

ANALYSIS OF DEFECTS IN AN INSTITUTIONAL BUILDING INFRASTRUCTURE

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ABSTRACT

Defects occur in various forms and to different extents in all types of buildings, irrespective of age. The followings all contribute to the occurrence of defects in buildings: The large varieties of building materials used that may not be well congruent with one another;

- *Construction techniques that may not be defect proof, inconsistent or sub-standard workmanship;*
- *Use of unsuitable construction details;*
- *Extreme site conditions undermining performance standards;*
- *Natural deterioration;*
- *Attacks by pollutants; and*
- *Improper uses of the completed buildings.*

In this report, we have described about the defects, types of defects, reasons of defects, solution for repairing, in the infrastructure of an institutional building. We have done survey for almost 15 days of whole university campus which includes Administration department, main academic building (ground floor, first floor, second floor, third floor, stairs), hostel building (main structure, mess, gym) and guest house. We have found many defects in the campus which includes cracks (vertical cracks, horizontal cracks, diagonal cracks, cracks due to load, cracks due to thermal expansion, cracks due to foundation defects, cracks due to improper masonry walls), plaster defects, paint defect, tiles defect, edges defects, door and window defects, ceiling defects, flooring defects, scratches, seepage defects, ventilation defects, holes defects etc. We have prepared this report for determining the condition of the university campus. There are many solutions have been provided for the better maintenance of the campus.

Keywords: Types Of Defects, Reasons Of Defects, Solution For Repairing, CRACKFILLER, Etc.

I. INTRODUCTION

Building defect occurs to either the new building or the old ones. Defect within new buildings is maybe of non-compliance with Building Code and published acceptable tolerances and standards. Meanwhile the older buildings,

or building out of warranty period, may not comply with these standards but must be judged against the standard at the time of construction or refurbishment.

A building defect may also include damage caused by land movement or earth settlement. Proving a building defect commonly requires the hiring and testimony of a highly trained and experienced expert. An expert, such as an engineer or an architect, is the one who will be able to determine the construction problem due to the improper design, material and workmanship.

II CATEGORY OF DEFECTS

1. Structural defects

Structural defect means any defect in a structural element of a building that is attributable to defective design, defective or faulty workmanship or defective material and sometimes a combination of these. Building structure includes earth retaining walls, columns, beams and flat slabs. (Northern Territory Consolidated Regulation) According to the Engineering Encyclopedia, structural defect can be categorized as cracks in foundations (Substructure), cracks in floor or slabs (superstructure), and cracks in walls (superstructure). These defects can be caused by improper soil analysis, inappropriate site selection, and the use of defective materials. Most of the structural problem can be avoided by implying the exact and detail of the design and planning. Structural defects in a building can occur over time due to deterioration, wear and tear, overloading, and poor maintenance. They must be repaired to maintain the building's structure and to prevent any further failures. Regular inspection is the key to protecting the 'health' of a building's structure. Structural defect that always occurs are steel corrosion, cracks, and deflection.

2. Non -structural defects

According to Northern Territory Consolidated Regulation, a non-structural defect in a residential building is described as a defect in a non-structural element of the building as a result of defective residential building work. According to the Engineering Encyclopedia, non-structural defect includes defect in brick work, dampness in old structures, and defects in plaster works.

III DEFECTS IN BUILDING

1. **Cracks**– due to load, due to thermal expansion, due to overload, due to heavy construction material load, due to foundation defects, due to improper masonry wall, due to seepage.

2. **Plaster defects**- due to seepage, due to improper maintenance, due to atmospheric conditions, due to bad material.

3. **Ceiling defect**- due to improper foundation, wooden ceiling, due to load.

4. **Doors & Windows**- due to improper maintenance, due to unsocial elements, due to sealing.

5. **Flooring defects**- due to improper maintenance, due to condition of soil.

6. *Edges defects*- due to improper maintenance.
7. *Ventilation window defect*- due to improper maintenance.
8. *Seepage defects*- due to improper curing.
9. *Paint defects*- due to seepage, due to improper maintenance.
10. *Holes in the walls*- due to improper maintenance.

IV OBJECTIVE

Its aim to determine the defects in the university campus and repair those cracks with different types of solutions provided. Most of the defects have been occurred due to improper maintenance of the infrastructure of the institute. The main defect in the campus is crack which is not a tolerable defect and it should be repaired as soon as possible. In this paper, we have provided different type of solutions to repair cracks and other defects which are studied carefully by us. We have prepared this report under guidance of our faculty and consulted with different knowledgeable person related to this field. The second main defect which is found in the buildings is seepage through walls, it decreases the strength of the walls and the lifetime of the building.

V METHODOLOGY

5.1 CRACKFILLER

We, all the three students researched about an agent which is called “CRACKFILLER”. We used that agent in our work for repairing cracks of plaster and in concrete. We got very satisfied results by using this agent and we have prepared an estimation of the Career Point University’s infrastructure’s defects.

Product Details:

| | |
|-----------------|---------------------------------------|
| Type of crack | Plaster, cracks in walls and concrete |
| Application | Walls, corners, columns, roof |
| State of matter | Paste |

5.2 Details of CRACKFILLER

Description:

Crack filler is a specially formulated polymer modified repair mortar designed to fully meet the requirement of effectively filling cracks in plasters and in concrete, avoiding the use of costly sealants. Crack filler is a dry powder when mixed with water it forms a creamy consistency paste which is ready for use in filling cracks and repairing plasters.

