EiABC

Ethiopian Institute of Architecture,
Building Construction and City Development
Addis Ababa University

BUILDING HEIGHT AND LAYOUT ANALYSIS FOR IMPROVED RESIDENTIAL QUARTERS; THE CASE OF SOME SELECTED CONDOMINIUM BUILDING SITES OF KOLFE KERANIYO SUB-CITY, ADDIS ABABA

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APPROVED SHEET

This is to certify that the thesis entitled " building height and layout analysis for improved residential quarters; in the case of some selected condominium building sites of kolfe keraniyo sub-city" is submitted in partial fulfillment of the requirements for the degree of Master‘s in urban planning and done by Habtamu Wesebo. Therefore, we recommend that it be accepted as fulfilling the thesis requirements, and hence, hereby can submit the thesis to the department.

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DECLARATION

I, the undersigned, declare that this thesis entitled "Building Height and Layout Analysis for Improved Residential Quarters: The Case of Some Selected Condominium Building Sites of Kolfe Keraniyo Sub-City" is my own and original work and has not been presented at any other university, and that all sources of material used for the thesis have been duly acknowledged, following the scientific guidelines of the institute.

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CONFIRMATION

This thesis has been submitted for examination with my approval as an Institute's advisor.

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ACRONYMS / ABBREVIATIONS

BAR	Built Up Area
FAR	Floor area ratio
IHDP	Integrated Housing Development Program
ELC	the European Landscape Convention
GTP	Growth and Transformation Program
SFH	Single family homes
CBE	commercial bank of Ethiopia
HOAs	homeowners' associations
RIP	Road Interpretation Plan
EiABC	Ethiopian Institute of Architecture, Building Construction and Urban Development

Building height and layout analysis for improved residential quarters; the case of some selected condominium building sites of kolfe keraniyo sub-city, Addis Ababa

Author: HABTAMU WESEBO

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ABSTRACT

This thesis investigates mainly the current housing problems in Addis Ababa, which are getting worse and need an urgent solution. Currently, there are about 950,000 people waiting for the 10/90, 20/80, and 40/60 condominium house schemes. The existing condominiums are built with limited consideration of available space and a low building height without accounting for proper building location, i.e., slope, noise, wind, weather, and sunlight. There are also limited communal parking spaces, green spaces, and recreational areas, and there are cases where those spaces are used for other purposes and are not used by the community. Methodologically, the height regulation building prepared by the Addis Ababa city administration used questionnaires and checklists to collect data. The findings show that there is a lack of building height and layout for regulations condominiums, variations in the standard and existing conditions, a lack of building setbacks, and the condition of buildings contradicting the nearby villages. So, the condominiums that are going to be built at the government level to overcome housing problems require a system that needs to be controlled and completely meet standards.

Key words; condominiums, community, building height, building layout, regulations…

CHAPTER ONE

1. INTRODUCTION

1.1. Background of the study

The general concept of a condominium is one of a large building or group of buildings divided into individual units that are owned separately, while the land under and around the structure and its common facilities are owned and maintained jointly. Individual units may be homes or offices, and single buildings may contain one type of unit or may mix several different kinds of units. Because condominium ownership represents a combination of individual and jointly owned property, concomitant rights and responsibilities must be set forth in a number of documents that usually accompany condominium development and sales.

Condominium development is a way out of costly and frustrating management, especially in a period when inflation may grow faster than rents can be raised. Furthermore, condominium owners receive tax breaks similar to homeowners; property taxes can be deducted from income tax, as can interest charges on mortgages. In spite of the attractions offered by condominiums, the financial, legal, and organizational problems that ensue are considerable.

Internationally, the way to solve the problems related to the height and layout of the building in relation to the construction and related design issues of condominiums is that the height of the building given by a city administration and the standard to be met,

In Africa and particularly in Ethiopia, housing problems are widespread. To overcome the problem, since 2005, Ethiopia has been implementing an ambitious government-led low- and middle-income housing Program called the Integrated Housing Development Program (IHDP). The initial goal of the Program was to construct 400,000 condominium units, create 200,000 job opportunities, promote the development of 10,000 micro- and all-enterprises, en enhance the capacity of the construction sector, re regenerate inner city slum areas, and promote homeownership for low-income households.

Addis Ababa, the capital and largest city of Ethiopia, is expanding spatially to accommodate the increasing population resulting from both natural growth and in-migration. As a result, residents living in the sprawling residential settlements at the fringes call for an affordable and efficient urban public living area to accommodate jobs, markets, health centers, and other socio-economic activities.

The quality of the condominiums that have been built, the lack of height of the buildings, and the lack of services provided to the community are not enough.

Addis Ababa is also the capital city, where most of the country's economic activity is concentrated. As a result, the number of people living in the city is increasing, while the provision of housing for city dwellers, especially those of low and middle income, is not yet well received. Most of the residents of the city are living in different housing options, i.e., renting individual houses, living in kebele houses, living with families, informal settlement areas, government housing corporations, and other areas. Therefore, generally, there is a shortage of housing for a rapid increase in the city's population.

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1.2. Statement of the problem

The low height of the condominium buildings so far built has its own consequence in not addressing the house-seeking community. The location of the buildings in terms of comfort for the residents and inadequate parking spaces, insufficient green spaces, children's play areas, recreational areas, and not meeting standards are the main problems of the study area.

Therefore, it is necessary to show the gaps by comparing governmental condominiums with private apartments, which are important for the institutions involved in the sector and the relevant offices.

The study area lacks important aspects of residential quarters like open space for recreation and parking space. The low height of the buildings in the condominiums accommodates a small number of people, which is against the purpose of the condominium housing program proposed for setting up a large number of residents in a small area.

Not providing low-cost residential houses affects those with a lower standard of living, as the cost of rental houses is increasing due to the increase in population in Addis Ababa city. Thus, the city needs to develop its capacity to accommodate the growing population. If the problem of communal housing continues in its current state, informal settlement will increase, which could potentially be another head-ache for the government. Other problems in the study include the lack of necessary infrastructure, the lack of suitable shopping areas, green space, the fact that the number of parking spaces is below the number of residents, and the absence of recreational facilities.

Therefore, it is critical to highlight the gaps in communal housing, like condominiums, and forward possible solutions for the problems and to make them so that mistakes are not repeated in future common housing projects.

1.3. Objectives of the study

1.3.1. General objectives

The general objective of the study is to analyze the building height and layout for sustainable improvement of residential quarters and neighborhoods in some selected condominium buildings located in Kolfe Keraniyo sub-city, Addis Ababa.

1.3.2. Specific objectives

The specific objectives of the study are to:

- Evaluate the height of condo buildings against the building-height restriction of the city;
- Investigate condo building layout effects on the existing and potential communal site functions; and
- Identify the influence of the existing building height variance on the condo and on the nearby villages.

1.4. Research questions

- The Research addressed the following research questions:-
  1. What are the gap between the building-height restriction of the city and the building height of existing condos?
  2. How the condominiums layout affects communal site functions?
  3. What are the effects of building height variance on the condo site and nearby villages?

1.5. Scope of the study

1.5.1. Thematic scope

The issues associated with public services are very vast and complex. Economic, social, and environmental issues are some of the issues associated with the low height of the buildings and the layout of the buildings. This study focuses on the accessibility of social services in Addis Ababa through recreational space, parking, and public green spaces.

1.5.2. Geographic Scope

The study is limited to the planning boundary of the Addis Ababa city administration, specifically targeting the Milifony, Weyra, and Kara Kore condominium sites in Kolfe Keraniyo sub-city, Addis Ababa.

1.6. Significance of the study

Academic significance: the study will be used by other researchers who are interested in conducting future studies in this area, and I, as a researcher, try to dig out the real problems that hinder the effect of building height and the arrangement of the building in condominiums.

Administrative significance: this study suggests means to improve the current policies and standards in the use of space. And forwarded guidelines help to plan and regulate condominium sites, which are the residential quarters of the majority of the population in Addis Ababa.

1.7. Limitation of the study

There are some limitations that affected the research at the time of data collection and post-data collection. Such problems are the bureaucracy of some offices, the absence of necessary documents in some offices, the misunderstanding of respondents, the coinciding of our data collection time with election promotion, financial related problems, and the lack of our own computer, which restricts the data collection and preparation of senior essays.

1.8. Organization of the Study

This study contains five chapters. Chapter one comprises the background of the research, statement of the problem, research objective, research questions, significance, scope, and limitations of the study. Chapter two describes a review of related literature. The third chapter includes a description of the study area, research design and methodology, research method, data source, sample size and sample technique, instruments of data collection, methods of data analysis and presentation, and ethical considerations. Chapter four consists of results and discussions, and the last chapter includes conclusions and recommendations from the research.

CHAPTER TWO

2. LITERATURE REVIEW

2.1. Theoretical literature reviews

Non-landed residential complexes with approval for habitation are known as condominiums. Every residential unit must have a functional layout with bedrooms, a living room, a dining room, a kitchen, and restrooms for domestic use. In the Master Plan, condominiums are permitted in the zones designated as Residential, Commercial & Residential, and Residential with Commercial. They are not permitted anywhere other than existing apartments and condominiums that have been previously approved in areas that are exclusively for landed housing developments. (Ayda Alehashemi, Seyed Amir Mansouri and Nasser Barati, 2017)

Compared to apartment buildings, condominiums often provide greater social and recreational space, have larger site areas, and have more common boundary setback, for locations with a combination residential and commercial zoning. One definition of a condo is having the air space of a unit in a multi-unit building. The four walls separating a condo unit from other units and common facilities are not part of the condo owner's title to the property, as this description makes clear. The common ownership of the apartment includes the floor, ceiling, walkways, stairwells and outdoor areas (Antrop and Mander, 2004)

A typical kind of condominium is a residential high-rise that houses multiple households. That being said, the idea is not exclusive to residential structures or high-rise buildings. Condos are sometimes built as residential townhouses, and the idea is also used for business structures, like office condominiums. (CHEN, 2023).

The methods used by condominium developers to give unit owners garages and parking spots vary. Certain developments set aside these facilities as restricted common areas; the condo association retains ownership of the space but grants the unit owner the only right to utilize the garage or area. (CHEN, 2023).

In other developments, the unit owner buys the garage or parking space and has ownership. However, the covenants, conditions, and restrictions may still limit the owner's ability to sell or rent the space independent of the unit itself (CHEN, 2023).

A legal document known as the declaration of covenants, conditions, and restrictions lays out rules for condominium unit owners. The unit's permitted use is defined in this document. It explains how the owner uses both public and restricted common areas. The declaration specifies procedures for choosing the homeowners' association board, which oversees the development. (CHEN, 2023).

Unit owners also pay condominium fees to the condominium association. These fees generally include the cost of insuring the building, shared utilities, and a reserve of funds for future maintenance of the building. The costs might also cover the amount the organization pays a management company to run the property on a daily basis. Condo fees are subject to increase, and unit owners may be responsible for any costs not covered by reserve funds in the event that the building needs major maintenance. (CHEN, 2023).

2.2. Theoretical of urban landscape sustainability and wetlands functions

The Renaissance and the advent of modernity coincided with the birth of the idea of landscape in Europe in the 15th century. (Berque, 2013). In the past, it was the outcome of the modern division between the physical and phenomenon realms. In actuality, the initial action in the emergence of the landscape is cogito Cartesian, which is regarded as the foundation of the ontology of modernity and suggests an infinite modern subject. (Berque J. , 1964).

Currently, modern humans are trying to individualize the environment and create a landscape in nature by severing the relationship between man and nature. (Mele, 2023). In actuality, the environment perfectly embodies the dichotomy established by contemporary absolute reason between the world and humans, nature and culture, and object and subject (Ayda Alehashemi, Seyed Amir Mansouri and Nasser Barati, 2017).

"Heidegger proposes a topological model for thinking about the relationship between people and the landscape as a matter of the 'there ness' of the self-disclosure of being in and of the world". At the same time, a middle method influenced by both the object and the thought replaces the dualism used to define a place and its landscape. This is the outcome of how the environment and the human mind combine to create a new, indivisible unit structure (Mahan and Mansouri, 2020).

2.2.1.1. Landscape definition

The researchers have employed many methodologies in their research due to the interplay between human interaction with the environment in this wide area and the scope and complexity of the concept of a landscape. However, as was already mentioned, researchers are attempting to bridge the gap between subjectivity and objectivity by studying a paradigm holistically, as seen by their definitions. In actuality, the meaning of a "landscape" varies depending on who is viewing or discussing it (Surendra N.and Kulshreshtha, 2020).

Which of them are mentioned below?

- ✓ The primary concern in regional geography is the terrain. It is regarded as an inseparable fusion of a region's natural and cultural characteristics. "A landscape is an objective form of existence. If a sight cannot or will not be understood by humans, it should not be regarded as a landscape, whether it is natural or man-made. According to the European Landscape Convention (ELC) (Antrop and Mander, 2004).
- ✓ According to research on popular perceptions of landscapes, certain terms such as "nature," "beautiful," "country," "city," and "garden" are associated with specific major images of individuals from the landscape. He further states that "the outcomes indicate a positive connotation of the landscape and its high relevance for individuals." Everyone's primary heritage is their landscape (Tilley, 2008).

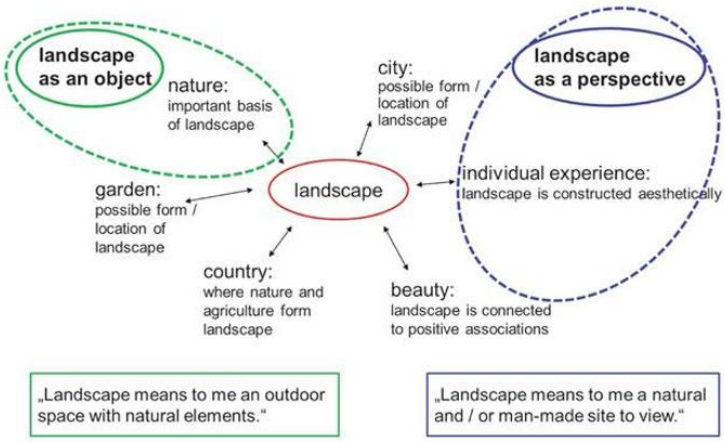

Figure 1 landscape and its semantic field (source: (Tilley, 2008))

2.2.1.2. Urban landscape

The urban landscape term is an old concept that has always existed for many years with the origin and development of cities, but as a specialized term in the late nineteenth century with the design and actions. The father of landscape architecture with reference to American cities: as may be observed, two contentious terms with a variety of interpretations make up the urban landscape. It is best to initially look into a few different perspectives on the idea of the city (Olmsted, Frederick Law, 1863).

- The city is referred to as a magnificent creative show in "City Planning According to Artistic Principles." From this vantage point, looking at the city is typically objective, with a focus on ornamentation and certain qualities like proportion, naturalism, plurality and variation, and organic systems in shape and color combinations. In actuality, a city is a physical entity, and specialists only take its aesthetic features into account. Considering this perspective as one of the artistic viewpoint adherents, it presents texture, color, mass, and lines as the primary components of the urban environment (Gibberd, 2004).

- Describes the residential, commercial, industrial, and transportation infrastructure as the city's four key sectors. Le Corbusier is a functional city as a result. He thought that the most well-known aesthetic response to human requirements in building is simplicity, as opposed to creative vision (Chiaradia, 2019).

Cities are thought to be more than just people and communal spaces. From their perspective, the city is more of a mental condition characterized by structured customs, habits, and attitudes. The city is more than just a physical system; it is a product of the social processes of the people who created it (Chiaradia, 2019).

Urban design, landscape architecture, urban planning, geography, geology, and other specialized publications have all made extensive use of the notion of an urban landscape in recent decades, both in theoretical underpinnings and in discussions and texts. The concept of the landscape is broad in scope and has particularly permeated the theoretical underpinnings of various disciplines; on the other hand, there are shared research topics in the aforementioned areas (Keshtkaran, 2019).

2.2.1.3. Urban landscape evolution

As can be seen from the above, there is much debate surrounding the idea that urban landscapes can serve as media for teaching people how to read urban texts. Meanwhile, this concept's evolution throughout the past few decades can be tracked by researching the history of the urban landscape. (Keshtkaran, 2019).

2.2.1.4. Landscape ecology

One of the newest fields of ecology to emerge in Europe since World War II is landscape ecology, which is regarded as a separate scientific discipline (Wu and Hobbs, 2007). Despite the fact that this word dates back to the 1930s, landscape ecology has only recently gained specialized attention when computers and software were used to assist ecologists and geographers in the 1980s. It is a well-known, specialized field of study by landscape architects, ecological scientists, geographers, and researchers of the social sciences around the world (Benjamins, 2011)

2.2.1.5. Urban wetland

Lessening the effects of flooding, reducing the urban heat island effect, recharging groundwater, filtering storm water, enhancing air quality, and creating green spaces, which are essential for both humans and wildlife in regions that are frequently dominated by development and impermeable surfaces, can all help make urban areas more livable. Urban wetland managers typically believe that because wetlands are too deteriorated or under too many stressors to be given priority for restoration or protection under programs with limited funding, local community leaders are generally uninformed of the benefits urban wetlands currently or potentially could bring. Consequently, these vital resources are frequently overlooked or over utilized for development, which reduces the advantages they offer to metropolitan areas (Benjamins, 2011).

❖ Benjamins, 2011 Considering these challenges:

- **Grey Infrastructure:** Systems are created and manufactured by humans, usually with a single purpose in mind. Detention ponds, pipelines, and wastewater facilities are a few examples.
- **Green Infrastructure:** Systems are created and manufactured by humans, usually with a single purpose in mind. Detention ponds, pipelines, and wastewater facilities are a few examples.
- **Living Shoreline:** a stabilized, protected margin around a body of water, either entirely natural or created using a blend of natural and artificial materials that offers additional benefits, including habitat and protection against storm surges.
- **Natural Infrastructure: natural** ecosystems that offer several co-benefits, such as wetlands and floodplains, and that produce desired results, such as storm surge protection, nutrient reduction, flood water attenuation, or enhanced natural habitat.
- **Nature-Based Project:** A project that focuses on the restoration, protection, and management of naturally occurring systems such as wetlands or floodplains to achieve desirable outcomes.
- **Urban Wetland:** Wetlands inside and close to densely inhabited places, such as towns and cities that serve such communities on an ecological, social, and economic level. Urban wetlands can be produced artificially or naturally.

Compared to rural wetlands, urban wetlands confront more obstacles and offer fewer benefits in terms of restoration and space protection. This is mostly due to programmatic priorities and scarce resources at the state level. Each state's wetland programmer is distinct and created to fulfill various state objectives (Dooley and Stelk, 2021).

2.3. Urban morphology

2.3.1.1. Definition of urban morphology

Urban morphology is the examination of a settlement's external structure. To be more exact, it is the study of how the various elements of the urban fabric come to be and how these elements relate to one another to explain the compositions and configurations of these elements across time. These intricate phenomena lend themselves to analysis across discipline boundaries and at various spatial dimensions; they have taken on their current form during the duration of human habitation. Every physical feature of a city has a shape; morphology permeates every part of urban life. Urban form changes continuously in response to social, environmental, economic, and technical advancements, all of which are mediated by the policies of municipal authorities. In the modern, urban age (Chiaradia, 2019).

2.3.1.2. Urban morphology challenges

Chiaradia (2019) categorized urban morphology challenges into three aspects;

- **The first challenge** is that the topic needs to be embedded in an epistemological framework. Three dimensions of reality are addressed by urban morphology: perceived, lived, and thought. Appealing political-economic, cultural, geographic, and epistemological embedding is offered by this conception (Chiaradia, 2019).
- **The second challenge** has to do with how vague the idea of shape is. Urban shape has a perceived reality, on the one hand. It is factually sound, regardless of how one chooses to interpret it. The idea of form has been enslaved by a tradition that limits the analysis of its objective aspect to symbolic-formal language (Chiaradia, 2019).
- **The final challenge** aims to offer a cohesive, all-encompassing method for studying urban morphology that may be applied to descriptive, explanatory, and prescriptive/normative contexts. Urban morphological techniques and indicators are rarely applicable on both sides of these divides due to a variety of issues with data availability (Chiaradia, 2019).

2.3.1.3. Condominium Site Coverage

The percentage of a site that is made up of buildings and other structures is known as site coverage. Residential sites are prevented from becoming overly developed by controlling the overall site coverage of dwelling buildings and associated development. Additionally, there is enough room for private open space and rich soil planting. Basements, stores, shops, common areas, green spaces, parking lots, recreational areas, driveways, swimming pools, and any attached or detached balconies, decks, patios, pergolas, terraces, verandahs, carports, and garages are all considered sites covered by the policy (Aakarshit, 2021).

