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# ADDIS ABABA UNIVERSITY SCHOOL of COMMERCE PROJECT MANAGEMENT

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The effect of Quality and Selected Standards on the  
Safety and Convenience of the Occupants in the Building  
Projects of Addis Ababa.

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**By: Daniel Dereje Senay**

A Research Project Submitted in Partial Fulfillment of the  
Requirements for the Award of the Degree of Masters of  
Project Management

**Advisor: Worku Mekonnen (Ph. D.)**

June, 2018

Addis Ababa, Ethiopia

The Effect of Quality and Selected Standards on the Safety and Convenience of the Occupants in the Building Projects of Addis Ababa.

ADDIS ABABA UNIVERSITY  
GRADUATE STUDIES PROGRAM  
MASTER of Arts IN PROJECT MANAGEMENT

The Effect of Quality and Selected Standards on the Safety and Convenience of the Occupants in the Building Projects of Addis Ababa.

By:  
Daniel Dereje Senay

Approved by Board of Examiners:

_____	_____	_____
Advisor	Signature	Date
_____	_____	_____
Internal Examiner	Signature	Date
_____	_____	_____
External Examiner	Signature	Date

Declaration

I hereby declare that the study which is being presented in this thesis entitled “The Effect of Quality and Selected Standards on the Safety and Convenience of the Occupants in the Building Projects of Addis Ababa” is conducted by Daniel Dereje for the partial fulfillment of the requirements for the award of master’s degree in Project Management. To the best of my knowledge it is original work carried by him, it had not been presented for a partial fulfillment for any educational qualification at this University or any other and in any projects by any means.

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Worku Mekonnen (Ph. D.)

Advisor

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Date

The Effect of Quality and Selected Standards on the Safety and Convenience of the Occupants in the Building Projects of Addis Ababa.

### Declaration

I hereby declare that the study which is being presented in this thesis entitled “The Effect of Quality and Selected Standards on the Safety and Convenience of the Occupants in the Building Projects of Addis Ababa” is original work of my own. It had not been presented for a partial fulfillment for any educational qualification at this University or any other and in any projects by any means, and all the resources, materials used for this thesis had been accordingly acknowledged.

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Daniel Dereje

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Date

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## List of Abbreviations

ADA: Americans with Disabilities Act

IBC: International Building Code

ISO: International Organization for Standardization

PMBOK: Project Management Book of Knowledge

QA: Quality Assurance

QC: Quality Control

TQM: Total Quality Management

OSHA: Occupational Safety and Health Administration

## Abstract

*The Study is about the effect of quality and selected standards on the safety and convenience of the occupants in building projects of Addis Ababa, specifically focusing on three standards in particular, access to the physically challenged, emergency exits (means of egress), and sufficient parking lots for the occupants of the building. Standards and regulations are few of the inputs to quality planning; the project aims in identifying whether standards and regulations are considered when designing the buildings in Addis Ababa, and check if quality is planned not inspected in. The study plans to find out where the gap exists and why the aforementioned standards aren't being included in the buildings of Addis Ababa, to help further constructions would be built with the standards making the city's buildings safe and accessible. The participants of the study are registered members of the Ethiopian Consulting Engineers and Architects Association consulting offices. The number of the population is 42, with a sample size of 36. The participants were selected by using simple random sampling technique, using the lottery method. The method of analysis used is mixed method; both qualitative and quantitative are used. To assess the effect of state of quality standards in the city's buildings, a questionnaire was distributed to thirty six engineering consulting offices and a semi structured interview was held to assess the problems they face. The results reveal that there is no significant gap in the designing stage but the standards don't get implemented for different reasons, among these reasons, the city's administration lack of consistent regulation and clients of the property asking a revision of a design in the process omitting the standards in the process. 47.2% of the firms have quality control department, while some consulting offices claim even though it is not structured as a department the work still gets done by other personnel. The offices have disclosed there are multiple reasons to which they have a problem in incorporating the standards, amongst the reasons that most participants mentioned are, clients manipulating the gap created by the responsible body to get maximum functional area, inconsistency of directives used by the permit issuing authority time and again, space limitation provided by the city administration, inappropriate conduct of the permit issuing officer are the few. The study's recommendation is, as the standards exist in the directives as well as in the occupancy permit check list, but the problems still exist, to involve stakeholders (users of the buildings) involvement in giving the occupancy permit process.*

*Key words: Quality, Standard, Quality planning*

## Chapter 1

### Introduction

#### 1.1. Background of the study

What is quality? In an ordinary dictionary the word “quality” is described as: Degree of excellence, the relative nature or kind of a thing; type; brand and a “quality product” is described as: a superior article, a high-class article these definitions indicate that quality is connected with type and excellence. In popular usage of the word “Quality” often means different things to different people. These different usages create considerable confusion and misunderstanding. Two such usages are “conformance to requirements” (Crosby, 1979) and “degree of excellence”. The first leads people to argue that “quality costs less” and the second conversely implies that “quality costs more”.(Landin, 2000).

According to “ISO 8402 Quality management and quality assurance vocabulary” Quality is defined as: “The totality of characteristics of an entity that bear on its ability to satisfy stated and implied needs”. “Stated and implied needs are the inputs to developing project requirements, a critical aspect of quality management in the project context is the necessity to turn implied needs into requirements through project scope management, and quality must not be confused with Grade. Grade is a “Category or rank given to entities having the same functional use but different technical characteristics. Low quality is always a problem but low grade may not be.” (PMBOK, 2000)

Since quality can be perceived in different ways in this thesis definition of quality should be taken as such. “The totality of characteristics of an entity that bear on its ability to satisfy stated and implied needs”.

A code is a law or regulation that sets forth minimum requirements and in particular a building code is a law or regulation that sets forth minimum requirements for the design and construction of buildings and structures.” (Arthur & Casey, 2002)

In San Francisco in early 1906, although there were some new Class “A” concrete and steel buildings in the downtown section, most of the city consisted of fire-prone wood shacks.

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Concerned with such conditions, the National Board of Fire Underwriters wrote that “San Francisco has violated all underwriting traditions and precedents by not burning up.”

On April 18 of that same year, the city of San Francisco experienced a conflagration started by an earthquake that killed 452 people and destroyed some 28,000 buildings. Total financial loss was \$350 million, which is over \$6.7 billion in estimated 2000 dollars. Although the contents of many of the new Class “A” buildings were destroyed in the San Francisco fire, most of the walls, frames, and floors remained intact and could be renovated.

Following analysis of the fire damage caused by the San Francisco disaster and other major fires, the National Board of Fire Underwriters became convinced of the need for more comprehensive standards and codes relating to the design, construction, and maintenance of buildings. With this increasing recognition of the importance of fire protection came more knowledge about the subject.

“The purpose of having a standard in buildings is to produce a detailed description of the type of building which best meets the needs of the commission and its departments.”

“Any building selected to house commission departments must conform in every respect to the public building legislation in force in the country where it’s located.” (Gabor Zupko, 2001).

Accordingly, this study refers to the Nations Building directive No 5/2003.

Out of the international building codes stated in the International Building code this study would specifically observe the state of three standards in particular, access for the physically challenged, emergency exits (means of egress), and sufficient parking lots for occupants of the building.

“Quality planning,” is a structured process for developing products (both goods and services) that ensures that customer needs are met by the final result. (PMBOK, 2000), for a building to fulfill standards needed, as we have defined quality above, the standards need to be incorporated at the planning stage. These standards in one way or the other have not been incorporated in the buildings of Addis Ababa and the study would discuss where the problem lies.

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## 1.2. Statement of the problem

According to the IBC 2006 edition, The IBC has 35 standards, expressing the different types of standards that should be followed regarding buildings, although buildings should have all the required standards, a building is best built when fulfilling more standards for the occupancies regardless of the different building standards available.

According to the “Ethiopian Building Proclamation” No.624/2009, a building means a permanent or temporary construction used for the purpose of dwelling office, factory or for any other purpose. A building should be safe, usable and accessible, regardless of what it was intended for, to accomplish what the building is designed for. To affirm, this is a reality a code needs to be followed. In this case a building code, a building code is a law or regulation that sets forth minimum requirements for the design and construction of buildings (Arthur & Casey, 2002) According to the nation’s building directive the three standards that this thesis wants to address, i.e., Access for the physically challenged, sufficient parking lots for occupants of the building, and Emergency exits (means of egress), few requirements that the codes need to fulfill are:

### Access for the physically challenged

- The buildings should be accessible or the buildings should be equipped for making accessibility possible.
- The buildings should be free from obstacles for people who use wheel chairs, who are visually impaired and for people who are physically challenged.

### Emergency exits (means of egress)

- Any work place depending on the type of establishment it should be equipped with access to the outside which is free from hazard.
- Halls and Corridors found in the buildings need to be equipped with appropriate signage of the buildings floor no.
- In case of emergency if regular entrance and exits are found to be dangerous an emergency exit from the building should be prepared.

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### Parking lots

- The directive states the number of parking lots assigned to a building should depend on the urbanization and the landscape of the city and after it has been researched by the city's administration.

In most cases, people find it difficult to gain access into these buildings simply because of their physical disability. The barriers could be in form of restricted access and narrow doorways, steps and staircases (Ward, 1979). Therefore, disabled people become frustrated and handicapped only by the way in which their environment emphasizes their disability. Architectural and urban barriers have prevented people with disabilities to partake in social activities and this equally has negative effect on the society at large (Ghaem, 1991).

Inadequate built environment design and crowd management can lead to loss of life and injury in public spaces (Langston, 2006). However, it is not possible to define the boundaries in building design because it depends on the context and the purpose of the design (Hale, 2007). Human behaviors during building evacuation such as congestions, herding, panic, ignorance of guidance or variations in route and exit preferences based on the level of familiarity with the building are challenges to design a fixed guidance system for safe building design and they are effective issues to improve safety in buildings (Chu, 2012).

According to a direct observation by the researcher the buildings being built in Addis Ababa do not follow uniform requirements; a similar building of a certain function differs from another in so many ways. Although the fact that Addis Ababa's latest construction boom is believed to start on the early years of the Ethiopian Millennium decade, emphasis hasn't been given to the fine tuning of certain features, for example,

- Sufficient parking lots for the residents,
- Access for the physically challenged, and
- Emergency exits (means of egress).

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### **1.3. Research Questions**

Research questions

1. What are the standards and guidelines followed in making sure some standards aren't omitted?
2. What are the existing situations on the ground?
3. What is the level of safety and convenience of the buildings in Addis Ababa?

### **1.4. Objectives of the Study**

#### *1.4.1. General objective*

The general objective of this thesis is to address the gap between what is expected of the buildings in Addis Ababa and what is being done.

