CHAPTER I

INTRODUCTION

1.1 General Background

Concentrically braced steel frames (CBFs) are a practical and economical structural system for many applications. Diagonal braces employ gusset plate connection and very efficient elements for developing stiffness and resistance to wind and earthquake lateral forces. For wind load, braced frames are normally designed to provide adequate elastic strength and stiffness to resist the force demands and to assure occupant comfort due to building movements and vibrations.

In seismic design, there is a trend towards engineering system to meet specific performance objectives. In current codes, there is an implied multilevel, performance criteria. For small, frequent earthquakes, the structure is designed to remain elastic and provide adequate strength and stiffness to assure serviceability during and after the earthquake. For large, infrequent seismic events, significant inelastic deformation of the structure is required. For CBFs, the inelastic deformation consists of tensile yielding and post-buckling of the bracing. This inelastic behavior is extremely important to the overall seismic performance of the system.

The AISC Seismic Design Provisions (AISC 2005) employ detailing requirements for Special Concentrically Braced Frames (SCBF) as a method of achieving the latter seismic design requirements. The SCBF design requirements

were initially developed in the early 1990s, and the evolution of these design requirements continues with improvements in the understanding of the CBF system result from previous and current research efforts.

Over the years, there have been changes in the SCBF design requirements in response to improved understanding on the seismic behavior of the structural system. Recent research suggest that advancements in the design of SCBF systems are needed, and work is underway to develop and evaluate proposed advancement.

1.2 Problem Statement

With the result from the research, there should be a modification on the AISC *Seismic Provisions for Structural Steel Building* (AISC 341-2005). This final project will compare column demand code based design and research result. The analysis will use ETABS version 9.5.

1.3 Problem Limitation

1. The structure which will be analyzed is a 5 story building. The plan view and the elevation view are shown in Figure 1.1 and Figure 1.2.
2. The structural members that will be designed are beam, column, bracing, and connection.
3. The structural elements will be designed as Special Concentrically Braced Frames.

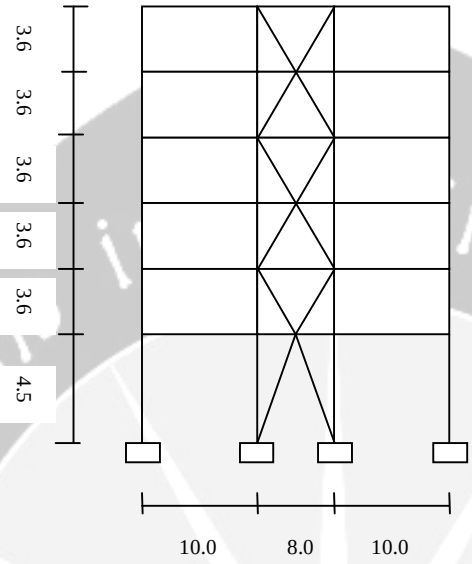

Figure 1.1 Elevation view

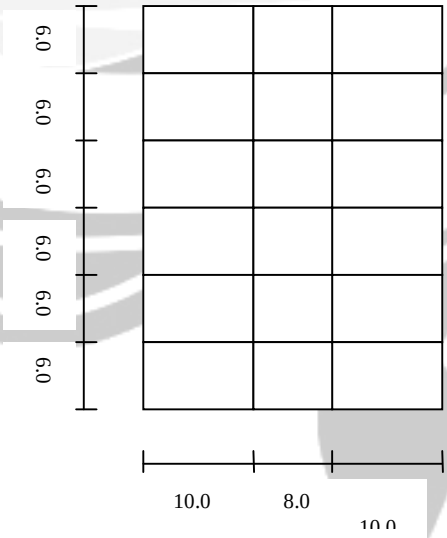

Figure 1.2 Plan view

4. The structures design will be compared using based code design and the research result.

1.4. Objective of the Study

The objectives of the study are to:

1. Design 5 story building as Special Concentrically Braced Frames,
2. Analyze the designed building by using Nonlinear Static Analysis,
3. Compare the result of the analysis from code based design with the research result.