

# **ASSESSMENT OF AN ACCESSIBLE PEDESTRIAN WALKWAY IN ADAMA TOWN THE CASE OF ABA GEDA AREA**

By: kifle Areri Besaye



This thesis is submitted to Adama Science and Technology University, Urban Planning and Design Program for Partial fulfillment of the requirements for Master of Science Degree in Urban Planning and Design

The department of Architecture, Urban Planning and Design

School of Civil and Architecture

Office of post Graduate Studies

Program: Masters of Science in urban planning and design

June17, 2019 Adama, Oromiya, Ethiopia

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Advisor: Dr. Berhane mehare, PH. D



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**DECLARATION**

I, Kifle Areri Besaye, do hereby declares that this thesis is my original work and that it has not been submitted partially or in full by any other person for an award of a master degree in any other University.

Name of Participant: \_\_\_\_\_ signature \_\_\_\_\_ date \_\_\_\_\_

This thesis has been submitted for examination with our approval as Adama science and Technology University, College of Civil Engineering and Architecture, Urban planning /Design supervisor.

Name of Advisor: 1. \_\_\_\_\_ Signature \_\_\_\_\_ date \_\_\_\_\_

## APPROVAL

The undersigned certify that they have read and hereby recommend to the Adama science and Technology University, College of Civil Engineering and Architecture, Urban planning/Design program to accept the thesis submitted by Kifle Areri, and entitled “assessment of an accessible pedestrian walkway in adama town the case of aba geda area” in partial fulfillment of the requirements for the award of a Master Degree in Urban Planning/ Design.

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Supervisor /Advisor

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Chairperson

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External Examiner

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## ABSTRACT

The urban transport systems in Africa's cities and urban centers suffer from poor allocation of financial resources, lack of regulatory frameworks, institutional weaknesses, inefficient public transport systems, poor allocation of road space and inadequate traffic management systems. The today's urban mobility challenge in Ethiopian cities is to arrive at balanced provision of traffic infrastructure for both Motorized transport traffic and pedestrian transport traffic. The road infrastructures within CBD of Adama town were majorly designed for Motorized transport giving little attention to pedestrian transport. Extreme increases in the number of vehicles have strained urban road networks, resulting in congestion for most of the day. Pedestrian transport generates no air pollution, no greenhouse gases, and little noise and air pollution; they are efficient and environmentally sustainable means of making short trips in urban centers.

This study sought to assess current levels and challenges of pedestrian walkways in Adama down town area that can be addressed by exploring the effective pedestrian planning and development alternatives with physical infrastructural intervention that can be introduced to promote the sustainable pedestrian walkways in the study site.

The research methodology involved the review of literature, primary and secondary data collection, data analysis, interpretation, successive proposal and recommendations to address urban pedestrian mobility challenges and to promote pedestrian transport in the Down Town area of Adama. The study targeted a population of 60 pedestrians. The primary data was sourced by administering questionnaire, interviewing and photography. Secondary data were collected from the review of published materials, government reports and internet. The Microsoft Excel & Word, AutoCAD and GIS software's were the main computer packages used for data analysis.

The study found that there exist the high pedestrians and pedestrian's traffic congestion, lack of pedestrians promotion programs and lack of pedestrians infrastructures which has led to unsustainable urban mobility and development within study area. The study proposed and recommended that pedestrians should be encouraged and promoted within the frame work of sustainable transport development due to its health, transportation, economic, quality of life and environmental benefits. From the study it can be concluded that integration of pedestrians transport and motorized transport will enhance the modernization of sustainable urban transport.

## ACKNOWLEDGEMENT

First of all, I would like to thanks, my Almighty GOD for all his support in my life. This project would have been conducted with the help of a grant from Bule Hora University for which I am grateful. I would also like to express my great appreciation to my staff members for all their suggestions and encouragement.

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Despite, lack of sufficient data, my deep heartfelt thanks goes to those create fast internet and Adama science and technology offices for their contribution. Last may not least, I am grateful to the community for their willingness coordination and support during field data collection time.

## **CHAPTER ONE**

### **1. INTRODUCTION**

#### **1.1. BACKGROUND**

The rapid population growth and spatial expansion has led to a sharp increase in demand for proper urban facilities and social services in many cities all over the world. However, the provision of social services in African and Asian Cities have been hindered due to high spatial expansion with little or no development planning/Design, while the huge capital costs, institutional weaknesses and time required to develop high capacity of accessible pedestrian transport systems have prevented the timely implementation on transport service sector in urban areas. This has led to a situation where many cities only rely on road-based transport systems, which have serious capacity constraints, negative environmental consequences and other limitations. Consequently, many cities in the region are facing serious urban pedestrian mobility problems, including significant levels of traffic congestion, air pollution, high rates of traffic accidents and inadequate access to transport facilities by poor and vulnerable groups, such as people with disabilities. The “livability” and productivity of many cities are threatened by deteriorating urban environment and poor planning on pedestrian transport. (steg et al, 2009).

In 1990's the Federal Highway Administration (FHWA) of the US government described pedestrians walking as “the forgotten modes” of transportation in urban centers as stated in FHWA (1997). The US Department of Transportation (USDOT) adopted the first national transportation policy to “increase use of pedestrian, and encourage planners, Designers and engineers to accommodate pedestrian needs in designing transportation facilities for urban and suburban areas, and increase pedestrian safety through public information and improved crosswalk design, signaling, school crossings, and sidewalks.” These priorities represented a significant shift in the attention given to pedestrians walking to cover short journey (FHWA, 1997).

A sustainable urban transport requires more efficient, equitable and environmentally sensitive transport system which makes it sensitive to political, economic, social and environmental constraints. In 2003, Litman affirmed that for sustainability of the transport system to be achieved by the transport infrastructure design and evaluation of the solution to transport problems must be looked into, to ensure it meets the present and without compromising future generations need (Tod litman, 2003).

Sustainable transportation network requires using each mode of transport for what it does best which typically means greater reliance on non- motorized for local travel, increased use of public transit in urban areas, a reduction of personal automobile. Pedestrians offer no cost, private transport, emit no pollution, use renewable energy, emphasize use of labor rather than capital for mobility, and are well suited for short trips in most cities regardless of income, offering an alternative to motorized transport for many short trips. Thus, the pedestrian is an appropriate element in strategies dealing with air pollution, management of traffic problems and motorization, and the social and economic dimensions of structural adjustment. Pedestrian transport has a most important role to play as a complementary mode to public transportation (Gwilliam, (2003) : 197-216).

According to Langen et al (2001) pedestrians provides a highly improved mobility to its users. He further noted that the effective instruments to improve pedestrian mobility exists in Africa but lacks proper planning and funds to be achieved. The most immediately applicable interventions are of a small scale, of a spot intervention nature, and do not require large sum of money. Their application is straight forward, and their benefits/cost ration is high, since their primary function is to repair serious deficiencies in the existing urban roads networks.

With the fast rate of urbanization in Ethiopia, cities are growing both vertically and horizontally. Man is string for good environment to inhale fresh air. People walk for many reasons: to go to a neighbor's house, to run errands, for school, or to get to a business meeting. People also walk for recreation and health benefits or for the enjoyment of being outside. Some pedestrians must walk to transit or other destinations if they wish to travel independently and a safe, secure, and comfortable system for all people who walk (kifle, 2019)

In Adama Town also there is a similar character that in the most planning and design projects the consideration of pedestrian walkway is minimal and not applied. From our daily experience most of a time, I am choosing Taxi or Bajaj rather than walking on foot due to lack of suitable and well attractive pedestrian walkway. Pedestrian users are increase in number but there is no comfortable pedestrian walkway. Lack of pedestrian walks is difficult especially for the security of children during school. Due to lack of pedestrian, peoples are more vulnerable for traffic accident (kifle, 2019).

## 1.2 PROBLEM STATEMENT

A balanced provision of infrastructure starts with a balanced perception of what urban traffic is and should aim to achieve. The World Bank paper of 2006 on a sustainable urban transport suggested that one of the reasons that it has been so difficult to achieve such balance is that many people automatically think of traffic as motorized transport traffic and never realize that pedestrian traffic is there just as well, in most African cities. Sustainable transportation systems should be seen as an economic production and market system that requires efficiency, hence the need for reduction of the direct and indirect cost of transport and time spend during the journey. The challenge is to arrive at a balanced provision of traffic infrastructure for both Motorized Transport traffic and pedestrian traffic within the cities (The World Bank(2006)).

The most prominent manifestation of this study is the persistence of traffic congestion being experienced in the Central Business District (CBD) both during peak hours and anytime of the day and in all directions.

The Down town or CBD area of Adama Town is actually stalling due to unorganized traffic modes and high rate of transport and business activity in the area and mainly designed for motorized transport giving little attention to pedestrian's walkway. From the observations it was noted that the down town area is very compact and supports mixed small and medium businesses with high traffic (kifle, 2019).

Where pedestrians walk is the main transport modes have an effect on reducing vehicle miles traveled and carbon dioxide emissions and to have lower rates of cardiovascular disease, obesity, and other health issues related to sedentary lifestyles, it is also critical for the economic functioning of the city and the country as a whole. Despite these obvious merits, pedestrians walk has been ignored in the formulation of infrastructure and positively discouraged as a service provider. One of the key issues affecting the friendliness and the quality of life in our towns and cities is the lack of considerations for the pedestrian walkways.

The only pedestrians available are very small in a width less than 1meter and unplanned left over or just avoided part of the space. The existing small pedestrian walk serve for other activities rather than walks, Peoples use the drainage manhole as pedestrian walkway is not comfortable to walk freely. There is no safety and security during walks because peoples use vehicular lane and this brought vulnerability for traffic accidents especially children less than 15 years of age during schooling and playing on the street, at noon, walking is difficult because there are no pedestrian walkways with plantations. There is no smooth surface walkway which is comfortable for disabled peoples. Solid and liquid wastes are disposed on

pedestrian walkway all these are the major problems faced by pedestrian transport in the Adama down town area.

### **1.3. RESEARCH OBJECTIVES**

#### **1.3.1 General objective**

The general objective of this study is to assess challenges, benefits, identify the problems and propose possible solutions, recommend development alternatives with physical infrastructural intervention in the Adama down town area.

#### **1.3.2 Specific Objectives**

The specific objectives of this study are: -

1. To assess current levels of pedestrian walkways in the Adama down town area.
2. To identify the existing pedestrian walkways challenges.
3. To recommend development alternatives with physical infrastructural intervention of pedestrian walkways in the Adama down town area.

### **1.4 RESEARCH QUESTIONS**

The research questions that the study seeks to address include: -

1. What is the current level of pedestrian walkways in Adama down town area?
2. What are the challenges of pedestrian walkways in Adama down town area to enhance accessible mobility?
3. What kind of development alternatives with physical infrastructural interventions that can promote sustainable pedestrian walkways in Adama down town area?