#### *1.4.2. Specific objectives*

To examine the standards and guidelines.

To identify what is happening on the ground.

To assess the safety and convenience of the buildings in Addis Ababa.

### **1.5. Significance of the Study**

The Study plans to give an insight as to why the aforementioned standards aren't properly executed and if they are being executed, how well they are implemented. And proposes a way in which the buildings that would be built in the future are safe and convenient. It also aspires to be a pathway for further researches being done on this topic and related issues as well.

### **1.6. Scope and limitation of the study**

#### *1.6.1. Scope of the study*

This research focuses on the quality and standard issues in the buildings of Addis Ababa. Although the international building code has 35 Standards this paper focuses on three standards that relate to our day to day lives, which are, sufficient parking lots for residents, access for the physically challenged and emergency exits (means of egress), It doesn't address other issues other than related to quality and selected standards of buildings in the capital city of Ethiopia.

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### ***1.6.2. Limitation of the Study***

The main limitation that the study has faced is locating the different consulting engineering offices as the addresses of the offices weren't updated on the website the study was faced with setbacks, like wrong phone numbers, the offices having vacated the address that was listed on the site. The fact that all the consulting engineers' offices don't work on buildings has limited the study benefiting from a larger population size.

### **1.7. Organization of the Study**

The Study is divided into five parts, Chapter one is comprised of background of the study, statements of the problem, objective of the study, and Significance of the study, scope and limitation of the study, the remaining chapters have literature review, research methodology, data findings and analysis, and finally Conclusion and recommendation.

## Chapter 2

### Review of Literature

#### 2.1. Literature Review

Due to a conflagration started in San Francisco in 1906 by an earthquake that killed 452 people and destroyed some 28,000 buildings. Following analysis of the fire damage caused and other major fires the National Board of fire Underwriters became convinced of the need for more comprehensive standards and codes relating to the design, construction and maintenance of buildings. With this increasing recognition of the importance of fire protection came more knowledge about the subject. Engineers started to accumulate information about fire hazards in building construction and in manufacturing processes, and much of this information became the basis for the early codes and standards. (Arthur & Casey, 2002)

#### HISTORY OF REGULATIONS FOR THE BUILT ENVIRONMENT

King Hammurabi, the famous law-making Babylonian ruler who reigned from approximately 1955 to 1913 B.C., is probably best remembered for the Code of Hammurabi, a statute primarily based on retaliation. The following decree is from the Code of Hammurabi: In the case of collapse of a defective building, the architect is to be put to death if the owner is killed by accident; and the architect's son if the son of the owner loses his life.

Today, society no longer endorses Hammurabi's ancient law of retaliation but seeks; rather, to prevent accidents and loss of life and property, from these objectives have evolved the rules and regulations that represent today's codes and standards for the built environment.

A code is a law or regulation that sets forth minimum requirements and, in particular, a building code is a law or regulation that sets forth minimum requirements for the design and construction of buildings and structures. These minimum requirements, established to protect the health and safety of society, attempt to represent society's compromise between optimum safety and economic feasibility. Although builders and building owners often establish their own requirements, the minimum code requirements of a jurisdiction must be met. (Arthur & Casey, 2002)

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According to (Arthur & Casey, 2002), there are two general types of building codes. Specification or prescriptive codes spell out in detail what materials can be used, the building size, and how components should be assembled. Performance-oriented building codes still embody a fair number of specification-type requirements, but provisions exist for substitution of alternate methods and materials (“trade-offs”), if they can be proven adequate.

The requirements contained in building codes are generally based on the known properties of materials, the hazards presented by various occupancies, and the lessons learned from previous experiences such as fire and natural disasters.

(Arthur & Casey, 2002) further stated, for a number of years, building codes dealt mainly with structural safety under fire or earthquake conditions. Since then, codes have grown into documents prescribing minimum requirements for structural stability, fire resistance, means of egress, sanitation, lighting, ventilation, and built-in safety equipment.

Typically, more than half of a modern building code usually refers in some way or another to fire protection. In as much as a building code is actually a law, various state and local jurisdictions write their own codes. Because of the complexities of modern building code development, several organizations develop model building codes for use by jurisdictions, which can then adopt the model codes into law. (Arthur & Casey, 2002)

#### Role of Standards in the built environment in the United States.

Many requirements found in building codes are excerpts from, or based on, the standards published by nationally recognized organizations. The most extensive use of the standards is their adoption into building codes by reference, thus keeping the building codes to a workable size and eliminating much duplication of effort. Such standards are also used by specification writers in the design stage of a building to provide guidelines for the bidders and contractors.

Model building codes contain appendices that list standards published by many organizations, including standards-making organizations, professional engineering societies, building materials trade associations, federal agencies, and testing agencies. The appendices are prefaced with a statement indicating that the standards are to be used where required by the provisions of the code or where referenced by the code. (Arthur & Casey, 2002)

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Universal design places human diversity at the heart of the design process so that buildings and environments can be designed to meet the needs of all users. It therefore covers all persons regardless of their age or size and those who have any particular physical, sensory, mental health or intellectual ability or disability. It is about achieving good design so that people can access, use, and understand the environment to the greatest extent and in the most independent and natural manner possible, without the need for adaptations or specialized solutions. (NDA, 2012)

It is imperative to integrate people with disabilities into society so that they can play active role in the society ( United Nations, 2004). Furthermore, provision of a barrier- free environment is broadly grouped into 4 complementary domains which are:

- a) inside the buildings,
- b) in the immediate vicinity of buildings
- c) on local roads and paths and
- d) in open spaces and recreational areas.

Several documents have set out guidelines for accessibility to places of public accommodation and commercial facilities by the disabled people. The guidelines are to be applied in the design, construction and alteration of public buildings. The facilities covered in the documents are substantial and it includes the following: ramps, stairs, elevators, platform lifts, windows, doors, entrances drinking fountains, signage etc. (Code of Federal Regulations 1994, Neufert, 1984 and United Nations, 2004).

United Nations (2004) further categorized the facilities into those that will be required for vertical and horizontal access in both new and existing construction and for urban design considerations (i.e. open spaces, recreational centers and pedestrian routes). The document further developed implementation checklists and the target group is composed of wheelchair users, people with limited walking abilities, the sightless, the partially sighted and the hearing impaired people.

Quality is one of the critical factors in the success of construction projects. Quality of construction projects as well as project success can be regarded as the fulfillment of expectations i.e. the satisfaction of project participants. (Ashokkumar, 2014)

“Quality of construction projects is linked with proper quality management in all the phases of project life cycle.” (Mallawaarachchi & Senaratne, 2005)

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The main phases of a building project can be described as: conceptual planning, feasibility study, design, procurement, construction, acceptance, operation and maintenance. Quality of construction projects is linked with proper quality management in all the phases of project life cycle. Design and construction are the two important phases of project life cycle which affect the quality outcome of construction projects significantly. In a NEDO (National Economic Development Office), London survey aimed at improving methods of quality control for building works it was found that "design" and "poor workmanship in the construction process" combined to form more than 90% of the total failure events. (Ashokkumar, 2014)

“Quality outcomes of the projects are not according to required standards faulty construction takes place, Further the errors on constructions projects occur frequently and can be costly for the contractors and owners of constructed facilities. In fact 6-15% of construction is found to be wasted due to rework of defective components detected late during construction and 5% of construction cost is wasted due to rework of defective components detected during maintenance. Although quality management at every stage of project life cycle is important but the quality management at the execution (Construction) stage contributes significantly on final outcome of construction projects. (Ashokkumar, 2014)

Quality Management System places emphasis on prevention not correction. The goal which works that is 100% free of errors, free of accidents, and 100% free of waste. The aim of the project is to do things right at the first time, eliminating waste and rework. To achieve this, it is necessary to focus on “Processes”. A process is a task or a series of tasks. Whenever the Quality management System is implemented we can easily minimize the wastage of material, cost overrun, wastage of time, etc... Literature and statistics show that small scale construction industries are not that much aware of Quality management system.

Quality: “The totality of characteristics of an entity that bear on its ability to satisfy stated and implied needs”. (PMBOK, 2000)

Quality management: Quality management refers to all activities of overall management functions especially top management leadership that determine quality policy objectives and responsibilities for all members of the organization.

Quality management: includes the process required to ensure that the project will satisfy the needs for which it was undertaken. It includes all activities of the overall management function that determine the quality policy, objectives and responsibilities and implements them by means

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such as quality planning, quality assurance, quality control, and quality improvement, within the quality system.

Quality system: The organizational structure, responsibilities, procedures, processes and resources needed to implement quality management.

Total quality management (TQM): A common approach to implementing a quality improvement program within an organization.

“Quality planning,” is a structured process for developing products (both goods and services) that ensures that customer needs are met by the final result. The tools and methods of quality planning are incorporated along with the technological tools for the particular product being developed and delivered. (Juran, 1999)

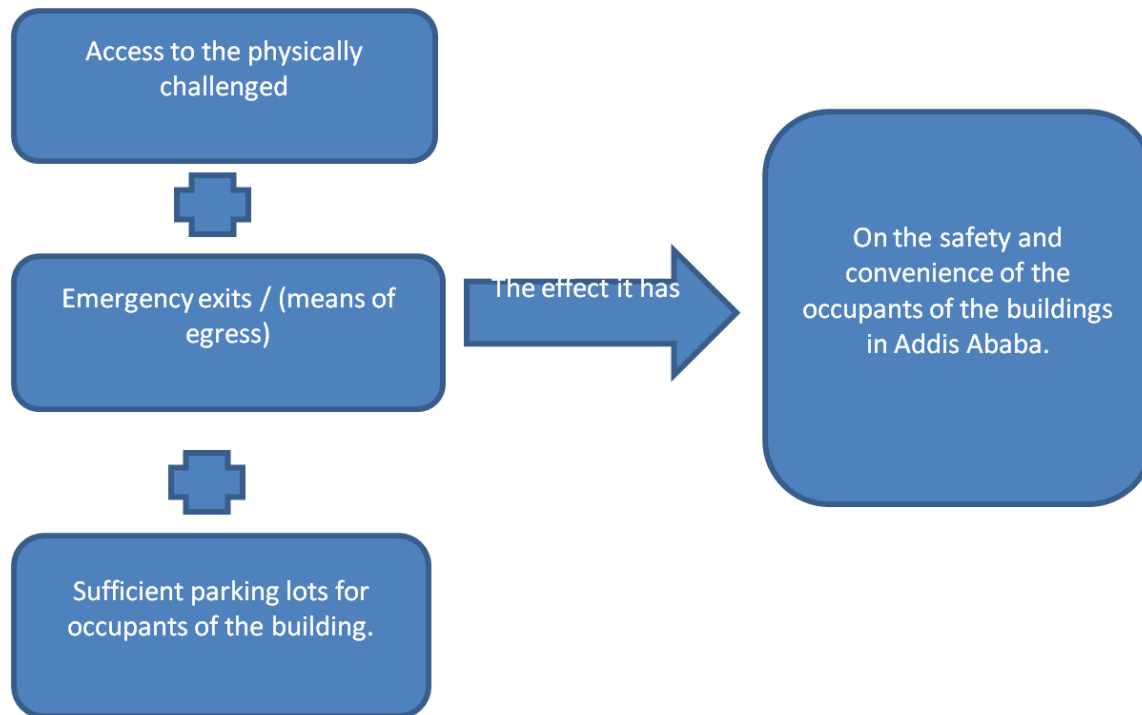
Quality planning: Identifying which quality standards are relevant to the project and determining how to satisfy them. Project quality management must address both the management of the project and the product of the project. It is one of the key facilitating processes during project planning, and should be performed regularly and in parallel with other project planning processes. Quality should be planned in, not inspected in.

