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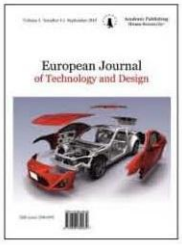

General Building Defects: Causes, Symptoms and Remedial Work

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Abstract. Building defect is one of the major components of building problems that significantly needed attention. When a building fails to function as it should, we must immediately seek for the determination. Is the problem taking place as the result of the worker's failure to assemble it properly? Is it involving the nature of it? Is the proper maintenance of the building not been performed as it should have been? The answers often depend upon a number of factors: the age of the affected building components, the exact nature of the problem, the presence or absence of human error, or some combination of all those three. This paper will review and discuss some of the major building defects happen throughout the world. It contains some of the main concepts and the definition of the terminological terms used. In addition, the causes, symptoms and remedial work of defect also been discussed in this paper.

Keywords: building defects, dampness, erosion, building, peeling paint, failure.

1. 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. (David Hall)

Defects and deterioration are common problems in any built structures. However, various defects are more common in an old structure (Ransom, 1981). As in BS 3811 (Code of Practice, British Standard 1984) defects are defined as the deterioration of building features and services to unsatisfactory quality levels of requirement of the users.

According to California Civil Code 896, common types of building defects include: structural defects resulting in cracks or collapse; defective or faulty electrical wiring or lighting, defective or faulty plumbing, inadequate drainage systems, faulty ventilation, cooling or heating systems, insufficient insulation or sound proofing, and also inadequate fire protection suppression systems. Plus, dry rot, wood rot, mold, fungus, or termite or vermin infestation may also be the result of a building defect.

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 involved due to the result of improper design, material, or workmanship.

2. Category of Building Defects

The defect can be divided into two categories, which are:

a) **Structural defect**

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 any 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.

b) **Non-structural defect**

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.

3. Common Building Defects

In general, there have several building defects which usually occur to building parts such as roofs, walls, floors, ceiling, toilets, doors and windows. (Tan Wei Cheun, 2008). Building difficulty and defect that are regularly found will be discussed in the following section which consists of wall crack, peeling paint, dampness, timber decay, fungi and small plant attack, sagging or deformation, erosion of mortar joint, defective plaster rendering, insect or termite attack, roof defect, and also unstable foundation, and services.

3.1 Crack on walls

It is the nature of many construction materials to crack as they age and as they expand and contract, particularly with exposure to moisture as they get wet and dry out alternately. There are cracks in common areas, such as exterior walls, interior walls at corners of doors and windows, and ceilings (usually in the middle). Crack defect have classified of visible damage to walls. There is having different state in category of damage, and degree of damage. Refer (Table 1)

Table 1: Classification of Visible Damage to Walls

Category of Damage	Degree of Damage	Description of Typical Damage	Approximate Crack Width (mm)
0	Negligible	Hairline crack of less than about 0.1 mm widths are classed as negligible. No actions required.	Up to 0.1
1	Very Slight	Fine cracks which can be easily treated during normal decoration. Damage generally restricted to internal wall finishes, crack rarely visible in external brickwork.	Up to 1

2	Slight	Crack easily filled. Recurrent crack can be masked by suitable linings. Cracks on not necessarily visible externally, some external reappointing may be required to ensure weather tightness. Doors and windows may slight and require easing and adjusting.	Up to 5
3	Moderate	Crack which required some opening up and can be patched by a mason. Repointing of external brickwork and possibly small amount of brickwork to be replaced. Doors and windows sticking. Service pipes may fracture. Weather tightness often impaired.	5 to 15 (or several of 3mm)
4	Severe	Extensive damage which required breaking-out and replacing sections of walls, especially over doors and windows. Windows and doors frame distorted, floor sloping noticeably. Wall leaning or bulging noticeable, some loss of bearing in beams. Service pipes disrupted.	15 to 25 But also depend on number of crack
5	Very Severe	Structural damage which requires a major repair job involving partial or complete rebuilding. Beams lose bearing, wall lean badly and require shoring. Windows broken with distortion. Danger of instability.	Usually greater than 25 but depends on number of crack

