Ethiopia Institute of Architecture Building Construction and City Development (EiABC)

Mapping the Level of Active frontage in Addis Ababa city, Ethiopia

By

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This is to certify that the thesis prepared by Ametu Mohammed, entitled: Level of Active frontage in Addis Ababa city, Ethiopia and submitted in partial fulfillment of the requirements for the degree of Masters of Science (Urban Design and Development) complies with the regulations of the university and meets the accepted standards concerning originality and quality.

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I, the undersigned, declare that this thesis is my own and original work for Addis Ababa city and has not been presented for any other degree in any other university but it might be done on similar topic that has different methodology, and that all sources of material used for the thesis have been properly acknowledged, following the scientific guidelines of the Institute.

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November, 2022

Abstract

Active frontages have high value for city development. However in Addis Ababa fence properties, blind walls and streets which make its frontage inactive and repressive for citizen, passersby and visitors. Blind walls or street frontages with few openings are deterring. The study aims to measure active frontage level of Addis Ababa city. Active frontage level in Addis Ababa city was identified on field observation and by applying Arc GIS software digitize and give attribute of each frontage level data obtained from field survey,(captured photos in walk-along), analyze, interpret, map out active frontage level map and rated active frontage level. Accordingly the city has been rated frontage level from A to E. Where frontage level A is full of widows and inviting and frontage level E is for passive frontage. The study investigated that the level of active frontage level in Addis Ababa city was depends on street type, building function, fence and building structure. The result showed that 85.6% of AA is passive while 14.4% % is active. The study found that from the total active street segments in Addis Ababa city 55.6% is both side active streets and 44.4% is one side active streets either right or left side. This shows that even the active streets in Addis Ababa city are not fully active. So the responsible body needs to take action by identifying potential active area by issuing relevant regulation and redistributing magnet buildings.

***Key words**: - Active frontage, passive frontage, active frontage level map.*

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Acronyms

AA	Addis Ababa
AASPR	Addis Ababa Structure Plan Report
BRT	Bus Rapid Transport
CBD	Central Business District
GIS	Geographic Information System
GPS	Ground Position System
LRT	Light Rail Transit
MRT	Mass Rapid Transport
PAS	Principal Arterial Street

CHAPTER ONE

INTRODUCTION

1.1Background

The concept of active frontages has primarily developed through the work of Gehl, (1971) but has its roots in the work of Jacobs, (1961) the concept eyes on street that is passive surveillance. Active frontage the frontage or edge of a building or space that has windows and doors as opposed to blank walls, fences and garages (ODPM, 2004).This study, focused on the level of active frontage in Addis Ababa city.

An active frontage is a continuous business or retail uses that open directly to pedestrian.The se uses provide activity on the streets.A building has an active street frontage if all premises on the ground floor of the building facing the street are used for the purposes of the business premises or retail premises it enhances public security and passive surveillance(Jacob, 1961). and improve the amenity of the public domain by encouraging pedestrian activities.

Active frontages can play a great role to creating successful public spaces, which can help to deliver comprehensive benefits for towns and cities (Heffernan et al., 2014).The potential benefit of active frontage is that it enhances interest, life and vitality in the public realm (Llewelyn Davies et al., 2013).Previous research by Gehl et al, (2006) has explained that good-quality active frontages can contribute to the success of a public space. Successful public spaces are those that are comfortable, sociable, and accessible and which are loved by the people who use them (Carr et al., 1992).

In other way making frontages active adds interest, life and vitality to the public realm. This means: frequent doors and windows, with few blank walls; narrow frontage buildings, giving vertical rhythm to the street scene; articulation of facades, with projections such as bays and porches incorporated, providing a welcoming feeling; and, on occasion, lively internal uses visible from the outside, or spilling onto the street.

The issue of safety in relation to active frontages is derived from the work of Jacobs, (1961) typically referred to as natural surveillance or eyes on street is the concept of providing a built environment that allows for interaction between buildings and the spaces they define. The most recent national planning guidance specific to designing for safety and security, Safer Places.AS ODPM, (2004) encourages the use of active frontages for these reasons of eyes on streets.

Urban planners and designers explain that active frontages provide interest to passers Viewing into a building, while views output 'eyes on streets', and contribute to safety. At the very least, windows can imply the presence of others. 'Capturing' road side space can create opportunities for informal activities to add vitality to a place. Streets can be attractively colonised by enabling restaurants, cafes and pubs to 'spill out (Llewelyn Davies, 2007).

1.2 Problem Statement

In Addis Ababa it is usual to build a fence around buildings. This makes the city unsafe for street activity. In other way dead Frontages that have not economic activities and social interaction, with no doors and windows that screens from view the interior of a property or it is not accessible even if it is visible. Dead frontages in Addis Ababa cause economic, social and environmental problems on the city residents; existences inactive frontage not only generates less street activities & poor building- street interaction but they also killed the whole street life.

In Addis Ababa it is observable that there are a number of administrative centers, Embassies, social services, large industries, manufacturing and warehouses, ring road and light rail transit. In spite of their significance, the dead frontage of these built structures, create in the city not only generates less frontage activities& poor building- street interaction but they also destroyed the whole street life. That means the potential land resource in the above noticeable city is isolated from street frontages.

Figure 1: explain dead frontages. Figure a is the over pass structure at "Bole" road create dead frontage, ones not easily cross the road or entities not inviting and easily accessible to passers hinder the network between the right and left side of the road, which create dead

frontage. Similarly figure b the blind wall at “Piassa” area worsens dead frontages. The pedestrian cannot see the inside of the fence that creates the pedestrian to fear crime and it kills the street life.

(a) (b)

Figure 1: Blind wall :(a) over pass structure at “Bole road “(b) blind retain wall at “Seba Dereja ”make worse dead frontage.

Figure2: Explain blind fences figure a blind at English Embassy and figure b at Israel Embassy. N in both case the blind fences enhance poor visual quality.

(a) (b)

Figure 2: Blind fence: (a) at English Embassy and (b) at Israel Embassy.

Figure 3:Explain blind wall in figure a, b and c that reduce the activities along the street.

(a) (b) (c)

Figure 3: Blind building wall :(a) at "Alem bank" (b) at "Anfo" and (c) at "Betehel" enhance dead frontages.

Figure 4:Explain blind fence affect the quality public realm, problem of sense of place, lack of safety and security, environmental pollution typically bad smell caused by urinating site and waste disposal along dead frontages, darkness and poor visual quality are some of the observed challenges in the study area.

Figure 4: Blind fence aggravate dead frontage at "Koshe area"

There is no research that has been done in the topic yet in the study area on the mentioned thematic area, except some attempts made by some scholars in the field of urban design. To mention, (Hikma N., 2015) The Contribution of Built Forms and Landscapes in Creating Vibrant Street Life, (Rabira B., 2016) Creating Safe Sidewalk for Crime Prevention, and (Berihu M., 2017) Plug-in Urban Design for activating blind street frontages and furthermore, no similar research have been yet done in the study area in Addis Ababa to identify the situation more.Therefore here also the study focused on the level of active frontage in the Addis Ababa.

The current study extends from this pervious work is that?

1. The study covers the whole Addis Ababa.
2. Measure the frontage level from high to low level.
3. The output of the study is produce frontage level map
4. All the previous work use descriptive statics to investigate the problems while this study uses field observation mechanism collect data through facade evaluation criteria and then

digitize the collected information by applying GIS software. For that reason, this research study proposes to fill the gap in understanding active frontage level for urban development in Addis Ababa city.

1.3 Objective

General objective: The general objective of the research is to measure active frontage of Addis Ababa city.

Specific objectives:

1. To prepare frontage level map.
2. To sort out active frontage types.
3. To identify active street sides

1.4 Research Questions

The following research questions are raised from the research objectives.

1. To what extent the frontage of Addis Ababa buildings are active?
2. In which locations are the active frontage found in the city of Addis Ababa?
3. What types of frontages are found?
4. Which street sides are active?

1.5 Scope of the study

This paper deals with level of active frontage in Addis Ababa and covers areas of the current jurisdictional boundary of Addis Ababa.

1.6 Significance of the study

The study will be very important to design active street frontages of Addis Ababa city. It assist to map out active frontage level map of Addis Ababa city, it offer information to prepare design guidelines and identify potential area of the city, it provides information to different frontage classes on house prices, category land grade and brings fair tax payments in Addis Ababa city. The study also provides information for how to design active frontage during urban development in Addis Ababa city. It also helps Addis Ababa municipality to understand how active frontages provide natural surveillance rather keeping the city by

police. Finally the study provides valuable information and used as an input for future investigators.

1.7 Limitation of the study

The study limited to the availability and clarity of data. It is observational study this may increase subjectivity of the thesis result ,to collect data for active frontage level at the city level applying traditional field survey method (lack of advanced tools to collect data) and this consuming time. The spatial variable for active frontage varies with place to place and time to time this may need adjustment and more proximity data required for detail study.

1.8 Organization of the report

This report contains six chapters. The first chapter deal, about the introduction, problem statement. Objective, research question, scope, significance, limitation and organization of the report, while the second chapter deals about the literature review. Chapter three deals about materials and method and chapter four deals about results and discussion, chapter five deals about discussion finally chapter six deals about conclusion and recommendation.

CHAPTER TWO

LITRATURE REVIEW

2.1. Frontage

Premises: -is Façade of building, edge of street

Detail: - is the design of the buildings and public realm, and most particularly, the interface between them. The building elements include elevations, corner treatments, roof lines, doors and windows, materials, floors capes of colour and texture. The public realm elements concern the street, the pavement and the square and include planting, street furniture, lighting and public art. The interface are the steps, the fences, front gardens, edges, walls, windows and doors the hinge between the horizontal and vertical planes (J. Gehl et al, 2006).

Importance of detail: - Detailed design is where the identity and quality of a place is finally won or lost. All have unconscious understanding of the quality of places from our experience, and are highly aware of whether they hinder our actions or do not work properly. But good design does not necessarily shout for attention. Often the detailing of buildings, streets or squares is quiet and unremarkable. Successful places have a feeling of serendipity; the happy yet almost accidental mixture of many good things brought together.

It is essential to be highly aware of the quality of detailing for it can:Make or break a place, Stimulate the commitment of the developer, the community and the authorities involved to the maintenance of high standards, Allow all the users of a place to enjoy it, in a balanced and efficient way, Create and retain value; and above all and Ensure distinctiveness, whether a central square or great avenue, a quiet street or mews. These keys are good design, good materials and the commitment of all those in an area to its successful long-term maintenance (ibid).

Active Frontages: The following simple definition is provided within the glossary of 'Safer Places' ODPM (2004) Active frontage: The frontage or edge of a building or space that has windows and doors as opposed to blank walls, fences and garages. Llewelyn Davies

(2007) listed a number of attributes for active frontages in their influential publication 'Urban Design Compendium': frequency of doors and windows; vertical rhythm to the buildings; articulation to building facades and views of lively internal uses.

Definition which combines elements from the 'Safer Places' definition ODPM (2004) with those from the work of Gehl (1994) and the 'Urban Design Compendium' Llewelyn Davies, (2007) is used, that is: the frontage of a building at ground floor level with frequent doors and windows, details and articulation to the facade and visible internal uses.

The Llewelyn Davies definition suggests that interest, life and vitality in the public realm are the potential benefits of active frontages; however one key justification given in much of the literature for the provision of active frontages is that of safety (ODPM, 2004; Sparks and Chapman 1996). The issue of safety in relation to active frontages is derived from the work of (Jacobs, 1961). Commonly referred to as natural surveillance is the concept of providing a built environment which allows for interaction between buildings and the spaces they define.

Returning to the more social and sociable aspects of active frontages (Alexander,1977).wrote of the need to treat the facade of a building as an entity with volume rather than a line on a plan, to design it as a place in its own right in order to support the social life of our towns and cities. 'The building with a lively edge, is connected, part of the social fabric, part of the town, part of the lives of all the people who live and move around it (Alexander et al., 1977).

The purpose of ground floor facade of a building is significantly different from those of other floors (Gehl et al., 2006). They suggest this is the case because we have 'close encounters' with the street level facade in a way we do not experience the other facades. They conclude that buildings must 'learn to make meaningful conversation' with both public spaces and the people who use them.

2.2. Criteria to Measure Active Frontage

Active frontages are measurable by different attribute some of the common attributes according to (Law et al., 2017) are the following.

a. Pedestrian density or no of premises

b. Façade treatment

C. no of Doors and windows

d. blind wall/blank wall

e. Fence height and types of materials

f. Street Type and quality

g. Building quality/form, types of material. Building details/

h. building function, types of activity and intensity of uses.

2.3. Advantages of Active Frontage

The quality of street frontages is an important factor in urban design, as it represents the space where the built environment and pedestrians interact most closely (Gehl, 1971). Good-quality active frontages can contribute to creating successful public spaces, which can help deliver far-reaching benefits for towns and cities (Heffernan et al., 2014).

The greater the number of doors and windows facing a street, the more "eyes-on-the-streets", which contributes to the perception of a safe, convivial and sociable street (Jacobs, 1961; Alexander et al. 1977). Jacobs argues that the public peace of cities, and particularly its sidewalks, is not primarily kept by the police, but by an intricate network of voluntary controls or the so called natural surveillance and standards among people themselves. This is seen prominently on busy city streets where passers-by, street-level merchants and residents keeping an eye on the street provide few opportunities for

street crime (Jacobs, 1961).In other word the concept eyes on street supports make frontage active rather than the cities kept by police.

Active frontage also has various benefits for successful public space some of thus are,health benefits such as Improved personal and mental health through social exchange, economic benefits such as increased land, property and rental values; attracting greater numbers of people to an area, thus benefiting the businesses located there and social benefit Providing a forum for social interaction:

Meeting people – friends, acquaintances or strangers; Individual and group empowerment; Better quality of life (Heffernan et al. 2014; Nase et al. 2013). Despite being advocated in planning guidance (Llewelyn Davies et al., 2013).

2.4.Types of active frontage

The study focus on the urban design concept of active versus blank frontage, or the level of frontage from high active frontage to low active frontage where active frontage is defined as ground floor buildings having windows and doors as opposed to blank walls, fences and garages (ODPM, 2005). The concept of active frontage has been expressed through frontage Classes (Law et al., 2017).Table 1: Explains active frontage level from A to E.

Table 1:Active frontage level from A to E.

Active frontage guidelines	
Grade A frontage	
More than 15 premises every 100m	No blind facades and few passive ones
More than 25 doors and windows	Much depth and relief in the building every 100m surface
A large range of functions	High quality materials and refined details
Grade B frontage	
10 to 15 premises every 100m	A few blind or passive facades
More than 15 doors and windows	Some depth and modelling in every 100m the building surface
A moderate range of functions	Good quality materials and refined details
Grade C frontage	
6 to 10 premises every 100m	Very little depth and modelling in the building surface
Some range of functions	Standard materials and few details
Less than half blind or passive facades	
Grade D frontage	
3 to 5 premises every 100m	Flat building surfaces
Little or no range of functions	Few or no details
Predominantly blind or passive facades	
Grade E frontage	
1 or 2 premises every 100m	Flat building surfaces
No range of functions	No details and nothing to look at
Predominantly blind or passive facades	

(Source: Llewelyn Davies et al., 2013)

2.5. Active frontage versus dead frontage.

Table 2: Explain the different between active frontage and dead frontage.

Table 2:Active frontage versus dead frontage.

Active frontage	Dead frontage
Frequent doors and windows with few blank walls	Longer lengths of blank walls to street
frontages where an active visual engagement occurs between people in the street and those on the ground floors of buildings	frontages reduce activity in the public realm and reduce actual and perceived levels of safety
quality is assisted where the front façades of buildings, including the main entrance, face and open toward the street	Transition between building interiors and exteriors. Glazing can be grouped in one segment of the building frontage leaving other stretches of the façade largely blank.
Frontages invite peoples to shop, work, meet, relax and often live	Frontages not invite people to shop and work
Frontages typically well served by public transport, and range in size and intensity of use.	Low intensity of uses
Building frontages will be developed as prime locations of economic and social activity.	Building frontage function is for administrative centres, Embassies, social services, large industries, manufacturing and warehouses, ring road and light rail transit
frontage with a high level of pedestrian amenity	Frontage with few or no pedestrian amenity
frontages feel safe during the day and night because they are always active with people moving about their business	Frontage not safe and high crime

2.6. Urban design objective and active frontage level

The qualities of urban design and peoples everyday activities have been explain in some studies (Ameli et al., 2015; Ewing & Clemente, 2013; Ewing, et al., 2016; Hamidi & Moazzeni, 2018; Maxwell, 2016).

Table 3: Explain the difference between active and inactive frontages.

Table 3: High Active Frontage vs. Low Active Frontage

High active frontage	Low active frontage
Ground floor uses: • mix of uses with several foods shops, side walk cafes • food shops were generators of activity	**Ground floor uses:** • no mix of uses mostly the same type, • no food shop or side walk cafes in the ground floor, side walk cafes with closed frontages • indoor seating only and presence of blank facades
Permeability: • high physical permeability that allows active extension and • moderate visual permeability	• No physical permeability • Very low or no visual permeability
Complexity and architectural character: • Moderate to high sense of scale and rhythm • Moderate articulation • Building articulation support seating and standing activity • High sense of human scale	**Low complexity and architectural character:** • Moderate to low sense of scale and rhythm • Moderate to low articulation • Moderate sense of human scale
Enclosure: high sense of enclosure	**Enclosure:** low sense of enclosure
Side walk width: 3m at non arcaded sidewalks • Non arcaded side was more populate that arcaded side • 5m at arcaded sidewalk • Sidewalks support seating activities however it is not sufficient during crowded times and seats spilled out on to the street	**Side walk width:** 1.5m o 3m at non arcaded sidewalks • 5m at arcaded sidewalk • No seating options presents from food shop

(Sources: - www.dse.vic.gov.au,accessed at December 7, 2021)

2.7. Methods to be used to change dead frontage in to active frontage

Create Active Frontages Design street and sidewalk-facing storefronts and entries to be inviting and easily accessible to passersby. Ensure that the ground floor promotes a sense of interaction between activities in the building and activities in the public realm. Views into a building provide interest to passersby and make its function apparent, while views output ‘eyes on streets, and contribute to the perception of safety.

Buildings should have a prominent entry and foster interaction between inside and outside by incorporating three or more of the following elements: A ground floor that has an almost continuous active frontage and through-block links to building arcade and Street, Encourage a feeling of interconnection with the building and street, Integrated areas for access to the open air through semi-enclosed stairs, balconies and a rooftop garden, Artwork conveys a sense of the building and contributes to the culture of the area, Overhangs (canopies, awnings) - at least 6 feet from either the face of the column or the street-facing elevation frontage, Clerestory or transom window as part of the large storefront system, Glass windows that flank the door (no mirrored or tinted glass),Decorative lighting large glass entry doors, Creative signage, Art work, Recessed entry bay, Incorporating paving and color along the building frontage and Increase the frequency of development that makes a positive contribution to the high street environment.

CHAPTER THREE

MATERIALS AND METHODS

3.1. Description of the Study Area

The capital city of Ethiopia, Addis Ababa,(Fig 5) is the study area. Addis Ababa, the capital city of Ethiopia and the diplomatic center of Africa, embodies a 130 years of development history that contributes to its current socio-spatial features. Its status as a primate city placed at the central of the nation has made Addis Ababa loved by many people with diverse social, economic, cultural and spatial experiences. Addis Ababa, the administrative center and the most important commercial and cultural center of Ethiopia, is geographically located at the heart of the nation, 9°2'N latitude and 38°45'E longitude. Its average altitude is 2,400 meter above sea level, with the highest elevations at Entoto Hill to the north reaching 3,200 meters. This makes Addis Ababa one of the high-altitude capital cities of the world (Mirror of Addis Ababa, 1942). Addis Ababa occupies a total of 52025 hactar of land area surrounded by mountainous landscape. There are different streets that vary from principal arterial to local road. The road in AA covers 8544.7ha or, 16.4%.of land.

Figure 5:Explain map of the study area.

Figure 5: Location map of study area.

3.2. Data and Collection Method

The data sets needed for this study were the frontage or front elevation with windows size open to the street. These data sets were collected by observation and photo cameras.

3.3. Research Design

Fig 7: Explain research process designed. The research designed is a plan or the road map of the research which show the starting and end points of the study. It is a logical reasoning runs from deductive to inductive or inductive to deductive. In this research the conceptual frame work goes from specific to general i.e. study the level of active frontage at site level and generalize the level of active frontage in Addis Ababa. To offer a further significant result and recommendation.

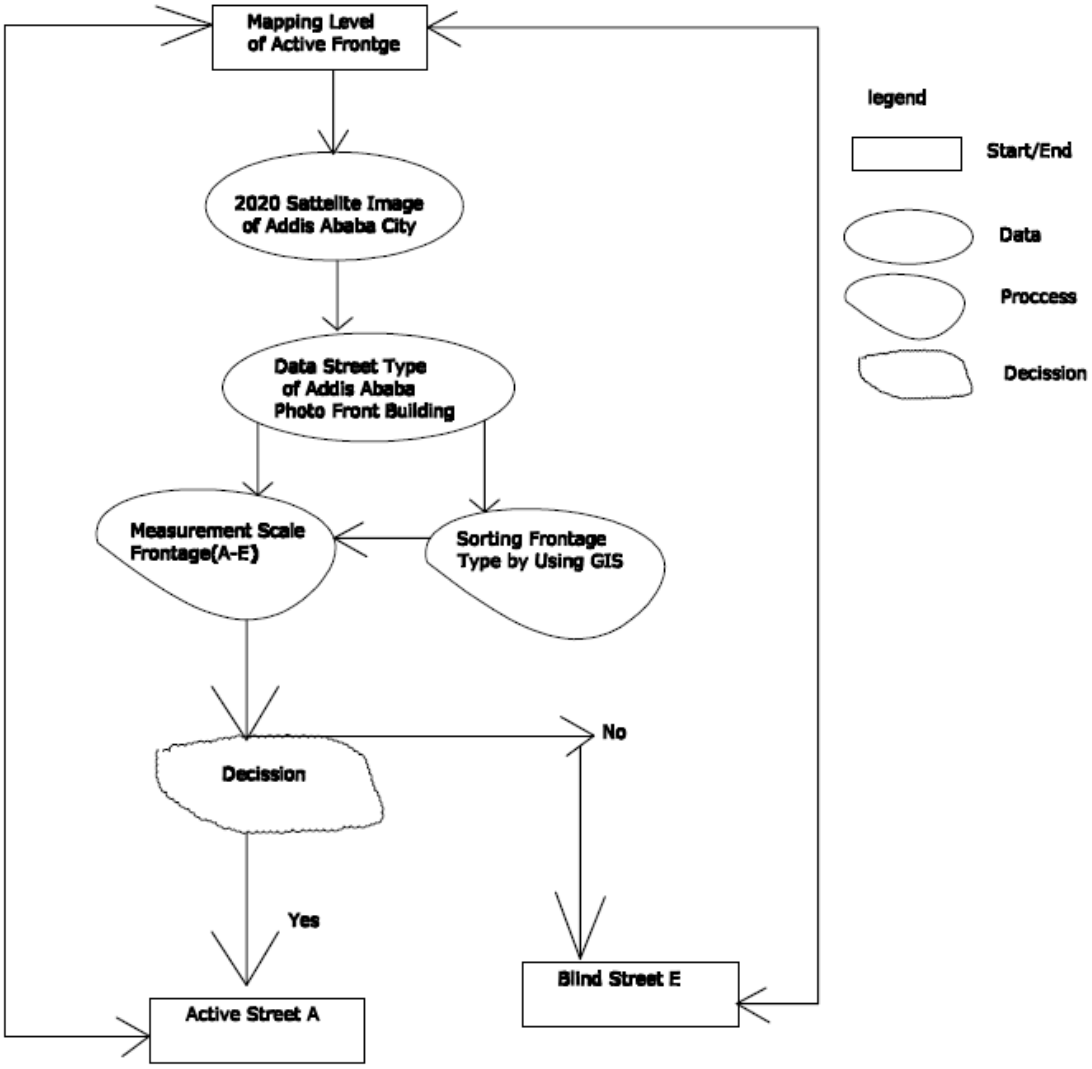


Figure 6: Research design diagram.

