Ethiopian Institute of Architecture,
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CREATING WALKABLE ENVIRONMENT FOR AXUM CITY TO ENCOURAGE TOURIST MOBILITY

/The case of Axum old Settlement/

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D E C L A R A T I O N

I hereby declare that the dissertation entitled "*Creating walkable Environment for Axum city to Encourage Tourist Mobility, the Case of Axum old settlement"* has been carried out by me under the supervision of Ato Ezana Yoseph, EIABC, Addis Ababa University, Addis Ababa and Co-advisor Ato Alazar Assefa EIABC, Addis Ababa University, Addis Ababa during the year 2014-2015 as a part Degree of Master of Science programme in Urban design and development. I further declare that this work has not been submitted to any other University or Institution for the award of any degree

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Date: June 2015

Addis Ababa, Ethiopia

CONFIRMATION

The thesis can be submitted for examination with my approval as an institute"s advisor

Advisors

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Abstract

Walkway spaces are an essential element of livable towns and cities in which people want to live. They can contribute in promoting walkable and well-connected areas. In any situation when people are asked as to why they choose to live in a particular location, most people usually say „this is walkable area". It is natural that People want to live in places where there is a good range of amenities and facilities located within easy reach, such as open space, retail and recreational areas, good schools and childcare facilities, and good transport links to places that they need to access services. In both the developed and developing world, pedestrian friendly city is considered to be a prerequisite for enhancing urban life and play significant role as catalyst for safe and comfortable transport system. Furthermore, it is understood that in order to realize such urban environment urban design must include viable and accessible walkable routes.

Realizing this fact this study has tried to assess the situation of the existing walkability of Axum city by selecting a case study area in the old settlement. Based on the existing problems, Axum hardly meets the required urban quality and standard of tourist city in its facilitation of walking space provisions as urban public spaces. Therefore, the purpose of this paper is to develop a set of detailed recommendations and approaches that could enable the tourist-oriented pedestrian system to play a major role in creating safe, sustainable, and equitable mobility in the city to be a touristic heritage site. Using such detailed regulations and guidelines and public stakeholder involvement, a uniform understanding can be reached within the different municipal divisions and walkability quality can be increased both for residents and visitors.

The analysis is based on the primary data by using various tools including interview, questionnaire survey, visual survey/observation, focus group discussion and secondary documents that were collected from the concerned agencies, of Axum city.

In general the lack of integrated urban walk way infrastructure and lack of common standards, lack of strong link between the land use development and tourism development are some of the findings of this research. Based on these findings the researcher has forwarded detail recommendation that includes designing the walk ways that fit to tourist city context as it is indicated in the detail recommendation and guidelines.

Chapter One

1. Back ground of the study

1.1 Introduction

Walk way spaces are an essential element of livable towns and cities in which people want to live. They can contribute to promote a walkable and connectivity of given areas. In any situation when people are asked why they choose to live in a particular location, most people will usually say „this is walkable area". (Jacobs, J. 1961). It is natural that People want to live in places where there is a good range of amenities and facilities located within easy reach such as open space, retail and recreational areas, good schools and childcare facilities, and good transport links to places that they need to accesses services. Different urban design literatures underlined that a good neighborhood is one where people can easily walk and is well connected to employment centers or places people spend their leisure time to satisfy their daily needs. (Jacobs, J. 1961).From these fact neighborhoods also tend to have a wide variety of things to do within them and have a strong walkability to the area in which they sit be it historical, cultural or visual. (Lynch, K. 1960).

Realizing this ambition it requires a powerful urban design framework of guideline, design to produce exciting, diverse, high-quality walkable spaces which meet the needs and aspirations of local communities and other visitors. At present, the ground reality reveals that with the increase in the proportion of global urban population, cities are also became congested that calls walking spaces. Particularly the old settlements, historical places and commercial areas need walkable environments. Therefore, the need of selecting and designing environmentally friendly walkable route had been great issue in developing as well as in developed countries, especially walking environment is important in tourism center cities and towns like Axum. Despite of such facts, Axum hardly meets the required urban quality and standard of truism city in its level of walking spaces provisions as urban public spaces. (Phillsiposon, D.1994).

A successful town cannot operate efficiently in isolation from its environment. It must balance social, economic and environmental needs. The rapidly urbanization and population booming in Aksum is bound to have a major influence on the urban environment and this influence goes beyond the boundary of the town. The town should put the needs of its citizens at the forefront

of all its planning activities; recognize its natural assets and its environment and builds on these to ensure the best possible returns. Currently the town is serving as the center of political administration, culture, Tourism and Trade.