Source: *Defect in Building, 2003*

According to the construction, the occurrence of wall crack is because they are overloaded or because the structure has settled or heaved. Vertical and angled crack are usually caused by settlement or heaving. Nevertheless, for horizontal crack are more likely to be caused by lateral pressure. There are varieties types of vertical crack such as:

a) Vertical crack away from corners

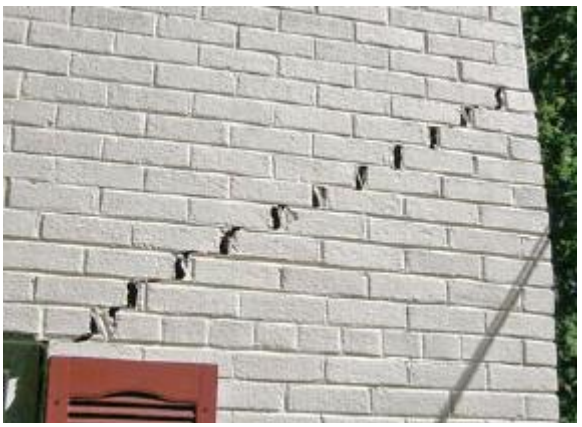

Figure 1: Foundation wall cracks

The crack is running along between the foundation and the top of the building. Cracks are usually the widest at the top of the building diminishing to a hairline crack at or near the foundation level (Figure 1). They may run through the foundation or they may only start above first floor opening. It is obviously detected in each of the opposite elevations of the building, will be a

single crack, and may be connected by a crack in a concrete floor or a flat roof. Besides that, the roof finishes of the pitched roof may be stretched or pulled apart. Diagonal cracks may also be associated with the defect.

b) At the centre of panel

Cracks occur near to centre of a panel of cavity brickwork (Figure 2). The crack is the widest at the bottom and may narrow to a hairline crack at the top (especially where the brickwork does not reach the top of the panel). The phenomenon usually occurs where panels of brickwork are set between columns, especially if they are of in-situ reinforced concrete.

Figure 2: Cracks at the centre of panel

c) Between bay window corners

Cracking at sides of bay windows (Figure 3). In either is the masonry or timber stud construction. It may become quite wide ranging in 5 – 15mm.

Figure 3: Crack between bay window corners

In the early life of cracking of the building may be inevitable. Cracks result from drying out or taking up of moisture or from the initial drying out of material that cannot be avoided. Cracks also is often exaggerated, it means a natural reaction of the owner or occupiers of the building. Besides that, cracks may be an indication of instability of the structure, even though it is taken seriously, it will have little or no effect on stability or other aspect of building performance apart from appearance.

Thermal expansion also is the causes in these cases where it actually is not the true main cause. Whichever origin of the crack will be, a convenient observation point will be provided. It is easy to observe changes in size where a crack opens and closes, whereas changes in the overall dimension of a wall can be measured only by using special equipment.

Besides that, slight movement also can cause cracking to large building. However, the occurrence has nothing to do to small building. The result is shown where the large concrete roof

slabs disrupts the perimeter parapet as it expands and contract in response to temperature variations. A temporary load or lack of support also may also be result to cracks. There is no evidence detected when the causes of cracking are being investigated. Cracks also have subjected influence. Maybe it is not described above, but it can probably happen if they give less maintenance or awareness.

3.2 Peeling paint

Figure 4: Peeling Paint

Peeling usually occurs on building facades, mainly on plastered walls, columns and other areas which are exposed to excessive rain and great dampness (Figure 4). Some buildings that are located near the sea may face a much higher risk once the signs of peeling paint are visible on the exterior walls. (Md. Kasim N.D, 2009)

Peeling paint is always the result of poor surface preparation. The majority of peeling paint problems occurs on surfaces exposed to the rain, sun, and the variation degree of temperature. Walls that have involved can be an unsightly mess in a home or building. It may result in embarrassment and frustration to the homeowner. If paint peels from an interior wall, the reason for the peeling paint is mostly often due to an improper preparation of the surface before painting. Apart from that, the moisture surrounding the wall also seeps in through from the wall to the paint surface. Thus, in order to repair and restore, repainting the wall that had peeling paint on it can be made as to make it attractive again. According to Midway Industrial Supply, peeling paint is simply other types of flaking where the amount of paint film remove is greater. Flaking is the lifting of small-to-large sections of the paint and is due to poor adhesion and to the brittleness of the paint.

