion, 'carelessness in the execution of annual repairs to museum buildings is a not frequent source of damage to exhibits and a particularly noticeable example of this is at Udaipur where, in the verandahs, sculptures have been defaced and inscriptions almost obliterated by yearly splashings of whitewash. As another example of the indiscriminate use of whitewash of paint we would mention two busts at the Victoria and Albert Museum at Bombay that had

[1] . op.cit., Markham and Hargreaves, pp56-57.

become unrecognisable due to several coats of white paint, which were superimposed during past years.

S.K. Bhoumik[1] expressed his views on 'protection against noise and vibration' as follows: The buildings situated near the main road suffer from vibration and noise as a result of heavy traffic. In such a case, special care must be taken to lay from foundations, using materials which do not transmit vibrations, and insulating them by a supporting wall if need be, from the subsoil of the surrounding streets. The architect must aim at selecting material in order to reduce noise to a maximum. Walls can be lined with asbestos, mica or wood pulp, a more adequate method is to use plastic and synthetic resin, together with glass fibre, compressed in layers to a thickness at which sound waves are deadened.

Bhoumik further sated that, Floors and staircases are of great importance in considering fire hazards, since the prevention of vertical spread of fire greatly depends upon their location, character, and the fire-resistance offered by them. As regards staircases, since they provide the only means of ascent to or descent from the upper floors, they must, in all cases, be made of fire resistant paints, varnishes, or impregnation products which also contain fungicides or insecticides. These could be made use for floors and staircases. Inflammable materials must not be used in the construction of a museum building except when absolutely indispensable. Attention should be given to the possibility of applying a fire-proofing substance to the backs of pictures, but avoiding direct contact.

Climatic aspect: Climate is constant at a place over a given period of time. For example, the intensity of natural light and the direction of movement of sun can be noticed and recorded by preparing a 'rose diagram'. So, based on that the structure of the building could be designed so as to utilise or discard the natural light as per the requirement of the museum and its collection. Similarly, the direction of wind and the average annual rainfall at a place can also be measured and this information can be used in proper designing of the museum building thereby protecting it from the seasonal vagaries.

On '*Preservation and climatic effects*', Markham and Hargreaves[2] opined - 'Whilst many museums of India are more liable to losses through human

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[1] . op.cit., S. K. Bhoumik, pp.78-80.

[2] . op.cit., Markham and Hargreaves, pp.53-56.

agencies than may seem credible, they also have difficulties of preservation greatly exceeding those of temperate regions. First, there is the climate, which varies from the excessive heat of the hot weather and damp heat of the monsoon period, to the dry pleasantness of the Indian winter.

Much more attention might be given by curators to counteracting the effects of the Indian climate. In some museums, such as the Museums of the Medical College of Bengal, the galleries are not are not only over-lighted but have such completely thin roofs that the heat engendered during the Indian summer is calculated to destroy many kinds of specimens, and, for an example of what uncontrolled heat can do, a visit to this museum in the summer is recommended. Broadly speaking, all the museums on the top floors of buildings suffer from this difficulty, and when there is top lighting, conditions in the middle of the Indian summer are almost insupportable. On the other hand a few museums by virtue of their structure give a delicious sense of coolness, particularly the basement and semi-basement rooms in museums such as those at Lucknow, Baroda, and even the ground floor rooms of buildings such as the Victoria Memorial at Calcutta. Curiously enough, it is the less perishable specimens which are usually in the coolest quarters, whilst the more perishable specimens seem to gravitate automatically towards the roof. Thus, at Lucknow the Archaeological specimens are in the basement and the Natural History specimens in the upper galleries. Obviously problems of mechanics account for this distribution, but it does not alter the fact that however bad the Indian climate is, its effects are increased rather than diminished in many museums, with the consequent shrinkage or cracking of Natural History specimens, the bleaching of textiles, and the fading of pictures.
For the instructive example of the bleaching effects of the Indian sun, one has to notice the postage stamps as they are exhibited in Mysore, Udaipur and Trivandrum, and textiles in many museums.

But the damage from climatic causes is greatly exceeded by that due to pests, which vary from moths to monkeys. One of the curious difficulties that adds to the trouble of a curator in India is the seeping of saltpeter through the soil, and at the Victoria Memorial and in the Indian Museum there is evidence that this trouble that has not been entirely eliminated'.

For example, the open corridors of the building of the Prince of Wales Museum are constructed to facilitate proper natural ventilation. The scarcity of space in the building for the administrative area forced the adaptation of a corridor of the first floor, on the western side of the

building into an office. But, this did not affect the envisaged ventilation, as it opted for alternative artificial ventilation. Secondly, the heavy monsoonal rains this place receives, slash the corridors on the ground floor entirely wet and almost block the passage of visitors to the galleries connected to them, unless they are covered by tarpaulin sheets.

Museums at Calcutta, Mumbai and Chennai are located nearer to the sea, these places are port cities. The humidity at these places used to be comparatively high than at other places which are away from the sea. So the designer of the building should keep this factor in mind.

India, the sub-continent has a varied climate at different geographic zones. The west of India has Thar desert in Rajasthan and up in north the foothills of Himalayas has a very dry and cool climate. The plains of north experience hot winds whereas most of north-eastern states are hilly and have tropical rain forests with thick vegetation and excessive rainfall. So, literally there is no chance for a single ideal design of a museum building for the country. Neither it is required contrary to the suggestions made by some museum professionals in the past at the meetings of Central Authority Board of Museums.

According to Coleman,[1] 'burglary protection is a matter of locks, alarms, and guarding ; but the effectiveness of it depends considerably on the number and location, as well as on the construction, of doors and windows. A museum that has only two entrances and no windows near the ground would be comparatively easy to watch ; but even windows of upper floors have their hazards if things can be thrown out. The growth of air conditioning has increasingly simplified this problem since windows that serve as light openings but are never needed for air can be made to stay shut at least until they are opened by authorized persons.

Fire protection begins with fire-proof construction. Safety against a destructive cause like fire, mainly consists of two aspects- fire fighting and fire hazard management. In addition, it should include all possible control of major fire hazards, including those of the storages for inflammables. An important part of planning for isolation of hazards, as well as for safety in case of fire, is the placing of stairs in properly

[1] . Laurence Vail Coleman, *Museum Buildings*, v.1, American Association of Museums, 1950, pp.232-233.

constructed shafts. Main stairs do not lend themselves well to this. Hazards of air ducts have to be noted.

Museum spaces are of two kinds with regard to fire hazards. First, there are spaces in which water damage might be as serious as fire damage itself, namely, exhibition rooms, curatorial workrooms and storages, and the packing and registrar's rooms ; and second there are spaces in which damage of any kind would probably not be too serious, namely, mechanical shops and storages for supplies, lumber, crates, and equipment.

(Extinguishers of hand-held, automatic or portable types mounted on wheeled trolleys should be installed in different areas of a museum building as a protective measure from the destruction caused by fire in case of an accident.)

A water standpipe and hose are advantageous in any building, and these are practically necessary in a building of several stories. Such provisions do away in an emergency with the need for hauling fire hose, and they minimize the time required for drastic action and limit the extent of possible fire damage. Hose connections should be put in early during construction of a building. The location of hose connections and other fire-fighting equipment should be studied with reference to crowding in case of evacuation, since equipment corridors, stairways, and lobbies likely to become congested might so be isolated and rendered useless. Hose racks may well be installed in recessed cabinets.

If a museum stands close to other buildings, provision for a fire-protective water curtain may be desirable'.

According to Hebditch[1], 'the security of *premises* and the *collections* and the *data* they contain is of vital importance as stated by Robertson.I.G. et al in their article, 'Museum Security' published in 1981 in the *Museums Association Information*. The main threats are known: fire and theft. The object of any museum system designed to deal with a threat in
1) detect something is wrong.
2) communicate that information rapidly and reliably.
3) Take effective action'.

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[1] . Max Hebditch, The management of premises, *Manual of Curatorship*, Butterworths, London, 1984, p.504.

Yani Herreman[1] stated, 'the inclusion of security installations in the design process is a further point that reflect the contemporary spirit prevailing in architectural planning'.

About security measures to be followed in museums Smita Baxi[2] made the following recommendations, 'fire and burglar alarms should be installed at least for important museum areas like reserve collections, valuable collections, jewellery, coins, rare and valuable objects, conservation laboratory etc.

In Philip Johnson's words, "Let us have grand museums and let them be among our monuments."

Stating his opinion on security, Satya Prakash [3] noted, 'not more than one entrance and exist should be provided for the visitors going into and coming out of the museum.

Protective measures against theft, fire and dust, which are great enemies of the museum, must be made before the museum is opened to the public. The doors should be made fire-proof and lined with rubber so as to make them close fitting. The doors must be made to open out so that, in the case of a fire, exist may not be impeded. In order to ensure security to objects, one gallery should connect with the next with very few entrances and few exits'.

Expressing her opinion on 'Measures for Protection' in two broadly varying climatic types viz. dry-hot and dry-humid types, Baxi [4] mentioned the following:

Control of Solar Radiation: In order to prevent the effect of solar radiation on the external walls, it is necessary to use external shade which keeps the buildings cool. The shade can be provided with adjustable sun-breakers which will allow light, but not direct sunlight. Vertical, horizontal or a

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[1] . Yani Herreman, A new canvas for new creative talent:contemporary trends in museum architecture, *Museum*, v.XLI, n.4, 1989, UNESCO, Paris, p.199.

[2] . Smita J. Baxi, Exhibition of Museum Architecture- In India and Abroad, *Museum Architecture*, Museums Association of India, New Delhi, 1971, p.83.

[3] . Dr. Satya Prakash, Small Museums : Building and Allied Requirements, *Small Museums*, Museums Association of India, New Delhi, 1975, pp.13-14.

[4] . Smita J. Baxi, Climate and Museum Architecture in the Tropics, *Conservation in the tropics*, International Centre for Conservation, Rome and National Museum, New Delhi, 1972, pp.70-73.

combination of both can be used for shading the walls. Whatever natural shade is available should be utilized, particularly on east and west facades. East-west orientation should not be utilized for habitable rooms unless protected by wide projections, balconies or verandahs. Dark colour for exposed ground near buildings is advisable as it decreases reflective radiation. Shades are important over the door and window openings. Blinds or shutters ensure better protection.

Ventilation: The humidity being generally low in summer in most of the regions in the country, doors and windows of the museum building are kept closed. Normal ventilation in buildings can be restricted to the minimum. Roofs and walls should be so constructed that the entry of hot, external air can be minimized during the hot day time period, but entry of cooled air should be permitted at night. Small windows high up on the wall reduce radiation.

Grass and hedges should be grown to the extent possible to avoid unshaded pockets, heat radiation and glare from ground pavings. Trees also shade walls and roof but in a museum it is necessary to see that these are not very near the walls, as they can be a threat to security of building by providing access to the roof and windows.

Trees, water and fountains near the buildings cool by evaporation and lower the temperature.

Walls: These are meant to control temperature, solar radiation, ground radiation, and dust.

Walls receiving the rays of the setting sun should be protected by adjustable sun-breakers, but it is necessary to reduce the length of such walls. It is desirable to have a heavy masonry wall on the west side. For a ten-hour time-lag, thirteen and half inch thick wall is necessary. East and south walls can be light construction if protected by sun-breakers or overhangs. Thick walls with small windows in general are good for hot-dry conditions where days are hot and nights are cool. Cavity walls are considered effective for blocking out heat transmission.

Roof: The roof functions by shielding the building from high radiation but needs protection from the same. Thermal insulation can be provided for the protection of roofs. Roofs should be painted white or near white for reflecting radiation. For eight-hour time-lag, four and half inch thick RCC slab with 3 to 4 inch lime-concrete layer or mud-concrete is sufficient.

Central courtyard at previous location of Saputara Museum being used for an educational programme.

Courtyard at Bharat Bhavan, Bhopal. Central courtyards are useful for relaxation and circulation by visitors. Occasionally one could hold some activities for a small group of people. (Courtesy- *Museum*, v.XLI, n.4, Unesco)

Windows: The radiation from the sun penetrates deep into the building through windows. Eastern and Western sides should have smaller openings, and deep reveals are advantageous. All windows, except on the north, are to be protected from high summer sun. Eastern windows need exterior sun shade in summer. North windows need protection (from wind in winter). West windows should be avoided or should be provided with adequate screens or shutters. For most of the year it will be preferable that doors and windows are kept fully closed to maintain higher humidity in-doors than out-doors.

Doors and windows should provide protection against dust. Small windows are advisable to prevent excessive breeze in hot and cold seasons, though extra ventilation is desirable from July to September.

Courtyards: Enclosed courtyards are desirable to retain heat in winter and to allow rapid radiation of heat and cooling of the house in summer evenings. Fountains and sprays prevent excessive accumulation of heat in summer.

Protection from Moisture: In the regions where there is scanty rainfall, light water-proofing of the building is sufficient. The extreme dryness prevalent for most parts of the year in Indian context, prevents deterioration of normal building materials, but air-borne sand or dust-storms and high solar radiation raising the surface temperature (150F to 170F) causes deterioration. Sudden chilling during the cold winter months creates great stress on the surface of materials. Surfaces facing the sun should be designed to withstand variations.

Ceiling fans, with the addition of desert-coolers and air-circulators make the summers comfortable and are good for circulation of air.

Protection from Wind: Winter winds from the north should be blocked by tight-shuttered windows, at least in India. Bedekar mentioned in one of his lectures about a pathetic example about cool winds. He stated that Hamzanama paintings, which are considered to be highly valuable and less in number, were used in a museum in Kashmir to seek protection from chilled winds. Though he stated this lamenting about the ignorance of museum personnel and impoverished state of affairs regarding museums ; the author would like to adapt that instance in this context to emphasise about the dire need to be protected from cool winds. (Dr.Bedekar narrated about this incident on 14 th August, 1998 at the Department of

Museology) Though this is a unique problem confined to a short duration in winters, this a recurring problem that is duly attended to by museum authorities across India and specially in northern part, with varying measures depending upon the intensity of the problem. For example, finding room heaters, is a common features between Christmas period and the Republic Day of the nation at museums in New Delhi, the capital of the country which is situated in the heart of northern India. Closeness to a desert region and being a land-locked place, winter and its breeze is a bit too severe for normal human comfort. The author has witnessed a progress even in the design and functioning of the room heaters during the tenure of research. The earlier models used to generate heat which used to confine to their near vicinity. Subordinate museum staff used to warm up themselves in turns by flocking near to these heaters. The authors last visit to museums at New Delhi, in last December, enabled him to find heaters fitted with blowers. These heaters come in different capacities, and can warm up a closed interior in a better way than the earlier versions. They function on the principle of dispersing the heat through winds that are blown over a heating coil and thus converted into hot air.