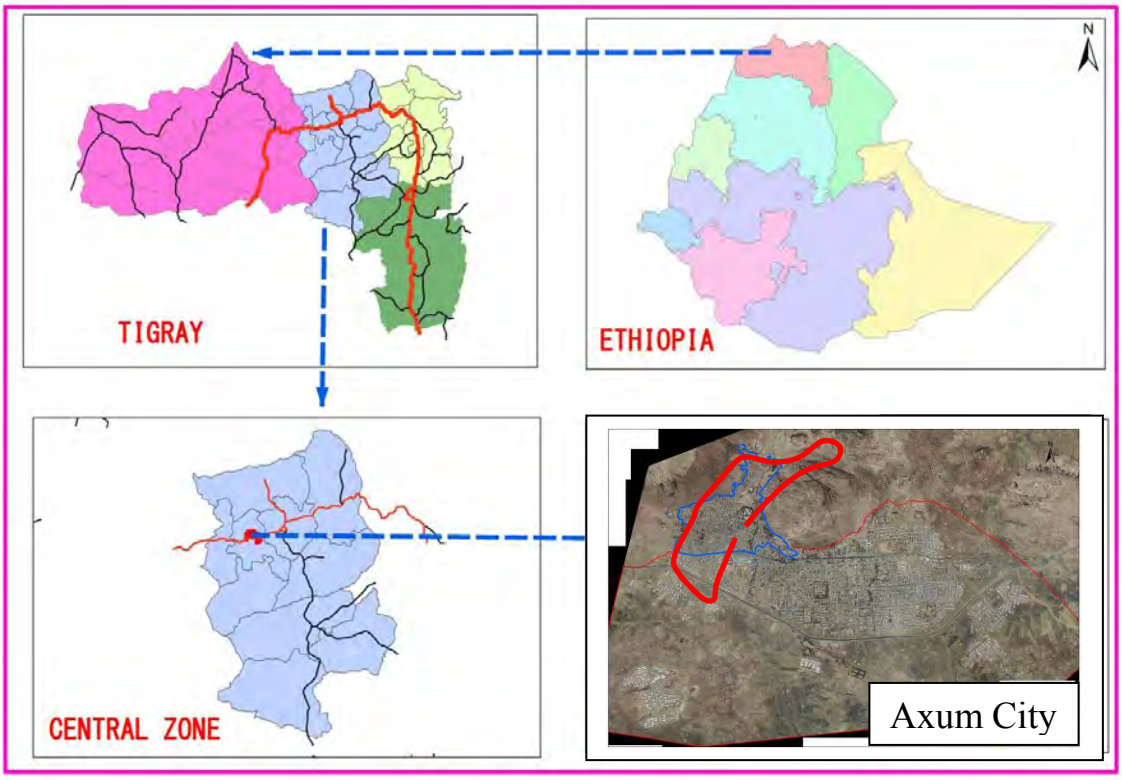
Walkable and safe streets, together with parks, full-service grocery stores, farmers‟ markets, less traffic volume, and open spaces, are all indispensable factors that contribute to the health of a community and have a positive impact on the health of residents and heritage conservations.(Jacobs, J. 1961). Land use and transportation facilities create barriers to physical activity and have a negative impact on environment. Automobile-oriented networks and urban forms have led to important impacts in terms of transportation congestion, air pollution, inactive lifestyle, pedestrian safety, poor pedestrian environment, and other built environment issues. Therefore, assessment of walkability and implementation of infrastructure improvements that make neighborhoods more walkable, healthy, and livable are urgently necessary in Axum city especially in the study area.

Therefore, the purpose of this paper is to develop possible urban design guideline and approaches that could enable the tourist-oriented pedestrian system to play a major role in creating safe, sustainable, and equitable mobility in the context of Axum city Centre into a touristic heritage. Using such a guide line and public stakeholder involvement, it can be reach in a uniform vision within the different municipal divisions and increase walkability quality both for residents and visitors.

1.2 Location of the Study Area

Aksum is located in the regional state of Tigray about 1043 km from Addis Ababa via Mekelle and Adigrat towns and 245 km Northwest of Mekelle town, which is the capital town of the regional state. Its administrative location is within Tigray National Regional State, central zone with in Laelay Maychew woreda. Absolute geographic coordinates of 470520m E and 1561532m N represent the town. Average elevation of the town is approximately 2100 m.a.s.l. (Axum Structural plan 2012).

Map 1.2.1. Location of the study Area



In the town there are about eleven tourism sites: Aksum Obelisk, St. Tsion church, museum, Atse Kaleb and G/meskel's tomb,Queen Saba, Gobo Dura, king Bazen's tomb,Ezan park, adi kilte, mai-shum, king Ezan inscription, Abune Pentelion church, and Abune Libanos church. There are also seventy seven historical, religious, and natural and park tourism resources as tourist attraction with in 160 kms diameter around Aksum. (Axum town culture and tourism office).

The Ministry of Tourism proposes a tourists master plan for Axum City and its surrounding and revitalizing the heritage area within the city and the region in general. This study aims to produce a portion of the larger proposed project by incorporating a tourist oriented pedestrian network within the heritage district of City Centre, that contributes to the well being of the local community.

1.3 Problem Statement

Walking is the oldest, most friendly and green transportation mode. In fact, built before the advent of the automobile, Axum has the charm of historically significant buildings and architecture, and small and walkable scales. However, rapid growth has made travel on foot a challenge.

Tourist"s movement is becoming a common experience in different parts of the city, but there is no well-connected pedestrian walkway and directions for the tourist attraction sites, one of these components of the urban system, as well as creating a medium for spatial interaction, continues to be in the thick of these challenges. The lack of properly planned pedestrian walkway and heritage conservation in the city leads to severe problem to those old buildings by entering or disturbing different heavy vehicles through the heritage site.