### **1.5 SIGNIFICANCE OF THE STUDY**

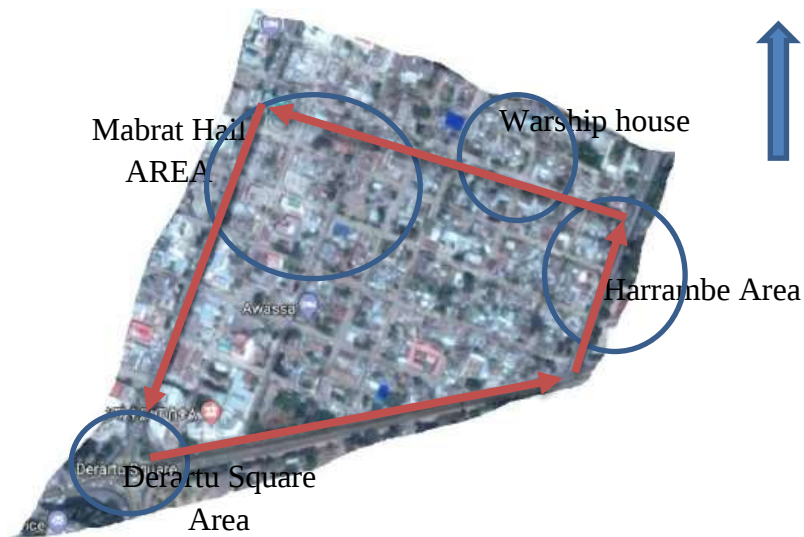
Most urban road infrastructure constructions in Adama focus on motor vehicle traffic in particular, with little attention given to the pedestrian walkway. The study deals with walking are largely seen as an environmentally friendly, cheap, efficient and effective viable option in meeting sustainability.

This study will offer the opportunity to identify the potentials for accessible and sustainable transportation planning for pedestrian walkway in Adama down Town area and its effects in the reduction traffic congestion and air pollution. It is important input for filling the gap of design standards in designing pedestrian walkway. In this respect it is useful for architects, designers, planners, engineers, and others to enhance human comfort in a city and for decision makers working on urban development to incorporate policy formulation, planning and decision making (kifle, 2019).

### **1.6 SCOPE OF THE STUDY**

The study covered the area between starting from Derartu Square Area through Harrambe Area, warship house Area and Mabrat Hail Area to more clearly see the following figure of the satellite image. In this case the Down Town area is hereby by treated as traffic analysis zone. The case study area was chosen because it is compact, ever congested, high number of public mobility, and high concentration of small and medium business activity. It is also chosen since it experiences high level of traffic jam both during peak and off-peak period in weekdays and weekend.

The research also includes; assessing current levels of pedestrian walkways within the Adama down town area, identification of the existing pedestrian walkway challenges that can be addressed by exploring the effective planning or proposal mechanism and propose development alternatives with specific reference to physical infrastructural intervention that can be introduced to promote the sustainable pedestrian walkways within the Adama down town area.



Source (google Earth of Adama town)

### 1.7. RESEARCH LIMITATION

Problems in terms of acquiring relevant data due to the limitation of literature.

## CHAPTER TWO

### 2. LITERATURE REVIEW

#### 2.1 Definition

##### 2.1.2. What is Pedestrian Walkway?

According to (Littlefair P.J., et al, 2000,12) pedestrian walkway is a space for peoples to go to a neighbor's house, for school, for recreation, for health benefits or for the enjoyment purposes of being outside, which provided along the urban streets.

A pedestrian walkway is also known as a sidewalk, footpath, footway or pavement. It is a path along the side of a road. A sidewalk is normally separated from the vehicular lane by a curb. There may also be a median or road vegetation, grass or trees.

##### 2.1.3 Factors affecting pedestrian demand

The demand for pedestrian facilities is influenced by a number of factors:

**Local land use activities-** the distance between local origins and destinations (e.g. homes and school, homes and shops), **Quality of provision-** If good quality pedestrian facilities are provided, then demand will tend to increase and **Safety and security-** pedestrians perceive the facilities to be safe and secure. For pedestrians this means freedom from conflict with motor vehicle (Source; [http://www.greatstreet-stl.org/content/view/471/400/28/12/2016 7:52AM](http://www.greatstreet-stl.org/content/view/471/400/28/12/2016%207:52AM)).

##### 2.1.4. Pedestrian flow characteristic

**Pedestrian flow rate:** is the number of pedestrians passing a point per unit of time, ex-pressed as pedestrians per minute.

**Pedestrian density:** is the average number of pedestrians per unit of area within a walkway or queuing area, expressed as pedestrians per square meter (p/m<sup>2</sup>).

**Pedestrian space:** is the average area provided for each pedestrian in a walkway expressed in terms of square meters per pedestrian (m<sup>2</sup>/p). This is the inverse of density, and is often a more practical unit for analyzing pedestrian facilities.

**Platoon:** refers to a number of pedestrians walking together in a group.

The fundamental relationship between speed, density, and volume for pedestrian flow is: As volume and density increase, pedestrian speed declines and as density increases and pedestrian space decreases (Source; [http://www.pedestriancharacteristics.org/content/view/96/36/28/12/2015 7:52AM](http://www.pedestriancharacteristics.org/content/view/96/36/28/12/2015%207:52AM)).

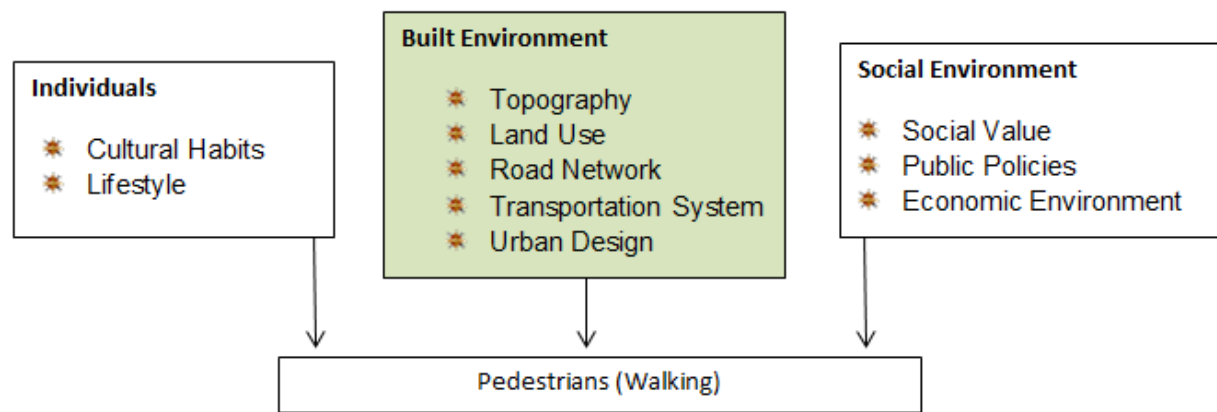
## **2.2. What is Pedestrian Walkway?**

According to (Littlefair P.J., et al, 2000,12) pedestrian walkway is a space for peoples to go to a neighbor's house, for school, for recreation, for health benefits or for the enjoyment purposes of being outside, which provided along the urban streets.

A pedestrian walkway is also known as a sidewalk, footpath, footway or pavement. It is a path along the side of a road. A sidewalk is normally separated from the vehicular lane by a curb. There may also be a median or road vegetation, grass or trees.

### **2.2.1. Factors Influencing Pedestrian Walkway**

Before presenting the criteria of walkable neighborhood, it is important to first review the factors affecting walking. A body of literature has explored the aspects of pedestrian environment, socioeconomic environment, and individual characteristics that encourage or discourage walking (Handy, S. 1996).

**Figure 2.1:** Factors Influencing Pedestrian Walking.

(Source, Handy, S. 1996).

### 2.3. The Definition of Pedestrian walkway and its Attributes

Individual and socioeconomic characteristics are invisible factors for promoting walking behavior. Pedestrian walk is more closely related to the attributes of the physical environment. (Southworth M. 2005), offer the following definition of pedestrian walk. “Pedestrian walk is the extent to which the built environment supports and encourages walking by providing for pedestrian comfort and safety, connecting people with varied destinations within a reasonable amount of time and effort, and offering visual interest in journeys throughout the network.” According to Michael Southworth (2005), a walkable network has several of the following important attributes:

- **Connectivity:** connectivity of path network, both locally and in the larger urban setting;
- **Linkage with other modes:** bus, streetcar, subway, train;
- **Land use pattern:** Fine grained and varied land use patterns, especially for local serving uses;
- **Safety:** safety both from traffic and social crime;
- **Quality of path:** including width, paving, landscaping, signing, and lighting; and
- **Path context:** including street design, visual interest of the built environment, transparency, spatial definition, landscape, and overall exportability.

To summarize, the five attributes of walkability helps promote a city as a walkable community towards safety, sustainability, vitality, public health, and equity.

**Safety:** safety is a major concern for pedestrians. The car-oriented streets are large and wide, which lead to high speed and high volume of traffic. Motor vehicle traffic can be at odds with crossing safety. The elderly, children and the disabled are considered as the most vulnerable population. The continuous sidewalk and safe crossing are the fundamental factors of walkable streets. Sufficient sidewalks can ensure pedestrian safe walking and convenient crossing. The street and intersection design which encourage pedestrian activities can improve safety and balance the uses of vehicles and pedestrians (Southworth, M. 2005).

**Sustainability:** like walking can help reduce traffic congestion and save energy. It is a sustainable green transportation mode that reduces noise and air pollution. Good walking routes connected to public transit provide environmentally sustainable alternatives to the private automobile. Compact, mixed-use land use pattern might be linked to lower Greenhouse Gases.

**Vitality:** varied land use pattern, path quality and path context can contribute to vibrant and attractive street life. A safe and continuous can ensure safety and connectivity, but cannot invite pedestrians. As (Southworth, M. 2005)states, many aspects of the path context and quality can contribute to a positive walking experience: landmarks of the built environment, design of the street as a whole, transparency of fronting structures, visible activity, street trees and other landscape elements, lighting, and views.(Southworth, M. 2005).

**Equity:** walkable streets are crucial spaces of strengthening the social fabric of a community. From equity standpoint, walking requires no license, no fare, and no fuel. It is popularly accessible and inexpensive mode of transportation. A pedestrian-friendly environment provides fair access to livelihood, education, and resources to a majority of the population (Southworth, M. 2005).

## **2.4. The opportunities of pedestrian walk**

The numerous benefits associated with them which include the environmental, economic, health, and transportation goals. Improving the efficiency of pedestrian travel is economically vital. Almost nearly trip begins and ends with walking trip.

### **2.4.1. Health Benefits**

The health benefits of regular physical activity due to the use of pedestrian walk are far-reaching: - reduced risk of coronary heart disease, stroke, diabetes, and other chronic diseases; and improved quality of life for people of all ages (Langen et al, 2001).

#### **2.4.2. Transportation Benefits**

Walkers can often bypass congestion and gridlock traffic, and in some instances may even arrive at their destinations faster than if they had driven a car. Accommodating pedestrians also ensures that individuals have transportation choices (German, 2002).

