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BUILDING FAILURES: THE ROLE OF THE ARCHITECT

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ABSTRACT

Failure could be defined as non-occurrence, non-performance, and running short, breaking down, ill success, and unsuccessful thing, or attempt (Horby ,2001). When any part of a building or entire building exhibits any of the above characteristics failure can be said to have occurred. The paper highlighted some types of building failures which are, non functional design, collapse, poor construction method and materials, natural disasters, cost overrun and litigation. Examples of famous building failures in history and some common building failures prevalent in Nigeria were documented. The paper concluded with the role the architect can play in minimizing building failures.

INTRODUCTION

Every architect who hears about a profound building failure recalls the lessons learned in architecture school during structural theory and ethics classes. Most designers have seen photos or read reports about famous failures in recent times. In Nigeria and abroad. Building that fail dramatically, or quietly, invite shock and grief, as well as questions and investigation. This paper highlighted some common building failures in Nigeria and the role the architect can play in minimizing building failures

CONCEPT OF FAILURE

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Failure could be defined as non-occurrence, non-performance, running short, breaking down, ill success, insolvency, unsuccessful attempt (Hornby 2001). Failure in construction therefore can be defined as negative consequences arising from risk actins(s) resulting in obstruction of any or all of the desired goals, objective and loss of appropriate benefits derivable from the construction project.

FORMS OF FAILURES

Non functional design: A well thought out project could fail because of defective design on the part of any of the Consultants, Architects, Engineers, Quantity Surveyors and other specialists involved in the design. The non-functionality of the design therefore results in inability to carry out successfully the activities intended within the building. This could be due to inadequacy of space, orientation, ventilation, Lighting, material specification scale, etc.

Collapse: Failure could occur in the form of partial or total collapse of the structure. A situation where, incompetent person or quarks are engaged as consultants, negligence on the part of the consultants could result in collapse of the structure.

Low and Poor Standard Quality of Construction: Lack of experience on the part of the contractor and the consultant could result in poor workmanship and low standard of construction. This could result in high running cost and in some cases failure of some part or the whole building.

Natural disaster: Failure could still occur despite all precautions must have been taken by all concerned, the client, the consultant's, contractors and others involved in the building construction team

Aesthetically Displeasing: The project could be a failure as a result of the building form or finishes being aesthetically poor

Cost Over-run: Lack of proper planning, adequate brief, good project management and experience can result in cost over-run and where the over-run cannot be met abandonment could occur.

Time Over-run (Slippage): Schedule completion time of a project has always been very critical, particularly these days of erratic cost escalation of material prices and labour cost. Slippage in construction prevents usage or availability of facility (s) when needed and this has its resultant effect on cost of the project and other costs to the project and other costs of the owner.

Litigation: Litigation is another form of failure which could be due to mismanagement resulting from lack of knowledge of the contract procedure, negligence on the part of any or all the parties involved in the construction. Because litigation takes long time to settle, there will be cost and schedule over run which may result in additional cost and possible abandonment of project.

WHAT FAILS MOST

Building failures include everything from dramatic collapse to the nagging, persistent problems – windows that leak, cracks in the cladding and walls/ foundations, poor functioning of Heating Ventilation and Air-conditioning (HVAC) systems and malfunctioning roofs.

Statistics an the most common types of failures are hard to come by one useful way to measure the frequency of failures of building components is to review claims made against architects.

FAMOUS BUILDING FAILURES IN HISTORY

(a)Greek mausoleum of halicarnassus, Greece built in 352 BC,the structure was destroyed by an eartquake in 1300s.

(b) The pharos of Alexandria,Egypt
The 350 foot high pharos, or lighthouse,was built in 280 b.c.was destroyed by earthquake in the 1200s.

(c) C.W.post college dome Auditorium,Brookville, N .Y. built in 1970 ,this shallow dome on the campus of long island university collapsed during heavy winds are rain in 1978.

(d) Hayatt regency hotel Kansas city,MO .two crowded walkways in the newly built hotel collapsed in july 1981 killing 114 and injuring 200.it remains the deadliest structural failure in US history.analysis showed that the walk ways have not been built as as originally designed

(e) Kemper Memorial Arena,Kansas city MO. Built in 1973 collaspsed during heavy winds and rain in 1979.no live was lost and no single cause of the accident was found.

(f)Pier 34,Philadelphia, penn.

The 91 year old pier,which held a popular night club ,collapsed in may 2000.three people died and 31 were injured, investigation revealed structural failure on the pier.