Pedestrian movement is the major mode of traffic activity within the project site; however, pedestrian routes and pathways are in adequately structured to handle the volume of pedestrian traffic. The network of pedestrian routes is not continuous throughout the site and between different districts. Walkablity is the valuable area of focus in this battle for heritage conservation and urban mobility. In general the study area lacks integrated urban walkway infrastructure, lack of strong link between the land use and tourism development, inadequacy of sidewalks, furnished pavements, and poor drainage network are witnessed within the site.

In light of the proceeding scenario the study henceforth was stay upon shading some light into the existing realities of the pedestrian network of the city with a general objective of providing solutions and suggesting measures that should be taken to make it play a leading role toward maximizing urban mobility and heritage conservation. Considering these issues, it is necessary to assess and improve walkability in old Axum. The study aimed to analyze current conditions, to assess needed improvements, and to identify strategies.

1.4 Objectives of the Study

A. General objective

The main objective of the study is to prepare possible urban design guidelines and approaches that could enable tourist-oriented pedestrian system to play a major role in creating safe, sustainable, and equitable mobility in the context of Axum City Centre into a touristic heritage landscape.

B. Specific objectives

1. To assess the existing pedestrian walkway and introducing a tourist-oriented pedestrian network within the site.
2. To Conserve heritage assets and open up heritage buildings for tourist attractions sites
3. To identify issues related to pedestrian connectivity and to understand how the existing urban fabric provides for pedestrian accessibility.
4. To develop appropriate design guidelines and options for addressing pedestrian connectivity issues within the context of heritage conservation.

1.5 Research Questions

1. How much is tourist-oriented pedestrian network important for heritage conservation?
2. What is the main issue related to pedestrian connectivity and how does the existing urban fabric facilitate pedestrian accessibility?
3. How can heritage assets be conserved and how can select heritage buildings for tourist attractions sites be opened up?
4. What possible strategies and approaches exist to create a walkeble environment system that plays a major role in conserving heritage and creating a tourist attraction site?

1.6 Significance of the study

This study is significant for academic purposes and it could be used as an input for other researches dealing with walkability and heritage conservation. The developed guide line can be also used as a policy-support document for governmental authorities who have direct or indirect connections to subject matter. So it can be serviced as input to problems related to heritage conservation further investigation. Moreover, the study will contribute paramount

advantages by creating awareness on the aesthetic and recreational value of walkable environment and attempts to improve the heritage conservation of the surrounding areas.

1.7 Scope of the study

The scope of study is very much limited to the study of the role of walkablity in conserving heritage and its geographic scope is confined to Old Axum in particularly and Axum City in general. Its thematic issue is focused on creating well connected pedestrian walkway and its impact on heritage conservation. Thus the paper greatly dwells on discussions about the effect of creating walkable environment in preserving heritage. The principal focus is on the discussion of their impact upon heritage conservation of the city as it exists now. However the paper has limited itself to suggesting recommendations that will help to make this sector function more efficiently.

1.8 Research Methodology

A. Data Collection Technique

This study tried to demonstrate facts and findings by using primary and secondary sources and literature review regarding walkability and heritage conservation. The primary data related to the study area (spatial and non-spatial) was conducted by making physical observation and interviewing key stakeholders. The secondary data was obtained from published and unpublished document sources which were collected from different institutions. The theoretical framework was studied by means of reading existing researches about the issue such as books, official websites, and journals. Surveys were made with subjects under varying circumstances such as pedestrian count, assessing the physical condition of the walkway and tourist attraction sites.

Comprehensive principles to guide the development proposal were developed upon identifying and reviewing approaches necessary for successful solutions. The approaches include understanding urban heritage tourism attributes, identifying successful pedestrian tourism criteria, and researching appropriate urban heritage management frameworks. Principles were used to realize potential locations and activities which were identified through a site analysis of the natural and built environments of the site.

B. Case Study as a Research Method

The research has been carried out with the help of secondary data and primary data. It was obtained by assessing the spatial and non spatial aspects of pedestrian walkways, with the help of semi structured and open ended interviews and questionnaires conducted on users. . In addition to this personal observations and photographs were also employed.

a. Sampling Techniques

The case study covered a general assessment of pedestrian walkways within the old Aksum, which is one of the oldest and the tourist attraction sites of the city. Primary sources of information and data on the subject had been selected by accidental non probability sampling method from residents, tourists and experts. Besides, key informants had been selected from residents, municipality officials and employees. Focused group discussion was under taken with key informants of residents and municipality employees.

b. Questionnaire surveys

These had been conducted on subjects, by simple random sampling. Here special emphasis was given to the particular times of the day when the sample was taken, i.e. surveys have been conducted both on and off peak hours. Furthermore deliberate focus was given to major tourist attraction areas.

The conditions under which these sample questionnaires were surveyed had varying characteristics. That was done in order to get a real feel of the tourist and the pedestrian system in operation. To this end, samples were taken of subjects walking on foot, using bicycle and other non-motorized vehicles.

c. On-site Pedestrian Count /Observation

Pedestrian count of the different modes of non motorized transport that exist in the city of Aksum was conducted at selected junctions and roads. These junctions and roads were selected based upon the degree of pedestrian movement observed especially at peak hours.

d. In depth Interviews

The third type of primary data was about informal discussions made with key stakeholders, key professionals and with people moving around the study area. That data source was collected in

aiming to know the attitudes and reflections of the citizen on the functions of the pedestrian system.