#### **2.4.3. Economic Benefits**

Walking can provide options for those who would like to save money. In Africa the economic benefits of pedestrian walk can also be achieved as persons need to be encouraged to walk to work as the free cost for short trips. The increasing of the modal share of walking can reduce a country's dependence on import oil for vehicles. Many developing countries are going deep into debt to continue subsidizing oil, which is overwhelmingly used by higher income motorists. The promotion of a safe walking improves the accessibility of the poor and the rich in cities (UK, department of transport, and 2008 report).

#### **2.4.4. Quality of Life Benefits**

Some sidewalks may be used as social spaces with sidewalk cafes, markets, or busking musicians. Numerous intangible benefits are associated with walking, the benefits are not limited to providing more travel options can increase a sense of independence in old persons, school students and pupils, and others who cannot or choose not to drive. An increased level of walking can have a great impact on an area's sense of livability by creating safe and friendly places for people to live and work (Canada, Ontario Ministry of Transportation, 2005).

### **2.5. Pedestrian Infrastructure**

**Sidewalks:** A minimum width of 1.5 meters, regular maintenance, and buffers from traffic are important factors in making walking comfortable (Lynch, 1960).

**Accessibility:** Sidewalks must provide support for seniors and people with disabilities. This includes the use of curb ramps, level sidewalks, and accessible buildings (Lynch, 1960).

**Street Crossings:** Factors include intersection geometry and controls, crossing width, and providing pedestrian refuge to break up wide crossings (Lynch, 1960).

**Street Amenities:** These include benches, garbage receptacles, newspaper racks, outdoor cafes, signs, and other amenities for people to rest, find their way, and otherwise feel invited to the street (Lynch, 1960).

**Street Lighting:** Adequate lighting is essential for both safety and security and may require additional pedestrian-level lighting to provide adequate illumination of the sidewalk (Lynch, 1960).

**Access to Buildings:** should provide direct access to pedestrians, without forcing them to enter through parking lots (Lynch, 1960).

## 2.6. Pedestrian norm and standards (Local)

Pedestrian ways should be provided on both sides of Arterial Street, for collector and local streets provision, location and size of pedestrian ways should be decided by Local Development Plans, Detail Plans, and other studies as applicable, Pedestrian ways should be raised 15-20 cm above the carriage way

Average width of pedestrian ways along sides of arterial streets in:

1. Industrial areas - 1.8 m
2. Shopping frontages - 3.7 - 4.5 m
3. Business and commercial areas- 3-5m

Table 2.1: Pedestrian ways width standards

| No | Street types       | Average width of pedestrian ways (m)         |
|----|--------------------|----------------------------------------------|
| 1  | Urban motorway     | No pedestrian ways                           |
| 2  | Sub-arterials      | 2.5-4m                                       |
| 3  | Principal arterial | Should not be less than 3.5m and maximum 5.  |
| 4  | Collector streets  | Should not be less than 2m                   |
| 5  | Local              | Should be decided based on local conditions. |

(Addis Ababa, 2002)

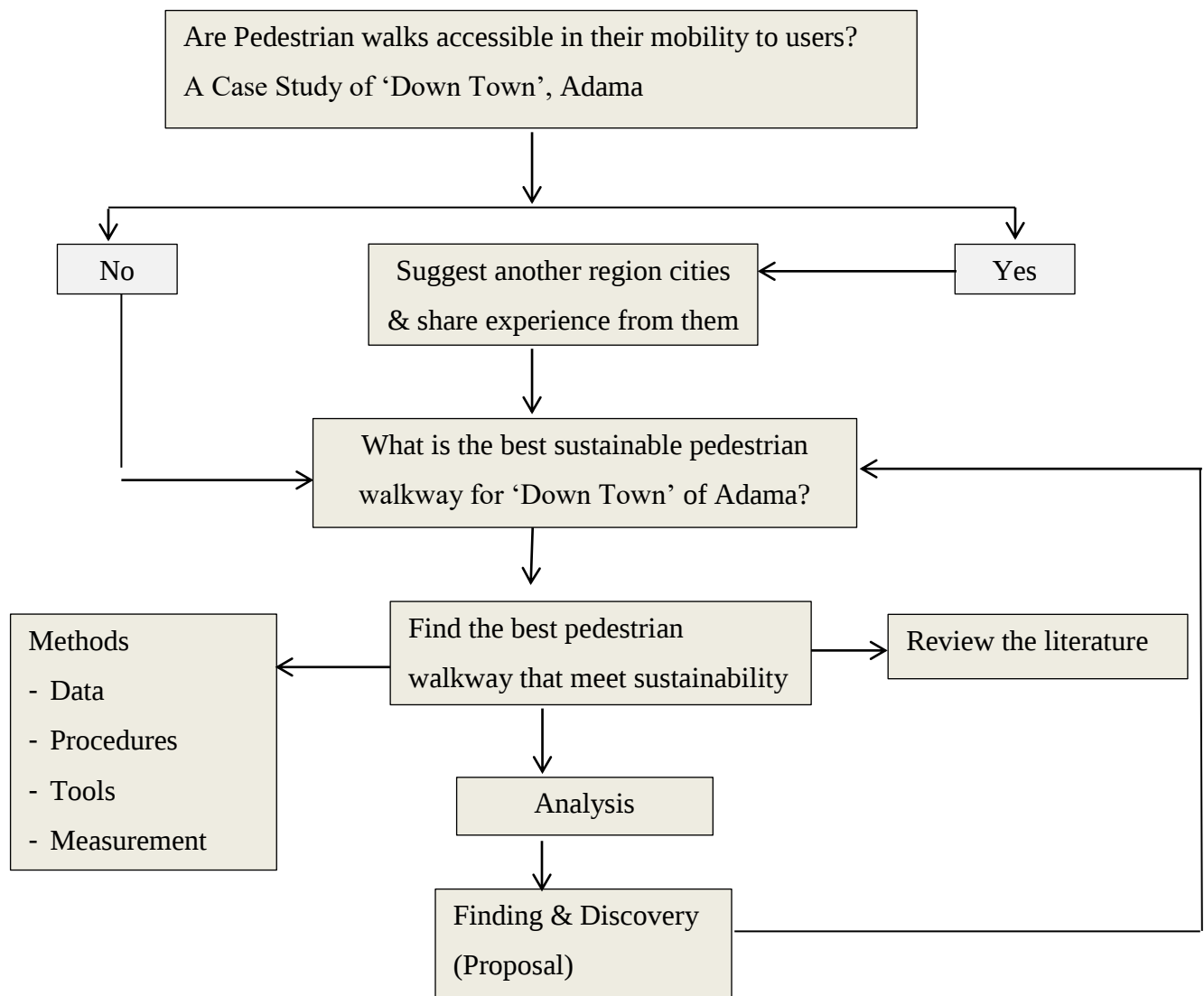
## CHAPTER THREE

### 3.1 RESEARCH METHODOLOGY

This research methodology covers the study area; data types and collection methods.

### 3.2 RESEARCH DESIGN

Figure 3.1: Research design



(kifle, 2019)

### **3.3. SITE SELECTION CRITERIA AND SAMPLING**

#### **3.3.1. Site Selection Criteria**

The Down town or CBD area of Adama Town is actually stalling due to unorganized traffic modes and high rate of transport and business activity in the area.

The study area is selected due to its characteristic of availability of different services, commercial or business and concentration of activities; peoples use the pedestrian walkway for different activities rather than walk.

The number of pedestrian users in the selected site are characterized by very high which mean characterized by high degree of mobility especially during peak hours.

### **3.4 Sampling**

#### **3.4.1 Sample Sizes and Method**

The study populations are stratified in order to capture the heterogeneity of the study population. The sample of sixty (60) from respondents are considered to various randomly selected pedestrians' users in the Adama Down town area.

Thereafter a sample of respondents each from Pedestrians, Town Council of Adama, Traffic police officers, Department of physical planning, civil society and academicians were selected through the sampling frame.

### **3.5 Data Analysis Method**

Both Quantitative or numerical data and Qualitative or descriptive data required for the study are collected from Primary data and Secondary data sources for the achievement of reliable and quality design of pedestrian walk ways and conclusion in the study area.

The data that are collected from field are edited. The quantitative data are analyzed using descriptive statistics and will be presented in the form of tables, percentages, graphs and charts. The qualitative data are analyzed through the use of content analysis of the questions administered with reference to the study objectives.

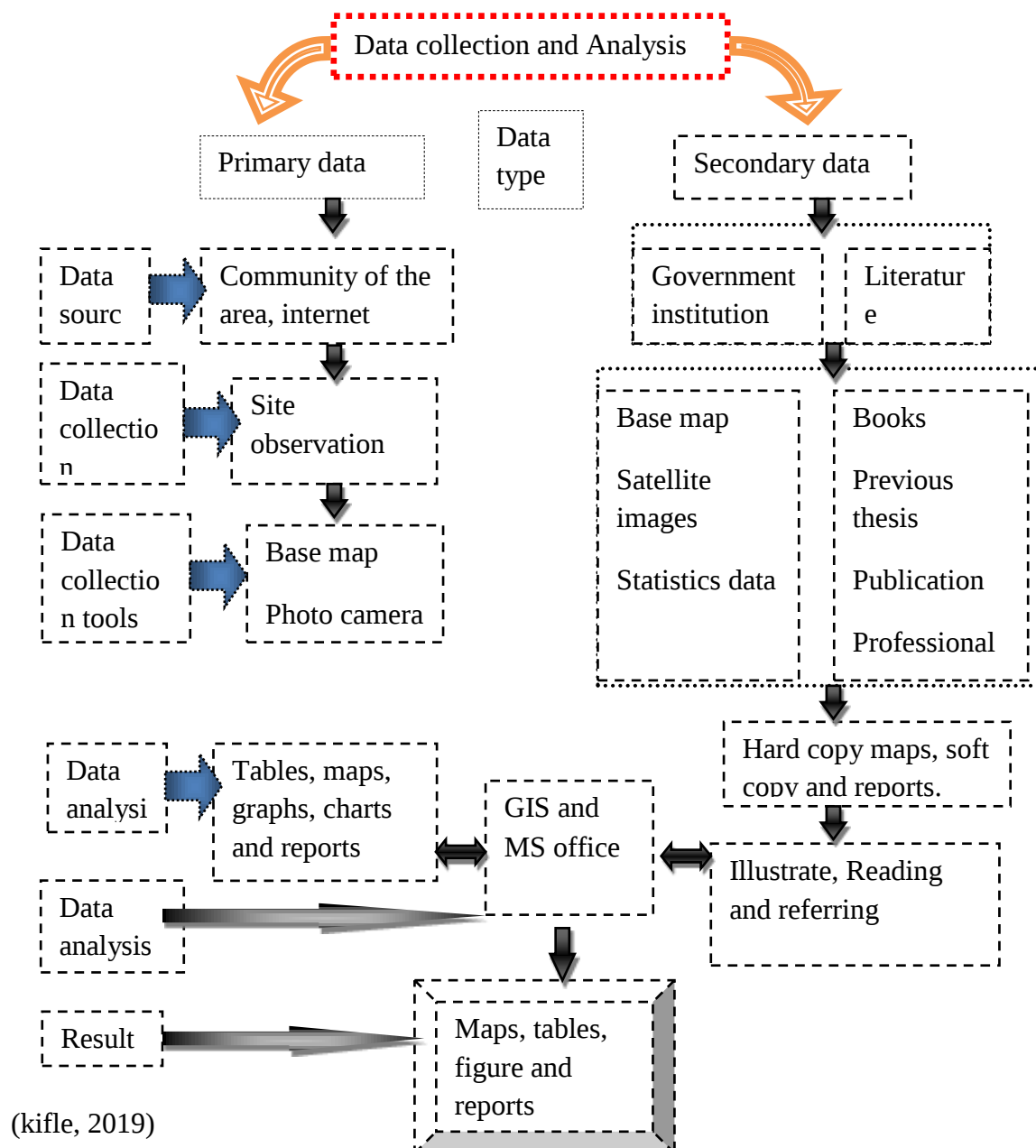
### **3.6 Data Analysis Tools**

The use of different software to carry out data handling like Excel for calculation of quantitative data, Word for description of qualitative data, Auto-CAD for producing 2D maps, Archi-CAD for sketching 3D and Lumion for rendering & Power point for presentation. For data management, file reshaping and data documentation as well as to represent the data and findings, graphs, pie charts, photographs and tables are used.