2.4. Communal housing standards

2.4.1.1. Green area

According to Addis Ababa's structural land use plan, the minimum requirement for urban green space area in residential compound areas is 30% of the total land area, with 4 m2 per 100 m2 for building permits. The poor standard results from the combined effects of growing built-up regions, expanding transportation infrastructure, and shrinking urban green spaces. Urban green space is disappearing due to a number of factors, including a lack of urban agroforestry, a lack of parks, a lack of designated green space areas, and a lack of strong urban policies. Policies for the development of urban green spaces are well-defined and firmly rooted in the constitution. Nevertheless, it is considered that the Growth and Transformation Program 2010–2015 (GTPI) (Elgar, 2022),

Table 1 green area standard

No	Functional level	Maximum distance from home (m)	Minimum surface (ha)
1	Residential green	150	1
2	Neighborhood green	400	10 (park: 5 ha)
3	Quarter green	800	30 (park: 10 ha)
4	District green	1600	60
5	City green	3200	>200 (smaller towns)
6	Urban forest	5000	>300 (big cities)

The benefits of green spaces in cities

Including green spaces in urban planning is the first step towards creating healthier urban communities. For instance, it has been shown that establishing green roofs and covering rooftops with plants might lessen the impact of the urban heat island. The amount of energy required to heat and cool the buildings would be decrease if our roofs were covered in soil, vegetation, and other greenery. These elements would also act as insulation for the structures below. Rainwater can also be controlled via green roofs, which can catch it as it falls and filter contaminants out of it. (Elgar, 2022).

2.4.1.2. Storage and Shops

Any place, whether physical or virtual, where a radiation machine, radiographic exposure device, or storage container is kept safe and out of the way while not being utilized for radiography procedures is referred to as a storage area. Storage facilities are secured with locks or a physical barrier to stop uninvited removal of the equipment, container, or device, as well as accidental exposure and tampering. It refers to a structure, or a portion of one, that is primarily used for the storage or shelter of products. Examples of such structures include warehouses, freight depots for cold storage, transit sheds, store houses, public garages, hangars, truck terminals, grain elevators, barns, and stables. Keeping and protecting commodities from the time of creation until they are required for consumption, which is, storing goods from the point of production to the point of consumption, is a crucial marketing function (TNAU and Palada, M. C., 2019).

2.4.1.3. Common service area

For the purposes of this lease, the term "Common Area" refers to the area of the shopping Center that is meant to be used by all tenants jointly. This includes, but is not limited to, amenities like parking areas, private streets and alleys, landscaping, curbs, loading areas, sidewalks, malls, and promenades (enclosed or not), lighting facilities, drinking fountains, meeting rooms, public restrooms, and the like. It also does not include space in buildings that are occasionally rented out for commercial purposes, as the same may exist from time to time, and further excluding streets and alleys maintained by a public authority, The proportions, identity, and kind of any buildings inside the Shopping Centre, as well as the Common Area's location, are all subject to modification at any moment by the Landlord. Tenant may not utilize the Common Area for commercial purposes or engage in any other activity that might infringe upon the rights of others to use the Common Area. (Tenant, 2017).

2.4.1.4. Parking space

Parking areas are defined as areas of open space other than streets that are used for parking cars, as well as access ramps and driveways to such areas. These areas must be free of buildings and other structures, with the exception of those that are necessary for the operation of the parking area, and they must be kept available and maintained for parking cars, including maneuvering aisles and other space that is necessary for parking cars. They may also include landscaped open spaces. "Garage parking spaces for cars should have an overall length of more than 5m and a width of 2.30m, and parking spaces for the disabled should be more than 3.50m wide," according to Ernst and Peter Neuter's book Architect's Data. But it's not that easy (Tenant, 2017).

The minimum length and width of a parking space depend on several factors, but mainly:

- ✓ From the angle of the parking (parallel to the road, 45°, 60°, 90°, etc.)
- ✓ From the width of the road,

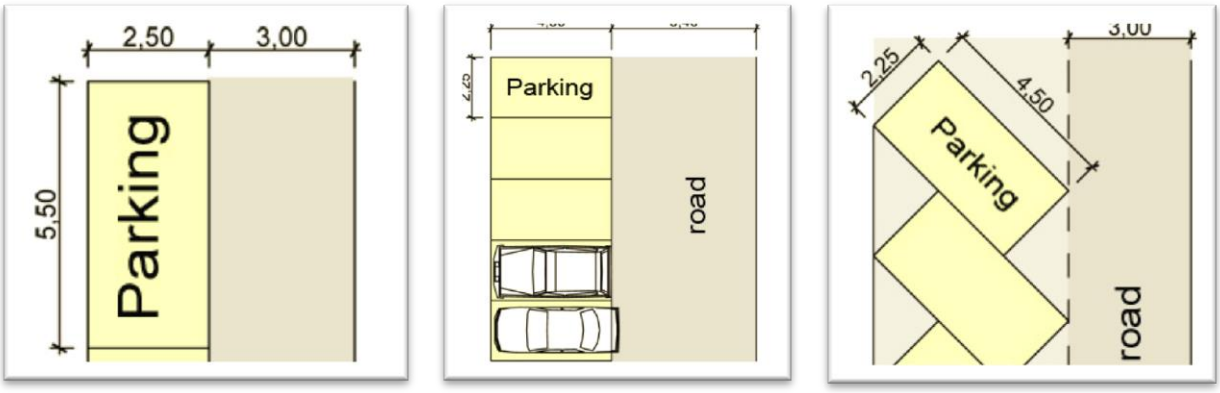

Figure 2 parking area size (source: Architecture Symbols, (Tenant, 2017)

2.4.1.5. Recreation area

Recreational areas are places where people go to play actively or have fun, such as playgrounds, parks, sports fields, golf courses, school yards, picnic areas, or other locations where turf is used for recreational reasons or to provide a playing surface (Tenant, 2017).

- ✓ It has been demonstrated that parks and other protected public lands enhance water quality, safeguard groundwater, avert flooding, enhance the quality of our air, act as vegetative buffers against development, create habitat for wildlife, and offer space.
- ✓ People flock to parks and leisure centers to stay in shape and healthy.
- ✓ Parks serve as a concrete representation of a town's quality of life, giving its residents a sense of identity and playing a significant role in how that community is perceived. Surveys evaluating how livable a community are frequently list parks and recreational amenities among the most crucial components.
- ✓ Regardless of their capacity to pay for admission, parks serve as meeting areas for families, social groups, and people of all ages and economic circumstances.
- ✓ There is a clear correlation between the availability of parks and recreational opportunities and lower rates of crime.
- ✓ Parks improve the local tax base and increase property values.
- ✓ According to the Centers for Disease Control and Prevention, increasing the number of people who exercise in physical activity spaces promotes both individual and community health.

Recreation area minimum requirement

Recreation areas in single-family or duplex residential subdivisions or projects must be 110 square meters for each anticipated resident. As established in accordance with this, recreation areas must be provided in other residential structures, including multifamily apartment buildings and linked housing complexes, in an amount equal to 50 square meters for each resident anticipated to live there (Tenant, 2017).

Figure 3 W. C. Swearingen Recreation Area (source: Sabine River (Ayda Alehashemi, Seyed Amir Mansouri and Nasser Barati, 2017)

2.5. Condition of the condominiums

2.5.1.1. Building height regulation

According to representatives of the Urban Information and Planning Institute and the municipal government, the regulation was updated to take into account factors including the preservation of historical sites, security issues, and the impact on the environment. According to officials, it is anticipated that the regulation's amendment will entice investors to participate in city development initiatives. The officials cited the projected 52-story headquarters building of the Commercial Bank of Ethiopia (CBE) as evidence of the necessity for the new legislation. The building height restriction has been increased to 55 stories, according to a statement made by the Addis Ababa City Administration. Previously, Addis buildings could only have a maximum of 20 stories (Elgar, 2022).

Table 2 Building height regulation preparation practices in Addis Ababa

No	Areas of the City	Building height (stories)	FAR (max)	BAR and Setback
1	Main city center (inner zone)	34-55	1:7	Minimum BAR for all areas --- 80% Front Setback: O for building height = street width 60 degree (1.73:1) for height above street width in
2	Main city center (intermediate ring)	21-34	1:5 - 1:7	
3	Main city center (outer zone)	13-21	1:4	

2.5.1.2. The Building height distance from the road

Table 3 Building height distance from the road

No	Height of the Building Up to (m.)	Exterior open spaces to be left out on all sides in m. front rear and sides in each plot)
1	10m	As per prescribed set backs
2	15m	5
3	18m	6
4	21m	7
5	24m	8
6	27m	9
7	30m	10
8	35m	11
9	40m	12
10	45m	13
11	50m	14
12	55 and above	16

2.5.1.3. The condition of the building material

There is a large selection of construction materials on the market, and choosing the best one to meet the different needs of the structure can be challenging because there are many elements to take into account. Considerations such as strength, durability, and accessibility of materials locally, sustainability, and ease of handling are crucial when choosing appropriate building materials for a particular project. (Khare, 2020).

Strength of building

When choosing building materials, strength is the most crucial factor. It illustrates the materials' resistance to stresses like shear, tension, and compression. For example, contractors can choose from a variety of steel grades with different yield strengths. (Khare, 2020).

Durability

Building a structure with a long lifespan and low maintenance costs requires components that are durable. Although some materials may cost more than others, these higher prices will be mitigated by future low maintenance costs (Khare, 2020).

Local availability of materials

Local material availability has an impact on building costs and schedules. Should the supplies be located far from the construction site, transportation expenses will be substantial, and if they are not pre-ordered, the work may be delayed (Khare, 2020).

Handling

Another aspect that needs to be taken into account is how materials are handled and stored, as this has an impact on the duration of construction, the amount of labor and equipment needed, and the cost (Khare, 2020).

Sustainability

The desire for lowering carbon emissions is driving up the need for sustainable development. Stricter guidelines for carbon release are always being established by applicable rules and standards (Khare, 2020).

2.5.1.4. The effect of the buildings on the beauty of the area

Research that has been published in reputable publications has demonstrated that attractive and well-designed buildings create a calm atmosphere that promotes wellbeing. On the other hand, badly planned architecture can cause discomfort and disarray, which is bad for mental health (Foster, 2023).

Green buildings

A green or sustainable building is one that may preserve or even raise the standard of living in the surrounding area due to the design and features of its construction. Green building encompasses the design and implementation of environmentally conscious and resource-efficient building procedures at every stage of the building's life cycle, from planning to design, construction, operation, maintenance, renovation, and demolition (Surendra N.and Kulshreshtha, 2020).

Waste disposal

Organizations can minimize, reuse, and prevent waste by using a streamlined waste management system or trash disposal procedure. Additionally, it is a method by which businesses put comprehensive plans into place to effectively manage wastes from the point of origin to the point of disposal (Surendra N.and Kulshreshtha, 2020).

2.5.1.5. The problems seen in the buildings

Noise

One issue with the environment in cities is noise pollution. The consequences of exposure to noise from building construction have not been investigated, despite recent field studies concentrating on transportation noises (Elsevier, 2000).

Three comparison groups of female students living in a three-wing residence hall next to a building site participated in a quasi-experiment. Using materials that absorb sound waves can help manage noise. Many typical construction materials are fairly reflective and do not absorb much sound, including wood, gypsum board, concrete, brick, and tile (Elsevier, 2000).

Sunrise

Because sunlight is the primary source of these issues glare, warmth, and material fading inside buildings it is necessary to block sunlight. Thus, providing shade from the sun is crucial for ensuring that daylight is used properly. The sun is a symbol of hope, light, warmth, and both new and eternal life. A sunset denotes the end of life in the body, while a sunrise represents the resurrection as the soul ascends to paradise (Atriadesigns.ca, 2022).

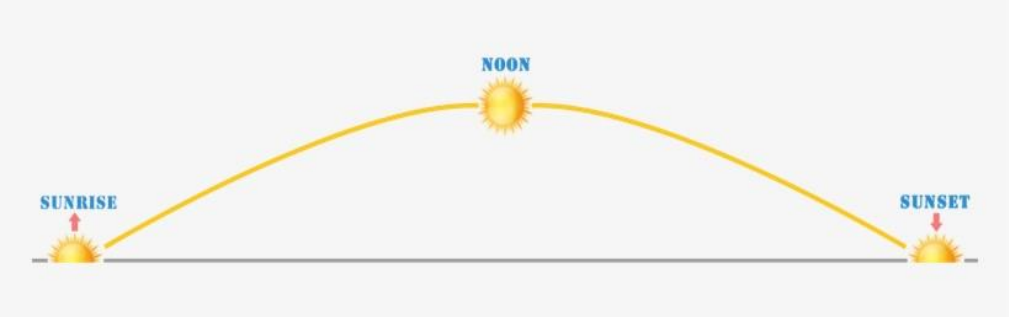

Figure 4 Sunrise Sunset Times (source: sun today (Elsevier, 2000))

Wind direction

The direction of the wind's origin is typically used to determine its direction. Typically, wind direction is expressed in degrees or in cardinal (or compass) direction. Because of this, a wind coming from the north is called 0° (360°), and a wind coming from the east is called 90°. These days, devices that measure wind direction and speed are known as wind vanes, anemometers, and endoscopes. The wind energy sector uses these kinds of devices for both turbine control and wind resource evaluation (wikipidea).

Slope

The definition of a slope, often called a gradient, is the direction or steepness of a line in a coordinate plane. Given the equation of a line or the coordinates of points on a straight line, the slope can be computed in a number of ways. For appropriate drainage and accessibility, most pavements should have walking surface slopes between 0.5% and 2% at both the minimum and maximum. For the boarding area to be easily accessible, landing zones should have a cross-slope of less than 1% (wikipidea).

Weather condition

The local weather over a specific length of time, ranging from one to several weeks, is referred to as the weather condition. The term "weather condition" refers to normal weather phenomena, such as a string of thunderstorms during the hot summer, a cloudy month in the autumn, or other weather conditions common to a certain area and/or season (Press, 2022).

Weather condition symbols:

- ✓ **Sunny** - A sunny symbol.
- ✓ **Partly Cloudy** - a sunny symbol party hidden by a cloud.
- ✓ **Cloudy** - a cloud symbol.
- ✓ **Windy** - a cloud with swirling lines.
- ✓ **Rainy** - a cloud symbol with rain drops below it.
- ✓ **Thunderstorms** - a cloud symbol with rain drops below it and a lightning bolt.

2.6. Alternatives of communal residential buildings structure

2.6.1.1. Single-Family Home

Single-family homes (SFH) are buildings with no shared walls that are constructed on a single lot. There may occasionally be a detached or attached garage. (Singh, 2023).

- Compared to other home styles, single-family homes typically offer greater room and privacy, as well as private front and rear yards. You are allowed to express yourself with any kind of home design you like because you are the only ones living on the land. Additionally, compared to condos and townhomes, your resale value will be more stable (Singh, 2023).

2.6.1.2. Condominium

Single units contained within a larger building or community is known as condominiums, or just "condos." Condos typically have homeowners' associations (HOAs), which demand monthly or annual dues from the occupants. They also typically share one or two walls with other apartments. They are well-liked in high-density metropolitan regions with lots of eateries and retail establishments (Singh, 2023).

- The homeowner has very little obligation to assist with upkeep and maintenance. For instance, rather than having to pay for everything yourself, you split the costs with other inhabitants if the roof breaks. Furthermore, some condos provide amenities like pools, gyms, and lounge areas that you would not be able to afford or fit in a single-family house (Singh, 2023).

2.6.1.3. Townhouse

Townhouses are a cross between a single-family residence and a condominium. They frequently feature several levels, one or two shared walls, plus a rooftop terrace or small garden. Generally speaking, they are smaller than a single-family home but larger than a condo. (Singh, 2023).

- In many cases, townhomes offer greater privacy than condos. For cost sharing, some establish joint maintenance agreements or homeowner associations. Generally speaking, they are less expensive than single-family homes. Townhomes are less private than single-family houses, but they typically lack shared amenities like a pool or gym.

2.6.1.4. Cooperatives

A slightly different method of obtaining a title to a shared building is through cooperatives, or co-ops. With a co-op, everyone owns the building collectively, whereas with a condo, you own the area inside your unit. To become a member of the community, there is frequently an interview process due to the shared obligation (Singh, 2023).

Singh, 2023 define Cooperatives aspects;

- Because co-op owners typically handle upkeep as a group, their HOA dues are typically lower. Additionally, they are typically less costly than equivalent condos.
- The bank may foreclose on the entire building if a co-op member stops paying their mortgage because you share financial responsibility for the building with your neighbors. Getting a loan for a co-op might be more challenging than for a condo; most require a larger down payment, and some banks won't support it.

2.6.1.5. Multi-Family Home

The least prevalent kind of residential building is a multi-family dwelling. In essence, they are one house divided into two or more apartments. They vary in size from a duplex to a four family home, and they can be designed like row houses or have numerous levels. Four units or more are classified as commercial. While some multi-family homes share a single entry, others have individual entrances for each unit. Condos and multi-family units differ in that the units cannot be bought separately (Singh, 2023).

Singh, 2023 define Multi-Family Home aspects;

- For individuals seeking an investment property, multi-family homes are a great option. Many choose to live in one unit and rent out the rest to generate money, or they choose to rent out every unit. They are also a fantastic choice for households with several generations because they let family members live together in the same building yet each have their own flat.
- A cross between a single-family house and a condominium are multi-family units. Compared to single-family homes, the apartments are typically less private and smaller. If you own one, you are responsible for all maintenance expenses in addition to the time required to find tenants. If you rent one, the landlord pays for all maintenance.

2.7. Different countries experience models

One can almost always tell if someone is from one of the wealthiest social classes if they own one of the world's most extravagant condominiums. Vertical projects such as condominiums, which genuinely do represent the phrase "The sky's the limit," are the best choice for both business magnates seeking to grow their companies and urban residents seeking homes close to their places of employment, particularly in metropolitan locations. Like anything else, condos offer more opulent versions as well. These are a few of the most opulent condominiums in the world (brittany.com, 2018).

2.7.1.1. Missoni Baia, Miami condominium

The condominium at Missoni Baia, rising to a height of 57 stories and extending 200 feet along Biscayne Bay, captures the timeless allure of living by the beach. This skyscraper residence that slices through the Miami skyline is an excellent treat for the elite classes of society thanks to its advantageous waterfront position and its enticing amenities; each of the 249 opulent condo units in the building has one to five bedrooms with breathtaking views of the city, Miami Beach, or the Atlantic Ocean. The fitness Center, residents-only spa, lounge pool, and children's water play area are among the bay front attractions that provide views of Biscayne Bay and Downtown Miami (brittany.com, 2018).

2.7.1.2. Opus, Hong Kong condominium

The apartment units' balconies offer views of the skyline of Hong Kong. When viewed from the city, the skyscraper also makes a remarkable silhouette against the verdant mountains. At the time, the most expensive condominium apartment ever sold in Asia was the 5,444-square-foot "Presidential Unit," which was located on the highest floor and sold for $66 million in 2015. In the Tagaytay highlands, surrounded by locally grown pine trees, Brittany's Crosswinds provides opulent, private condominiums if you're searching for a comparable option in the Philippines. The Opus tower is very exclusive to its occupants, having been designed to take advantage of its special location and characteristics. There are twelve units in all. There are two double-level apartments with private pools on the lower levels. Ten floor-wide apartments with shared access to the rooftop pools are located on the upper levels (brittany.com, 2018).

2.7.1.3. One Hyde Park, London condominium

A theatre, an entertainment suite, a library, a pool, a spa managed by the Mandarin Oriental and even a golf simulator are all features of this opulent condominium structure. One Hyde Park is recognized for housing a number of powerful people; hence security is strict within the structure. They have panic rooms and bulletproof glasses (brittany.com, 2018).

2.7.1.4. One Palm, Dubai condominium

There are just 94 opulent residences in this upscale neighborhood that are for sale, and they're all oriented towards the Arabian Gulf and the Dubai skyline. Among its top features are outdoor pools with a view of the Arabian Gulf, a playground for kids, and a fitness center for those who want to work out. Lifeguards are on duty around-the-clock. It even provides cleaning services to its tenants and even an outdoor theatre (brittany.com, 2018).

2.7.1.5. No.1 Grosvenor Square, London condominium

No. 1 the opulent apartment block that is in Grosvenor Square has a 300-year history. It was originally constructed by the Grosvenor family as an aristocratic estate. These days, London is a huge square that embodies the rich English culture and the everlasting legacy of the city. From housekeeping and housekeeping services to health and wellness facilities like a sauna, steam room, individual treatment rooms, gym, and even a space for yoga and ballet training, to the more intricate matters of art, law, taxes, and even immigration (brittany.com, 2018),

2.8. Empirical literature review: condominium building approaches in Ethiopia

2.8.1.1. Historical Evolution

Although comparable arrangements are utilized in many other countries, the name "condominium" is mostly used in the USA and Canada. Both the structure and complex as a whole and each individual unit within might be referred to by the same name. A condominium, also referred to as a "condominium," is a type of ownership arrangement in which a building is divided into multiple individually owned units and enclosed by communal areas that are owned jointly. (wikipidea).

Historically, condominiums have been used to resolve territorial disputes between nations rather than to address disagreements over self-determination. They are typically connected to the colonial era and perceived as strategies employed by colonial powers to avert protracted hostilities over regions that were frequently thousands of miles from the mother country (wikipidea).

The New Hebrides (a French-British condominium from 1906 to 1980), the Samoan Islands (a German-British-American condominium from 1889 to 1899), the Sudan (a British-Egyptian condominium until 1956), and the Canton and Ender bury Islands (a British-American condominium from 1939 to 1979) are typical examples. The emergence of condominiums in Europe can be attributed mainly to their ability to prevent protracted military conflicts over contested territories. The earliest is typically regarded as the county of Friesland (West Frisia), which had condominium powers from 1165 to 1493, with the Prince-bishop of Utrecht and the Count of Holland serving as those authorities (Rowthorn, 1993).