1.9 Organization of the thesis

The thesis report is structured in five chapters: **Chapter one** states the general context of the study including the general introduction and back ground, problem statement of the study, research objectives, and research questions, significant of the study. **Chapter two** gives comprehensive review of literature of relevant topics, namely, walkablity and urban heritage, pedestrian movement and urban tourism were presented from various sources. **Chapter three** presents the description of the study area, settlement trend of the city. **Chapter four** presents analysis of pedestrian and heritage conservation system in Axum in a detailed manner and its major findings. Finally guidelines and recommendation of the research was presented in **Chapter five.**

Chapter Two

2. Literature Review

2.1 Definition and Common terminologies used

Walkability: While there are many options available to combat these trends, the city planning profession has once again begun to place emphasis on designing compact, mixed-use communities that resemble those cities that existed decades ago. A major goal in this process has been to create walkable communities, where the built environment is designed in a way of fostering walking and bicycling to nearby destinations rather than requiring individuals to rely strictly on the automobile.(Handy, S. 1996.)

What Is Walkability?

Walkability has become a measure of how friendly an area is for pedestrians. What is walkability? The word is widely referred to, but poorly defined. In order to develop a more walkable neighborhood in old Axum, it is necessary to define the term first and perform analysis towards this objective.

Factors Influencing Walking

Before presenting the criteria of walkable neighborhood, I 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.)

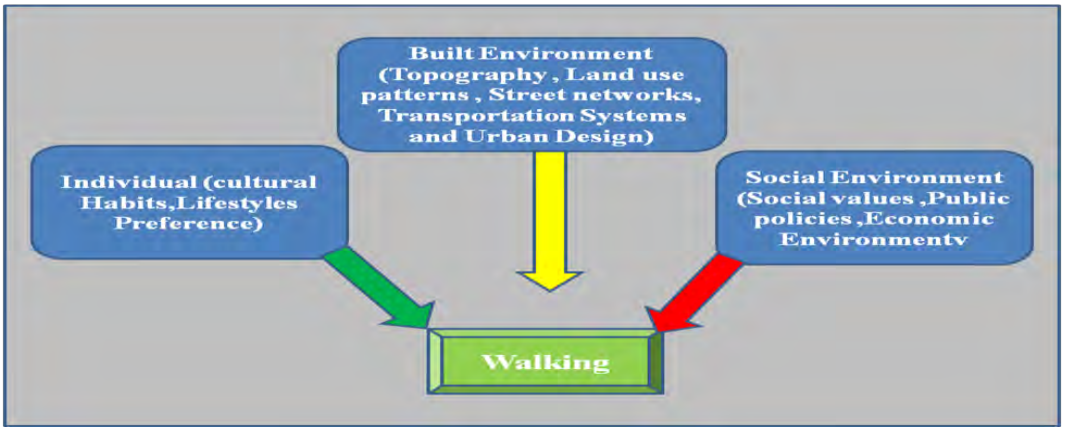


Figure 2.1. Factors Influencing Walking Paradigm

Motivation to walk depends on personal characteristics, which is the most difficult factor to change. One considers ability, comfort, confidence, habits, and perceptions when he/she choose transportation mode. Although these can evolve over one"s lifespan, they may also be modified by targeted intervention and education programs. Pedestrian built environment factors contain land use patterns, street connectivity, adequate pedestrian facilities and sidewalk design, all of which are shaped and affected by development policies and public investments over time. Socioeconomic factors are also playing an important role in influencing the willingness and desire of an individual to walk, such as poverty level, medium income, car ownership, the community attitude towards walking, etc. (Handy, S. 1996.)

What Is Pedestrian?

Defining "pedestrian" is the first step. The definition of what is a pedestrian is vital since it strongly influences the design of infrastructure and the urban environment as a whole. In other words, the understanding of pedestrian influences our criteria of walkability. (Ewing, R.1999.)

A pedestrian is any person who is afoot or who is using a means of conveyance propelled by human power other than a bicycle.

A Pedestrian includes any person who is operating a self-propelled wheelchair, invalid tricycle, or motorized quadricycle and, by reason of physical disability, is otherwise unable to move about as a pedestrian.

A pedestrian is a person walking rather than traveling in a vehicle. Pedestrian behavior is mainly defined as the transportation mode compared to vehicles, public transit or bicycles. (Oxford English Dictionary, 2006)

To summarize the definition of "pedestrian", it can be defined as any person traveling on foot and any mobility-impaired person using a wheelchair, not only for transportation purpose, but also for social interaction, shopping, leisure, recreation, exercise, protest, etc.

A. Boundary and Scale of Defining and Measuring Walkability

The term walkability is growing in popularity, but there still is a great deal of confusion in defining it (Southworth, M. 2005). Like other terms in urban design, such as livability or sustainability, the meaning of walkability is evolving and seemingly expanding with each new suggestion. Today many non-design determinants, such as housing density and land use, have been added and seem to play an even greater role than design factors in defining walkability.