Air-conditioning: The shape of the building plays an important part in economising costs. It is advisable to decide, at the time of planning, whether the building will be air-conditioned or not. For air-conditioning, or even cooling, a compact structure and minimum open spaces are advisable. If a building built for natural atmosphere and is to be air-conditioned later on, the cost goes much higher. The National Museum of the country is a case in point. The details of its later adaptation to air-conditioning from its initial plan to work on natural atmosphere and the inconvenience caused as a result of it ; is mentioned in a previous chapter under case studies.

Planning in General: Arrangement of galleries and grouping of different activity areas is essential in a museum building. Noisy areas, like workshops plant rooms, should be away from the exhibition areas. Auditorium and educational activities space should also be away from the galleries, as well as study-rooms. Courtyard planning of a compact type is suitable for hot-dry climate.

A hot and humid zone is characterized by moderately high temperature, moist air and damp ground. Cloud and vapor act as a filter to solar radiation and the damp ground does not heat up easily. Moisture combined with moderate heat, favors growth of vegetation which in turn

reduces reflective radiation. Evaporation is difficult, although greatly facilitated by air movement.

Protective Measures

Control of Solar Radiation: Although average intensity is less than in hot dry zones, solar radiation is still high, particularly on the roof surface. Roofs and radiation from the roof can be treated in the same way as for the hot-dry climate. External shade of trees and of planting may be utilized to the fullest extent, without interrupting free flow of air. Wall shades can be in the form of verandahs. Louvers and sun-breakers can be useful for shading, but care should be taken so that they do not interfere with the breeze. Trees or fountains near the museum building offer a potential path of entry for termites and moisture, through the overhanging branches of trees or through the ground.

Ventilation: Breeze at body level is desired. Natural ventilation is a necessity. External air must continually replace internal air. Natural air currents through the wind-oriented openings must be provided.

Walls: Walls must be thick enough to keep out solar radiation. These should also be protected from the direction of rain by wide projections over openings or verandahs. Water penetration, due to horizontal rains, must be avoided by adjustable louvers or wide projections, which would allow breezes but not rain.

Windows: Window openings should be bigger than the windows of the hot-dry zone, but could be smaller than openings in cold climates. Windows should face the wind direction and halls or rooms must have cross-ventilation. West and south side windows may be protected from solar radiation.

Moisture Analysis: Humidity is high due to the large moisture content in the air. Metals corrode, and timber, unless well ventilated, is subject to termites. Stone and concrete behave well, but in many areas bricks, particularly in open brickwork, deteriorate due to excessive moisture in the coastal zones.

Interior Climate: For a museum building, indoor climate is very important, particularly for the objects. Conditions of temperature and humidity suitable for the objects have to be maintained despite the extreme climates. 70F temperature and 50% to 55% humidity are the most normal

conditions for the objects. The most damaging is variation in humidity; the stability of the system is most important.

Some organic materials sensitive to moisture variation need galleries with constant relative humidity.

Fans are necessary in the tropics for visitors' comfort, but they should not cause fluttering of open exhibits, like textiles.

Lighting: Particularly the ultra-violet contents of sunlight, of fluorescent lamps, and the heat of tungsten lamps have to be taken care of. The source of light should as far as possible be hidden from visitors.

The provision of artificial lighting only or of natural lighting only, or of mixed lighting is a deciding factor for designing the galleries.

In addition, the availability of products and materials easily procured indigenously influences the design.

By orientation of the galleries and storage areas for objects, by protecting the natural and artificial light sources, so that they light the objects without glare, the objects can be protected and this has to be the main consideration while planning the museum building.

This discussion may be concluded here by stating that as for any other architecture, climate influences the design of a building. This acutely so in case of museum architecture, as museums have a double responsibility of preserving valuable collections in addition to providing for human comfort. This task can be made easier by creating a favourable climate inside the galleries, by taking care of external and internal climatic influences at the time of the initial planning of museum buildings'.

Discussing about Humidity and Temperature which are two major factors of climate in relation to the design of a museum building and the conservation point of view; Bhoumik[1] stated, 'several museum buildings have been erected after independence in India but there is hardly any arrangement or system in these museums that can prevent the entry of wet air during the rainy days, and hot air during the dry season. Walls, floors and ceilings of most of the museum buildings of India are responsible for

[1] . op.cit., S. K. Bhoumik, pp.75-77.

the introduction of persistent dampness to exhibits displayed on permanent exhibition. "It is proved that the persistently damp roof has walls, floors, and ceiling permeable to water. Such persistent damp room is the provoking of long term problems that tend to defy solution." Dampness is positively dangerous for museum collections, particularly of organic nature. In the presence of warmth and darkness it breeds germs and harmful micro-organisms which destroy museum collections. The main sources of damp are: (i) through the ground surface adjacent to the walls, (ii) or through the walls as a result of rain falling on them during continued wet weather. As excess of humidity is harmful to the museum collection, it is necessary to make flooring, walls, ceiling etc. entirely damp proof. The foundation plinth has to be well insulated against moisture. *An essential precaution is to make a very accurate prior examination of the geological structure of the site, especially where the water-table is encountered close to the surface.*

External brick walls are no doubt good insulators against heat radiation, but they readily absorb moisture, and may be soaked with water during the monsoon period. It is, therefore, imperative to think of the means of insulation of the external walls so that the inner wall surfaces remain dry. It is for the architects and planners to make use of modern industrial products to achieve an efficient insulation. Rooms must be insulated as completely as possible. Preference should be given to materials that have already been tested. The use of continuous layers of slates, in cement or asphalt, or some bituminous compound, prevents damp rising up the walls from the damp earth by capillary attraction. *Hollow walls* or *double walls* or *false inner walls* may act as barriers against the penetration of dampness.

Before beginning the construction of a museum building, certain precautionary measures should be taken for the prevention of damp. In the first place such a site should be selected as to make sure that the first point at which water is struck in a pit is at least 15 ft. below the surface of the ground, even in the wet season. Secondly, the ground surface surrounding the building must slope away from the area of the building so that rain water drains away before it has time to collect.

For damp-proofing, good quality pore-filling water-repellent materials (bituminous and non-bituminous) should be used for surface treatment. If the site of the museum building is swampy, or near the bank of river, subject to high floods causing the sub-soil water level to rise high during floods, the basements should be made water-proof by first forming a layer

of mass concrete, about 6 inches thick, over the entire are proposed to be built up, with one of the water-proofing compounds added to the concrete during the process of mixing, and, on top of this, one or two asphalt membrane layers should be laid, which should be continued vertically against the inner surface of the basement walls to a height at east one foot above the highest water mark. Then an RCC slab designed to withstand the water pressure should be constructed. The reinforcement should be carried up the walls on the inner face to 6 inches above the highest water-mark, and covered under either 4-1/2 inches brick work in cement mortar or 3 inches of cement concrete. The following preventive measures can be adopted against moisture penetrating the surface of walls:

(a) The exterior wall should be of sufficient thickness, if of brick it should be of minimum thickness of one to one and half bricks.
(b) The face bricks should be of good quality and of low absorption co-efficient. If the wall is of stone, there should be no hollows left inside, and the joints on the exposed should be pointed with cement.
(c) The exposed surface should be covered with cement plaster in which some water proofing compound may be mixed. For this purpose 'Snowcem', manufactured Snowcem India Ltd., Bombay, decorative water-proof cement coating may be used. It does not flake off or peel off, repels rain and dampness and protects building from dampness.

Doors, windows and shutters should be planned in such a way that day to day fluctuation of temperature and relative humidity can be minimized to a reasonable limit of safety. Museum building should have ceiling fans and exhaust fans which are important means for controlling the rise of moisture, temperature and dust in the gallery. *Every care should be taken in designing museum buildings for keeping galleries cool and clean.* Galleries adjacent to or in contact with external atmosphere should be specially constructed to make them damp-proof and heat-proof, which can be achieved by using and skillfully lining thermocol substances over moisture insulating substances. Windows must be non-conductive of heat from outside.

The following insulation materials against rainwater penetration have been recommended: clay clinkers, expanded glass-wool, polystyrene pears; rockwool granules; rockwool, batts and urea foam, Inject 1.

These insulation materials absorb moisture only slightly, when driving rain penetrates to the cavity in the brick wall, and as all these have a small thermal conductivity (0.03-0.035 Kcal/Mhoc for the pure materials) they are considered to be suitable for insulation of cavity brick walls.

Light is to be best termed as a 'necessary evil' in a museum context. Light is necessarily for viewing the objects but it has harmful effects also. Discussing about an alien example it may be stated, the modern American museum is windowless, artificially lit and air-conditioned. This arrangement eliminates the effect of sunlight which in the tropics is capable of bleaching the fastest colours and deteriorating wooden exhibits and fabrics. It is also observed that Indian paintings and fabrics give out their best in artificial light. The absence of windows prevent dust. In order to protect light-sensitive collections from the harmful effects of light, the following necessary arrangements should be made:

Means to prevent the entry of direct sunlight

For the protection of museum collections from the glare of sunlight and heat, some arrangements should be made in the architectural design of museum buildings. Low windows, either from the sides can be had, to keep the sun out and break the intensity of direct lighting. Venetian blinds made of wood or aluminium may be used where there in no special device to diffuse light. They can screen the light, even from an entirely transparent window'.

Reporting about the controversy of damage to a valuable painting at the Museum and Picture Gallery, Baroda; Nina Shah[1] stated, 'earlier measures of restoration for the art gallery in the museum have failed to stop the seepage of water inside. The previous year Rs.10 lakhs were spent on the gallery but the Public Work Department failed to avert the destruction caused to the invaluable paintings in the gallery. The relative humidity in the gallery is 85 per cent and the permissible moisture content for preservation is 45 per cent. If the humidity is above 60 per cent, it is suicidal for the life of the painting.

A painting of Princess Catherine of Braganza worth Rs. 40-50 lakh approximately appears to have developed an air bubble due to temperature and humidity variations. Over the time, this will probably

[1] . op.cit., Nina Shah.

Natural disasters like floods are a common occurrence, specially so, during monsoons. Museums located near to rivers and other large pools of water must take preventive and precautionary measures to protect themselves and their contents from such destructive and devastating calamities.

produce cracks and destroy it. The priceless collection of paintings are in danger of being destroyed by moisture, rodents, pigeons and bats'.

Natural Disasters:

A natural disaster as a causative factor of damage to a museum is though a less frequent phenomenon, not an uncommon one. Instances of destruction caused by this factor are aplenty. Calamitous reasons cause major loss at times. Natural vagaries recur at periodic intervals. Many museums in India are a case in point.

Floods : Museum and Picture Gallery, Baroda located in the near vicinity of a native rivulet, called as 'Viswamitri'. The Museum was a victim of the spate of the floods caused by it. The Botanical Gallery of this museum was known to be washed off with the flood waters from the basement of this building. As stated by Mehta[1] in his article in the centenary souvenir of this museum "Different types of wood, four hundred varieties of drugs derived from plants and herbs, and various forest products were acquired for this section. With these materials an attempt was made to develop an economic court in 1921-22. Unfortunately, the collection suffered damage in the floods of 1927, and though the Botanical Survey of India provided replenishments, it was again damaged in 1942. Thereafter, it was transformed to the Pratap Singh College of Commerce in 1943-44."

Even, the Sardar Patel Museum, Surat was a victim of the floods of the river Tapti, when it was located in its former building. It was stated in the souvenir[2] of this museum as, 'floods, earthquakes and lightning are the common natural disasters that cause immense damage to a museum building. Due steps to be taken in planning and designing the building to ensure that no damage to the building and its collection will be caused in case of any eventuality'.

The Centenary Souvenir of Sardar Vallabhai Patel Museum gives the following account about the disaster history of this institution as 'being very old (established in 1890), its history is quite interesting. As happens

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[1] . R.N. Mehta, *The Royal Bequest - Art Treasure of the Baroda Museum and Picture Gallery*, India Book House Limited, Bombay, 1995, p.14.

[2] . Surat Municipal Corporation, *Sardar Vallabhai Patel Museum Progress through a century (1890-1990)*, Surat,1990.

in human life, with the passage of time, this century old museum has seen and faced ravages of time. In its history, the blows received during the Tapti river floods were the most cruel. Situated in the low-lying area of Chawkbazar, this museum had been the victim of floods for the first time in the year 1959. Again in the year 1968, when nearly ninety percent area of the city was under flood water, the museum was under water for 96 hours, at 3 metre level inside, drenching the rare museum exhibits. Because of the untiring efforts of several individuals, as many things as possible were saved. Before everything was put in order, again in the year 1970, for the third time, this museum was hit by floods. In this way, the museum lost 1300 valuable, rare art objects and many more were damaged which was a great loss.

with a view to ensuring that, these valuable treasure might not again get damaged and to preserve this heritage for the posterity, the Surat Municipal Corporation decided to raise one more floor above the old building.

In the first place, museums that have to be constructed at places nearer to rivers, rivulets and other natural forms of water bodies, should not be located in low-lying areas. Further, due provisions should be made in the building and in its basement for easy and quick removal or drainage of flood waters. Only resistant material that is not easily affected by water has to be displayed at basement and ground floor of such museums.

For museums located in ***seismic zones***, appropriate construction material and technology should be used in construction of the museum building. The incidents of severe earthquake in the Terai region of foothills of Himalayas ; in the Deccan plateau of India, at Latur in Maharashtra and at Jabalpur in Madhya Pradesh are major earth quakes that caused immense damage of loss of property and life in the Indian subcontinent in the recent past, not spanning more than a couple of decades.

Markham and Hargreaves [1] chronicled the events of earthquakes in India and their affect on museums as, ' Records of earthquakes in India occur frequently in Mohammedan historical works, one of the most notable events of the time of Sultan Sikandar Lodi being a shock which in 1505 A.D. shook the whole of Hindustan so that "men supposed the day of Resurrection had arrived," and believed that no such earthquake had been

[1] . op. cit.., Markham and Hargreaves, pp.51-52.

known since the day of Creation. Coming to recent times , severe earthquakes have occurred from time to time during the last forty years wrought considerable damage in northern India along the line of the Himalayas, and in the most recent reports of the Patna and Lucknow museums are references to damage to buildings and exhibits due to this cause. The Patna Museum was closed to the public from the 16th January to the 20th May, 1934, for this reason. During the last few months several earthquake shocks have been reported in N. India tend to become larger, and the collections more extensive and valuable and the time appears to have come when steps ought to be taken to house these priceless treasures in earthquake-proof structures. The importance of this question may be realised when it is considered that this touches the museums of Chamba, Delhi, Lucknow, Patna, Calcutta, Darjeeling, most of which contain irreplaceable material.' (Starting from the earliest mention of earthquakes, the author would like to give the latest possible information on this issue by referring to the title 'Trembling Earth' of the editorial column of *The Times of India*, Ahmedabad, dated 4-11-1998. It reads, 'Forewarned will hopefully be forearmed in the context of the predicted earthquake in the Sone-Narmada-Tapti basin. That the possibility a quake in this region has been raised by Dr. J.G. Negi of the National Geographical Research Institute, a scientist with an impeccable track record in seismic prediction, merits prompt pre-emptive action though this has not so far been the case in the tragically neglected sphere of ***crisis management***. Long before a devastating earthquake killed thousands of people and destroyed property worth millions of rupees a few years ago, Latur was identified as a seismically vulnerable region. Yet nothing was done until the calamity actually occurred. Dr.Negi envisions a quake Khandwa-Pandhana region of Madhya Pradesh. This is the first time that a detailed study of a region has been undertaken to predict a forthcoming quake. In the past two months, there have been over 930 tremors in the area, 14 of them measuring over three on the Richter scale- a clear warning of an impending disaster. Unfortunately, the precise timing of the calamity cannot be determined since earthquake prediction is still very much a hit and miss affair. The Chinese were able to predict the Haicheng catastrophe in 1975 in time to evacuate the populace ; however, in the next year a totally unforeseen earthquake hit Tangshan. **With two-thirds of the subcontinent being vulnerable to seismic activity, it is perhaps too much to expect high levels of preparedness at all times**. But, now that a particular area has been pinpointed, there is no excuse not to take measures to minimise the damage.