3.4. Methods

Using Addis Ababa Google map field survey of a variety of Arterial, Sub Arterial, Collector Street and access road were taken, collects data from the median of a street then classified into four groups; 1.Active on both sides of a street, 2.Active frontage on right side of a street, 3.Active on left sides of a street 4. Blank frontage on both sides of a street. In addition to this data were collected at plot or building level and rated the level of active frontage by applying the facade evaluation scale from The Urban Design Compendium (Llewelyn Davies Yeang and HCA, 2013).By applying Arc GIS software digitize and give attribute of each frontage level data obtained from field survey,(captured photos in walk-along), analyse, interpret, map out and rate active frontage level from A to E.

Figure 7& 8: Clarify criteria to level Frontage in Addis Ababa city.

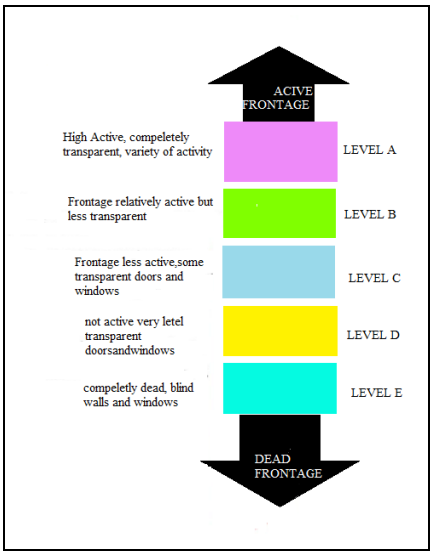


Figure7: Criteria to level active frontage of Addis Ababa city.

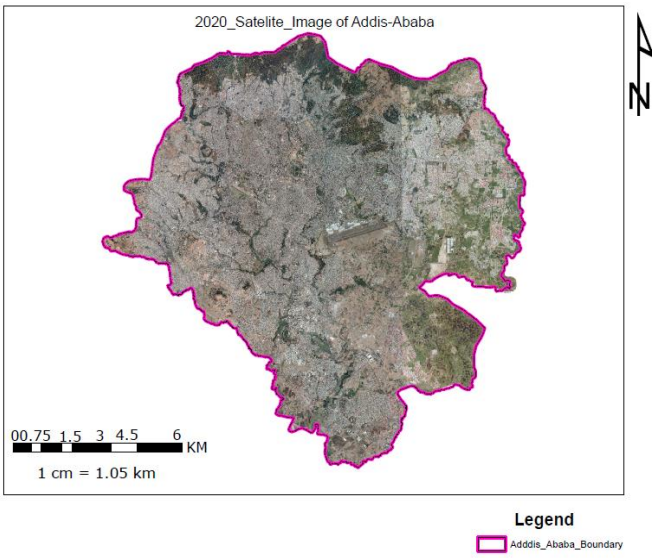
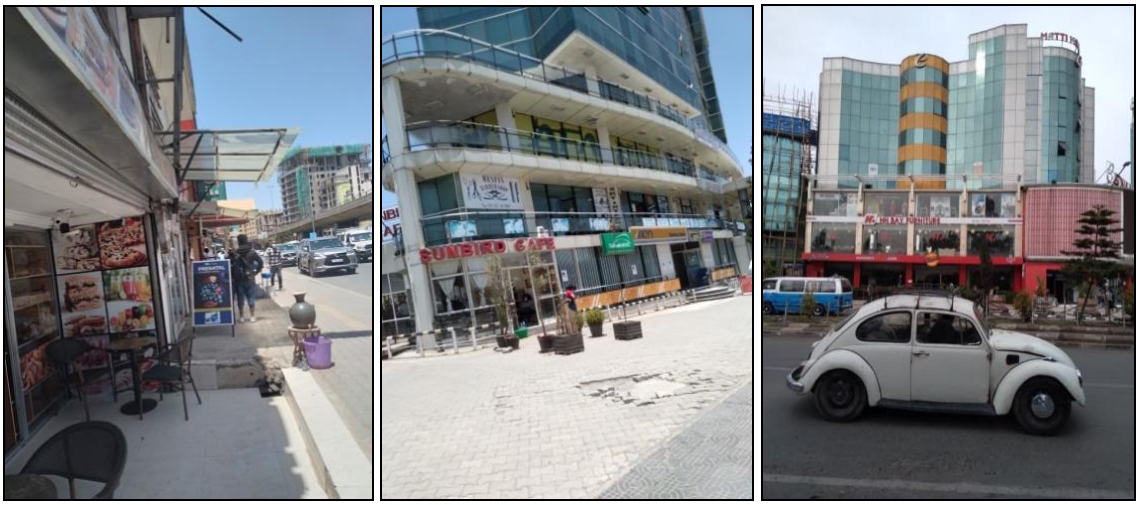


Figure 8: 2020 satellite image of Addis Ababa city.

3.5. Addis Ababa Active Frontage Condition This study provides a map, photos and image based analysis methodology that could be applied to the investigation of frontage level in Addis Ababa city. The Methodology builds on existing analysis methods for studying frontages. Gehl's (1994, 2010) frontage evaluation grading scale rates.

Figure 9: Describe that active ground floor uses. Figure (a) outdoor dinning at bole bride, fgure (b) outdoor commercial activities at piassa and figure (c) at Edenamol building commercial activities, cafes and dining areas and super markets adjacent to the sidewalk encourage the vitality of active frontages.



(a) (b) (c)

Figure 9: Outdoor dining areas assist active frontages :(a) at Bole,(b) at Paisa and (c) at Edna mole building.

Figure 10: Illustrate that figure a, b and c Create a vibrant, continuous pedestrian zone by avoiding unnecessary side plot setbacks between buildings and street. A zero setback from the side of buildings and street. Continuous storefront windows and frequent, highly visible entrances along this street provide visual interest and invite workability promote active frontage.

(a) (b) (c)

Figure 10: building proximate along the street or zero seatback from the front property line promote active frontages: (a) Merekato area, (b) Piassa area and (c) Betehel area.

Figure 11: Reveal that all figures a, b and c creating unnecessary setback from buildings and streets discourage visual interest and not invite walkability promote dead frontage.

(a) (b) (c)

Figure 11: Excessive seat back between street and building create dead frontages :(a) at"Betehel area, (b) at "Anfo Mesejed" Area and(c) at" Alembank "area.

Figure 12: Reveal that all the three figures a, b and c blind retain wall and blind fence create inactive frontage. Furthermore the blind fence invite waste disposal creates environmental pollution and buildings which present their backs to public space (even on main roads) often present high fences and walls to the street, reducing overlooking and safety.

(a) (b) (c)

Figure 12: Blind fence create dead frontages :(a) at"Alembank Kidanemeheret" church area, (b) at "Keaniyo Medahenalem church area and (c) at "Koshe area".

Figure 13: Describe that in both cases figure a and b activate the street and sidewalk by providing active ground floor uses, locating building entries and windows in appropriate locations, and providing pedestrian-scaled elements. Provide continuous storefront windows, open air store frontages, and frequent, highly visible entrances and ground floor street frontage space is to be predominantly for active, pedestrian-oriented uses desirable to active frontages.

(a) (b)

Figure 13: Active ground floor provide vibrant frontages:(a) at National Theatre area and (b) at Mexico area.

Figure 14: Clarify that all the three figures a, b and c describe active commercial uses on the ground floor, including restaurant and retail, adjacent to the sidewalk create a lively pedestrian realm which boosts active frontages. Ground floor commercial uses adjacent to the street and sidewalk contribute active frontages.

(a) (b) (c)

Figure 14: Commercial activities that enhance active frontages(a) at "Mere Kato",(b) at Anware Mesjed area and (c) at :Bethel" area.

Figure 15: Give explanation that entries that face the primary street which is directly connected to the street's sidewalks and customer entry is directly visible and accessible from the public sidewalk, which strengthens the pedestrian realm enhance active frontages. Likewise emphasize building entries with small entry plazas, vertical massing, and architectural elements such as awnings, arcades or porticos.

(a) *(a)* *(a)*

Figure 15: Clear building entrance that improve active frontage at Bole Street.

Figure 16: Explains that figure a no clear and direct route from street to the building, figure b curbs and blind fence which limit active frontages and figure c blind wall and utility poles create dead frontage. In a different way pedestrians have a clear and direct route from street to the building entry and public sidewalk system. The circulation path has directed, continuous, and free of barriers (e.g., site equipment, signage, utility poles, etc.

(a) *(b)* *(c)*

Figure 16: No direct route from street to building (a) at "Ambasader/Stedium area,(b) at ,"Seba Dereja" and (c) at " Piasa"area.

Figure 17: Explains that building on corner lots have the primary entry facing the intersection. Corner entries help to create an active public realm reinforce significant street and sidewalk intersect

Figure 17: A corner building facade orients the main entry to the primary street for added visual interest at Piasa.

Figure 18: illustrate that well-designed building fronts including windows, doors, wall composition, colours, and materials enhance active frontage. In other word building details (doors, windows and building materials) assist active frontages.

(a) *(b)* *(c)* *(d)*

Figure 18: Buildings details at Bole Street.

Figure 19: Show that is all figures a, b and c explains a define street and facade treatments, well defined public realm (enclosure) that continue on the side of the building create continuity in design and visual interest. Moreover, buildings close to the sidewalk, to enclose the public realm of the street and sidewalk, locate shops and restaurants next to the pedestrian sidewalk enhance active frontages.

(a) *(b)* *(c)*

Figure 19: Facade treatment and enclosing the public realm enhance active frontages :(a) well defined public realm (b) façade treatment and (c) transparent window.

Figure 20: Express that facades elements help define a building's architectural character and quality of design enhances active frontage .Building materials that are high quality and richly detailed provides visual interest and durability.

(a) (b)

Figure 20: Quality building material and richly detail provide active frontages ;(a) quality building material and (b) rich details and front articulation.

3.6. Streets of Addis Ababa city.

In Addis Ababa, There are totally 8505km streets. From these street 375km are principal arterial, 329km are sub arterial, 466km are collector and 7335km are local roads. In addition to those there are also the ring road has length/perimeter on plan is 46.9km and existing ring road is 37.7km, that means 9.2km ring road is not constructed and LRT line that align East West and South to North and has length 44km. Each street and front buildings were analyzed using Arc GIS selects by attribute and select by location. Based on facade evaluation scale method for each street. Then, the scales for active frontage were used to level each street. Figure 21: and Table 4: Describe total length of Addis Ababa streets are 8505km from this PAS Express way covers 3%,PAS_Bulvard_Street 1.3%,SAS_Street cover4%, Collector Street cover 5.5% and Accesses Street cover 86.2%.This reveal that from the total coverage of Addis Ababa street the highest percent is accesses road.

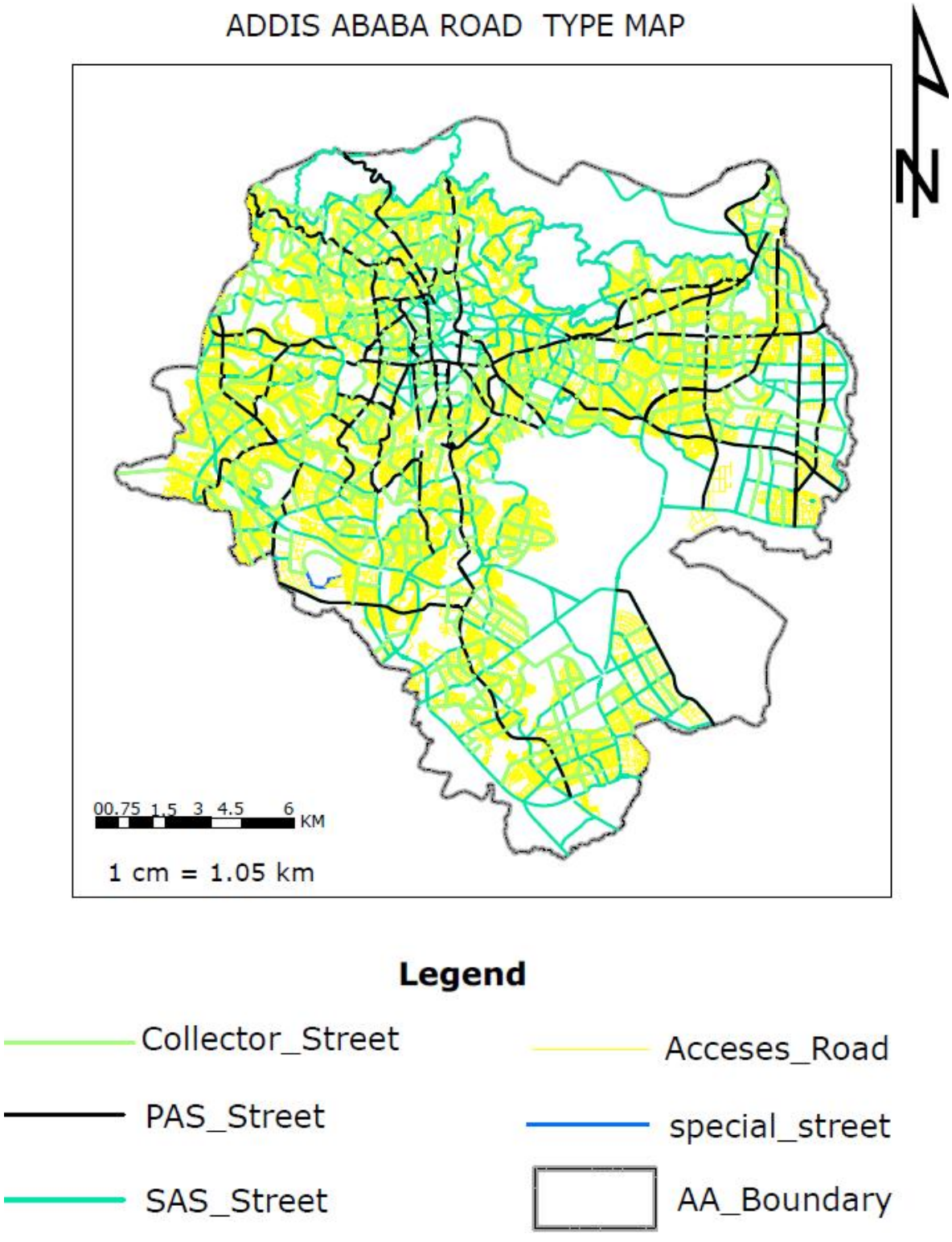


Figure 21: Addis Ababa road type map.

Table 4: Addis Ababa City Street Type

No	Streret Type	Length in km	Percentage
1	PAS_Express_way	262	3
2	PAS_Bulvared_Street	113	1.3
3	SAS_Street	329	4
4	Collector_street	466	5.5
5	Access_Street	7335	86.2
	Sum	8505	100

CHAPTER FOUR

RESULTS

4.1.Frontage Level

Figure 22: and Table 5: One observe that the total spatial coverage 43,480.5 hectare of Addis Ababa land at parcel level front level A and B cover 14.4%. This means active frontage area of Addis Ababa is only 14.4% the rest 85.6% is covered by frontage level C, D, and E or 85.6% of Addis Ababa land is covered by dead frontage.

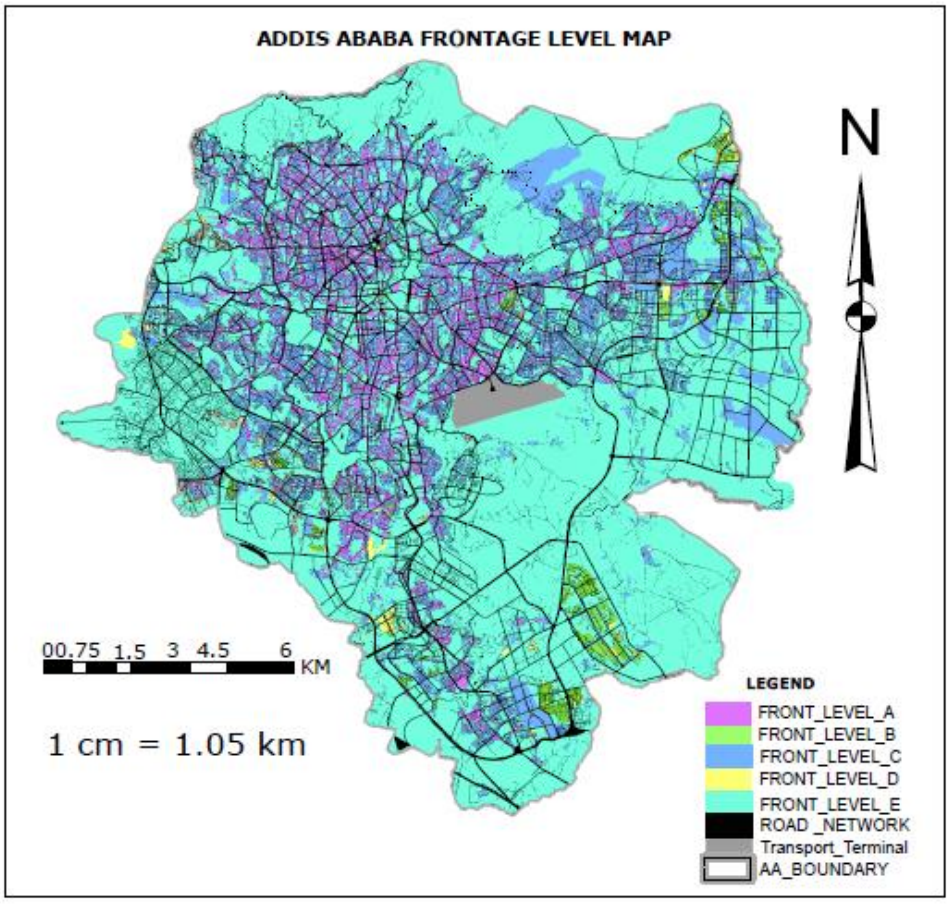


Figure 22: Addis Ababa frontage level map

Table 5: Addis Ababa City Active Frontage Level Proportion

No	Frontage Type	Area in hectare	Percentage
1	A	3641.8	8.4
2	B	2601.3	6
3	C	12778.6	29.4
4	D	581.5	1.3
5	E	23877.3	55
	Sum	43,480.5	100

Notes that from the total 52025.2hactare area of Addis Ababa land road network cover 8544.7ha=16.4%

Figure 23:Explain existing LRT almost 44km Active frontage street on LRT is 20km. Active LRT is 45%.From this it is understand that most of LRT line is dead.

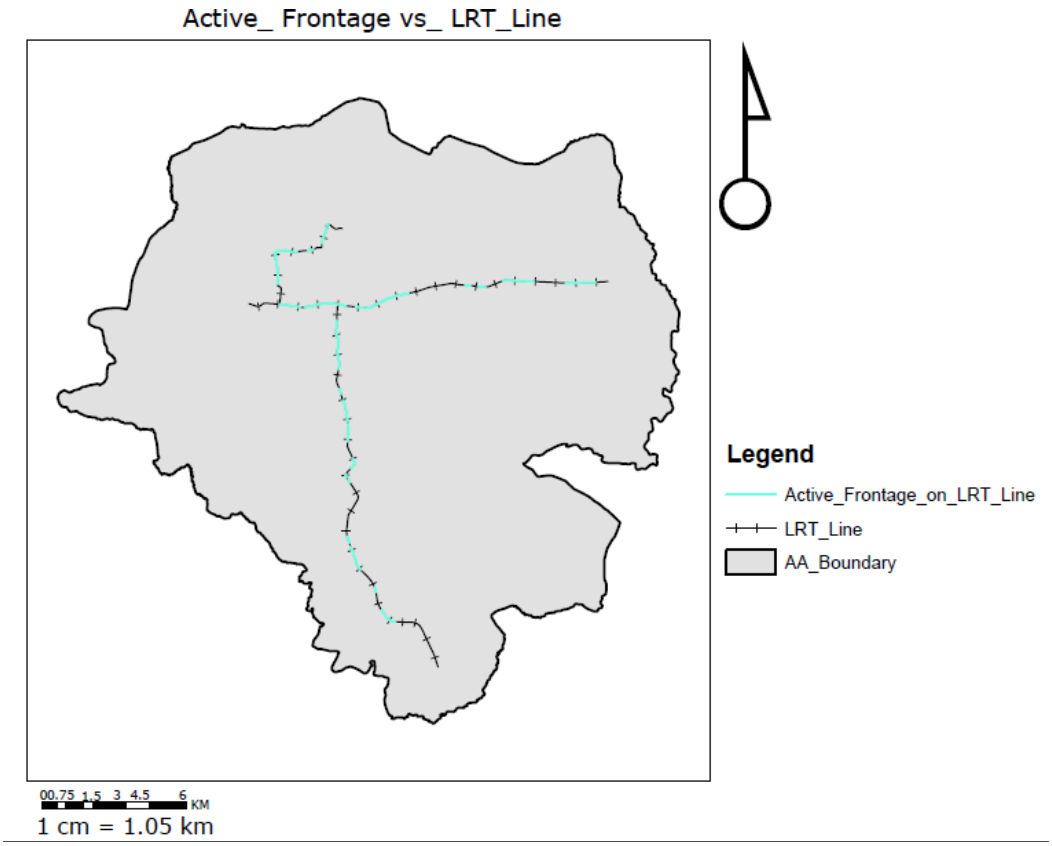


Figure 23: Active Frontage on LRT line.

Figure 24: and Table 6: Briefly explain that level A frontage of PAS and SAS street cover 68.3%.This show that most of active frontage are found at PAS and SAS street. However from the total 8505km street length of A.A only 536.6km length or6.3% is covered by frontage level A. From this one understood that from the total AA Street the coverage of front level A Street or Active Street is very low.