It happens when new plastered or skimmed walls or ceiling are not given enough time to completely dry before painting. The temptation is to start painting as soon as the plasterer has left the building but plaster takes longer to completely dry. The heating on full blast to try to speed up the drying process also result to peeling paint. This is because the sudden rise in temperature can cause different problems.

Another reasons that peeling paint occurs is that when the initial coat of paint on the new plaster is bog standard silk applied undiluted directly to the plaster. For the bathroom ceiling cases, it has been freshly painted on the new plaster which has never had a chance to dry. This is because the bathroom is in constant use and then the shower is being used before the paint is completely dry.

3.3 Rising Dampness

Figure 5: Rising dampness problem

Dampness is generally defined as unwanted and excessive water or moisture. The existing of dampness in building is one of the most damaging failures that really must be taken care of. It can cause damage in brickwork by saturating them, decaying and breaking up of mortar joints, rotting in the timber structures, defecting by the corrosion of iron and steel materials and also destroying the equipment in the building. Dampness in walls has been taken in consideration in recent years. If even the level of dampness is low, the value of the building can be highly affected.

According to Belgrade Charter (1975), dampness can be a serious matter, particularly to the building located near water sources. Somehow, the water can enter the building bit by bit through different routes resulting in dampness. Furthermore, prevailing wet wind and rain will due to water penetrations that occur through walls.

Dampness also occur when water penetrate through capillaries or cracks between mortar joints, and bricks or blocks before building up trap moisture behind hard renders. Moreover, contribution of dampness is due to the existence of gravity. The other factor such as leaking gutters or down pipes, defective drains, burst plumbing, and condensation due to inadequate ventilation also can be the factors yielding to dampness occurrence. Dampness in building originated from a number of sources such as:

a) Rain

Precipitation can be wind driven that it penetrates joints that remain watertight in normal weather condition. The gutter overflow also can collect and be the aspects of dampness against walls.

b) **Condensation**

Humid air condensation on cooler surface or within, or between, building materials also can result to dampness. Air can become humid in several ways, including from the occupants' water vapours.

c) **Rising damp and flooding**

It may be contract with groundwater or floodwater. It also the groundwater may be absorbed by the walls and transported up the wall by capillary action.

d) **Services leaks**

It may not just from pipes and tanks, but also the overflowing of condensation forming together with ventilation systems.

e) **Construction process**

The construction process too can play its role in this scenario. It is where the process of mixing water to form mixtures that dry out for the construction purpose before the building is functioned, but sometimes by retaining moisture (sealed in by impermeable finishes) that shows and causes problems in the completed building.

f) **Use of the building**

This may includes the cleaning of the building, spills, and apparatus leaking.

g) **Moisture in the air**

It is in contrast with condensation. Hygroscopic salts can extract moisture from the air in condition that would not allow that moisture to undergo the process of condensation.

Dampness comes and goes according with the change of condition. Dampness also may leave stains or traces of mould and lichens and also in certain cases, mosses.

3.4 Timber decay

Figure 6: Brown rot Decay

Figure 7: Timber decay of Flat roof

Timber defect are classified into two major groups, non-biological and biological deteriorations. Non-biological deterioration consists of physical decay, excessive moisture content, dimensional instability and chemical deterioration. These defects are mainly caused by the timber in service being subjected to environmental exposure. The most common and destructive timber biological deterioration is those due to dry rot, wet rot as well as insect attraction. (N.H. Ishak)

Typically timber decay may occur at roof timber, floor timber and joinery timber such as door frame or window frame (Figure 6 and Figure 7). This defect results whether woodworm infestation is active or there is evidence of decay such as wet rot and dry rot. Dry rot also can be destructive and spread considerable distance within an effected building or home. It is essential that the cause and full extent of the attack is established. Besides that, timber decay in building or home will only occur if the timber becomes sufficiently wet.