Zaporozhian region, Neutral Moresnet (a condominium from 1816 to 1919 initially with the Netherlands and Prussia as condominium powers, who were succeeded in 1830 and 1871 by Belgium and Germany, respectively), and Maastricht (a condominium of Belgium and Holland from 1830 to 1839) are other examples of continental cases. The co-principality of Andorra is the second-oldest and longest-lasting condominium in the world, while Northern Dobruja, which existed under the combined sovereignty of Austria-Hungary, Bulgaria, Germany, and the Ottoman Empire from May to September 1918, is the shortest-lived example of a condominium (Rowthorn, 1993).

2.8.1.2. History of Communal Arrangement

Living in a commune seems like a throwback to the hippy movement of the 1970s, when people lived in communes to oppose traditional capitalist principles and support alternative lifestyles. However, communal living was not originally invented by hippies, and communal design has recently seen a renaissance that suggests it may soon become the new standard for millennials and their families (Brooks, 2023).

1) Ancient communal living

Figure 5 Ancient communal living (Hunter-gatherer societies were the first example of communal living, (Berque J. , 1964))

Historians Karl Marx and Friedrich Engels contended that egalitarian social relations and shared ownership were the fundamental foundations of hunter-gatherer communities, which can be linked to the earliest periods of human cohabitation. Furthermore, although there was nothing in the way of architecture, community living, the practice of the tribe equally sharing resources predates written (Brooks, 2023).

2) Communal living in the middle Ages

Figure 6 Communal living in the middle Ages (Illustration from "Roman de Fauve, (Berque J. , 1964))

Communal living continued to be the norm for households. Homes served as essentially social hubs for tiny, nomadic communities of people, acting as a conceptual halfway house between the living arrangements of hunter-gatherers and modern people. In Western Europe, homes did not become cantered on monogamous spouses and their offspring until the 12th century. They were far from the traditional nuclear family, though, as they frequently shared communal dwellings with other townspeople, low-income married couples, other children, widows, orphans, old people, and tenants. Extended communities became less required as a result of industrialization, and communal living largely disappeared (Berque J. , 1964).

3) Communal living in the '70s

There are currently approximately 700 "living communities" in Denmark, the birthplace of the contemporary cohousing movement. The first cohousing community was created in 1972 in Copenhagen by a Danish architect and a psychotherapist. "Every child should have 100 parents," and housed 27 families. Approximately 1% of Danish people still reside in cohousing communities today. (Brooks, 2023),

4) Shared outdoor space as communal architecture

Particularly in the UK, shared areas have continuously increased the value of real estate. The idea of shared architecture is not new; over the years, Georgian squares and Victorian parks have successfully withstood cultural changes and economic downturns. In some of the most densely populated places, urban parks and squares have been referred to as civic "breathing spaces" because they increase local property prices and foster a sense of community. Over 40% of the property is made up of open green space, It gives residents more opportunities to live in a community setting where they may interact with neighbors, let their kids play and make friends, and have sporadic interactions with the general public (Brooks, 2023).

5) current communal architecture

In millennial culture, communal living and architecture have started to make a comeback. Whether it's the cost of housing, digital lifestyles, millennial values are becoming more and more compatible with community architecture. Millennials are known for being tech-savvy, wanting a healthy, more laid-back work-life balance, and searching for real experiences but yet needing immediate access to goods. Architecture needs to drastically change to accommodate the world's future homeowners, as recent trends indicate that millennials are willing to give up some of their personal space in exchange for more communal areas and state-of-the-art facilities (Brooks, 2023).

2.9. Characteristics of the condominium building structure

2.9.1.1. Fully Furnished

Everything is prepared for you already. There is no need to invest in a presentable lobby, lavatory installations, or air conditioning. Instead, home furnishings and design can create a setting that is welcoming, professional, and on-brand for your business (CHEN, 2023).

2.9.1.2. Good Amenities

The amenities that are offered vary from condominium to condominium. The fact is, condos with higher prices typically have more amenities than those with lower prices. But a decent apartment should have all the essential features, such as security, resident parking, elevators, etc., regardless of price (CHEN, 2023).

2.9.1.3. Maintenance

Most condos' maintenance is typically under the control of the building manager. When it comes to the maintenance of the building's façade, residents need not worry. The building manager is in charge of duties including cleaning, mowing, and other maintenance (CHEN, 2023).

2.9.1.4. Security

Condos offer top-notch security to building occupants. Many condos have security guards or doormen who make sure the occupants are safe. Before being permitted entry, visitors are interrogated in-depth. This is done to make sure that nobody entering the building could endanger the occupants' security. (CHEN, 2023).

2.9.1.5. Rules and Regulations

Generally, there are a few set regulations that all residents must follow. There are restrictions that almost all condo buildings have that tenants are expected to abide by. For instance, it might not be possible for guests to access a property late at night. Playing loud music may be forbidden in some places, and vice versa. These guidelines are in place to make sure building occupants don't bother one another. (CHEN, 2023).

2.10. Condominium Building height And Building arrangement

2.10.1.1. Built Up Area

The gross area of the property is known as the built-up area or the plinth area. It is the entire area of the house, taking into account the utility space, balcony, terrace, wall thickness, and carpet area. In essence, the built-up area of a house is around 10%–15% more than its carpeted area. The area of the outside and interior walls, the balcony, the exterior staircase, and any other usable spaces, if any, add up to the built-up area. It also includes any exclusive terrace that may exist. Approximately 70–80% of the super-built-up area is made up of the built-up area. A flat's carpeted area plus the space occupied by the walls make up its built-up area. For this reason (Sitte, 1945)

Built up Area (Area of plot) = Measure the length (L) * width (W) of the land in meters

Multiply the length by the width to find the area

Area = L × W square units (Aakarshit, 2021)

2.10.1.2. Floor area ratio (FAR)

The floor area ratio, or FAR, varies from city to locality and is set by the municipal corporation of the relevant zone. Geographical limitations and municipal laws have an impact on it. The FAR is affected by variables such as building type, location, size of the land, and amenities' accessibility. A city's older, more established neighborhoods frequently have a different FAR than its newer, emerging neighborhoods. The FAR value may be changed by the city in accordance with development requirements and land value. Additional restrictions, such as roads, lifts, porches, and service spaces, may have an impact on how well people comprehend FAR. In order to support a community's preferred layout and kind of development, FAR is an efficient method of calculating the bulk or mass of a building volume on a construction site. Higher FARs in this case denotes a larger construction volume. How is the floor area ratio in shared homes calculated? The development plan's density pattern is used to compute the number of housing units; with 4.5 people per dwelling unit, the maximum FAR is 1.25 (Sitte, 1945).

2.10.1.3. Building Height Regulation

The Zoning and Development the bylaw does not specify "building height," which is the vertical distance a building rises above the base surface. The majority of district schedules specify the highest building height allowed for particular types of development, but in certain cases, the Director of Planning or the Development Permit Board may approve height increases (Keshtkaran, 2019)

- To accommodate architectural and mechanical amenities and access to infrastructure on the roof.
- To accommodate passive house features.
- To accommodate additional floor area that has been approved by the Director of Planning or Development Permit Board.
- The height, bulk, location, and overall design of the building.

Table 4 Building Height Regulation

Regulation zone	Floor Area Ratio (FAR)		Remark	Building Height (meters	
	Minimum	Maximum		Minimum	Maximum
I.	1:10	Unlimited	Main city center	70	Unlimited
II.	1:5	Unlimited	Collector street and above		70
	5	5	Local street		35
III.	2	Unlimited	Collector street and above.		35
	2	5	Local street		35
IV.	0.5	Unlimited	Collector street and above		35
	0.5	3.5	Local street		35
Historical areas	0.5				21
Green areas		0.05			6

The building height restriction has been increased to 55 stories, according to a statement made by the Addis Ababa City Administration. Previously, Addis buildings could only have a maximum of 20 stories. According to representatives of the Urban Information and Planning Institute and the municipal government, the regulation was updated to take into account factors including the preservation of historical sites, security issues, and the impact on the environment. According to officials, it is anticipated that the regulation's amendment will entice investors to participate in city development initiatives. The officials cited the projected 52-story headquarters building of the Commercial Bank of Ethiopia as evidence of the necessity for the new legislation (Meron, 2011)

2.10.1.4. Building Setback from Boundary

A certain distance must separate condominiums from the common boundary and the road. The setback distance, excluding property to be vested to the state for road, drainage, or public purpose, is measured from the road reserve line or boundary line to the exterior wall of the flats. The road buffer, which depends on the type of road the site fronts and the height of development, establishes the distance for apartments and condominiums from public roadways (Borodinecs Anatolijs, 2020).

2.11. Conceptual frame work of the research

Although a condominium building is required, the terms "building height regulation" and "building layout" denote the existence of a building height control by legislative approval or legal status at the city level. There are two gaps in the studies for both scenarios. In the factors that influence building height, there are four standards, which are FAR, BAR, building height, and building setback standards. In the second building arrangement, factors are green space, parking space, recreational space, storage, and shops And finally comparing the condo site with the village nearby.

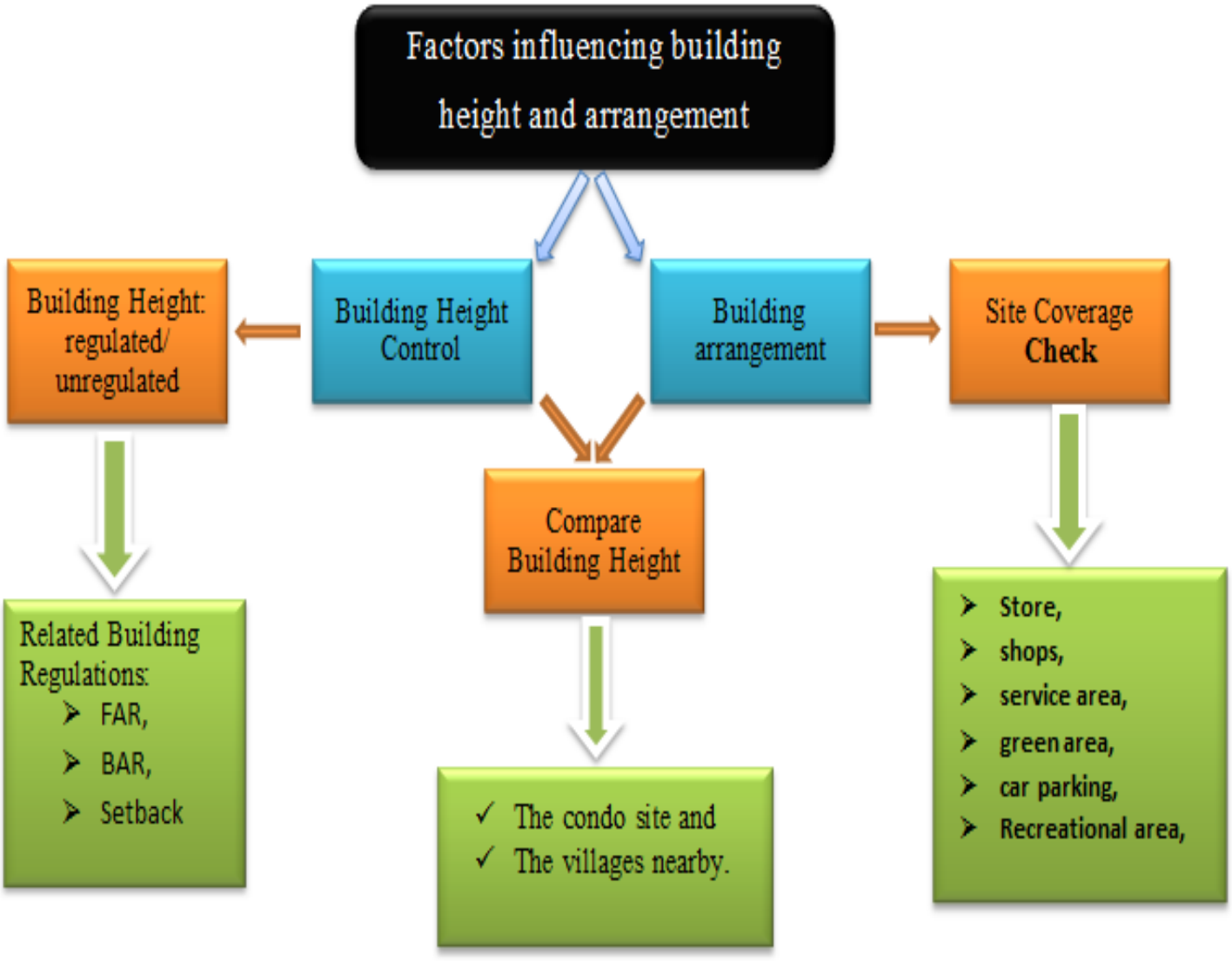

Figure 7 conceptual frame work of the research area

2.12. Research gap

Research gaps: various studies have focused on the social services of society, such as the height of the building and the arrangement of the building. Most studies are classified as human basic needs, so it is a matter that needs to be done to make them accessible to all, and it is necessary to benefit low-income groups.

According to this, one of the main causes of the housing problem in our country is the height of the building, while buildings built in other countries have benefited by building a large number of houses in small areas. In addition, the condominiums that have been built are small in terms of the building height regulation of the Addis Ababa city administration, so they do not match with the society that is looking for a building.

Another problem is the layout of the building, which should be included in one condominium site, i.e., green space, parking space, recreational space, storage, shops, and other infrastructure, but these problems are widely seen in selected condominiums.

Finally, in terms of the approximate height, color, design, distance from the road, and other effects of all buildings on the environment, it's necessary to ensure that the building master plan is consistent, that the public does not have a distorted view, and that the environment can be easily understood.

CHAPTER THREE

3. MATERIAL AND METHODS

3.1. Study area

Addis Ababa, the capital of Ethiopia, is one of the most rapidly urbanizing cities in the world. According to the population projection of the Central Statistical Agency (CSA) for 2007, the total population of Addis Ababa for the year 2016 is 3,384,569. Administratively, it is divided into eleven sub-cities, namely Addis Ketema, Akaki-Kality, Lideta, Arada, Kirkos, Gulelte, Bole, Nefas-Silk Lafto, Yeka, Lemi Kura, and Kolfe-Keraniyo. Geographically, it is located at the center of the country and coordinated at a latitude of 8050′11″ to 9005′29″ north and a longitude of 38039′40″ to 38054′57″ east on the Universal Transverse Mercator projection.

The capital lies at the foot of Mount Entoto, which is 3400 meters above sea level and extends southwards to its lowest point, near 2000m above sea level around Akaki. Its temperature stays nearly constant monthly, with no more than 100 °C variations.

Addis Ababa has a pronounced rainfall peak during the summer season, locally known as 'Kiremt', which is from June to September. It also exhibits a considerable amount of rainfall during February to May, locally known as 'Belg'; the winter season, locally known as 'Bega', is from October to January with the minimum rainfall record.

For the purpose of our study, we selected Kolfe Keraniyo sub-city, which is located in the eastern part of Addis Ababa. It has a total population of 546,219. Area: 61.25 km2 (23.65 sq. m). The research will be conducted in the areas where there is a significant problem with housing in Addis Ababa. The existing problems with their condominiums are the arrangement of the building and building heights.

Milifony Condominiums, Weira Condominiums, and Kara Kore Condominiums have been constructed in various districts or wereda and are being provided to the residents in the various condominium villages that are located in the new structure or boundary in Kolfe Keraniyo sub-city.

3.1.1 Location map

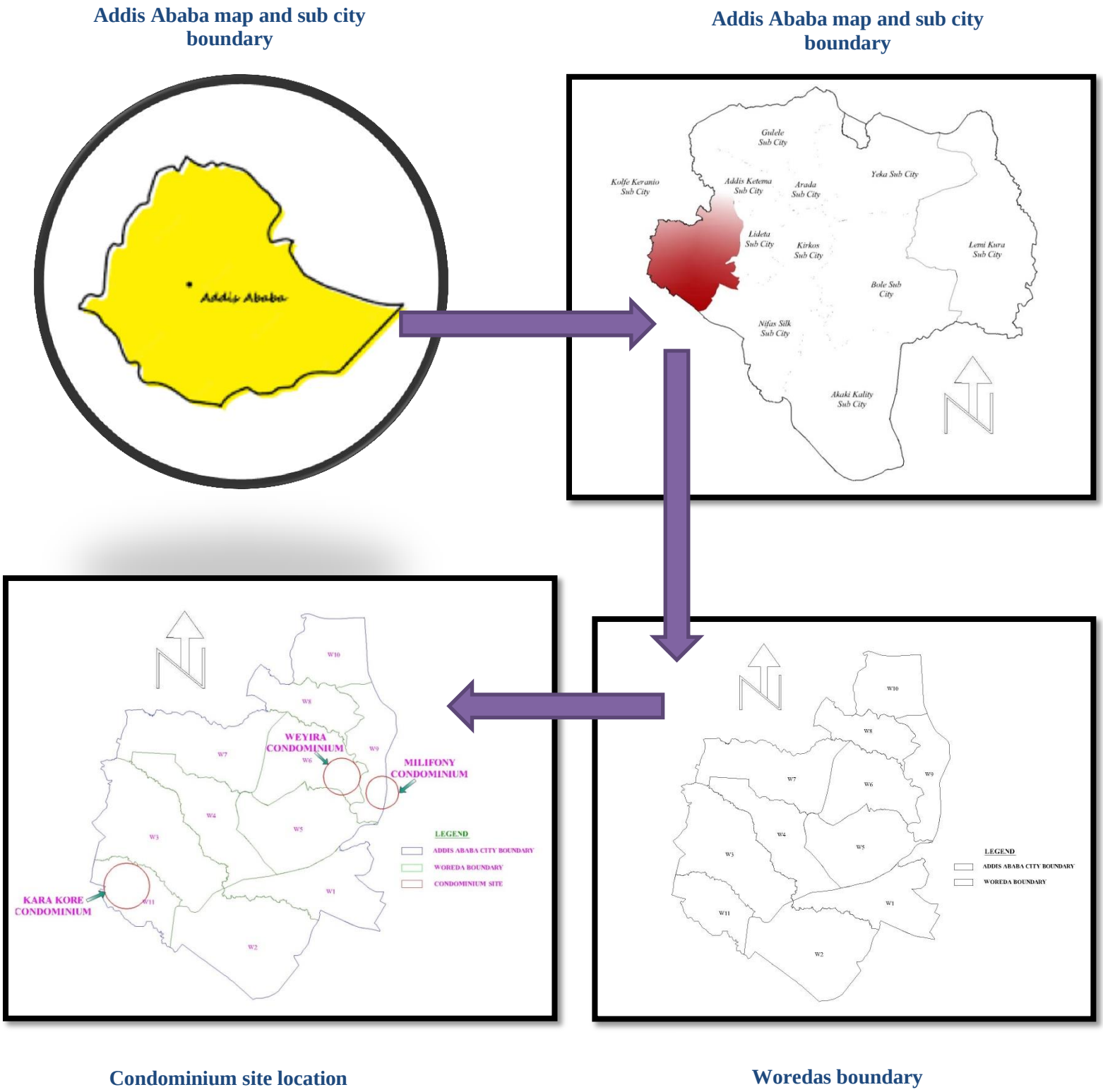

Figure 8 location map (source (GIS), (wikipidea) (Addis Ababa line map, 2022))

3.1.2 Description of the study area

Addis Ababa, the capital, the major metropolitan area, and the largest highland city situated in West Shewa, Oromiya, with geographical coordinates of 9°03′ North latitude and 38°42′ East longitude, approximately at the geographical center of the country, is characterized by a high number of residential, commercial, and industrial developments.

The physical growth is shown over the years, growing from only 33 km2 in 1920 to 224 km2 in 1984, and since 1990, the area is estimated to be 530 square kilometers with a density of over 5600 people per km2. The city is subdivided into 11 sub-cities, which in turn are divided into 119 wereda, where power is devolved to the smallest tier of administration. Having a balance of people with housing and its structure plans, the city is now subjected to various types of problems, one of which is, of course, condominiums regarding the height of the buildings and the arrangements of the buildings.

In a city like Addis Ababa, where the amount of infrastructure is limited and the supply of urban public housing is at its beginning, the construction of more housing is encouraging but should be cautious. It is recognized that it is the duty of the government to provide affordable housing to meet the needs of society.

Milifony, Weira, and Kara Kore Condominiums have been constructed in various districts or wereda and are being provided to the residents in the various condominium villages that are located along the new boundary in Kolfe Keraniyo sub-city.

3.2. Research design

A research design is a way in which research can be conducted to answer the question that's been requested. So, it shows the conceptual structure of the research. The study started by identifying the challenges of building height and arrangement. This study will use a descriptive research design as it describes the existing conditions that have been seen in the study area. A quantitative approach has been used to collect and analyze data concerning the arrangement of the building and building heights. This approach has been used to describe the demographic and socioeconomic conditions of a sample population and to show the relationship between the quantified condominium points acquired from subjective and objective surveys. The system of data collection is mixed, which is quantitative and qualitative data through the application of the descriptive survey method for the questioner, interviews, and observation information, and the analytical descriptive survey method for data that are essentially quantitative in nature. This method also allowed direct contact between the researcher and the respondents, which helped to get good-quality data.

3.3. Source of data

3.3.1 Data types

The data collected is majority primary data, Primary data was collected from all the selected sample areas using objective and objective surveys. The subject survey includes questions to be asked to describe how they feel about shared housing. An objective survey was conducted by the researcher answering standardized questions to assess quality.