### 3.7 RESULTS

Results of the data analysis provided information that formed the basis for discussion, conclusion, and interpretation of the findings and recommendations of the study.

Figure 3.2: Research process



## CHAPTER FOUR

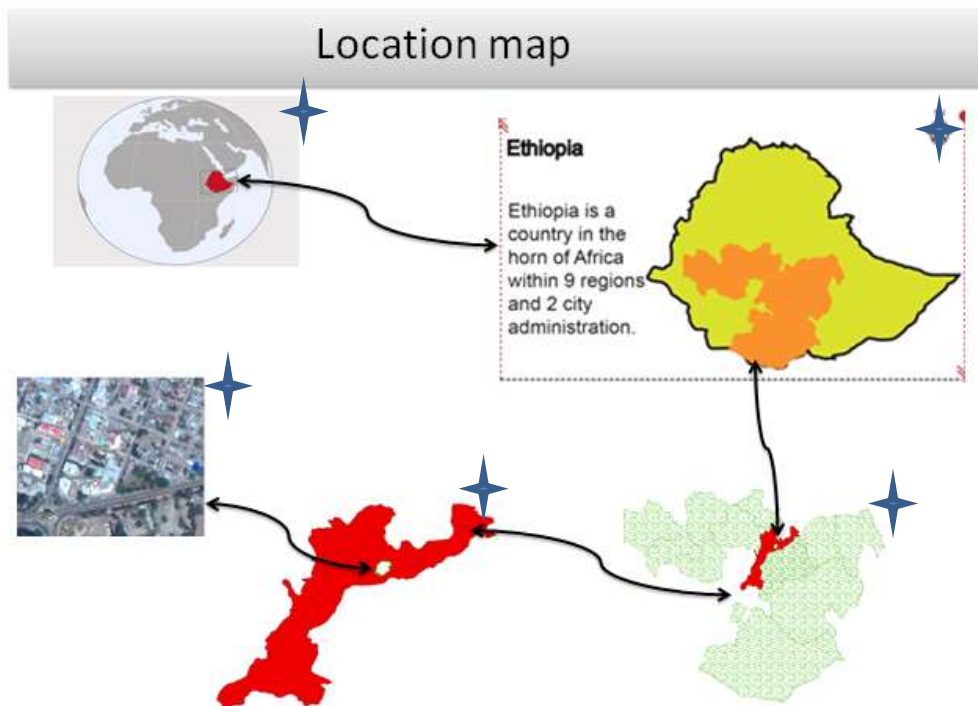
### 4.1 ANALYSIS AND DISCRIPTION OF THE STUDY AREA

#### 4.1.2 LOCATION OF THE STUDY AREA

##### Location and climate

Adama City is located at some 99 kilometers from Finfinne, on the southeast along the main road to Harar. Its grid references point that the City stretches between 80 33' to 80 36' North latitude and 390 11' 57" to 390 21' 15" East longitude. Adama lies in somewhat warm and lower badda dare Climate.

**Figure 4.1:** Study area location



(kifle, 2019)

#### 4.2. Characteristics of sample Respondents

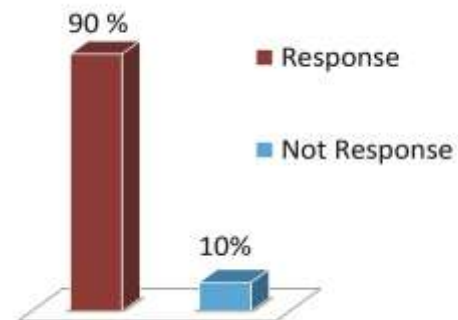
The data that were collected by administering questionnaires, direct observations, interviewing, photographs and digitization of maps are presented and discussed in this section. The response rate, the socio-economic characteristics, time taken during the trip, purpose of the journey, level of education, modal choice of transport, pedestrian's facilities and traffic tally locations are analyzed as captured during the research.

Table 4.1: Response Rate of Respondents

##### Response Rate

| Response type | Frequency | %   |
|---------------|-----------|-----|
| Response      | 54        | 90  |
| No Response   | 6         | 10  |
| Total         | 60        | 100 |

(kifle, 2019)



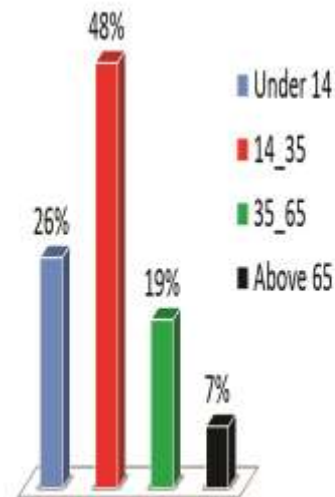
As indicated in the table 4.1 and figure the response rate of pedestrians were 90% with more than 80% of the questions are answered. This high response rate will be entirely attributed to the fact that the questions were administered directly to the respondent by the researcher.

#### 4.2.1.2. Age Bracket of Respondents

Table 4.2: Age brackets of Respondents

| Age Bracket    | Frequency | %    |
|----------------|-----------|------|
| Below 18 Years | 12        | 22.2 |
| 19-35 Years    | 20        | 37   |
| 36-65          | 14        | 26   |
| Above 65       | 8         | 14.8 |
| Total          | 54        | 100  |

(kifle, 2019)



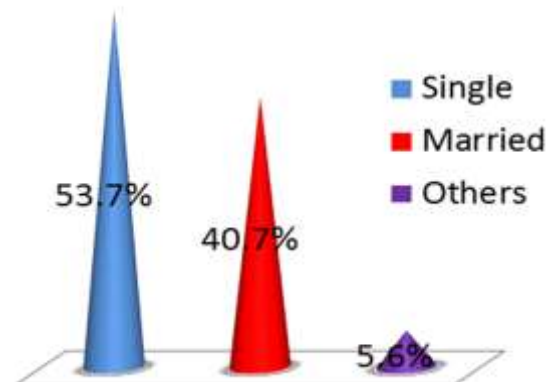
The age distribution is definitely skewed toward those aged 14-35, which mean the number of youth pedestrian is very high due to the student's trip to schools and workers.

#### 4.2.1.3. Marital Status of Respondents

Table 4.3: Marital status of Respondents

| Marital Status | Frequency | %    |
|----------------|-----------|------|
| Single         | 29        | 53.7 |
| Married        | 22        | 40.7 |
| Others         | 3         | 5.6  |
| Total          | 54        | 100  |

(kifle, 2019)

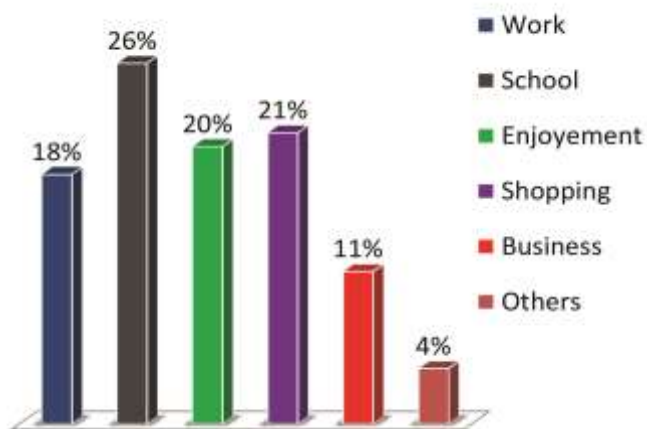


From the table 4.3 and figure it is evident that the area is frequented by people in different marital status; the single and the married alike. From the findings the pedestrians were composed of 40.7% married and in the others category which comprised of the single, the divorced the separated and even the students they were represented by a total of 59.3%.

#### 4.2.1.4. Purpose of the Journey

Table 4.4: Purpose of the Journey

| Purpose of the Journey | Frequency | %   |
|------------------------|-----------|-----|
| Work                   | 9         | 18  |
| School                 | 14        | 26  |
| Enjoyment              | 11        | 20  |
| Shopping               | 12        | 21  |
| Business               | 6         | 11  |
| Others                 | 2         | 4   |
| Total                  | 54        | 100 |
|                        |           |     |



(kifle, 2019)

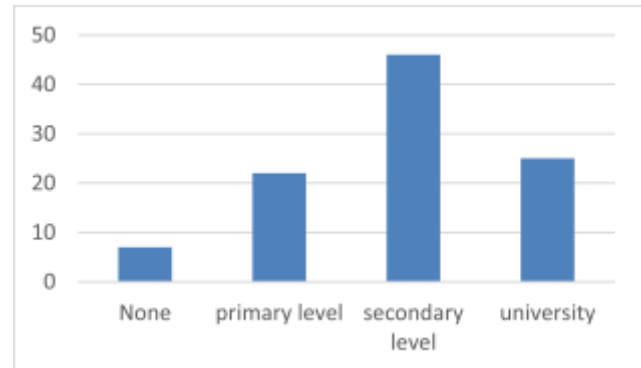
From the table 4.4 and figure results it can be seen that the majority of pedestrian's transport users are peoples go to do work, school, business and shopping purposes.

#### 4.2.1.5. Educational Level of respondents

Table 4.5: Educational Level of respondents

| Educational Level         | Frequency | %   |
|---------------------------|-----------|-----|
| None                      | 4         | 7   |
| Primary level             | 12        | 22  |
| Secondary level           | 24        | 46  |
| University /college level | 14        | 25  |
| Total                     | 54        | 100 |

(kifle, 2019)



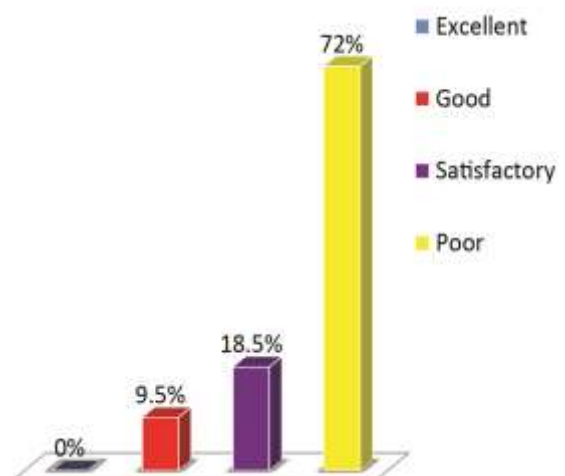
The table 4.5 and figure shows that out of the 54 people interviewed only 7 % of the respondents had no formal education while 22% Primary and 46% secondary. This indicates that majority of the respondents that involved in this activity in the study area did not go beyond secondary school education. Similarly, 25% of the respondents were students and teachers of College and University education. This implies that pedestrians transport services/operations and trading activities require no detailed education.