According to Exposure Surveying LTD, timber part of a building will display differing levels of moisture content. Apart from that, it is indicated that wood rooting fungi will not affect the timber with moisture content below 22% and wood boring beetles will not be successful in timber with moisture content below 12%. This reading will change depending on the number of years.

According to Taylor (2000), timber is durable material and would last indefinitely as it does not deteriorate spontaneously. Magnificently, atmospheric condition such as rain, frost and acids that would normally affect other materials, however only has little effect on timber. It will deteriorate if attracted by certain of external forces.

Timber is also subjected to biological deterioration caused by living organisms such as insect infestation, fugal decay and marine borers. On the other hand, it is highly reliant on combination of a suitable temperature, moisture, oxygen, and cellulose in timber. (Richardson, 2001). Generally, the most common causes of timber decay are as follows:

a) Design

Usually proven in many older buildings, structural timbers are embedded into external walls and encased into solid floor, which are being the common causes of timber decay.

b) **Alterations**

This is regularly seen when sand and cement rendering has been applied to the exterior of the building, trapping moisture and elevating the moisture content of timber window lintels and embedded joints, leading to their decaying.

c) **Maintenance**

Blocked gutters, missing roof tiles and leaking pipes will all channel the water to ingress into the fabric of the building, which will then affect timber to decay if the problems are not noticed and restored soon enough.

d) **Wood boring insect**

It is a fact to know that old building or home will somehow, have evidences of some form of beetle activity, which will mostly be historic and will have died out years ago.

Timber that is used in the building during construction may have high sapwood (high in nutrients) content and have been susceptible to beetle infestation. However, as the sapwood has been depleted and the moisture levels within the timber remain stable, the beetle infestation will

die out. The beetle will only infest the heartwood section of the converted timber if it has been modified by fungal decay.

e) **Fungal decay**

Fungal decay occurs when higher level of moisture that consequently leads to the development of beetle infestation. It can be separated into two groups, white and brown rots. White rots have a bleached, fibrous appearance and substantial loss in weight is evident in the timber. It happened when there is high moisture content on timbers that are already decayed by brown rots. Brown rots are synonymous with the darkening of the timber, cubical cracks and are mainly found in softwood.

3.5 Insect or termite attacks

Termites are small, pale to brownish black in color, insect that capable of feeding on mostly anything including timber. The timber is easily deteriorated if exposed to water penetration, high moisture content and loading beyond its capacity as this greedy and colony-living insect is easily attracted to it. Insect or termite attacks pose a threat to damp and digestible timber found in wall plates, the feet of rafter, bearing ends of beams and trusses. Affected timber can be treated by pressure-spraying with insecticide or fumigant insecticidal process. (A Ghafar Ahamd)

Subterranean termites or underground termites are the most destructive insect pests of wood. The activity of them is often not readily noticed because it is hidden behind wallboards, sliding or wood trim. Basically, foraging of termites by dead trees and brush provides a natural food source. When natural vegetation is cleared and houses are built, termites often switch to feeding on wooden structures. Next, they will continue to enter the building through wood that is direct contact with the soil and by building shelter tubes over or through the cracks found in the foundation. Infestation of termites can do damage to any cellulose-based material in direct contact with the soil. (Roger E. Gold)

Most of timbers that are commonly affected by termites are plywood, meranti, and selangan batu and also belian (ironwood). Any building that touches the soil and from tree branches will be attacked by termites. Besides that, dead wood, tree stumps and nearness to forest areas also increase the likelihood of the attack. To avoid this, the forest must be cleared for building, and the dead wood should be removed and are not left to rot under the residence. On top of that, the beams also should be supported on old stumps. (Lipa A, 2001)

Termites will survive as long as the situation or environments meet their chance of survival. They can spread easily in a blink of an eye into larger area and build their nest there, in the building or property. The requirements in their chance of surviving are;

a) Moisture

Termites will survive in moist environment. This is because they do not have hard body cover and may easily lose moisture from their body. Thus, consistently humid environment is well suited for them. The sources of moist are from leakage of water pipe, roof system and other source of water habitat such as pool, lake, or pond.

b) **Source of food**

Any surrounding area that has dead wood is probably foraged by the termites. Any building structure material that is made from wood or timber will be easily targeted by them if it is wet and moist.

c) **Dark, and Low Light Intensity**

If the building has a very low tolerance to light, it will to provide a well habitat for immature grow of termites.

d) **Minimal flow of air**

Minimal flow of air or low ventilation in building due to humidity in certain area which can lead to higher chance of survival of community of termites.