3.3.2 Source of data

In order to conduct this research, both primary and secondary sources of data will be used. The primary data sources of the study include information obtained from field observation and own survey results, as well as from leadership, experts, and respondents through structured questionnaires and interviews. The secondary data sources of the study include documents, reports, and manuals from the Kolfe Keranoyo sub-city house development and management office, Addis Ababa House Corporation, annual and mid-term plans and reports, websites, previous research, books, and articles.

3.4. Sampling design

3.4.1 Sampling techniques

After the selection of households, a census of houses was done to select the sample. For the size of the research, the census of houses was done not only to create a sample size but also to It is also to distinguish between condominiums and identify which study areas have high, medium, and low rates of condominiums. Referring to the sample size on one block, it is expressed as a percentage of the total number of houses.

- For the first objective, various departments under Kolfe Keranoyo sub-city house development, Addis Ababa House Corporation, and the management office will collect the data by observation in terms of their functions.
- The second objective, I will use cluster random sampling techniques to identify respondents.
- For the third objective, I will use cluster random sampling and a field survey to compare condominiums with nearby ones based on city standards.

3.5. Sampling population

In this study, purposive sampling was combined with cluster systematic sampling. Areas of interest in this case include Milifony Condominiums, Weira Condominiums, and Kara Kore Condominiums. The Kolfe Keranoyo Sub-City House Development and Management Office were established with the mission of solving housing management problems at the local level.

The house development and management office provides various services in it, including designing the condominium houses, mainly managing the construction work, transferring the lots to those who have received them, managing the transferred houses, i.e., renovation, monitoring payment on time, and identifying open houses.

3.4.2 Sampling size

Collecting data by cluster random sampling technique, the questioner used a sample size of 1 person **per block** of the 119 selected residents in Kolfe Karanio Sub-district, **Milifony** Condominium, **Weira** Condominium, and **Kara Kore** condominiums in Kolfe Karanio Sub-city.

Table 5 Sampling size and techniques

No	**Condominium site**	**Number of Block**	**sampling technique**	**Sampling size**
1	Milifony Condominium	10	cluster random	10 residence
2	Weira Condominium	36	cluster random	36 residence
3	Kara kore condominium	73	cluster random	73 residence
		Total 119 Blocks		**Total 119 residence**

3.6. Method of data collection

3.6.1. For Objective one ;-

- To collect secondary data, prepare the building height check list for the location by taking the building-height regulation from the Addis Ababa housing development office or the kolfe keraniyo sub city.

3.6.2. For Objective two

- Preparing a questionnaire for the relevant parties and collecting information from the housing development office, the housing association committee, the resident, and the protection of the condominium in the places where the condominium is located.
- To prepare the check list for open space and green areas, storage, shops, common service areas, parking spaces, recreational areas, and others.

3.6.3. For Objective three; -

- To prepare a check list comparing the construction height of the condominiums with other buildings in the area and the height of the building allowed in the area, this survey uses a set of questions to gather the respondent's perception. This survey uses a set of questions to gather the respondent's perception.
- Preparing a questionnaire about safety, comfort, provider attention, and housing status. The first part of the questionnaire includes information about the respondent, such as gender, age, monthly income, housing condition, purpose of use, etc.

3.7. Method of data analysis

3.7.1. For Objective one

Using this information to analyze the height of the buildings in reference to the built condominiums, that is, the study was mainly conducted regarding the height of the building. Using this approach, four cases, including the first regulation in 1996, two revisions following the urban plan revisions in 2002 and 2015, and an intermediate revision made by the university in 2010, a study was conducted by the Ethiopian Institute of Architecture, Building Construction, and Urban Development (EiABC).

3.7.2. For Objective two

- By using building layout standards to analyze and preparing a check list to ensure that the use of open space, storage, shops, common service area, green space, parking space, recreation area, and other condominium areas is fulfilled.
- By using a Google form to analyze the demographic characteristics of the household, satisfaction of households by the available open space, their access to social and infrastructural services, the social interaction, relationship of residents, and security related issues such as theft, crime, and sound.

3.7.3. For Objective three

By using Google form analysis and comparing the building height of the condominiums with other buildings in the area, the height of the building allowed in the area, the distance of the condominiums from the road, the condition of the condominiums, the effect of the buildings on the beauty of the area, and the problems seen in the condominiums, i.e., noise, wind, sunrise, slope, weather, and other related factors, They are collected in the field survey.

3.8. Method of data presentation

All the information I use to illustrate with the help of various pictures, maps, satellite images, graphs, and tables. All maps are produced in the Arc Map GIS environment, and photographs are taken during site surveys. All split maps are condominiums located in different locations within the same sub-city.

3.9. Validity and Reliability

The researcher, "Addis Ababa City Housing Administration," conducted a preliminary analysis and demand assessment of the selected Kolfe Karanio Sub-city Kara Kore condominiums, Milifony Condominium, and Weira Condominium. Therefore, before the questionnaire is used to collect data to get a correct answer, the general knowledge about the questionnaire is derived from previous consciousness, and any suggestions can be made at the same time to improve the content of the questionnaire. In order to get more reliable information, the study basically used the method of attaching a document filled with the questionnaire related to the answers of the respondents. This technique was carried out basically during the interviews of random people in the area. On the other hand, it is necessary to see the reliability of the researched data to know the accuracy of the data collected from the interview.

CHAPTER FOUR

RESULT AND DISCUSSIONS

4.1. Analysis of condos height against the city building-height regulation

The Addis Ababa plan documents and other standards governing urban planning and design were reviewed to evaluate the height of condominium buildings. Four regulations were analyzed: the first regulation in 1996, two revisions following the urban plan revisions in 2002 and 2015, and an intermediate revision made in 2010 by the Ethiopian Institute of Architecture, Building Construction, and Urban Development (EIABC).

Table 6 plan and Existing condition

No	Condominium site	Area of plot (m^2)	Total built up area (m^2)	Built up area (%)	Floor area ratio (FAR)		Building height	Building Setback	
					Existing building	City regulation		Min	Max
1.	**Milifony**	10,907	3086	28.3	**1.5**	2 – unlimited	Max 70m	4m	12m
2.	**Weira**	50,852	9495	18.7	**1**	0.5 - 6.5	Max 35m	0.5m	4m
3.	**Kara kore**	130,955	28,002	21.4	**1**	0.5 - unlimited	Max 70m	10m	30m

2.12.1.1.

4.1.1. Built Up Area

Milifony condominium site

Thus, it makes sense that the Milifony condominiums constructed G+4 buildings, but the buildings that ought to have been constructed on the site were G+6 structures in height. It was simple to determine that it isn't functioning and that the building's height is the issue. The current built-up area is 28.3%, while the standard built-up area is 80%. Thus, the study verified that they were constructed with a typical built-up area of roughly 70–80% of the site plan.

Weira condominium site

The height of the building that should have been constructed on the site is G+6, yet the Weira condominiums are G+4 structures. It was simple to determine that it was broken and that the building's height was the issue. The current built-up area is 18.7% of the standard built-up area of 80%. As a result, the study verified that they were constructed with a typical built-up area of roughly 70–80% of the site plan.

Kara kore condominium site

Kara Kore condominiums built G+4 buildings, but the height should have been G+5. The standard built-up area is 80%, while the existing area is 21.4%. The survey confirmed that the buildings were built with a standard built-up area of 70-80% of the site plan, indicating a problem with the height and the standard built-up area.

Generally, we can see that the buildings built in Millifoni, Waira, and Kara Kore condominiums are only G+4 buildings, but the height of the building that should have been built on the site should have been G+5 buildings and above. So there is a problem with the height of the building. The standard built-up area is 80% of the building, and the built-up area is 18.7%, 28.3%, and 21.4%. It is known that it is necessary to build buildings of international standards, and it is also important to prepare a suitable living space for the community. The main purpose of condominiums is to build tall buildings in small areas and make them accessible to the community.

In addition, when constructing such condominiums, it is necessary to take the experience of other countries with a large population and look at the current situation of the country, including site selection, design, construction, infrastructure, and other additional works.

4.1.2. Floor area ratio (FAR)

Milifony condominium site

It was simple to determine from the study that the floor area ratio of the building that had to be erected on the site was 2 up to infinite, but the buildings constructed by Milifony Condominium had a floor area ratio of 1.4, or about 1.5. There is an issue with the building's height. The study indicated that the primary reason for the housing problem is that it is not up to par and is not operating in accordance with the plan published by the local government. FAR (floor area ratio) = 1.5 the building's floor area ratio that was required to be constructed on this property.

Weira condominium site

We were able to determine that, while the buildings constructed by Weira Condominium had a floor area ratio of 1.4, or around 1.5, the structure that was required to be constructed on the site had a floor area ratio of 1 up to 6.5. It was simple to ascertain via the study. There is an issue with the building's height. The study indicated that the primary reason for the housing problem is that it is not up to par and is not operating in accordance with the plan published by the local government. FAR (floor area ratio) = 1. The building that had to be constructed at this location had a floor area ratio of 1 to 6.5.

Kara kore condominium site

It was ascertained that the buildings constructed by Kara kore Condominium had a floor-area ratio of around 1.5, although the minimum required floor-area ratio for the building to be constructed on the property was 0.5, with no upper limit. From the research, it was simple to ascertain. The height of the building is an issue. The primary reason for the housing issue is that, as the survey revealed, it is not up to par and is not operating in accordance with the plan that the municipal government established. FAR, or floor area ratio, is 1.5. The building's floor area ratio that was required to be constructed on this property ranged from 0.5 to unlimited.

Finally, Millifony, Waira, and Kara Kore condominiums have floor area ratios of 1 and 1.5, but the standard set by the city administration varies according to the local conditions. Based on the survey, it has been found that these are the places where it is allowed to be unlimited.

Therefore, although the floor area ratio of the area allows, the buildings that have been built are small, so it is clearly seen that the housing problems of the community should have been built in a way that can accommodate a large number of residents in a small area and that they were built outside of the standards of the city administration.

4.1.3. Building Height Regulation

Building height regulations are set by the city administration, and the maximum building height in Millifony, Waira, and Kara Kore condominiums is 70m, while the built condominiums are no more than 15 m or 20 m. And it helps to show that the lack of building height is seen as one of the reasons for not being able to solve the problem of society.

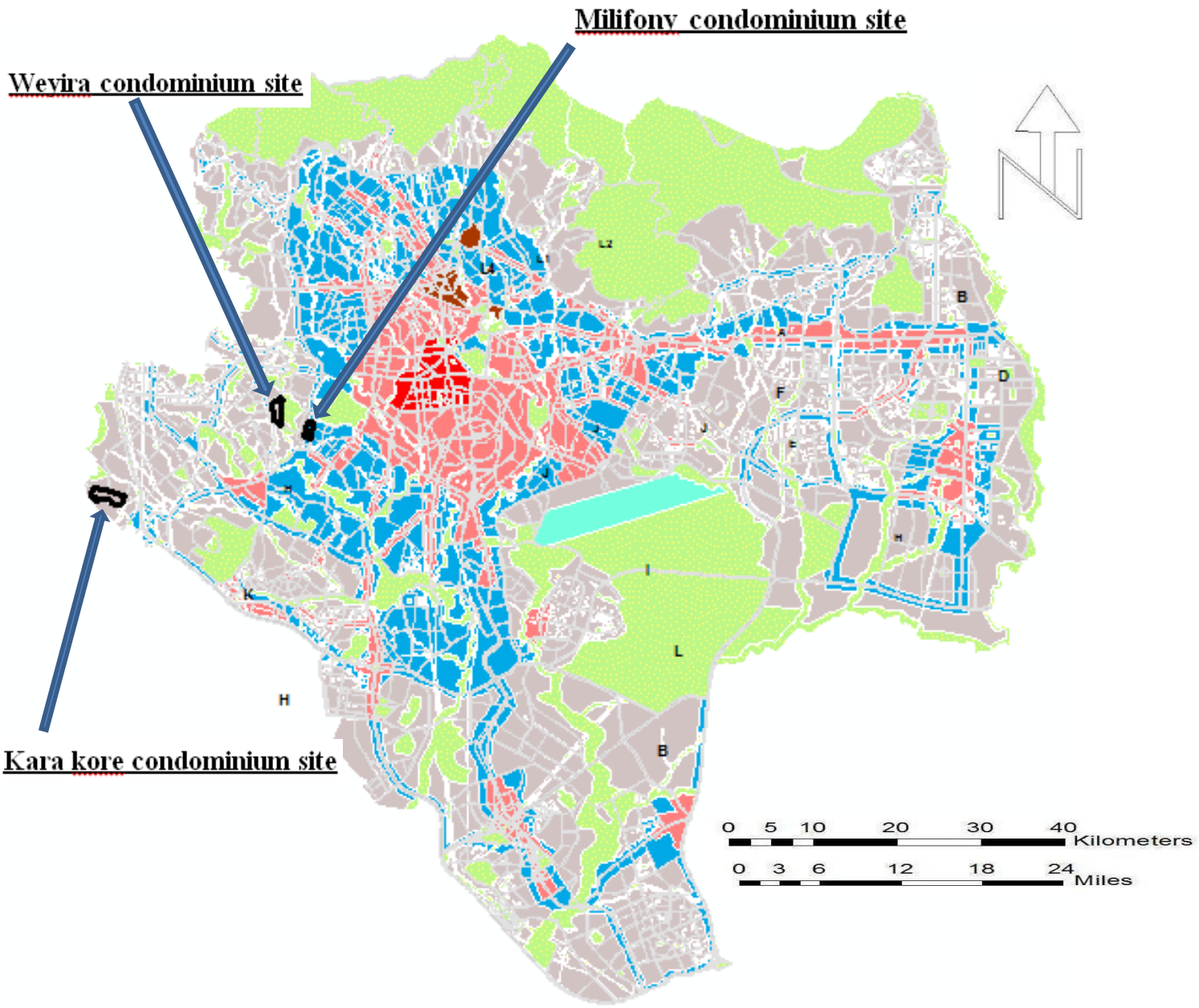

Figure 9 Addis Ababa Building Height Regulation (source; (Borodinecs Anatolijs, 2020))

In general, it is difficult to say that it has been implemented according to the building height regulation set by the city administration, but in the selected condominium sites, such as Milifoni, Weira, and Kara Kore condominiums, the height of the buildings used is small, which is not enough compared to the existing population and the house-seeking community, and the height of the buildings that are to be built, It is easy to understand that there is a big problem with the use of space by building at a height of 15 m, while it is possible to use up to 70m. According to the land use set by the city administration, we have been able to understand that there are condominiums that have been built with the purpose of the location as well as those that have not been built with the purpose of the location.

Milifony condominium site

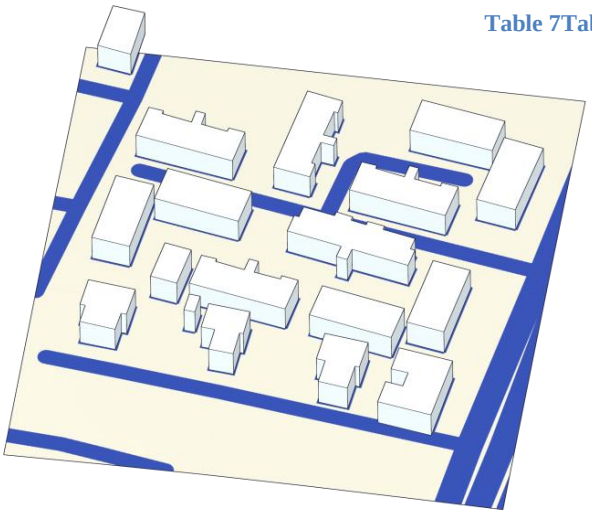

Figure 10 milifony condominium site (source; cad mapper, Sep 2023)

Table 7Table 7 proposed milifony site building height regulation

No	Zone	FAR	Building height	Type
1	3	2 – unlimited	Max 70m	Mixed-use

		2	ያልተገደበ	>=20	-	70
	3	2	ያልተገደበ	15	-	52.5
		2	8	>=10	-	42
		2	5	<10	-	35

In Milifoni, condominiums are zone 3, and if there is a road of 20m or more, the height of the building is allowed up to 70 m. The road in the area is 40m wide, and the height of the building is allowed up to 70m, but the height of the built buildings is not more than 15m. In addition, the place could be used for different purposes, and since it was not used for any purpose other than housing, according to the land use set by the city administration, they were able to see whether the place was used for mixed use when it should have been used.

Weira condominium site

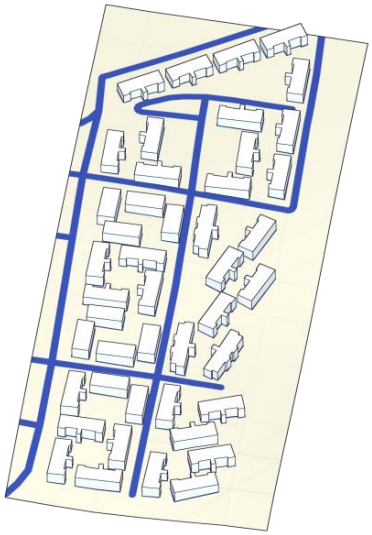

Figure 11 weira condominium site (source; cad mapper, Sep 2023)

Table 8 Table 7 proposed weyra site building height regulation

No	Zone	FAR	Building height	Type
1	4	0.5 - 6.5	Max 35m	Residential

	0.5	ያልተገደበ	>=20	-	70
	0.5	ያልተገደበ	15	-	52.5
4	0.5	6.5	>=10	-	35
	0.5	3.5	<10	-	35

The building in Weira Condos Zone 4 is 35 meters high, with a road width of 12 meters in the vicinity if there are 10 meters or more of them. They used it exclusively for houses, as it was designed to be used for domestic reasons. It's great that they were able to verify that the location is being used for residential purposes in accordance with the land use regulations established by the local government.

Kara kore condominium site

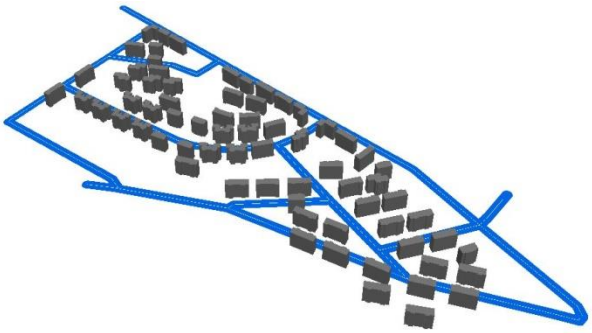

Figure 12 kara kore condominium site (source; cad mapper Sep 2023,)

Table 9 proposed kara kore site building height regulation

No	Zone	FAR	Building height	Type
1	4	0.5 - unlimited	Max 70m	Residential

4	0.5	ያልተገደበ	>=20	-	70
	0.5	ያልተገደበ	15	-	52.5
	0.5	6.5	>=10	-	35
	0.5	3.5	<10	-	35

Condos in Kara kore are located in zone 4, and if there are 20 meters or more of roadways, a building's height can reach 70 meters, with a 30-meter-wide road authorized. They were able to verify that the location is being used for residential purposes in accordance with the land use defined by the municipal government because it was constructed to be used for residential reasons and they did not use it for anything except housing, which is praiseworthy.

In general, it shows that the regulation of building height has not been implemented in the manner set by the city administration, which leads to additional problems, which causes society to be homeless and ill-treated, and shows that it is an irresponsible system that only works for political gain. Another thing is that if we have limited space, it is known and clears how we should use the existing open spaces, taking the experience of other countries, namely the above-mentioned countries, by creating a better building height and an environment that is suitable for society.

4.1.4. Building Setback

Table 10 city standard of Building Setback

No	(Road Type)	(Road Width) m	(Building Line Setback)
1	Principal Arterial Street (PAS)	>30	3 m
2	Sub-Arterial Street (SAS)	25-30	3 m
3	Collector Street (CS)	15-20	2 m
4	Local Street (LS)	<15	1 m

Although it is difficult to say that it has been implemented according to the Building Setback standard set by the city administration, the selected condominium sites, namely Milifoni, Weira, and Karakore condominiums, are constructed in relation to the location of the buildings from the road, namely Principal Arterial Street (PAS), Sub-Arterial Street (SAS), Collector Street (CS), and Local Street (LS).

Although he has set the distance that should be avoided on these types of roads, we have been able to see that there are buildings built close to the road in certain condominiums, which may expose them to various noises and natural hazards.

Such as fire and the like, we have been able to understand that there are buildings built on the communal houses without any distance from the road and that they are in danger, which means that the attention given to the communal houses is less and that there is no one responsible for the problems that arise through the survey.

According to the Building Setback standard set by the city administration of Milifoni condominiums, the buildings that were built are without any problems, and although it is stated that the Principal Arterial Street (PAS) should be built at a distance of 3m, the buildings are built at a minimum distance of 4m and a maximum of 12m.