As a result, many design practitioners and walking advocates think of walkability as the neighborhood urban form with some added micro-level design characteristics. (Southworth, M. ,2005),this urban form-based walkability, defined and measured at the neighborhood level, could limit both urban design research and practice in the following ways:

First, in urban design research, using this broad definition of walkability will reduce the future likelihood of proving the possible effects of the urban design attributes on walking travel behavior. The three major urban form variables namely neighborhood housing density, land use diversity, and street patterns require a larger scale research than street-level urban design attributes. (Southworth, M. (2005).

Second, in urban design practice, modifying urban form is often beyond the urban designers‟ realm in practice, because in many existing urban areas, they relatively have little control over land use, density, and even street patterns unless they are designing for a master planned new town. Changing the street patterns or zoning codes in an existing urban setting is difficult and frequently beyond the urban designers‟ scope (Handy, S. L. 1996.).

B. The Definition of Walkability and its Attributes

Individual and socioeconomic characteristics are invisible factors for promoting walking behavior. Walkability is more closely related to the attributes of the physical environment. (Southworth M. 2005), offer the following definition of walkability. "Walkability 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. Ample 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, pedestrians, and cyclists. In practice, measures that design the street for pedestrians in mind sidewalks, raised medians, better bus stop placement, traffic-calming measures, and treatments for disabled travelers all improve pedestrian safety.(Southworth, M. 2005)

Sustainability: like bicycle, 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 vivid 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).

C. Walkability Attributes Related to Curb-to-Curb Roadways

Many studies have pointed out that various attributes related to curb-to-curb roadways might influence pedestrians. The general idea is that a wider street draws fast-moving traffic, which decreases the sense of safety, and thus a narrower street is more pedestrian-friendly (Southworth, M. 2003). Southworth suggested 8m as the ideal curb-to-curb width.

D. Walkability Attributes Related to Pedestrian Crossings

What makes pedestrian crossing safer and easier? Many studies have answered this question by suggesting the crossing design attributes, such as the types of crosswalk markings, quality of illumination/signage, raised pedestrian crossings, existence of median islands, and curb extensions. (Jacobs, J. 1961).

E. Walkability Attributes Related to Sidewalks

The importance of the characteristics of the sidewalk is mentioned by almost all walking-related studies.(Ewing, R. 1996.).One notable concept is having a clear passage, excluding sidewalk space that accommodates street appurtenances, such as parking meters, planters, mail boxes, light poles, benches, transit shelters, fire hydrants, and utility poles.

The minimum width of the clear passage is another popular concept, which originated from pedestrian level-of-service studies. Three 1m of clear passage is frequently mentioned (Ewing, R. 1996.). Another issue is the sidewalk length. Some researchers claim that lengthy sidewalk segments (or blocks) at the neighborhood level are associated with lower levels of street connectivity and thus work against pedestrians (Leyden, K. M. 2003).

Driveway curb-cuts is also mentioned as an important attribute of sidewalks, because they reduce sidewalk continuity (Leyden, K. M. 2003), Sidewalk steepness might also be an important walking-related attribute. Some studies suggest a 10% grade as a maximum acceptable steepness (Lynch, K. 1960.). Although a slope gives more views sometimes, it seems intuitive that a steep sidewalk is not good for pedestrians (Jacobs, Allan B. 1993).

F. Walkability Attributes Related to Sidewalk Facilities

The importance of street trees is mentioned in numerous studies. Jacobs, pointed out two benefits of street trees: shading from sunlight, and physical and psychological buffer from fast-moving traffic (Jacobs, Allan B. 1993). Some scholars also claim that trees effectively reduce

wind velocities (Lynch, K. 1960.). Ewing‟s visual preference survey found that "trees along the street" were one of the top five determinants influencing bus users‟ route choice to bus stops (Ewing, R. 2000). Many researchers mentioned street furniture (Ewing, R. 2000), but there has been relatively little discussion about what kinds of street furniture matter and how they influence pedestrians. Some studies also mentioned street lighting, especially pedestrian-level lighting, reflecting an intuitive belief that well-lit streets are important for pedestrians‟ sense of security. (Ewing, R. 2000)

G. Walkability Attributes Related to Street Scale and Enclosure

Urban design experts have pointed out that there may be an intimate human scale, which is determined by street width (building-to-building distance) (Jacobs, Allan B. 1993). This theoretical human scale is based on whether a pedestrian on one side of the sidewalk can recognize the facial expression of pedestrian on the other side. Building height has also been proposed as an important factor in street scale. Jacobs cited Blumen feld‟s study claiming that three-story (or 30-foot) buildings, (along with a-36 foot building width and a 72-foot street width) is the maximum dimension for human scale. Jacobs also suggested that the ratio between building height and street width is important. He claimed that the best ratio is 1:3.3, such as a 20-foot building height coupled with a 66-foot building-to-building distance, while 1:2 (or less) gives a strong sense of enclosure, and 1: 5 (or more) shows a weak sense of enclosure (Jacobs, Allan B. 1993).

H. Heritage Conservation

The term heritage has different meanings in different contexts. World Heritage Convention classifies heritage into two categories: Heritage conservation refers to the protection of heritage from damages since heritage is non-renewable in nature. (Jacobs, Allan B. 1993).