Quality policy: is the overall intentions and direction of an organization with regard to quality as formally expressed by top management. The quality policy of the performing organization can often be adopted “as is” for use by the project.

Quality management plan: The quality management plan should describe how the project management team will implement its quality policy. In ISO 9000 terminology it should describe the project quality system “the organizational structure, responsibilities, procedures, possesses and resources needed to implement quality management. The quality management plan provides input to the overall project plan and must address quality control, quality assurance, and quality improvement for the project. The quality management plan may be formal or informal, highly detailed or broadly framed, based on the requirements of the project. (PMBOK, 2000)

## 2.2. Conceptual framework

Inputs to quality planning: The presence, inclusion/ implementation of standards.



*Fig. 2.2.1. Conceptual Framework*

## 2.3. Processes of Quality management

According to the professional practice for quality in the construction project the quality assurance (QA) can be defined as a program covering all the activities necessary to enhance quality in the work to meet the project predefined requirements.

Quality assurance provides protection shield against quality problems, difficulties through early warnings of trouble ahead. Such early warnings play as essential guard in the prevention of both internal and external problems; this procedure should be created before starting the construction phase.

Quality assurance is all the planned and systematic activities implemented within the quality system to provide confidence that the project will satisfy the relevant quality standards. It should

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be performed throughout the project. Prior to development of the ISO 9000 series, the activities described under quality planning were widely included as part of quality assurance. Quality assurance is often provided by a quality assurance department or similarly titled organizational unit but it does not have to be.

Assurance may be provided to the project management team and to the management of the performing organization (internal quality assurance), or it may be provided to the customer and others not actively involved in the work of the project (external quality assurance).

On the other hand, Quality control (QC): can be defined as the specific installation of the QA program and related activities, monitoring specific project results to determine if they comply with relevant quality standards and identifying ways to eliminate causes of unsatisfactory performance.

It should be performed throughout the project. Project results include both product results, such as deliverables and project management results, such as cost and schedule performance. Quality control is often performed by a quality control department.

Since quality control deals with monitoring specific project results to determine if they comply with relevant quality standards the aim of this thesis would be to check whether the mentioned standards, i.e., access for the physically challenged, emergency fire exit, and sufficient parking lots, are incorporated in the city code and how well they are implemented.

## 2.4. Standards and Regulations

The International organization for Standardization (ISO) differentiates between standards and regulations as follows:

- A standard is a document approved by a recognized body that provides, for common and repeated use, rules, guidelines or characteristics for products or services with which compliance is not mandatory. There are numerous standards in use covering everything from thermal stability of hydraulic fluids to the size of computer diskettes.
- A regulation is a document which lays down product process or service characteristics, including the applicable administrative provisions, with which compliance is mandatory. Building codes are an example of regulations. Care must be used in discussing standards and regulations since there is a vast gray area between the two. (PMBOK, 2000)

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As an illustration,

- Standards often begin as guidelines that describe a preferred approach, and later, with widespread adoption, become de facto regulations (e.g., the use of the critical path method for scheduling major construction projects).
- Compliance may be mandated at different levels (e.g. by a government agency by the management of the performing organization, or by the project management team).

## **2.5. Theoretical review regarding the selected building Standards in Focus**

Urbanization is currently one of the most important trends of the 21<sup>st</sup> century. Urbanization has a great potential to be a great engineer to achieve sustainable and inclusive development for all. About 6.25 billion people, 15% of them with disabilities are predicted to be living in urban centers by 2050. Urban environments infrastructure facilities and services, depending how they are planned and built, can impede or enable access participation and inclusion of members of society. (DESA, 2014)

### **2.5.1. Accessibility to buildings**

Why accessibility

We live in a diverse society, where social inclusion is becoming a worldwide issue and the demographics are changing in particular the population is aging and there is increased immigration. A report entitled “2010: A Europe accessible for all” highlighted that accessibility is a key to Autonomy, inclusion and sustainable development. ([http://www.socialdialogue.net/en/en\\_lib\\_170.htm](http://www.socialdialogue.net/en/en_lib_170.htm)). Sustainability is now high on the agenda for all and accessibility is a major factor in the delivery of a more sustainable environment. An accessible building has for all. It is safer, healthier, more comfortable and easily adapted to changing needs.

Everyone requires equal consideration from those who commission, design, construct or manage buildings and the external environment for example:

- Someone who is short of breath or has a broken ankle will find stairs difficult or impossible,
- Even a single step can deny entry to a person pulling a suitcase on wheels, or a person using a wheelchair. (O’herlihy, 2005)

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Human beings are physically disabled sometime in their lives. Thus public buildings should be accessible and barrier-free to both able and disabled people. Disabled people find it difficult to gain access into and operate freely without assistance in many buildings in Nigeria. Due to short fall or perhaps total neglect in provision of these facilities, their movement competence and talents are being restricted. These equally constitute a barrier in the development of their abilities and talents in people with disabilities. (Soyingbe, et al, 2006)

### *2.5.2. Emergency exits (means of egress)*

What's an exit route?

An exit route is a continuous and unobstructed path of exit travel from any point within a workplace to a place of safety. An exit route consists of three parts:

Exit access: Portion of an exit route that leads to an exit.

Exit: Portion of an exit route that is generally separated from other areas to provide a protected way of travel to the exit discharge.

Exit discharge: part of the exit route that leads directly outside or to a street, walkway, refuge area, public way or open space with access to the outside.

How many exit routes must a workplace have?

Normally, a workplace must have at least two exit routes to permit prompt evacuation of employees and other building occupants during an emergency. More than two exits are required, however, if the number of employees, size of the building, or arrangement of the workplace will not allow employees to evacuate safely. Exit routes must be located as far away as practical from each other in case one is blocked by fire or smoke. (Osha fact sheet, 2018)

What are some other design and construction requirements for exit routes?

- Exit routes must be permanent parts of the work place.
- Exit discharges must lead directly outside or to a street, walkway refuge area, public way or open space with access to the outside.

These exit discharges areas must be large enough to accommodate the building occupants likely to use the exit route. Exit stairs that continue beyond the level on which the exit discharge is located must be interrupted at that level by doors, partitions, or other effective means that clearly indicate the direction of travel leading to the exit discharge.

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#### Exit route

Doors must be unlocked from the inside. They must be free of devices or alarms that could restrict use of the exit route if the device or alarm fails.

- Side-hinged exit doors must be used to connect rooms to exit routes. These doors must swing out in the direction of exit travel if the room is to be occupied by more than 50 people or if the room is a high-hazard area.
- Exit routes must support the maximum permitted occupant load for each floor served, and the capacity of an exit route may not decrease in the direction of exit route travel to the exit discharge. (Osha fact sheet, 2018)

Aysu sagun, (2013) conducted a study on achieving efficient safety and security in public buildings during emergencies, stating it is important to consider the design process as a whole to ensure a safe and secure building that:

- Controls building access;
- Prevents targeting occupants;
- Integrates visual and audio notifications;
- Enables efficient evacuation.

Such a design approach covers the three main areas of building layout and circulation design namely:

- Means of ingress [Entrance]
- Circulation
- Means of egress [Exit]

These design aspects need to be investigated and considered carefully with appropriate design information and guidelines to improve safety in the built environment. Considering and identifying hazard resistance methods for various natural and human-induced events should be an integral part of the design projects. (Sagun,*et al*, 2013)

The fundamental principle for safety in buildings is to ensure that the occupants in a building are safe during emergency events as well as normal conditions. It is important to provide the opportunity for the occupants to move to a safe area, either inside or outside the building before the environment becomes hazardous. The design of the means of egress is defined by the number and location of exit routes and doors that ensure safe and continuous flow without any

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obstructions. Exit doors include both the doors used in natural conditions and the emergency exits used during an emergency event.

The evacuation process is dependent on the performance of the exits. This refers to how well the exits enable speedy evacuations by facilitating the efficient flow of people. It is influenced by a number of factors related to the characteristics of both the building and the building occupants.

These can be summarized as:

- People flow rate;
- Door dimensions;
- Visibility of the exits;
- Door condition (open or closed);
- Building geometry;
- Obstacles on the way to exits (furniture, columns, *etc.*);
- Circulation routes;
- Signage.

People heavily rely on their own personal experiences in decision making. As (Benthorn & Frantzich, 1999) stated, people's behavior is related to the schemata in their mind that maps how different facilities are organized in specific situations. This prior knowledge and instant perceptions merge to help them to make decisions when they face an unexpected event. In case of an emergency, they have to choose their exit route and door to leave the area that is exposed to danger. (Gwynne, *et al.*, 2001). People's exit choice depends on the following factors (Kuligowski, 2003):

- Familiarity with the exit door;
- Distance to the exit;
- Visibility of the exit door;
- Signage;
- Movement of other people;
- Orientation of the fire marshals;
- Obstacles on the exit route;
- Queuing in front of the doors. (Shen, 2003).

The design of buildings can be improved to mitigate the impacts of emergencies on people if these factors are investigated in detail to develop guidelines for design solutions for different

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types of buildings, circumstances and emergency events. Over-reliance on standards may limit the designers' ability to fully express their design ideas or develop better design solutions for particular cases. It can also dissuade them from searching and developing a deeper understanding of safety issues that may be specific to their design. This over-reliance may also create a danger by limiting their responsibility, causing inefficiency by letting them avoid some design issues because they are not stated in standards or codes of practice. (Hale,*et al.*, 2007).