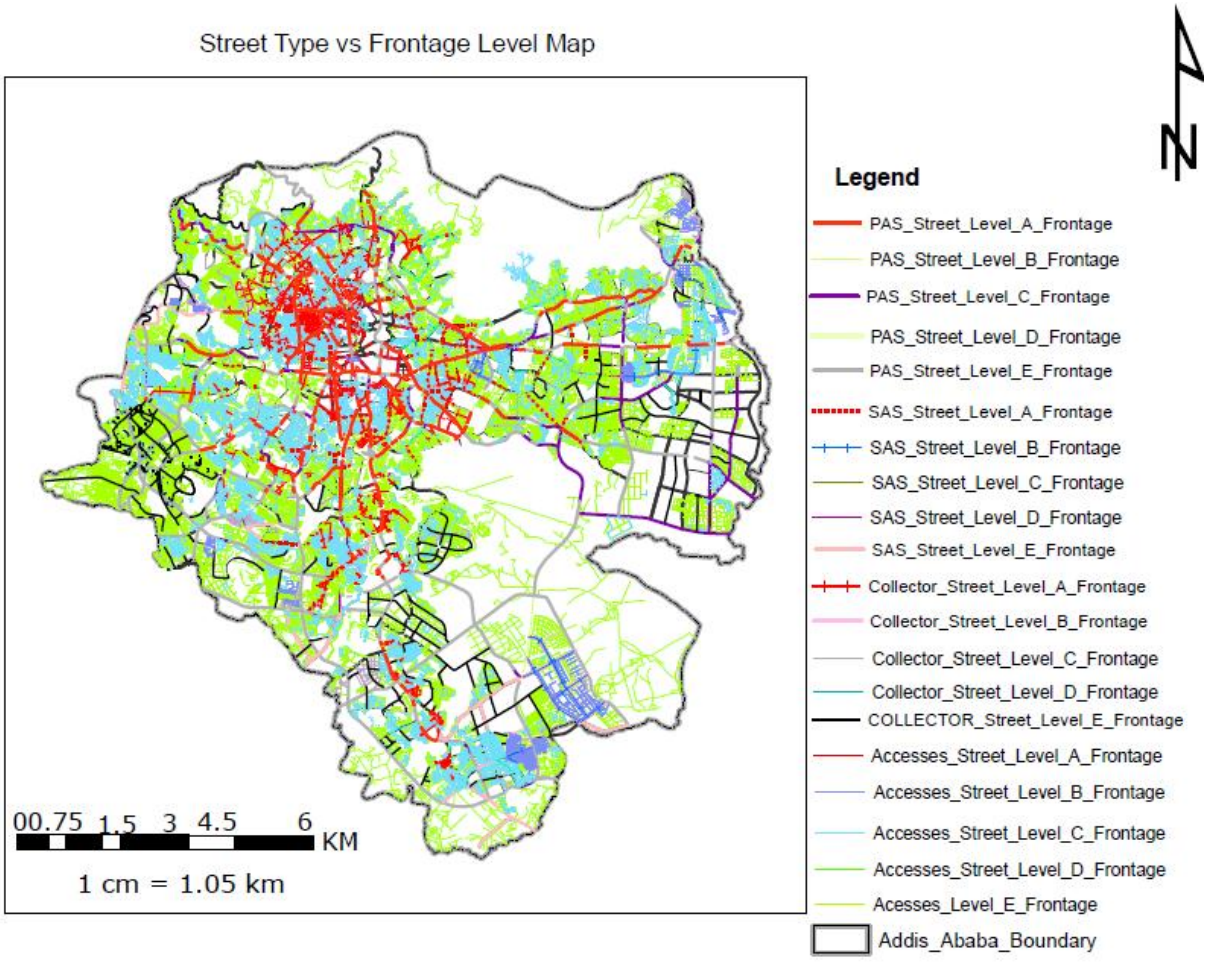


Figure 24: Street Type vs. Frontage Level Addis Ababa city.

Table 6: Addis Ababa City Street type vs. Frontage Level

No	Street Type	Length in km	frontage level A	Percentage
1	PAS	375	114	30.4
2	SAS_Street	329	124.8	37.9
3	Collector street	466	92	19.7
4	Access Street	7335	205.8	2.8
	Sum	8505	536.6	6.3

Figure 25: Explain that total street segement length is 3km from this both side active frontage street length 1.3km or, its percentage is 43%, right side active frontage street is 0.56km , or 18.7%.This reveal that from the total 3km street segement length 1.86km, or 62% is active the rest 1.14km , or 38%street segement is dead frontage.

1. Megenagna to Kebena 3km Length PAS Segment Analysis.

Figure 25: Megenagna to kebena street segment

2. Kebena to 4 Kilo square 1.8km Length SAS Segment Analysis

As make clear in Figure 26 and 27:Total street segement length is 1.8km from this both side active frontage street segement length 0.5km or, its percentage is 27.8%, right side active frontage street is 0.9km , or 50%.This reveal that from the total 1.8km street segement length 1.3km, or 72% is active the rest 0.5km , or 27.8%street segement is dead frontage.

. Figure 26: Kebena to 4 kilo street segment.

Figure 27: Different side active frontage street from Kebena to 4 Kilo Street.

Legened

Street Segement

Kebena Square

4Killo Sqare

SAS Street Right Side active

SAS Street Left Side Active

SAS Street Both Side Active

3. 4 Killo square to Piassa 2 km Length SAS Segment Analysis

Figure 28:Enlighten that total street segement length is 2km from this both side active frontage street segement length 0.29km or, its percentage is 14.5%, right side active frontage street is 0.9km , or 45% and Left side active street length frontage is 0.18km, or 9%. So from 2km street segement length 1.37km, or 68.5% street segement has active frontage. This reveal that from the total 2km street segement length segement length 0.63km, or 31.5% street segement has dead frontage.

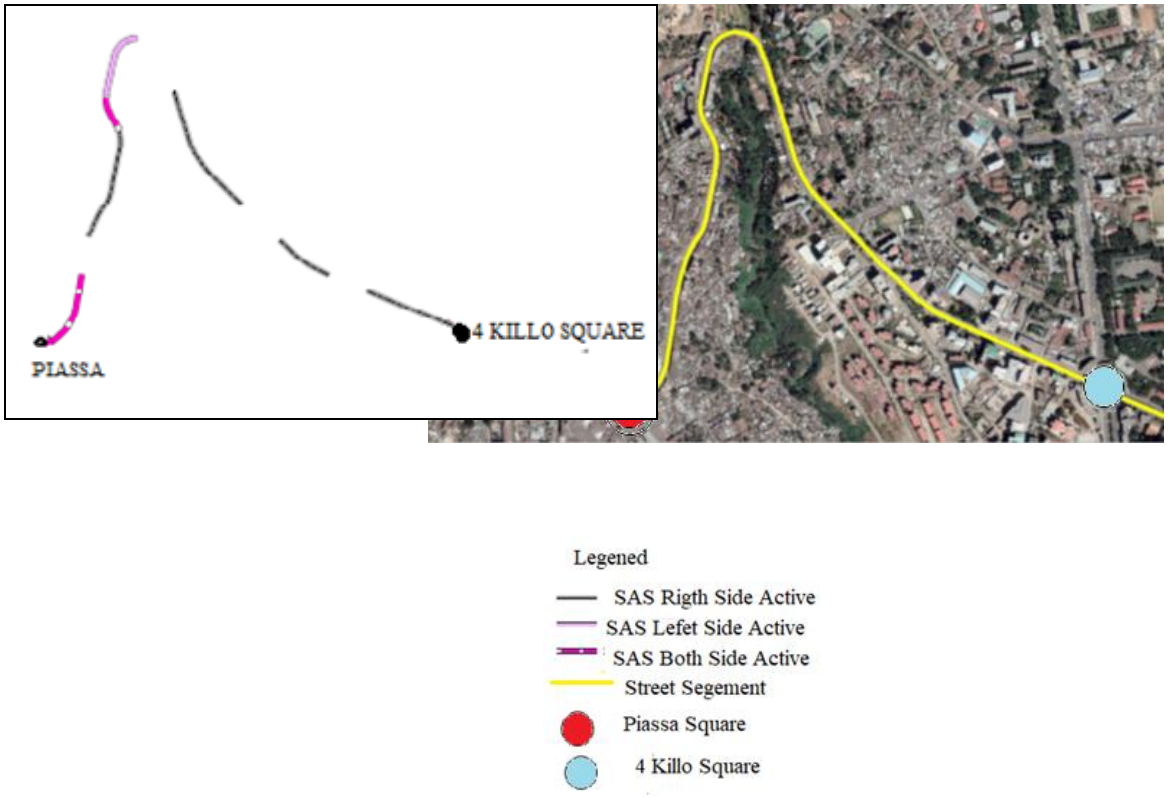


Figure 28:4kilo to Paisa street segment.

4. Piassa to Kelifa square 0.9km Length SAS Street Segment analysis

Figure 29 and 30:Inform that street segement length is 0.9km from this both side active frontage street segement length is 0.9km or, its percentage is 100% has active frontage.From this one understood that the street is very active.

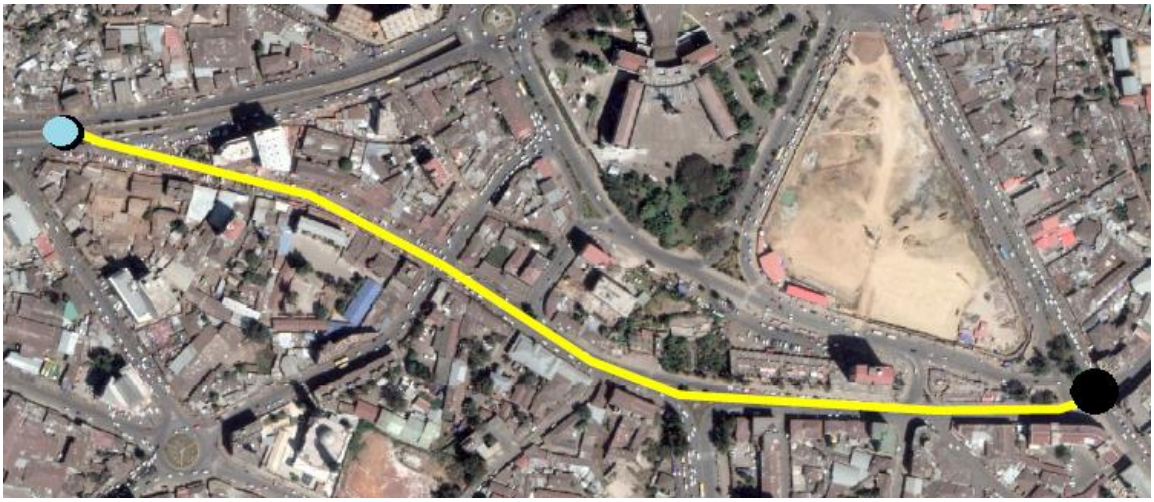


Figure 29: Piasa to Kelifa building street segment

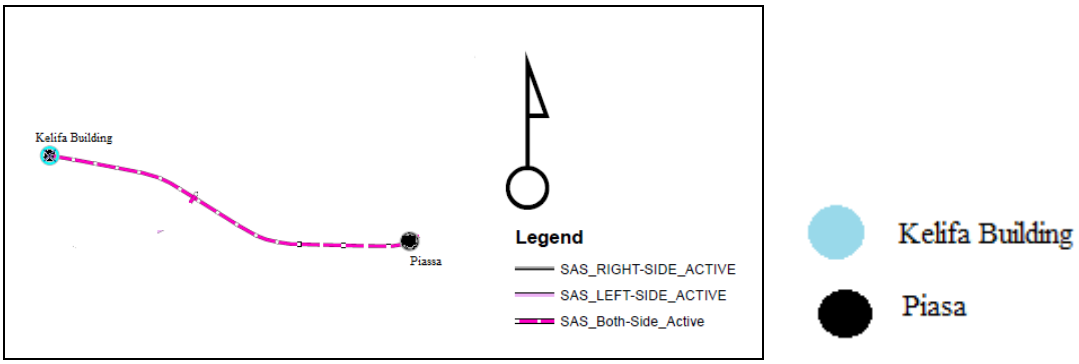


Figure 30: different side Active Street from Piasa to Kelifa building street segment.

5. S.t George Church to Autobus Tera 2.3km Length PAS Street Segment Analysis

Figure31and 32 :Clarify that total street segement length is 2.3km from this both side active frontage street segement length 1.4km or, its percentage is 60.9%, right side active frontage street is 0.2km , or 8.7%, left side active frontage street is 0.36km or 15.7%,.This reveal that from the total 2.3km street segement length 1.96km, or 85% is active the rest 0.34km , or 15%street segement is dead frontage

Figure 31: S.t George Church to Aoutobuse Tera street segment.

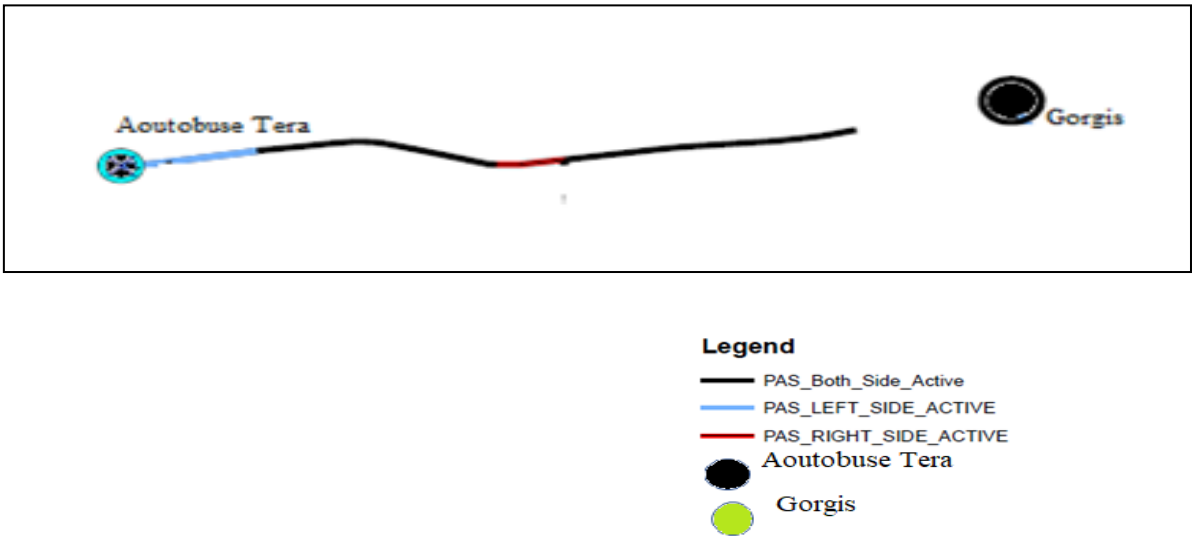


Figure 32:Different side Active Street from S.t George Church to Autobuses Tera street segment.

6. Autobus Tera to Coca 2km Length PAS Street Segment Analysis.

From Figure 33: One understood that ttotal street segment length is 2km from this both side active frontage street segment length is 2km or, its percentage is 100% has active frontage. From this one understood that the street is too active**.**

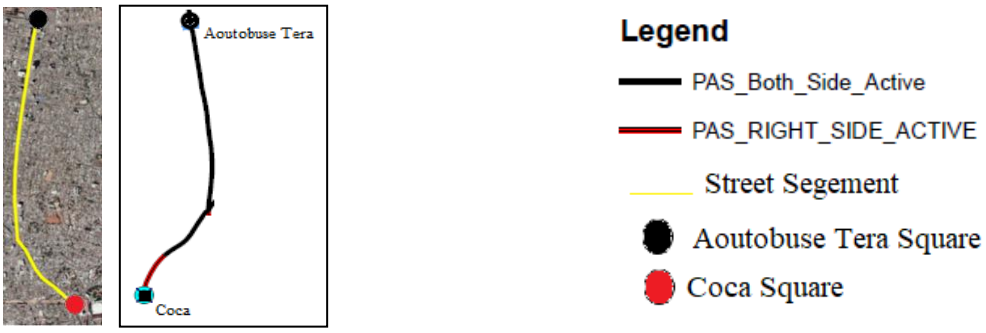


Figure 33: Autobus Tera to Coca street segment.

7. Abenet to Tekelehaymanot 1.4km Length PAS Street Segment Analysis

Figure 34: Elaborate that total street segment length is 1.4km from this both side active frontage street segment length is 1.4km or, its percentage is 100% has active frontage. From this one understood that the street is too active**.**

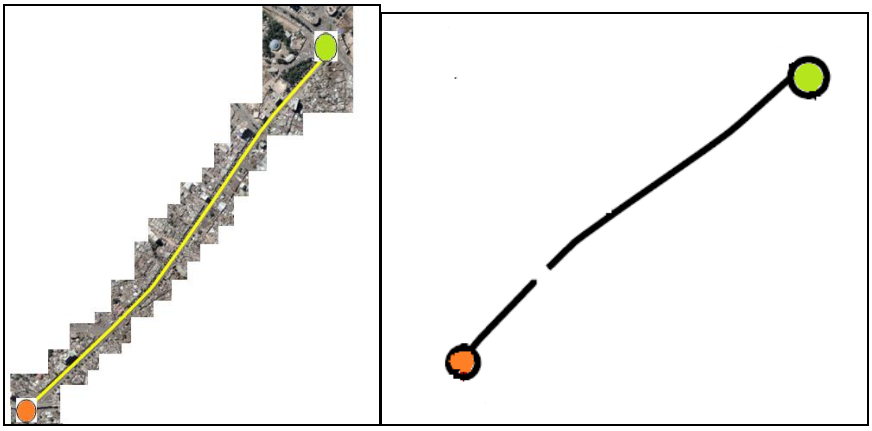


Figure 34: Abenet to Tekelehaymanot street segement.

8. Tekelehaymanot to Somale Tera 0.5km Length SAS Street Segment Analysis

Figure 35: Describe that Total Street segment length is 0.5km from this both side active frontage street segment length is 0.5km or, its percentage is 100% has active frontage. From this one understood that the street is too active.

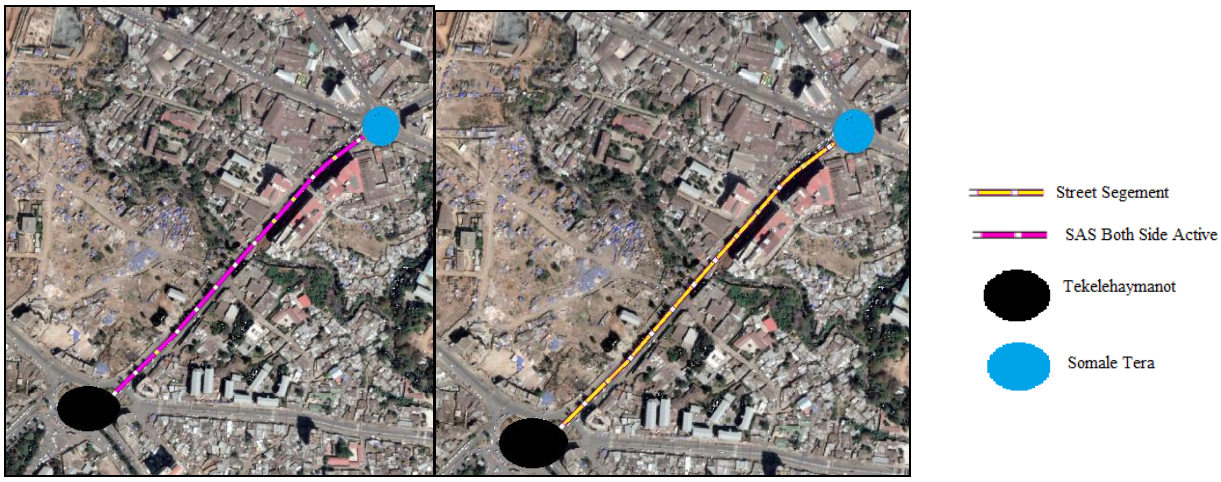


Figure 35: Tekelehaymanot to Somali tera street segment.

9. Tekelehaymanot to Tewoderose square 0.9 km Length SAS Street Segment Analysis

Figure 36 and 37: Explain total street segment length is 0.9km from this both side active frontage street segment length is 0.26km or, its percentage is 28.9% has active frontage. From this one understood that the rest 0.64 or 71% street segment has dead frontage.

Figure 36:Tekelehaymanot to Tewoderose street segment

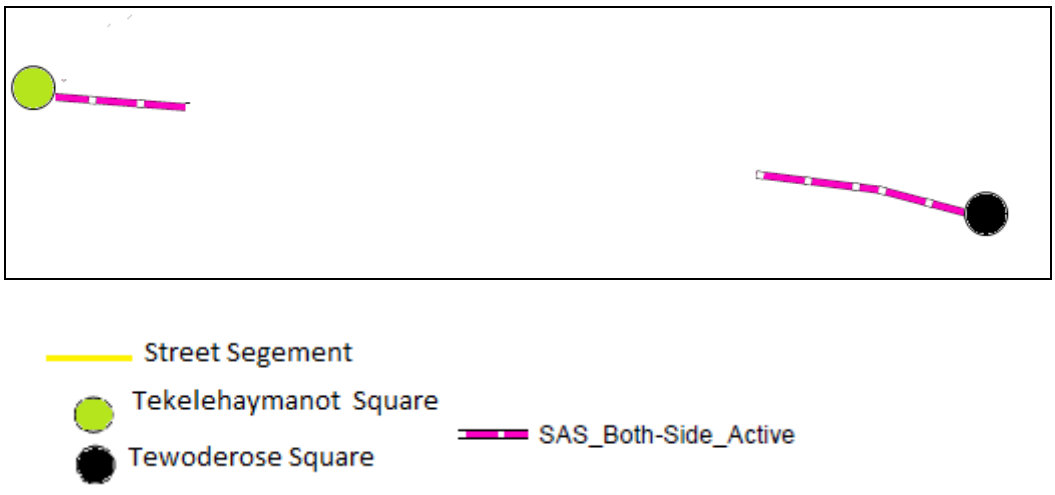


Figure 37: Different side Active Street from Tekelehaymanot to Tewoderose street segment.

10. Tewoderose square to Legehar 1.7 km Length PAS Street Segment Analysis

Figure 38:Explain total street segment length is 1.7km from this both side active frontage street segment length 0.4km or, its percentage is 23.5%, right side active frontage street is 0.36km , or 21%, left side active frontage street is 0.1km or 5.9%,.This reveal that from the total 1.7km street segment length 0.86km, or 50.6% is active the rest 0.84km , or 49.4%street segment is dead frontage

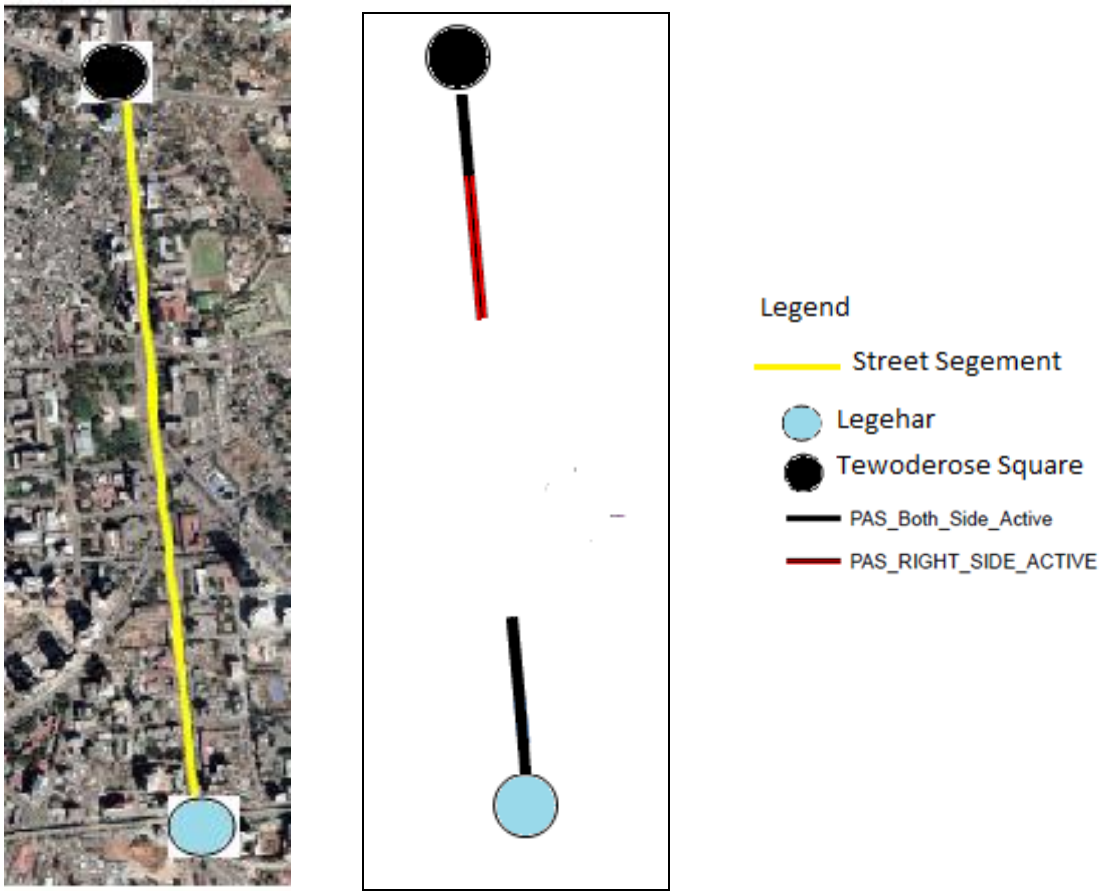


Figure 38: Tewoderose square to Legehar street segment.