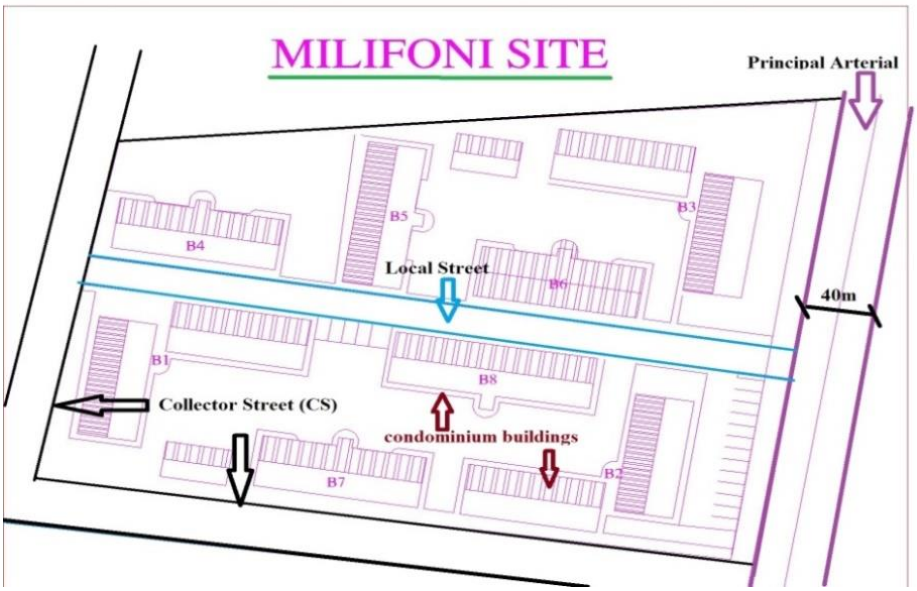

Figure 13 Milifoni condominium site (source; cad mapper, Sep 2023)

According to the Building Setback standard set by the city administration of Weira condominiums, the buildings that were built have certain problems, which are that Collector Street and Local Street (LS) should be built 1m apart, but some parts of the building are built adjacent to the road, which are a minimum of 0.5m and a maximum of 4m. We confirmed that it was not built according to the standard set by the city administration because it causes various problems.

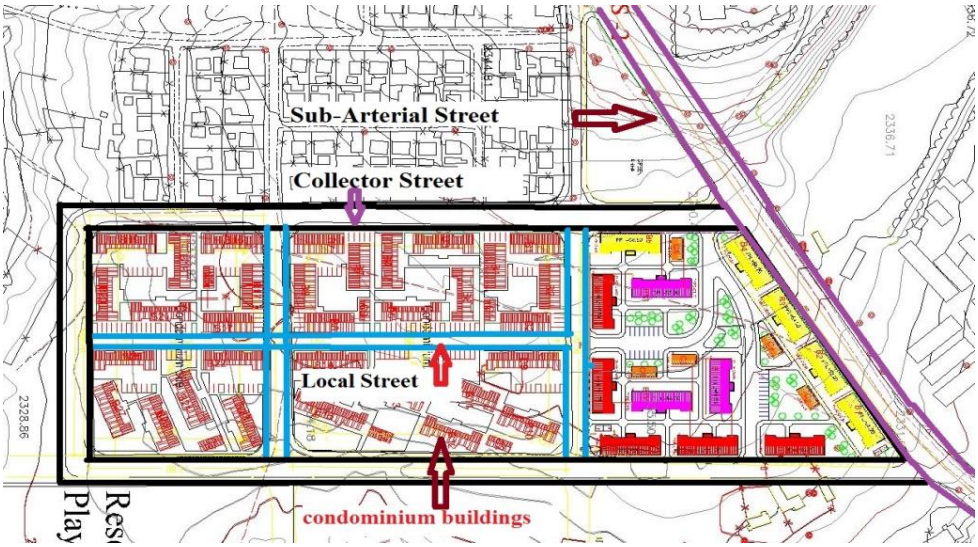

Figure 14 Weira condominium site (source; cad mapper, Sep 2023)

The other condominiums in Kara Kore are built according to the Building Setback standard set by the city administration because there are no problems, which means that the Principal Arterial Street (PAS) should be built at a distance of 3m, but the buildings are built at a minimum distance of 10m and a maximum of 30m.

Figure 15 Kara Kore condominium site (source; cad mapper, Sep 2023)

4.2. Building layout effects on the communal site functions

Below we will look at the location of the buildings and the services they provide, and I will try to show the effects on the condominiums based on the information collected from the residents of all sites such as Milifoni, Weira and Kara kore condominiums.

4.2.1. Residents perception and their satisfaction on Building layout effects

As we can see in all sites such as Milifoni, Weira and Kara kore condominiums, the services provided in terms of the location of the buildings are only for housing, which is not required or should be fulfilled in a condominium such as shopping centers, car parking, children's playground and common areas, so the community It was found that it is not satisfaction.

Table 11 Response number and percentage

No	Residences satisfaction on	Response number and percentage				
		Strongly agree	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagree
1.	Design of the houses communal residence		**20 (16.8%)**	**32 (26.9%)**	**67 (56.3%)**	
2.	Pertinence of the open spaces utilization		**2 (1.7%)**	**2 (1.7%)**	**115 (96.6%)**	
3.	Convenience of the location for living		**7 (5.9%)**	**5 (4.2%)**	**107 (89.9%)**	
4.	Adequacy of height of the buildings		**7 (5.9%)**	**2 (1.7%)**	**110 (92.4%)**	
5.	Level of Basic infrastructure provision		**16 (13.4%)**	**0 (0 %)**	**103 (86.6%)**	
6.	Availability of methods for social interaction		**39 (32.8%)**	**4 (3.4%)**	**76 (63.9%)**	
7.	The level of social interaction strength		**13 (10.9%)**	**19 (8.4%)**	**96 (80.7%)**	
8.	The extent of security		**95 (7.6%)**	**15 (12.6%)**	**9 (79.8%)**	
9.	Presence of noise disturbance		**25 (21%)**	**9 (7.6%)**	**85 (71.4%)**	

According to the set standard, using observations, checklists, and questionnaires, it has been tried to show the prepared questions regarding the use of open space, storage, shops, common service areas, green spaces, parking spaces, recreation areas, and other communal housing and present the answers in a relevant manner. A table showing the detailed results of the respondents to the questions listed in this table.

Table 4:3 other information of respondents (N=119)

Table 12 Responses category

Category	Characteristics	Frequency	Percent (%)
Condominium site and Woredas	Woreda 3 (Kara Kore)	73	61.3
	Woreda 6 (Weyra)	36	30.3
	Woreda 9 (Milifony)	10	8.4
Gender	Male	70	58.8
	Female	49	41.2
Age	Less than 15 year	0	0
	16 - 25 Years	20	16.8
	26 - 35 Years	49	41.2
	36 -45 Years	40	33.6
	More than 46 Years	10	8.4
Time they start living in condominium site	Less than 1 year	3	2.5
	1 - 5 Years	52	43.7
	6 - 10 Years	54	45.4
	11 -15 Years	8	6.7
	More than 46 Years	2	1.7

- According to the responses of the respondents, 300 house owners in Milifoni in 10 buildings, 1080 house owners in Weira in 36 buildings, and 2190 house owners in Kara kore in 73 buildings are located in the area indicated.
- Another response from the respondents shows that if 1 person selected from each building fills out the questionnaire, 70 people, or 58.8% of the 119 residents, are men, and 49 people are 41.2% women, and it shows that it is fairly filled because they are close numbers.
- According to the responses of the respondents, if 1 person selected from each building filled out the questionnaire, 0% of the 119 residents were over 15 years old, 20 people, or 16.8% were 16–25 years old, and 49 people, or 41.2%, were 26–35 years old. It shows that 40 people, or 33.6% of them, are 36–45 years old, and 10 people, or 8.4% of them, are over 46 years old.
- According to the responses of the respondents, if 1 person selected from each building filled out the questionnaire, 3 people, or 2.5% of the 119 residents, lived for less than 1 year, 52 people, or 43.7%, lived for 1–5 years, and 54 people, or 45.4%, lived for 6–10 years. It shows that 8 people, or 6.7%, lived between 11 and 15 years old, and 2 people, or 1.7%, lived more than 15 years old.

Examining the details of each variable and measure offers some concrete understanding of the situation in the urban area with respect to the social and physical aspects associated with the planning and design concerns of the housing strategy that seek to improve the occupants' quality of life.

- **When the study examines the effectiveness of the open areas utilized in the communal living quarters for offering various community services, like a children's playground, green space, and parking, there are a lot of concerns.**

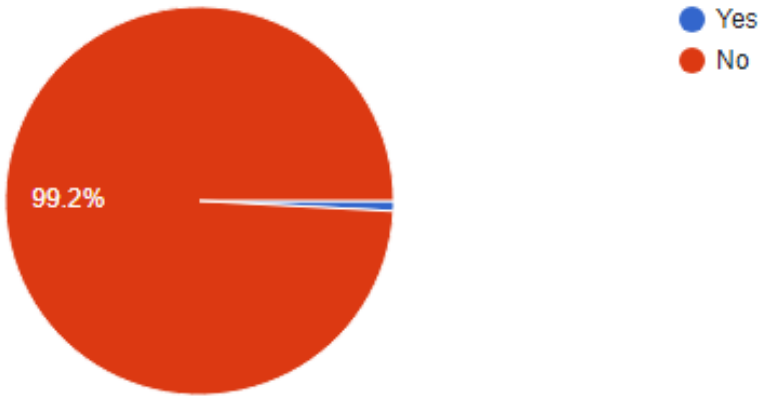

Figure 16 Analysis of green space (source; Google form)

The communal village lacks sufficient parking, green space, and entertainment for children, making it unsuitable for adults and children. The lack of green space, children's playgrounds, and entertainment options further exacerbates the issue. The area is not convenient, lacks a common dining room, and is rented for car-owning individuals. The children's playground is also lacking, as it is rented for car-owning individuals, the empty space is not being used for any purpose, and it is not designed for children. The parking issue is not a complete solution, as there is no green space for children, parking, or a playground.

The community's lack of interest in the development of the area and the government's inaction contribute to the issue. The site should have been considered before the construction, and the societal attitude towards this matter further exacerbates the issue. The management problem is also a concern, as the green space and children's playground were not originally designed for children. The community has no motivation to develop the area, the road is not comfortable, and the recreation area for young people is also lacking.

In conclusion, the communal village lacks sufficient parking, green space, entertainment, and green spaces for children and adults. The lack of a children's playground, green space, and entertainment options further exacerbates the issue.

❖ **Given the location of the building, a number of uncomfortable elements, such as noise, bad air quality, natural light, and other things that make the situation worse, may make living in the condominiums challenging.**

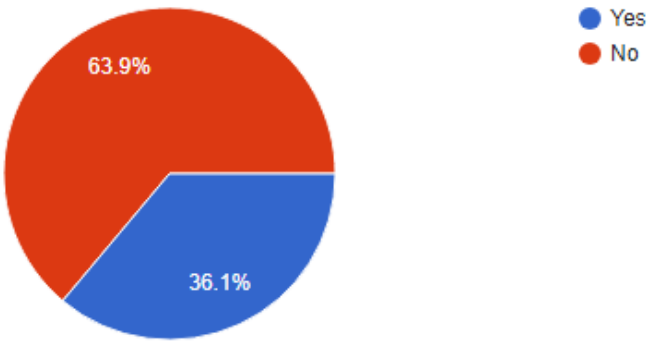

Figure 17 Analysis of noise, natural light, air quality (source; Google form)

The residents of the area experience various issues, including morning sunlight, smells from garbage dumps, noise pollution in religious places, and unsuitable terrain for disabled people. The cold climate, high altitude, security issues, environmental conditions, lack of drainage, and water scarcity contribute to these issues. The cold climate also causes noise pollution from nearby churches and mosques, as well as the dividing walls of houses. The sound of neighbors, the dividing wall of houses, and the proximity of schools further exacerbate the problem.

Additionally, the terrain is not suitable for disabled people to move, and the sunlight is particularly bothersome. These issues contribute to the overall discomfort of the residents.

❖ **Figure 35 has provided some insight into whether social interactions exist that could improve the relationships between residents in shared living quarters.**

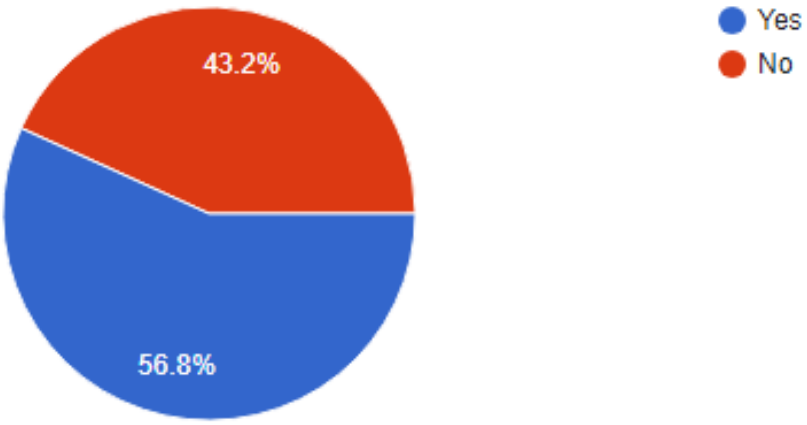

Figure 18 Analysis of the relationship between residents in shared housing (source; Google form)

Based on the question, the answer he got is that most of the residents living in Milifoni and Kara kore condominiums are not involved in things that strengthen common social bonds; I understand that their relationship with each other is not pleasant. In other words, most of the residents living in the Weira condominium are involved in things that strengthen the common social bond; the fact that they have been displaced from one area or given a replacement place helped them to get know each other better. According to the overall results, 56.8% of the residents living in the common housing village are involved in things that strengthen the common social bond, while 43.2% of the residents living in the common housing village are not involved in the things that strengthen the common social bond.

- **The ease of site control and mobility connivance in the condominium development area is influenced by various factors in site (refer to image 36).**

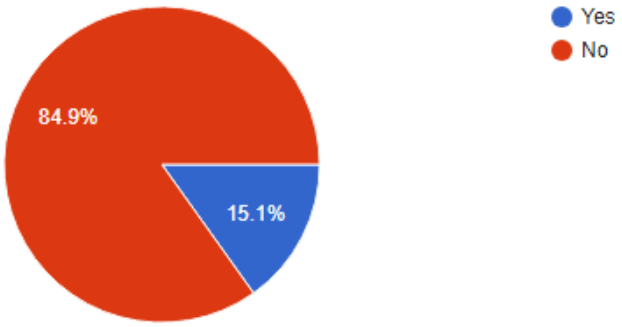

Figure 19 Analysis of movement and control (source; Google form)

The terrain of the building is steep, making it difficult to move freely. Thieves often bother the residents due to the lack of a common fence, making them afraid to move, especially at night. The building is not suitable for movement due to its openness, lack of security staff, and lack of a fence. The road and stairs are also difficult for elderly individuals, and the building's location makes it difficult to move from place to place. The road is not convenient due to its lack of protection, and the building is not suitable for people of our age. The building's location is also a concern, as it is not particularly suitable for transportation. The forest grows, and the building has many doors and openings. The roads are uncomfortable, and the position of the building is not suitable for control. The design of the houses is narrow, making it difficult to control due to the large number of residents. The inner path is narrow, especially for the disabled, and the stairs are not suitable for children and the disabled. The design of the houses is narrow, and there is a lot of robbery in the area and a lack of security. The lack of security staff, the difficulty of movement, and the lack of a fence contribute to the building's safety concerns. The lack of security staff, the difficulty of movement, and the lack of a fence further contribute to the building's safety concerns.

Generally, the residents find it challenging to walk about freely because of the building's high topography, a lack of security personnel, and a lack of a fence. Elderly people find it difficult to navigate the road and steps, and transportation is not feasible there.

The dwellings' constrained layout makes them challenging to park, especially for people with disabilities. The building's safety issues are further exacerbated by a lack of security personnel, restricted movement, and the absence of a fence.

- **The height of the condominiums built in the district is sufficient for the home-seeking community (refer to image 37).**

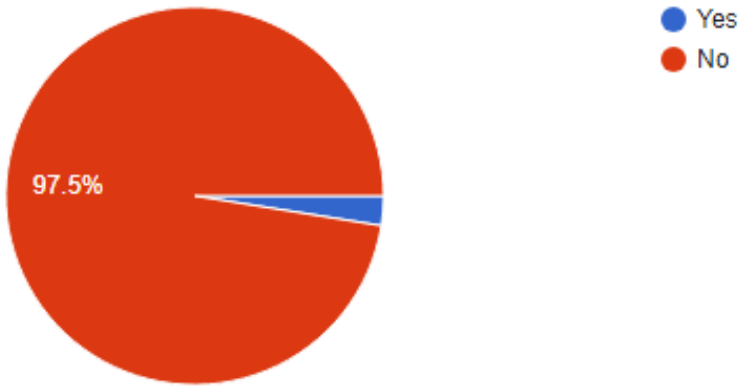

Figure 20 Analysis of the height of the condominiums (source; Google form)

Although the building they are currently living in is already built, it is not proportional to the number of people who are looking for a home. According to the survey, 97.5% of the people living in the condominiums said that the height of the condominiums is sufficient for the community, and 2.5% of the people in the condominiums. Their height is enough for the home-seeking community.

- ✓ If your answer is no, then correct what you say if the height of the three is G+_____

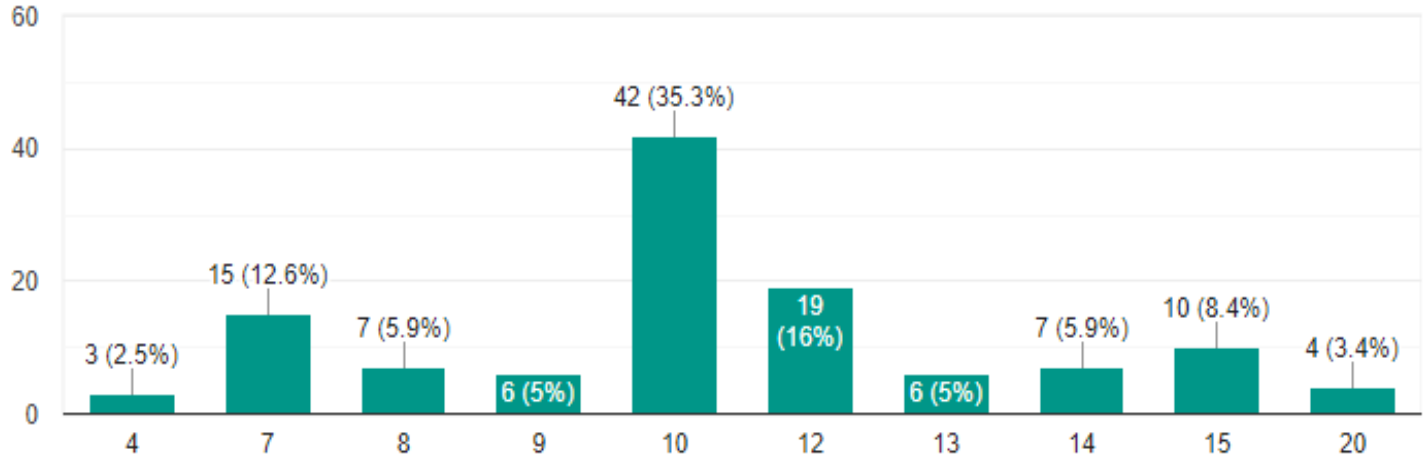

Figure 21 Analysis of the height of the three (source; Google form)

Based on this, 3 people, or 2.5% of the residents who were asked what the height of the condominiums should have been, said it should have been 4 stories; 15 people, or 12.6%, said it should have been 7 stories; and 7 people, or 5.9%, said that it should have been 4 stories.

It should have been 8 floors, 6 people or 5% of them said it should have been 9 floors, and the majority of 42 people or 35.3% of them said it should have been 10 floors, 19 people or 16% of them said it should have been 12 floors, 6 people or 5% of them said it should have been 13 floors, 7 people or 5.9% of them said it should have been 14 floors, and 10 people or 8.4% of them said it should have been 15 floors. It should have been a floor, and 4 people, or 3.4% of them, said it should have been a 20-floor. Therefore, this shows that society is not satisfied with the current building height.

- ❖ According to the check list, the areas where condominiums were built, i.e., Millifoni, Weira, and Kara Kore condominiums should have been included in the open space and green area, storage, shops, common service area, parking space, and recreation area, according to the standard set by the city administration. It helps to find out and show what needs to be fixed.

Open Space and Green Area

The structural land use plan of Addis Ababa city indicates that the minimum standard for urban green space area is 30% of the total land area; in residential compound area, 4 m2 per 100 m2 in the Addis Ababa building permitting office. In spite of this, it can be easily stated that what is seen on the ground shows that the mentioned sites, namely, in Millifoni, Weira, and Kara Kore condominiums, the use of open space and the beautification of green space are not accessible to the public according to the criteria set at the city level. Therefore, it can be understood that there is no space designated for green space on some sites or that the space designated for green space is being used for other purposes, due to the fact that the community is not able to access the service easily.

Figure 22 existing Open Space and Green Area (source; Field survey, May 2023)

Storage

In the storage area, you can use it as a permanent place to store anything that one needs. In addition, the owner can have a home away from home and use it as a place to work or store large items. Storage space in condominiums is becoming an important factor, which is another reason why it is a good and unique investment. In our country, a minimum of 2*2 (4 m2) per person is required in both private and communal housing, but what can be seen on the ground is that the mentioned sites, namely in Milifoni, Weira, and Kara Kore communal housing, use the common space for various office services for people outside the communal housing rented, and they were able to confirm that it was kept closed.