Cultural heritage: a monument, group of buildings or site of historical, aesthetic, archaeological, scientific, ethnological or anthropological value. Cultural heritage includes both tangible and intangible heritage. Heritage can bridge a link between different generations with their ancestors. Hence heritage is a source of social attachment and gives a sense of belongingness. (Southworth, M. (1997).

- **Monuments:** architectural works, works of monumental sculpture and painting, elements or structures of an archaeological nature, inscriptions, cave dwellings and

combinations of features, which are of outstanding universal value from the point of view of history, art or science; (Southworth, M. (1997).

- **Groups of buildings**: groups of separate or connected buildings which, because of their architecture, their homogeneity or their place in the landscape, are of outstanding universal value from the point of view of history, art or science;

Natural heritage: includes outstanding physical, biological, and geographical features, different kind of plants or animals species and areas with significant scientific or aesthetic value that could be best for conservation (UNESCO, 1972)

- **Natural features** consisting of physical and biological formations or groups of such formations, which are of outstanding universal value from the aesthetic or scientific point of view;
- **Geological and physiographical** formations and precisely delineated areas which constitute the habitat of threatened species of animals and plants of outstanding universal value from the point of view of science or conservation:
- **Natural sites or precisely** delineated natural areas of outstanding universal value from the point of view of science, conservation or natural beauty.
- **Cultural landscapes:** they are illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal. These cover the following categories,
    - Cultural Landscapes;
    - Historic Towns and Town Centers;
    - Heritage Canals;
    - Heritage Routes.

Cultural landscapes fall into three main categories, namely:

- The most easily identifiable is the clearly defined landscape designed and created intentionally by man. This embraces garden and parkland landscapes constructed for aesthetic reasons which are often associated with religious or other monumental buildings and ensembles. (UNESCO, 1972).
- The second category is the organically evolved landscape. This results from an initial social, economic, administrative, and religious imperative and has developed its present

form by association with and in response to its natural environment. Such landscapes reflect that process of evolution in their form and component features.

- The final category is the associative cultural landscape. The inscription of such landscapes on the World Heritage List is justifiable by virtue of the powerful religious, artistic or cultural associations of the natural element rather than material cultural evidence, which may be insignificant or even absent. (UNESCO, 1972).

Historic Towns and town Centres

Groups of urban buildings eligible for inscription on the World Heritage List fall into three main

Categories, namely:

- **Towns which are no longer inhabited** but which provide unchanged archaeological evidence of the past; these generally satisfy the criterion of authenticity and their state of conservation can be relatively easily controlled;
- **Historic towns** which are still inhabited and which, by their very nature, have developed and will continue to develop under the influence of socio-economic and cultural change, a situation that renders the assessment of their authenticity more difficult and any conservation policy more problematical;
- **New towns of the twentieth century** which paradoxically have something in common with both the aforementioned categories: while their original urban organization is clearly recognizable and their authenticity is undeniable, their future is unclear because their development is largely uncontrollable. (UNESCO, 1972).

Heritage routes

The concept of heritage routes is shown to be a rich and fertile one, offering a privileged framework in which mutual understanding, a plural approach to history and a culture of peace can all operate. A heritage route is composed of tangible elements of which the cultural significance comes from exchanges and a multi-dimensional dialogue across countries or regions, and that illustrate the interaction of movement, along the route, in space and time. (Lynch, K. 1960).

2.2 The World Heritage Convention

The cultural and natural heritage is among the priceless and irreplaceable assets, not only of each nation, but of humanity as a whole. The loss, through deterioration or disappearance, of any of these most prized assets constitutes an impoverishment of the heritage of all the peoples of the world. Parts of that heritage, because of their exceptional qualities, can be considered to be of outstanding universal value and as such worthy of special protection against the dangers which increasingly threaten them. (Lynch, K. 1960).

Conservation of Built Environment and Sustainability

Sustainability begins with conservation. Conserving historic buildings is essential to understanding our nation's heritage, and preserves the historic character of older towns and cities. In addition, it is an environmentally responsible practice. Conservation maximizes the use of existing materials and infrastructure and also reduces waste. (Lynch, K. 1960).

Modern materials and buildings are often rather different from the traditional structures and the natural surroundings. They do not fit the environment as monuments or even common, existing historic buildings do. (Handy, S. 1996.)

Sustainable of built environment means conservation of

- The conventional balance between natural and built environment.
- The historical styles, traditional appearance, the scene of folk life, art and habits.
- All the values of local human communities and nations.
- The whole character of the built environment and its culture.

Historical Character and Integrity: The things that make a historic building special define historic character. Its visually distinctive materials, features and spaces, the architectural styling or design, and its unique methods of construction or craftsmanship give it its character. The historic character is often determined by the surface qualities of materials. The original choice of materials plays the dominant role in establishing the close-range character because of the color, texture, or shape of the materials (Ewing, R. 1999).

2.3 The Role of Urban Design in Transferring Cultural Heritage to the Future

Historical settings are part of the cultural heritage that reflects the socio-economic and cultural structures, life-styles, architectural and aesthetic characteristics of past civilizations. Those

settings have to be preserved in order to sustain the unique and universal cultures. Historical urban textures, urban spaces that take into consideration the human dimension, attract anyone with their rich composition, narrow-curved streets and delicate labor-work. They are not only fascinating examples but also informative and instructive ones. (Ewing, R. 2000.)

