Chapter I
INTRODUCTION

1.1 Background

Geographical condition of Indonesia which is located at the confluence of the two largest physical tectonic line i.e. sirkum the Pacific and Mediterranean. This results in Indonesia is very prone to quake. By looking at the case in civil engineering, it is of concern in designing a building earthquake resistant. In planning the building designs structures largely determine whether the building can stand perfectly or not. For it required careful consideration and calculations so that the resulting product according their functions.

Indonesia has recorded history Quake enough to make consideration in planning the structure of the building. As an example of earthquake events of the 2006 earthquake in Yogyakarta, Padang, West Sumatra in 2009, as well as the events of the 2010 earthquake in Sinabang Nangroe Aceh Darusalam which caused damage to the structure is serious enough in some building structures with different type of collapse. This confirms to the experts structure particularly in Indonesia for earthquake load considering plans on the structure as a step anticipated in case of earthquake.

At the time of the earthquake expected building structures able to accept a certain level of earthquake force without significant damage. Although in the end the building collapsed due to the earthquake force, at least structures form the nonlinear behavior on post-natal elastic so that building as well as its contents are more assured of its safety. Following some cases collapse structure withstand the earthquake load :

Figure 1.1 Structural Damage Mall Saphir Yogyakarta Square 2006

Source : Wikipedia,org, Mengenai : Gempa Yogyakarta

Figure 1.2 Structural Damage Bank Indonesia Padang 2009

Source : Finance,Detik, About : Gedung Rusak Berat

Figure 1.3 Structural Damage Bank Indonesia Padang 2009

Source : Tribunnews, Mengenai : Gedung Rusak Parah

See how the danger if a building collapsed at the time of the earthquake. For that very need to building planned and analysed in order to ensure the safety of the building and the user. In the present direction of the planning method of earthquake resistant switched from approach strength (force based) approach toward performance (performance based) where the structure of the planned against some level of performance. To know the performance of the structure while receiving the brunt of the quake, then needed a simple nonlinear analysis but quite accurate. One way nonlinear analysis that can be used is the Capacity Spectrum Method utilizing nonlinear static thrust loads analysis (nonlinear static pushover analysis) that use the structure as target performance planning. Performance based planning requires adequate performance (level of performance) is desired for a given level of earthquake load with a period certain reset by assigning three levels of performance, namely the serviceablity limit state control performance, damage structures (damage control limit state) and the performance of safety (safety limit state). Nonlinear Static Pushover Analysis well enough to accurately predict the pattern of the collapse of a building due to the earthquake.

1.2 Research Problem

The problems faced in this final project work is as follows :

1. How are the hinges collapse pattern plastis building after analyzed with a pushover?
2. How the results output analysis on use of the pushover SAP2000 v. 15?
3. Whether the results of the analysis showed that the building would be able to behave after a nonlinear collapse?

1.3 Research Objective

Objective of the final project research is as follows :

1. Analyze the relationship of capacity curve, base shear displacement curve with a pushover as a representation of the stages of the behaviour of the structure of the moment are base shear force on a certain level and peformance points.
2. Analyze the fatigue schemes (plastis hinge) formed after the collapse of the calculation result SAP2000 v. 15.
3. Analyze the patterns of collapse at the time of the maximum deformation of the structure so that it can be known hinges that is experiencing the ravages of earthquake force occurred.
4. Analyze the performance criteria of seismic structure medical building faculty of Universitas Muhammadiyah Surakarta from peformance point results by reference criteria for the performance of ATC-40 procedures A.

1.4 Reseach Benefit

Practical benefit of final project research is as follows :

1. Get the maximum deformation on the structure due to earthquake maximum force.
2. Determine if the structure is reviewed can still be used if the maximum deformation experienced due to the force of the maximum earthquake.
3. Can know in detail the behaviour and the performance level of the structure with nonlinear analysis corresponding to simulation of earthquake load on the real state of affairs.
4. Predicting closer hinges which will experience a collapse when the quake force.

Scientific benefits of the final project research is as follows :

1. Generate a recomendation that every building is need for structure analysis of performance against the influence of earthquake burden plan

using pushover analysis, so that the performance of the building can be predicted accurately.

2. Find out if the structure is analyzed using pushover analysis on the basic of performance could still be used after the occurrence of the maximum deformation due to the force of the maximum earthquake.