Figure 23 existing Storage area (source; Field survey, May 2023)

Shops

It is obligatory for commercial organizations in our nation to get at least 10% of the ground floor and first floor of private and communal residences through auction. Consequently, it is important to decrease the quantity of individuals who must travel to other locations in order to obtain these services. The government should set up the scenario so that the community may access ground floor and first floor business services in common residential structures.

Common service area

Condominiums with common areas such as swimming pools, gyms, co-working spaces, and more that provide a comfortable living environment for young families, retirees, or young professionals are very popular these days. The community atmosphere of these spaces allows for gatherings in addition to providing additional living space. There are various advantages to living in a condominium with common areas. Among them, common areas create a comfortable environment to meet with your neighbours; having a routine to make exercise a part of your daily life makes life easier; and choosing to read in the common recreation area after a busy day at work. These places are designed to simplify your daily life and facilitate your activities, i.e., walking, cycling, children playing, and so on.

Figure 24 existing Common service areas (source; Field survey, May 2023)

Parking space

Assuming that at least one resident will have one car among our residents, whether in private or communal housing, it is stated that at least 15 m2 of parking space is required and necessary for the number of residents. The information collected from the residents revealed that the number and number of parking spaces are not consistent, and the ones that are available are not suitable for cars, and there is no designated space for parking. This shows that the government does not pay attention to parking in the condominiums that are being built and does not understand that it is an important thing.

Figure 25 existing Parking space (source; Field survey, May 2023)

Recreational areas

Recreational areas can provide opportunities for exercise, sport, and recreation for all ages and abilities, help improve the overall health and well-being of local communities, and encourage more active and healthy lifestyles. It is stated that these are important, but what can be seen on the ground is that at the said sites, namely in Milifoni, Weira, and Kara Kore condominiums, for the physical and social activities problems caused by the community not being able to access recreation areas near the condominium building, the body that built the houses or the government should take responsibility, and in the future It should be noted that it should be adjusted for the construction. It should be made convenient for the community to have access to recreational facilities near the common residences.

In general, it is easy to see that there are problems in the condominiums, namely Milifoni, Weira, and Kara Kore condominiums, and it shows us that there are problems with using open spaces for other purposes and the community's lack of desire to develop them. Also, the government has yet to hand over the land for condominiums.

4.3. The effects of existing building height variance on the condo site and the nearby villages

By comparing the construction height of the condominiums with the surrounding buildings, the height of the building allowed in the area, the distance of the condominiums from the road, the condition of the condominiums and the impact of the buildings on the beauty, according to the prepared checklist, the problems seen in the condominiums in the area from Construction height, The distance from the road, The condition of the building material The effect of the buildings on the beauty of the area, The problem seen in the buildings and other related factors. I will try to show the data collected in the field survey one by one.

4.3.1. Comparison of the building height of the condominiums with the surrounding buildings

Milifony condominium site

Table 13 analysis of Milifony condominium site

No	Comparing mechanism	Type	Condominium building	Others building
1.	Construction height	Maximum	G+4	G+12
		Minimum	G+1	G+4
2.	The distance from the road	Maximum	12m	10m
		Minimum	4m	4m
3.	The condition of the building material	Strength of building	Isn't good	It's good
		local availability of materials	Yes	mixed
		handling	Isn't good	It's good

		serviceability	Isn't good	It's good
4.	The effect of the buildings on the beauty of the area	Green buildings	No	No
		Waste disposal	It's difficult	It's good
5.	The problems seen in the buildings	noise,	Yes, a main road side	Yes, a main road side
		sunrise	No	Yes, opening side
		Wind direction	Isn't good	SE to SW
		Slope	2% - 3%	2% - 3%
		Weather condition	Sunny & Windy	Sunny & Windy

As we can see, the height of the buildings built in the selected condominium sites, namely Millifoni, Weira, and Kara Kore condominiums, and the height of the buildings in the area, compared to the height of the buildings in the area, are smaller than the buildings in the area. We have seen that there are buildings that have been built up to the main road, and because they are built too far from the main road, a gap has been observed in the use of space.

When we look at the condition of construction materials, regarding the strength of the construction, the community expressed that they were happy that they were built by a company called GTZ, and the availability of materials in the area means that the condominiums were built with materials produced locally, while the buildings in the area were built with materials produced locally and abroad. Regarding the maintenance of buildings, we have seen that the communal houses are unsanitary, but the buildings in the area are well maintained.

Finally, in relation to the provision of services, the communal houses are not convenient to move around and do not provide external services, while the buildings in the area are convenient to move around and provide external services. In terms of the impact of the buildings on the beauty of the area, for example, in terms of the use of green plants on the buildings, we have observed that there are no green plants used on the communal houses and buildings in the area. We have seen that they fall, but we have found out from the survey that there are no such problems in the buildings in the area. In the problems seen in the buildings, for example, in relation to noise, it was found that there is excessive noise pollution in the condominiums and the buildings in the area due to the high traffic congestion in the area.

This problem is clearly seen on the buildings in the area, but they do not get sunlight well, i.e., buildings that face the rising sun, so they are not vulnerable to this problem. With the other direction of wind, because the condominiums are built in all directions, some of the blocks are exposed to the wind, but we have confirmed that they are not exposed to the wind because they are built in the SE to SW directions. As it is 3%, we can easily understand that they are in a suitable land position, and finally, the weather conditions are sunny and windy in the common residences and buildings in the area.

Weyira condominium site

Table 14 analysis of Werira condominium site

No	Comparing mechanism	Type	Condominium building	Others building
1.	Construction height	Maximum	G+4	G+8
		Minimum	G+1	G+2
2.	The distance from the road	Maximum	4m	6m
		Minimum	0.5m	2m
3.	The condition of the building material	Strength of building	Isn't good	It's good
		local availability of materials	Yes	mixed
		handling	Isn't good	It's good
		serviceability	Isn't good	It's good
4.	The effect of the buildings on the beauty of the area	Green buildings	No	No
		Waste disposal	It's difficult	It's good
5.	The problems seen in the buildings	noise,	Yes, a river side	Yes, a river side
		sunrise	No	Yes, opening side
		Wind direction	Isn't good	SE to SW
		Slope	2% - 7%	2% - 7%
		Weather condition	Cloudy & Windy	Cloudy & Windy

The height of the buildings built in the selected condominium sites, namely Millifoni, Weira, and Kara Kore condominiums, and the height of the buildings in the area, compared to the height of the buildings in the area, are smaller than the other buildings in the area. We have seen that there are buildings that are built up to the main road, and because they are built next to the main road, there is a gap in the use of space, which means that other buildings have a minimum distance of 2m and a maximum of 6m from the main road, while in shared housing buildings, we have seen that the height of the buildings is low and they have a minimum distance of 0.5m and a maximum of 4m, which is inappropriate. When we look at the condition of construction materials, regarding the strength of the construction, the community expressed that they are happy that certain buildings were built by a company called GTZ, while other buildings are in a state of collapse. They are built with imported materials. Regarding the maintenance of buildings, we have seen that the communal houses are unsanitary, but the buildings in the area are well maintained. Finally, in relation to the provision of services, the communal houses are not convenient to move around and do not provide external services, while the buildings in the area are convenient to move and provide external services.

In terms of the impact of the buildings on the beauty of the area, for example, in terms of the use of green plants on the buildings, we have observed that there are no green plants used on the communal houses and buildings in the area. We have seen that they fall frequently, but we have come to know from the survey that there are no such problems in the buildings in the area. In the other problems seen in the buildings, for example, in relation to noise, it was found that there is excessive noise pollution in the condominiums and the surrounding buildings due to the presence of a large river and a church in the area, and with the sunrise, the condominiums do not get any sunlight, that is, they turned their backs.

This problem is clearly visible due to the presence of buildings, but the buildings area does not get sunlight well, i.e., the buildings facing the sunrise are not vulnerable to this problem, and the other direction of the wind is that the condominiums are built in all directions, so some of the blocks are exposed to the wind, but on the buildings in the area We have confirmed that they are not exposed to the wind as they are built in the SE to SW direction; the other slope, that is, the land layout of the condominiums and the buildings in the area, is 2%–7%, so we can easily understand that they are in a suitable land layout; and finally, the weather conditions in the condominiums. Also, there is a cloudy and windy weather on the buildings in the area, and we have been able to understand this based on the survey that we have found that when the weather is cold and windy, the community takes care of doing various environmental protection works.

Kara kore condominium site

Table 15 analysis of Kara kore condominium site

No	Comparing mechanism	Type	Condominium building	Others building
1.	Construction height	Maximum	G+4	G+9
		Minimum	G+1	G+2
2.	The distance from the road	Maximum	30m	10m
		Minimum	10m	5m
3.	The condition of the building material	Strength of building	Isn't good	It's good
		local availability of materials	Yes	mixed
		handling	Isn't good	It's good
		serviceability	Isn't good	It's good
4.	The effect of the buildings on the beauty of the area	Green buildings	No	No
		Waste disposal	It's difficult	It's good
		noise,	Yes, a river side	Yes, a river side

5.	The problems seen in the buildings	sunrise	No	Yes, opening side
		Wind direction	Isn't good	SE to SW
		Slope	2% - 12%	2% - 12%
		Weather condition	Cloudy, Rainy & Windy	Cloudy, Rainy & Windy

The height of the buildings built in the selected condominium sites, namely Milifoni, Weira, and Kara Kore condominiums, and the height of the buildings in the area, compared to the height of the buildings in the area, are smaller than the buildings in the area. We have seen that there are buildings that have been built up to the main road, and because they were built very far from the main road, a big gap has been observed in the use of space, which means that other buildings have a minimum distance of 5m and a maximum of 10m from the main road, while the buildings in condominiums have a minimum height of 10m and a maximum of 30m.

The community expressed dissatisfaction with the fact that the materials were made by a local contractor and that the condominiums were constructed using only domestic materials, whereas other buildings in the area were constructed using both domestic and foreign materials, when we examined the state of the construction materials in relation to the strength of the construction.

In terms of building upkeep, we've seen that while the nearby structures are well-maintained, the community dwellings are filthy. In conclusion, when it comes to service delivery, the buildings in the vicinity offer external services and are easily movable, but the community residences are not. The influence of the structures on the area's aesthetics For instance, we've seen that the area's shared dwellings and buildings don't have any green vegetation on them. Although we have seen that they fall, the study has revealed that there are no such issues in the buildings in the area.

This problem is clearly visible due to the presence of buildings in the area, but the buildings in the area do not get sunlight well, i.e., the buildings facing the sunrise are not vulnerable to this problem, and the other direction of the wind is that the condominiums are built in all directions, so some of the blocks are exposed to the wind on the buildings in the area. But since they were built in the SE to SW direction, we have confirmed that they are not exposed to the wind. The other slope, that is, the land layout of the condominiums and the buildings in the area, is 2%–12%, so we can easily understand that they are in a suitable land layout.

Finally, the weather conditions in the condominium there is cloudy, rainy, and windy weather on the houses and buildings in the area, and we have been able to understand based on the survey that the community needs to do different environmental protection works to make this weather stable.

4.3.2. Construction height of each site

As I tried to explain above, at the sites where the study was conducted, namely in Milifoni, Weira, and Kara Kore condominiums, the height of the buildings in Milifoni and Weira condominiums is 3 floors and 4 floors, but in Kara Kore condominiums, it is confirmed that it is only 4 floors. Therefore, I understand that the height of the community housing building is not enough and that it is not proportional to the number of people in the community who are waiting to take shared housing.

Figure 26 Existing Construction heights (source; Field survey, May 2023)

As a result, society needs to create a situation where the height of the building in the shared residences is different and it can be demolished to accommodate more residents. The other was able to confirm the difference by comparing it with the buildings built in the area, that is, near the common residences.

4.3.3. The distance from the road

As I tried to explain above, in the sites where the study was carried out, i.e., Millifoni, Weira, and Kara Kore housing estates, the distance of the buildings from the main road was good in some of the sites, but according to the new guidelines, developers on state highways must build buildings at a distance of 40m from the highway, similarly on major circuit roads. It is said that developers should build buildings at a distance of 25m from the middle of the road.

- ✓ Kara Kore communal housing area is more than 50m, so it shows that it was built according to the guidelines.
- ✓ In Millifoni condominiums, the distance of the buildings from the main road is 10m, and the largest is 15m, which shows that they were not built according to the guidelines. Another is that.
- ✓ Weira condominiums the buildings are built 500m from the main road into the neighborhoods, so they have been able to ensure that the distance does not have an effect on the road. The condition of the building material

Construction material is the material used for construction. Many naturally occurring materials, such as clay, stone, sand, wood and even twigs and leaves, have been used to construct buildings. In addition to natural materials, many artificial products are used; some are more and some are less artificial. The production of construction materials is an established industry in many countries.

Therefore, it was possible to confirm that at the sites where the study was conducted, namely, in Milifoni, Weira, and Kara Kore condominiums, the materials of which the buildings are made are produced locally and are available in the country at a low cost, which accelerates the development of the country, but the lack of quality is widely noticed.

Finally, Condominiums are not well-maintained, and the buildings are in need of maintenance and are dangerous, such as the collapse of the building's stairs, cracks, lack of hygiene, and space utilization problems. In this regard, they have been able to confirm that the possibility of the buildings remaining, that is, providing services, has reached a critical level.

4.3.4. The effect of the buildings on the beauty of the area

The impact of the buildings on the aesthetics of the environment the wider design concept is replacing the concepts of high-performance or green buildings with a growing consideration of architectural aesthetics in the built environment. This work is part of the Beauty in Building (BIB) research, conducted by a team of architects and engineers working to understand the link between building aesthetics and building performance. This work presents exploratory findings on how architectural aesthetics can affect energy performance.

Therefore, it was possible to confirm that the sites where the study was conducted, namely, the buildings in Milifoni, Weira, and Kara Kore condominiums, do not have any greening works on all the sites, and the way to remove waste is very difficult, so the impact on the environment is clearly visible.

Figure 27 the existing effect of the buildings on the beauty of the area (source; Field survey, May 2023)

4.3.5. The problems seen in the buildings

Assess the problems in the buildings, such as noise pollution, sunlight, wind direction, slope, and weather conditions, according to the prepared checklist. Therefore, it was tried to show the buildings at the sites where the study was conducted, as follows:

Noise pollution affects millions of people every day. In all the sites, namely in Millifoni, Weira, and Kara Kore condominiums, the community stated that they are bothered by the sound of cars, mosques, and churches, and the most common health problem is hearing loss caused by the noise. Studies show that exposure to loud noise can cause high blood pressure, heart disease, sleep disorders, and anxiety.

Therefore, it shows us that it is important to prepare a comfortable living place for the community by solving this problem. To ensure that the sunrise at all the sites, i.e., Millifoni, Weira, and Kara Kore condominiums, allows for adequate sunlight at midday and evening, but that there are blocks that do not receive moderate sun in the morning and that suffer from heavy sunlight in the afternoon, it is clearly visible.

In general, orienting the wind direction of the building to coincide with the wind provides maximum wind ventilation. Keeping it in a direction relative to the prevailing winds, however, provides the least amount of ventilation. The best direction for residential areas is the sun's north, but the directions from north to 15° west and north to 25° east are still good wind directions in our country, so the buildings should be built according to this. Therefore, it was possible to confirm that there are blocks at all the sites, namely in Millifoni, Weira, and Kara Kore condominiums, which are affected by strong wind. Another thing is that in the Kara kore condominiums, the place where the buildings are built is high, so they were able to confirm that the wind can move freely and disturb the community.

In relation to land layout, even though most of our country does not have straight land, we need to create a comfortable place for living by using different methods. Therefore, it was seen that both sites, Millifoni and Weira condominiums, have a good landscape, while in the Kara kore condominium, the area where the buildings are built has more than 10% of the terrain, which makes it difficult for the community to move around either by car or on foot. Another is that in all the sites, namely, in Millifoni, Weira, and Kara Kore, there are people who have difficulty moving around because the design does not take the disabled into account.

They are about the different types of weather that we encounter every day in the global weather system, i.e., the local weather that affects our daily lives, the interaction of solar radiation in the atmosphere, and the large ocean of the earth. Due to its diverse landscapes and activities in space, it hosts large global events in the atmosphere. Therefore, it was seen that at all the sites, they get all the weather except storms at the right time and place, and they never faced any serious problems related to this.

CHAPTER FIVE

5. CONCLUSIONS AND RECOMMENDATION

5.1 Conclusions

The condominium buildings built by Milifoni, Weira, and Kara Kore are G+4, but the minimum height of the building should have been G+6, and G+5 buildings. Therefore, the building height regulations are not implemented. The standard built-up area is 80%, but the existing built-up area of the condos is 18.7%, 18.7%, and 21.4%, respectively, which is built below the standard.

Although it's difficult to implement according to the building height regulation set by the city administration, the buildings used in the selected condominiums, such as Millifoni, Weira, and Kara Kore condominiums, have a minimum height. It is easy to understand that there is a big problem with the use of space in buildings. Since there was no building built higher than G+4, it was possible to build buildings with a height of up to G+22 in order to be able to hold many houses. Another is that according to the land use set by the city administration, there are condominiums built for unauthorized purposes.

In general, the selected condominiums in Milifoni, Weira, and Kara Kore are those built according to the Building Setback standard set by the city administration. This indicates that there is a lack of control over the government's condominium housing. Most of the residences are not satisfied with the design of the houses built in communal housing due to the narrowness of the communal housing, and they are having trouble because their location is not suitable.

Additionally, residents stated that they are facing difficulties due to the lack of infrastructure services such as transportation, water, electricity, and telecom on the upper floors of condominiums. The residents of the condominium site are also practicing edir, iqub, association, etc., which helps them strengthen social interaction. They also stated that due to the presence of recreational space and green spaces for worship in the area, they are having some kind of noise disturbance.

Another is that the space designed for green areas and parking spaces on condominium sites are below standard. The sites are also including a very limited common service area to relax. Although the buildings around the condo were built with G+12 stories, the condo buildings are only G+4. This means that by only increasing the building height of condos, a large number of house seekers can be accommodated. Building materials and finishing materials are good for the development of the country, but quality problems are widely seen. Another effect of the buildings is the pressure on the beauty of the area.

Finally, adjust the height of the buildings based on the building height regulations and the house seekers in the city. It is implemented to establish a system that can be controlled and is responsible. It should be included in the design to build common areas, such as open space, green area, storage, shops, common service area, parking space, recreation area, etc.

5.2. Recommendation

Based on the findings mentioned above, the following recommendations have been forwarded:

- Open spaces, storage, shops, a common service area, a green space, a parking space, a recreation area, and other infrastructure works should be transferred as per standards to the community.
- According to the FAR, BAR, building height, and building setback standards set by the Addis Ababa city administration, buildings should be constructed.
- The height regulation of buildings in an area and consistent construction art should be implemented.
- The design of the condominiums should be done in a way that considers noise, wind direction, slope, weather conditions, and other associated aspects of the buildings.
- There should be an appropriate body to control buildings usually used as communal housing.
- Condominiums should be designed in such a way that they are easily accessible for different groups of people, including people with disabilities.
- It should be the primary task of the management of condominiums to solve the problems associated with the construction of the internal roads, street lights, and other basic infrastructure of buildings.

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Annex 1 Article

Article

ANALYSIS OF BUILDING HEIGHT AND LAYOUT FOR IMPROVED RESIDENTIAL QUARTERS; IN THE CASE OF SELECTED KOLFE KERANIYO SUB-CITY CONDOMINIUM BUILDING SITES

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ABSTRACT

This thesis investigates mainly the current housing problems in Addis Ababa, which are getting worse and need an urgent solution. Currently, there are about 950,000 people waiting for the 10/90, 20/80, and 40/60 condominium house schemes. The existing condominiums are built with limited consideration of available space and a low building height without accounting for proper building location, i.e., slope, noise, wind, weather, and sunlight. There are also limited communal parking spaces, green spaces, and recreational areas, and there are cases where those spaces are used for other purposes and are not used by the community. Methodologically, the height regulation building prepared by the Addis Ababa city administration used questionnaires and checklists to collect data. The findings show that there is a lack of building height and layout for regulations condominiums, variations in the standard and existing conditions, a lack of building setbacks, and the condition of buildings contradicting the nearby villages. So, the condominiums that are going to be built at the government level to overcome housing problems require a system that needs to be controlled and completely meet standards.

Key words; *condominiums, community, building height, building layout, regulations…*

1. Introduction

The Integrated Housing Development Program (IHDP) was implemented in Ethiopia in 2005 to construct 400,000 condominium units and promote homeownership for low-income households. However, the housing problem in Addis Ababa remains widespread, with many registered and waiting for a house for over 10 years.

The community living in condominiums faces various problems, including the lack of suitable housing for the number of people looking for condominiums. One solution proposed is to increase the height of buildings in proportion to the area to accommodate more community units in a small area. The gap between land use and communal housing policies is weak and needs to be addressed by the city administration.

1.1. Objectives

1.1.1. General objectives

- The general objective of the study is to analyze the building height and layout for sustainable improvement of residential quarters and neighborhoods in some selected condominium buildings located in Kolfe Keraniyo sub-city, Addis Ababa.