A considerable amount of work has already been done in India on quakes which should obviate the need once again for delegations to travel abroad to study ways and means of restricting losses. The department of earthquake engineering in the University of Roorkee has done extensive work on earthquake resistant structures, particularly high-rises. The National Building Organisation too has undertaken some commendable work in this field. Predictably, little of this has been implemented. Another problem in predicting, indeed measuring in India, is the obsolete seismic instrumentation available. With the increase in density of population, the devastation from earthquakes can only become greater. This makes it imperative to set up a national panel to refine prediction techniques and formulate a permanent mechanism to deal with the aftershocks.)

Further mentioning about precautions against ***Lightning*** they noted, 'Use of lightning deflector, as prominently seen on the building of the Prince of Wales Museum, should be a must with all the museum buildings which in general are high rising and isolated so as to avoid any disaster that could be caused by a lightning.'

Man Made Disaster: Attacking and plundering of museums is almost an inevitable part of war. This is because of two reasons. One intention is to hurt and offend the psyche of the citizens of a country as museums are the guardians of the cultural wealth of a nation and secondly antiques and the art objects carry immensely monetary valuable in general. The looting of the National Museum of Kuwait and the practical restitution of its objects by Iraq as a result of intervention by United Nations after the gulf war; is a recent example that was widely reported by media all over the world in their art columns.

Adequate consideration should also be given at the time of construction of a museum building for the protection of the museum collection in the **event of armed conflict.** *There should be provision for constructing underground stores* where temperature and relative humidity can be adequately controlled. Such underground cells should be damp-proof, shock-proof and fire-proof, and should be adequately placed for the hiding, protecting and preserving valuable museum collections in the event of war.

According to Hebditch[1], 'however, as well known threats, natural disaster such as flooding should not be ignored, while the other problems caused

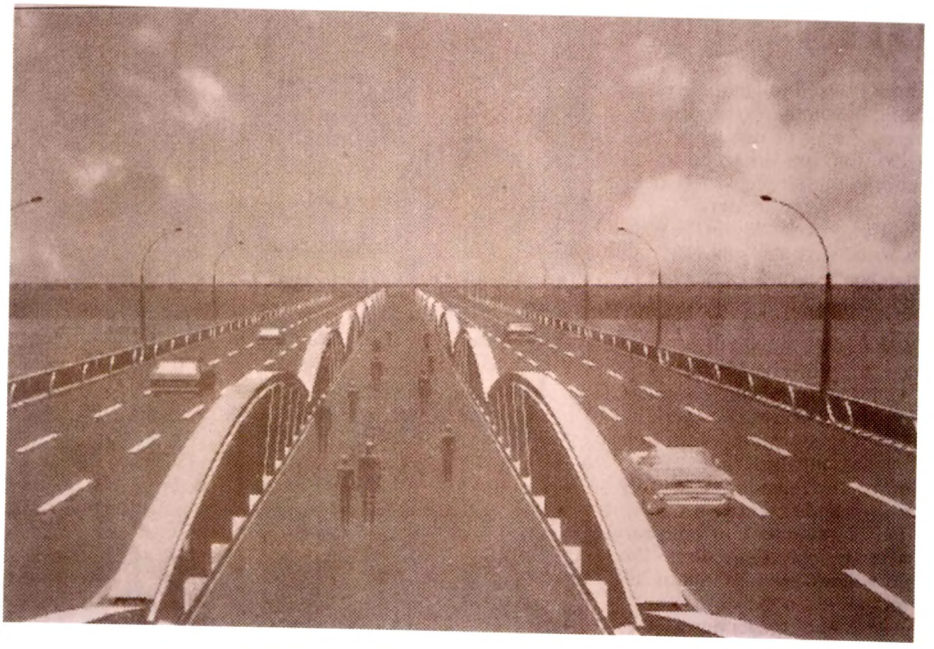
[1] . op.cit., Max Hebditch, p.504.

A reconstructed mosque in Nigeria typifies the global desire to preserve the past. The Friday Mosque of Zaria at the Museum of Traditional Nigerian Architecture is part of the still-unfinished National Museum complex at Jor.

Exterior view of the National Museum of Fine Arts in Buenos Aires.

The recently renovated Coptic Museum in Cairo is one of few Egyptian museums fairing well.
(Courtesy- *Museum News*, v.67, n.1, American Association of Museums)

At present we are living in an age of Information Technology. With the advent of computers in almost every sphere of life, things have begun to work easier and faster. Computer Graphics and Animation is a field that facilitates 'Virtual Reality', which in turn facilitates to envision the future appearance of a structure or construction. Shown here is the 'computer imaging' of Ellis Bridge at Ahmedabad after expansion. Museums should make use of these latest technologies easily and cheaply available in the market to design proper buildings.



by earthquakes, etc. should be kept in view obviously, steps should be taken to minimize the risks. But a disaster plan should also be prepared, that even if the unlikely does happen, steps can be taken immediately to minimize the damage. The plan must identify the chain of command in an emergency, the relative importance of items in the collections when removing them from hazard and the procedure to be followed rectifying damage'.

Construction - Materials, Methods and Criteria :

According to Coleman[1],'it would be very expensive to construct reinforced museum buildings to protect them from bombing. So as an alternative, museum buildings in war zones, could be covered by sand bags during times of war. Further, their objects could be transferred to the basement of their building or to any other safer place, for the time being, so that they could be guarded from the ravages of war.

Further discussing about selection of site, he further stated, 'In choosing a site, dry and well drained land should be sought. However, even normally dry earth acquires moisture at times, and a basement floor or walls in contact with it will take up moisture and become damp throughout. On any site, foundation walls require at least routine damp-proofing, and on a wet site they call for special protective measure.

Building on a site with excessively moist or marshy land is not recommended because of the high cost of concrete foundation on a system of concrete or other piling. Some museums have a sump pump in the deepest part of the basement to take out any water that may penetrate.

Some museums have a *sump pump* in the deepest part of the basement to take out any water that may penetrate.

Foundation and ***basement*** construction is of major concern to the *building committee* because this must provide a sound and also dry lower part of the building. Ordinarily ***structural adequacy, with all its importance, is but a half-measure without completely effective damp-proofing***.

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[1] . op. cit., Laurence Vail Coleman, pp.218-219.

Even where there are favourably dry soil conditions the basement or sub-basement floor should rest not directly on the soil but on a 9-inch layer of broken stone, slag, or gravel under the cement.

In addition to such provisions, the basement itself should have adequate damp-proofing. There are three methods in general use for this : 1) membrane damp-proofing - integrated in the floors and walls 2) integral damp-proofing, with compounds added to the concrete when it is mixed ; and 3) surface damp-proofing of the basement walls.

It must be emphasized that the ***basement of a museum is not a cellar, but a busy lower floor.'***

Plumbing

According to Coleman[1], *'basement drainage* to the sewer may require special attention. Some sites create need for an alternative to sump pump, and may call for a 'stand by' to electrical equipment to be used if current fails. Outside areas subject to flooding in storms should be adequately drained to lower levels. Low-level plumbing may require a *sewage ejector.*

Electrical installations

Electrical appliances that a museum needs can be discovered only through study of the plans, space by space, always with reference to contemplated uses. Lighting installations will be called for throughout. Exhibition areas have their special requirements. Some of the needs of exhibits may develop only with the exhibits themselves, but the necessary outlets can be provided in advance'.

Though apparently look trivial, the improperly positioned electrical connections and fixtures are as problematic as ill-conceived or misplaced windows. Sridhar Andhare, the former Director and the present Honorary Director of the Lalbhai Dalpatbhai Museum of Ahmedabad pointed out the difficulty caused by such electrical points if they are located at a normal height as at office and residential accommodations to the writer and his class mates when the latter visited that museum during its early and formative stages as a post-graduate student of Museology. He is right in his objection to their normal positioning as they interfere with exhibits or

[1] . op.cit.., Laurence Vail Coleman, p.229.

installation of exhibit cases. In a modern museum they should be located at an obscure place or corner at or near to ground level.

The *conditions imposed by the collections* do not correspond to the *requirements of uses, whether museum staff or visitors.* This *major dilemma poses a crucial problem* so far as the design of display areas is concerned, and as had an effect on the form and interior layout of the buildings. The same may be said of *environmental control*, there being two trends: the *use of high technology, based exclusively on ultra-modern technical equipment*, and attempts to find more *architecturally oriented solutions by the choice volumes, angles, finishes, colour and other technical elements.* ***The Museum is a form of Architecture.***

Expressing his opinion about *'construction and equipment'* Molajoli[1] stated, 'the building, especially if it is being erected in the middle of a town, must be protected from vibration, damp rising from the ground, and the danger of fire spreading from neighbouring premises. Special care must be given to laying firm foundations, using foundations, using materials which are waterproof and do not transmit vibrations, and insulating them, by a supporting wall if need be, from the subsoil of the surrounding streets.

An essential precaution is to make a very accurate prior examination of the geological structure of the site, especially where the water table is encountered close to the surface. Reinforced concrete, now employed in an ever-increasing number of ways and in all parts of the world offer excellent results in museum-building, and even in countries which, like Greece, Japan and Sicily, are subject to earthquakes. It provides *a simple means of insulating the museum from external vibrations, its greater strength enables the roof to be constructed in one piece, and its use permits large interior spaces.*

In the *exhibition rooms* and in *all public parts of the building* (*passages, stairways*, etc.), floors and their supporting walls should be designed to carry a weight of at least half a ton per square yard, with a very wide margin of safety. Allowance must be made for the largest throng of visitors and for the assembly of a number of heavy objects in specific rooms.

As the museum adds to its contents, director must be able to place statues, even heavy ones, in the middle of the rooms without fear of damage to the

[1] . Bruno Molajoli, Museum Architecture, *Organisation of museums- a practical advice*, Unesco, 1960, Paris, pp. 164-167.

floor. An example of a sunken floor in the middle due to probable weight of heavy sculptures in the centre of hall can be noticed at the Museum of the Depatement of Museology.

The *rooms of a museum must be protected* not merely *from noise*, but from extremes of temperature and humidity. The building must be insulated as completely as possible. It is advisable not only to isolate inert material or by leaving spaces, but also to investigate the capacity of absorption of the surfaces used inside the rooms immediately behind the exhibits; these must be chosen with a view to ensuring that the temperature and humidity of the atmosphere surrounding the objects exhibited are kept as constant as possible. ***In special instances certain new building materials may be used ; but the architect should remember that the museum has to last a long time and should therefore give preference to what has already been well tested.***

Ceilings and roof. Rooms with lateral lighting may have ordinary ceilings (flat, vaulted, smooth), all that is required being a suitable refraction of diffused, colourless light; matters are much more complicated, however, when a room is lit from above.

The light may penetrate into such a room either *directly* from outside, or *indirectly*, through a glass-paneled ceiling with skylights above it.

Light falling directly from above, through skylights or windows, is to be avoided.

Direct contact of a museum building with the exterior environment has an immediate influence on the temperature, rendering it difficult to avoid extremes of heat and cold. These drawbacks are inherent in every system, even the best .

(Windows and doors.. The windows, at what ever height they may be placed, must be
(a) of suitable size for lighting the room ;
(b) strong and able to be securely closed ;
(c) non-conductive of heat from outside.)

Metal frames are preferable, for they are more durable, easier to handle, and can be bought ready-made in standard styles among which the appropriate type can easily be found.

The glass should be chosen for its brightness, and capacity to diffuse light to the best advantage'.

Proceedings of the Symposium on Museum Architecture[1] held at Mexico, state, '*Conservation,* one of the essential tasks of a museum, implies that measures are taken, from very beginning of the construction and equipping of the building, to *prevent any deterioration* due to insufficient, excessive or variable humidity, to *avoid pollution* of the atmosphere by dust or gases, to ultraviolet rays to visible light'.

From all that has been said, it can be stated that the construction of a museum is a collective task involving the director and the architect, both assisted by specialists. The team thus constituted, under the final responsibility of the director, should ***work out the concept*** *(the museum programme and the architectural plan),* ***supervise construction*** *(building and equipping), and* ***undertake evaluation*** *and* ***improvement*** *(operation of the museum).*

Bose[2] giving his opinion on the planning for small museum building quoted, Coleman as "***It is a mistake to build during the early stages of a museum's career. A museum is not a building but an organisation that has taken shape, it is shortsighted to attempted to house it".***

Bose continued as 'I am inclined to agree with the above view and suggest that it will be an excellent idea to start with an exhibit depository first to collect and house models, exhibits and other artifacts. Many a time we have started with equipping a museum and discovered too late that there were not a sufficient number of exhibits to fill up the place. There is consequently a blockage of capital without much use and inevitable frustration. During the last 7 or 8 years, the Indian Industrial and Technological museums have started introducing regional science exhibition centres in rented buildings with the avowed object of creating a local interest, accumulating exhibits and exploring whether a permanent building will be justified or not. Simultaneously an effort is made to involve the local government and their various agencies in the search for suitable land for the museum or in participating in educational extension

[1] . Symposium on museum architecture access and circulation - Mexico, *ICOM News,* v. 22, n.1, Paris, pp.39-42.

[2] . A. Bose, Planning a Building for a Small Museum, *Small Museum,* Museums Association of India, New Delhi, 1975, pp.66-67.

programmes. The Union Department of Science and Technology have also taken a laudable step in starting a museum, initially in a rented building, recruiting and training staff, collecting adequate exhibits and prepare models and dioramas and then look for a suitable land where a building could be set up at a later date.

The *depository* is not to be confused with a storage godown. *It is a place where objects of museum interest can be carefully stored, labeled, preserved, and periodically examined by the museum personnel or studied by experts from other organizations*. We have to remember that usually there is a long time-gap between the decision to set up a museum and the actual inauguration of the museum. The planners would do well to take this into consideration and utilize the time-gap in collection, restoration of the artifacts if necessary, preparation of history sheets, etc. *For a Science and Technology museum, where exhibits are mostly fabricated as per given design -a practice which takes a long time and cannot accelerated simply because the overhead of staff will increase, depositories are a must.* Sometimes the exhibits' ultimate utilization is not quite apparent either because of academic doubts or if it does not immediately fit into the galleries in mind. In such cases preservation in depository is the only answer.