EXAMPLES OF COMMON FAILURES IN NIGERIA

ROOF LEAKAGES

Roof is the top external covering of a building shielding the occupants from some climatic elements such as rainfall and sunshine, roof are prone to leakages which allow the penetration of moisture into the building. Poor fixing details for roof covering or its structural members may cause this. Flat roof may leak due to poor finishes or slope on roof surfaces.

ACTION OF WIND ON ROOF

Wind may affect the covering of roof or its structural members. By either removing the covering or moving the entire roof structural members away from the wall planes depending on the severity of the wind or construction method used in the fixing of the structural members, a great example is that of the Abuja Stadium.

CRACKING OF WALLS

Sandcrete blocks or clay bricks are the most common types of walling units used in Nigeria and they are prone to cracks when used as a walling material if bonding is not properly done or poor mix in the production of the walling units. Also if foundation shifts or it's not properly done it often affects the walling unit resulting into structural failures.

MOISTURE PENETRATION THROUGH WALLS

Moisture penetration through walls is a common phenomenon today due to poor external rendering and poor quality of material used in the walling units or where a dam proof course is not during the construction of the wall.

FAILURES IN FLOORS

Floors may crack or fail totally depending on the structural support or system if a foundation or support to upper floors fails the result is a total collapse of the floor system, which is often catastrophic. Moisture penetration can also affect building floors if floors are not properly constructed.

FAILURES IN FOUNDATIONS

Foundations are the structural element that carries the self-load and imposed load of any structure. When foundations are not designed to carry self load and imposed load with due considerations to the soil bearing capacity or geological phenomena's that effect foundations it's bound to fail, therefore foundations must be

designed to take into considerations the factors mentioned above, also construction of foundations must follow construction details given by the engineer.

THE ROLE OF THE ARCHITECT IN PREVENTING BUILDING FAILURES

Architects, of course, will never fully eliminate the possibility of a failure on their projects, but designers can focus on activities within their control to minimize their risk of liability for failure. The recommendations below are intuitively obvious, but they are easy to overlook in the face of tight submittal deadlines, the pressures of designing quickly and on computers and with limited budgets. These are essentially reminders of good practice habits.

PRACTICE

CONSULTANTS

Architect should avoid confusion among the different parties involved by taking a leadership role in coordinating design documents and submittals with consultants. Reviews of submittals and drawings practically guarantee problems. Assign complicated designs details to experienced designers instead of quarks. Minimize the use of addenda to submittals, which make projects more difficult to manage. Consultants are to have evidence of being registered and must have participated in various successful projects before commissioning them into project.

CONTRACTORS

Some contractor accepts commissions of job of which the scope is beyond their capability in terms of experience and use of necessary construction equipment. Therefore the likely hood of performance is threatened. The client and the consultants must always choose the qualified contractor for any given project to achieve safety and avoid risk in construction projects. Also qualified contractors will carry out work in accordance to drawing and contract documents while some will cut corners and cheat on the job it is necessary that the consultants monitor contracts properly. The contractor must also have good management skills in contract administrations because this may pose threat to the realization of the project.

COST

Be realistic about the limitations imposed by the budget and resist the temptation to get too much out of a little.

EXPERIENCE

Learn from past experience and similar projects seek input from the client, the design community and other building owners as to challenges of the project type.

LIFE SPAN

Be realistic with owners in assessing how long the building and its material will last.

RISK

Make certain clients understand innovative technologies and materials, how they are used, and risks involved in their use. Allocate appropriate resources for research and use new products judiciously. Be sure that contractors on site are able to install them properly.

MATERIALS

Make sure incompatible metals and other materials are not combined causing interactions such as differing rates of expansion and contraction between components to avoid incompatibilities between project features such as doors and walls, mechanical features, landscaping elevations, and other elements.

MAINTENANCE

The architect should visit finished projects time to time to make sure the clients carry out routine maintenance on the building to avoid failures and report any fault appropriately to the owners of the building.

EDUCATION

The architect must educate the client on the project extensively because some clients can be a source of risk because of their difficulties and poor knowledge in building design and construction, this is an important point the architect should note before construction begins

CONCLUSIONS

An architect's job aside from designing beautiful buildings is to protect the health, safety and welfare of the building and its occupants, therefore care and attention must be given to the above highlighted points in subject heading 5.0 in this write up in other to produce safer buildings and environments. Also a deeper consciousness of human and social responsibilities by professionals in the building industry could lead to construction of safer buildings.

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