1.1.2. Specific objectives

- Evaluate the height of condo buildings against the building-height restriction of the city;
- Investigate condo building layout effects on the existing and potential communal site functions; and
- Identify the influence of the existing building height variance on the condo and on the nearby villages.

2. Literature review

Condominiums are non-landed residential developments approved for dwelling purposes, with each unit having a satisfactory layout including bedrooms, a living room, a dining room, a kitchen, and toilets. They are allowed in areas categorized as residential, commercial and residential, residential with commercial, and residential in the master plan. Condos typically offer more communal and recreational facilities, a larger site area, and a greater common boundary setback. They can be developed as residential high-rises, residential townhouses, or commercial properties (1).

Developers provide parking spaces and garages to unit owners, either as limited common areas or as separate units. The declaration of covenants, conditions, and restrictions sets forth regulations for unit owners, including acceptable use, board selection, and fees for insurance, shared utilities, and maintenance. Condo fees are subject to increase, and if the building requires major maintenance, any costs not covered by reserve funds can be billed to unit owners (2).

2.1. Landscape definition

The definition of a landscape is complex and influenced by the interaction between humans and the environment. Researchers aim to reduce the gap between objectivity and subjectivity using a holistic approach (3). The landscape is a combination of natural and cultural characteristics of a region, and the European Landscape Convention defines it as an area perceived by people as the result of natural and human factors. Research on landscapes reveals their relevance to individuals, including nature, beauty, country, city, and garden (4).

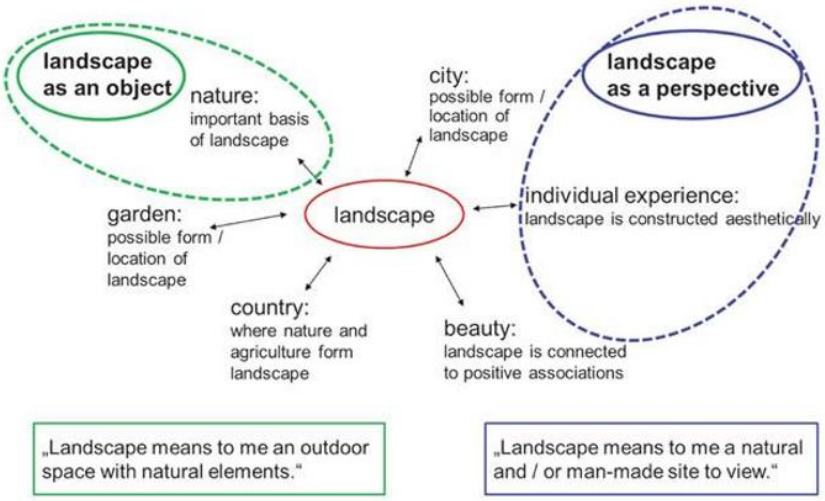

Figure 28 landscape and its semantic field (source: Hokema)

2.1.1. Urban morphology

Urban morphology studies the physical form of settlements, focusing on the formation of urban fabric components and their relationships over time. It is a complex phenomenon that evolves with social, environmental, economic, and technological developments, is mediated by urban authorities, and is present in our current urban age (5).

2.1.2. Condominium Site Coverage

Site coverage refers to the proportion of a site covered by buildings and structures, ensuring adequate space for deep-soil landscaping and private open space. It includes basements, stores, shops, communal areas, green spaces, car parking, and attached balconies (6).

2.1.3. Communal housing standards

2.1.3.1. Green area

Addis Ababa's structural land use plan suggests a minimum urban green space standard of 30% of the total land area. However, low standards are due to declining green areas, built-up areas, and transportation infrastructure expansion. The city's policies, including the Growth and Transformation Program, have a strong constitutional foundation (7).

No	Functional level	Maximum distance from home (m)	Minimum surface (ha)
1	Residential green	150m	1
2	Neighborhood green	400m	10 (park: 5 ha)
3	Quarter green	800m	30 (park: 10 ha)
4	District green	1600m	60
5	City green	3200m	>200 (smaller towns)
6	Urban forest	5000m	>300 (big cities)

2.1.3.2. Storage and Shops

Storage areas are facilities or vehicles used to store and secure radiographic exposure devices, radiation machines, or containers. They are locked or have physical barriers to prevent accidental exposure. Storage is an essential marketing function, holding and preserving goods from production to consumption. Buildings like warehouses, freight depots, and public garages are used for storage (8).

2.1.3.3. Common service area

The common area in the shopping Centre is for the common use of all tenants, including facilities like parking, streets, and public toilets. The landlord can change the area's dimensions and location, and tenants must not solicit business or interfere with others' use rights. This lease excludes space in commercially rented buildings and streets maintained by public authorities (9).

2.1.3.4. Parking space

A parking area is an open space used for motor vehicle parking, including ramps and driveways, and may include landscaped open spaces. It is associated with a specific building or land use and is controlled by the land owner.

The minimum size for a car-parking space is 15 m^2, but the exact size depends on factors such as the size of the space, the type of vehicle, and the accessibility of the space (9).

2.1.3.5. Recreation area

Recreational areas, such as parks and playgrounds, are vital for active play and health. They improve water quality and air quality and provide habitat for wildlife. Parks reflect a community's quality of life, providing identity for citizens and influencing perceptions of livability (9). They serve as gathering places for families, social groups, and individuals of all ages and economic statuses. Access to parks has been linked to reduced crime, improved property values, and increased physical activity. The Centres for Disease Control and Prevention recommend creating and improving recreational areas to improve individual and community health (9).

2.2. Condition of the condominiums

2.2.1. Building height regulation

The regulation was revised to take into consideration elements including environmental impact, infrastructural development, and security concerns, as well as maintaining historical sites, according to city administration and Urban Information and Planning Institute officials. It is expected that the revision of the regulation will encourage investors to engage in development projects in the city, say the officials. The new 52-story headquarters building planned by the Commercial Bank of Ethiopia (CBE) is an example of the need for the new regulation, according to the officials. The Addis Ababa City Administration announced that the building height regulation has been raised to 55 floors. Buildings in Addis were previously limited to a maximum of 20 floors (7).

Table 16 Building height regulation preparation practices in Addis Ababa

No	Areas of the City	Building height	FAR (max)	BAR and Setback
1	Main city center (inner zone)	34-55	1:7	Minimum BAR for all areas --- 80% Front Setback: O for building height = street width 60 degree (1.73:1) for height above street width in
2	Main city center (intermediate ring)	21-34	1:5- 1:7	
3	Main city center (outer zone)	13-21	1:4	

2.2.2. The Building height distance from the road

Table 3 Building height distance from the road

Regulation zone	Floor Area Ratio (FAR)		Remark	Building Height (meters	
	Minimum	Maximum		Minimum	Maximum
I.	1:10	Unlimited	Main city center	70	Unlimited
II.	1:5	Unlimited	Collector street and above		70
	5	5	Local street		35
III.	2	Unlimited	Collector street and above.		35
	2	5	Local street		35
IV.	0.5	Unlimited	Collector street		35
	0.5	3.5	Local street		35
Historical areas	0.5				21
Green areas		0.05			6

2.3. The condition of the building material

A wide range of construction materials are available on the market, and since several factors need to be considered for the selection of materials, it can be difficult to choose the best option that serves the various requirements of the building. **Strength, durability, local availability of materials, sustainability, and handling** are some essential factors that should be considered when selecting suitable construction materials for the given project (10).

2.4. The effect of the buildings on the beauty of the area

❖ **Green buildings**

A green or sustainable building is a building that, because of its construction and features, can maintain or improve the quality of life of the environment in which it is located. Green building refers to both a structure and the application of processes that are environmentally responsible and resource-efficient throughout a building's life cycle: from planning to design, construction, operation, maintenance, renovation, and demolition (11).

❖ **Waste disposal**

A waste management system, or waste disposal, is a streamlined process that organizations use to dispose of, reduce, reuse, and prevent waste. It is also an approach where companies implement comprehensive strategies to efficiently manage wastes from their origin until their final disposal (11).

2.5. The problems seen in the buildings

- **Noise pollution** is a significant environmental issue in cities, with recent research focusing on transportation noises. Building construction noise exposure has not been studied, but absorptive materials like gypsum board, wood, concrete, brick, and tile can help control sound.

- **Sun-shading** is crucial to screen sunlight, as it causes glare, overheating, and the fading of materials inside buildings. The sun symbolizes renewal, light, warmth, and hope, while sunrise and sunset symbolize the end of life.

- **Wind direction** is reported in cardinal or compass directions, with modern instruments like anemoscopes, anemometers, and wind vanes used for wind resource assessment and turbine control.

- **Slope** is calculated using equations or coordinates of points on a straight line. Minimum and maximum walking surface slopes on sidewalks should be between 0.5% and 2% for good drainage and accessibility, and less than 1% cross-slope for accessible boarding areas.

- **Weather conditions** refer to regional weather during a defined time period, describing typical weather phenomena such as thunderstorms in hot summers or foggy months in autumn. Weather condition symbols are sunny, partly cloudy, cloudy, windy, rainy, and thunderstorms.

2.6. Alternatives of communal residential buildings structure

2.6.1. Single-Family Home

Single-family homes provide privacy, space, and freedom of design, offering a more reliable resell value than condos and townhomes. However, they require more maintenance, which is shared with the homeowner, unlike condos and townhomes, where costs are shared (12).

2.6.2. Condominium

Condominiums are single units within a larger community, often with homeowners' associations (HOAs) that require monthly or yearly dues. They are popular in urban areas with numerous restaurants and shops. Condos offer minimal homeowner responsibility for maintenance and amenities, but may limit remodeling, pet and rental restrictions, and privacy. HOAs priorities uniformity and safety, ensuring high-quality and safe installations(12).

2.6.3. Townhouse

Townhouses are a hybrid of condos and single-family homes, often featuring multiple floors, shared walls, and small yard spaces. They offer more privacy than condos, are more affordable, and may have HOAs or joint maintenance agreements. They lack shared amenities (12).

2.6.4. Cooperatives

Co-ops are a shared building title where everyone owns the building together, with lower HOA dues and lower costs compared to condos. Owners typically take on maintenance as a community but share financial responsibility with neighbors, potentially leading to foreclosure. Loans for co-ops can be more challenging due to higher down payment requirements and potential bank restrictions (12).

2.6.5. Multi-Family Home

Multi-family homes are residential buildings with multiple units, ranging from duplexes to four-family units. They are ideal for investment properties and multi-generational households. They are a hybrid between single-family homes and condos, with smaller units and less privacy. Renting a multi-family home incurs maintenance costs, while owning one incurs maintenance costs a time commitment (12).

2.7. Different countries experience models

2.7.1. Missoni Baia, Miami condominium

Missoni Baia, a 57-story condominium along Biscayne Bay, offers beachside living with a strategic waterfront location and appealing amenities. With 249 luxury units with 1-5 bedrooms, the bayfront offers views of Biscayne Bay and Downtown Miami, a lounge pool, fitness gym, residents-only spa, and water play zone (13).

2.7.2. Opus, Hong Kong condominium

The Opus tower in Hong Kong offers residential units with stunning views of the city skyline and green mountains. The top-floor "Presidential Unit" sold for $66 million in 2015, making it the most expensive condominium unit in Asia. Brittany's Crosswinds in Tagaytay offers private and luxurious condominiums surrounded by pine trees. The tower has 12 units, including two double-level apartments with pools and ten floor-wide units with shared rooftop swimming pools (13).

2.7.3. One Hyde Park, London condominium

The building includes the usual amenities of luxurious condominiums such as a pool; a spa ran by the Mandarin Oriental, a cinema, an entertainment suite, a library, and even a golf simulator. Since One Hyde Park is known for being the home to many influential people, security in the building is tight. They have bulletproof glasses, and panic rooms (13).

2.7.4. One Palm, Dubai condominium

This high-end residential development only has 94 luxury homes for sale, all of which offer views of the Dubai skyline and the Arabian Gulf. Its premium amenities include an outdoor swimming pool overlooking the Arabian Gulf with 24/7 lifeguard services, a play area for children, and a gym for fitness enthusiasts. It even has an outdoor cinema and offers housekeeping services to its residents (13).

2.7.5. No.1 Grosvenor Square, London condominium

No. 1 Grosvenor Square, a 300-year-old aristocratic property, is now a luxurious apartment complex in London. The complex offers a range of services, including hospitality, household services, health and wellness facilities, and complex matters like art, legal, tax, and immigration. With 44 units, Rosa is an English-inspired development with a countryside manor vibe and hedged cobbled paths, reflecting the city's rich English culture and heritage (13).

2.8. Empirical literature review: con-dominium building approaches in Ethiopia

2.8.1. Historical Evolution

Condominiums are ownership structures where a building is divided into separate units, surrounded by jointly owned common areas. Historically, condominiums were used to settle territorial disputes between states, often during colonial periods. Examples include the Canton and Enderbury Islands, the New Hebrides, the Samoan Islands, Sudan, and Togoland (14). Condominiums first emerged in Europe to avoid protracted military conflict over disputed territories. Examples include Friesland, Zaporozhian, Neutral Moresnet, and Maastricht. The shortest-lived example is Northern Dobruja, while the co-principality of Andorra is the second-oldest and longest-lasting condominium in the world (14).

- **Communal living in the middle Ages**

Communal living can be traced back to the earliest days of human cohabitation. Historians Karl Marx and Friedrich Engels argued that hunter-gatherer societies were traditionally based on egalitarian social relations and common ownership. And while there was little architecture to speak of, communal living—the act of the tribe sharing resources equally—is something that predates even the written word (15).

- **Ancient communal living**

During the middle Ages, communal living was the norm in Europe, a midpoint between hunter-gatherers and modern living arrangements. Monogamous couples emerged in the 12th century, but communal housing was often shared by various groups, including townspeople, poor couples, orphans, widows, and tenants (15).

- **Communal living in the ‘70s**

The modern cohousing movement actually began in Denmark, where there are currently over 700 “living communities." Designed through collaboration between a Danish architect and a psychologist, the first cohousing community was built in 1972 close to Copenhagen and housed 27 families, drawing influence from Bodil Graae’s 1967 article, “Every child should have 100 parents." To this day, approximately 1% of the Danish population still lives in cohousing communities (15).

- **Shared outdoor space as communal architecture**

Shared spaces in the UK have consistently increased property value and community spirit. Urban parks and squares, known as civic 'breathing spaces', account for over 40% of development areas, creating a flood-resistant, and biodiversity landscape. These communal spaces provide residents with opportunities to socialize, make friends, and interact with the wider public (15).

- **current communal architecture**

Millennia’s are increasingly adopting communal living and architecture due to their tech-savvy nature, relaxed work-life balance, and desire for authentic experiences. They are willing to sacrifice personal space for communal areas and amenities, requiring architectural styles to adapt. Common elements in condo complexes include corridors, garbage rooms, lobbies, locker areas, garages, technical rooms, roofs, grounds, and walkways (15).

2.9. Characteristics of the condominium building structure

2.9.1. Fully Furnished

Everything is already set up for you. With home design and furnishings that provide an inviting, professional, and on-brand environment for your company, there is no need to pay for a presentable lobby, installing restrooms, or air-conditioning (16).

2.9.2. Good Amenities

The available amenities differ from one condominium to another. The thing is, more expensive condos usually have better amenities than those that are less expensive. However, regardless of the cost, a good condo should come with basic amenities like security, parking space for residents, elevators, etc. (16) ,

2.9.3. Maintenance

The building manager usually handles the maintenance of most condos. Residents have nothing to worry about regarding the management of the exterior parts of the building. Things like cleaning, mowing, and other maintenance tasks are taken care of by the building manager (16).

2.9.4. Security

Condos provide residents of the building with high-end security. A lot of condos usually have a doorman or security personnel who ensure the residents are safe. Visitors are thoroughly questioned before being allowed to enter the building. This is done to ensure everyone that goes into the building does not pose any security threat to the residents (16).

2.9.5. Rules and Regulations

Some rules are usually put in place for all residents to abide by. Almost all condo buildings have some rules that everyone is supposed to follow. These rules are put in place to ensure residents of the building do not disturb each other (16).

2.10. Condominium Building height And Building arrangement

2.10.1. Built Up Area

The built-up area, or plinth area, is the gross area of a property, including carpet, walls, balconies, terraces, and utility areas. It is 10–15% more than the carpet area and comprises 70–80% of the super-built-up area. In flats, the built-up area includes a carpet area and wall spaces, making the space appear larger (17).

2.10.2. Floor Area Ratio

FAR, or Floor Area Ratio, is a measure of building volume on a development site, influenced by factors like property size, building type, location, and amenities. It is often used in conjunction with other development standards to encourage community design. In group housing, the FAR is calculated based on the density pattern in the development plan, with a maximum of 1.25 FAR (17).

2.10.3. Building Height Regulation

Building Height is not defined in the Zoning and Development By-law, but refers to the vertical distance that the building extends above the base surface. The Addis Ababa City Administration has raised the building height regulation to 55 floors,

2.10.4. Building Setback from Boundary

Condominiums must have been set back from roads and common boundaries, with a minimum road buffer of 7.5m for uncategorized roads and a green buffer for uncategorized roads. Land vested in the state for road, drainage, or public purposes is excluded. Road category classification can be obtained from the Road Interpretation Plan.

3. Material and Methods

3.1. Study area

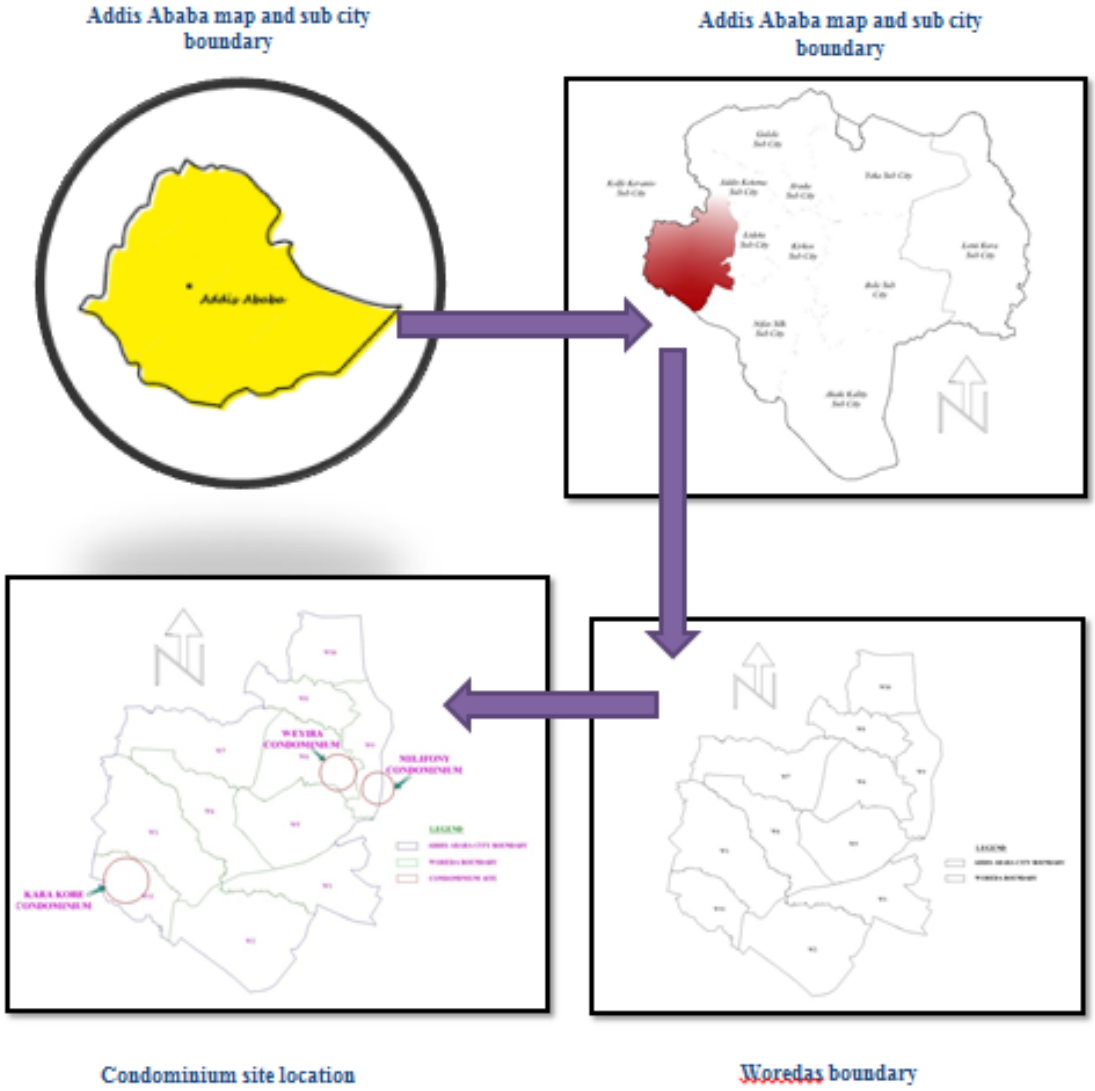

Figure 29 location map of study area (source: Wikipedia, line map, Sep 2022)

3.2. Sampling design

3.2.1. Sampling techniques

- For the first objective, various departments under Kolfe Keranoyo sub-city house development, Addis Ababa House Corporation, and the management office will collect the data by observation in terms of their functions.
- The second objective, I will use cluster random sampling techniques to identify respondents.
- For the third objective, I will use cluster random sampling and a field survey to compare condominiums with nearby ones based on city standards.