After the museum is established the depository may lose many of its collections which are shifted to the display hall. This is the time for starting further collections. The function of the depository will continue to be a study room for the serious minded visitors who come for scholarly purposes. Many museums have been seriously thinking of selecting separate locations for their display and reserve collections.(what Bose has stated as a hypothetical idea then, has become a reality and practice within two decades ; with prominent museums like the Smithsonian Institution establishing separate storage complexes away from the parent institution. An elaborate and detailed description of it is given in the special issue of *Museum International* on 'storage' published in 1997.) The latter could be less expensive areas although administratively it becomes a difficult proposition if the two units are at different places, particularly if the museum is concerned with fine arts or archaeology, the question of safety of exhibits is also to be considered. On the other hand the architectural requirements of storage and exhibition areas are different and much less effort will be required to design a depository, which is occasionally used , and that too by limited number of people'.

Recommending[1] about the requirements of buildings, the conference on 'the small museum', noted,

-Planning of small museums should ensure security against theft and fire. It is desirable to enclose small museums by compound walls as a security measure.

-For reasons of economy and smooth operations of small museums, it is recommended that natural light and ventilation should be used to the maximum possible.

-In adapting old buildings for small museums, structural alterations should be kept to the minimum.

-Considering the restricted spaces of small museums, the activity spaces should be designed for multipurpose use.

Dr. Satya Prakash[2] stated, 'but as in the case of a small museum, both the qualitative and quantity issues of construction is to be limited to the extent funds are available. This must be kept in mind by the persons responsible for raising the new construction. Geographical and climatic conditions should not be ignored in any way ; and the *use of local materials, if these are more economical'.*

According to Agrawal,[3] 'the Building and Climate Control' should take into account the following matter.

'The fact that the design of a building has great influence on the climate inside, is often not fully realized. That the orientation, plan, shape, thickness of walls, ventilation system and other aspects of a building do have an influence on the micro-climate inside was the subject of thorough discussion at the Asia Pacific Conference on Conservation of Cultural Property, February 6-17, 1972, New Delhi. The penetration of solar heat can be greatly reduced by shading the windows and other openings, and walls, and reflection of heat by the use of white surfaces outside, proper ventilation, and the use of building materials of low thermal capacity.

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[1] . Recommendations, *The Small Museum,* Museums Association of India, New Delhi,1975, pp. 123-124.

[2] . op.cit., Dr. Satya Prakash, p.14.

[3] . op.cit., O.P Agrawal, Climate and Environment, p-21.

There are a number of possibilities for assuring a favourable micro-climate, which must be kept in mind when planning a museum building.

S.K. Bhoumik [1] expressed his opinion on 'construction' as, 'the galleries to be constructed must fulfil the requirements of various sections. A few examples may be cited. A section containing a natural history collection requires a spacious hall with alcoves in the wall for installing dioramic cases. Such a gallery should be protected from excessive light and heat. On the other hand, a picture gallery should be constructed in such a way that it is able to reduce sudden fluctuations of relative humidity and temperature and remain cool throughout the day. In a picture gallery there should be plenty of wall space and arrangements for indirect illumination, filtration of dust and harmful gases. For a picture gallery, light absorbing paints, like zinc oxide and titanium dioxide should be used. A gallery exhibiting stone sculptures should be so constructed that sufficient daylight may be available in the gallery.

Another important and equally urgent problem in India is to make necessary alteration in old museum buildings so as to eliminate sources of climatic and biological hazards. In every old museum building certain repairs and alterations are necessary. The old system of ventilation should be changed. Old unsuitable museum buildings must be renovated taking into consideration the prevalent climatic conditions of the place. For every museum it is desirable to have a ***master plan*** in which the building development and the general needs for a few decades should be provided for.'

Equipment:

According to Coleman,[2] 'the building committee very commonly has to consider *construction* and *equipment* during the course of work that leads up to the final ***structural plans*** and to the plumbing, electrical, and heating and air conditioning plans of the building. The architect and engineers have the technical side in hand, but they should look to the committee for many a lay decision.

Fireproof construction is imperative. To be sure, many temporary museum homes and also some small permanent museum buildings are of perishable

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[1] . op. cit., S. K. Bhoumik, p.79.

[2] . op.cit., Laurence Vail Coleman, p.217.

construction; but any museum with irreplaceable collections is entitled to a fireproof structure'.

Coleman[1] further stated 'passenger elevators are important conveniences, if not necessities. ***Ordinarily, to be sure, more than half the museum's attendance will walk up one story in spite of a chance to ride; but a great many people prefer to wait and crowd into elevator.*** The author agreeing with the gentle suggestions made my Coleman, would like to emphasise the importance of such facilities. In fact they become a necessity unless there is an alternative mode of passage for the handicapped and disabled such as a ramp. A museum visit even in cases where it is purely meant for enjoyment and entertainment is a drain on the energies of a visitor both physically and mentally. Coleman's statement based on a finding or an observation, that a large chunk of visitors wait to avail the elevator facility should not be taken just as an indication of the preference of even able bodied people to opt for such a facility when it is available but as a strong suggestion to install such facilities where there is need for such provision and funds permit its installation. Though not strictly followed in this country, the legal provisions for the handicapped entitle and facilities their entry and access to all public places meant for normal bodied people. To fulfil the needs of this less privileged lot, museums should have facilities like these that make the visit by the handicapped a convenient and comfortable one.

The number of elevators required will depend upon occupancy conditions.

A special transport problem, that any museum may feel but that only a museum with a very large building can meet; is moving groups of school children up and down by elevator'.

Molajoli[2] discussing various electrical equipment in museums stated, 'All the electric equipment required in a museum, whether for lighting or for power, must be planned and installed not only according to immediate requirements, but also with a view to its possible increased use or further extension in the future.

All wires, controls and fittings, in whatever part of the building, should be connected, by a number of independent circuits, to a main switch box, which will be placed in the quarters set aside for the technical supervision

[1]. op.cit., Laurence Vail Coleman, pp.123-125.
[2]. op.cit., Bruno Molajoli, pp. 182-184.

of the museum, and if necessary, linked by a relay system to the night watchman's room.

At this central control point there should be charts and clearly worded explanations and instructions, which can be followed and applied by anyone in the event of an emergency.

Every care should be taken to avoid the danger of short circuits in the electric system ; all wiring will of course, be installed according to highest standards of safety, and completely insulated.

The precautionary measures adopted on ships as protection against fire should all be extended to museums, or at least be taken into account during building and equipment. Every country has rules and regulations on this subject, to which references must be made.

Gopal Bhargava[1] discussing about Innovative Technologies with reference to housing plan suggests, 'planning for mass scale housing programmes necessitates inexpensive substitutes for building materials. There is an imperative need for rational utilisation of space and design of the tenement with appropriate application for the urban poor. It is worthwhile to point out that, at present building material like iron, cement, bricks and wood have become a costly proposition. There is a dire need for research and development innovations, so as to devise appropriate substitutes for building materials. Thus comprehensive and analytically oriented technologies will have to be emphasised. Instead of traditional use of cement in the building structures, the application of flyash as a substitute for cement has got to be recognised. Due to presence of thermal power stations in urban areas, flyash is available in abundance. Innovations in building technology can help in providing mass scale housing facilities to an alarmingly increasing urban population.

The housing programme should not be vested in monopolistic governmental housing agency alone. However, the low-cost housing competition will give a better layout and reduced costs.

It is worthwhile to point out that in the layout for low-cost housing, the important consideration is the optimal utilisation of space at the minimum

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[1] . Gopal Bhargava, Housing plan and innovative technologies, *Employment News*, 15-21 August, 1998, p.14.

cost. In a paper on housing approach, Shri Jagmohan, Member of Parliament, has rightly pointed out that our own policy should clearly lay down that we have a problem of housing not in the conversational sense but that of shelter, not of luxurious living but of roof over head.

The cost of roofing can be reduced by the use of asphatic corrugated sheets and cement pulp roofing sheets, which have recently been used with advantage in constructing low-cost housing structures. The use of plastic pipes and fittings would also add to some savings. However, there is also scope for cost reduction in foundation work of 'under piles', a product developed by the **Central Building Research Institute**. It has been found suitable for low-cost housing under certain soil conditions.

The National Building Organisation (NBO) had suggested several measures for reducing the consumption of steel in building construction. These include the use of deformed bars, tabular structures, light guard structural sections and substitute materials like cement, concrete and timber. These measures are being increasingly adopted. The National Housing Policy document has advocated the importance of building materials and technology with the following considerations: Selection, extension and promotion of proven technology and building materials and the use of materials conforming to standards and quality control through the efforts of Building Materials and Technology Promotion Council and State Government and to provide financial and other assistance to entrepreneurs for the manufacture and marketing of appropriate and innovative materials; encourage the use of materials based on industrial and agricultural wastes, on local resources and alternate appropriate technologies; incorporating low cost technologies and materials in the national standards and specifications laid down by the State agencies and further requiring the public construction agencies to draw up plans for the use of cost effective technologies and materials to the extent of at least 10 percent of total annual construction, training, technology extension and skill upgradation through a network of building centres in urban and rural areas set up by State agencies, research bodies, voluntary agencies and dissemination of information to the actual users and communities ; building up an extension network for the spread of information on housing schemes and low cost technology, shelter guidance centres, retail outlets for materials ; strengthening the existing research and development facilities in other suitable institutions by necessary financial support and by obliging all public and private construction agencies to set apart at least one per cent of their annual expenditure for Research and Development Housing Sections.

Housing development has to be viewed in a regional perspective. In fact, housing in the limits of metropolitan and large cities is restricted. Therefore, as a significant strategy, it is vital that the peripheral land of metropolitan and large cities should be developed for mass scale housing programme'. Many of the points stated with reference to housing policy and most of the information regarding construction material could be adapted for beneficial use in the construction of museum buildings to build cost effective and structurally sound museum edifices.

Material:

According to Coleman,[1] 'reinforced concrete frame, or a fireproofed steel skeleton, is now the rule for buildings of any considerable size'.

Brick is a less ostentatious material than stone, always popular for public libraries and increasingly employed by museums. For small buildings brick is especially appropriate, but there are also brick buildings of larger size.

With limestone trim, brick has a very pleasing appearance partly because of its simplicity. There are molded bricks for decorative purposes ; and the bond in which any brick is laid can be chosen from the pattern.

New materials for exterior construction have been explored in modern style, but the principal change that has come about so far is a ***greater use of glass***. Many new materials of ready adaptability for interiors cannot be exposed to weather, and some of the new materials that have found a place in buildings of other kinds do not lend themselves very well to museums. Further, it should be remembered that the ***established materials are not threatened by modernism***, if only because ***some of them are new enough to have helped in producing contemporary style itself***. " No substitutes are available in permanent construction for concrete, steel, brick, stone, glass, wire, certain metals, etc.," says the firm of Eggers and Higgins, New York, in a recent brochure.

New molded and ceramic materials, metals in new uses, and especially plastics should be viewed with interest, and judged by their performance.

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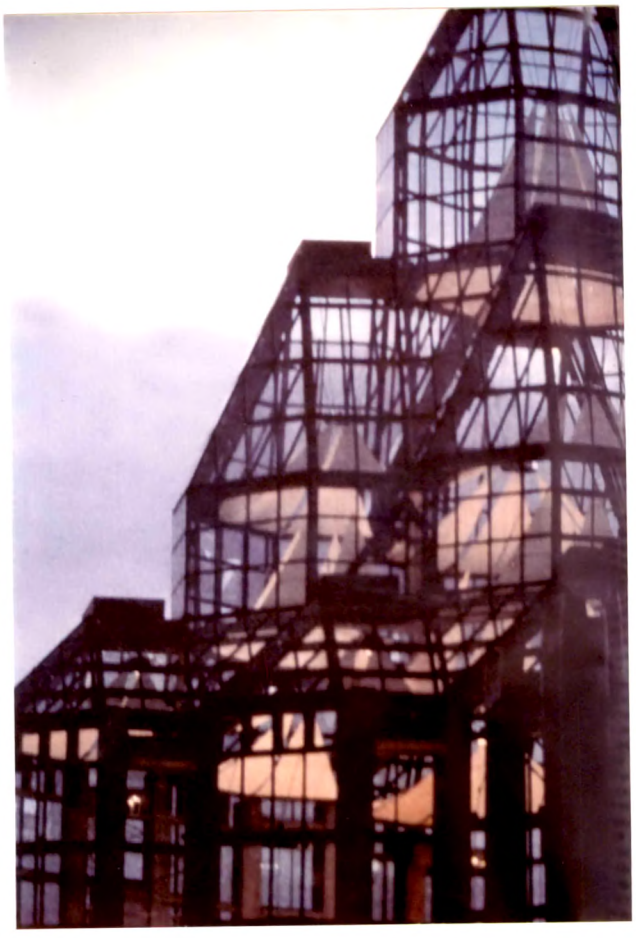
[1] . op.cit., Laurence Vail Coleman, pp.219-222.

View of the Great Hall of the National Gallery of Canada in Ottawa-showing extensive use of glass as construction material. (Courtesy-*Museum News*, v.67, n.1, American Association of Museums)

The strong and elegant Basalt stone wall of the exterior of Prince of Wales Museum building .



Glass, which ***is a new materials only with respect to the manner and the extent of its use, has been employed to advantage in museums as in modern structures of other kinds.*** Moreover, museums have employed structural glass in its natural and proper role- as a material admitting light, not as a novel substitute for other facing materials over opaque panel walls. The long-standing use of glass in art museum *roofs* is of course a totally different matter.

Glass, if used extensively in exterior walls, must be of some type that does not impose excessive air conditioning loads and that does not put proper conditions of humidity out of reach by introducing places where condensation will surely occur in times of cold. For large panels, insulating glass may be required.

Glass blocks enclose air pockets, and when laid in a panel they are roughly equivalent to an 8-inch masonry wall with regard to their heat transmission. Sound transmission by glass block is also low. For different light requirements there are different types of glass blocks-diffusing types to break up light, prismatic types to throw the light towards the ceiling or elsewhere as desired, and transparent types to give window panels either entire or as spots in larger diffusing panels. Glass blocks are usually employed in areas of not more than 100 square feet'.

Yani Herreman[1] mentioned in her article, 'Le Corbusier, Frank Lloyd Wright, Gropius, Candela, Niemayer, Nervi and Loos are a few famous architects who developed the technical and expressive potential of concrete.'

Charles Correa[2] opined, 'the ying-yang relationship (open-to-the-sky space surrounded by solid built forms, and vice versa) generates figure/ground patterns in which the open spaces can act as areas of visual rest between the enclosed volumes- a principle of enormous potential for museums. For not only does this pattern create the opportunity to provide a combination of concentration and relaxation, is also opens up the possibility of offering the visitor alternate paths through the various sections of the museum. As we are aware, many visitors to large museums are interested only in a

[1] . Yani Herreman, A new Canvas for Creative talent:Contemporary trends in museum architecture, *Museum*, v.XLI, n.4, 1989, UNESCO, Paris, p.200.