#### 4.2.1.8. Pedestrians Rating

Table 4.6: Pedestrians Rating of the Respondent

| Rating       | Frequency | %    |
|--------------|-----------|------|
| Excellent    | 0         | 0    |
| Good         | 5         | 9.5  |
| Satisfactory | 10        | 18.5 |
| Poor         | 39        | 72   |
| Total        | 54        | 100  |

(kifle, 2019)

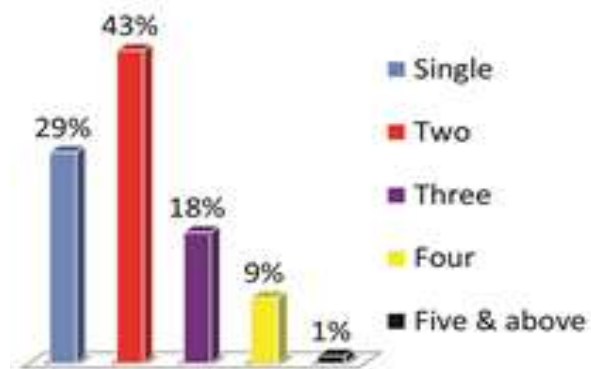


Adama down Town lacks proper pedestrian's lane signage; this was demonstrated by low satisfaction of the time taken to reach the destination by the pedestrians. The arterial and Collector streets should be

refitted with pedestrian lanes where there is no enough roadway width to accommodate them. Existing street and pavement conditions on all six test routes are in a sorry state. Drainages are always blocked by dirt and debris due to poor design and maintenance. This may require re-designing and planning.

#### 4.2.1.9. Group Size

About 29% of pedestrians observed were walking alone, with most of the remainder walking in pairs. The time of day influenced whether or not pedestrians were observed walking in groups. In the morning, most pedestrians are making their morning commute and at night enjoyments

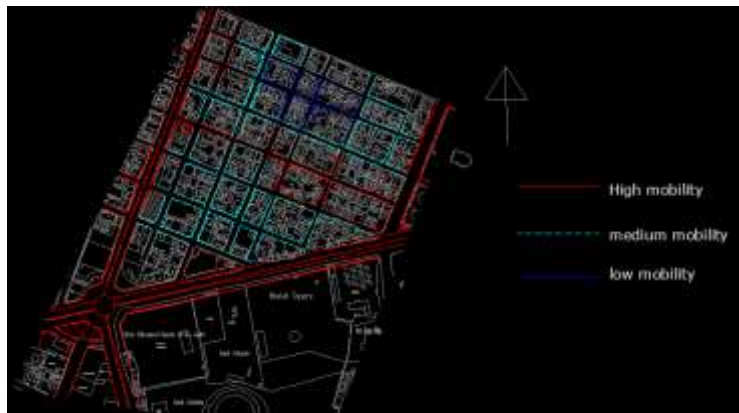


(kifle, 2019)

#### 4.3. Pedestrian Mobility Analysis

Place is a particular area occupied by something while mobility is the level of activities accumulated. The numbers of pedestrians in the selected site are very high which mean characterized by high degree of mobility especially during peak hours at morning, midday and at evening and also during break days the level of mobility is high along the main road, market, guilt's, and service areas.

Figure 4.2: Pedestrian Mobility Analysis

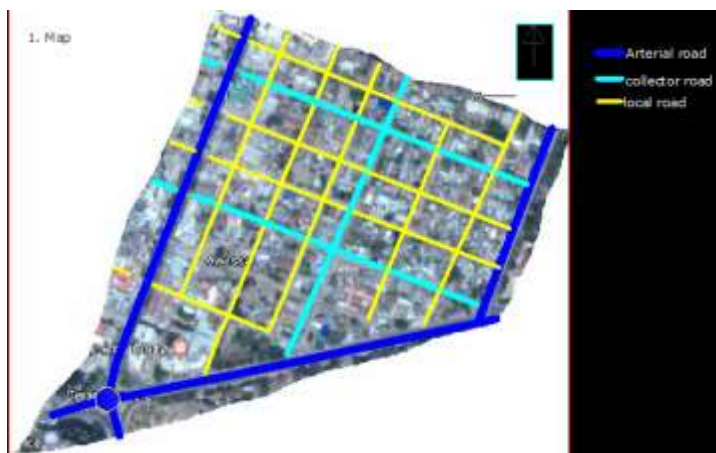


(kifle, 2019)

#### 4.4. description of existing Road Network

It is important to identify Street Networks, Hierarchy and the main access of the study area since the pedestrians follow the network to walk. The pattern and nature of the internal roads are narrow and no pedestrian walkway, dead ended and organic nature and an illegal Street activity like street vendor.

Figure 4.3: Description of existing Road Network



| Type | Width  | Area | Material |
|------|--------|------|----------|
| AS   | 18-20m | 5.6h | Asphalt  |
| CS   | 10-12m | 1.8h | Coble    |
| LS   | 3-7m   | 3.2h | Mud      |

The existing small peestrial is not comfortable to walk due to drainage manhole.

In the site the pedestrial is overlap with the drainage.

(kifle, 2019)

#### 4.5. Land Use Map Analysis

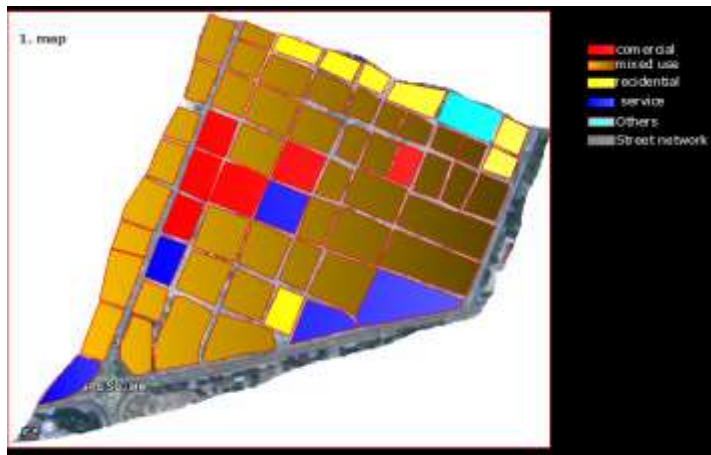
According to the data gathered during site observation the land use of the area is dominated by mixed use activities which are about more than 50% and there is less use for service and residence within 16.5 and 16.2 respectively. However, the movement of town dweller from their home to CBD of the town to fulfill their needs like shopping, administration service and other cases are the major factor or purpose of pedestrian trip and Therefore due to those different land use activities, pedestrian movement is increased and the desire for pedestrian services are very high.

**Commerce:** commercial shops and cafeterias along the road and market and Guillit activities.

**Residences:** the neighborhood blocks along the road and existing residential activities near to the main road.

In the study site peoples use the pedestrian walkway for different activities rather than walk like Selling activities, Garage activities, Coffee and tea cafes, Shoeshine boy's activities, Begging activities, Playing activities, Sitting function, advertising function, Construction material dropping and parking etc.

Figure 4.4: Land Use map Analysis



(kifle, 2019)

#### 4.6. Pedestrian Flow Size per minute during peak hours

The number of pedestrian users in the selected site is very high which mean characterized by high degree of mobility especially during peak hours and during break days Saturday & Sunday.

**At Morning:** students go to school, workers go to their workplace and others also go to different place from their home, so during this time the level of mobility flow is high.

**At Mid-Day:** the level of the mobility is medium not like morning because the activities are more concentrated inside the institutions. However students learning at morning and afternoon one section interchange the other, during this time the level of mobility flow is medium.

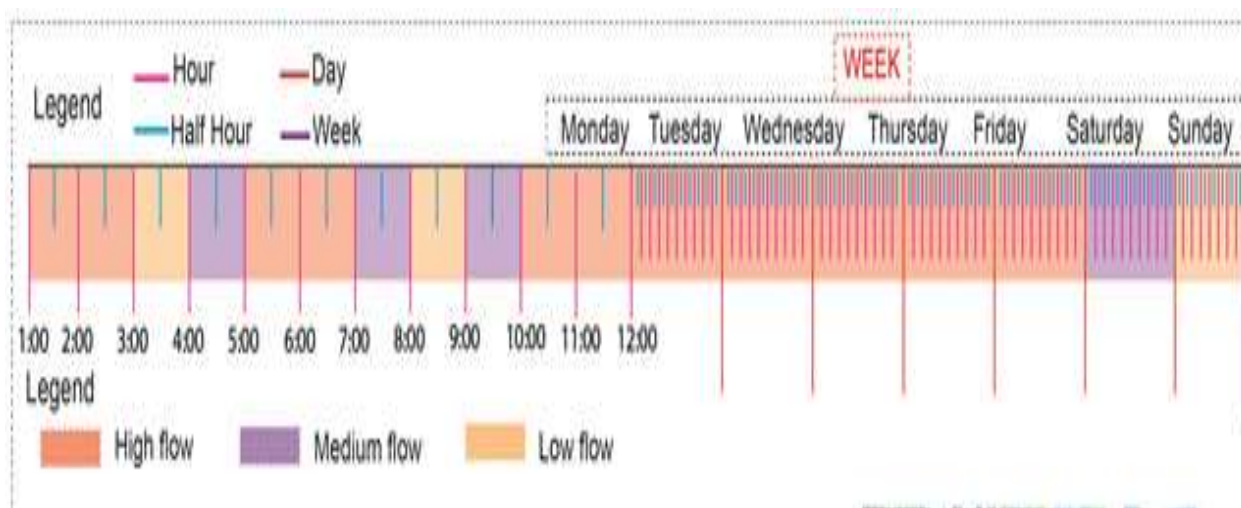
**At Evening:** the level of mobility is very high because of many people's walks for different purposes like to enjoy or recreate and for other purpose and also students' workers and others go to their home.

#### 4.7. Pedestrian Flow per Day & Per Week Analysis

The activity of pedestrian flow in the study site varies from hour to hour and day to days, during break day's people stayed in their homes so the pedestrian movements decrease or low and during working days

the community made a trip to work or school and a trip to home to fulfill their purpose of trip so the pedestrian flow is very high.

Figure 4.5: Pedestrian Flow per Day & per Week Analysis



(kifle, 2019)

#### 4.7.1. Pedestrian Flow per Day Hours Analysis

##### A. High pedestrian flow

Characterized by peak hours (1:00-3:00, 5:00-7:00 and 10:00-12:00). The pedestrian walkways of the study site are highly crowded because of the traffic flow and commerce related activities are very high. On the other hand the existing width size of the pedestrian walkway is less than one meter and this makes walking challenge peoples use the vehicular lane.