### *2.5.3. Sufficient parking lots*

The provision of car parking is a fundamental component of all urban developments. Insufficient car parking provision can lead to congested, unsafe traffic conditions or result in illegal parking and may impact on the commercial viability of business; conversely an over-provision of car parking spaces may encourage car use and is an uneconomical use of urban land. (Aurecon Group, 2013)

A guideline prepared for Adelaide states, a factor in the success of a development or activity center is the level of transport access and parking provided. Developers and business operators often consider it a necessity that adequate car parking spaces are provided to meet demand and assist with the commercial viability of their businesses. Inadequate parking provision can result in over spill parking on residential streets, generating on-street congestion and creating potential adverse economic impacts on relevant businesses.

However, the following aspects are also relevant when determining the appropriate anticipated parking demand:

- The parking requirement may burden businesses where land value is high.
- Car parking is considered free by users, but the construction and maintenance costs are passed on through other means such as property prices or the cost of goods / services.
- Land used for parking could instead be developed and generate additional employment or income opportunities.
- Free and available parking encourages the choice of the car as the preferred transport mode.

A suitable balance between satisfying the anticipated demand for parking, and the benefits of utilizing the least land possible for parking is the ideal.

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Parking ratio is a formula used to compare the number of parking spots available in a lot to the square footage of building space. Cities and municipalities normally have ratio requirements to ensure adequate parking space and safety for workers and guests. (Kokemuller, 2018)

#### Standard calculation

Historically, the parking ratio compared parking square footage to building space square footage. As of 2015, though, the ratio is calculated by dividing the number of vehicle parking spaces into the building's square footage, and expressing the result per 1,000 square feet. Take a retail plaza with 300 parking spots and 60,000 square feet of shopping space. To calculate the parking ratio, divide 300 by 60. The result is five parking spots for each 1,000 square feet of floor space in the plaza. Parking requirements vary by building type. A general manufacturing plant must have 2.5 spaces per 1,000 square feet as of 2015. An arcade requires four spaces while a dance studio requires five.

A city or county website is a good resource to find municipality parking requirements. Business developers or operators can contact a city or county office to get parking ratio requirements if they aren't published online.

#### ADA Requirements

The Americans with Disabilities Act includes provisions that businesses must allocate a portion of parking spots to handicapped drivers, including spaces that are at least 96 inches wide for van accessibility. As of 2015, for the first 100 total spots, every 25 spots must have a corresponding handicap spot. As the total spots increase, the portion required for handicap spots decreases. (Kokemuller, 2018)

These standards included in the standard of the Ethiopian Building directive are supposed to be included in the design stage of the construction process, acting as Quality policy which in turn acts as an input to Quality control.

When the standards are found to be integrated properly it would qualify as a quality product as we have defined in this thesis quality is “The totality of characteristics of an entity that bear on its ability to satisfy stated and implied needs” and the standards satisfy the implied needs. With

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this in mind this thesis plans to find out the effect of quality and the standards on the safety and convenience of the occupants in the buildings of Addis Ababa.

### Empirical Study

A study conducted by A. soyingbe, to assess the accessibility for the physically challenged in public buildings in Nigeria, the study used checklists to assess presence and the functional requirements of the different facilities such as ramps, elevators/lifts, restrooms, signage, corridors, etcetera. Functional requirements of the facilities were also drawn up for the purpose of the study. A total of 257 public buildings were observed the study covered public buildings such as religious buildings, government administrative buildings, etcetera. Findings reveal the importance of barrier-free buildings cannot be over emphasized as it guarantees equal access to able and the disabled people. The inventories gathered on public buildings revealed that most public buildings are “closed” to the disabled people. Among the deficiencies identified with public buildings are inaccessibility and non-compliance of the supporting facilities to guidelines relating to the design and construction.

Kobes, (2008), conducted a study which was intended to describe the fire risk of high-rise buildings related to evacuation in case of fire, the study has revealed it is essential to extinguish or suppress an initiated fire as soon as possible. For that reason it is necessary to fit a sprinkler system in high rise buildings, especially in high-rise apartment buildings hotels and other high risk occupancy with regard to fire fatality. In addition the study reveals that occupants use familiar routes in case of fire, which in the case of high rise buildings, making it essential to make fire safe elevators to use the lifts in case of fire. Another aspect pointed out by Prolux (2007) that has great influence on the (downward) evacuation velocity in staircases, a counter flow of fire fighters who want to enter the building by the use of staircases. A study’s recommendation is to make extra staircases that are especially designed and only for fire fighters to make use of.

The study finally concludes, for making a rapid evacuation possible it is recommended to make use of spoken messages and to educate and train key role employees in organizations in the coordination of an evacuation.

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A study by (Kobes, 2008) also reveals, very little information is found on the extinguishment of a fire by occupants. Bennett et al (2007) found that in 78% of the domestic fires in Great Britain and in 75.2% of the fires in Australia the fire brigade was not called, suggesting one third of the fires puts itself out or this is done through actions of occupants. With regard to the strategy of 'Shelter and wait' it is found in several fires where people rather tend to walk through smoke or even choose to jump out of the building instead of shelter and wait for being rescued. (Gwynne, Galea, Lawrence, & Flippid, 2001). On the other hand, the strategy to instruct occupants of hotel or residential buildings to stay in their rooms / apartments is likely to be effective for the survival of a fire (Demers, 1981; Bryan, 1992).

## **2.6. Ethiopian Building Directives and Proclamations**

### ***2.6.1. Related standards and regulations in the building proclamation.***

These directives are selected because they are related to the standards in focus in this study.

These directives are excerpt of the Proclamation No. 624/2009

Note: The proclamations are numerated as they appear on the proclamation; this is due to citing the article numbers without creating confusion.

### **29. Land Use and Related Studies**

A national, regional or an urban plan approved by federal, regional or urban administration shall have precedence on aspects of land use and related studies stipulated in this Proclamation.

### **30. Designs**

1/ any building shall have designs required for the category it belongs.

2/ any building or components thereof shall be designed according to acceptable building design codes to ensure safety, comfort and unconstrained services.

3/ any building shall be designed and constructed in such a way that it ensures safety for people, other constructions and properties.

### **33. Architecture**

1/ any room or space shall have dimensions that shall ensure that such room or space is fit for the purpose for which it is intended.

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2/ the floor area of any dwelling unit may not be less than that necessary to provide one habitable room and a separate room containing toilet facilities.

3/ any habitable room in any dwelling building or dwelling unit, or any bedroom in any building used for residential or institutional occupancy shall, in addition to the provision of artificial lighting, be provided with at least one opening for natural light.

4/ any building, which is more than 20 meters above the ground floor, shall be provided with a lift or other similar service.

5/ Lifts shall be made to provide service without interruption.

## **FIRE PROTECTION AND FIRE FIGHTING INSTALLATION**

### **44. General Requirement**

- Any public building shall be designed and constructed in accordance with acceptable fire protection design standards so that it becomes fire resistant and, if fire occurs, it minimizes accident to its users and its surroundings.

### **48. Improper Granting of Work Permit**

1/ A building officer, or any other person who is vested with the power of granting permit for construction works intentionally:

a) Grants construction work permit to a person who has no legal possession on the land on which the building is to be constructed; or

b) Grants construction work permit to a person whose documents supporting the application are illegal or falsified; or

c) Grants an occupancy permit to a person whose building design or the construction thereof is not in compliance with the relevant plan of the urban center in which such a building is to be constructed; is punishable with rigorous imprisonment from five years to ten years and a fine not less than birr ten thousand and not exceeding fifty thousand birr.

2/ Where the crime specified in sub article (1) of this Article is committed negligently the penalty shall be imprisonment from one year to five years and a fine not less than one thousand birr and not exceeding birr five thousand.

### **49. Breach of Duty to Supervise**

1/ Any building officer or other public servant or any other person under contractual agreement, who is entrusted with supervising a building under construction in accordance with this

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Proclamation, intentionally refrains from stopping or causing the stoppage of the construction of a building the illegality of which he knows or should have known shall be punishable with rigorous imprisonment from five years up to ten years and with a fine not less than birr ten thousand and not exceeding fifty thousand birr.

2/ Where the crime specified in sub article (1)of this Article is committed negligently, the penalty shall be imprisonment from one year to five years and a fine not less than one thousand birr and not exceeding birr five thousand.

### *2.6.2. Related standards and regulations in the building directives*

According to the National building directive the three mentioned standards are expected to fulfill the following requirements.

Note: The directives are numerated as they appear on the Building directives; this is due to citing the article numbers without creating confusion.

#### *2.6.2.1. Access for the physically challenged*

##### General

- 33.1.1. The buildings should be accessible or the buildings should be equipped for making accessibility possible
- 33.1.2. The buildings should be free from obstacles for people who are visually impaired and for people who are physically challenged.
- 33.1.3. In a meeting hall found in a public building a standard designated place should be prepared that considers people who use wheel chairs and crutches.
- 33.1.4. Factories, educational establishments, place of worships and shopping centers, should have a cloth changing booth and rest rooms which are convenient for physically challenged people.

##### Stairs

- 33.2.1. Stairs should have handrails on both sides.
- 33.2.2. Handrails should have a maximum height of 0.90m and a minimum of 0.70m and should at least be 0.30m from the ramp of the landing.
- 33.2.3. If the width of the stair is more than 3meters, it should have a handrail in the middle.
- 33.2.4. The thread of the stair shouldn't be less than 30cms and the riser shouldn't be greater than 15cm.

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33.2.5. The surface of the threads should be made of non slippery materials.

### Ramp

33.3.1. A ramp shouldn't exceed 10% and should be connected with the lobby or the landing.

33.3.2. The surface of the ramp should be made out of durable and non slippery material and should be free from obstruction at all times.

33.3.3. The ramp should have a guardrail which is not less than 45 cms.

33.3.4. Ramps should have a maximum height of 0.90m and a minimum of 0.70m and should at least be 0.30m from the ramp of the landing.

33.3.5. If the width of the ramp is more than 3meters, it should have a handrail in the middle.

33.3.6. On any ramp turn a space which is 1.50m by 1.50m should be prepared.

### Lifts

33.4.1. Notwithstanding article no 33 sub section 33.1.1 for buildings which are less than 4 stories and if conditions are not satisfied for physically challenged people and if there are public buildings the lifts should be convenient for physically challenged people.

33.4.2. Any lift door shouldn't be less than 0.90m

33.4.3. Every lift should start from the ground floor and should reach every floor.

33.4.4. The lift should have a handrail on three sides of the lift and should be 80cm to 85cm from the floor.

33.4.5. The lift bell buttons should be 90cm to 110cm from the floor and 40cms from the corner of the wall.

33.4.6. The lift should be designed in such a way that it should aware the visually impaired having an audio that signals the level of the floor and the door is open. The buttons should also have a brail writings on the inside as well as the outside.