[2] . Charles Correa, India: from a philosophy of ages, architecture for today, Museum, v. XLI, n.4, 1989, Unesco, Paris p.223

portion of the material; yet they have to drag their weary feet through endless corridors to reach the particular collections in which they are interested .In fact, since a major cultural centres like the Louvre, in Paris, actually consists of several large-size museums strung along in a row, like pearls in a necklace. It is not known why could not these units be organized in a manner which allows independent access to each one?

Correa, while discussing the Mahatma Gandhi Sangrahalaya, under the heading 'homage and treasure trove' which he built between 1958 and 1963, stated 'The memorial museum is created in the Ashram where Mahatma Gandhi resided. Built by the Sabarmati Ashram Trust in homage to the memory of the Mahatma, and to propagate his ideas, the Sangrahalaya was inaugurated in 1963 by Jawaharlal Nehru.

The material used in the construction are similar to those in the other buildings in the Ashram: tiled roofs, brick walls, stone floors and wooden doors. No glass windows are used anywhere in the buildings (in deference to Gandhi's rejection of modern industrialized products), light and ventilation being provided by operable wooden louvers.

While describing the Bharat Bhavan (a museum for visual and performing arts at Bhopal), under the heading, *' Progressing casually'* which was built by him between 1975 and 1981, he noted, 'The site for this arts centre is on a gently sloping plateau overlooking the lake at Bhopal. The natural contours of the site have been used to create a series of terraced gardens and sunken courtyards- off which are located a number of cultural facilities.

As one progresses through the terraced gardens and courtyards, one comes across these various facilities in a casual manner, making them easily accessible to the citizens of Bhopal.'

Explaining about the Crafts Museum under the title, *As varied as India,* Correa wrote, 'The initial stage of the Crafts Museum was completed in 1977. The final stage is currently under construction. In it, ancient buildings of extraordinary merit (for instance, an old wooden *haveli* from Gujarat and a stone temple from Tamil Nadu) are being incorporated into the new construction to make the architecture a collage as varied and pluralistic as India herself'.

Discussing about the diversity of the methods of construction and material Molajoli[1] stated, *'It is not possible to recommend one method of construction or one material rather than another ; every country has its own traditions and possibilities.*

In selecting his materials the architect must aim at reducing noise to a minimum, whether it comes from outside or from other parts of the building. Reinforced concrete has been criticized as a transmitter of sound, but there are various ways of overcoming this, and full use should be made of them in the construction of a museum. The choice is wide; the walls can be lined with or coated with asbestos, mica or wood pulp.

The glass ceiling may be either flat or sloping. The objection to the large expanses of glass, whether laid horizontally or at an angle in the ceilings for the diffusion of light, is that it is difficult to keep them clean and that they may easily be broken- with the possible risk of injury to the visitors.

This can now be avoided by using, instead of glass, the modern plastics ('plexiglass', 'perspex' etc., with a thickness of 2 to 3 millimeters) ; these materials are now being manufactured in every country, and are highly transparent and hard wearing. Most of these plastics are lighter than glass which simplifies the problem of supporting framework ; it will however, be wiser for this to be of metal of a standard type, or of some light alloy, it will then last longer and not become warped.

In ceiling of this type the main weight is constituted by the glass and its supporting framework, which should therefore rest on the side walls to be suspended from the roof structure. The solid, opaque portions can be built of light-weight materials, except in places where the workmen responsible for maintenance have to walk.

The ceiling must also carry the apparatus required for the artificial lighting of the room and its exhibits.

For the hanging of pictures, too, it is advisable to make provision, during the construction of the building'.

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[1] . op.cit., Bruno Molajoli, pp. 164-167.

Orderliness:

Keeping the things as they were planned to be and in working condition, can be considered as orderliness. This is applicable to a passage area in a gallery (fig.) or a circulatory route in a museum (fig.) . The illustrated examples belong to the Museum and Picture Gallery, Baroda and the Salar Jung Museum, respectively. This not only causes repulsion to the public but also confusion ultimately leading to chaos. Because of these errors, people tend to enter same galleries again which they have already seen during their visit or miss a few galleries. It would be irritating, tiring and disappointing when they become aware of it. So, due care should be taken to avoid any situation that arise either out of poor planning or subsequent alterations of temporary or permanent kind. Whenever a temporary diversion in the circulation is made, it should be provided with a signage that leads to the proper route, to be followed. Orderliness need not be confined just to a route or circulation path in a museum. It could be regarding every functional and aesthetic aspect of a museum building.

Coming to the understanding about this subject, there seems to be some ambiguity regarding the disciplinary status of 'Museum Architecture'. Neither this is a special subject nor a specialization offered in architecture. **It is just part of the study in the subject architecture**. So, there is no such myth like sending an architect of Central Public Works Department for specialising in this discipline abroad to ensure the construction of better museum buildings. This was clarified by Rehman, Director of the Central Public Works Department during 1971. The opinions and views of experts and concerns of professional bodies are appended herewith, which indicate the constant attention this topic has drawn by the museum field because of its importance and the gradual advancement of the understanding of this subject. But, it is lamentable, that in spite of all these, there are some rudimentary flaws and misconceptions are still existing in the minds of the museum authorities. The author drew this inference from the answers provided by them, which are appended herewith. For example, majority of these people are still for an ornamental structure of a museum building, though it was stated time and again at the fora that these involve expenditure of construction and maintenance. Coleman has stated that ***non-ornamentation of the building would reduce the construction cost by 10-25%.*** Moreover, an ornamental museum building is no more in vogue contemporarily, throughout the world. This reflects the ignorance about the events of past, contemporary thinking and modern developments in architecture on the part of museum personnel. If museum people want to construct modern and suitable

structures they should familiarise themselves with the basic aspects and developments in this field.

The author was intrigued all throughout while browsing the literature on museum architecture about this sparingly referred National Building Code. But for a mention of it, no author who used it, did not dwell deep into it. So, it was decided upon to probe into this gazetteer and provide useful information to the museum fraternity in order to facilitate an appropriate construction of museum building on their part, that conforms to the legal norms. With this view in mind, the author furnishes the following norms mentioned in that book, which have to be adhered to in constructing a building.

Building Rules and Regulations [1]

part 111 Development control rules and general building requirements

Greenbelts and landscaping

General: Greenbelts and landscaping including plantation of shrubs and trees help certain extent in enhancing the environmental quality.

Planning of trees in streets and in open spaces be done carefully to take advantages of both shades and sunshine without handicapping the flow of natural winds. Their advantage for abating glare and for providing cool and/or warm pockets in developing areas should also be taken.

Where relief from noise is to be provided by means of greenbelts, these may be of considerable width and be landscaped. The extent of relief that may be derived from the above may be derived from the above may be estimated only after considering other environmental factors. Strong leafy trees may be planted to act as noise baffles. Shrubs or creepers may also be planted to act as noise baffles. Shrubs or creepers may also be planted for additional protection between tree trunks; artificial mounds and banks should be formed wherever practicable.

[1] . *National Building Code*, Indian Standard Institute, New Delhi, 1984, pp.111.6-111.33.

Norms for planting shrubs and trees

Suitable provisions may be made for greeneries including plantation of shrubs and trees as a part of environmental protection in general. This aspect shall be taken care of from the initial stage of town and country planning, zoning and planning of development of particular area. Finally, this aspect shall also be taken into account in planning individual building of different occupation.

The types of plants, the distance between trees, plants from the building and the distance between plants shall be carefully worked out keeping in view the structural safety and aesthetic requirements of buildings.

Appendix C (clause 11.2..1)
Guidelines for plantation of shrubs, trees and greenery
Educational and institutional I)125 trees per hectare ii) 50 per cent of the permissible open space for greenery.

Note- Landscape proposal shall got to be approved from the local authority alongwith the building plan.

Occupancy classification
b)educational
c)institutional

Open spaces (within a spot)
8.1.1 The open spaces inside and around a building have essentially to cater for the lighting and ventilation requirements of the rooms abutting such open spaces, and in case of buildings abutting on streets in the front, rare or sides, the open spaces provided shall be sufficient for the future widening of such streets.

Besides the above information, the National Building Code also provides the following definitions to the architectural terms.

Site Plot - A parcel (piece) of land enclosed by definite boundaries.

Building - Any structure for whatsoever purpose and of whatsoever materials constructed and every part thereof whether used as human habitation or not and includes foundation, plinth, walls, floors, rooms, chimneys, plumbing and building services, fixed platform, verandah, balcony, cornice or projection, part or a building or anything affixed

thereto or any wall enclosing or intended to enclose any land or space and signs and outdoor display structures.

Floor - The lower surface in a storey on which are normally walks in a building. The general term 'floor' unless specifically mentioned otherwise shall not refer to a 'mezzanine floor'.

Window - an opening to the outside other than a door which provides all or part of the required natural light or ventilation or both to an interior space.

Parking space - An area enclosed or unenclosed, covered or open, sufficient in size to park vehicles, together with a driveway connecting the parking space with a street or alley and permitting ingress or egress of the vehicle.

Further details in the book are as follows, that also include information about protection from pests and natural calamities.

Land use classification and uses permitted:

The various land use classifications may be indicated below:

a) Residential Zone - Purely residential (R1)
Residential with stoplines at ground floor (R2)

b) Commercial Zone - Local commercial area (C1)
District Commercial area (C2)

c) Industrial Zone - Service industries (I-1)
General Industries (I-2)

d) Green Zone

e) Special Reservations

3.3 Uses to be in conformity with the zone- where the use of buildings or premises is not specially designated on the Development Plan, it shall be in conformity with the zone in which they fall.

3.4 Uses as specifically designated on the development plan- where the use of a site is specifically designated on the development plan, it shall be used only for the purpose so designated.

13. Rat-proofing and termite proofing of buildings

13.1 Every building or part thereof that is designed or intended for use as a dwelling or for the handling, storage or sale of foodstuffs shall conform to the requirements as given in 13.2 and 13.3

13.2 Every such building unless supported as posts shall have continuous foundation walls, extending from at least 60 can below ground level to at least 15 cms. above ground level or shall have a continuous floor or masonry or reinforced concrete or other equally effective rat-proof materials.

13.3 All openings in such foundations or floors, windows and drains, and all junctions between foundation walls and building walls shall be tightly fitting, and other openings shall be securely covered with rat-proofing screening or grillage or shall be tightly closed with metal sheeting, concrete or other equally effective rat-proof material.

13.4 Termite control in a building is very important, as the damage likely to be caused by termites to wooden structures of buildings and other household articles like furniture, clothing, stationery, etc. is considerable. Antitermite measures in building shall be taken in accordance with good practice;

14. Lighting and ventilation

14.1.1 Lighting and ventilation of rooms-Rooms shall have, for the admission of light and air, one or more openings, such as windows and ventilators, opening directly to the external air or into an opening verandah with a maximum width of 2.4 meters.

14.1.2 Notwithstanding the area openings obtained through this minimum aggregate area of such openings, excluding doors inclusive of frames, shall be not less than:
a)one-tenth of the floor area for dry hot climate
b)one-sixth of the floor area for wet hot climate
c)one-eight of the floor area for intermediate climate, and
d)one-twelfth of the floor area for cold climate

Note 1-If a window is partly fixed, the openable area shall be counted
Note 2-No portion of a room shall be assumed to be lighted, if it is more than 7.5 meters away from the opening assumed for lighting that portion.
Note 3-The area of lighting as given in a) to d) above shall be increased by 25 per cent in the case of kitchen.

I.M. Pei's 71 foot-high stainless-steel and glass pyramid in the Louvre's Cour Napoleon will act as a skylight to the new underground reception area. As it nears completion, Pei's controversial pyramid looks certain to make a lasting impression. (Courtesy- *Museum News*, v.67, n.1, American Association of Museums)

18. Provision of lifts
18.1 Provision for lift shall be made for building more than 15 meter in height. Planning and designing of lifts shall be in accordance with the provisions of this code.

19. Lighting protection of buildings
19.1 Lighting protecting system requires to be installed on all buildings and structures vulnerable to lighting strokes owing to their height or exposed situation, buildings of public strategic importance. buildings of public resort, buildings housing valuable materials, ancient monuments, observatories, etc.

Appendix E

Special requirements for planning of public buildings meant for use of physically handicapped.

Site development
E.1 Almost any building can be made accessible to handicapped persons by so planning the site that the terraces, retaining walls and winding walls are used effectively.

Remodelling:

Remodelling has been a matter of discussion for long, concerned to museum architecture, as often museums have to be housed in temporary structures or stop-gap arrangements till a suitable accommodation is constructed for them.

Expressing her opinion on this topic, Alma Wittlin[1] stated, 'the National Museum in Munich, founded in 1868, was housed in a building which originally had been intended as an Institute for the Deaf and Blind and then had been found unsuitable for the purpose . The structure was of somewhat inferior quality as may be gathered from the collapse of ceilings which caused injury to visitors and damaged to exhibits. When the much-discussed Imperial Museum of Vienna were completed in 1881, the palatial architecture with its copious Renaissance decoration proved too

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[1] . Alma S. Wittlin, *The Museum its history and its tasks in education*, Routledge & Kegan Paul Limited, London, 1949, pp.145-146.

small for the specimens to be accommodated. The site would have been large enough, but according to tradition the rooms and corridors had been made so spacious, and above all so high-ceilinged, that the practical purpose of the museum was almost defeated. The building designed to hold the Art Gallery and Museum of Glasgow, which was completed in 1901, was, to quote a contemporary description, an " ornate structure in the spirit of the French Renaissance " . There was an abundance of carved surfaces and a floor of variegated, white, black and yellow marbles, and the great hall was impressive by its mere height of eighty feet. The Victoria and Albert Museum was hardly established in its new building, in 1908, when criticism was voiced, especially on the shortcomings of the building itself ; on the lack of provision for offices of keepers, bad lighting and the uniform type of cases'.

According to Coleman,[1] 'an old building cannot be changed into an up-to-date building by making alterations. The best to be hoped for is a more or less up-to-date looking thing, without some of the drawbacks of the original form. A great deal of the remodeling that goes on is really ill-advised. After all, the normal life of a public building is not much over fifty years. Some of the buildings of the prominent museums have crossed half century mark; These may well encourage some demolition and the taking of fresh starts instead of what might otherwise be patchwork.

Alteration of museums is undertaken as a rule to save money, although new constructions may be what is rally wanted. Minor changes may not be of this ilk; but many a remodelling, such as comes when a building is just too antiquated to be put up with any longer, is a sheer measure of economy. More than that, it is often a measure of *false* economy, since the product is still a makeshift and may in the long run prove to be more costly than has been planned. Every contractor knows that additions to an old building cost less than alterations. *And every museum board should know, if only from the experience of others, that a remodelled building is full of chances for operating waste to pile up year after year.*

Remodelling will surely go on, and it may well aim at approximating conditions. Exterior walls can be simplified by removal of stylistic ornament, but *no amount of effort to treat an old facade in modern style can do more than turn it into modernistic veneer on a still old piece of architectural construction.*

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[1] . op.cit. , Laurence Vail Coleman, pp.250-252.