##### B. Medium pedestrian flow

(4:00-5:00, 7:00-8:00 and 9:00-10:00) During this time the dwellers of the town are stay at their home, work place or school due to this reason the pedestrian flow size, traffic flow, commercial activity and movement in this period are relatively medium or decrease.

### **C. Low pedestrian flow**

(3:00-4:00 and 8:00-9:00) During this time the activity is low and dead, especially at morning and mid-day when the climate is difficult to move from place to place.

#### **4.7.2. Pedestrian Flow per Week days Analysis**

##### **A. High pedestrian flow**

The pedestrian movement is high during working days especially Monday, Tuesday, Wednesday, Thursday and Friday during those days the dwellers made a trip to work or school and a trip to home.

##### **B. Medium pedestrian flow**

The pedestrian flow is relatively somehow decrease during Saturday because of break days for students or governmental workers but this day is very active regarding commercial and commerce related activities so due to this the pedestrian flow is medium.

##### **C. Low pedestrian flow**

These low pedestrian movements were happened at Sunday that is break day for the people's students or governmental workers as well as merchants and others due to this reason there is no more pedestrians' movements at CBD of the town during this day.

#### **4.8. Pedestrian Function & Activity Analysis**

In the selected site peoples use the pedestrian walkway for different activities rather than walk and those activities are: Selling, Garage service, Coffee and tea cafes, Shoeshine, Parking, Begging, Playing, Advertising function, Construction material dropping sand, stone etc.

## 4.9. Existing Condition of Walkways

### 1. Walkway Width Size

The width of the pedestrian walkway is playing a great role in the provision of accessible pedestrian mobility. However, the existing width of pedestrian walkway in Adama down town is below standards which are about less than one-meter size and this leads to overcrowdings and traffic accidents.

### 2. Walkway Surface Material

Adama town is one of economically developing towns in the eastern part of the showa zone and the construction of various buildings in the down town, but different construction materials dumped on sidewalks. More than 70% of side walkways in Adama down town are obstructed by different construction materials and excavated soils, by construction materials and excavated soil from construction plots this makes pedestrians challenge.

Figure 4.6: Existing Condition of Walkways

#### Images



FigA: construction materials dump



Fig. B. street vendors

(kifle, 2019)



Fig. C. Zebra cross is not visible

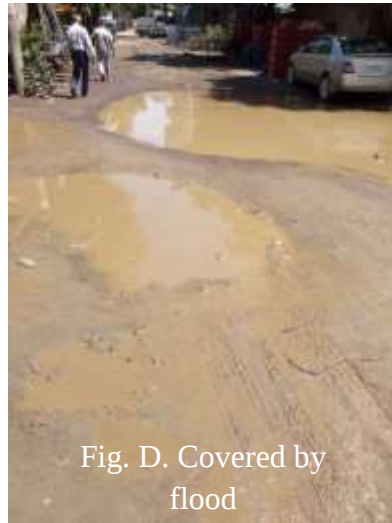


Fig. D. Covered by flood

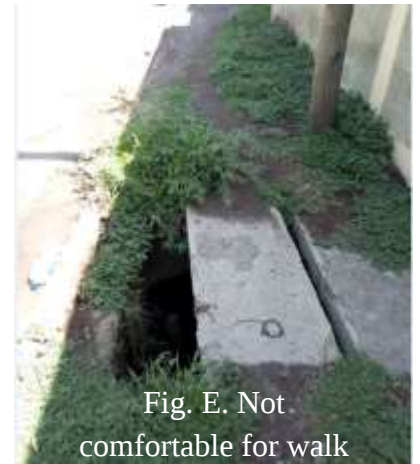


Fig. E. Not comfortable for walk



Fig. F. There is no sitting furniture



Fig. G. There is no sitting furniture



Fig. H. No landscape

(kifle, 2019)

### 3. Street Vendors

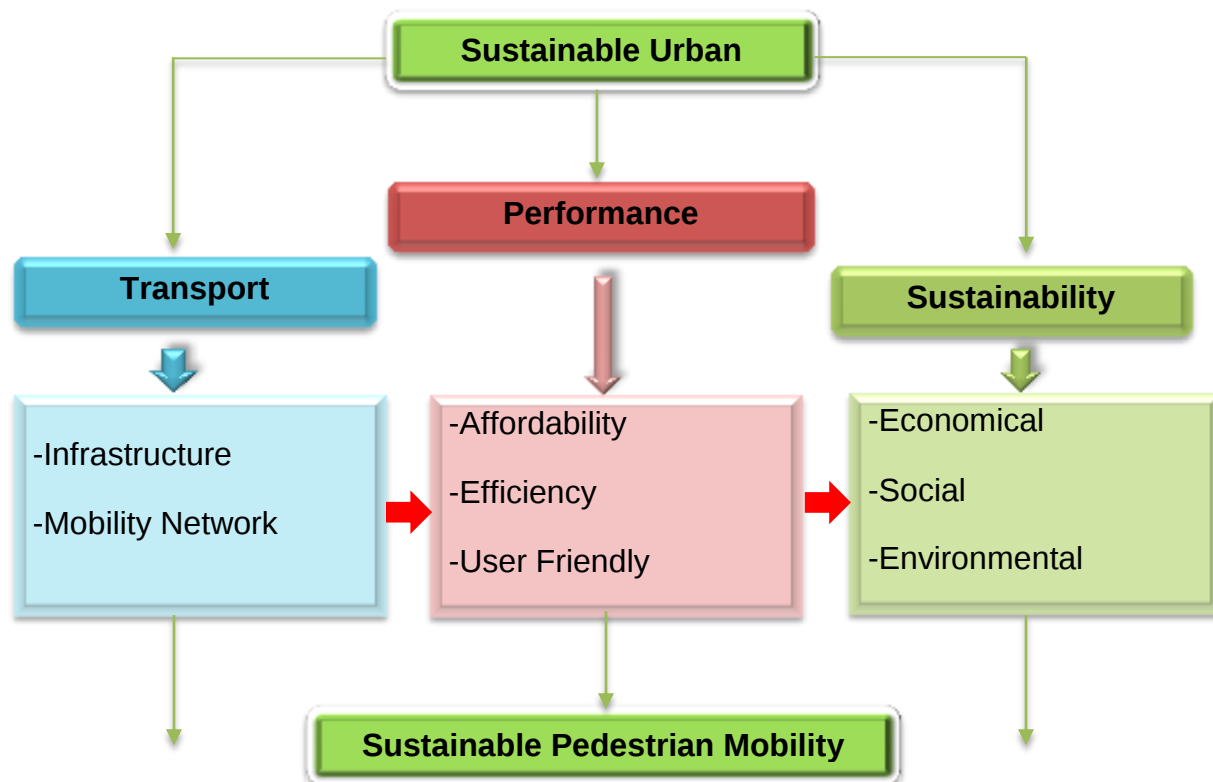
The street sides market activity is currently in a bad condition, both vehicular and pedestrian accesses are converted in to market stalls and as a result the vehicular and the pedestrian are used the same lane so this is the main cause for traffic accident and congestion especially during peak hours (kifle, 2019)

## CHAPTER FIVE

### 5.1. Conceptual Framework towards Pedestrian Proposal

This research has proposed a comprehensive accessible and sustainable pedestrian transport strategy that suits particular town according to its social, economic, political, and environmental needs. The key components to a sustainable pedestrian walkway are transport, performance indicators and sustainability. This conceptual model is summarized as indicated in figure 5.1.

**Figure 5.1:** Conceptual model towards sustainable pedestrian mobility



(kifle, 2019)

### 5.1.2 Street Proposal

**Figure 5.2:** Street Proposal

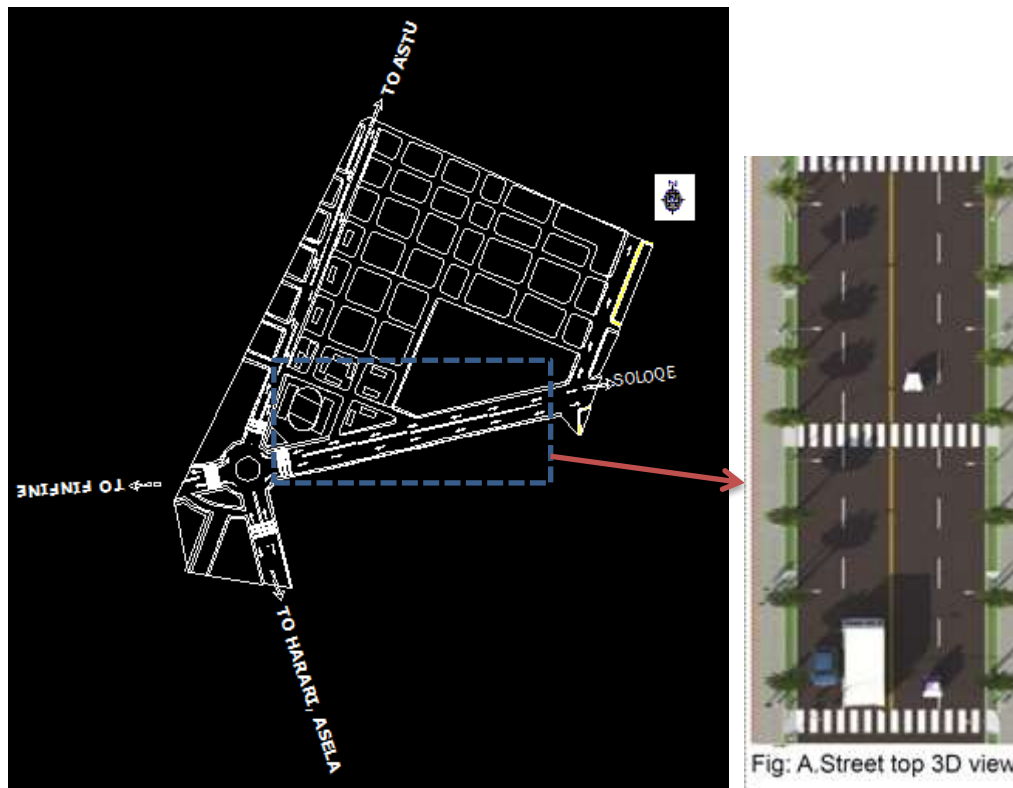


Fig: map of street proposal

Based on the history, topography, existing and standards the streets are designed for more accessibility.