33.4.7. The lift's internal dimension should not be less than 1.30m in length and a height of minimum of effective 1m.

### Entrance

33.5.1. Any Public building's door sill should have a ramp if it has a level difference with the pavement.

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33.5.2. The width of the corridor shouldn't be less than 1.50m on the entrance of the building.

33.5.3. The floor of the building should be made out of non-slippery roads or it should have a carpet tied to the floor.

#### Door

33.6.1. The door width of any public buildings shouldn't be less than 85cm.

#### Rest Rooms

33.7.1. For a public facility there needs to be at least one water closet with one hand wash basin near to an entrance.

33.7.2. The area of the rest room door effective width shouldn't be less than 90cms and it should open towards the outside.

33.7.3. The width of the rest room door effective width shouldn't be less than 90cms and it should open towards the outside.

33.7.4. The rest room should have handrails on the three sides of the wall and the handrail should be 8cm to 10cm from the wall.

33.7.5. The height of the water closet should be 57cm to 60cm.

33.7.6. The hand wash basin, hand drier and soap dispenser should be at 50cm to 70cms from the floor.

#### Car Parking

33.8.1. Public facility buildings should have parking spaces reserved for the physically challenged with appropriate means access to it.

33.8.2. A designated parking spot should be marked and reserved for wheel chair users.

#### *2.6.2.2. Emergency exits (means of egress)*

43.1. Any workplace depending on the type of establishment it should be equipped with access to the outside which is free from hazard.

43.2. People at work, equipments and other goods should be out of harm's way and be ready in case of emergency.

43.3. Halls and corridors found in the building needs to be equipped with appropriate signage of the buildings floor no.

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43.4. In case of emergency if regular entrance and exits are found to be dangerous an emergency exit from the building should be prepared.

43.5. Emergency exits or roads should be designed in a way it could facilitate a quick way of evicting the building, and should have a signage and should have enough lighting.

43.6. Emergency fire doors direction of opening should be in a floor or landing that can accommodate full size of the doors and for swinging doors, the doors should be transparent allowing visibility to both sides of the door.

### *2.6.2.3. Sufficient parking lots*

- The directive states the number of parking lots assigned to a building should depend on the urbanization of the city and the landscape of the city and after it has been researched by the city's administration.

This directive is effective starting from 11<sup>th</sup> of May 2011 G.C.

According to PMBOK, Quality policy and Standards and regulations are few of the inputs to quality planning, which gives way to check whether Standards and regulations are considered when it comes to the designing of the buildings. Having these standards in the city code, the thesis aims to see the state of the standards in the different buildings of Addis Ababa.

## **2.7. Occupancy Permits**

Occupancy permits are documents that signify that a building surveyor is satisfied that the completed building work is suitable for occupation. The building Act 1993 requires the issue of an occupancy permit prior to occupation of a building where a building permit states that one is required. (VBA, 2017)

When are Occupancy permits required?

A building permit will specify whether you require either an occupancy permit or a certificate of final inspection prior to occupation of a building. Building work for a new home (including units or apartments) will always require an occupancy permit to be issued. It is an offence to occupy a new home that does not have an occupancy permit. A certificate of final inspection is issued for extensions or alterations to existing homes. Extensions and alterations do not require an

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occupancy permit as the existing building should already have had an occupancy permit issued on its completion. Again, the requirement for issue of a certificate of final inspection will be indicated on the building permit. (VBA, 2017)

### *2.7.1. Content of the Occupancy permit on Proclamation No. 624/2009*

1/ a newly constructed category “C” building shall not be put to use before it has been inspected for compliance with this Proclamation and a certificate of occupancy has been issued.

2/ a building officer may provide occupancy permit for partially completed building provided safety is ensured.

3/ Without prejudice to the requirements provided for in this Proclamation the time limit within which an occupancy permit may be issued shall be determined by Regulation to be issued for the implementation of this Proclamation.

4/ a building officer may take legal measures on any person occupying a category “C” building without a valid occupancy certificate.

## Chapter 3

### Research Methodology

#### 3.1. Research design

Research design is the blueprint for fulfilling research objectives and answering questions, in other words it's a master plan specifying the methods and procedures for collecting and analyzing the needed information. It must ensure that the information collected is appropriate for solving a problem.

The study has used mixed design using both qualitative and quantitative methods. The study has used cross-sectional studies design as it aims to see the state of the quality and standards at the moment the research has been carried out.

#### 3.2. Target population

The study's target populations are engineering consulting offices that are responsible for designing buildings, as the standards need to be incorporated at the designing stage from the standards and regulations placed in the building directives. This allows the study to examine whether the designs that are being designed, incorporate the standards in focus. The population is taken from the association of registered consultants by selecting the ones that work on buildings, so it would be an appropriate source of information to get the desired data. Out of the 88 Consulting engineering offices, 4 offices are closed, 42 offices don't work on buildings, making the study population size 42, with a sample size of 36 consulting engineering offices.

#### 3.3. Sampling Strategy

The sampling method used in the study is simple random sampling technique, and a lottery method is used in selecting the participants with no bias in mind meaning, regardless of their category, and years of experience giving each sample an equal chance of selection. The research is on the effect of quality and selected standards on the safety and convenience of the occupants in the buildings of Addis Ababa, so to have a representative population the study has chosen registered engineering consultants as it would be a valid input for the study since they follow the directives properly. Out of the eighty eight registered consultants some don't work on building projects, for this reason the study has selected the ones that work on buildings. One questionnaire

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is given to one consulting office and to get the most out of the survey the study's respondents are owners of the firms and senior architects that work in the offices.

### **3.4. Data collection tools and techniques**

Both primary and secondary sources are used to collect data for the research. A survey method is used to find out the data needed, a questionnaire is given for the sample statistics which are engineering consulting offices in Addis Ababa. In addition to the questionnaires given in person mail survey has been used via Google forms to collect surveys having the same content with the one given physically. Questionnaires and semi structured interview are used as a primary data source. The primary sources are used to find out whether standards are being incorporated in the design of the buildings and also whether there is a barrier that hinders the standards from being included. Secondary sources were used to check what the standards needed to fulfill, and how these standards need to be integrated from quality planning aspect.

The study has used four types of questions which are fill in the blank, a check box, and a table with a 'Yes' or 'No' option and the Fourth is a table that has a scale ranging from 1 to 5, 1 representing little significance and 5 having highest significance.. Arising from these questions the study was able to get some insights as some of the questions were open to express the participant's perceptions. These findings are in the qualitative analysis of the paper. The participants are randomly chosen and are expected to express their experience, no requirements is expected of them to fill the questionnaires other than being a practicing consulting firm.

### **3.5. Validity and Reliability**

Validity and Reliability issues are used for checking quality of instrument. These are criterion for evaluating the research tools. The Study has selected engineering consulting offices as a population. Validity of the questionnaire was done through consultation with the advisor. The alpha coefficient for the items is 0.92 which is considered acceptable (M.Cortina, 1993) suggesting that the items have relatively high internal consistency.

In addition to that the firms have designed a total of 1770 buildings amongst themselves which helps to show the representativeness of the sample size.

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Total projects in Addis Ababa

N	Valid	36
	Missing	0
	Std. Deviation	53.49953
	Minimum	.00
	Maximum	190.00
	Sum	1770.00

Table: 3.5.1. A *table* showing the number of buildings designed amongst the 36 Consulting engineers offices.

### 3.6. Data analysis methods

On the analysis section, the data gathered from different sources was analyzed and interpreted. The data gathered was analyzed in relation to the research questions and the objective of the study, i.e. the problem that the study wanted to address. The data gathered was analyzed using SPSS software.

Both quantitative and qualitative findings are presented. The quantitative findings are presented in a form of a table with the help of a qualitative approach taken from the semi structured interview. The analysis also includes qualitative findings, which are collected from the questionnaire, and semi structured interview.

### 3.7. Ethical issues

All parties in research should observe ethical behavior. Informed voluntary consent of the research participants and the confidentiality of the responses were kept private, and any quotes and illustrations are attributed to their source and properly referenced.

## Chapter 4

### Data Findings and Analysis

#### 4.1. Introduction

This part of the paper discusses results gathered from the engineering consulting offices questionnaires, and semi structured interviews while they fill the questionnaires and secondary sources including building directives, occupancy permits used by the regulatory body to give permission for the building to be of use.

#### 4.2. Findings and Analysis of the different standards and other issues related

Is there a quality control department in your firm?							
	N	Minimum	Maximum	Mean	Std. Deviation	Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Is there a Quality control department in your firm?	36	1	2	1.47	.506	-2.107	.768
Valid N (list wise)	36						

Table: 4.2.1. A table showing the presence of a quality control department in the firms.

According to the survey a mean of 1.47 is found in a scale of 1 to 2. Signifying, out of the sample size there are more firms without quality control departments than the ones that have one. When put in percentages, 47.2% of the firms have quality control departments where as 52.8% don't have quality control departments. Although according to the semi structured interview, even though the quality department is not available the consulting firms emphasized that the work gets done by other personnel without the presence of the department.

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	N	Minimum	Maximum	Mean	Std. Deviation	Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Due consideration given to the inclusion of access?	36	2	5	4.11	.747	.457	.768
Due consideration given to emergency exits?	36	2	5	4.44	.735	2.177	.768
Due consideration given to sufficient parking lots?	36	2	5	3.67	.986	-1.047	.768
Valid N (list wise)	36						

Table: 4.2.2. A table showing the due consideration given for the standards in the design.

The standards in discussion are present in the building directive as well as the occupancy permit. An occupancy permit is a permit which will be given to the owner of the building upon completion of the building, having checked it has fulfilled the needed requirements. Both the building directives as well as the occupancy permit incorporate the standards as mandatory. According to the survey, all the standards are given due consideration and included in the designs, but according to the semi-structured interview conducted while the participants are filling the questionnaire, they have stated that although it is included in the design stage it doesn't guarantee its implementation. This applies for all the three standards. The consideration given to the standards, ranking with emergency exit being given more attention followed by accessibility to the physically challenged and finally for sufficient parking lots.

**Do you apply the whole contents of the directives?**

	N	Minimum	Maximum	Mean	Std. Deviation	Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Do you apply the whole content of the directive?	36	2	5	3.78	.989	-.699	.768
Valid N (list wise)	36						

Table. 4.2.3. A table showing whether the firms apply the whole contents of the building directive No. 5/2003 when designing buildings.

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When it comes to application of the directive the participants have responded that it is mandatory to follow the directives, because the regulatory body wouldn't approve the designs especially after the directive has been acted into law. Keeping this in mind, the respondents mean as shown above is 3.78, 1 representing Not at all, and 5 denoting all the time, giving an idea that there is still a gap in following the directives from the design offices.