11. Stedium to Mexcico 2km Length PAS Street Segment Analysis

Figure 39:Explain total street segement length is 2km from this both side active frontage street segement length 0.47km or, its percentage is 23.5%, right side active frontage street is 0.5km , or 25%, left side active frontage street is 0.46km or 23%.This reveal that from the total 2km street segement length 1.43km, or 71.5% is active the rest 0.57km , or 28.5%street segement is dead frontage.

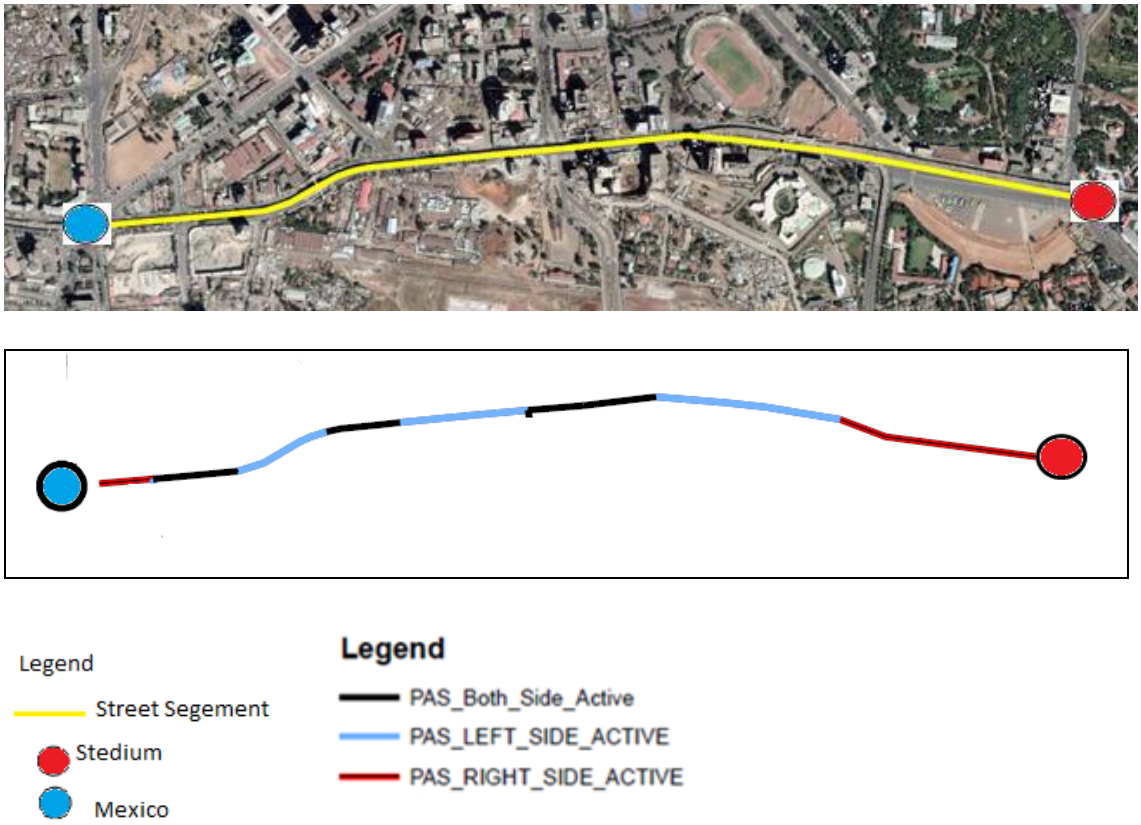


Figure 39: Stedium to Mexico street segment.

12. Mexico to Torhayloch 2.7km Length PAS Street Segment Analysis

Figure 40:Clarify total street segement length is 2.7km from this both side active frontage street segement length 0.2km or, its percentage is 7.4%, right side active frontage street is 0.3km , or 11%, left side active frontage street is 0.81km or 30%.This reveal that from the total 2.7km street segement length 1.31km, or 48.5% is active the rest 1.39km , or 51.5%street segement is dead frontage.

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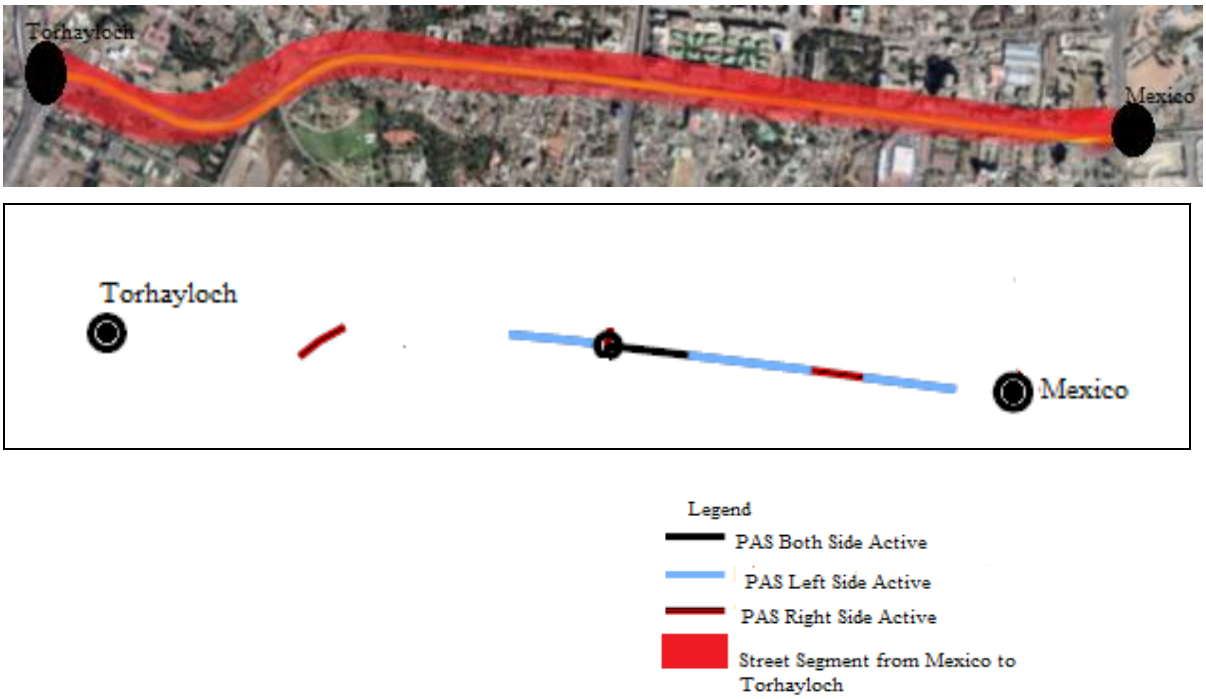


Figure 40: Mexico to Torhayloch street segment

13. Stadium to Unreal 1.36km Length Street Segment Analysis.

Figure 41:Clarify street segement length is 1.36km from this both side active frontage street segement length 0.78km or, its percentage is 57.4%.This reveal that from the total 1.36km street segement length 57.4% is active the rest 0.58km , or 42.6%street segement is dead frontage. reveal that from the total 1.36km street segement length 57.4% is active the rest 0.58km , or 42.6%street segement is dead frontage.

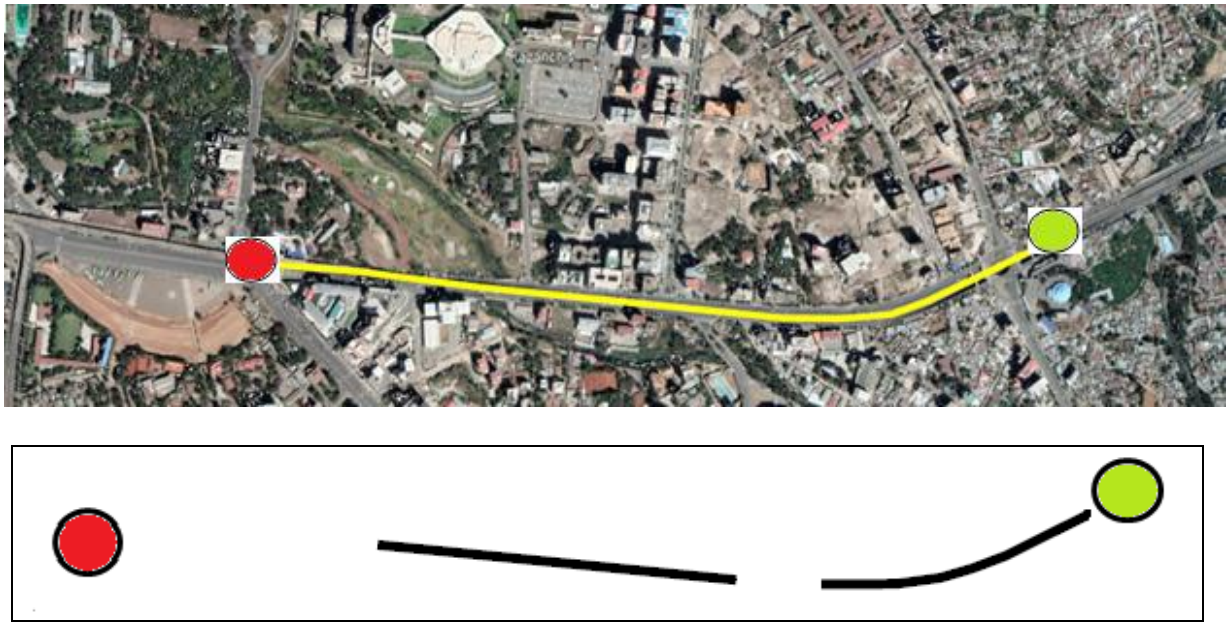


Figure 41: Stadium to ureal street segment

Figure 42: Make clear that street segment length is 1.5km from this both side active frontage street segment length 0.64km or, its percentage is 42.7%, right side active frontage street is 0.54km, or 36%. This reveal that from the total 1.5km street segment length 1.18km, or 78.7% is active the rest 0.32km, or 21.3% street segment is dead frontage.

14. Urael to Golagole 1.5km Length PAS Street Segment Analysis.

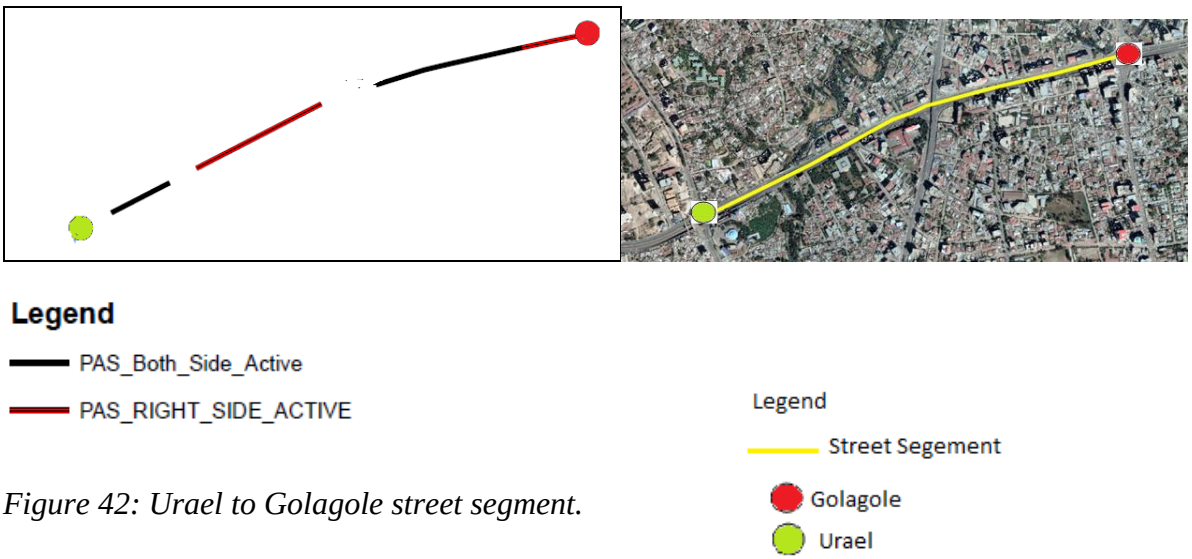


Figure 42: Urael to Golagole street segment.

15. Golagole to Megenagna 1.6km Length PAS Street Segment analysis.

Figure 43 and 44: Explain street segment length is 1.6km from this both side active frontage street segment length 0.9km or, its percentage is 56%, right side active frontage street is 0.6km, or 37.5%. This reveal that from the total 1.6km street segment length 1.5km, or 93.8% is active the rest 0.1km, or 6.2% street segment is dead frontage.

Figure 43: Golagole to Megenagna street segment.

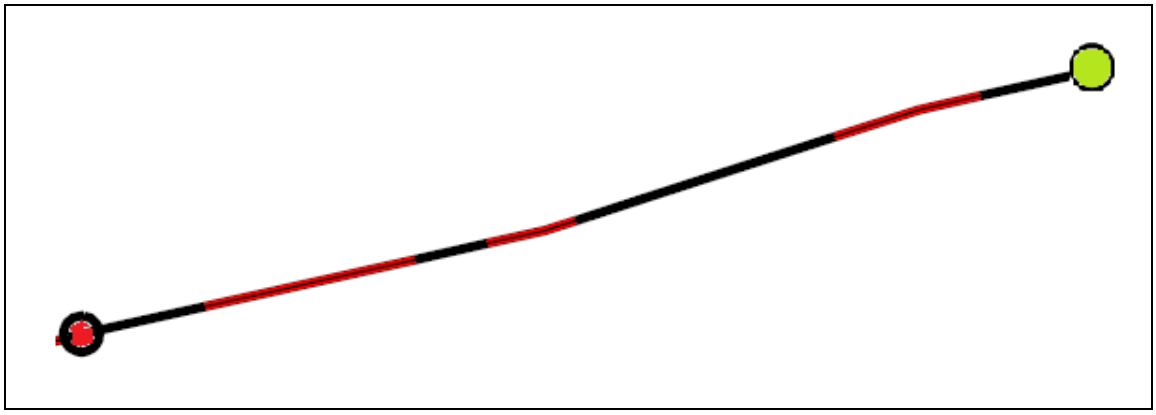
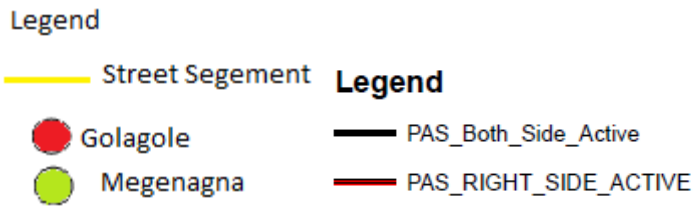


Figure 44: Different Side Active Street from Golagole to Megenagna street segment.



16. Bole to Megenagna bridge 4km Length PAS Street Segment Analysis

Figure 45: Decribe street segment length is 4km from this both side active frontage street segment length 0.3km or, its percentage is 7.5%, left side active frontage street is 1.12km, or 28%. This reveal that from the total 4km street segment length 1.42km, or 35.5% is active the rest 2.58km, or 64.5% street segment is dead frontage.

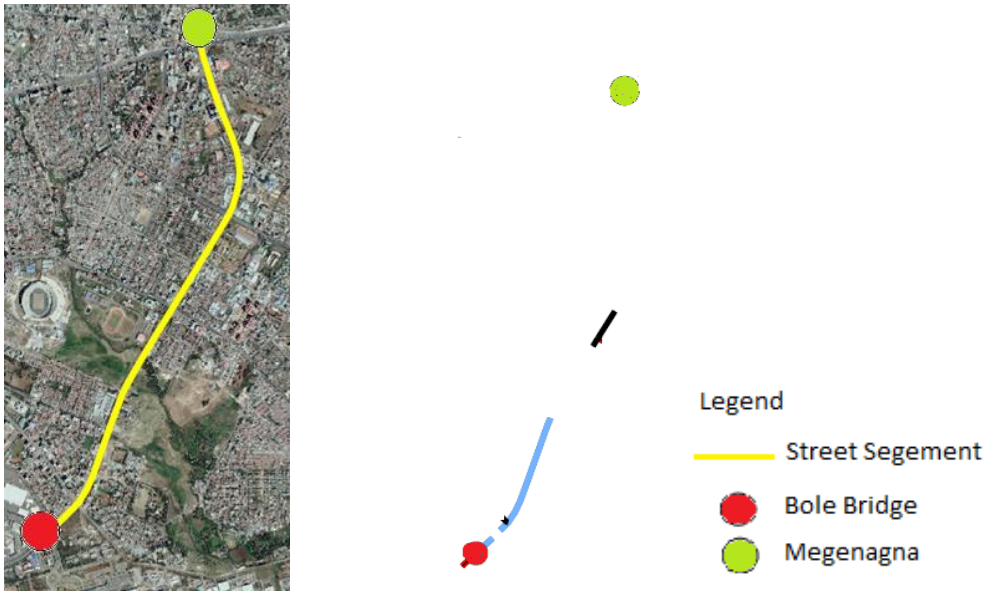


Figure 45: Bole Bridge to Megenagna street segment.

From 29.66km sample study PAS and SAS street at the active zone/center of Addis Ababa city 11.84km (40%) street have both side active frontages, 7.43km (25%) streets have right or left side/one side active frontages. In other word from 29.66km street length in active zone of Addis Ababa city 19.3km (65%) street segment have either both side active or one side active they remain 10.36km (35%) street segments have dead frontages. From this one understood that even the active zone area street 35% street segment have dead frontages indicate how dead frontage in Addis Ababa city is a serious problem.

Figure 46: and Table 7: Explain that the total length of PAS street is 375km. From this active frontage level A cover 30.4%, frontage level B cover 6.4%, frontage level C cover 17.9%, frontage level D cover 1.3% and frontage level E cover 44%.This implied that 36.8% of PAS street is front level A and B the rest 63.2% of PAS street is front level C,D and E or 63.2% PAS street in Addis Ababa has dead frontages.

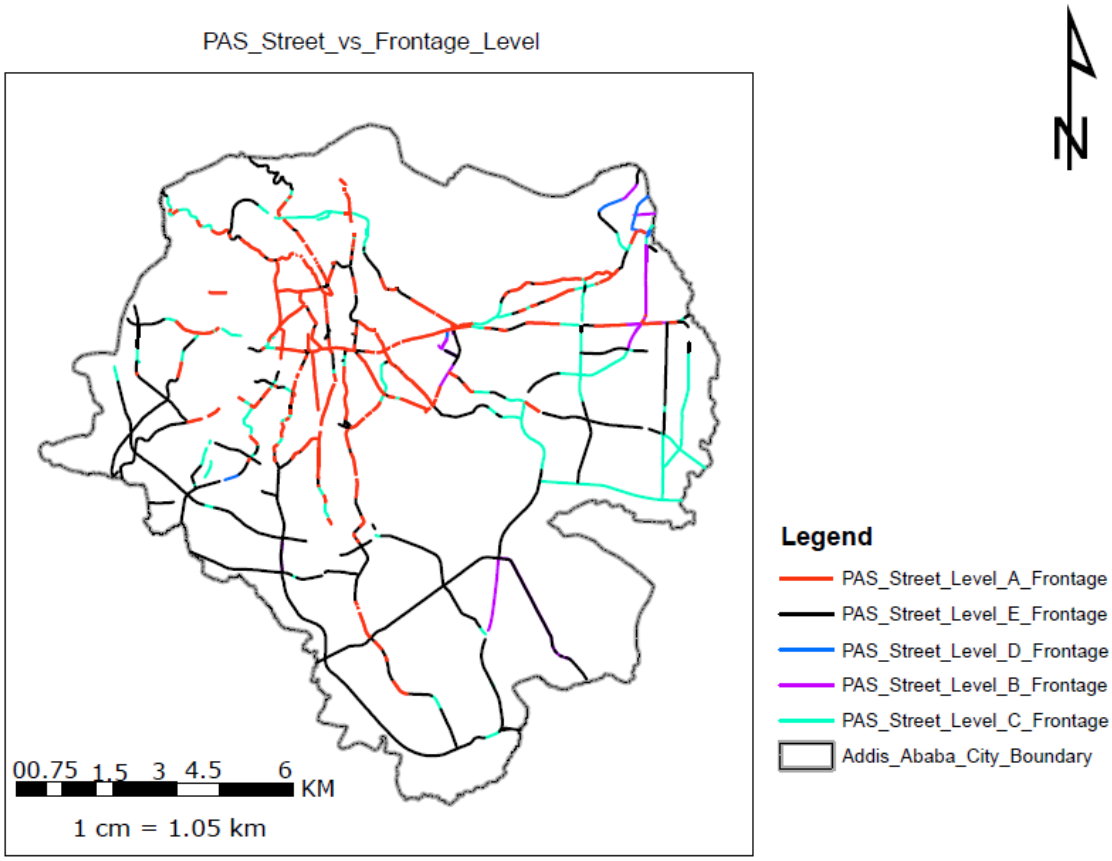


Figure 46: PAS Street vs. Frontage Level of Addis Ababa City.

Table 7: PAS Street vs. Frontage Level.

Frontage_Level	Length in_ k m	Percenta ge
A	114	30.4
B	24	6.4
C	67	17.9
D	5	1.3
E	165	44
Sum	375	100

Figure 47: and Table 8: Thoroughly explain that the total 329km SAS street of AA active frontage level A cover 37.9%, frontage level B cover 17.7%, frontage level C cover 22.5%, there is no frontage level D found at SAS street and frontage level E cover 21.9%, or 55.6% of SAS street found at front level A and B. while 44.4% of SAS street found at front level C

and E. This explains the highest share of SAS streets of A.A are found at active frontage level and the least of SAS streets are found at dead frontage. In other word most SAS streets of AA have active frontages. This means SAS street have significant contribution to make a frontage to be active.

