IDENTIFICATION, CAUSES AND PREVENTION OF COLLAPSE OF BUILDINGS

BY

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1.0 INTRODUCTION

- The occurrence of building collapse in our cities especially Lagos is worrisome.
- The type of buildings collapsing is another issue that is unique to our dear country.
- Various reports inundate our newspapers that one can nearly predict when the next collapse in likely to happen.
- Saturday Nov. 7, 2015, two buildings collapsed on the same street in Lagos and four children of the same family perished.
- SCOAN collapse claimed 116lives, most are foreigners.
- No succour or compensation to victims/families only pity and write ups in the papers.
- For how long shall we continue to kill ourselves in the absence of wars and natural disasters?

2.0 OBJECTIVES AND INGREDIENTS OF SAFE BUILDING DESIGN

- The central objective of a designer of a building structure is **safety and economy.**
- To achieve this, the following are required:
  - A professionally qualified designer
  - Quality materials and quality control and
  - Good construction methodology
- A qualified designer, according to Prof Nwokoye is "***an engineer who having obtained the prescribed academic standard in the field of structural engineering or cognate fields and who having reached professional maturity in the practice of structural engineering is recognized as such by the Regulating Professional body or bodies***"

2.0 Cont'd

- A civil engr is not necessarily a structural engineer unless he is:
  - So registered by COREN or
  - Registered by COREN as a civil engr and has MNIStructE or is practicing structural engineering.
- In most cases there are no problems with cement and other concrete materials but iron rods are most often than not they undersized and not up to the standard in terms of strength.
- Water cement ratio and water quality is an issue to be seriously considered because they affect concrete strength.
- Quality control is important too.


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3.0 PRECAUTIONS AGAINST COLLAPSE OF BUILDINGS

- To avoid building collapse the following precautions should be taken:
- Soil Tests: This is a must done except the soil is very firm (good lateritic or gravely lateritic) and the storey not exceeding two (that is, ground and first floors).
  - for confirmation of bearing capacity, ground water level, settlement rates, bearing strata and soil properties.
- Appropriate loading should be assigned depending on the usage of the building.
- Construction methodology should be appropriate and good quality control measures put in place.

3.0 Cont'd

- The use of a qualified structural engineer for both the design and supervision cannot be over emphasized.
- Designs are generally based on assumptions and the designer need to carry the assumptions through.
- Fees payable for the services are very insignificant compare to the loss of lives and properties for doing otherwise.

4.0 FAILURE MODES

- Four common failure modes can be identified:
- **Punching failure**: Due to inadequate pad thickness in a framed structure, the column punches through the base and the sinking may lead to collapse.
- **Bearing Failure**: In this case the base is not wide enough, the building continue to sink until the stratum that can withstand the imposed load is reached.
- **Flexural failure**: This is perhaps the most common where the collapse occurs suddenly due to inadequate sizing of members.
- **Falsework failure**: This is the failure of the props supporting the wet concrete.

