

# Design of Structural Damage Identification Applications Web-Based

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**Abstract.** The current building construction and maintenance Note well, certainly will be utilized as desired. If a building is experiencing interference, then all activities will be obstructed so that the building requires maintenance activities. Building maintenance activities include the maintenance of the structure, architectural, mechanical, electrical, and outer space. On systems that are running now the surveyor directly monitor to location which requires a fee and take a long time. Technology websites that are built can be used for building maintenance activities in the form of a data string entered by the Manager of the building and the response of the Contracting Party. With this technology produces a system that can help in the process of monitoring a building that suffered damage and need repair.

## 1 Introduction

Buildings have a very important function for human life, especially to perform daily activities so that buildings need to be done in order for the building's maintenance are able to stand up well in a long period. As stated in the regulation of the Minister of public works number: 24/PRT/M/2008 about the guidelines of building maintenance and upkeep of buildings in Indonesia then any required maintenance. As for the aspect to note in maintenance of the building is aspects of architecture, structures, mechanicals, electricals, and outers space [1].

Building maintenance management is often related to the innovative strategy and future sustainability. Various working methods are introduced to the performance of building maintenance management [2]. Maintenance is often defined as the series of activities undertaken either care of the building structure and services to ensure the intended functions and optimal performance of a building's life cycle [3].

Maintenance of the building serves to maintain the physical buildings as well as the age of the building in accordance with plans. Construction of new buildings is generally not accompanied by an increase in maintenance activities. Usually one cause is less planning of a maintenance system and good supervision [4]. Maintenance is a way to safeguard the condition of buildings in order to be always in good shape fit function [5]. Building maintenance activities that cause an inadequate building suffered damage over time [6]. In fact less maintenance activities observed by the owner of the building. According to Labombang in Thohir [7]

maintenance activities less observed because of several factors, including: maintenance activities seen not urgent compared with development activities, organizational structure maintenance is not always there [8], and the Facility Manager assumes that the maintenance building is just a technical issue that is not related to the purpose of the function of the building as you wish.

In each building, surely the presence of the Manager of the building. With this, the building manager also has full responsibility will be building maintenance. Because if there's anything the incident or event digedung, the first party which asked for responsibility is the Manager of the building. Over time, many changes in both physically on a building that is already so. A Building manager when performing maintenance activities, A building manager should report to the construction workers about the damage parts of what happened to the building manager. Every building manager has a complaint of damage to the building as evidence of logging reports of damage to buildings of a building manager. On the current state of each building are using telephone communication Manager to report any damage to the building contractors. With the condition that occurs when this causes reporting history missing for granted so that the recording and reporting of damage to the building could not be controlled, because of the lack of a history or record of the inspection history of the building.

From the explanation above, the authors conducted a study to design applications Web-based reporting of damage to buildings that only focuses on the structure of the building.

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## 2 Building Maintenance

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Several theories related to this research are:

### a. Building

Building is the physical manifestation of human work Copyright its main function is as a place of human activity at once limiting or a patron of the influence of the outside environment. According to the law – the Republic of Indonesia number 28 in 2002 about the Building. The building is defined as a form of physical work of construction that blends in with its position, as a place of human conduct its activities, for the residence, religious activities, business activities, social and cultural activities, and special events [8].

### b. Purpose of the maintenance

Generally, the main objective of the maintenance process is: [6]

- To extend the age of buildings
- To ensure the availability of equipment and also benefit from the investment of a maximum
- To ensure the safety of humans who use the building.
- To ensure readiness of the Operational of any equipment or supplies in the face of emergency situations such as fire

### c. Component maintenance building

The scope of the care and maintenance of the building, among others, are: [4]

- Architectural
- Structural
- Mechanical (Manage of Water, Sanitation, Plumbing and Transportation)
- Electrical (power supply, Lighting, telephone, communication and Alarm)
- Maid (housekeeping).

### d. The categories of building damage

According to John OE in Malitha [9], there are 5 (five) different kinds of categories damage to the structure of a building that is as follows:

- Light damage to a building non-structure  
A building zoned non-structure suffered damage when things happen as follows:
  1. Cracks smooth (the width of the gap is smaller than 0.075 cm)
  2. On the stucco plastering tumbling Flakes
  3. Include a limited breadthThe action that needs to be done is repair (repair) in architecture without emptying the building.
- Damage to Light the structure of a building zoned Light level structure suffered damage when things happen as follows:
  - a. small Crack (the width of the gap between 0.075 to 0.60) at Plaster wall
  - b. loose and tumbling
  - c. Includes spacious great
  - d. damage to those parts of non-like structures on the chimney, lipstank, etc
  - e. ability to shoulder the load of the structure not much diminished.
  - f. be eligible functionThe action that needs to be done is repair (repair) is the architecture so that the endurance the buildings remain preserved. Repair with mild damage on the structure can be done without emptying the building.
- Damage to the structure of the medium level  
Medium Level Structure Damage happen when things as follows:
  1. large Crack (the width of the gap is greater than 0.60 cm) on the wall
  2. Cracks in many places, such as the load carrier walls, columns, chimneys, tilt and collapse.
  3. the ability of the structure to bear the burden of already reduced most
  4. be eligible functionActions you need to do is:
  1. Recovery of parts of structures in retaining (strengthening) to withstand earthquake loads
  2. Repair (repair) in architecture
  3. Buildings emptied and can be inhabited again after the restoration process is finished

- Damage to the structure of the level weight  
 A building zoned heavy levels of structure damage if things happen as the following:
  1. Wall bearers load split and collapse
  2. separate buildings due to the failure of the elements of a binding element.
  3. approximately 50% of the main elements of damage
  4. Not be eligible function
 The action that needs to be done is to destroy the building or done restoration and thoroughly before retaining the building habitable again. In conditions of damage such as this, the building became very dangerous, so it must be emptied.