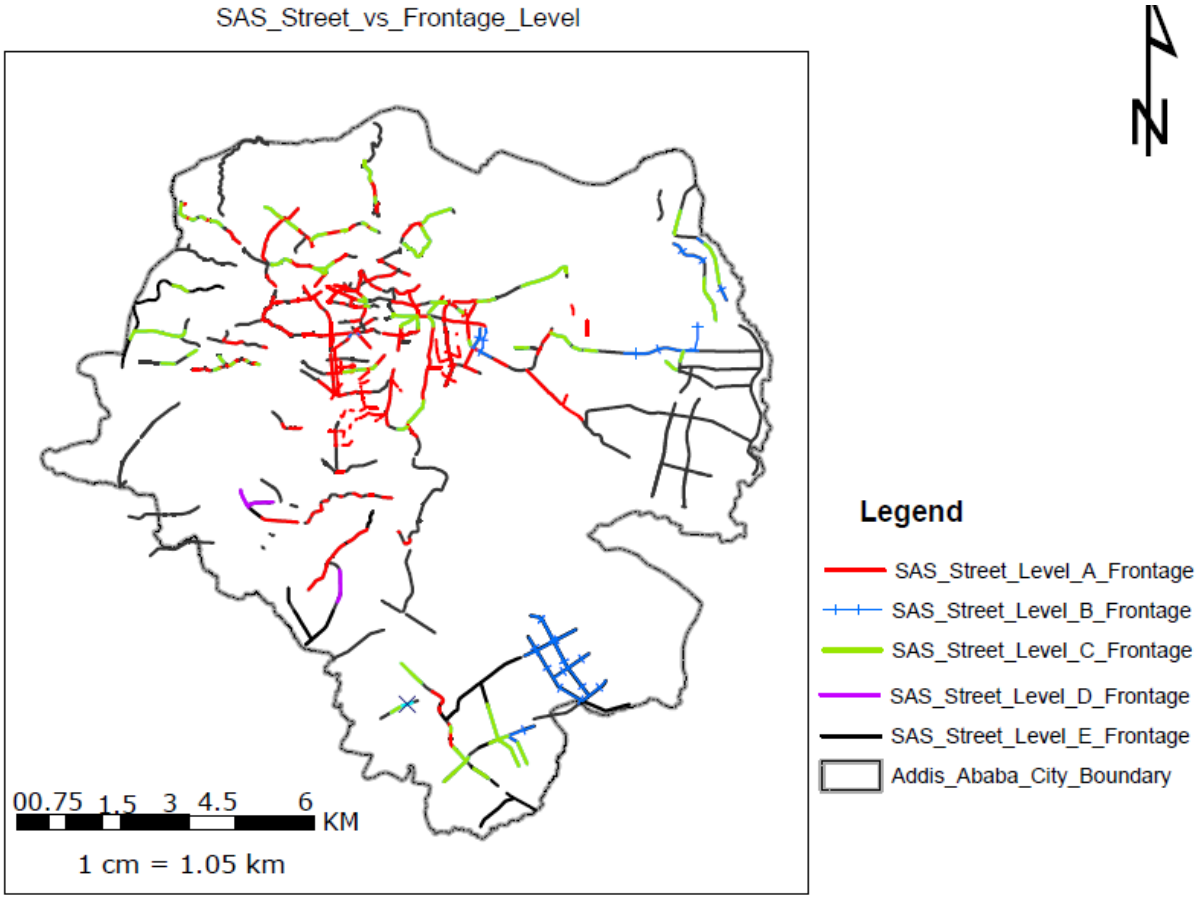


Figure 47: SAS Street vs. Frontage Level of Addis Ababa City.

Table 8: Addis Ababa City SAS Street vs. Frontage Level.

SAS_Street vs Frontage level		
Frontage_Level	Length in_ km	Percentage
A	124.8	37.9
B	58.2	17.7
C	74	22.5
D		
E	72	21.9
Sum	329	100

Figure 48: and Table 9: In-depth explain that the total 466km collector street of AA active frontage level A cover 19.7%, frontage level B cover 11.6%, frontage level C cover 16.3%, frontage level D cover 9.9% and frontage level E cover 42.5%, or 31.3% of collector street found at front level A and B while 68.7% of collector street found at front level C, D and E. This explain the highest share of collector streets of A.A are found at dead frontage level and the least of collector streets are found at active frontage level. In other word most collector streets of AA have dead frontages. This means collector streets of A.A not developed at the required level.

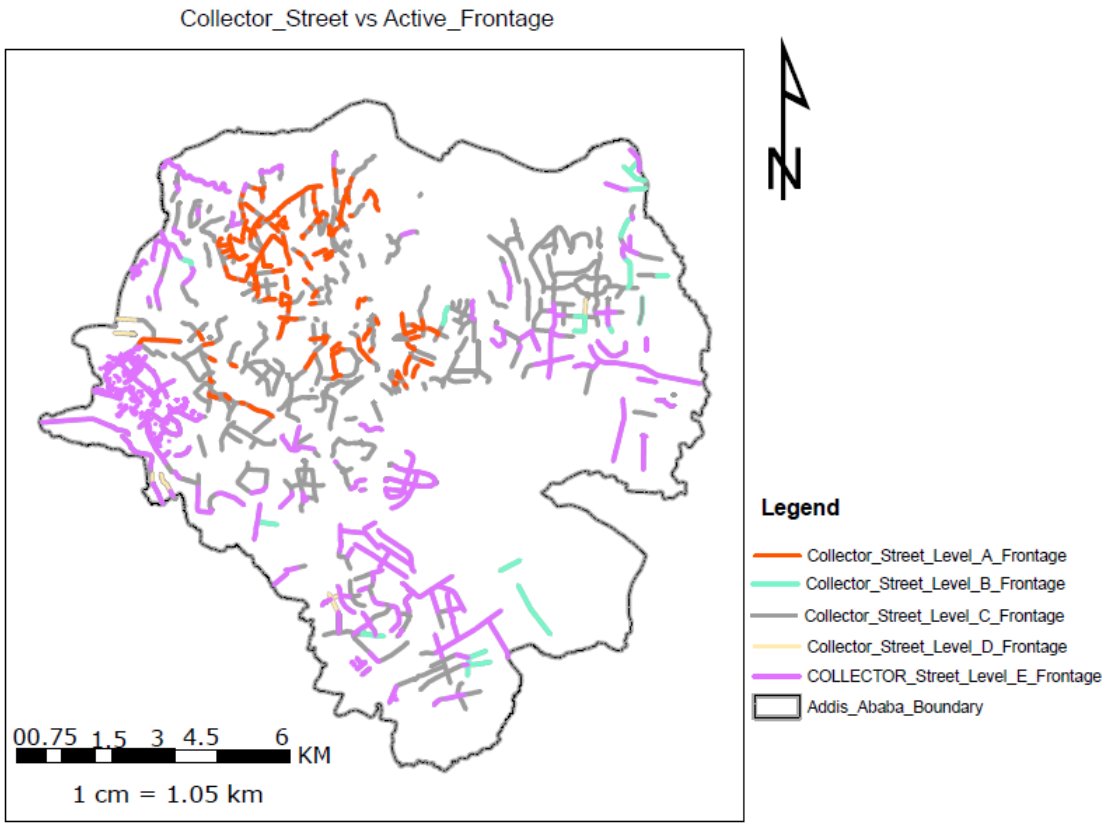


Table 9: Addis Ababa City Collector Street vs. Frontage Level

Frontage_Level	Length in_ km	Percentage
A	92	19.7
B	54	11.6
C	76	16.3
D	46	9.9
E	198	42.5
Sum	466	100

Figure 49:and Table 10:Illustrate that the total 7335km accesses street of AA active frontage level A cover 2.8%, frontage level B cover 4.8%, frontage level C cover 30%, %,

frontage level D cover 3%, and frontage level E cover 59.4%, or 7.6% of accesses street found at front level A and B while 92.4% of accesses street found at front level C,D and E. This explain the highest share of accesses streets of A.A are found at dead frontage level and the least of accesses streets are found at active frontage.

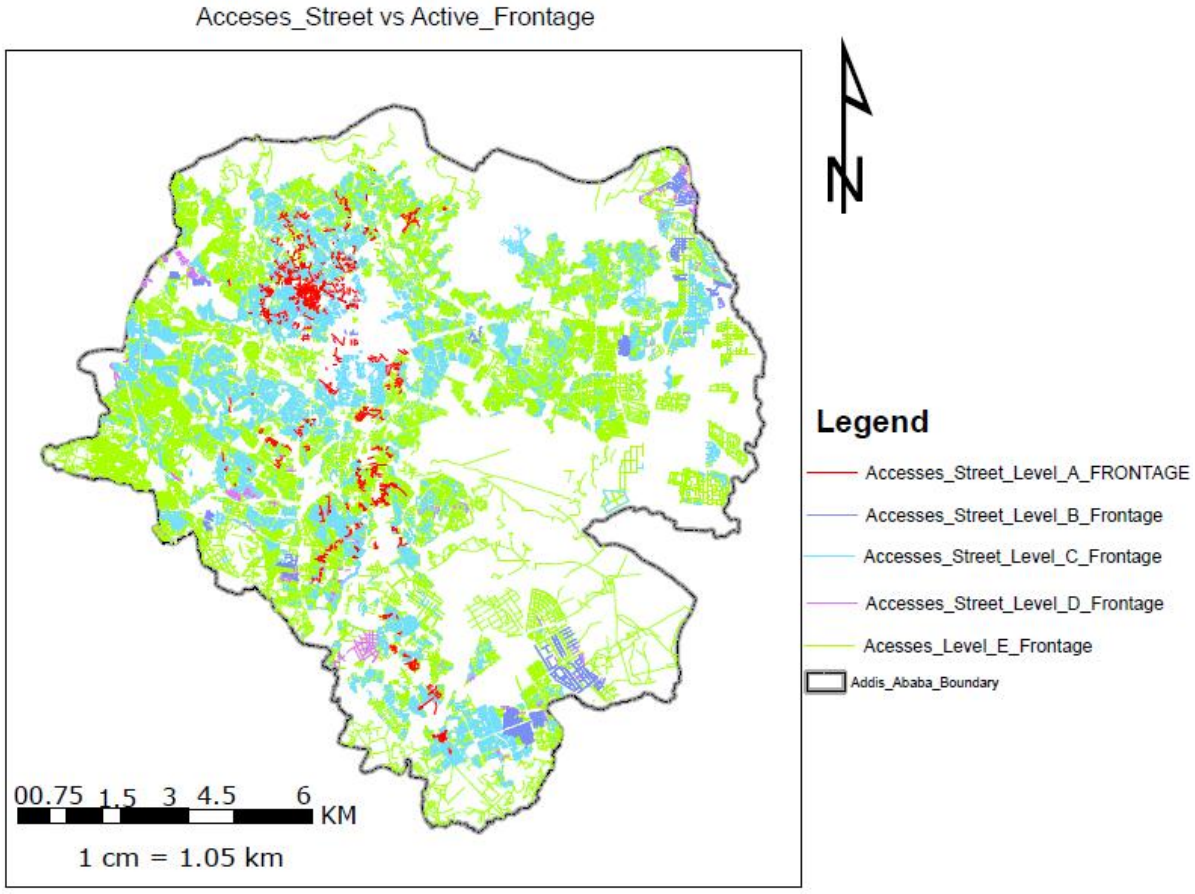


Figure 49: Accesses Street vs. Frontage Level of Addis Ababa City

Table 10: Addis Ababa Access Street vs. Frontage Level.

Frontage Level	Length in_ km	Percentage
A	205.8	2.8
B	352.8	4.8
C	2201.3	30
D	218.8	3
E	4356.3	59.4
Sum	7335	100

From Figure: 50 and table 11: One understood that total length of active frontage level A is 225km (PAS, SAS and Collector Street). From this both side active is 55.6%, right side active is 25.3% and left side active is 19.1%.This show that even the active streets are not fully active rather only 55.6% both side active and the rest active mean only one side active.

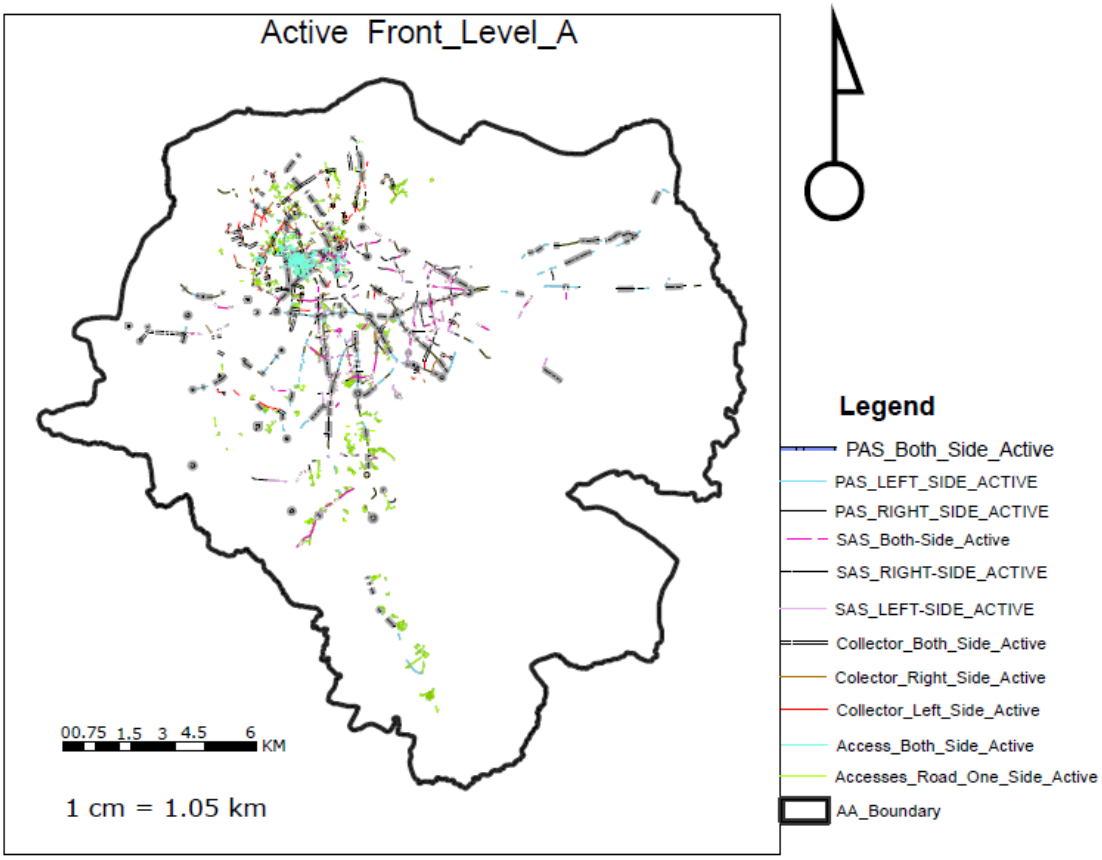


Figure 50: Street Type vs. Different Side of Active Street in Addis Ababa City

Table 11: Addis Ababa City Street Type vs. Different Side Active Street

Streret Type	Both_Side_Active _Frontage Length in_ km	Right_Side_Active_Frontage Length in_ km	Lefet_Side _Active_Frontage Length in_ km
PAS	56	25	23
SAS	45	18	10
Collector_street	24	14	10
Sum	125	57	43
percentage	55.6	25.3	19.1

Figure 51: In detail explain that active street level A total lenegth 399.802m or 399.8km Active street length withen the ring road is 322km , active street length out the ring road is

77845.4m or 77.8km. And hence percentage of Active street out the ring road from the total active street of Addis Ababa is 19.5% and percentage of active street withen the ring road from the total active street of Addis Ababa is 80.5%.From this one understood that most of active street is found withen the ring road.

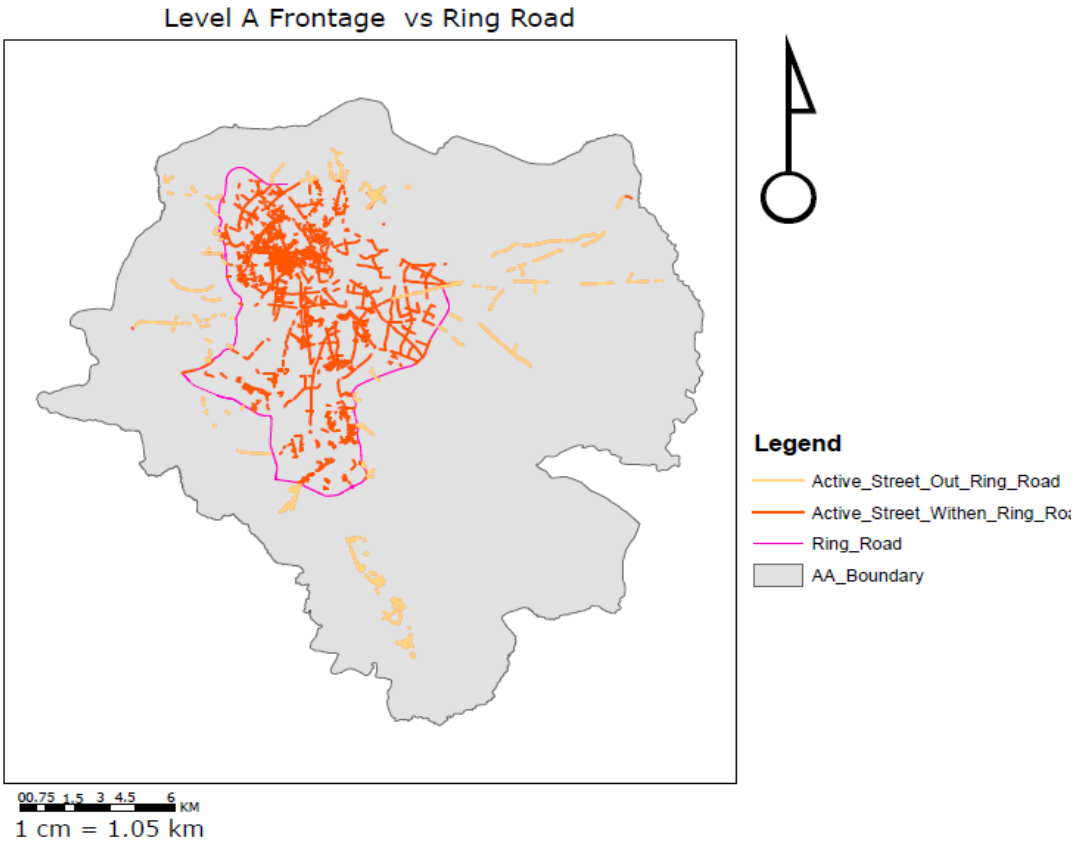


Figure 51: Active Street within and Out of the Ring Road in Addis Ababa City.

Figure 52: Elaborate that total area of Addis is 52025 ha, active zone of Addis Ababa is 10077.4554m2=10,077ha and dead zone area of Addis Ababa is 41,948 ha. That means percentage of active zone in Addis Ababa is 19.4% and percentage of dead zone is 80.6%. From this it is understood that most of Addis Ababa area is dead or not developed

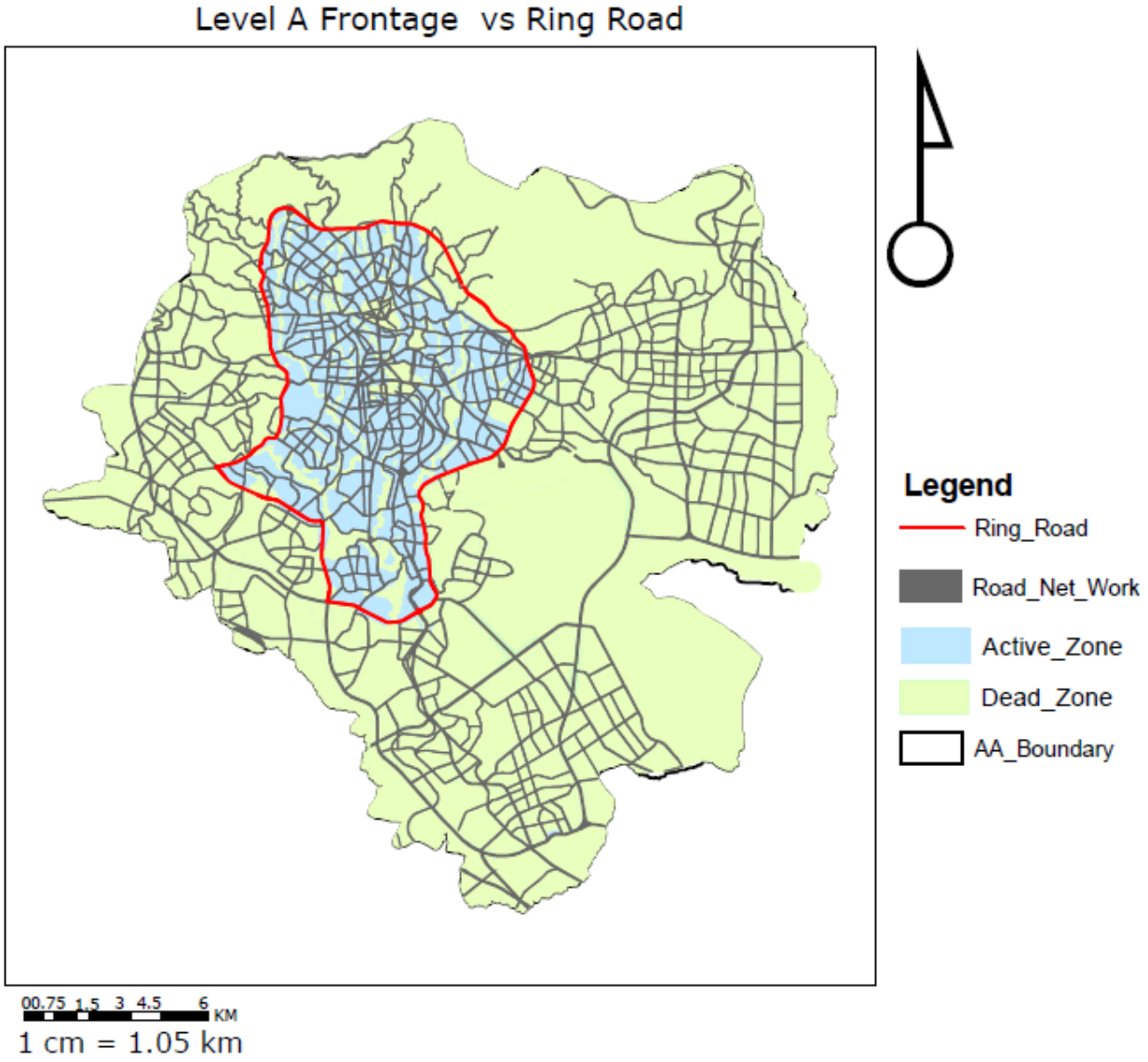


Figure 52: Dead vs. Active frontage Zone in Addis Ababa City

CHAPTER FIVE

DISCUSSION AND FINDING

5.1. Discussion

The similarity and difference of this study with other study

This study provides a map and image based analysis methodology that could be applied to the investigation of frontage level /street building interfaces in Addis Ababa city. The Methodology builds on existing analysis methods for studying frontages. Gehl's (1994, 2010) frontage evaluation grading scale rates.

Similarity

1. The study observes that ground floor commercial uses or, a variety of uses and activities generate an active frontages. This is similar to the study out (Llewelyn Davies, 2007). (Newmakkn, 1972; Newman, 1996).Experientially, the ground floor of buildings is noticed by passersby over any other floor, as the field of view of human beings is far more horizontal than vertical and other senses also have a limited reach (Gehl, 1987). Interactive frontages provide passersby with a multi-sensorial stimulation, which can fill their paths with excitement beyond mere utility

2. Mix of uses or diversity in range of function that provides active frontages. This is consistent with the study obtained by the work of (Jacobs, 1961).