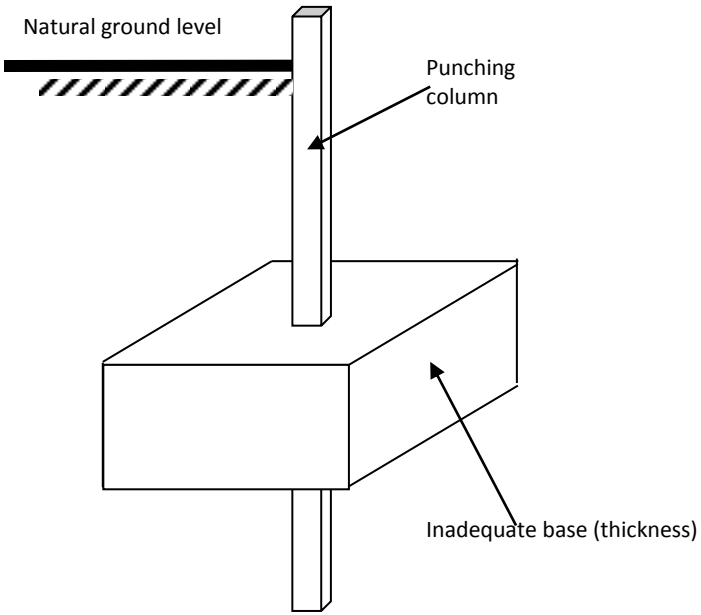


Figure 4.1

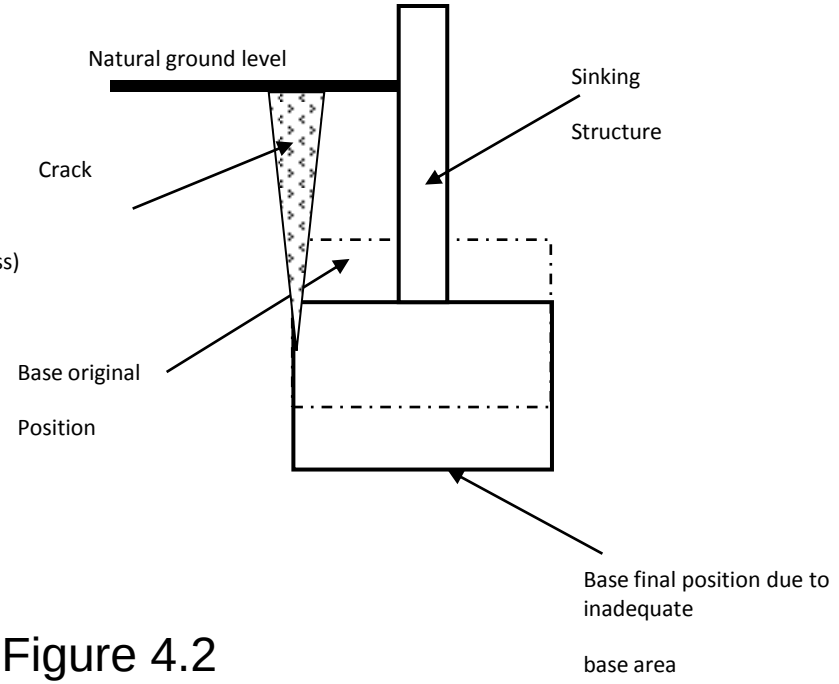
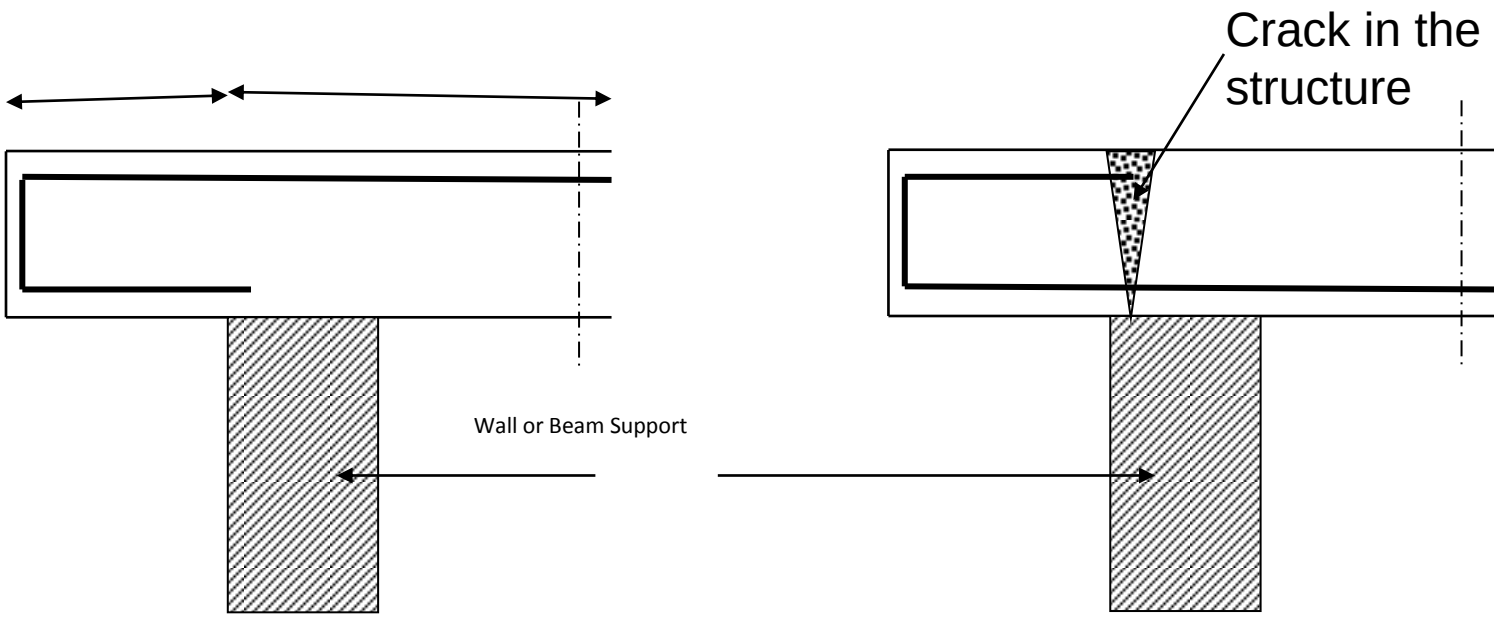
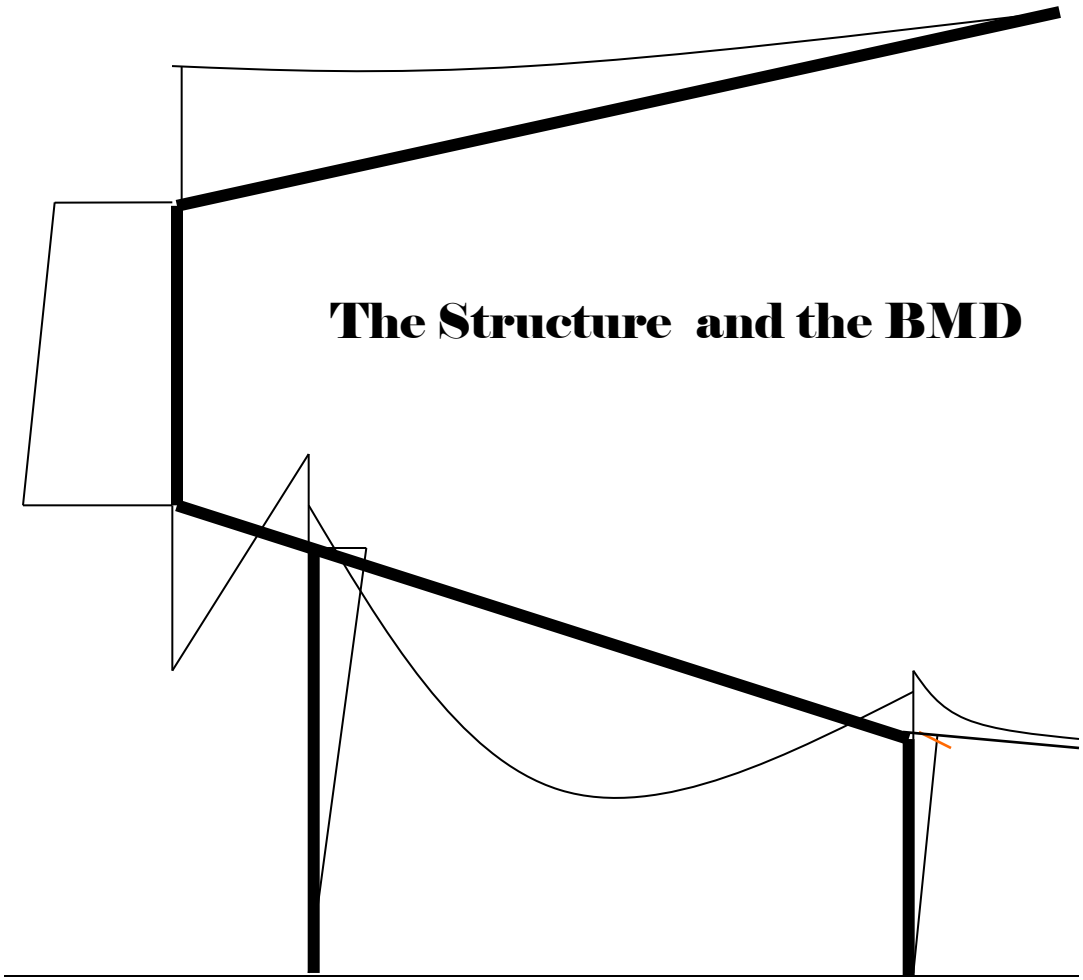