The hierarchy of street includes sub Arterial Street, collector and local streets with different width size.

| Street Types | Width in M | Area in Ha | Surface Material | %   |
|--------------|------------|------------|------------------|-----|
| AS           | 25-30      | 6.14       | Asphalt          | 31  |
| CS           | 12-15      | 4.3        | Asphalt          | 22  |
| LS           | 8-10       | 9.6        | Coble stone      | 47  |
| Total        |            | 20.4       |                  | 100 |

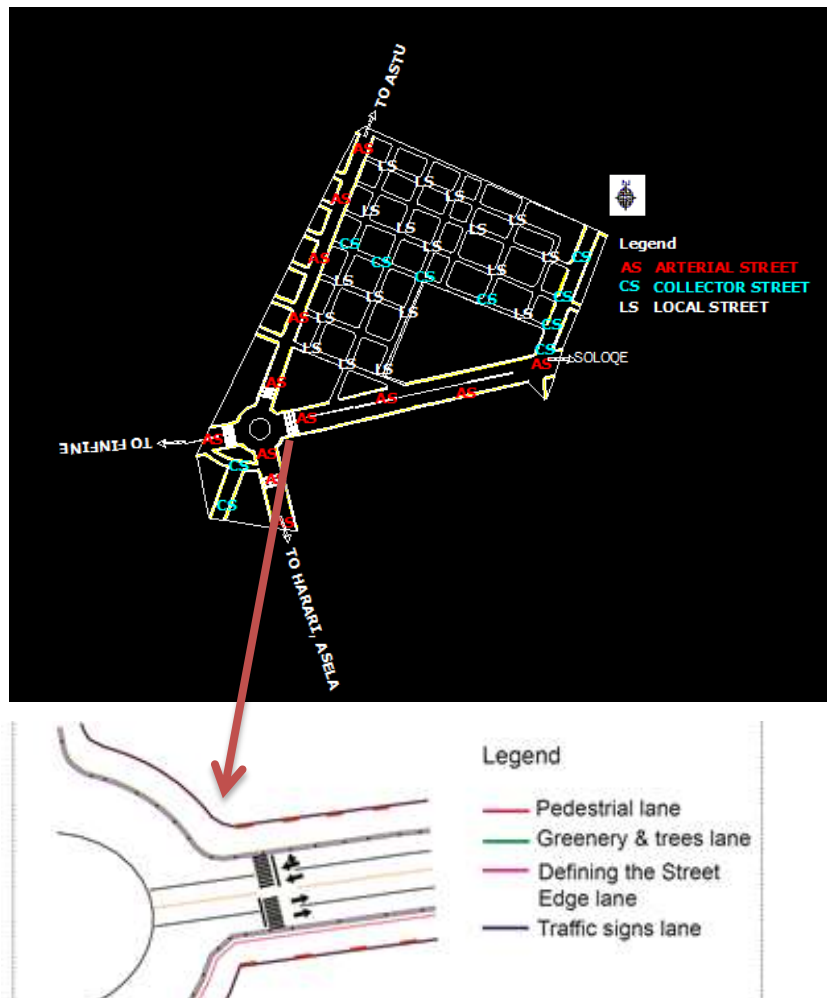
Table: Proposed street hierarchy, & width size

Midblock crossings used when blocks are greater than 150m in length in order to keep pedestrians from going too far out of their way to cross the street.

(kifle, 2019)

### 5.2.2. Pedestrian Walkway Design

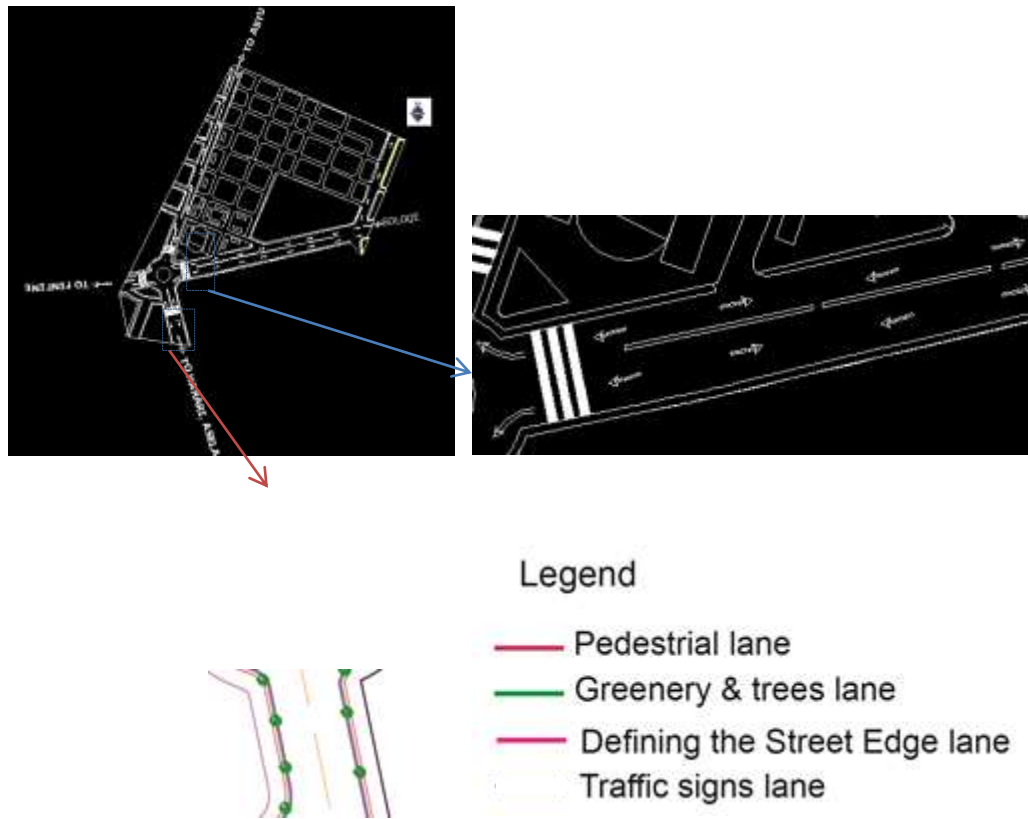
Figure 5.3: Pedestrian walkway Design



(kifle, 2019)

### 5.3 Pedestrian Junction and Cross

Figure 5.4: Pedestrian junction and cross



(kifle, 2019)

Figure 5.5: Pedestrian cross



(kifle, 2019)

Figure 5.6: Pedestrian cross



(kifle, 2019)

Figure 5.7: Pedestrian junction



(kifle, 2019)

Figure 5.8: Defining the Street and Pedestrian Edge



### Curb extensions/pedestrian cross

Curb extensions/Zebra cross are used at crosswalks in areas with a great deal of pedestrian activity. It increases the area of the pedestrian realm, increase pedestrian visibility, and help to slow traffic. The area of extension is at least the width of the pedestrian (5m), which is preferred to increase pedestrian visibility. The proposal of the pedestrian walks in both side of the street encourages the right of way. Therefore, pedestrian cross is provided in the junction of streets with 5m width zebra cross.

### Pedestrian junction

Pedestrian junction is also proposed on the linkage of main street and attribute/collector/ streets. Therefore, pedestrian junctions are proposed within 3-5m radius cave and break to the next side.

### Defining the Street Edge

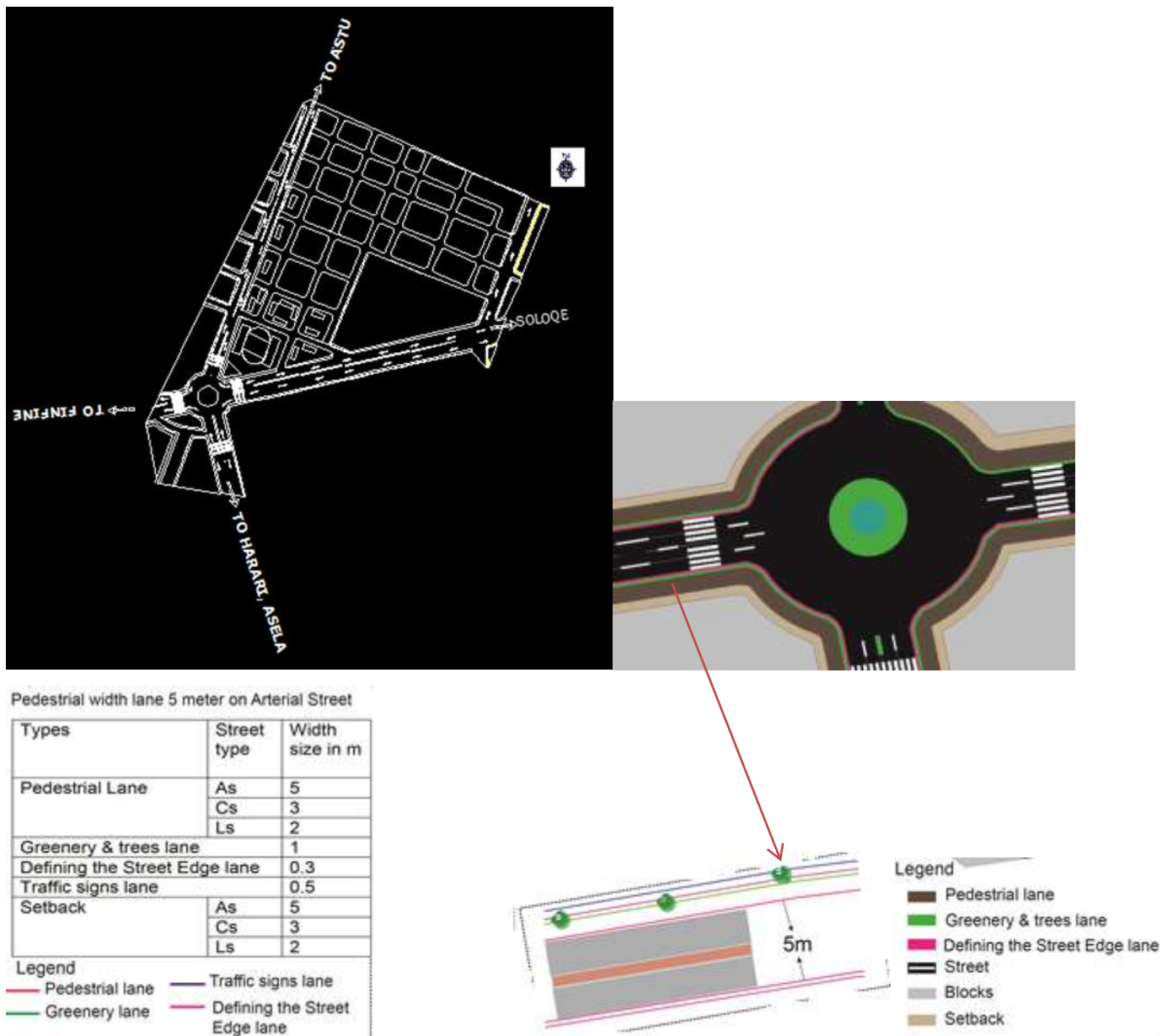
Pedestrian boundary lines are proposed to identify the boundary between street and pedestrian walk with 0.3m width. These boundary lines helps for the pedestrian side and reduce the interference of pedestrian within street traffic accident.

#### **5.2.4. Pedestrian width**

The sidewalk helps to provide a pedestrian realm. When wider, it can accommodate pedestrians of varying speeds and give pedestrians more room for leisurely walking. The sidewalk should be as wide as possible to comfortably accommodate pedestrians and related uses.