Therefore, the basic target of planning the historical settings is to promote the cultural heritage by preserving and developing them. Preservation planning can be applied on a variety of scales, on a country in general, a single building or even city furniture in particular. The planning, applied on a country, a region, a neighborhood, a city, a street, a square and building groups is not only related to the city planning, but also to urban design.

A successful urban design assists to improve the urban quality and to create a space that is suitable for human habitation. This can only happen by focusing on the formation of cities at both macro and micro levels, ranging from the shape, quality, and location of the city furniture to the dimension of space, the relationship between the elements involved in the space and their relationship with their vicinity (Ewing, R. 2011).

In accordance with the principle of protection/maintenance/development, urban design activities are indispensable in achieving structural and spatial integration to improve the quality and attractiveness of cities. Urban design is the sole means to guarantee the reconstruction of historical settings by integrating them with the contemporary surroundings. Therefore, it enables the sustainability of historical development.

The process of urban design requires an integrative approach same as the process of urban planning. In order to preserve the historical texture, every aspect and element of the city, from city to street dimension and from the building to street furniture, have to be interrelated with its environment and the city as a whole. (Rapoport, A. 1990).

With urban design applications, preservation, sanitation and re-functioning of the assets that have the qualifications of being a cultural heritage will be possible. Therefore, they will be transmitted to future generations. In this process, urban design approach has to reach a synthesis that is appropriate to national conditions, local characteristics, diversity, possibilities and potentials.

2.4 Sustainable Urban Regeneration

Urban regeneration involves comprehensive attempts to retrieve the decline in urban areas. The decline could be in the form of physical, social and economic functions in the urban fabric. The

regeneration process is thus an integral part of urban planning which aims at reconciling the decline in the urban society and townscape.

The very nature of urban regeneration is interventionist activities (Rapoport, A. 1990). It could be operated through various modes: by demolition and redevelopment, through refurbishment for the current use or conversion for a new use (Rapoport, A. 1990). But these two modes cannot assure the sustainable and vibrant urban life and coherent city fabric.

Long-term urban regeneration should thus incorporate the concept of sustainability. Sustainable urban regeneration as comprehensive and integrated vision and action which leads to the resolution of urban problems and which seeks to bring about a lasting environment in the economic, physical, social and environmental condition of an area that has been subjected to change. (Rapoport, A. 1990)

Comprehensive policy measures are required to deal with the crucial problem of dilapidated urban fabric and townscape to bring back a sense of living place to secure the social coherence, economic efficiency and environmental sustainability in urban areas. The comprehensive policies for sustainable urban regeneration can be attained by integrating heritage conservation in the broader framework of urban regeneration. (Rapoport, A. 1990).

2.5 Heritage Conservation in the Context of Sustainable Development

World Commission on Environment and Development defines sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Rapoport, A. 1990). This emphasizes a balanced and integrated urban growth by utilizing minimum resources for dynamic results of sustainable development.

Improving the quality of life in a city, including ecological, cultural, political, institutional, social and economic components without leaving a burden on the future generations. A burden is seen here, which is the result of a reduced natural capital and an excessive local debt. (Ewing, R. 1996).

Heritage conservation can help to visualize the diversity of urban form and to explore the cultural, political and historical character of the urban areas. Heritage conservation can also support to dig out some crucial incidents and events that might have brought major changes in the development trends, urban fabric of the city and the townscape. In a way the conservation of heritage is a crucial factor in the long-term prosperity of a city. (Ewing, R. 1996)

Sustainable urban regeneration is a comprehensive process which deals with the social, economic and environmental vitalization at the same time for a long term urban vibrancy. Sustainable urban regeneration refers to a process that will help reconstruct or rehabilitate the urban fabric, revitalize community-based economy and built social capital (Southworth, M. ,2005). It not only deals with social equity and justice issues, but also promotes and enhances diversity in culture, economy and built form (Southworth, M., 2005).

2.6 Increase in Tourist Attraction

Heritage features: provide important landmarks in the city and affect the overall urban design in local and intermediate scale. Attention should be given to protect the surviving features. Effort should be made to create a suitable setting to make a design respond to those heritage features (Nasser, N. ,2003).

Re-use: Conservation of heritage, architectural, and culturally significant features should be encouraged to enhance cultural and historical continuity. The refurbishment and re-use should be compatible with the surroundings. (Nasser, N. , 2003).

Protecting the Setting of Heritage Features: Individual or clusters of heritage features should be recognized as important contextual elements. Context or setting of these heritage features should be responded to. Suitable settings for heritage features should be preserved or created. Building heights of new neighboring developments should generally respect and if necessary be lowered towards the heritage features. (Nasser, N., 2003).

Compatibility: To minimize negative impact of a new development on a neighboring heritage feature, massing of the new development should be arranged in such a way that larger elements should be located furthest from the heritage feature with smaller elements to be located closest. Terraced and landscaped podium could be adopted to integrate more coherently with scale and possibly the character of the heritage feature (Roberts P., 2000).

Preservation of Local Character development, especially in the lower floors, should be compatible with the heritage feature as far as possible. Local districts have their own unique cultural activities, and physical and historical characters. In redevelopment, these activities and characters should be retained and enhanced as much as possible. (Roberts P.,2000).

