CHAPTER III

BASIC THEORY

3.1. Structure

Structural is the main component in the building. Structure basically consist of column, beam, slab, roof and foundation. The structural elements have function to support the existence of non-structural elements which include visible elements, interior, and architectural details so as to form a single unit. Each part of the building structure also has their respective functions and roles.

Another use of building structure is to continue the load from the top of the building to the bottom of the building, then spread it to the ground. The design of the structure must ensure that parts of the structural system are able to allow or bear the gravity load and the self-weight of the building, then support and transfer it to the ground safely. There are 3 parts in the structure such as;

1. Substructure are parts of the building which are located below the surface of the land. This bottom structure includes the foundation and sloof.
2. The middle structure is the parts of the building which are located above the ground surface and under the roof and fit for human habitation. Middle structure includes walls, columns and rings.

3. Superstructure is the building parts that are formed extending upward to support the roof. This structure are located in the upper of the middle structure. The superstructure included truss.

3.2. Soft Story

Soft story are one of the behavior of the structure happen lateral stiffness is less than 70 percent compare to the story above or less than 80 percent of the average lateral stiffness of three story above. Nowadays, many building constructed with ground story opened for parking lot. This ground story becomes weak and soft compare to the other story. There are 2 following features that characterize a soft story building;

a. The ground story relative flexible compare to the upper story, and this will make the horizontal movement much larger. And this is called soft story
b. The horizontal earthquake forces that resisted in the ground story is less than the upper story

If the columns in the ground story are weak, it will more stressed and may seriously damage which lead to the collapse of the building

3.3. Nonlinear Static Analysis (Pushover)

Nonlinear static analysis is a simplified nonlinear analysis technique to estimate the deformation of the structure. This deformation analyzes with seismic loading working on the structure. Nonlinear static analysis or pushover analysis is applying

loads until the weak link in the structure is found and then revising the model to incorporate the changes in the structure caused by the weak link. A second iteration indicates how the loads are redistributed. The structure is “pushed” again until the second weak link is discovered. This process continues until a yield pattern for the whole structure under seismic loading is identified.

Pushover analysis is commonly used to evaluate the seismic capacity of existing structures and appears in several recent guidelines for retrofit seismic design. It can also be useful for performance-based design of new buildings that rely on ductility or redundancies to resist earthquake forces.