3. Active street frontage mean in this study is if all premises on the ground floor of the building facing the street are used for the purposes of the business premises or retail premises. This is consistent with the study obtained by urban design Compendium (Llewelyn Davies Yeang and HCA, 2013).

4. The study finds out that the level of active frontage in Addis Ababa greatly influenced by the quality of physical environment. This is consistent with the study obtained by (J Gehl,1971)

The difference of this study with other study

1. The study observes that in some areas of Addis Ababa city even though the building and street standard is very low and if the area uses for commercial purpose it is very active. This is inconsistent with the study obtained by (Llewelyn Davies, 2007). His observation was active frontages have high quality materials and refined details.

2. This research differs from previous Studies is that classifying a street segment into four classes of street frontages, 1. Active on both sides of a street, 2.Active at right side of street, 3.Active at left side of the street, 4, Dead frontages. This is varying with the study obtained by (Berihu, 2017). His observations not clearly identify which side of the street is active.

5.2. Finding

1. From the total spatial coverage 43,480.5 hectare of Addis Ababa land front level A and B cover 14.4%. This means active frontage area of Addis Ababa is only 14.4% the rest 85.6% is covered by frontage level C, D, and E or 85.6% of Addis Ababa land is covered by dead frontage.

2.From the sample 29.66km active zone of Addis Ababa city 19.3km (65%) street segment have either both side active or one side active and the remain 10.36km (35%) street segments have dead frontages.

3. The study found that from the total active street segments in Addis Ababa city both side active streets in Addis Ababa city is 55.6%, and one side active street either right or left side active street is 44.4%.This show that even the active streets in Addis Ababa city are not fully active rather only 55.6% both side active and the rest active mean only one side active.

4.Active LRT is 45%. It is understand that most of LRT line in Addis Ababa city is dead.

5.Active street out the ring road from the total active street of Addis Ababa is 19.5% and percentage of active street withen the ring road from the total active street of Addis Ababa is 80.5%.From this one understood that most of active street is found withen the ring road.While most of dead frontages are found out of the ring road in Addis Ababa city.

6.63.2% PAS street of A.A is cover by dead front level. This explain the highest share of PAS street of A.A is covered by dead frontage level and the least is covered by active frontage.

7. Level A frontage of PAS and SAS street cover 68.3%.This show that most of active frontage are found at PAS and SAS street.

CHAPTER SIX

CONCLUSION & RECOMMENDATION

6.1. Conclusion

The study observes that even though most dead frontages in Addis Ababa are found at the local streets, the ring road and LRT are also aggravating dead frontages. Blind walls and fence or barrier edge create dead frontages in Addis Ababa. The study also investigated that the level of active frontage level in Addis Ababa city was depends on street type, building function, fence and building structure. The highest percent of Addis Ababa land is covered by dead frontages and this need changes in ground floor uses in case of institution and social services. Most active streets in Addis Ababa found within the ring road while dead frontages are found out of the ring road.

6.2. Recommendations

1. Change ground floor building uses in case of institutions such as ministry of education building, Tegbare Ede building, Ethiopia main electric power office building etc.

2. Avoid blind walls and fence in case of social service, Bole Medahenalem Secondary school, Ayer Tena secondary school,Black Line Secondary school etc.

3. Change uses of properties like immigration building, Addis Ketema Secondary school, Defense office building, Police commission office building

4. Encourage shops, food services and openings to have display windows to enhance active ground floor façade.

5. Follow the lead of Addis Ababa city active edge policy by suggesting an area of the street level frontage to be enter or clear transparent display window

Recommended Research in the future

1. Pedestrian friendly street to achieve active frontage in Addis Ababa city

2. Mapping active frontage by applying city engine software in Addis Ababa city

3. Design 3D model to improve active frontage in Addis Ababa city.

Reference

Addis Ababa Structure Plan Riport, 2017

Ameli, S. H., Hamidi, S., Garfinkel-Castro, A., & Ewing, R. (2015). Do better urban design qualities lead to more walking in Salt Lake City, Utah? Journal of Urban Design, 20(3), 393–410.

Berihu. M, 2017. Plug-in Urban Design for activating blind street frontages of Addis Ababa: The Case of the Central Business District.

City of New York , 2013. *Active Design Shaping The Sidewalk Experience*,City of New York: City of New York.

Llewelyn Davies Yeang and Homes and Communities Agency (HCA). (2013) Urban Design Compendium 1, 3rd edn. London:HCA.

David Walton, etl., 2007. urban design compendium. second ed. London: English Partnerships.

Ewing, R., & Clemente, O. (2013). Measuring urban design: Metrics for livable places. Island Press.

Ewing, R., Hajrasouliha, A., Neckerman, K. M., Purciel-Hill, M., & Greene, W. (2016).Streetscape features related to pedestrian activity. Journal of Planning Education andResearch, 36(1), 5–15

Hamidi, S., & Moazzeni, S. (2018). Examining the impacts of street-level built environmental and urban design qualities on walking behavior in downtown Dallas, TX, transportation research board 97th annual meeting.

Heffernan, E. E., Heffernan, T. W. & and Pan, W., 2014. *The relationship between the quality of active frontages and public perceptions of public spaces. Papers: Part A. 6132.*, Hong Kong: Faculty of Engineering and Information science.

Jacobs, J. (1961) The Death and Life of Great American Cities. New York: Random House

J Gehl. 1971. Life between buildings: Using public space. The Danish Architectural Press.

J. Gehl et al, 2006. Close encounters with buildings. URBAN DESIGN International, Volume 11, p. 29–47.

Gehl, J. (2013). Cities for people. Island press.

Kickert, C. C., 2016. Active centers – interactive edges: The rise and fall of ground floor frontages. *URBAN DESIGN Internationa,* Volume 21, p. 55–77.

Matt Riley, BEU, 2012. *Unitary Plan - Managing Frontages and Pedestrian Amenity in the City Centre,* Auckland: Auckland city plan commission .

Maxwell, J. A. (2016). Designing for 'life between buildings': Modeling the relationship between streets cape qualities and pedestrian activity in Glasgow, Scotland (Doctoral dissertation) University of Strathclyde.

Mehta, V., 2006. *Lively Streets: Exploring The Relationship Between Built Environment And Social Behavior,* Maryland: S.N.

Ministry of Urban Development & Housing, 2016. *Urban Design Manual of Ethiopia,* Addis Ababa: Ministry of Urban Development & Housing.

Ministry of Urban Development and Housing, 2017. *Street Design Standards for Urban Ethiopia ,* Addis Ababa: Ministry of Urban Development and Housing.

Noor M., et al , 2019. Toward liveable commercial streets: A case study of Al-Karada inner street in Baghdad. *Heliyon,* Volume 5, pp. 1-4.

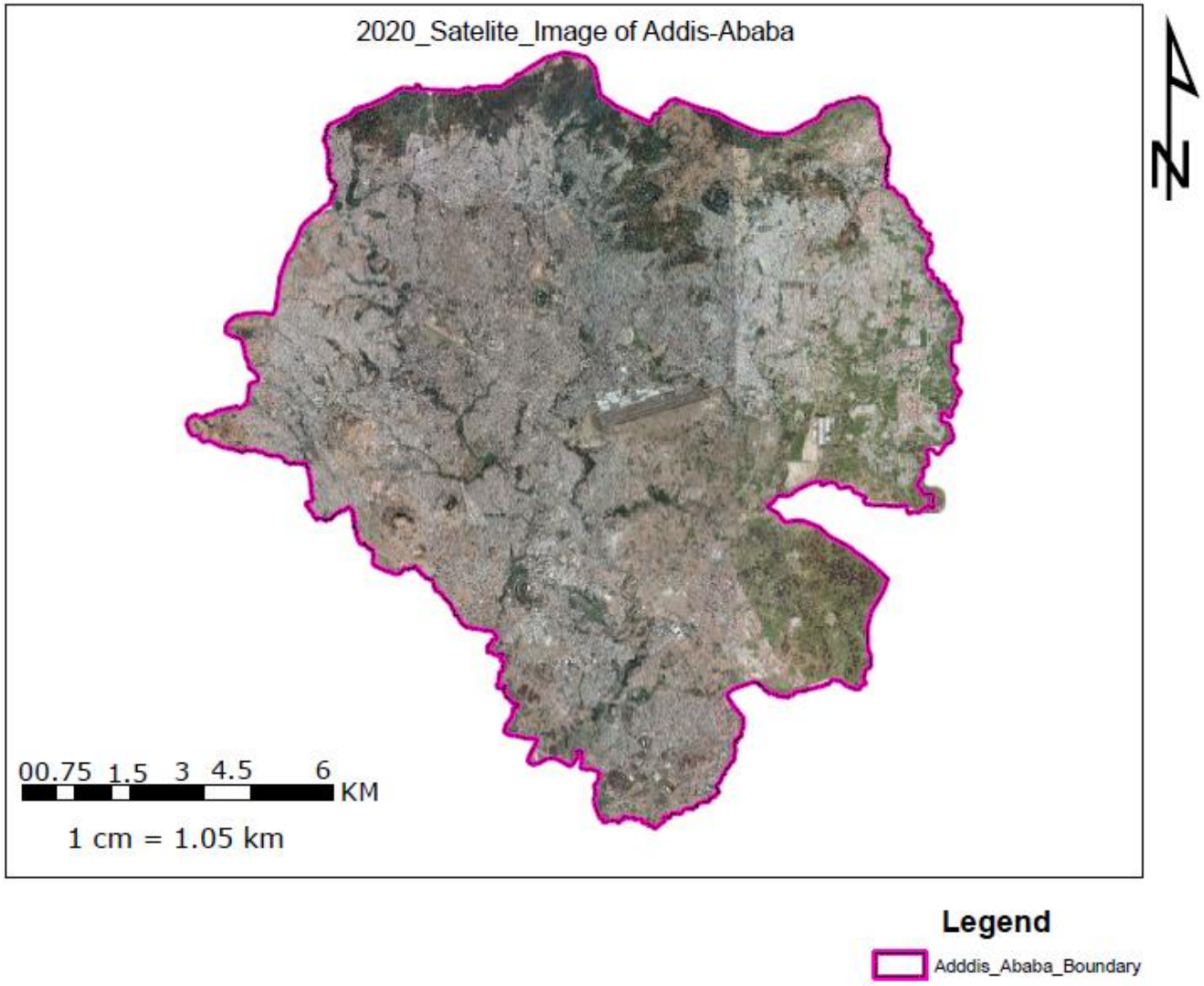
Saad Khudhair Mahmood Al-jumaili , 2014. Street orientations: The first step towards a sustainable place. *American Journal of Environmental Protection,* Volume Vol. 3, No. 6, pp. 305-317.

Toronto Public Health, 2014. Toronto Public Health. Healthy Streets. [Online] Available at:http://www.toronto.ca/health [Accessed 13 08 2020].

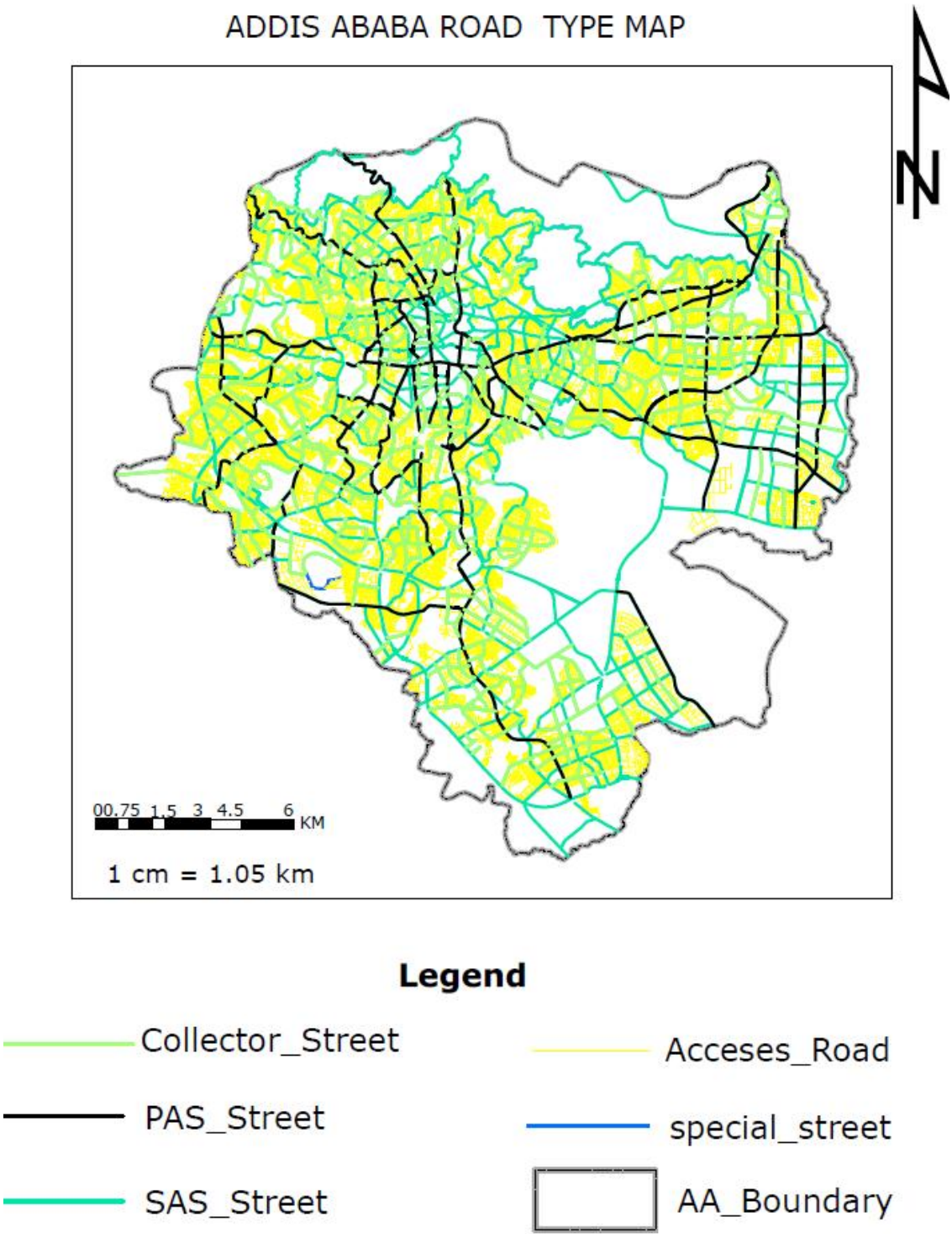
von Schönfeld, K. & Bertolini, L., 2017. Urban streets: Epitomes of planning challenges and opportunities at the interface of public space and mobility. *Cities,* Volume 68, pp. 48-55.

Annex

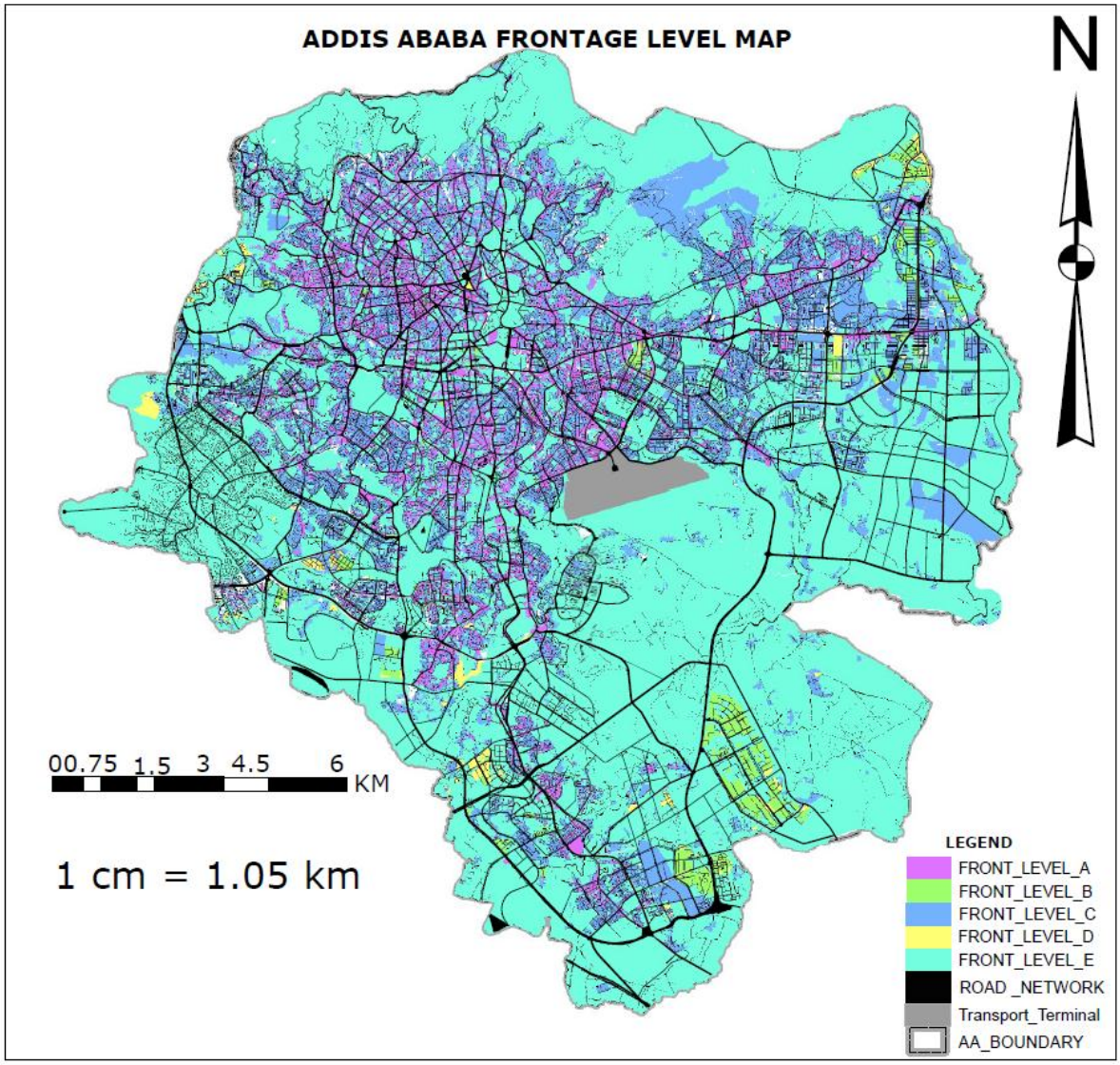
Annex 1:2020 satellite image of Addis Ababa city.



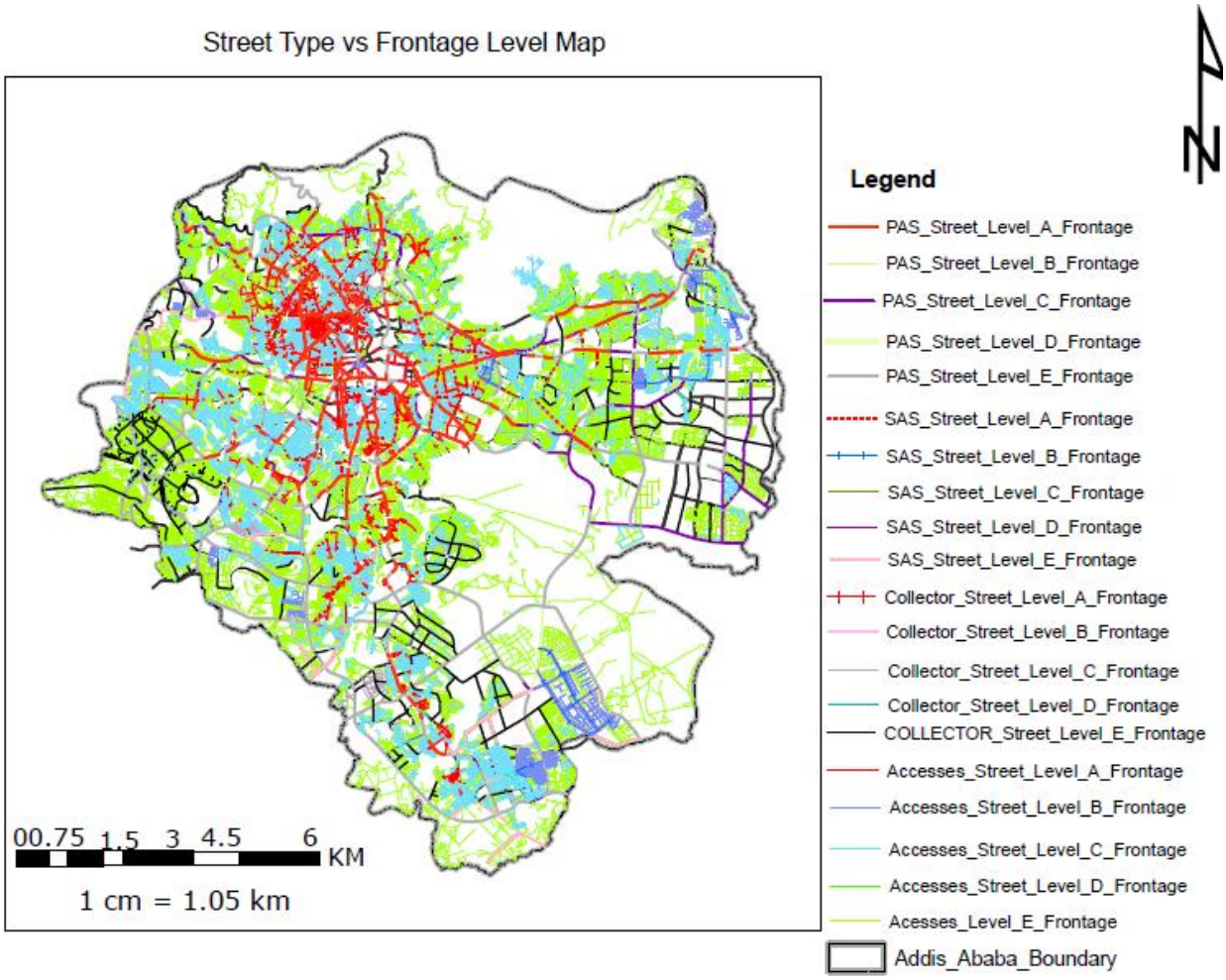
Annex 2: Addis Ababa road type map.