**How often does an omission of a standard disqualify a design?**

	N	Minimum	Maximum	Mean	Std. Deviation	Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Does an omission of a standard disqualify a design?	36	2	5	4.03	1.276	-1.247	.768
Valid N (list wise)	36						

*Table 4.2.4. A table showing whether an omission of a standard disqualifies a design or not.*

According to the survey the possibility of omitting a standard leading to disqualification is big, signifying at the design stage the city administration is in control of approving the designs that are to the standard. Although the majority of the respondents have replied that it is mandatory, according to the semi-structure conducted the attitude and professionalism of the permit approving officers plays a great role in keeping the standards upheld. This shows the inconsistency of the rules that are put by the city administration, and so, leading to unsafe and inconvenient environment for the occupants of the buildings.

**How often do you have meetings with the city administration concerning the building directives being implemented?**

	N	Minimum	Maximum	Mean	Std. Deviation	Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Regular meeting with officials?	36	1	5	1.58	.937	4.691	.768
Valid N (list wise)	36						

*Table: 4.2.5. A table showing whether regular meetings are held with officials or not.*

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The survey has shown that regular meetings with the city administration doesn't happen with the consulting engineers, that often, as the mean result shows 1.58 is in the range in between "Not at all" and " Not that often" signifying the fact that due attention is not given from the city administration. In addition to that the rules and regulations change from time to time without notifying the consulting engineer offices giving room for malpractice and a space for justifying wrong doings as the rules weren't informed timely.

**The rate of accessibility, safety and convenience of the standards**

	N	Minimum	Maximum	Mean	Std. Deviation	Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
How do you rate of the occupants' safety?	36	2.00	5.00	3.8333	.81064	-.140	.768
How do you rate accessibility of buildings?	36	3.00	5.00	4.0556	.62994	-.300	.768
How do you rate convenience of the parking lots?	36	1.00	5.00	2.8333	1.08233	-.385	.768
Valid N (list wise)	36						

*Table 4.2.6. A table showing the rate of safety and convenience of the standards built.*

The survey has shown that the safety of the occupants has a mean of 3.83 out of a scale 1-5, 1 being the least safe. Suggesting there is a room for progress because the safety of the occupants could be kept by following the directives and sticking to the standards. And according to the semi-structured interview the answers given only apply in the design stage, this is to say there is a possibility of the standards being applied but it doesn't guarantee it as there is usually a design change promoted by the owners of the building, which could affect the safety of the occupants as a result.

The accessibility of the buildings has a mean of 4.05, out of a scale 1-5, 1 being the least convenient, signifying the buildings are accessible, yet could fulfill the maximum scale if the

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right procedures and directives are adhered to. Although according to the respondents this as well is guaranteed on the design stage, due to space limitation and client’s need to use the space for maximum functional area the designs made for access could get omitted on the implementation stages.

The survey has shown that the convenience of the building parking lots has a mean of 2.83, out of a scale 1-5, 1 being the least convenient, showing clearly the inconvenience that could create for the occupants of the building. This has been confirmed by the respondents saying the directives that come from the city administration states the space allocated for the occupants is less than the number of the occupants in the buildings.

**How often does a limitation of space become a problem to accommodate the mentioned standards?**

	N	Minimum	Maximum	Mean	Std. Deviation	Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Space limitation.	36	1	5	3.75	.874	4.067	.768
Valid N (list wise)	36						

*Table: 4.2.7. A table showing how space available for the construction affects the standards.*

According to the survey the mean displays a 3.75 on a scale of 1-5, 1 being the least and representing, 1=Not at all, 2=Not that often, 3= Sometimes, 4= Most of the time, 5=All the time.

According to the result 16.7% have said all the time, 58.3% has said space limitation is a problem most of the time, where 19.4% have said sometimes, , and 5.6% of the participants have said not at all, for incorporating the three standards.

Although, space limitation was raised as a question as it could be an obvious barrier from implementing the standards, the study has posed a question asking if there are other physical or legislative barriers that impede the standards from being incorporated. In response to that, many reasons were disclosed, these answers with the semi structured interview has shed some light to the problems faced with the standards not being constructed.

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### **4.3. Quality from the design perspective**

Quality planning involves identifying which quality standards are relevant to the project and determining how to satisfy them. (PMBOK, 2000)

According to the survey conducted there is no problem at the designing stage, as all the three standards were incorporated in almost all the designs especially after the building directive was introduced at 2011 G.C., and the Consulting engineers couldn't help the situation other than deliver their part to the expectation of the building directives, based on the semi structured interviews while filling the questionnaires the consulting engineers has complained about the inconsistency directive that comes from the regulatory body, the frequency of the changes of the directive, the conduct of the personnel assigned to give the permit, and the loose controlling system are some of the problems that they have mentioned.

### **4.4. Problems mentioned by consulting engineers preventing from following the building directives.**

These problems are collected from a primary source on the questionnaire.

- Permit rules.
- Client's requirements, alteration of ideas.
- Offsets from adjacent roads and properties.
- The City's master plan.
- Municipality and Utility lines.
- Parking requirements, Floor to area ratio (FAR).
- Inconsistency rule of thumb by permit authority.
- Client's need and knowledge regarding the standard and building design.
- Professionals not having enough knowledge on the directives.
- The size of the plot and topography of the site.
- Huge demand of clients for maximum functional area.
- Change of regulations time and again.
- Misconduct of regulatory body.
- Corruption.
- The legislative body not having clear rules and obligations due to this following the building directives will depend upon the attitude of the building permit officer.

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- Topography and location of site.
- Lack of clarity of the building directives.
- The fact that the plot size and the project scales don't match on most projects, creating a pressure from the client to use minimum standards.

#### 4.5. Summary

The results reveal that the standards and guidelines accommodate the mentioned standards and the participants have confirmed that not only it is included but is mandatory for the design to be approved.

The reality on the ground is although the standards are incorporated in the building directives and included in the designs according to the survey, the designs do not get implemented for different reasons among the main ones, lack of consistent regulation and changing the rules time and again by the city administration, and the clients/ owners of the properties asking for a revision of the design, omitting the standards topping the list.

According to the survey, the safety and convenience of the buildings in Addis Ababa have a room for improvement as the buildings incorporate the standards on the design stage, leaving a room for the owners of the buildings to ask for a revision, which according to the semi-structured interview, leads to an omission of the standards, leading to the buildings being unsafe and inconvenient.

## Chapter 5

### Conclusion and Recommendations

#### 5.1. Conclusion

The study reflects, the responses taken from both the primary and secondary sources has proved, the standards and regulations that need to be followed as an input for quality planning are incorporated in the city code, and in the occupancy permit checklists, and it has been acted into law since 2011 G.C.

Having seen the findings, what is happening on the ground is these standards aren't being incorporated consistently in all the buildings of the city, is attributed to the fact there is no consistent code or standard that the regulatory body follows. In addition to this the changes that are made do not get informed to the consulting engineers. This has made things difficult for the consulting engineering offices to abide by consistent rules and regulations. This has also opened a path to building owners to manipulate the property as they see fit.

In conclusion, regardless of the building directives being acted into law, the state of the quality and standards in Addis Ababa remain unsafe and inconvenient according to the semi structure interview with the research participants, this is due to after the consulting engineers have designed the designs and are approved, the clients would ask for a change in design which the consulting engineers are not in control, as the scope of agreement doesn't include the supervision of the design and handing over the site until the building is ready to use.

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## **5.2. Recommendations**

It is the study's recommendation that if there is a regulation that states it should be the responsibility of the Consulting engineers to supervise the inclusion of the different standards in the design as well as the implementation of it, in the building directives this could guarantee the inclusion of the standards as the consultant engineers are legal bodies which could be held responsible unlike an individual or entity who is not legally accountable.

The study also recommends for the city administration to send different permit issuing officers on different stages of the supervision so that there is a check and balance not leaving a room for corruption. In addition to this, adding the frequency of the officer that is responsible for overseeing the project's completion to be involved in the process as well, rather than coming to approve a finished product, can help the project from possible structural as well as aesthetic modifications to the completed building.

And finally, to ascertain the safety and convenience of the buildings, the study recommends the issuance of the occupancy permit to incorporate stakeholders especially in public buildings, so that they could comment on the presence and omission of the standards this way it would make things harder for the building owners, as they are not considering the safety and convenience of the users of the buildings.

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## Appendices

### Appendix A

#### Questionnaire for Survey

Addis Ababa University School of Commerce

Graduate program in Project Management

Title of the Thesis: “The Effect of Quality and Selected Standards on the Safety and Convenience of the Occupants in building projects of Addis Ababa.”

Dear Participant,

This questionnaire is meant to collect information on the inclusion of certain standards in the buildings of Addis Ababa. The research intends to identify the missing gaps if there are any, in these standards, the standards being, Access for the physically challenged, Emergency exits (means of egress), and sufficient parking lots for the occupants of the buildings. It's with great sincerity we appreciate your willingness to participate in this survey. We ask your kind cooperation in answering the question as truthfully as possible. For further questions pertaining to this project, please contact, Addis Ababa University, School of Commerce.

Sincerely,

Thank you for your Cooperation.

By: Daniel Dereje

Mobile: +251 91 164 7349

Advisor: Worku Mekonnen (Ph. D.)

## Questionnaire

Dear Participant,

Underneath there are questions with four types of approach, the first type is fill in the blank, the second is a checking box, third is in a form of a table giving an option of a Yes or No and the Fourth is a table that has a scale ranging from 1 to 5, 1 representing little significance and 5 having highest significance. It's with great appreciation that I ask you to fill in the blanks accordingly, tick the boxes which fit your answer and fill in the Yes or No with a clear symbol and choosing your level of significance; you would be helping the study in reducing its measurement error.

Thank You.

1. Educational background 1. Diploma  2. BA/BSC  3. MA/MSc  4. PhD
2. How long have you worked in the industry? (In years).\_\_\_\_\_
3. When was your company founded? \_\_\_\_\_
4. What category is your firm? \_\_\_\_\_
5. How many projects has your company done in Addis Ababa? \_\_\_\_\_
6. How many projects has your company done after May of 2011 G.C. in Addis Ababa?  
\_\_\_\_\_

		Yes	No			
7.	Is there a quality control department in your firm?					
		1	2	3	4	5
8.	How often do you give due consideration in the inclusion of access for the physically challenged in the buildings you design?					
9.	How often do you give due consideration in the inclusion of emergency exits (means of egress) in the buildings you design?					
10	How often do you give due consideration in the inclusion of sufficient parking lots for the building occupants?					