3.6 Fungi and Small Plant Attack

Figure 8: Fungi on eternal wall

Figure 9: Fungi on internal wall

Mold and fungi are found everywhere either both indoors and outdoors all the year round (Figure 8 and Figure 9). The terms fungi and mold are often used interchangeably, but mold is actually a type of fungi. Concerning about indoor exposure to mold has increased along with public awareness that exposure to mold can cause a variety of adverse health effects. There are many thousands of species of mold and most, if not all of the mold found indoors comes from outdoor sources. It seems likely to grow and become bigger threat only when there is water damage, high humidity, or dampness.

Mold is addressed in specific standards for the general industry, shipyard employment, and the construction industry. Molds live in the soil, on plants, and on dead or decaying matters. Outdoors, molds play as a key role in the breakdown of leaves, wood, and other plant debris. Molds belong to the kingdom of Fungi, and unlike plants, they are lack in chlorophyll and must survive by digesting plant materials, and consequently inverting them and other organic materials as food. Without molds, our environment would be overwhelmed with large amounts of dead plant matter.

Molds produce tiny spores to reproduce, just as same as those plants that produce seeds. These mold spores can be found in both indoor and outdoor air, and settled on both of the surfaces. When mold spores land on a damp spot, they may begin growing and digesting whatever they are growing on in order to survive. Since molds gradually destroy the things they grow on, you can prevent damage to building materials and furnishings and save money by eliminating their growth.

Molds produce and release millions of spores small enough to be in the air, water, or insect borne. They can also produce toxic agents known as mycotoxins. Spores and mycotoxins can have negative effects on human health.

The moisture of wall occurs due to many causes. There are water leakages, drain block, roof leakage and so on. In addition, improper material also was used for the building. Other causes of moisture due to DPC that is not installed correctly for the particular building. Instead of the moisture, the high level of humidity around the building also being affected due to abundant growth of trees and insufficient direct sunlight. Moreover, spores of mold from trees can be spread to the building by the assist of air, water and insect borne. Molds are found everywhere inside and outside, and can grow on almost any substances when moisture presents. Molds reproduce by spores, which can be carried by air current. When these spores land on a moist surface that is suitable for life, they begin to grow. There are three common causes of mold

a) Water leakage

Water leakage will happen by the plumbing that is not installed properly. Some time water leakage also comes from the toilet. Besides that, the gutter of roof also can cause the mold that will attach itself to the wall.

b) **Moisture**

Moisture of the wall can cause the faster growth of the mold. The moisture is affected due to the improper material that was used for this environment where this building receives less of sunlight.

c) **Humidity**

Higher humidity can cause the growth of mold faster. Plus, the residence was surrounded by abundant of big trees and reduces of direct sunlight through the building. Thus the degree of humidity around the building is high.

3.7 Defective plaster rendering

Plaster or render is like mortar coating over the block work. The coating on the inside walls called plaster, then the coating outside the walls called render. Plaster and render is totaling different. The render is generally richer and mostly in cement than the plaster due to weather resistant.

The both of plaster and renders have different function. The plaster insides the walls to make the walls smooth, easy to clean, avoid from insect, and for better appearance. Apart from that, the plasters act as a protection against fire. The other functions are breathable for walls, abrasion resistant, and suitable for decorating or covering with coating, wallpaper and tiles. For the renders, is provided to protect them from the influences of weather.