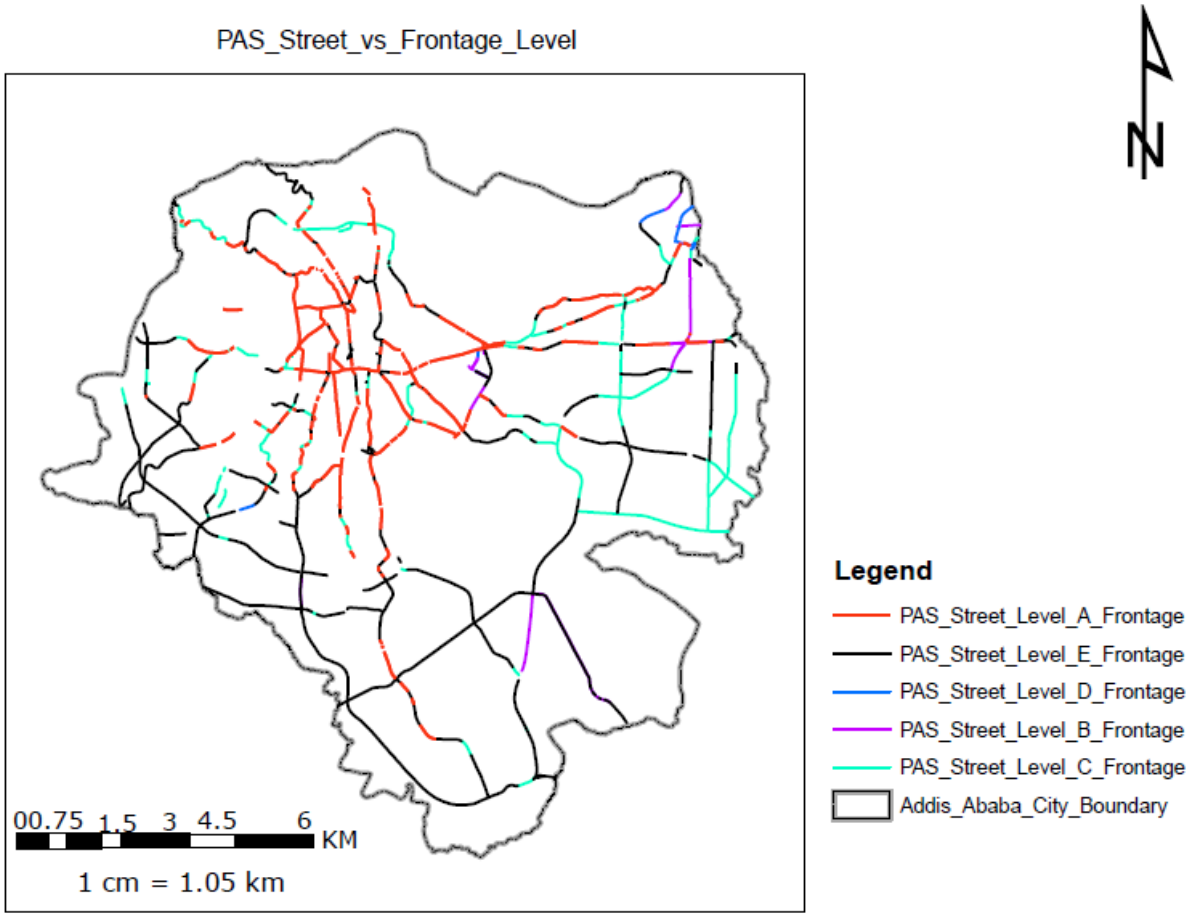
Annex 3: Addis Ababa city frontage level map.



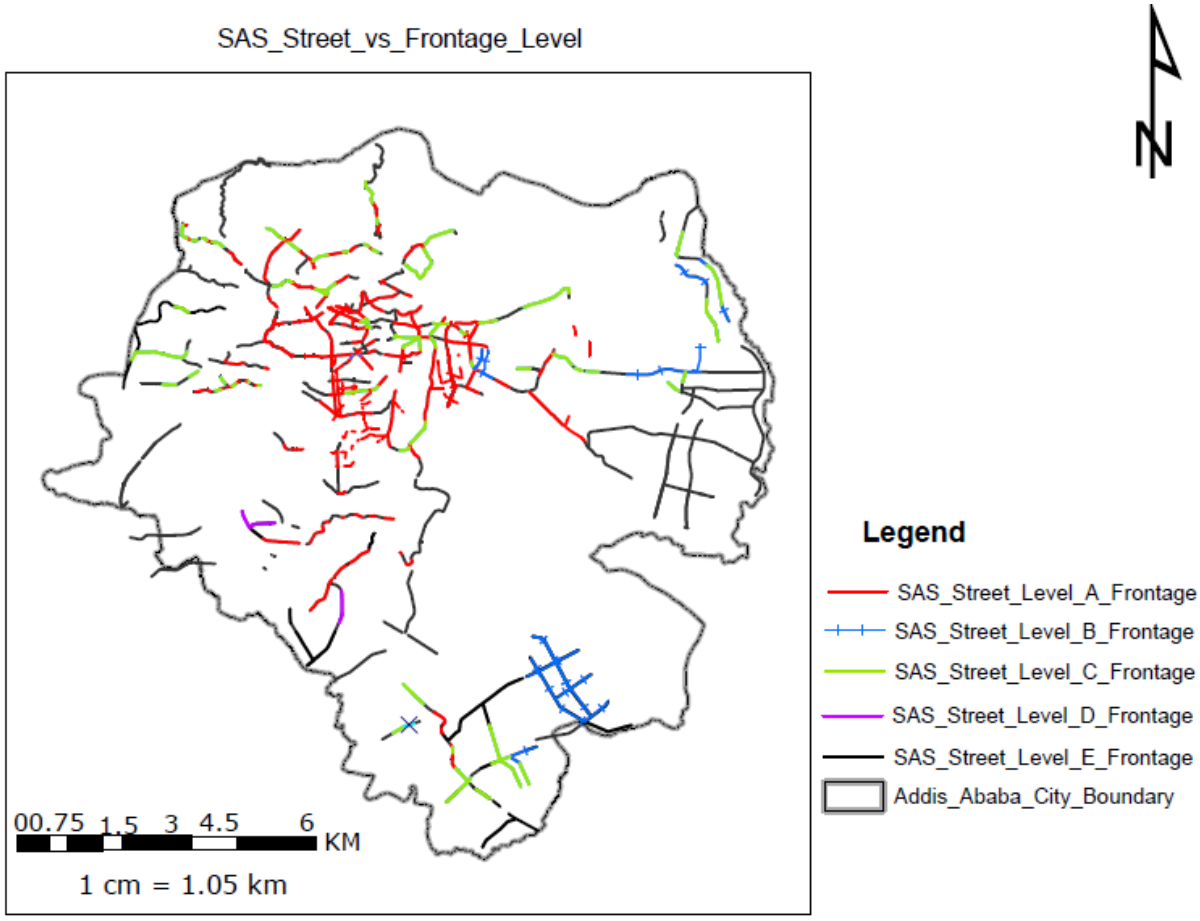
Annex 4: Addis Ababa city frontage level vs. street type map.



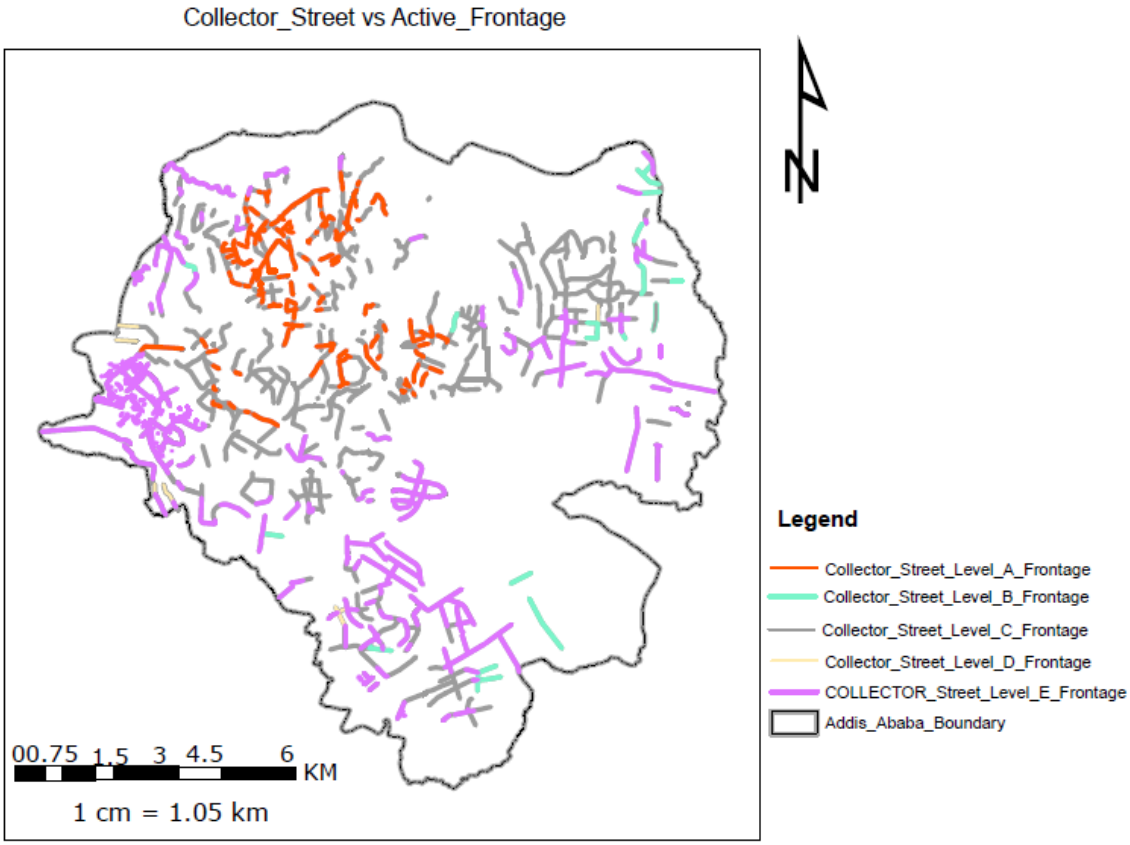
Annex 5: Addis Ababa city frontage level vs. PAS street map.



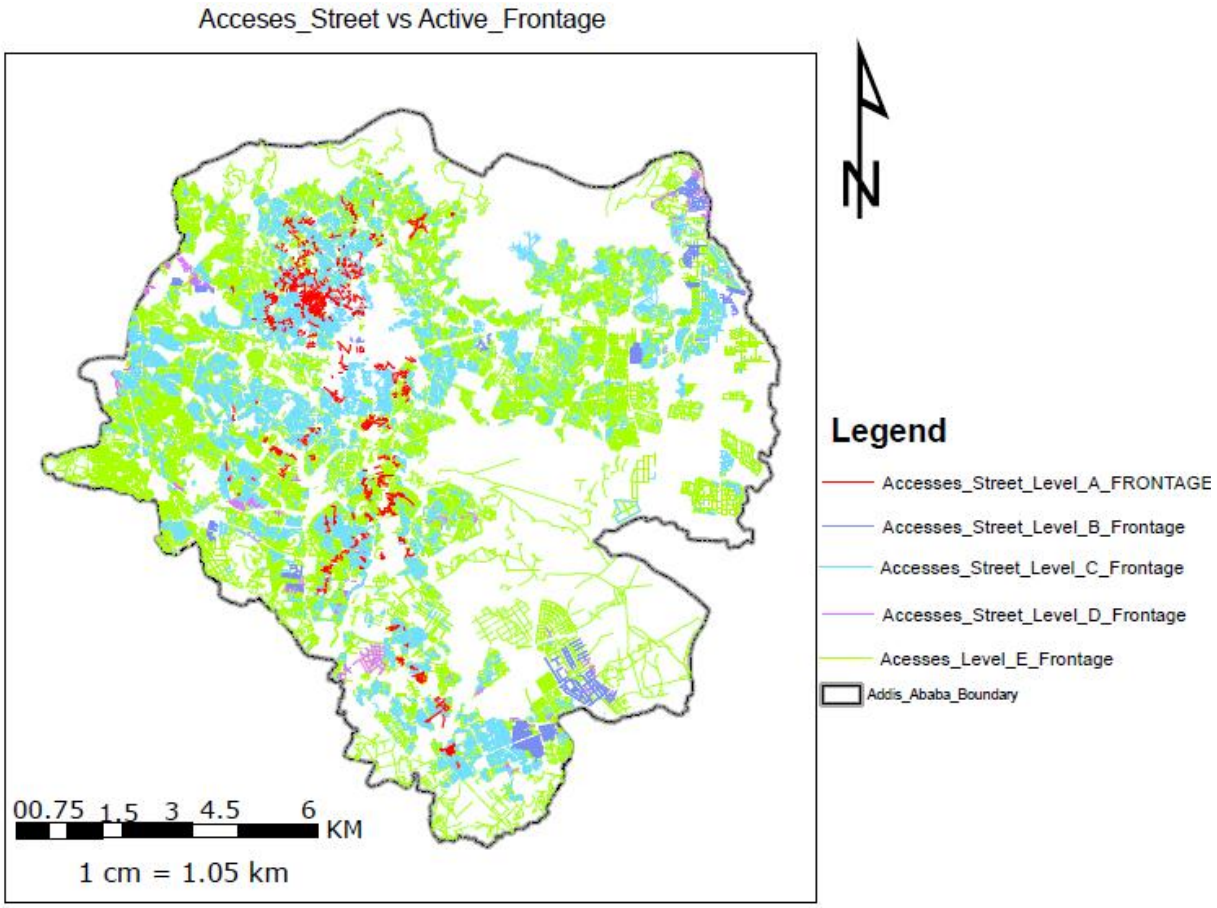
Annex 6: Addis Ababa city frontage level vs. SAS street map.



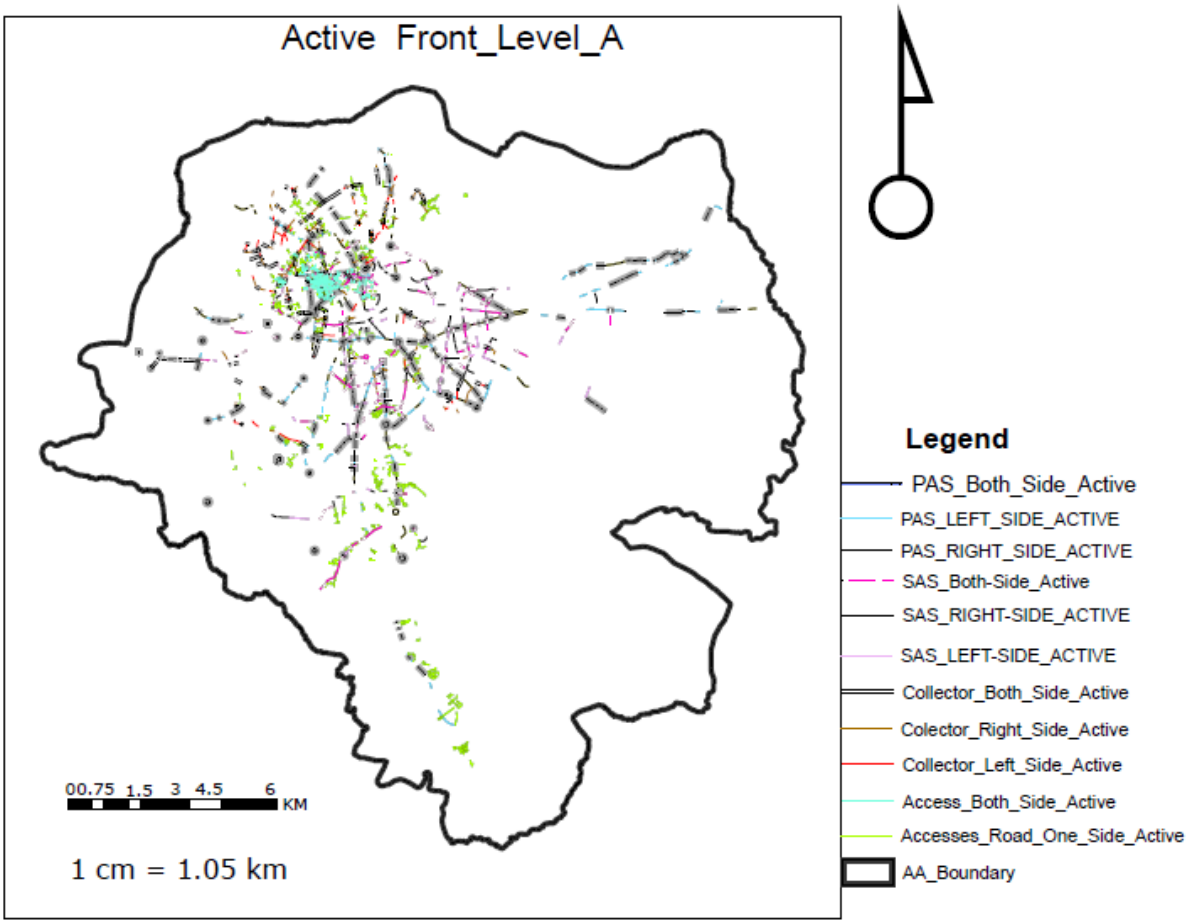
Annex 7: Addis Ababa city frontage level vs. Collector Street map.



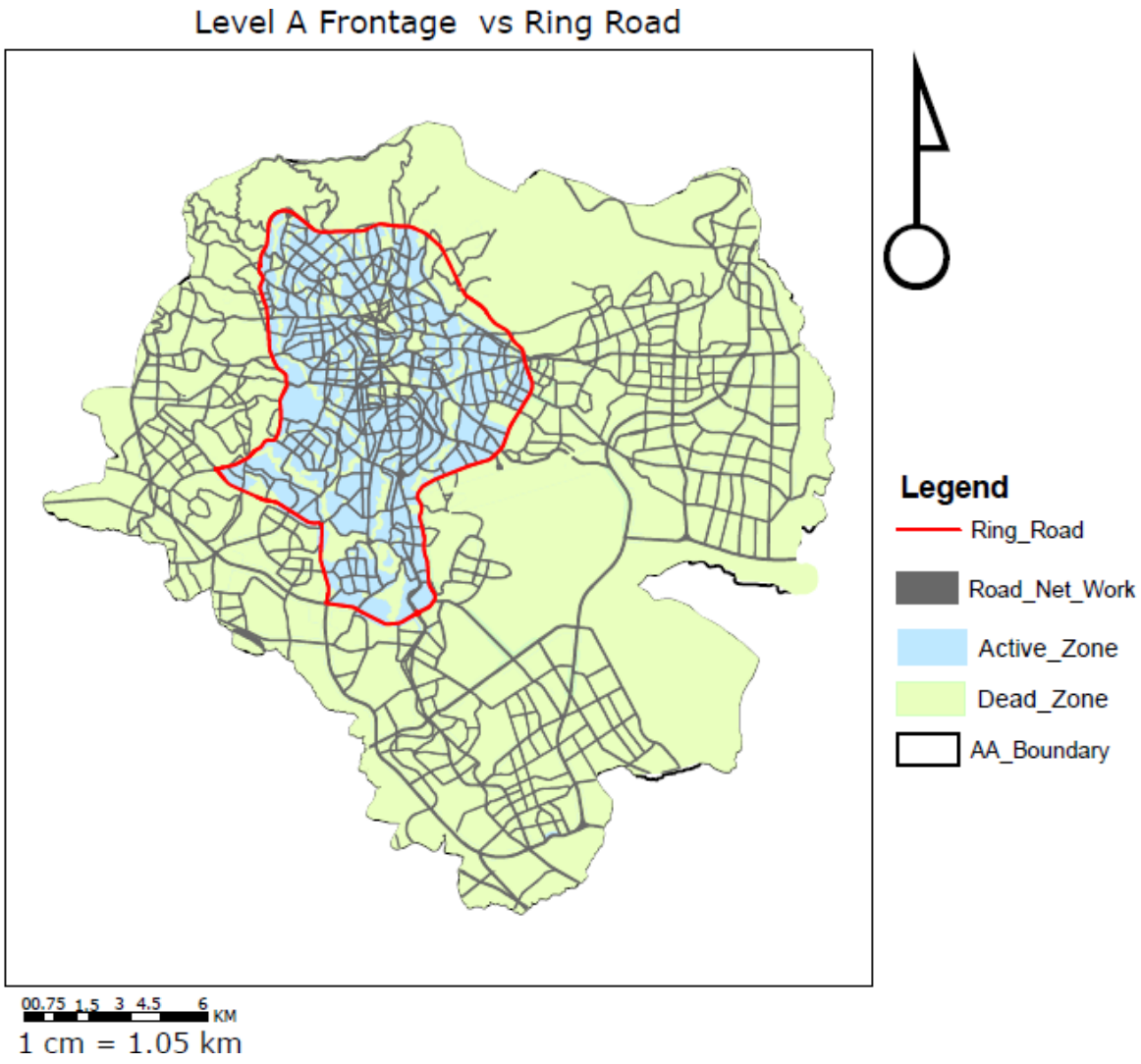
Annex 8: Addis Ababa city frontage level vs. accesses Street map.



Annex 9: Addis Ababa city different side active frontage level A vs. Street type map.



Annex 10: Addis Ababa city active frontage zone and dead frontage zone map.



Annex 11: Journal

ADDIS ABABA UNIVERSITY

EiABC

Urban Design and Development

Level of Active frontage in Addis Ababa city, Ethiopia

Ametu Mohammed Oumer, Tibebu Assefa(PhD)

Addis Ababa University

Active frontages have high value for city development. However in Addis Ababa fence properties, blind walls and streets which make its frontage inactive and repressive for citizen, passersby and visitors. Blind walls or street frontages with few openings are deterring. The study aims to measure active frontage level of Addis Ababa city. Active frontage level in Addis Ababa city was identified on field observation and by applying Arc GIS software digitize and give attribute of each frontage level data obtained from field survey,(captured photos in walk-along), analyze, interpret, map out active frontage level map and rated active frontage level. Accordingly the city has been rated frontage level from A to E. Where frontage level A is full of widows and inviting and frontage level E is for passive frontage. The study investigated that the level of active frontage level in Addis Ababa city was depends on street type, building function, fence and building structure. The result showed that 85.6% of AA is passive while 14.4% % is active. The study found that from the total active street segments in Addis Ababa city 55.6% is both side active streets and 44.4% is one side active streets either right or left side. This shows that even the active streets in Addis Ababa city are not fully active. So the responsible body needs to take action by identifying potential active area by issuing relevant regulation and redistributing magnet buildings.

***Key words**: - Active frontage, passive frontage, active frontage level map.*

1. Introduction

The concept of active frontages has primarily developed through the work of \Gehl, (1971).But has its roots in the work of \Jacobs, (1961). The concept eyes on street (Newman, 1973). The following simple definition is provided within the glossary of Safer Places (ODPM, 2004). Active frontage the frontage or edge of a building or space that has windows and doors as opposed to blank walls, fences and garages. This study, focused on the level of active frontage in Addis Ababa city.An active frontage is a continuous bus iness or retail uses that open directly to pe destrian. These uses provide activity on th e streets.A building has an active street fro ntage if all promises on the ground floor of the building facing the street are used for t he purposes of the business premises or ret ail Premisesit enhances public security and Passive surveillance (Jacob, 1961).And improves the amenity of the public domain by encouraging pedestrian activities.

Active frontages can play a great role to creating successful public spaces, which can help to deliver comprehensive benefits for towns and cities (Heffernan et al., 2014).The potential benefit of active frontage is that it enhances interest, life and vitality in the public realm (Llewelyn Davies et al., 2013).Previous research Gehl et al.,(2006) has explained that good-quality active frontages can contribute to the success of a public space. Successful public spaces are those that are comfortable, sociable, and accessible and which are loved by the people who use them (Carr et al, 1992).

In other way making frontages active adds interest, life and vitality to the public realm. This means: frequent doors and windows, with few blank walls; narrow frontage buildings, giving vertical rhythm to the street scene; articulation of facades, with projections such as bays and porches incorporated, providing a welcoming feeling; and, on occasion, lively internal uses visible from the outside, or spilling onto the street.