- The Total Damage  
 A building classified as damaged total/fallen if things happen as follows:
  1. fallen Buildings entirely (>65%)
  2. most of the major components of the structure of the damaged
  3. does not qualify function
 The action that needs to be done is to destroy the buildings, clean up the site, and set up the new building.

c. Theory Website

This website may also be interpreted as a collection of pages that display text data information, still or moving image data, data, animation, sound, video and or a combination of both, be it static and dynamic. On the website page there is a hyperlink.

d. Database

According to Yuswanto in [9], Database is a collection of data/information regularly based on specific criteria that are related. In the world of computer, database can be categorized is very special because it has always been the main thing in designing computer systems. Surely there is some reason why the database becomes its own priorities in performance such as:

- a. The database contains not only the data but also contains a plan or capital data.
- b. Database can be the primary source being used simultaneously by different users in accordance with their needs.

### 3 Overview

#### 3.1 Explanation System

The system is designed to be used by two groups of users, i.e. contractors and the building manager, which will start its input from the contractor who insert data of building damage which they build.

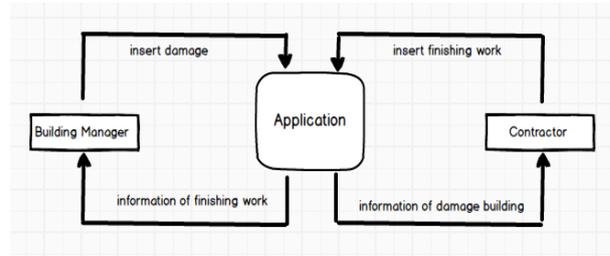


Fig. 1. Context Diagram

#### 3.2 Question from System

The system is run by started with a few questions. Questions can be seen from the following table 1. If question 1 is correct then it will go to question 1.1. otherwise the question number 2 will appear.

Table 1. Questions in the system

No	Categories	Information
1.	Non-Structured Light Damage	Smooth cracks (more gaps smaller than 0.075 cm) in stucco
1.1		Plastering spills fall
1.2		Covers limited area
2.	Structured Light Damage	Small cracks (gap widths between 0.075 and 0.60) on the wall
2.1		Plastering is loose and collapsed
2.2		Covers a large area
2.3		Damage to non-structural parts such as flue, lipstank, etc
2.4	Worthy function	
3.	Damage Structure medium level	Big cracks (gap more than 0.60 cm) on the wall
3.1		cracks are widespread in many places, likes load bear wall, columns, sloping chimneys and collapsed
3.2		The ability of the structure to carry the load has been partially reduced
3.3	Worthy function	
4.	Damage Structure weight level	The load-bearing wall is split and collapses
4.1		Buildings are separated by the failure of binder elements
4.2		Approximately 50% of the main elements damaged
4.3		Not functional
5.	Total Damage	Building full-collapsed (> 65%)
5.1		Most of structure main component are damaged.
5.2		Not functional

Case examples with questions answered as follows:

1. In which part of the crash:
  - a. structures (Columns, beams, walls, etc) → True
  - b. Non-structures (chimneys, lipstank, etc)
2. Does the fallen buildings > 65%?
  - a. Yes
  - b. Not → True
3. How to measure crack?
  - a. Cracking smooth (width slit < 0.075 cm) on the stucco 1
  - b. Small Cracks (the width of the gap between 0.075 to 0.60) on the wall
  - c. Large Crack width slit > 0.60 cm on the wall

4. What is the area of crack?
  - a. Includes extensive limited → True
  - b. Cracked in many places
5. Do stucco off and tumbling?
  - a. Yes → True
  - b. Not
6. Be what stucco that fell:
  - a. Flake → True
  - b. a piece
7. What is the condition of the bearers of the load:
  - a. the ability to shoulder the burden of already reduced → True
  - b. Wall to shoulder the burden of already split and collapse
8. How about the ceiling cracked area of experience:
  - a. Cracking smooth (width slit < 0.075 cm) → True
  - b. Small Cracks (the width of the gap between 0.075 to 0.60)
  - c. large Crack (width slit > 0.60 cm)
9. Whether the ceiling is exposed to seepage water so as to make the ceiling is black:
  - a. Yes
  - b. Not → True
10. Is there a section apart from the outskirts of ceiling?
  - a. Yes
  - b. Not → True
11. The condition of the floor:
  - a. Cracking smooth (width slit < 0.075 cm) → True
  - b. small Cracks (the width of the gap between 0.075 to 0.60)
  - c. large Crack (width slit > 0.60 cm)

If the person managing the building inputs by answering such cases means the type of damage is minor damage. This result is obtained from the criteria on the type of damage. The above question will appear on a system that will be answered by the person who manages the building on a choice answers provided.

## 4 Conclusions and Recommendations

Based on the results of the analysis of the system then it can be inferred: (a) this research aims to design applications for the reported building damage in particular building structures from the Manager of the building to a Contracting Party with the web-based. (b) from the results of analysis conducted is obtained the draft database consisting of 8 tables. (c) information appearing on the system in the form of location information, time reporting the damage, part what happen damage and type of damage.

In this study only analyzed to design reporting application damage on buildings only for building structures, it is also recommended for maintenance aspects of buildings more like architecture, electrical, mechanical, and outer space.

## Acknowledgement

Thanks, was delivered to research institutions and community services (LP2M) Institut Teknologi Padang (ITP) for funding research grants for the year 2018.

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