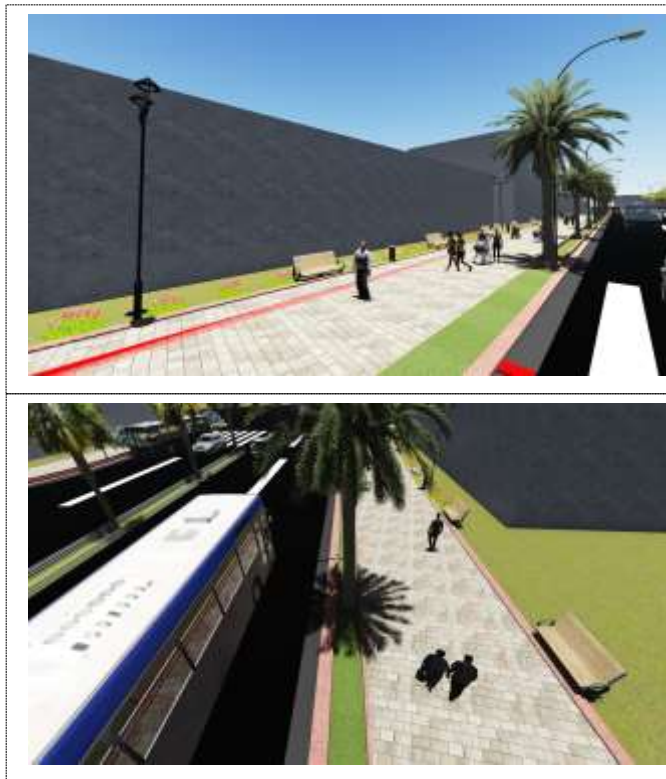
Cafe seating or other appropriate building-related uses should be encouraged to occupy space on their frontage side. Since the desires for pedestrian walk in the selected sites are very high, therefore Pedestrian widths can vary, but typically they are a minimum of 2m wide on local residential streets, and can be 3-5m on collector and arterial streets. At the middle 1m width for disable / blind/ on the other both sides 2.5m, so the total pedestrian width is 5m.

Figure 5.9: Pedestrian Width Size



(kifle, 2019)

Figure 5.10: Pedestrian Surface Material



### **Pedestrian surface material**

The quality of Pedestrian surface materials is very important for comfort ability and secured manner of walks. Therefore the researcher is assure to propose tile and cobblestone material for both side of Pedestrian walkway but, for the disable Pedestrian at the center the proposed surface material is brick/ tarmac/ because it is very smooth material for the disable persons. Why the researchers choose cobblestone for surface material, it is a local material and a low cost and has aesthetic significance.

(kifle, 2019)

### **5.2.5. Pedestrian Vegetation**

Trees along the street can make walking an enjoyable experience by providing visual stimulation as well as for protection. They can also act as a buffer between pedestrians and traffic. Trees are located no more than 10 to 15 m apart in order to provide definition along the street. An area of at least 1m by 1m per tree is provided in order for trees to be successful. Trees are a locally appropriate species and should be of an upright type whose canopy will not spread too far toward buildings along the street. Like Lusitanica, Junipus Indigenous, Olea Africana/Woira/, Jacaranda Mimosfolia, Gravela Robusta, and Schinus

(kifle, 2019)

Figure 5.11: Pedestrian Trees



**Air Purification:** Vegetation's are to remove dust and pollutants from the air as well as provide fresh breath around the attraction areas and also Vegetation that reduce temperatures by shading the ground and by the cooling effect of the walking areas which encourages movement on foot.



(kifle, 2019)

Figure 5.12: Pedestrian Greenery



Figure 5.13: Pedestrian Amenities



### Landscaping

Street trees in planting buffers and along streets can greatly enhance the pedestrian experience, both in terms of esthetics and safety. Landscaped areas may be provided along the street edge of the sidewalk, but should not impede pedestrian traffic.

Landscape planters may also be provided in front of buildings to create visual appeal or to break up a long blank wall, but should not be wide enough to create significant separation between the building and the walkway.

**Benches:** are inviting the pedestrian to rest, creating a comfortable walking experience. Benches should be provided in locations that experience heavy pedestrian traffic. Benches should be conveniently located adjacent to the pedestrian walkway, but should not impede pedestrian traffic.

### Signs

Signage helps to orient the pedestrian and also provides visual interest. Signs are oriented to the pedestrian; text should be large enough to be read by the pedestrian. Business signs should be ideally located on the building or awning to be read from across the street; Directional signs should be located adjacent to the walkway, oriented toward pedestrians, and should not impede pedestrian traffic. Traffic signs should be located outside the pedestrian travel zone, in the road area and near the curb. The bottom of a sign should be at least 3m above the roadway or pedestrian walkway.

(kifle, 2019)

Figure 5.14: Pedestrian Signage



(kifle, 2019)

### Lighting

Lighting of streets and the adjacent pedestrian walkway increases pedestrian's safety, security, and comfort, and encourages walking. Beside the illuminating function of lighting, the landscaping design work will incorporate the expressiveness and enhancing elements of lighting in to the design.

Street Lighting system (Under Ground Distribution Network, distribution transformers selection, design of manholes, and other related activates). Therefore the pedestrians light are proved within the interval between 20-30m

### Site Amenities

Site amenities include Dustin bin, benches, telephone booths, bus shelters, walls, fences etc. With proper planning and design, site amenities become a cohesive link that has a positive effect on the overall appearance of the pedestrian walking routes. Site amenities need to be compatible with the adjacent architectural features.

Site amenities should be conveniently located adjacent to the pedestrian walkway, but should not impede pedestrian traffic.

Figure 5.15: Pedestrian for disable



### Pedestrian for disabled

While designing or proposing pedestrian walk way is always better if the personal status is taken in to consideration. Accordingly, the researcher divided in to two Status.

1. The pedestrians for normal and
2. The pedestrian for disabled. Therefore, by giving emphasis to the disables the pedestrian is proposed at the pedestrian walkway within 1m width, because they can access freely and safely without any interference. The surface material for disables also considered to be smoother and more suitable for them during walks.

(kifle, 2019)

## **6. CONCLUSION AND RECOMMENDATION**

### **6.1. CONCLUSION**

- In urban centers, pedestrian flows can be significant, and they must be accommodated in planning and design of traffic facilities and controls. Pedestrian safety is also a major issue. Pedestrians must walk to transit or other destinations if they wish to travel independently and a safe, secure, and comfortable system for all people who walk.
- This study covers pedestrian problems, their characteristics, different level of services and design principles of pedestrian facilities. Pedestrian walkways are as the most basic unit / component for street and public space design. Pedestrian includes vulnerable road users - elderly, disabled, children, people with baggage etc. The pedestrian walkway is a place for people to walk. Based on the stated preferences of people surveyed in this research, the researchers found that the current pedestrian using method should be improved to be used in a comfortable way for the user pedestrians, and this could be done by reflecting the change of pedestrian comfort levels in a proposed sidewalk pavement width design method.
- The research also found that pedestrian paths would be a good source in understanding how pedestrians experience discomfort on the sidewalk pavement, and that the comfort levels also varied by how many pedestrians group together in their sideways space.
- Finally, when proposed pedestrian walkway design will be applied to a case study site, a more pedestrian friendly urban area is to be made possible. From the study it can be concluded that integration of pedestrians transport and motorized transport will enhance the modernization of sustainable urban transport in the Adama Down town area.

## 6.2. RECOMMENDATION

Based on the problems, literature review, key findings and opportunities the following ideas are recommended by researcher to overcome the problem of pedestrian walkway in Adama town the case of down town. Those are:

- The study site should be more attractive and to encourage pedestrian friendly environment development.
- Create a street environment that strives to ensure pedestrian safety sidewalks, pathways and crossings should be designed and built in study area to be free of barriers to minimize conflicts with external factors.
- There should be pedestrian lighting on the street and buildings so the focus is not only on lighting the road for the automobile.
- Curb Ramps should be built or repaired at each crossing location.
- Buffering throughout the area to protect the pedestrian physically and psychologically from vehicles. This can be in the form of landscaping, trees and planting can provide shade and other benefits to the pedestrian.
- The width size of the pedestrian walk should be in accordance with pedestrian width standard.
- The surface quality of the pedestrian walks should be smooth for easy and comfortable circulations.
- Provide pedestrian amenities and promote land uses that enhance walkability through vegetation, greeneries and sitting furniture's must be provided for more access and function.
- Elements related to pedestrian should be aligned and Utility covers should be located outside the pedestrian travel zone. Plantation along roads, streets and pedestrian pathways must be carried out in accordance with the cross-section illustrated.
- The recommended minimum pedestrian walkway width is 2m. This width allows two pedestrians (including a wheelchair user) to walk side by side, or to pass each other comfortably. It also allows two pedestrians to pass a third pedestrian without leaving the walkway.
- The pavement material is suggested for the area should be cobblestone on all possible areas and tile materials.

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## APENDICES

### APPENDIX

#### STRUCTURED QUESTIONERS AND INTERVIEWS FORMAT

Adama science and tecknology University

School of civil and Architecture

Urban Planning and Design Program

#### ASSESSMENT OF AN ACCESSIBLE PEDESTRIAN WALKWAY IN ADAMA TOWN THE CASE OF ABA GEDA AREA

**Declaration:** The information given will be treated with confidentially and used for academic purpose only so that Please answer the Questions as instructed.

Please answer the Questions as instructed

Name of the Road .....

Respondents Details

Qtn No.....

Date.....

Name of the Road .....

Respondents Details

1. Name (Optional).....

2. Age: 1. Below 18 2. 18-36 3. 37-55 4. Over 55

3. Sex: 1. Male 2. Female

4. Marital Status: 1. Single 2. Married 3. Divorced 4. Separated 5) Others Specify.....

5. Educational Level: 1. No formal education 2. Primary level 3. Secondary level, 4. Tertiary college  
5. University level

6. Occupation: 1. Formal employment 2. Self-employed 3. Farmer 4. Manual laborer 5. Others

7. Where is your origin of walking?.....

8. Where is your destination of walking?.....

9. How long do you take (minutes) to reach your destination? 1 (1-20 minutes) 2. (21-40 minutes) 3. (41-60) minutes 5 (others)

10. Are you satisfied with the time you take? Yes.....1). No.....

11. If No what can be done to reduce your journey time.....

12. What is the purpose of your journey? 1) work 2). school 3) Shopping 4) Business 5) others

13. What time of the day do you take long to reach your trip (local time)?

1.1.00 -3.00 am 2.5.00 - 7.00am 3.9.00- 11.00am 4. 11.00am-1.00pm 5. 1.00-3.00pm

14. Why you preferred pedestrian mode of transport within the area?.....

15. How would you describe the condition of pedestrian Transport infrastructure or Foot paths along this road? 1. Excellent.... 2. Good..... 3. Satisfactory.... 4 Poor....

16. What do you suggest that the Government can do to improve the pedestrian walkway within the area?.....

17. What are the potential of pedestrian walkway within the area and how can it be exploited?.....

18. According to you, who are the key players within the pedestrian transport sectors and what can they do to promote sustainable pedestrian walks?.....