3.2.2. Sampling population

In this study, cluster random purposive sampling was combined with sampling Areas of interest in this case include Milifony Condominiums, Weira Condominiums and Kara kore Condominiums. Which are further condominiums to the city located in different zones in different directions?

kolfe keranoyo sub-city house development and management office was established with the mission of solving housing management problems at the local level,

3.2.3. Sampling size

Collecting data by cluster random sampling questioner using a sample size of per block 1 person of the 119 selected residents in Kolfe Karanio Sub-district, Milifony Condominium, Weira Condominium and Kara kore condominiums in Kolfe Karanio Sub-city,

No	**Condominium site**	**Number of Block**	**sampling technique**	**Sampling size**
1	Milifony Condominium	10	cluster random	10 residence
2	Weira Condominium	36	cluster random	36 residence
3	Kara kore condominium	73	cluster random	73 residence
		Total 119 Blocks		**Total 119 residence**

3.3. Method of data collection

3.2.1. Analysis of condos height against the city building-height restriction

- To collect secondary data, prepare the building height check list for the location by taking the building-height regulation from the Addis Ababa housing development office or the kolfe keraniyo sub city.

3.2.2. Building layout effects on the communal site functions

- Preparing a questionnaire for the relevant parties and collecting information from the housing development office, the housing association committee, the resident and the protection of the condominium in the places where the condominium is located.

- To collect the data depends on the compound building standards and prepare the check list for Open Space and Green Area, Storage, Shops, Common service area, Parking space, Recreation areas and others.

3.2.3. The effects of existing building height variance on the condo site and the villages nearby

- By field survey, comparing the construction height of the condominiums with other buildings in the area, the height of the building allowed in the area,
- This survey uses a set of questions to gather the respondent's perception The query will launch Answers to questions about safety, comfort, provider attention and housing status. The first part of the questionnaire includes information about the respondent such as gender, age, monthly income, housing condition and purpose of use, etc. All questions are under the objective questionnaire category.

3.3. Method of data analysis

3.3.1. Analysis of condos height against the city building-height restriction

- Using this approach, four cases including the first regulation in 1996, two revisions following the urban plan revisions in 2002 and 2015, and an intermediate revision made by the University in 2010: A study was conducted by the Ethiopian Institute of Architecture, Building Construction and Urban Development (EiABC).

3.3.2. Building layout effects on the communal site functions

- By using observations to collect data, in reference to the set standard, by preparing a check list to ensure that the use of open space, storage, shops, common service area, green space, parking space, recreation area and other condominium areas are fulfilled.

- By using questionnaires were used to gather information about the demographic characteristic of the household, satisfaction of households by the available open space, their access to social and infrastructural services, the social interaction, relationship of residents, and security related issues such as theft crime and sound disturbance.

3.3.3. The effects of existing building height variance on the condo site and the villages nearby

- By using comparing the construction height of the condominiums with other buildings in the area, the height of the building allowed in the area, the distance of the condominiums from the road, the condition of the condominiums, the effect of the buildings on the beauty of the area, the problems seen in the condominiums, i.e. From noise, wind, sunrise, slope, weather and other related factors. They are collected in the field survey

3.4. Method of data presentation

All the information I use to illustrate with the help of various pictures, maps, satellite images, graph and tables. All maps are produced in the Arc Map GIS environment and photographs are taken during site surveys. All split maps are condominiums located in different locations within the same sub-city.

4. Result and discussions

4.1. Analysis of condos height against the city building-height restriction

Table 4 built up area, floor area ratio, building height and building setback analysis

No	Condominium site	Area of plot (m^2)	Total built up area (m^2)	Built up area (%)	Floor area ratio (FAR)		Building height (m)	Building Setback	
					Existing	Plan		Min (m)	Max (m)
1.	Milifony	10,907	3086	28.3	1.5	2 – unlimited	Max 70	4	12
2.	Weyra	50,852	9495	18.7	1	0.5 - 6.5	Max 35	0.5	4
3.	Kara kore	130,955	28,002	21.4	1	0.5 - unlimited	Max 70	10	30

4.2. Building layout effects on the communal site functions

Below, we will look at the location of the buildings and the services they provide, and I will try to show the effects on the condominiums based on the information collected from the residents of all sites such as Milifoni, Weira and Kara kore condominiums.

4.2.1. Questioner data analysis

1. **When the study examines the effectiveness of the open areas utilized in the communal living quarters for offering various community services, like a children's playground, green space, and parking, there are a lot of concerns.**

The communal village is unsuitable for both adults and children due to its lack of parking, green space, and entertainment options. The area is not convenient, lacks a common dining room, and is rented for car-owning individuals. The lack of green space, parking, and a playground further exacerbates the issue. The community's lack of interest and the government's inaction contribute to the problem. Management issues and societal attitudes further exacerbate the issue.

2. **Given the location of the building, a number of uncomfortable elements, such as noise, bad air quality, natural light, and other things that make the situation worse, may make living in the condominiums challenging.**

Residents face discomfort due to morning sunlight, garbage smells, noise pollution, and unsuitable terrain for disabled people. Factors like a cold climate, high altitude, security issues, environmental conditions, a lack of drainage, and water scarcity contribute to these issues. Noise, neighbors, and school proximity exacerbate the problem.

3. **Figure 35 has provided some insight into whether social interactions exist that could improve the relationships between residents in shared living quarters.**

The study found that most residents in Milifoni and Kara Kore condominiums are not involved in strengthening social bonds, indicating unfavorable relationships. However, most residents in the Weira condominium are involved in strengthening social bonds, possibly due to displacement or replacement. The overall results showed 56.8% of common housing village residents are involved in strengthening social bonds.

4. **The ease of site control and mobility connivance in the condominium development area is influenced by various factors in site (refer to image 36).**

- The building's steep terrain, lack of security staff, and lack of a fence make it difficult for residents to move freely. The lack of a common fence and openness make it unsafe for elderly individuals and those with disabilities. The location, with its numerous doors and openings, is also problematic.

- The narrow design of the houses, particularly for disabled individuals, makes them difficult to control and navigate. The lack of security staff, restricted movement, and the absence of a fence further exacerbate the building's safety concerns.

- The building's high topography, lack of security personnel, and restricted layout make it unsuitable for residents and visitors.

5. **The height of the condominiums built in the district is sufficient for the home-seeking community (refer to image 37).**

Although the building they are currently living in is already built, it is not proportional to the number of people who are looking for a home. According to the survey, 97.5% of the people living in the condominiums said that the height of the condominiums is sufficient for the community, and 2.5% of the people in the condominiums. Their height is enough for the home-seeking community. According to the check list, the areas where condominiums were built, i.e., Millifoni, Weira, and Kara Kore condominiums should have been included in the open space and green area, storage, shops, common service area, parking space, and recreation area, according to the standard set by the city administration.

- **Open Space and Green Area**

Addis Ababa's structural land use plan mandates a 30% urban green space standard in residential compounds. However, in Millifoni, Weira, and Kara Kore condominiums, open space and green space beautification are not accessible to the public, indicating that designated green space is being used for other purposes, causing difficulty in community access.

- **Storage**

Storage areas in condominiums provide a permanent storage space, providing a home away from home, workspace, or large items storage. In our country, a minimum of 2*2 (4 m2) per person is required, but sites like Milifoni, Weira, and Kara Kore communal housing use common space for office services and rents.

- **Shops**

In our country, at least 10 percent, or the ground floor and 1st floor, of private and communal houses are transferred to commercial institutions through auction, and it is necessary. As a result, there is a need to reduce the number of people who have to go to other areas to access these services. On the part of the government, it should create a situation where the community can get these services in the common residential buildings, that is, ground-floor and first-floor commercial services.

- **Common service area**

Condominiums with common areas like swimming pools, gyms, and co-working spaces are popular among young families, retirees, and professionals. These spaces provide a comfortable environment for gatherings and facilitate daily activities like walking, cycling, and children's play. They simplify daily life and make exercise a routine.

- **Parking space**

Assuming that at least one resident will have one car among our residents, whether in private or communal housing, it is stated that at least 15 m2 of parking space is required and necessary for the number of residents. The information collected from the residents revealed that the number and number of parking spaces are not consistent, and the ones that are available are not suitable for cars, and there is no designated space for parking.

- **Recreational areas**

Recreational areas in Milifoni, Weira, and Kara Kore condominiums are crucial for community health and well-being. However, access to these areas is limited, causing physical and social activities problems. The building or government should take responsibility and adjust the constructions to ensure convenient access to recreational facilities near common residences.

4.3. The effects of existing building height variance on the condo site and the villages nearby

- **Milifony condominium site**

The Millifoni, Weira, and Kara Kore condominiums are smaller than the surrounding buildings, with some built too far from the main road, causing a space gap. The community is satisfied with the construction materials used and with the condominiums being built by GTZ, a local company. The communal houses are unsanitary, while the area's buildings are well-maintained and provide external services.

The buildings do not use green plants, and noise pollution is high due to traffic congestion. The buildings face sunlight better, making them less vulnerable to wind. The condominiums are built in a suitable land position, with 3% exposure to wind. The weather conditions are sunny and windy, with the common residences and buildings in the area experiencing different weather conditions.

- **Weyira condominium site**

The construction height of Millifoni, Weira, and Kara Kore condominiums is lower than other buildings in the area, with some buildings built next to the main road, creating a gap in space. Shared housing buildings have lower heights, ranging from 0.5m to 4m. The community is satisfied with some buildings built by GTZ, while others are in a state of collapse due to imported materials. The communal houses are unsanitary, while the area's buildings are well-maintained and provide external services. Green plants are not used on the buildings, and noise pollution is prevalent due to the presence of a river and church. The buildings face sunlight better than those facing sunrise, and the land layout is suitable for 2%-7%. The community takes.

- **Kara kore condominium site**

The condominiums in Milifoni, Weira, and Kara Kore are smaller than the surrounding buildings, with some built closer to the main road. The community expresses dissatisfaction with the strength of the construction materials used, as they were made by a local contractor. The communal houses are unsanitary, while the area's buildings are well-maintained and provide external services. The buildings do not use green plants, and noise pollution is prevalent due to mosque and church noise. The land layout of the condominiums is suitable, with a 2%-12% slope. However, the buildings face exposure to wind, with some blocks exposed to the wind. The community needs to implement environmental protection works to ensure stable weather conditions. The survey also reveals that the area's buildings are not exposed to the wind, and the area's land layout is suitable for 2%-12%.

5. Conclusions and Recommendations

The condominiums in Milifoni, Weira, and Kara Kore are built at G+4 heights, which is below the standard of G+6, G+5, and G+6. This is due to the lack of space and infrastructure services in the built-up areas. The residents are dissatisfied with the design of communal housing and the narrowness of the housing, which makes it difficult for them to move. The lack of infrastructure services, such as roads, water, electricity, and telecom, also affects the residents' experience.

The open space in the condominiums is also insufficient, with some sites having less than the standard of 100m2 / 4m2 green areas set by the city administration. Additionally, parking space is not enough for residents to prepare for it, and there is a lack of a place to relax, exposing society to unwanted abuse and additional expenses.

The building heights are built with local materials, but quality problems are widespread, and the buildings pressure the area's beauty. To address these issues, it is necessary to adjust the height of the buildings based on the lack of space in the city and establish a controlled and responsible system for the design of common residences.

- Open spaces, storage, shops, a common service area, a green space, a parking space, a recreation area, and other infrastructure works should be transferred as per standards to the community.
- According to the FAR, BAR, building height, and building setback standards set by the Addis Ababa city administration, buildings should be constructed.
- The height regulation of buildings in an area and consistent construction art should be implemented.
- The design of the condominiums should be done in a way that considers noise, wind direction, slope, weather conditions, and other associated aspects of the buildings.
- There should be an appropriate body to control buildings usually used as communal housing.
- Condominiums should be designed in such a way that they are easily accessible for different groups of people, including people with disabilities.
- It should be the primary task of the management of condominiums to solve the problems associated with the construction of the internal roads, street lights, and other basic infrastructure of buildings.

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Annex 2 Check list 1

No	Comparing mechanism	Type	Condominium building	Others building
1.	Construction height	Maximum		
		Minimum		
2.	The distance from the road	Maximum		
		Minimum		
3.	The condition of the building material	Strength of building		
		local availability of materials		
		handling		
		serviceability		
4.	The effect of the buildings on the beauty of the area	Green buildings		
		Waste disposal		
5.	The problems seen in the buildings	noise,		
		sunrise		
		Wind direction		
		Slope		
		Weather condition		

Annex 2 Check list 2

Check list				
No	**Compound includes**	**Standard**	**Existing**	**Difference**
1	Open Space and Green Area	4m2 / 100m2		
2	Storage	2*2 (4m2) per person		
3	Shops	10% in compound area		
4	Common service area	9m2 per person		
5	Parking space	15m2 per person		
6	Recreation area	50m2 per person		

Annex 3 Calculation

1. Built up Area calculation

- **Milifony condominium site**

Built up Area (Area of plot) = Measure the length (L) * width (W) of the land in meters

Multiply the length by the width to find the area

Area = L × W square units (Aakarshit, 2021)

Area of plot = length * width = **10,907 m2**

Total built up area = FAR * Area of plot

=1.5 * 10,907 m2 =**16,360.5 m2**

Maximum built up area – 331 m2 * 4 block = **1324 m2**

– 272 m2 * 6 block = **1632 m2**

– 65 m2 * 2 block = **130 m2**

1324 m2 + 1632 m2+ 130 m2 = **3086 m2**

Number of floors can be constructed on the plot

= Total built up area / Maximum built up area

= 16,360.5 m2 / 3086 m2

= **5.3 floors ≈ 6 floor**

It means ground floor, first floor, second floor, third floor, fourth floor = **3086 m2 and**

#fifth floor = **1635 m2 or 5.3% *(3086 m2)**

= 3086 m2 / 10 blocks

= each block average block area is 308.6 m2

Built up area is = 28.3%

- **Weyira condominium site**

Built up Area (Area of plot) = Measure the length (L) * width (W) of the land in meters

Multiply the length by the width to find the area

Area = L × W square units (Aakarshit, 2021)

Area of plot = length * width = **50,852 m2**

Total built up area = FAR * Area of plot

=1 * **50,852** m2

=**50,852 m2**

Maximum built up area – 303 m2 * 10 block = **3030 m2**

– 272 m2 * 8 block = **2176 m2**

– 261 m2 * 11 block = **2871 m2**

– 319 m2 * 2 block = **638 m2**

– 65 m2 * 12 block = **780 m2**

3030 m2 + 2176 m2 + 2871 m2+ 638 m2 + 780 m2 = **9495 m2**

Maximum built up area= **9495 m2**

Number of floors can be constructed on the plot

= Total built up area / Maximum built up area

= **50,852** m2 / **9495**m2

= **5.4 floors ≈ 6 floor**

It means Ground floor, first floor, second floor, third floor, fourth floor = **9495**m2 per floor and

#fifth floor = 5127.3 **m2 or 5.4% *(9495 m2)**

= 9495 m2 / **36 blocks**

= each block average Block area is 263.75 m2

Built up area is = 18.7%

- **Kara kore condominium site**

Built up Area (Area of plot) = Measure the length (L) * width (W) of the land in meters

Multiply the length by the width to find the area

Area = L × W square units (Aakarshit, 2021)

Area of plot = length * width = **130,955 m2**

Total built up area = FAR * Area of plot

=1* **130,955 m2** = **130,955 m2**

Maximum built up area – 356 m2 * 17 block = **6,052 m2**

– 366 m2 * 3 block = **1,098 m2**

– 376 m2 * 26 block = **9,776 m2**

– 274 m2 * 11 block = **3,014 m2**

– 381m2 * 10 block = **3,810 m2**

– 376 m2 * 6 block = **2,256 m2**

– 224 m2 * 9 block = **2,016 m2**

6,052 m2 + 1,098 m2 + 9,776 m2 + 3,014 m2 + 3,810 m2 + 2,256 m2 + 2,016 m2 = **28,002 m2**

Number of floors can be constructed on the plot

= Total built up area / Maximum built up area

= **130,955** m2 / **28,002** m2

= **4.67 floors ≈ 5 floor**

It means Ground, first, second, third, and fourth floor = **28,002** m2 per floor and

Fifth floor = **18,761 m2 or 0.67% *(28,002 m2)**

=28,002 m2 **/ 73 blocks**

= each block average Block area is 383.6 m2

Built up area is = 21.4%

2. Floor area ratio (FAR) calculation

- **Milifony condominium site**

Floor area of the building – 331 m2 * 4 block * 5 floors = **6,620 m2**

– 272 m2 * 6 block * 5 floors = **8,160 m2**

– 93 m2 * 2 block * 2 floors = **558 m2**

=15.338 m2

Area of plot = length * width = **10,907 m2**

FAR = Total floor Area / Total plot Area

=15,338 m2 /10,907 m2

= **1.4 ≈ 1.5**

Floor area ratio (FAR) = 1.5 the floor area ratio of the building that had to be floor area ratio built on this site was 2 up to unlimited

- **Weyira condominium site**

Floor area of the building – 319 m2 * 2 block * 5 floors = **3,190 m2**

– 272 m2 * 8 block * 5 floors = **10,880 m2**

– 261 m2 * 11 block * 5 floors = **14,355 m2**

– 303 m2 * 15 block * 5 floors = **22,725 m2**

– 65 m2 * 12 block * 2 floors = **1,560 m2** **=52,710 m2**

Area of plot = length * width = **50,852 m2**

FAR = Total floor Area / Total plot Area

=**52,710** m2 / **50,852** m2

= **1.03 ≈ 1**

Floor area ratio (FAR) = 1 the floor area ratio of the building that had to be floor area ratio built on this site was 1 up to 6.5

- **Kara kore condominium site**

Floor area of the building – 356 m2 * 17 block * 5 floors = **30,260 m2**

– 366 m2 * 3 block * 5 floors = **5,490 m2**

– 376 m2 * 26 block * 5 floors = **48,880 m2**

– 274 m2 * 11 block * 5 floors = **15,070 m2**

– 381m2 * 10 block* 5 floors = **19,050 m2**

– 376 m2 * 6 block * 5 floors = **11,280 m2**

– 224 m2 * 9 block * 2 floors = **4,032 m2**

=134,062 m2

Area of plot = length * width = **10,907 m2**

FAR = Total floor Area / Total plot Area

=**134,062** m2 /**130,955** m2

= **1.02 ≈ 1**

Floor area ratio (FAR) = 1.5 the floor area ratio of the building that had to be floor area ratio built on this site was 0.5 up to unlimited.

Annex 4 Questioner

You don't need to write your name and you can provide your answers by putting tick mark (√) on the boxes of your choice.

_____

Part one: Profile of Respondents

1. Gender
   Male ☐ Female ☐
2. Please indicate the number of years you have been in your current position
   Less than 1 year ☐ 1-5 Years ☐ 6-10 Years ☐
   11-15 Years ☐ More than 15 Years ☐
3. Place of responsibility
   _____

Part two:

The following statements are intended to evaluate whether the questionnaires were used to collect information about the condominium, housing satisfaction with available space, access to social and infrastructure services, social interaction, resident relations, and security-related issues such as burglary and noise disturbances in the area. How much do you agree or disagree with your idea in the box? Explain it.

Questionnaires have been prepared for the relevant parties, namely the woredas Housing Development Office, Housing Association Committee, Resident and Condominium Protection Information Collection

Key for Analysis:

(Strongly agree) =5;

(Agree) =4;

(Neutral) = 3;

(Disagree) = 2; and

(Strongly disagree) =1

For the resident selected by the block

Sub-city _____ Woreda _____ Site _____

Block quantity _____

No	Description	Please tick (√)				
		Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1.	You will feel satisfied with the design of the houses made in the common residence					
2.	Do you think that we have properly utilized the open spaces of the condominiums, such as green space, children's play area, car parking and toilets?					
3.	The location of the communal houses built in the communal village is convenient for living					
4.	You think that the height of the condominiums is enough for the home seeker					
5.	The infrastructure services such as road, water, electricity, telecom etc. are complete in the built condominiums					
6.	There are tools in the area that help to strengthen social interaction, such as web, ekub, etc…					
7.	You think that the relationship between residents in condominium site is strong					
8.	There are issues related to security in condominium site					
9.	Do you think that there are things to be afraid of in relation to noise disturbance in condominium site?					

1. Are you properly using the open spaces of the communal houses built in the communal housing village for various services, such as green space, children's playground, car parking and others?

   Yes, ☐ No, ☐

   If your answer is no, please explain the reason

   _____

2. Is there any in the area that is difficult to live in due to the location of the condominiums built in the condominium village, such as noise, natural light, air quality, etc.?

   Yes, ☐ No, ☐

   If your answer is yes, then tell me what your problem

   _____

   _____

3. Do you think there are any social interactions that can strengthen the relationship between residents in shared housing?

   Yes, ☐ No, ☐

   If your answer is yes, then tell me what it is

   _____

   _____

4. Is the location of the condominiums in the condominium convenient for movement and control?

   Yes, ☐ No, ☐

   If your answer is no, give a reason

   _____

5. Do you think that the height of the condominiums built in the district is sufficient for the home-seeking community?

   Yes, ☐ No, ☐

   If your answer is no, then correct what you say if the height of the tree is G+_____