Mostly the defective plaster rendering occurs on the external walls, column and ceiling. Defective rendering are normally caused by biological attacks arising from penetrating rain, evaporation, condensation, air pollution, dehydration and thermal stress. The mould or harmful growth, insect, animals, and traffic vibration also will contribution causes of defective plaster rendering. Prior to being decomposed and broken apart, rendering may crack due to either shrinkage or movement in the substrate. (A Ghafar Ahmad). Types of defective plaster rendering

a) Cracking in Plastering

This is because of breaking away the section of the plaster. Penetration of rain to the external surface of structural, have allowing admittance of rain to the back of the intact plaster coat. So, any weakness in the bond between plaster and background or between renders coats will make the further defect.

b) Holes in Plaster wall

Holes usually occur because of user or human made such as hanging family picture, shelves or other decorative item to the wall. the is easily to be filled in with a tad of sparkling compound.

c) Plaster falling off from ceiling

Often the vibration of people going up and down by the stair for many years is cause to plaster falling off from ceiling. The vibration will travel through the plaster and cause hairlines cracks between the wooh lath, and plaster.

d) Shrinkage Cracking

When strong mixes of render are used on weak or bad prepared background have due to shrinkage cracking. if the crack only in the topcoat, it caused the excessive cement in the finish coat or excessive thickness or if the renders is too wet.

Causes of defective of plaster rendering as follows:

1. Loss of bond between coats

It means inadequate key or mineral bond, rapid loss of moisture to undercoat, swelling of clay materials in unwashed sand, a stronger outer coat, inappropriate paint and finish used.

2. Surface cracking

High strength plaster on a weak background, clay contaminated sand and structural movement will due to surface cracking. Normally, happen when drying shrinkage on surface.

3. Friable powdery surfaces

It means rapid drying, migration of salts (these usually follow a pattern of moisture movement through the building)

4. Water damage

Source of water comes from overflowing tub, leakage in the toilet or shower, seep out of plumbing or roof, storm damage, cracks around a chimney, and the list goes on. All of these will eventually cause to the rust of nails, and some other dirt or debris.

5. Movement of structure

The settling of the house, expansion or shrinking of the wood inside the ceiling or walls is due to movement. Besides that, the external factors such as vibration from the outside construction, traffic or even sound wave also contribute to movement of the structure.

6. Non suitable of renders and plasters

The cement renders has low rate of vapor exchange. For the long time period, the wall contains high level of damp causes the external render to crack and delaminate.

7. Chemical attacks

If the sulphate is applied to strong render to the walls, it will probably cause to shrinking. Plus, rain can also penetrate the cracks. A part from that, a soluble salt will present in some brick if the wall behind the renders become saturated. At the same time, it will react with the cement in the mortar joints to produce a chemical compound.

8. Efflorescence

Efflorescence is like white, a fine, powdery deposit of water soluble that's depends of types and total of salt in the walls masonry as the water evaporates. It takes a long time to produce. It happens wherever there is the presence of wet surface area.

9. Lime Bloom

This chemical reaction is the result by undergoing through the process of hydration. Lime bloom contains the white film of calcium carbonate that will affect the renders. The sign is easily noticed as there is a change in color which is fairy pale color.

10. Popping or Pitting

When the renders is finished with cement lime or sand render and calcium oxide, this problem will occurs.

3.8 Roof Defect

Figure 10: Sagging of roof

Roof as usually exposed to the element, particularly to the extremes of temperature degree and change, solar radiation, and wind action. Roofs have special risk due to the design of the building itself such as services passing through the roof covering, and internal gutters. The consequence small defective of roof will may be greater effect of similar defect in a wall or other element.

Roof defect are divided into structural faults and defect in the waterproofing material. The majority of roof defect that occurs is distortion of either the roof or of the wall at roof level (Figure 10). Normally, structural defect can be identified from the visual inspection. For the defect of waterproofing material, it will provide the building to be durable under wide range of exposure condition. The pitch roof sagging result is from the slating or tilling that has dished appearance, and the ridge may also have sagged. This defect is more commonly found in older pitched and tiled or slated roof.