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11.	How do you rate the application of building directives No. 5/2003 when designing buildings?					
12.	How often do you have meetings with the city administration concerning the building directives being implemented?					
13.	How often an omission of a standard disqualifies a design?					
14.	How often is it possible to omit a standard because of a client's request?					
15.	How do you rate the safety of the occupants or the users of the buildings in regard to the standards?					
16.	How do you rate the accessibility of the buildings to the users of the buildings?					
17.	How do you rate the convenience with regard to the parking area for the occupants of the buildings?					

18. Type of organization 1. Government  2. NGO  3. Private  4. Other

19. How often does a limitation of space become a problem to accommodate the mentioned standards?  Not at all  Not that Often  Sometimes  Most of the time  All the time

20. What other physical or legislative barriers are there, that prevent you from following the building directives.

\_\_\_\_\_

\_\_\_\_\_.

21. How many projects incorporate all three standards in the design located in Addis Ababa?

\_\_\_\_\_.

22. How many projects incorporate all three standards after May of 2011 G.C. in Addis Ababa? \_\_\_\_\_.

## Appendix B

### Ethiopian Building Directive: Building directives No. 5/2003.

#### 29.6. የመኪና ማቆሚያ ስታንዳርድ

ለማንኛውም ተሽከርካሪ የማቆያ ቦታ እንደ ከተማው ዕድገት እና መልከወጥሶ ስራዎች አቀማመጥ በከተማው አስተዳደር ተጠንቶ በሚዘጋጅ መመሪያ መሠረት ተግባራዊ መደረግ ይኖርበታል፤

#### 33. ለአካል ጉዳተኞች የሚደረጉ ዝግጅቶች

በማንኛውም በሕንፃ ምድብ “ሐ” የሚገኙ የሕዝብ መገልገያ ሕንፃዎች የአካል ጉዳት ላለባቸው ሰዎች ከዚህ በታች የተመለከቱት ዝቅተኛ መስፈርትን የሚያሟሉ እና አመቺ መዳረሻዎች ሊኖራቸው ይገባል፡፡

#### 33.1. አጠቃላይ

33.1.1 ማንኛውም የሕዝብ መገልገያ ሕንፃ ለአካል ጉዳተኞች ተደራሽ በሚሆን መልኩ መገንባት ወይም አካል ጉዳተኞችን ተደራሽ ለማድረግ የሚያስችሉ የተመቻቹ ሁኔታዎች ሊሟሉለት ይገባል፤

33.1.2 በተሽከርካሪ ወንበር ለሚጠቀሙ፣ ማየት ለተሳናቸው እንዲሁም በከፊል ለተጎዱ አካል ጉዳተኞች ወደ ህንፃው መዳረሻ ከእንቅፋት የፀዳ መንገድ ሊዘጋጅ ይገባል፤

33.1.3 በማንኛውም የህዝብ መገልገያ ሕንፃ ውስጥ የሚገኝ የመሰብሰቢያ አዳራሽ በተሽከርካሪ ወንበር ወይም በክራንች የሚንቀሳቀሱ አካል ጉዳተኞችን ታሳቢ ያደረገ የመቀመጫ ቦታ በስታንዳርዱ መሠረት ሊዘጋጅ ይገባል፤

33.1.4 ፋብሪካዎች እና የትምህርት ተቋማት፣ የማምለኪያ ቦታ፣ የገበያ ማዕከል ለአካል ጉዳተኞች የሚያመች የልብስ መቀየሪያና የመፀዳጃ ክፍሌ ሊኖራቸው ይገባል ፤

#### 33.2 ደረጃዎች

33.2.1 መወጣጫ ደረጃዎች በሁለቱም ጎኖች የእጅ መደገፊያ ሊኖራቸው ይገባል፤

33.2.2 የእጅ መደገፊያዎች ከፍታቸው ከወለል በላይ ከፍተኛው 90 ሳ.ሜ ዝቅተኛው 70 ሳ.ሜ ሆኖ ከተዳፋቱ መዳረሻ ቢያንስ 30 ሳ.ሜ አልፎ የተዘረጋ መሆን ይኖርበታል፤

The Effect of Quality and Selected Standards on the Safety and Convenience of the Occupants in the Building Projects of Addis Ababa.

33.2.3 የመወጣጫዎች ደረጃ ስፋት ከ3 ሜትር በላይ ከሆነ በመሃል የእጅ መደገፊያ (Handrail) ሊኖረው ይገባል፤

33.2.4 የደረጃዎች መርገጫ ስፋት ከ30 ሳ.ሜ ያላነሰ ከፍታው ከ15 ሳ.ሜ ያልበለጠ መሆን አለበት፤

33.2.5 የደረጃዎች የወለል መርገጫ ከማያንሸራትት ቁስ መሰራት ይኖርበታል፤

33.3 ተዳፋት (Ramp)

33.3.1 ማንኛውም ተዳፋት ወይም ራምፕ ተዳፋቱ ከ10 ያልበለጠ ሆኖ ከዋናው ወለል ማከፋፈያ መተላለፊያ (Lobby) ወይም የወለል መዳረሻ ጋር መገናኘት ይኖርበታል፤

33.3.2 የተዳፋቱ መተላለፊያ ጠንካራ ወይም የማይለመጥ እና ከማያንሸራትት ቁስ የተሰራ ሆኖ ከማንኛውም ከሚጋርዱ ነገሮች ነፃ መሆን ይገባዋል፤

33.3.3 ከተዳፋቱ ግራና ቀኝ 45 ሳ.ሜ ያላነሰ ከፍታ ያለው መከለያ ሊኖረው ይገባል፤

33.2 ደረጃዎች

33.2.1 መወጣጫ ደረጃዎች በሁለቱም ጎኖች የእጅ መደገፊያ ሊኖራቸው ይገባል፤

33.2.2 የእጅ መደገፊያዎች ከፍታቸው ከወለል በላይ ከፍተኛው 90 ሳ.ሜ ዝቅተኛው 70 ሳ.ሜ ሆኖ ከተዳፋቱ መዳረሻ ቢያንስ 30 ሳ.ሜ አልፎ የተዘረጋ መሆን ይኖርበታል፤

33.2.3 የመወጣጫዎች ደረጃ ስፋት ከ3 ሜትር በላይ ከሆነ በመሃል የእጅ መደገፊያ (Handrail) ሊኖረው ይገባል፤

33.2.4 የደረጃዎች መርገጫ ስፋት ከ30 ሳ.ሜ ያላነሰ ከፍታው ከ15 ሳ.ሜ ያልበለጠ መሆን አለበት፤

33.2.5 የደረጃዎች የወለል መርገጫ ከማያንሸራትት ቁስ መሰራት ይኖርበታል፤

33.3 ተዳፋት (Ramp)

33.3.1 ማንኛውም ተዳፋት ወይም ራምፕ ተዳፋቱ ከ10 ያልበለጠ ሆኖ ከዋናው ወለል ማከፋፈያ መተላለፊያ (Lobby) ወይም የወለል መዳረሻ ጋር መገናኘት ይኖርበታል፤

33.3.2 የተዳፋቱ መተላለፊያ ጠንካራ ወይም የማይለመጥ እና ከማያንሸራትት ቁስ የተሰራ ሆኖ ከማንኛውም ከሚጋርዱ ነገሮች ነፃ መሆን ይገባዋል፤

33.3.3 ከተዳፋቱ ግራና ቀኝ 45 ሳ.ሜ ያላነሰ ከፍታ ያለው መከለያ ሊኖረው ይገባል፤

33.3.4 የተዳፋቱ የእጅ መደገፊያ ከፍታ ከወለል በላይ ከፍተኛው 90 ሳ.ሜ ዝቅተኛው 70 ሳ.ሜ ሆኖ ከተዳፋቱ መዲረሻ ቢያንስ 30 ሳ.ሜ አልፎ የተዘረጋ መሆን ይኖርበታል፤

33.3.5 የተዳፋቱ ስፋት ከ3 ሜትር በላይ ከሆነ አካፋዩ ላይ ተጨማሪ የእጅ መደገፊያ (Handrail) ሊኖር ይገባል፤

33.3.6 በማንኛውም የተዳፋት መዘራያ/መታጠፊያ ቦታ አንድ ዓይነት የወለል ከፍታ እና 1.50 ሜትር በ1.50 ሜትር ስፋት ያለው ማረፊያ ቦታ መዘጋጀት ይኖርበታል፤

### 33.4 አሳንሰር

33.4.1 በአንቀጽ 33 ንዑስ አንቀጽ 33.1.1 ላይ የተጠቀሰው እንደተጠበቀ ሆኖ ከ4 ፎቅ በታች ለአገልግሎቶቹ ተደራሽ የሆነ የተመቻቸ ሁኔታ በሌለበት እና ከ4 ፎቅ በላይ ለሚኖራቸው የሕዝብ መገልገያ ሕንፃዎች ለአካል ጉዳተኞች የሚያመች አሳንሰር በሕንፃው ውስጥ መገጠም ይኖርበታል፤

33.4.2 የማንኛውም አሳንሰር በር ስፋት ከ90 ሳ.ሜ ማነስ የለበትም፤

33.4.3 ማንኛውም አሳንሰር ከምድር ወለል (Ground floor) የሚነሳ እና ወደ ሁለም ወለሎች የሚያደርስ መሆን አለበት፤

33.4.4 አሳንሰሩ በሦስቱም የግድግዳ ክፍል በኩል የእጅ መደገፊያ ሊኖረው የሚገባ ሆኖ መደገፊያው ከወለል በላይ ከ80 ሳ.ሜ እስከ 85 ሳ.ሜ ከፍታ ያለው መሆን ይኖርበታል፤

33.4.5 አሳንሰሩ የመጥሪያ ደወል ከወለል ከ90 ሳ.ሜ እስከ 110 ሳ.ሜ እንዲሁም ከግዴግዳው ጠርዝ 40 ሳ.ሜ ርቆ የተቀመጠ ሊሆን ይገባል፤

33.4.6 አሳንሰሩ ማየት ለተሳናቸው የአካል ጉዳተኞች አመቺ በሚሆን መልኩ የበር መዘጋትና መከፈት እና የወለል ከፍታን በድምጽ የሚገልጽ መሣሪያ የተገጠመለት እንዲሁም የውስጥ እና የውጭ መጥሪያ ደወል የብሬይል ጽሐፍ ያለበት መሆን ይኖርበታል፤