Most old buildings can be made more fire resistant in some parts, and more weather resistant in others. Interiors can be simplified also, much to the advantage of exhibits in a place that is cluttered with the accustomed decoration. Other practical improvements can often be brought about, as by removing masses in the way such as a staircase blocking the lobby, or by adding needed conveniences such as a staff stairway, or by relocating nonbearing partitions and reshuffling uses of space to give more functional arrangements. In a limited way, ***old lighting installations can be replaced by new - with as much recognition of the present methods as existing plan, scale, construction and other stubborn realities will permit.*** Light openings may be closed, or perhaps even introduced in new positions if the facade does not veto such changes. (Museum and Picture Gallery is a classic example of remodelled lighting arrangement and the complications associated with if. Built to serve as a museum but function under the provision of natural light, the building was adapted to partial artificial lighting. Majority of exhibit lighting today depends upon artificial lighting. But, the whole arrangement leaves much to be desired, based on contemporary standards of display and interior arrangement of museum buildings. None of the things, the building, the exhibit cases, the design of galleries or their layout ; permitted a suitable adaptation. The initial changes were brought about more than six decades ago. Even the recent changes done barely three years ago confined to a limited portion i.e. to its special exhibition gallery; during its centenary year are not very convincing. Though the changes per se are up to date and modernistic they tend to make the rest of the museum appear like a 'poor cousin' in comparison. Though they are good, they are so drastically different from the rest of the lighting arrangement in the entire building. If a building does not permit changes as Laurence aptly put it as *stubborn realities*, they have to be admitted before embarking on any changes in them. Otherwise they result in crude, unsightly structures. Though the intensity of the problem is not so severe or acute in case of Museum and Picture Gallery, Baroda; it imposed some minor patches of avoidable portions even in exhibition areas.(fig.)

Hung ceilings may perhaps be engineered, floors can be replaced . More or less of air conditioning can be instituted as a rule.

Converting of houses and other non-museum structures into museum homes, temporary or permanent, may be any of a number of varied tasks. It may be a mere altering job, to make rooms built for living or cooking or eating or sleeping serve for museum display, administration and

educational work. It may be matter of adapting some esteemed building to a use that will let it live on in a not too changed condition. Or it may be the assignment of preserving and perhaps restoring some structure worthy of being a true historic house museum.

The last of these possibilities is a special commission of trust that calls for restraint, perhaps research, and survey knowledge of the history of design and building. The second possibility is likely to be a frustrating task that ends by leaving the facade about as it was and dealing with the interior by an altering job of the first-named category. Birla Industrial and Technological Museum, Nehru Memorial Museum and Deeg historical houses are examples of the above three types of possibilities of remodelling in the same order. Experimentation in Indian context is no less with regard to accommodation of a museum building. As in alien contexts they were accommodated in abandoned railway stations and decommissioned ships (eg.. Vasa Museum), even in Indian context, there was no dearth of ingenuity and initiative. One of the present leading site museums of the country was initially located in a bus stop as reported by an author in his article. Similarly the author has seen the museum at Prabhas Patan located in a tin shed before it was shifted to its recently constructed building. The point here is adaptation is a norm with regard to museum buildings than an exception.

Converting a former residence into a home for a museum is a highly unsatisfactory kind of remodelling work. Probably the soundest reason for undertaking it is the hope of preparing the way, in the life of some growing institution; for a future museum building. But, even so, the trustees would do well to learn the full cost of making the alterations proposed and to compare this with the cost of putting up a part of new structure. Museums, have been often cautioned against accepting too hastily a gift of property that may turn out to be more of a burden than a benefaction. Not a few gift houses have been found valuable chiefly as pieces of land. There should not be any legal terms and conditions attached to them. There were reports of National Gallery of Modern Art facing problems of expansion due to the dual ownership of its building- Jaipur House under the state government of Rajasthan and the Maharaja of Jaipur.

What the great cleric, Richard Hooker, wrote some centuries ago is still true: "*Alteration, though it be from worse to better have in it inconveniences, and those weighty.*"

According to Hebditch,[1] 'more rarely, the curator will have the opportunity to create new museum premises. All types of museums pose problems requiring architectural solutions. New ventures will fall into three main categories:

1) The re-use of premises originally designed for an entirely different purpose.
2) The use of premises of historical interest, often related to the museum's own purpose.
3) The commissioning of totally new premises.

The authors opines palaces and houses of the noble are ideal for historical and personalia museums. Mysore Palace Museum, Darbar Hall Museum, Junagadh (figs.) ; and Nehru Memorial Museum are examples of this.

Hebditch,[2] further stated, 'in general the care with which buildings can be made weatherproof and structurally sound, converted for new purposes, maintained at reasonable cost and made accessible for are to be thoroughly studied.

Museums are often located in historic buildings. Apart from the additional planning requirements already referred to, the curator has certain professional responsibilities to observe. *If the building is itself an artifact, it is as important as any other item in the collections.* In considering the use of historic building, it is necessary to ensure that any proposals respect the historical and architectural significance of the building. These 'curatorial' qualities of a building are not always so obvious to architects, who may be influenced either by aesthetic considerations alone. But *both architectural and historical considerations can fall foul of* ***building regulations*** *in general, and* ***fire regulations*** *in particular.* Enclosing staircases, the installation of escape routes and sprinklers are well-known problems, but discussions with appropriate inspectors at a very early stage can sometimes lead to relaxations or other solutions which minimize the damage to the buildings qualities. In general, however, historic buildings should not be entrusted to architects without their having the fullest possible briefing as to the significance of the building.

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[1] . op.cit , Max Hebditch, p. 498.

[2] . ibid., p.503.

Regarding the use of old buildings, Molajoli[1] stated, *'Museums housed in old buildings,* a practice which is widespread and usually proves most satisfactory is that of housing a museum in some ancient building whose architectural and historical characteristics give it a certain value.

In many cases the choice is determined by considerations of economy and utility, as it is thought better to use an existing building than to put up a new one.

In some cases the motive is the opposite one of finding a practical and cultural purpose for an old building and thus saving it from the risk of becoming derelict or suffering undesirable alteration.

In any case these advantages have to compensate for the unfortunate fact that modern methods of museum organization can be applied only within strict limits in an historical building or even in a merely old one. Those methods can, however, be drawn upon for certain adaptations, possible even in an ancient building ; for instance, some of its features may serve to provide a more original and typical setting for works of art.

In such cases one of the advantages is undoubtedly the special interest attaching to a museum housed in a building of artistic and historical importance- all the more so if it is connected with the memory of some historical event, some important figure or even some legend calculated to stir the visitor's imagination and feeling for romance.

Almost every European country possesses some ancient buildings which have been turned into museums, and these are of the most varied types-medieval castles, churches and monasteries, private houses and public buildings, prisons and palaces.

These relics of the past -many of which, however, have recently been modernized or restored by up-to-date methods-can be classified in various groups, each of which in the light of circumstances, is seen to be subject to restrictions so far as its use and adaptation as a museum are concerned.

The first strict principle, from which there must be no departure, is that of preserving all the original features of the architecture and decoration for such a building. When necessary, therefore, scrupulous restoration and

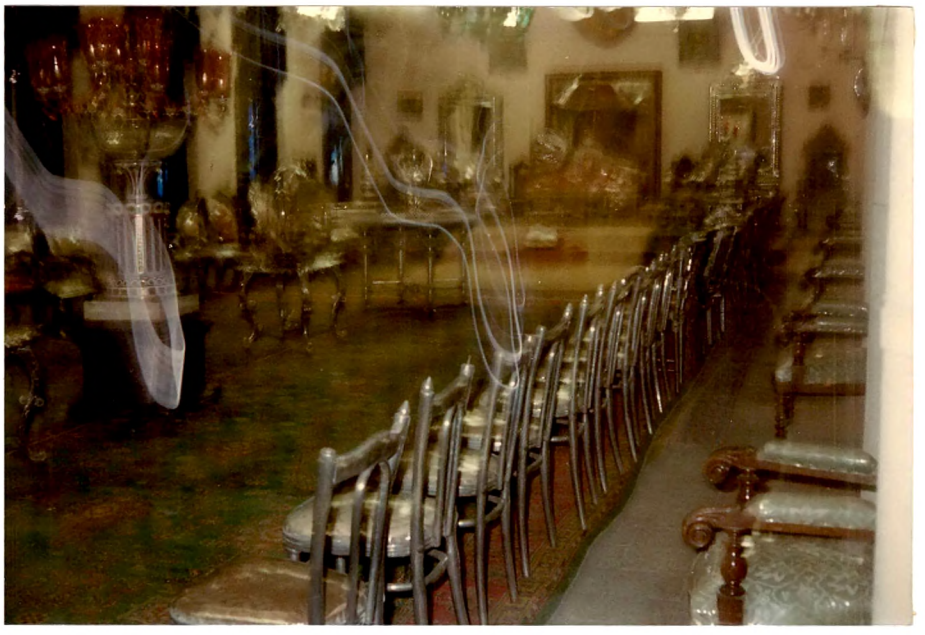
[1] . op.cit., Bruno Molajoli, pp.170-174.

Unconcealed electrical fixtures flanking next to exhibits. Adapted conditions sometimes pose problems.

Old buildings even if they are purpose built, do not lend themselves to modern use of a museum; because modern developments and advancements bring a change in the old methods and practices. Picture shows the internal arrangement of electrical and fire-fighting equipment at a centenary museum building.

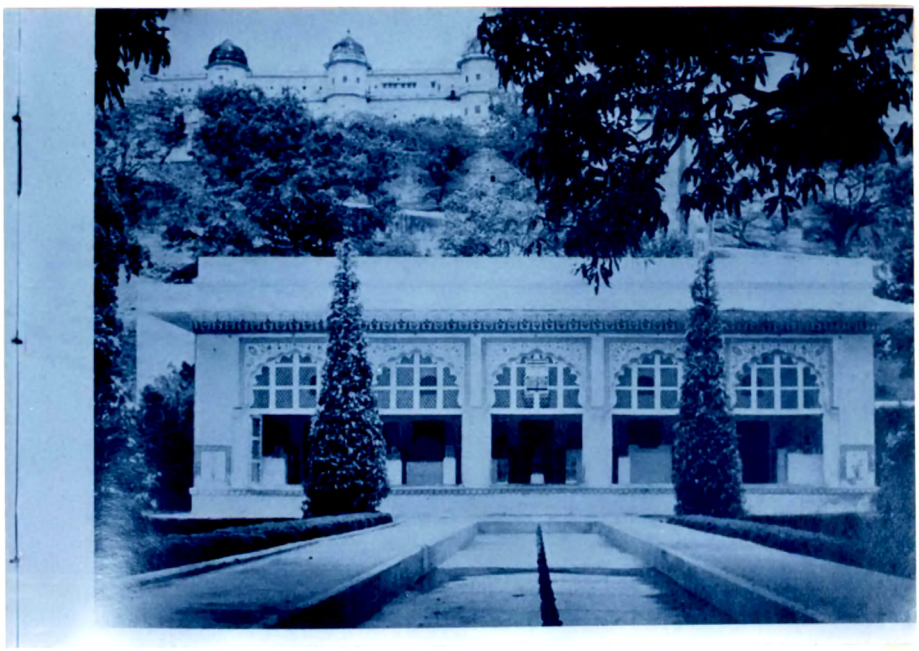
A general view of Mysore Palace (Courtesy- *Museums and Museology*, Agam Kala Prakasan)

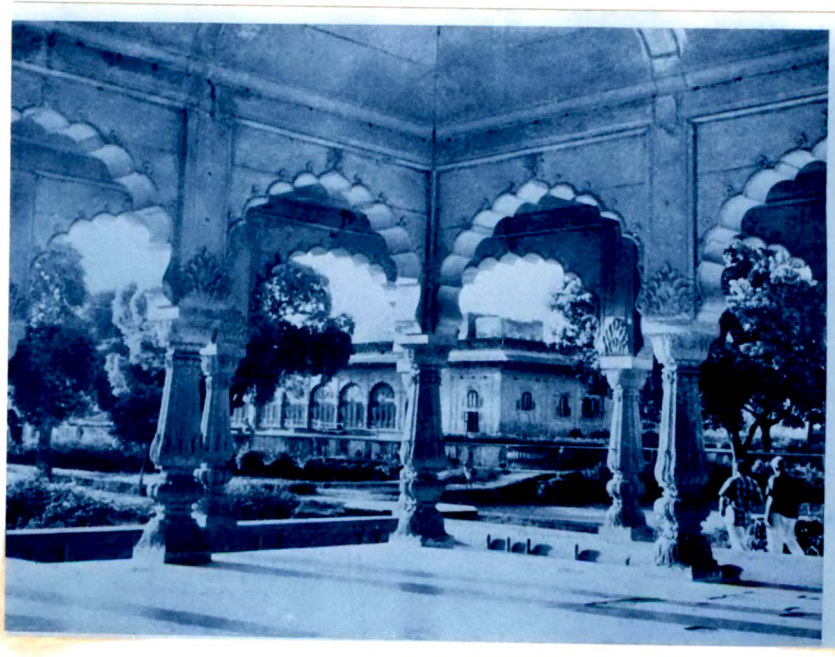
Main hall at the Darbar Hall Museum showing period furniture 'in situ.'
- A classic example of how an old building is useful for museum purpose at times, specially if the exhibits also belong to that building.



Archaeology Museum, Amber. The museum is a small palace at the foot of the hill on which Amber palace stands. (Courtesy- *Museum*, v.XIX, n.4, Unesco)

Deeg, 18th Century palaces in five formal gardens with numerous fountains, some of the rooms are still furnished as they were in the late 19th and early 20th century by the former ruler of Jat State of Bharatpur. It is a site administered by the Archaeological Survey of India as an historical house. (Courtesy- *Museum*, v.XIX, n.4, Unesco)





repair work should be carried out before the museum is established ; and this requirement must always be kept to the fore in any project.

While present-day taste rejects as false and artificial any imitation of ancient styles made under the pretext of restoring a work of art in the manner of its period, our feelings for history makes us unwilling to reject or alter the genuine historical flavour of any period which, where by good fortunes it survived, illustrates the taste that prevailed in that day, even if it is at variance with ours.

This is a moot point as far this author's knowledge regarding this matte goes. Though the above belief is widely accepted and followed all over the world in museum profession, by no means it is a rule of thumb. There are variations, exceptions and contradictions to it. Some museums still follow a period setting to their exhibits, where the design of the building is in conformity and conducive to the requirements of the exhibits and recreation of their original setting (fig.). Though this effort may help to reliven history and the original association of exhibits, it may dramatise the whole display and may divert the attention of the visitor from the exhibits to their surroundings, there by defeating the primary aim of a museum of educating its visitor about its exhibits. The extent to which museums follow this practice depends upon the museums view point and policy matter. Some museums follow this practice with their temporary exhibitions like the Museum of Indian Art, Munich presently exhibiting its collection in India on the golden jubilee eve of the country is doing.

