

CHAPTER ONE

INTRODUCTION

1.1 General Concept

An electric power system is a network of electrical components used to supply, transfer and use electrical power. This power system is known as the grid and can be divided into generation, transmission and distribution systems.

Transmission system represents the connection between generation and distribution systems. The basic purpose of transmission system is to transfer energy from generating plants at different locations to distribution centres. Generally, transmission system is consisted of transmission lines and substations.

The substation is assembly of apparatus to change, control and improve the characteristics (voltage, frequency, power factor ... etc.) of electric supply. The classification of substation depends on different ways like the classification according to requirement such as voltage level, transformer capacity and transmission, distribution substation.

Substations play basic role in transmitting the energy from the generation to the load. At these days' substations help in control and protection of power system and it has big deal with improving the quality of electricity production because the electricity is like any product needs to be evaluated from different vision such as economic, reliability and its effect in the equipment of the costumers. Depending on this designing of substation is important step to maintain good power quality in the power system which conducted in a voltage and frequency that stays within the limits.

1.2 Problem Statement

As technical and economic losses result in reduction the system's efficiency, also it affects the equipment performance characteristics.

Center area of Khartoum suffering severe under voltage, equipments work at values less than the rated because of increasing load and low capacity of transformers, thus it affects continuity of supply and service reliability.

Since the supply doesn't meet the specification requirement of the system that causes economical losses.

The proper design according to national standard and the country requirement avoid these technical and economic losses and leads to good results.

1.3 Proposed Solution

The solution includes designing of a new substation which covers the increment in load and increase service reliability.

1.4 Objectives

To design a new substation

1.5 Methodology

The data was collected by different method. Some of these data was collected from The Sudanese Electric Holding Company. Data was also collected by reading meters and nameplates of some equipment. The simulation was done by using ETAP program. This simulation is concerned with load flow and short circuit studies. Analytical calculations are used to obtain results from planning study.

Google earth was used to determine the area of the substation and the path of underground cable.

1.6 Research's Layout

This project consists of five chapters. Chapter one gives an introduction about the principles of the project, in addition its reasons, motivation and objectives.

Chapter two represents functions of substation, classifications and main components of the substation.

Chapter three discusses the research's main studies and how they were done.

Chapter four shows the results of planning, load flow and short circuits studies and analysis of these results.

Chapter five provides the conclusion and recommendations.