33.4.7 የአሳንሰሩ የውስጥ ርዝመት/ጥልቀት ከ1.30 ሜትር እና የተጣራ ስፋት ከ1 ሜትር ያላነሰ መሆን ይኖርበታል፤

33.5 መግቢያ

33.5.1 የማንኛውም የሕዝብ መገልገያ ሕንፃ ደፍ የወለል ክፍታ ልዩነት ካለው የተዳፋት መወጣጫ መዘጋጀት ይኖርበታል፤

33.5.2 በሕንፃ መግቢያ በኩል ያለው ኮሪድር ስፋት ከ1.50 ሜትር ያነሰ መሆን የለበትም፤

33.5.3 የሕንፃው ወለል ከማያንሸራትት ቁስ የተሰራ ወይም ከወለል የተያያዘ ምንጣፍ ያለው መሆን ይኖርበታል፤

33.6 በር

33.6.1 በማንኛውም የሕዝብ መገልገያ ሕንፃ ውስጥ የሚገኙ በሮች ስፋት ከ85 ሳ.ሜ ማነስ የለበትም፤

33.7 መፀዳጃ

33.7.1 ለአንድ የህዝብ መገልገያ ሕንፃ ቢያንስ አንድ መፀዳጃ ከአንድ መታጠቢያ ጋር መግቢያ በር አካባቢ ሊዘጋጅለት ይገባል፤

33.7.2 የመፀዳጃ ክፍሉ 1.50 ሜትር በ1.50 ሜትር ስፋት ያላነሰ መሆን ይኖርበታል፤

33.7.3 የመፀዳጃ ክፍሉ የተጣራ የበር ስፋት ከ90 ሳ.ሜ ማነስ የሌለበት ሆኖ ወደ ውጭ ተካፋች መሆን ይኖርበታል፤

33.7.4 በመፀዳጃ ክፍሉ ውስጥ በሦስቱም ማዕዘን የእጅ መደገፊያ ያለው ሆኖ መደገፊያው ከግድግዳው ከ8 ሳ.ሜ እስከ 10 ሳ.ሜ ርቆ መዘጋጀት ይኖርበታል፤

33.7.5 የመፀዳጃ ቤቱ መቀመጫ ከ57 ሳ.ሜ እስከ 60 ሳ.ሜ ከወለል በላይ ክፍታ ሊኖረው ይገባል፤

33.7.6 የመፀዳጃ ቤቱ የእጅ መታጠቢያ፣ ማድረቂያ፣ እና የሳሙና ማስቀመጫ ከወለል በላይ ከ50 ሳ.ሜ እስከ 70 ሳ.ሜ ክፍታ ሊይ መዘጋጀት ይኖርበታል፤

33.8 የመኪና ማቆሚያ

33.8.1 የሕዝብ መገልገያ ሕንፃዎች ለአካል ጉዳተኞች የሚያመች የመኪና ማቆሚያ ቦታ ከአመቺ መዳረሻ ጋር ሊዘጋጁላቸው ይገባል፤

33.8.2 ለተሽከርካሪ ወንበር ተጠቃሚ የአካል ጉዳተኞች የመኪና ማቆሚያ ቦታ ጠቋሚ ማሳያ ምልክት መዘጋጀት ይኖርበታል፤

43. ስለ አደጋ ማምለጫ መንገዶች

43.1. ማናቸውም የሥራ ቦታዎች ለሥራው እንደየሥራው አካባቢ ተገቢ የሆኑ እና ከአደጋ የተጠበቁ የመግቢያ እና የመውጫ መንገዶች ሊኖራቸው ይገባል፤

43.2. በሥራ ቦታ የሚገኙ ሠራተኞች፣ መሣሪያዎች እና ሌሎች ቁሳቁሶች ከአደጋ በተጠበቀ ሁኔታ ሊንቀሳቀሱ በሚችሉበት ሁኔታ መዘጋጀት አለባቸው፤

43.3. በአዳራሾች ወይም በሌሎች ክፍሎች የሚገኙ መተላለፊያዎች እና በየሕንፃው ውስጥ ከክፍል ወደ ክፍል ለመዘዋወሪያ ወይም ለመውጫ እና መግቢያ የሚያገለግሉ መተላለፊያዎች እንደየአስፈላጊነቱ በወለል ምልክቶች እንዲለዩ መደረግ ይኖርበታል፤

43.4. ድንገተኛ አደጋ በሚፈጠርበት ወቅት እና መደበኛ የመውጫ መንገዶች አደገኛ ሆነው ሲገኙ ወይም ከአገልግሎት ውጭ ሆነው ሲገኝ ለማምለጥ የሚያስችሉ የድንገተኛ አደጋ ማምለጫ ዘዳዎች በቅድሚያ ሊዘጋጁ ይገባል፤

43.5. የአደጋ መውጫ በሮች ወይም መንገዶች ፈጣን የመውጫ አገልግሎት እንዲሰጡ በሚያስችል ሁኔታ ሊዘጋጁ፣ ምልክት ሊደረግባቸው እና ብርሃን ሊኖራቸው ይገባል፤

43.6. የአደጋ ጊዜ መውጫ በሮች መከፈት የሚኖርባቸው የበሮቹ ውዝዋዜ በሚፈለገው የቦታ ስፋት ወደ ያዙ ወለሎች እና የደረጃ ማረፊያዎች በኩል ሆኖ ወደ ሁለቱ ተቃራኒ አቅጣጫዎች የሚወዛወዙ በሮች ሲገጠሙ አሳልፎ ለማየት በሚያስችል ክፍተት መሆን ይገባቸዋል፤

### Appendix C

## Occupancy Permit

ቀን \_\_\_\_\_

#### የግንባታ መጠቀሚያ ፈቃድ ጅክ ሊስት

1. የግንባታው መረጃ

- ❖ የባለ ይዞታው ስም \_\_\_\_\_
- ❖ ስልክ የቤር \_\_\_\_\_ ሞባይል \_\_\_\_\_
- ❖ የግንባታው አገልግሎት አይነት በጸደቀው ፕላን የተፈቀደለት ስ \_\_\_\_\_ አገልግሎት ነው
- ❖ ክፍለ ከተማ \_\_\_\_\_ ወረዳ \_\_\_\_\_ ቀበሌ \_\_\_\_\_ የቤት ቁጥር \_\_\_\_\_
- ❖ የግንባታ ፈቃድ የተሰጠበት ቀን \_\_\_\_\_
- ❖ መጠቀሚያ የተጠየቀለት ግንባታ ስሙ ስም \_\_\_\_\_ ስሙ ስም \_\_\_\_\_ ስሙ ስም \_\_\_\_\_
- ❖ የተሟላ መረጃ ተረጋግጧል \_\_\_\_\_ አስከ \_\_\_\_\_

1. የይዞታ ማሳያ ፕላን \_\_\_\_\_ አለው 2. የወለል ፕላን \_\_\_\_\_ አለው 3. የቁም ገፅ እና ተቆራጭ ፕላን \_\_\_\_\_ አለው

2. ሳይት ፕላን

- ❖ ለአካል ጉዳተኞች መግቢያ ተጻፋት፣ ተሰርቷል \_\_\_\_\_ አልተሰራም \_\_\_\_\_
- ❖ የመጠባበቂያ ዉሀ አለው \_\_\_\_\_ የሰውም \_\_\_\_\_
- ❖ የመጠባበቂያ ኤሌክትሪክ አለው \_\_\_\_\_ የሰውም \_\_\_\_\_
- ❖ የአደጋ ጊዜ ማምለጫ መወጣጫ አለው \_\_\_\_\_ የሰውም \_\_\_\_\_

3. የምድር በታች ወለል

- ❖ ከተፈቀደው ፕላን ዉጭ ግንባታ አለው \_\_\_\_\_ የሰውም \_\_\_\_\_
- ❖ ለመኪና አገልግሎት ነው \_\_\_\_\_ አይሰም \_\_\_\_\_
- ❖ አንጻራዊ ምልክቶች አሉ \_\_\_\_\_ የሰውም \_\_\_\_\_
- ❖ የአሳት ማጥፊያ የዉሀ መስመሮች እና የጋዝ ማጥፊያ ማሳሪያዎች ተገጥመው አገልግሎት ይሰጣሉ \_\_\_\_\_ አይሰጡም \_\_\_\_\_

4. የምድር በላይ ወለል

- ❖ የመጻጻጃ አገልግሎት የተሟላና የሚሰራ ነው \_\_\_\_\_ አይሰም \_\_\_\_\_
- ❖ የአሳት ማጥፊያ የዉሀ መስመሮች እና የጋዝ ማጥፊያ ማሳሪያዎች ተገጥመው አገልግሎት ይሰጣሉ \_\_\_\_\_ አይሰጡም \_\_\_\_\_
- ❖ የፕላን ለዉጥ አለው \_\_\_\_\_ የሰውም \_\_\_\_\_
- ❖ ግንባታው ሙሉ በሙሉ ተጠናቋል \_\_\_\_\_ አልተጠናቀቀም \_\_\_\_\_
- ❖ የአንጻራዊ የደረጃ መወጣጫ፣ የሰነት/ባልኮኒ/ መደገፊያዎች ጥራቱን በጠበቀ የግንባታ ቁሳ ተሰርተዋል \_\_\_\_\_ አልተሰራም \_\_\_\_\_

5. የቁም ገፅ

- ❖ የመስኮት ለዉጥ አለው \_\_\_\_\_ የሰውም \_\_\_\_\_
- ❖ የቤት ቁመት ለዉጥ አለው \_\_\_\_\_ የሰውም \_\_\_\_\_

6. የግንባታው ጥቅል ይዘት

- ❖ የግንባታው የክፍል አገልግሎት አይነት በተፈቀደው መሰረት ነው \_\_\_\_\_ አይሰም \_\_\_\_\_
- ❖ የፕላን ለዉጥ ተደረጓል \_\_\_\_\_ አልተደረገም \_\_\_\_\_
- ❖ ግንባታው ሙሉ በሙሉ ተጠናቋል \_\_\_\_\_ አልተጠናቀቀም \_\_\_\_\_
- ❖ የልተጠናቀቀው የአንጻራዊ ክፍል ከአደጋ ነፃ ነው \_\_\_\_\_ አይሰም \_\_\_\_\_
- ❖ መነሳት ያለበት የአንጻራዊ ቁሳ ተሰርቷል \_\_\_\_\_

7. የመተማመኛ ፊርማ

> መረጃው ሲወሰድ የነበሩ ባለሙያ ስምና ፊርማ

7.1 ስም \_\_\_\_\_ ፊርማ \_\_\_\_\_ 7.2 ስም \_\_\_\_\_ ፊርማ \_\_\_\_\_

ቀን \_\_\_\_\_ ቀን \_\_\_\_\_

> መረጃው ሲወሰድ የነበሩ የአንጻራዊ ባለቤት ወይም ሕጋዊ ተወካይ ስምና ፊርማ

ስም \_\_\_\_\_ ፊርማ \_\_\_\_\_ ቀን \_\_\_\_\_

መታወቂያ ኮፒ ይያያዝ