The cases likely to arise can, it seems to be classified as follows :

The building of historical and artistic interest which still contains the furnishings and art collections assembled there in former centuries, itself is a museum, and little change can be made in adapting it for public use, except the most faithful restoration and a little caution retouching of a strictly functional nature.

The building of historical and artistic interest whose original contents have disappeared but whose decoration has survived intact or can be refurbished.

The building which has preserved only its outer aspect, together perhaps with a few of its internal features (such as courtyards and staircases), its rooms having been completely altered, should be adapted to house a museum of an independent, modern type.

The building which, though old, has particularly interesting features either outside or inside, may be adopted for museum if it is structurally suitable.

As regards to buildings in the first of these groups, it is hardly necessary to point out that any changes made to convert them into museums should be as slight as possible. They are genuine historical monuments in their own right, and the organizer should confine himself to measures essential to preserve the structure and make the most of it, without impairing its harmony.

The building may, in a few exceptional cases be an historical one which has retained its original furnishings, works of art and decoration. It may be one with the historical interest of an old house whose characteristic, traditional features illustrate the craftsmanship of its day. Or it may have been the home of some celebrated figure whose possessions and relics must be kept in place simply to preserve the surroundings in which he lived and worked. In all these cases care must be taken not to destroy the historical atmosphere, which must be restored if it has been impaired in any respect.

Even a building of this type cannot, of course be opened as a public museum unless certain requirements are met with. So some part of the premises should be found, suitably situated and not in itself remarkable (such as always exist, even in an ancient building) and adapted to house the essential services.(offices, records and storerooms, laboratories, etc.)

Obviously it will also be possible and necessary to modernize all the technical equipment (electricity, security, cleaning, etc.) make sure it is efficient and safe and place all pipes and other fittings in positions where they will not detract from the period atmosphere of the surroundings.

If the building still has its original stairs and floors and there is any reason to fear that these might be worn out by the coming and going of visitors, they should be protected by carpets - but only in the places actually exposed to wear and tear, for they ought not to be entirely concealed, especially if they are decorated and typical of their period. According to the author's observation, this happens mostly with wooden staircases and floors. He further agrees with the view that these structures should be covered and protected only where they are prone to further damage. The beauty of some of these stairs, floors and even compound gates and turnstiles have to be seen to be believed.(Museum and Picture Gallery has

one with a counting device at the entrance of its building. The author has not seen another of its kind anywhere else. It is his experience, who ever were shown that, pointedly, had either admired or appreciated it with awe.) Spiral stair cases in wrought iron is a coveted antique structural item. Of course though the list of these items extend to a broad range, it would not fall in the scope of present discussion.

The present-day organizer can do little more than this; his own good taste and respect for history will prompt him to the right solutions of the many individual problems which it is hardly possible to anticipate.

In the case of a building in the second category (mentioned the above list), where the architecture and interior decoration have survived more or less intact, (but which has lost all its original furnishings) the organizer will be faced with the difficult but stimulating task of bringing the contents of the museum into harmony with surroundings which cannot be altered.

There are two possible solutions to this problem: (a) the exhibits or collections may be so arranged as to suggest a connection with the style, period and state of their settings; (b) the ancient setting may be to a great extent preserved, but the exhibits arranged without regard to it, according to the dictates of present-day taste and museum techniques.

In the former case the organizer will here and there introduce elements which bring the setting and the exhibits into a mutual relationship; but he is bound to experience difficulty in establishing a systematic classification, and will not be able to settle matters merely by lining up a number of five pieces - for the effect will be arbitrary, artificial, and only vaguely suggestive of some unconvincing historical arrangement.

The better preserved and more genuine the architectural style of a building, the more complex the problems that will arise and their solution will vary according to circumstances.

The main problem will, however, always be that of bringing the requirements of systematic classification into line with the importance and architectural features of the rooms in which it is to be displayed.

Sometimes the building - especially if it dates to eighteenth and nineteenth century - may even have been planned and constructed to house certain art collections in the manner of its day. In such cases it is an absorbing task to restore it to its original purpose and thus confirm the historical

External flight of steps leading to museum entrance in the initial plan of Museum and Picture Gallery, Baroda.

interest of its past. According to the author the successful restorations done at the Louvre, Paris ; by I. M. Pei, and Alte Pinacothek at Munich constructed initially by famous architect Leo Von Klenze are examples of this.

In any event, the relationship between the building and its contents must never denigrate into sham aestheticism of the 'antique shop' type, an indiscriminate assemblage of heterogeneous items.

Neither should the organizer be tempted into the bad taste of introducing into the old building architectural or decorative elements (staircases, windows, ceilings, etc.) taken from other houses or purchased with an intention of constructing an 'atmosphere'.

When an old building is to be adapted for use as a museum, the firsts step towards the rational arrangement of its collections is to solve the problem of where they are to be placed and what itinerary visitors are to follow- just as when a new museum is being designed.

An old building, originally intended for other purposes, is not easily transformed into a museum *without altering and adapting the system of communication between its various parts in order to establish a clear and logical progress through it and to make the best use of available space.*

The *search for a suitable route* must be guided by these considerations.

Certain characteristic features of the building may even be sacrificed without hesitation - though not without caution and discernment- in order to achieve the best results in this respect, for the sake of which a comparatively large sum may be spent on *knocking out walls, changing the position of doors or windows and opening new ones, even if these differ in size and design from the uniform style of the building.*

Particular attention will also be devoted to the *problem of access* to the rooms.

Staircases, if not numerous or not strong enough for the intensive and concentrated demands, sometimes made on those of a museum, must be suitably strengthened or widened, new ones even being constructed at points where they will be most useful.

At least one supplementary or 'service ' staircase should be brought back into use if it already exists, or constructed if it does not ; this will be used for all supervisory and other functional work, and in the event of fire or any other danger. It must therefore provide an unbroken link between all the floors of the building and go right up to the attics to facilitate the inspection and repair of the roof.

The *roof* of an old building to be turned into a museum provided the organizer with one of his chief problems. If it is a wooded one and financial considerations make it inadvisable to replace the beams by something safer (e.g., steel), it must at least be strengthened in a rational manner, all wooden parts must be fireproofed and it must periodically be thoroughly sprayed to prevent damage, by termites, borers, etc.

The attic should be cleared of any unnecessary superstructure and of everything that is inflammable or liable to rot ; and their floors, above the exhibition rooms, should be made watertight by one of the usual and now widespread technical methods, to avert the risk of rain-water seeping through the roof and ceilings and damaging the exhibits.

The roof should always be accessible both from inside and outside, with gangways and protective parapets to facilitate upkeep and inspection by museum staff.

A menace to which old buildings in all parts of the world are particularly vulnerable is *moisture*, which creeps up from the ground into the walls. Strong and rational measures must be adopted to parry this, for it can do untold harm to works of art and to the other contents of a museum. The foundations of the building must be isolated from the soil, which absorbs water and humidity by capillary attraction or by dispersion. This is done by inserting horizontal layers of impervious material (lead, concrete, asphalt sheeting, etc.) into walls where damp is found to have risen vertically through capillary attraction, by building new walls side by side with those into which saltpeter or water has penetrated, leaving space between the two surfaces for insulation and ventilation, or by introducing some method of absorption and evaporation.

To coat the walls with so-called damp-proof material is useless and harmful, for this not only fails to remove the cause of the damp, but by preventing it from evaporating at once, forces the water into other directions, so that it spreads all over the wall.

The *joint objective of curator and architect will be to retain as much as possible of the existing structure for obvious reasons of economy*, while adapting the old building to the new aesthetic and functional requirements'.

Observations made by the Estimates Committee set by the Parliament in the past, to look into the expenses incurred by the leading museums of the country gives an interesting account of museums. Referring to the National Gallery of Modern Art, the communication between the Committee and the government was as below.

Estimates committee report[1]

62 report: Recommendation (serial No.20) para No. 32.:

'The committee realise that the National Gallery of Modern Art is handicapped both by unsuitable and inadequate accommodation. They also realise that in the context of present financial difficulties it may not be possible to construct a separate building to house the gallery. The committee would therefore suggest that Government may explore the feasibility of acquiring the present building and making necessary alterations and extensions thereto suit the purpose of the National Gallery of Modern Art. *The committee feels that the present gallery building possesses the requisite locational advantages*:

Reply of Government: Government agrees in principle with the recommendation and will explore the feasibility of acquiring the present building which belongs to the Government of Rajasthan. Government will also consider making necessary alterations in the building after it has been acquired.

Further information called for by the committee:
i) Please state the steps taken to acquire the building in which the National Gallery of Modern Art is housed from the Government of Rajasthan.
ii) Please also state what alterations have been made or contemplated to be made in the building so as to make it suitable for the National Gallery of Modern Art.

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[1] . *Estimates Committee Sixty Second Report*, Lok Sabha Secretariat, New Delhi, 1968-69, p.23.

Reply of Government: The Jaipur House where the National Gallery of Modern Art is housed is owned by the Government of Rajasthan in partnership with the Maharaja of Jaipur. The Rajasthan Government who were moved in the matter have now informed that the Maharaja of Jaipur does not take interest in the sale of his share in the Jaipur House and as such it is not proper for the Government to implement Government of India's suggestion in the matter. In view of this position it has not been possible to take up the question of making alterations in the building so as to make it suitable for the National Gallery of Modern Art.

Generally buildings are available and the museum has to adapt itself to the conditions existing. Though this is a universal problem, old and unfit buildings - either highly ornamental from outside or with pillars inside and broken walls with windows and without sufficient space for display exist in India in fairly large number and museums have been established in them. It presents a difficult situation when such museums are reorganised and displays made to be adapted to suit the modern museum techniques'.

Devkar[1] in his comments on Durbar Hall Museum stated the following:

'As it might be interesting for you to know the reorganization of a small museum, I will tell something about the Darbar Hall Museum of Junagadh. It serves a limited area and a small community and has interesting problems.

This little known museum is situated in the heart of the small town of Junagadh. It enjoys great popularity with the public on account of its central location and easy accessibility. The collections of this museum are housed in an old building which was constructed in the time of Nawab Mohobatkhan-II by Vazir Bahauddin, about 1860. It was used by the former Nawab of the Junagadh partly for residential purposes. Since the merger of the State of Junagadh into the Indian Union, this old building of the Darbar Hall, together with its contents, remained in charge of the Collector of Junagadh. The upper floor of the Darbar Hall was utilized by the Collector to dump the old records of the Junagadh State and that of the Collectorate, creating a dangerous condition for the Darbar Hall on account of the heavy overload in an old building.

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[1] . V.L. Devkar, Darbar Hall Museum of Junagadh, *The Small Museum*, Museums Association of India, New Delhi, 1975, pp.120-122.

The collections of the Darbar Hall are divided into two main portions- the Darbar Hall proper and the Shilekhana. The Darbar Hall represents a huge hall which contains life-size portraits of the former Nawabs of Junagadh, Royal gorgeous old-fashioned furniture, huge ornamental mirrors, decorative settings, carpets, chandeliers etc. used by the former Nawabs on Darbar occasions. The Shilekhana contains a great variety of old arms and rare weapons of offence and defence, displayed in a crowded manner in a big room adjoining the Darbar Hall.

The Darbar Hall and the Shilekhana are at present disorganized and their collections stored in strong boxes. The old building is under repairs and the local P.W.D. is making necessary additions and alterations in the building to suit the requirements of a modern museum display. The reorganization of the Darbar Hall museum on modern lines involves several administrative problems'.

Discussing on similar theme but on a different note, Satya Prakash [1] stated, 'when a small museum is offered the least attractive rooms in any building- and these may be in the spacious basement of any big building -and the museum has to be lodged in them temporarily, paint and wall-board or plywood may be used to transform the space into a decent place for museum purposes. Temporary partitions will add extra rooms, false walls will hide rough walls, even in the basement, fluorescent tube lights will make the room attractive. Pipes and conduits, hanging below the ceiling, should be either covered or painted black, and the light fixtures hung just below the black area. In this way the ugly structural features will disappear and the space available can be used to the advantage of the museum-visiting-public'.

According to Nagaraja Rao[2], the description of Mysore Palace Museum is as follows, 'the main building is a grey granite massive structure. Converting such a grandiose building into a museum is a challenging task. The eternal problem faced by museum director in utilising an imposing building for converting into a museum is being successfully solved in the case of the Mysore Palace. The authorities have decided that the palace

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[1] . op.cit., Dr. Satya Prakash, p.12.

[2] . M.S. Nagaraja Rao, Converting a Palace into a Museum : The Mysore Palace, *Museums and Museology*: New Horizons, Agam Kala Prakashan, Delhi, 1980, pp. 300-301.

at Mysore should not be a museum in the conventional sense of the term it is to be a museum reflecting the history and glory of the Mysore and that of the illustrious Mysore royal family. Not merely that. It is to be a living cultural center encouraging various fine arts. No objects of art and archaeology unconnected with the history of Mysore dynasty are to be exhibited. The structure itself to be maintained as a historical building. The ceremonial halls are to be maintained in their pristine form so that the people could come and see the grandeur of the period and appreciate the aesthetic qualities. In fact, the three ceremonial halls in the main palace are themselves are varietable museums even in their present form.

The majestic Darbar Hall can itself be best described in the words of Constance Parsons, 'no short description, if any, can do justice to the beauty of line, wealth of material, blaze of colour and exuberance of decoration in the great Darbar Hall. Walls vie with ceilings, columns with doorways, the hall gathers up and displays all that poets and artists have dreamed of the splendid city of an oriental court; with all the glamour and glory.'

Stating about the adaptation of Berne Historical Museum, Steller,[1] 'it is attractive and rewarding to build and fit up a museum "from scratch ", and projects for new museums, such as that drafted by Le Corbusier for Tokyo or by Frank Lloyd Wright for New York bear witness to great richness of ideas. On the other hand, it is hard and thankless convert to museum requirements an existing museum which has become out of date, more particularly if the building belongs to a bad architectural period with apertures where there should be partitions, and walls and solid barriers where openings are needed for free circulation. If however, as often happens with buildings of no architectural merit, the solidity and good condition of the structure compel one to resign oneself to its retention on grounds of economy, an endeavour must be made to make a successful job of reconstructing the interior by sheer application and imagination and to create, even man outmoded building, a museum which corresponds to today's ideas.

The fact that the museum in question is an historical one does not make the task earlier, since it means that two conceptions, that of the work of art and that of the historical document, are operative currently.

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[1] . Michel Steller, The Berne Historical Museum, *Museum*, v.X, n.4, UNESCO, Paris, 1957, pp.256-257.