Figure 4.2

Figure 4.3: A Cantilevered Slab



Good Detailing ***Bad Detailing***


The Structure and the BMD

5.0 CAUSES OF BUILDING COLLAPSE

Causes of building collapse can be man made or due to natural causes which we may not be able to control but that of man made is controllable and includes:

- Deficient design and drawings
- Lack of supervision and monitoring
- Alterations to existing buildings
- Alterations of drawings for construction including additional floors.
- Client's penchant to cut corners
- Use of sub-standard materials
- Activities of quacks.

6.0 PREVENTION/CONCLUSION

- Design should be handled by qualified structural engineer.
- A structural engineer must pass the professional practice examinations as set up by the Institution.
- A structural engineer must know his limitations and associate with others for peer reviews.
- Artisans and craftsmen should be supervised properly.
- Fees for professionals should be the list consideration of any client.
- Building within a flood plain should be at the instance advice of the structural engineer.

6.0 Cont'd

- Conversion of a building to another use should be at the instance of the structural engineer's instructions and based on the as-built drawings.
- There are lessons to be learnt from any structural failure and should be panacea against future occurrence. COREN/CORBON should coordinate investigations of building collapse.
- Contractors should handle projects within their capacity.
- Buildings should be re-classified, Stadia and Tall buildings are massive engineering projects – see Regulation of Construction Industry, April, 2016..
- Nigerian universities should allow practicing professionals to handle practical oriented courses.

THANK YOU FOR

YOUR ATTENTION