While there are many different types of roofing defects, most are known to be causes by:

a) Improper installation

The installation of roof will need a number of skilled workers. If the roof is not installed properly, it wills yield to roof defect such as roof leakage and sagging. The causes of roof defect are because the worker maybe not have a license, or certificate apart from having a low level of experience.

b) **Poor workmanships**

Quality of workmanship is needed such as to maintain the roof or construction of roof. The life expectancy will be reduced due to the poor workmanships which is can both bring to loss for both the dealer and the buyer.

c) **Defective materials**

Materials themselves also may be the factors to the roof defect. The material too, may be not suitable to weather condition. Sometimes, it is not installed correctly also due to sagging and deformation.

3.9 Erosion of mortar joint

Mortar is a mixture of sand and cements in form of brick and block walls. The compositions of mortar are sand, water, and cement or lime. When it dried, it became rigid aggregate that is defined as building paste. While it was still wet, the mortar is spread along the edges of brick or stone.

Mortar joint is function to the masonry block or brick wall. This is because of there is strong and durable materials. Mortar joint is considering deterioration when have the sign such as:

i. They have eroded more than 1/4" from the face of the unit or beyond the depth of the original joint.
ii. Cracks are visible within the mortar
iii. The bond between brick and mortar is broken or the mortar is soft or crumbling
iv. Any portion of mortar joint is missing

Mortar joints are not intended to be a permanent part of a masonry wall, but rather, an expendable component that does have to be replaced at intervals. Removing deterioration of mortar joint is having through the repointing process and replacing it with new mortar.

The causes of erosion of mortar joint as follows:

- Spalling of the mortar and brick will occur due to the expansive nature of frozen water. This happens when excessive moisture enters the wall.
- Any building that are built without adequate expansion joints will be the cause for this problem.
- The cracking occurs due to movement, or from thermal expansion. Besides, uneven settlement in building's foundation also can produce to cracking.
- Probably the mortar is unstable to be as resistant as it should be to severe weathering such as the use of high cement content mortars can result in loss of bond between brick and mortar.

3.10 Unstable Foundation

Foundation is necessary to support a building and the all of its loads that are within or on it. The foundation should be made from material that will not fail and lost its stability in the presence of ground or surface water. Usually, the foundation is constructed with a depth of one semi-meter from the ground level. When the building or property is designed, there should be little or no cracking in the foundation and of course zero water leaks. Besides that, it is necessary to determine the total load to be supported. The foundation will be carrying out both the dead and live load and will transfer the load to the soil. Moreover, the function of the foundation is to avoid building from sinking due erosion or movement and also to stabilize the building.

If there is presence of difficulty in the foundation, it will defect all of the building structure. Some of the affects of foundation problem are building collapsing, crack on the floor and the wall, the wall leading and many others.

Another unstable factor is the movement of the soil because of presents of the water flow. Besides that, the faulty design of foundation also will cause it to overload. Apart from that, the using of material for the foundation is not being followed as the standard and requirement being agreed. The causes of unstable foundation as follows:

a) Movement of the soil

There is one major cause in the movement of soil that is the presences of water flow. Especially for the hill slope area, the probability of landslide occurrence is higher particularly while heavy downpour.

b) Faulty Design

Design is important thing before the building is constructed. Design will ensure the foundation is suitable for supporting the building. If the design fails to fulfill the requirement standard, it will cause the building to collapse.

c) Overloaded

The maximum load of building will be stated by the architect. The building will collapse if the load is not suitable with the foundation. The foundation must be stable enough and suitable to support the building and its total load. (Dead and Living Load)

d) Material

Material also will affect the stability of the foundation. The material used will affect the strength of the concrete. It is also being a must to ensure that the foundation will last long and have longer life expectancy. At the same times, the foundation should be made from materials that will do well even in the presence of ground or surface water.

e) Natural Disaster

Another factor is natural disaster that is unexpected. It also happened because of human negligence.

4. Conclusions

It should be pointed out that, entire buildings are subjected to the various forms of defects, failures, deterioration and variation. The literature has explored a number of building defects and its contribution factors which can be associated to the major theme of this paper. It is significant to appraise each defect and failure in every part of building and find out the primary causes of each individual defect and failure. Then, remedy them correctly. The contribution factors to these defects and failures must be investigated intensely. Once founding out the possible causes of the defects and failures, it is imperative to distinguish how to keep away from it in the future and reduce the effect to the minimum.

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