1.5 Limitation Problems

Look at the breadth of the field of planning that will arise in the preparation of this final project and time limitations the workmanship as well as discipline master. In the analysis of pushover is restricted in the planning stages of the configuration structure is used, the loading of which happened, modeling the structure, and the analysis of the structure. Hence the need to limit the problem as follows :

1. The structure of the building that serves as the Medical Faculty Building of Universitas Muhammadiyah Surakarta, with an height of 6 floors.
2. The structure of the building is a reinforced concrete building that is irregular, partial ductile structure.
3. The structure of the concrete structure is used, include :
   a. Structural reinforced concrete frame.
   b. Floor plate of reinforced concrete.
   c. Non structural components such as lifts and staircases.
4. Non structural components and non concrete is covering wall.
5. Loading of the building include :
   a. Dead load (form of burden self).
   b. Live load (form of the load due to the function of the building).
   c. Lateral Loads (form of earthquake load in accordance with SNI 03-1726-2002, RSNI SNI 03-1726-2010 Planning Ordinances and Earthquake Resistance For Building).
   d. Load Regulatory based on Load Regulatory of Indonesia for Home and Building 03-1727-1989.
6. Peformance kriteria using the ATC-40

7. The behaviour of the structure is analyzed using the method of capacity spectrum pushover analysis procedure A.
8. The structure is analyzed using structure analysis program SAP2000 v. 15.

1.6 Reseach Authenticity

Research on building performance evaluation using pushover analysis are :

1. Yunalia Muntafi., Universitas Islam Indonesia (2012), mengenai Evaluasi Kinerja Bangunan Gedung DPU Wilayah Kabupaten Wonogiri Dengan Analisis Pushover.
2. Wisnu Murti,Indra Cahya dan Ashar Anas, Universitas Brawijaya (2008), mengenai Analisis Pushover Pada Gedung Tidak Beraturan Dengan Studi Kasus Pada Gedung Baru FIA UNIBRAW.
3. Andityo Budi T, Universitas Sebelas Maret (2011), mengenai Evaluasi Kinerja Seismic Struktur Beton Dengan Analisis Pushover Prosedur A Dengan Menggunakan Program ETABS V.9.50.
4. Yanto Dwi, Universitas Sebelas Maret (2010), mengenai Evaluasi Perilaku Seismic Gedung Balai Kota Surakarta Pasca Gempa Dengan Nonlinier Static Pushover Analysis Metode Spektrum Kapasitas

Based on the planning, then the final project with the title Study Peformance On Medical Faculty Building of Universitas Muhammadiyah Surakarta With Analysis Pushover this has never been done in the scope of Civil Engineering Department Engineering Faculty of Universitas Muhammadiyah Surakarta.

1.7 Research Location

Medical Faculty Building of Universitas Muhammadiyah Surakarta

Provinces : Central Java

Regency : Sukoharjo

Sub : Kartosuro

Village : Gonilan

The following image map and location planning

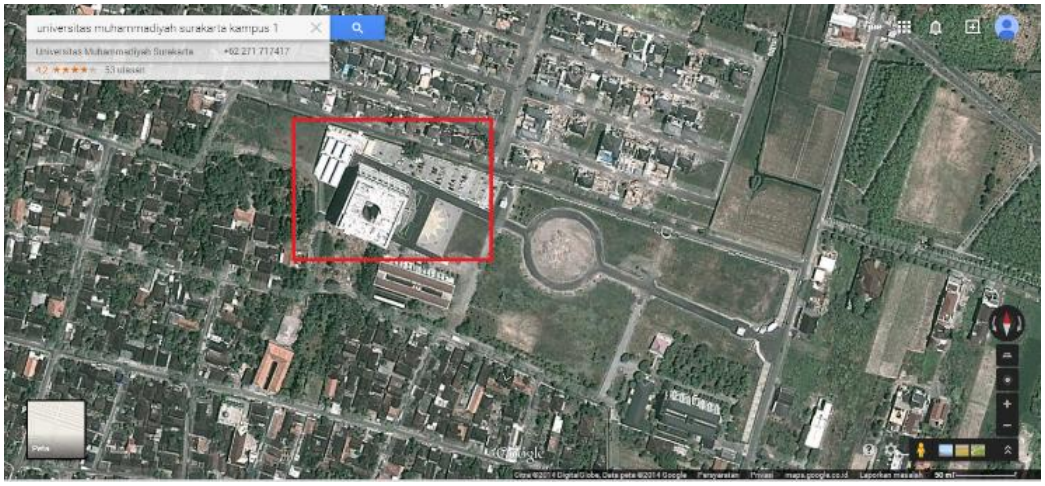

Figure 1.4. Research Location

Source : Google Map, About : Gedung Fakultas Kedokteran UMS