Primary uses:

- Crack filler is ideally suited for filling up of superficial plaster cracks as well as structural cracks.

- Crack filler can be used for repairing ceiling cracks and plasters with ease because of its viscosity.
- Cracks arising due to plasters cracking at junctions of wall and column or brick work and soffit of beam can be effectively sealed.
- Cracks at parapet wall junction and roof slabs are also sealed with Crack filler.

Advantages:

Crack filler replaces costly sealant and putties. It is non-shrink, hence possibility of shrinkage cracks are nonexistent. It has high tensile strength and good adhesion property. The finish achieved is sufficiently smooth. Good resistance to freeze / thaw cycles, carbonation and attack by chlorides. Conventional curing is not required.

Composition:

Crack filler is available in two grades, namely grey and off white to suit the surrounding surface color and texture. The product is a blend of special cements, special additives and selected grades fine aggregates along with alkali resistant glass fibers. The product when mixed with water in the proportion of 3.5 Volume of powder to one volume of water results in a workable paste which can be troweled to a fine finish.

5.3 Directions for use

Preparation:

It is essential that the surface of the concrete to be repaired is sound, clean and uncontaminated. Chase the crack and form a neat “V” shaped groove at least 6mm wide on surface. Damaged plasters can be cut out in more or less square sides. Defective material must be removed carefully using reducing tools, needle guns or sharp tools and chipping hammers. Force must not be applied as it will damage the sound material beneath.

Curing:

Curing is not required for this compound. It can be hardened without curing.

Subsequent Finish:

Crack filler is suitable for all subsequent decorative finishes and painting. The finish obtained by Crack filler is far smoother than conventional plasters.

Properties:

| | |
|-----------------------|---|
| Form | Free Flowing light grey/off white powder. |
| Bulk density | 1600 kg/m ³ |
| Application thickness | 1 mm to 20 mm |
| Pot life | 300- 360 minutes at 25° C |

VI EXPERIMENT

OBJECTIVE-: To repair a crack with an agent which is called “CRACKFILLER”.

EQUIPMENTS-

1. Crack filler agent
2. Water
3. Blades for filling
4. Mixing container
5. Cutting Machine
6. Rag mark for finishing

PROCEDURE

1. As to repair a crack with a nominal length, width & depth, we are using a crack repair agent named CRACKFILLER.
2. First we have to observe the crack's length, width & depth and Crack is a structural or a non-structural crack. After that we start to repair the crack.
3. With a grinding or cutting machine, we cut the nearby area of the crack with a certain depth.
4. We mix the crack filler agent with the quantity of 1 kg. with 500 ml. of water. We mix well and keep it for 15- 20 minutes. We can also use it after mixing.
5. Now we put some water on the area of the crack for removal of extra dust and particles.
6. Now we take blades for filling and fill the paste in the area of the crack as we do putty on walls.
7. Now it is leaved to be dry for an hour or more.
8. After getting dry, we use rag mark to finish the extra material of that area for a smoother wall.
9. It doesn't need any curing.
10. It is very fast, simple and economical.

PROPERTIES OF CRACKFILLER-

After our observation and experiment we can use **17 kg. crack filler to repair 85 cracks of length of 1 meter** with a certain depth and width.

Price of crack filler-

- 1 kg.- 200 Rs.
- 10 kg.- 1750 Rs.
- 20 kg.- 3400 Rs.

Working duration-A skilled labour can repair 40-50 cracks in a day.

Cost- for a nominal crack of

Length- 40 inches, width- 2-2.5 inches, depth- 2 inches

Quantity of crack filler- 0.2 kg or 200 gms- 40- 50 Rs.

Machinery and labor- 20- 25 Rs.

Total cost to repair a crack- 60- 70 Rs.

VII SUMMARY

For the Study the Defects in an institutional building, we have studied almost all types of defects which includes cracks, dampness, plaster defects, flooring defects, ceiling defects, doors and windows, painting defects etc. We found that the main defects which is present in the infrastructure is CRACK. We researched about cracks, in which we found structural and non-structural cracks, minor and major cracks, horizontal and vertical cracks etc. We found almost above 1500 defects in the university's infrastructure. We have prepared an estimate to repair of defects for this project. We prepared a large Microsoft office excel sheet in which all types of defects have been included.

VIII CONCLUSION

In conclusion, there are six common building defects found in infrastructure which includes dampness, loose of plastering, nonstructural cracks damaged doors and windows damage of ceiling, improper maintenance of washroom and blistering of paintwork. The condition of infrastructure is in poor condition due to many building defects which diminishing the beauty and appearance.

The main defect found is nonstructural cracks which do not endangered safety of a building but creating a feeling of instability.

IX. FUTURE SCOPE OF THE RESEARCH

As we have completed our research project of defects, we know that mostly defects are non-structural defects which are caused by the weather or by people activity. So, from this research report, we can know about the condition of any infrastructure. We can prevent our measures and construction. We can use precautions at the time of construction. If we want to use any type of admixture, any compound, any agent of waterproofing or crack removal, we can use at that time. We can prevent the defects which can be occurred in the future.

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