It was to house this heritage that a building of the chateau type in the rather pretentious taste of the period, was erected and finished in 1894. It is a four-storey structure with twin bays on each, plus a three-storey annex, built in 1920, with floor levels different from those of the main building; the whole , in section and ground plan alike, is a absolute maze. Ramps and steps, turrets, mosaics on the facade, would-be decorative carving- nothing is missing. Possibly it all seemed less top heavy and airier than fifty years later, but in any case as the half century drew to its close, the need for a complete refurbishing became gradually apparent. The first question which arouse was one of policy : in view of the lack of space - the common affliction of all museums with ever-growing collections- should an all-out drive be made for a new building-an undertaking of doubtful success costly "face-lifting" kind of operation? The latter solution had to be accepted.

Two measures in particular made it possible to give up the idea of a new building and to make do with the old one, without touching the exterior- where bad proportions made it a hopeless proposition in any case- except for doing away with a few unnecessary windows and gables. Inside, advantage was taken of the great height of the rooms to divide certain of them horizontally by building in additional floors and thus provide accommodation for the research collections. This made it possible to relieve the congestion in the rooms open to the public and more useful, more understandable as complete exhibits and more eloquent.

The second measure consisted in starting a branch museum in the castle of Oberhofen on Lake of Thoune. This historic building is now administered by the Berne Historical Museum under the terms of a foundation established by the generosity of the castle's American owner, Mr. W.M. Measey. The consequent decentralization has improved the position in Berne as regards both exhibits and objects deposited with the Museum. The castle stands in a large lakeside park, amid a magnificent landscape with views over snow-clad mountains and is an extremely popular resort

The complicated shape of moulded pillars, the sculpted capitals, the arches of every kind over every possible opening -window, door, etc.-and its bad proportions all made the hall-barn would be better-one of the most troublesome problems in modernizing the Museum. The main change made was to replace the wooden gallery by an intermediate floor spanning the whole chamber. In addition the positions of doors were shifted; heights were levelled up; the whole was treated with a clear colour wash; and

The National Gallery of Australia in Canberra, along with many of the country's flourishing museums, is seen as a big tourist draw. (Courtesy-*Museum News*, v.67, n.1, American Association of Museums)

tiling was substituted for the wooden floor. The result was to give the whole more balanced shape which had been sought.

The exhibition rooms have been modernized on similar lines. The ceilings, formerly heavily moulded, have been largely lowered and given flat surfaces. the much too lofty lancet windows have been replaced by pleasanter rectangular windows without altering the outside appearance and, as already remarked, better space utilization divisions in reinforced concrete where the study collections can be stowed with access to them by stairs built for the purpose. The architectonic simplification and increase in horizontal divisions coupled with the removal of part of the contents to another building have done much to overcome a trouble some lack of space at the same time to respond satisfactorily to our present-day need for clarity and for an overall view. Then, again, as every where today, action has been taken in a variety of ways - re-equipment of the laboratory and workshops, publication of year books and catalogues, innovations such as free entrance hours daily, etc., to try to cope with the fourfold task of a modern museum- conservation, exhibition, research, and publicity. The greater part of the projected work has been completed and the process continues'.

Coming back to discussion on native museums it may be stated that since museum buildings like any other buildings have a limited span of life. Even an architect with best vision can anticipate and envisage requirements for a limited span of future, say five or six decades. A building almost becomes redundant after a century for contemporary taste and use. So, adaptation in the form of renovation, expansion or modification become imperative. This happens with any museum. Bhattacharya,[1] in his article about Indian Museum, stated, 'sometime, between 1904 and 1911 fresh additions of new wings, both for gallery purposes and for study and administrative accommodation, as well as for meeting the needs of a lecture hall, were completed. The magnificent new east wing thus came up, and later, the top floor on the Chowringhee Road, where the offices of the art and archaeology sections were housed'.

[1] . A.K. Bhattacharya, Indian Museum- (Calcutta), *Marg*, v.XIX, n.1, Marg Publications, Bombay, 1965, p.21.

Ellen C. Hicks[1], in his editorial stated, '***adaptive use is a way to preserve the past while giving vitality to the present, and that's what museums are all about.***

Museum Marketing:

Term 'Museum Marketing' is perhaps a decade young to the museum field, though it might be existing in conceptual form or in practice quite earlier to this period. From the phase of being a 'repository', museum has evolved to a much advanced stage. As a corollary museum buildings have emerged as landmarks of the town planning. With the result, museum buildings started to occupy a centre stage in the gamut of cultural affairs. They started playing a vital role in the revenue generation of many prominent cities around the globe, specially from tourists visit. This gave a distinct role they could play in the improvement of local economy of a place. This newly added positive dimension and varied perspective has brought in significant changes in the profile of museums. This relative modern trend explained by two authors through their articles was shared in this context because of their reference to museum buildings. This was acknowledged in the past in various professional journals in their coverages. This phenomenon is a bit conspicuous in countries known for their traffic inflow and tourist economy. There was a time when London and Paris were the sought after destinations for a global tourist. With the change in life styles and improved economy, many more new destinations added to the list. Australia the continent nation is an important destination in Pacific zone, known for the vastness of its size, largely suitable climate, richness of resources, development of technology, improved economy, educational standards, and a key commercial and trading point. Because of these advantages and advanced position, it naturally attracts a great number of visitors for several reasons. Looking at the assured visitor inflow and the potential it holds to develop into an important tourist centre; the country has exploited its cultural sphere also by constructing a string a attractive museums which proved to be great crowd pullers and have successfully drawn visitors to them because of their pleasing looks coupled with their successful programmes and activities organised by them. This was vouched by Donald McMichael, Director of National Museum of Australia in 1989, that a new museum building is erected each year in that country (as stated by Yani Herreman in her article in *Museum*,number four of 1989). No doubt, Australia is country known to be rich for its

[1] . Ellen C. Hicks, editorial, *Museum News*, v.59, n.1, 1960, American Association of Museums, Washington D.C.

geological wealth and anthropological (aboriginal) culture. But unless there is an overall scheme of things and supportive infrastructure that promotes, even a prominent moveable cultural wealth of a country that needs to find an expression and exposure through a museum may go unnoticed. With the foregoing, the author quotes Yves Nacher in the following.

Yves Nacher[1] expressing his views in this perspective noted, 'museums today are having to adjust to a new interpretation of the meaning word 'heritage'. They are also restating the question of access to knowledge. No longer are they centres for passive contemplation of a monolithic and definitive culture. Instead, they become sites for an individual experience, scientific research, experimentation with new techniques for knowledge dissemination and attempts to break down social boundaries'.

This change of nature and the transition to a new 'here and now' are having obvious repercussions on museum architecture, which must keep up with the new needs in terms of space and layout, mastery of light, new teaching or commercial activities.

Architecture like every product of mind, has its ups and downs. But it is dependent on a utilitarian process: a building must be commissioned.

Commissions have in fact changed radically. Alongside major structures, which countries and large capital cities are still erecting, we now find a profusion of small projects all over the world, generated by local initiatives. Then there are increasing number of private orders placed by large companies which invest their image or capital in collections. This cultural Darwinism is replacing the dinosaurs ill- adapted to the needs of our age by a proliferation of experiments, like so many new species that are being put to the test. It is inducing a different approach to the architectural project and a new way of managing its implementation accompanied by new social and urban approaches.

However, interfering factors have crept into this new architectural concept of the museum space and its (physical) relationship with the city and (symbolic) relationship with its age .With the transition from the status of applied art to that of art for its own sake - which is more fashionable - in

[1] . Yves Nacher, From medium to message: museum architecture today, *Museum International*, v.49, n.4, UNESCO, Paris, 1997, pp. 4-5.

the globalized thinking of the 1980s, architecture was seen as imparting cultural added value to everything with which it became involved. it ceased to be a tool and was instead converted into a message . Nowadays, it is not unusual for museums to seek a strong architectural image with the sole aim of attracting visitors. In an environment of increasingly keen competition (in culture as in other fields) where media impact reigns supreme, we see cities fighting for the international stars of the day who produce what is expected of them: namely manifesto buildings that 'sell' well, but are sometimes constructed without a genuine project. The consequences are there for all to see: serried ranks of empty shells, which have nothing to offer other than their outer skin - itself a *tour de force* concealing the cruel conceptual vacuum of their would-be collections. This is a strident expression of the ambiguity, so often criticized, of the relationship between art and architecture: the former, jealous of its stardom, often wants the latter to refrain from seeking to prove its own existence through a visible claim to glory; instead architecture is supposed to be moulded and concealed around the works.

The recent trends of museography and their consequences for architecture, the changed nature of architectural commissions (or the end of the dinosaurs), architecture as a symbolic value in cultural marketing, new museum programmes spearheaded by what has been termed 'the neighbourhood museum': those are just a few of the many themes dealt with by the panel of architects , journalists , critics and academics whose contributions are published in this issue In presenting these different viewpoints, our aim is not to highlight theories that are only as irrefutable as they are fragile. We want, on the contrary, to guide the eye and the mind, so as to sharpen up the discernment and critical view which the closing years of this century so badly need in architecture as elsewhere.

The museum as a commercial product, the shopping mall as a symbol of the museum of the future, the architect as international star- these are the images conjured up by Claus Kapplinger, who describes how contemporary museum architecture has contributed to the dramatic change in the public perception of the museum. The author is a German architect who lives and works in Berlin.

The industrial age seems to be drawing to a close and we are entering the post -industrial decade. This transition plays a significant role in art. Another factor is the constantly growing demand for art. Nowadays, 100 million guilders may be paid for a painting by Van Gogh and 1.5 million for a Frank Lloyd Wright lamp. If an artist wants to secure his present and

future reputation, he must take account of the market mechanisms and arrange a good supply of his works. Art as a feature of successful cultural marketing: seldom has a museum director described the role of art today more frankly than Frans Haks, whose comments made in his address given in 1991 as the founding director of Groningen Museum Island remain equally valid for museum architecture today.

Groningen Museum was opened in 1995. It may look like a somewhat bizarre bird of paradise among the latest museum buildings, with its variegated collection of low and high, old and contemporary arts, built as it was by four internationally famous designer-architects: Alessandro Mendini, Michele Lucchi, Philippe Starck and Coop Himmelblau. Nevertheless, it is a fine example of a new generation of museums. These are virtuoso worlds, stage sets for experience and happenings which try to appeal to all the senses of the public. Even more than the works of art on display in them, their architecture clamours for attention. Seldom are these buildings satisfied with a secondary role of serving as a backdrop for art: they are themselves the focus of attention. They reflect a playful approach to art works and offer visitors a moment of communicative pleasure whereas in the past architecture tended to be a more reserved and sober frame for silent reflective concentration on the exceptional work of art itself.

The change of emphasis and perception that has occurred is reflected in the diversity and more relaxed attitudes of modern museum visitors, who have lost all their complexes over contact with the museums and art. The fact that more and more members of the public today want not only to buy postcards of the art works that they have seen, but of the building itself as a souvenir of their visit, points to a changed concept of the museum. Twenty years ago, few visitors would have considered buying a photograph of the museum building. But in recent decades, museum architecture has become a central symbol, representing the site and the image of the museum. Today, it is not uncommon for the architecture rather than the art collection itself to cause the media and then tourists to travel beyond their national borders, visit cities again and go to museums. These museums with entertaining architecture cry out for personal discovery, even though their forms are becoming increasingly identical.

After all, the expectations of the public have to be met, and the public can only be attracted back to the collections by the big names of famous architects; the self-same collections were previously visited by only small numbers of art lovers. New architecture not infrequently performs the

same function as the big travelling exhibitions and retrospectives of great artists which bring a museum or a town into the limelight as worldwide media events. The widely publicized controversy over the commissioning of the American architect Ioh Ming Pei to rebuild the Paris Louvre was an exception in the 1980s. but the overwhelming public success of the newly opened and extended Louvre in the end confirmed the justification of awarding the contract to an architect who already enjoyed international fame'.

The commercialization of museums

Kapplinger[1] discussing about the commercialization of museums stated, 'the Palace Louvre is also an example of the enormous commercialisation of museums which has grown in recent decades. The construction of an underground mall, the Carrousel du Louvre, which its fast -food, souvenir and other shops leading to the Metro stations, the expansion of the museum shop space, the merchandising of art works through all kinds of copies and even the imprint of its name or the glass pyramid on paper, fabric and ceramics must be seen against this background as the all too rapidly understandable consequences of a development which increasingly regards the museum as a marketable asset.

The museum cafe and shops were then first step. But it was the idea of promoting comforts and souvenirs of the visit to the museum which in the 1960s gradually led to timid new uses of space and allowed small areas to be rearrange in remote corners . Today, on the other hand, the quality and success of a museum are often measured by the additional sales, extensions and potential of what previously were considered secondary functions. So is the mall a symbol of the museum of the future? The quality of the permanent collection is no longer sufficient today to attract the masses to museums. Like a shopping mall, museums are seeking to attract a broad range of visitors who stay for as long as possible and are less interested in originality or in art itself than in the additional opportunities for consumption and interaction.

For the intellectual and symbolic appropriation of the cultural space, the museum today must guide its public - which is seldom familiar with the background and character of all that it has seen because it lacks the

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[1] . Claus Kapplinger, Architecture and the marketing of the museum, *Museum International*, v.49, n..4, UNESCO, Paris, 1997, pp.6-9.

necessary cultural knowledge- towards art through a disparate range of other services. Over and above the conventional educational lectures, museums are increasingly providing space for bookstalls, pop concerts, multimedia shows and representative areas used by sponsors for receptions or product-launch events. A prestigious architect and attractive virtuoso architecture able to hide and conceal conflicting needs play an increasingly central role here. And success seems to justify their concepts. The fact is, for instance, that the number of visitors to museums in Germany following the avalanche of new building projects rose from 14 million in 1969 to 69 million in 1995.

Measured against these impressive figures the museum has long since been part of the market circuit. Something that began in the late 1960s with the opening of museums and culture to society at large - typified by the Pompidou Centre in Paris representing equality of opportunities and the transitions from a purely receptive, bourgeois concept of art to a wider notion of culture- was imperceptibly transformed into a market factor which today attempts to combine maximum entertainment value with cultural representation, mass culture and elite high culture.

As an integral component of the network of a globalised economy, the major museum today has an impact on the market value of a city comparable to the quality of its airports, trade-fair centres, headquarters, shopping centres or gentrified districts. There are now a whole range of scenarios in which not just culture and the economy, but also cultural practices and patterns of consumption of the service -provider class are explicitly interwoven with the financial investments of a globalized economy. As a representative investment and cultural spectacle, a new museum building or the extension of an existing institution is an opportunity to attract international and media attention. This enormously enhances the market value of a town, and the phenomenon is not just confined to the adjacent districts but extends to the whole of the city. The flood of new museum buildings in recent decades provides ample confirmation of this fact. The number of museums built since the early 1980s must surely be greater than in any other period. Today, the museum embodies more than ever before the life-style of our own age, typified by spending power, spectacular events and demonstrative enjoyment of life. However, there are clear limits to the individuality and differentiation of museums. The limits are those of a market which has triumphed over art and architecture which are regarded as having no values in their own right'.