The issue of safety in relation to active frontages is derived from the work of \Jacobs, (1961). Typically referred to as natural surveillance or eyes on street is the concept of providing a built environment that allows for interaction between

buildings and the spaces they define. The most recent national planning guidance specific to designing for safety and security, Safer Places: The Planning

In Addis Ababa it is usual to build a fence around buildings. This makes the city unsafe for street activity. In other way dead Frontages that have not economic activities and social interaction, with no doors and windows that screens from view the interior of a property or it is not accessible even if it is visible. Dead frontages in Addis Ababa cause economic, social and environmental problems on the city residents; existences inactive frontage not only generates less street activities & poor building- street interaction but they also killed the whole street life.The main objective of the research is to measure active frontage level of Addis Ababa city.

2. Materials and Methods

2.1. Description of the Study Area

The capital city of Ethiopia, Addis Ababa,(Fig 5) is the study area. Addis Ababa, the capital city of Ethiopia and the diplomatic center of Africa, embodies a 130 years of development history that contributes to its current socio-spatial features. Its status as a primate city placed at the central of the nation has made Addis Ababa loved by many people with diverse Social, economic, cultural and spatial experiences. Addis Ababa, the administrative center and the most Important commercial and cultural center of Ethiopia is geographically located at the heart of the nation, 9°2'N latitude and 38°45'E longitude. Its average altitude is 2,400 meter above sea level, with the highest elevations at Entoto Hill to the north reaching 3,200 meters. This makes Addis Ababa one of the high-altitude capital cities of the world (Mirror of Addis Ababa, 1942).Addis Ababa occupies a total of 52025 hactar of land area surrounded by mountainous landscape. There are different streets that vary from principal arterial to local road. The road in AA covers 8544.7ha or, 16.4%.of land.

Figure 16: Location map of study area.

2.2. Research Design

Fig 7: Explain research process designed. The research designed is a plan or the road map of the research which show the starting and end points of the study. It is a logical reasoning runs from deductive to inductive or inductive to deductive. In this research the conceptual frame work goes from specific to general i.e. study the

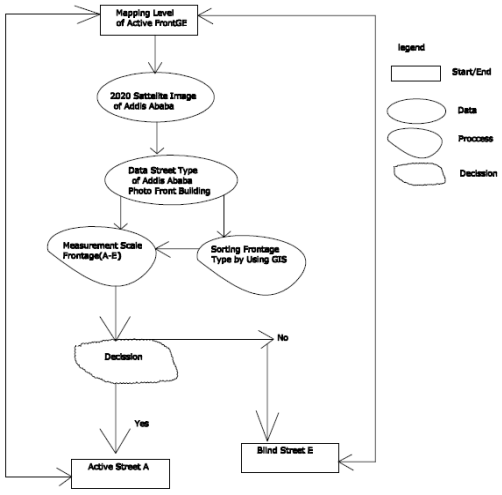


Figure 1: Research design diagram.

Level of active frontage at site level and generalize the level of active frontage in Addis Ababa. To offer a further significant result and recommendation.

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2.3. Methods

Using Addis Ababa Google map field survey of a variety of Arterial, Sub Arterial, Collector Street and access road were taken, collects data from the median of a street then classified into four groups; 1. Active on both sides of a street, 2. Active frontage on right side of a street, 3.Active on left sides of a street 4. Blank frontage on both sides of a street. In addition to this data were collected at plot or building level and rated the level of active frontage by applying the facade evaluation scale from The Urban Design Compendium (Llewelyn Davies Yeang and HCA, 2013).By applying Arc GIS software digitize and give attribute of each frontage level data obtained from field survey, (captured photos in walk-along), analyse, interpret, map out and rate active frontage level from A to E.

3. RESULTS

Figure 3: and Table 1: One observe that the total spatial coverage 43,480.5 hectare of Addis Ababa land front level A and B cover 14.4%. This means active frontage area of Addis Ababa is only 14.4% the rest 85.6% is covered by frontage level C, D, and E or 85.6% of Addis Ababa land is covered by dead frontage.

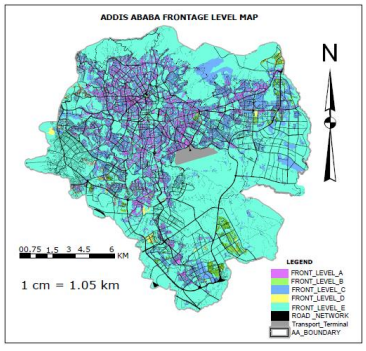

Figure 3: Addis Ababa frontage level map.

Table1: Addis Ababa City Active Frontage Level Proportion

No	Frontage Type	Area in hectare	Percentage
1	A	3641.8	8.4
2	B	2601.3	6
3	C	12778.6	29.4
4	D	581.5	1.3
5	E	23877.3	55
	Sum	43,480.5	100

Figure 4: and Table 2: Briefly explain that level A frontage of PAS and SAS street cover 68.3%.This show that most of active frontage are found at PAS and SAS street. A. From this one understood that from the total AA Street the coverage of front level A Street or Active Street is very low.

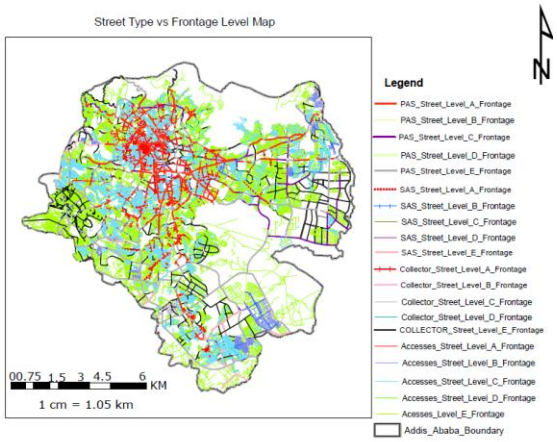

Figure 4: Street Type vs.

frontage Level of Addis Ababa city.

Figure 5: and Table 3: Explain that from the total Addis Ababa street 36.8% of PAS street is covered by front level A and B the rest 63.2% Of PAS street is front level
C, D and E or 63.2% PAS street in Addis Ababa has dead frontages.

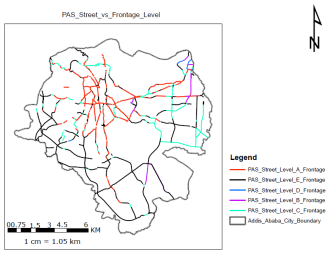

Figure 5: PAS street vs. Frontage level of Addis Ababa city.

However from the total 8505km street length of A.A only 536.6km length or6.3% is covered by frontage level

Table 2: Addis Street type vs. Front Level

No	Street Type	Length in km	frontage level A	Percentage
1	PAS	375	114	30.4
3	SAS_Street	329	124.8	37.9
4	Collector street	466	92	19.7
5	Access Street	7335	205.8	2.8
	Sum	8505	536.6	6.3

Table 3: Addis PAS Street vs. Frontage level

Frontage_Level	Length in_ k m	Percentage
A	114	30.4
B	24	6.4
C	67	17.9
D	5	1.3
E	165	44
Sum	375	100

Figure 6: and Table 4: Thoroughly explain that the total 329km SAS street of AA active frontage level A cover 37.9%, frontage level B cover 17.7%, frontage level C cover 22.5%, there is no frontage level D found at SAS street and frontage level E cover 21.9%, or 55.6% of SAS street found at front level A and B. while 44.4% of SAS street found at front level C and E. This explains the highest share of SAS streets of A.A are found at active frontage level and the least of SAS streets are found at dead frontage. In other word most SAS streets of AA have active frontages.This means SAS street have significant contribution to make a frontage to be active.

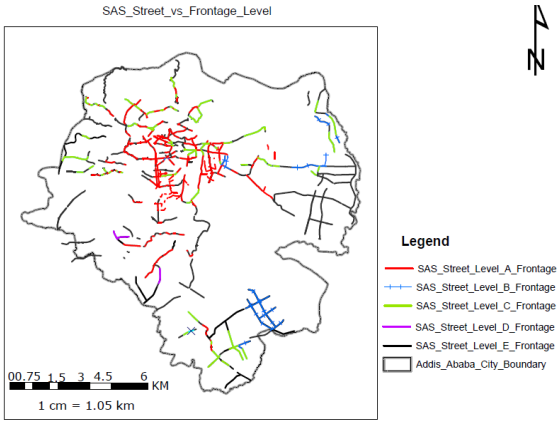

Table 4: Addis Ababa City SAS Street vs. Frontage Level.

SAS_Street vs Frontage level		
Frontage_Level	Length in_ km	Percentage
A	124.8	37.9
B	58.2	17.7
C	74	22.5
D		
E	72	21.9
Sum	329	100

Figure 6: SAS Street vs. Frontage Level of Addis Ababa City.

Figure 7: and Table 5: In-depth explain that the total 466km collector street of AA active frontage level A cover 19.7%, frontage level B cover 11.6%, frontage level C cover 16.3%, frontage level D cover 9.9% and frontage level E cover 42.5%, or 31.3% of collector street found at front level A and B while 68.7% of collector street found at front level C, D and E.This explain the highest share of collector streets of A.A are found at dead frontage level and the least of collector streets are found at active frontage level. In other word most collector streets of AA have dead frontages. This means collector streets of A.A not developed at the required level.

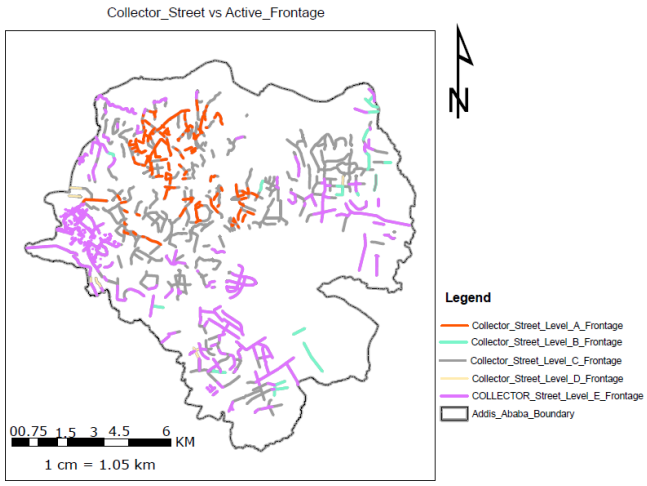

Figure 7: Collector Street vs. Frontage Level of Addis Ababa City.

Table 5: Addis Ababa City

Collector Street vs. Frontage Level.

rontage_Level	Length in_ km	Percentage
	92	19.7
	54	11.6
	76	16.3
	46	9.9
	198	42.5
um	466	100

Figure 8:and Table 6:Illustrate that the total 7335km accesses street of AA active frontage level A cover 2.8%, frontage level B cover 4.8%, frontage level C cover 30%, %, frontage level D cover 3%, and frontage level E cover 59.4%, or 7.6% of accesses street found at front level A and B while 92.4% of accesses street found at front level C,D and E. This explain the highest share of accesses streets of A.A are found at dead frontage level and the least of accesses streets are found at active frontag

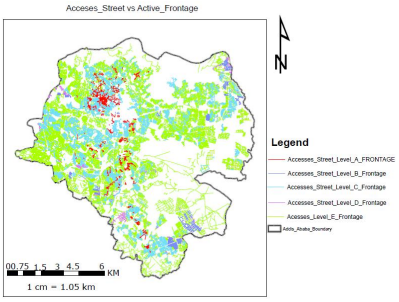

Figure 8: Accesses Street vs.

Table 6: Addis Ababa Access Street vs. Frontage Level.

Frontage Level	Length in_ km	Percentage
A	205.8	2.8
B	352.8	4.8
C	2201.3	30
D	218.8	3
E	4356.3	59.4
Sum	7335	100

Frontage Level of Addis Ababa City.

Figure 9 and table 7: One understood that total length of active frontage level A is 225km (PAS, SAS and Collector Street). From this both side active is 55.6%, right side active is 25.3% and left side active is 19.1%.This show that even the active streets are not fully active rather only 55.6% both side active and the rest active mean only one side active.

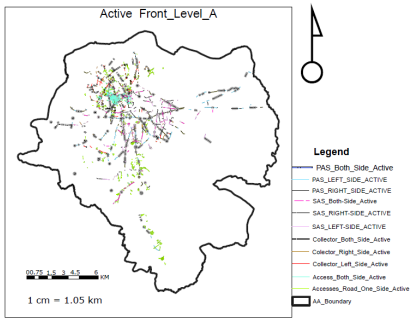

Figure 9: Street Type vs. Different Side of Active Street in Addis Ababa City.

Table 7: Addis Ababa City Street Type vs.Different Side Active Street

Streret Type	Both_Side_Active_Frontage Length in_ km	Right_Side_Active_ Frontage Length in_ km	Lefet_Side _Active_Frontage Length in_ km
PAS	56	25	23
SAS	45	18	10
Collector_street	24	14	10
Sum	125	57	43
percentage	55.6	25.3	19.1

Figure10: In detail explain that active street level A total lenegth 399.802m or 399.8km Active street length withen the ring road is 322km , active street length out the ring road is 77845.4m or 77.8km. And hence percentage of Active street out the ring road from the total active street of Addis Ababa is 19.5% and percentage of active street withen the ring road from the total active street of Addis Ababa is 80.5%.From this one understood that most of active street is found withen the ring road.

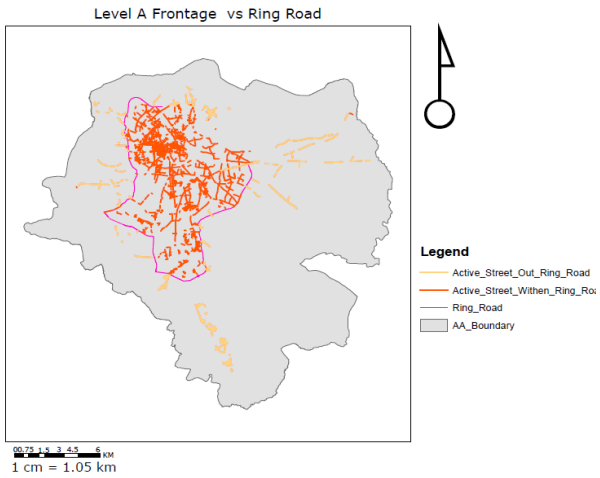

Figure 10: Active Street within and Out of the Ring Road in Addis Ababa City.

Figure 11: Elaborate that total area of Addis is 52025 ha, active zone of Addis Ababa is 10077.4554m2=10,077ha and dead zone area of Addis Ababa is 41,948 ha. That means percentage of active zone in Addis Ababa is 19.4% and percentage of dead zone is 80.6%. From this it is understood that most of Addis Ababa area is dead or not developed.

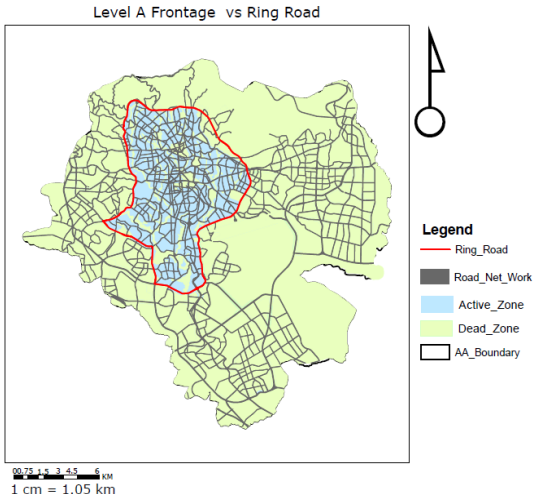

Figure 11: Dead vs. Active frontage Zone in Addis Ababa City.

4. Discussion and Finding

4.1. Discussion

The similarity and difference of this study with other study

This study provides a map and image based analysis methodology that could be applied to the investigation of frontage level /street building interfaces in Addis Ababa city. The Methodology builds on existing analysis methods for studying frontages. Gehl's (1994, 2010) frontage evaluation grading scale rates.

Similarity

1. The study observes that ground floor commercial uses or, a variety of uses and activities generate an active frontages. This is similar to the study out (Llewelyn Davies, 2007). (Newmakkn, 1972; Newman, 1996).Experientially, the ground floor of buildings is noticed by passersby over any other floor, as the field of view of human beings is far more horizontal than vertical and other senses also have a limited reach (Gehl, 1987). Interactive frontages provide passersby with a multi-sensorial stimulation, which can fill their paths with excitement beyond mere utility

2. Mix of uses or diversity in range of function that provides active frontages. This is consistent with the study obtained by the work of (Jacobs, 1961).

3. Active street frontage mean in this study is if all premises on the ground floor of the

building facing the street are used for the purposes of the business premises or retail premises. This is consistent with the study obtained by urban design Compendium (Llewelyn Davies Yeang and HCA, 2013).

4.The study finds out that the level of active frontage in Addis Ababa greatly influenced by the quality of physical environment. This is consistent with the study obtained by (J Gehl,1971)

The difference of this study with other study

1. The study observes that in some areas of Addis Ababa city even though the building and street standard is very low and if the area uses for commercial purpose it is very active. This is inconsistent with the study obtained by (Llewelyn Davies, 2007). His observation was active frontages have high quality materials and refined details.

2. This research differs from previous Studies is that classifying a street segment into four classes of street frontages, 1. Active on both sides of a street, 2.Active at right side of street, 3.Active at left side of the street, 4, Dead frontages. This is varying with the study obtained by (Berihu, 2017). His observations not clearly identify which side of the street is active.

4.2. Finding

1. From the total spatial coverage 43,480.5 hectare of Addis Ababa land front level A and B cover 14.4%. This means active frontage area of Addis Ababa is only 14.4% the rest 85.6% is covered by frontage level C, D, and E or 85.6% of Addis Ababa land is covered by dead frontage.

2.From the sample 29.66km active zone of Addis Ababa city 19.3km (65%) street segment have either both side active or one side active and the remain 10.36km (35%) street segments have dead frontages.

3. The study found that from the total active street segments in Addis Ababa city both side active streets in Addis Ababa city is 55.6%, and one side active street either right or left side active street is 44.4%.This show that even the active streets in Addis Ababa city are not fully active rather only 55.6% both side active and the rest active mean only one side active.

4.Active LRT is 45%. It is understand that most of LRT line in Addis Ababa city is dead.

5.Active street out the ring road from the total active street of Addis Ababa is 19.5% and percentage of active street withen the ring road from the total active street of Addis Ababa is 80.5%.From this one understood that most of active street is found withen the ring road.While most of dead frontages are found out of the ring road in Addis Ababa city.

6.63.2% PAS street of A.A is cover by dead front level. This explain the highest share of PAS street of A.A is covered by dead frontage level and the least is covered by active frontage.

7. Level A frontage of PAS and SAS street cover 68.3%.This show that most of active frontage are found at PAS and SAS street.

5. Conclusion and Recommendation

5.1. Conclusion

The study observes that even though most dead frontages in Addis Ababa are found at the local streets, the ring road and LRT are also aggravating dead frontages. Blind walls and fence or barrier edge create dead frontages in Addis Ababa. The study also investigated that the level of active frontage level in Addis Ababa city was depends on street type, building function, fence and building structure. The highest percent of Addis Ababa land is covered by dead frontages and this need changes in ground floor uses in case of institution and social services. Most active streets in Addis Ababa found within the ring road while dead frontages are found out of the ring road.

5.2. Recommendations

1. Change ground floor building uses in case of institutions such as ministry of education building, Tegbare Ede building, Ethiopia main electric power office building etc.

2. Avoid blind walls and fence in case of social service, Bole Medahenalem Secondary school, Ayer Tena secondary school,Black Line Secondary school etc.

3. Change uses of properties like immigration building, Addis Ketema Secondary school, Defense office building, Police commission office building

4. Encourage shops, food services and openings to have display windows to enhance active ground floor façade.

5. Follow the lead of Addis Ababa city active edge policy by suggesting an area of the street level frontage to be enter or clear transparent display window

Recommended Research in the future

1. Pedestrian friendly street to achieve active frontage in Addis Ababa city

2. Mapping active frontage by applying city engine software in Addis Ababa city

3. Design 3D model to improve active frontage in Addis Ababa city.

Reference

Addis Ababa Structure Plan Riport, 2017

Ameli, S. H., Hamidi, S., Garfinkel-Castro, A., & Ewing, R. (2015). Do better urban design qualities lead to more walking in Salt Lake City, Utah? Journal of Urban Design, 20(3), 393–410.

Berihu. M, 2017. Plug-in Urban Design for activating blind street frontages of Addis Ababa: The Case of the Central Business District.

City of New York , 2013. *Active Design Shaping The Sidewalk Experience*,City of New York: City of New York.

Llewelyn Davies Yeang and Homes and Communities Agency (HCA). (2013) Urban Design Compendium 1, 3rd edn. London:HCA.

David Walton, etl., 2007. urban design compendium. second ed. London: English Partnerships.

Ewing, R., & Clemente, O. (2013). Measuring urban design: Metrics for livable places. Island Press.

Ewing, R., Hajrasouliha, A., Neckerman, K. M., Purciel-Hill, M., & Greene, W. (2016).Streetscape features related to pedestrian activity. Journal of Planning Education andResearch, 36(1), 5–15

Hamidi, S., & Moazzeni, S. (2018). Examining the impacts of street-level built environmental and urban design qualities on walking behavior in downtown Dallas, TX, transportation research board 97th annual meeting.

Heffernan, E. E., Heffernan, T. W. & and Pan, W., 2014. *The relationship between the quality of active frontages and public perceptions of public spaces. Papers: Part A. 6132.*, Hong Kong: Faculty of Engineering and Information science.

Jacobs, J. (1961) The Death and Life of Great American Cities. New York: Random House

J Gehl. 1971. Life between buildings: Using public space. The Danish Architectural Press.

J. Gehl et al, 2006. Close encounters with buildings. URBAN DESIGN International, Volume 11, p. 29–47.

Gehl, J. (2013). Cities for people. Island press.

Kickert, C. C., 2016. Active centers – interactive edges: The rise and fall of ground floor frontages. *URBAN DESIGN International*, Volume 21, p. 55–77.

Matt Riley, BEU, 2012. *Unitary Plan - Managing Frontages and Pedestrian Amenity in the City Centre*, Auckland: Auckland city plan commission .

Maxwell, J. A. (2016). Designing for 'life between buildings': Modeling the relationship between streets cape qualities and pedestrian activity in Glasgow, Scotland (Doctoral dissertation) University of Strathclyde.

Mehta, V., 2006. *Lively Streets: Exploring The Relationship Between Built Environment And Social Behavior,* Maryland: S.N.

Ministry of Urban Development & Housing, 2016. *Urban Design Manual of Ethiopia,* Addis Ababa: Ministry of Urban Development & Housing.

Ministry of Urban Development and Housing, 2017. *Street Design Standards for Urban Ethiopia ,* Addis Ababa: Ministry of Urban Development and Housing.

Noor M., et al , 2019. Toward liveable commercial streets: A case study of Al-Karada inner street in Baghdad. *Heliyon,* Volume 5, pp. 1-4.

Saad Khudhair Mahmood Al-jumaili , 2014. Street orientations: The first step towards a sustainable place. *American Journal of Environmental Protection,* Volume Vol. 3, No. 6, pp. 305-317.

Toronto Public Health, 2014. Toronto Public Health. Healthy Streets. [Online] Available at:http://www.toronto.ca/health [Accessed 13 08 2020].

von Schönfeld, K. & Bertolini, L., 2017. Urban streets: Epitomes of planning challenges and opportunities at the interface of public space and mobility. *Cities,* Volume 68, pp. 48-55.