Recreated Heritage: Where appropriate, new developments could consider to create a sense of history through their architectural forms and materials with a view to providing interest and contrast with the general urban area (Roberts P., 2000).

View Corridors: View corridors allow views to distant object such as landmarks, ridgelines, water body, countryside, other natural features, etc. Views corridors should be integrated in the design of development layouts and can be combined with breezeways to be formed by roads, open space, amenity area and low-lying buildings. Views to special landmarks and features should be functionally protected to avoid finger or broken views. Additional view access should also be maximized to strengthen visual permeability in the dense city form or heritage land marks. (Lynch, K. 1960).

2.7 The Context of Urban Design and Pedestrian Tourism

Territory McManus (1998) suggests, visitors learn and understand about the site as they walk in groups in a pedestrian flow. Her study suggests that: paths at all historic landscape sites need to be designed, firstly, so that they do not damage the landscape and, secondly, so that people feel comfortable, relaxed and open to any interpretation presented to them in the form of panels, hand held leaflets or audio guides. (McManus, 1998) also examines behavioral patterns of different situations and settings in pedestrian urban environments. She explores territorial behavior through personal perception of ownership over public spaces. She explores the relationship of territorial behavior with cultural differences. Communities in pedestrian oriented townscapes are likely to experience varied feelings of invasion of their self claimed territory by strangers or tourists. Tourists are likely to tolerate having strangers within their culturally and personally defined space or personal territory of convention or the accepted perimeters of social regimentation prevail or allow for the behavior. However, permanent users and residents of the pedestrian heritage townscape are more vulnerable towards strangers invading their territory. Locals are likely to tolerate visitors in public zones, such as commercial streets and recreational spaces, but intrusions to intimate residential settings, especially in conservative societies, are undesired. (McManus, 1998).

Particular factors must be considered when introducing a pedestrian net work for tourists, such as considering personal distances that are related to cultural and personal factors, density on the social and special dimensions, territorial behavior as in personal spaces in public places,

crowding, and behavioral aspects of visitors to recreational and tourism spaces. Street and path widths, social and cultural behaviors of the local community, traffic considerations, buildings scale, and distances are among the features considered and documented to support a development plan. (McManus ,1998).

Five recurring issues are considered pivotal for developing successful pedestrian networks within heritage townscapes. Those issues are:-

A. Destinations

A heritage site providing two or more primary attractions within walking distances boosts potential for a successful pedestrian network; however, lack of support activities or aesthetic qualities along the routes connecting the major destinations hampers the tourists experience. (McManus ,1998).

B. Continuity

A sense of continuity and connection is vital to ensure easy flow and direct accessibility from one segment to the other. Disconnection can often occur due to intersection with major traffic routes cutting through the pedestrian network, and obstructing structures. Clearly identifying entrance points to the pedestrian network can strengthen the tourists‟ visual perception of where to go. (McManus ,1998).

C. Way Finding

Tourists with limited sense of where they are in the site and where to go next are likely to feel vulnerable and lost. Providing good guidance mechanisms and orientation tools is necessary. Special street signs distributed throughout pedestrian networks are the most common directional tool. Signs dedicated for directing tourists take into consideration language capabilities. Therefore, many directional systems use symbols to indicate the location of places. such as a simple drawing of a shopping bag to indicate a shopping district, or a primitive drawing of a

castle to indicate the old citadel. Tourist maps are also common tools. They provide clear orientation to the visitor in relation to the larger surroundings. A map leaflet can also provide descriptions of attractions and locations in the site, giving the visitor the chance to decide and plan the desired walking route. (McManus (1998).

D. Distances and elevations

Tourists of different ages and backgrounds have different physical capabilities to walk distances or ascend and descend stairs. Route allocation should consider distances between destinations and provide locations or facilities for resting if a person became tired. Benches and shaded areas are commonly used. Tourists‟ retail and services outlets can provide options for the passing pedestrians. Cafes, restaurants, and gift shops are examples of places to stop for a break before

Tourists continue to desired destinations. Heritage sites located on sloped terrain require public staircases to navigate between elevations. Old steps that are part of original town heritage assets and protected under conservation acts cannot afford major alteration; however, certain mitigation techniques and minor alterations that can satisfy safety requirements should be permitted. (Nasser, N. 2003).

E. Safety and security

Routes and pathways should provide safe environments. Pathway floor covering should be well maintained, properly designed for drainage, and free of obstacles. This does not prohibit other common activities; it requires a defined through route. Extended view planes along routes can induce feelings of comfort and orientation. However, moderate curves can initiate anticipation for what's around the corner. Curves along wide paths help reduce feelings of discomfort or insecurity, while narrow paths with inconsistent street walls elevate discomfort and fear. Well lit routes and paths are also desired. Allocating routes that satisfy the criteria for a successful pedestrian network does not have to reject portions that lack desired features. Path allocation criteria can relax to tolerate short less attractive distances that provide better connections and reinforce continuity. (Nasser, N. 2003)

2.8 Urban Heritage and Tourism

What makes tourists want to come spend time in one area? What components of the culture and urban fabric make an area a desirable tourist destination? Tackling such questions requires a comprehensive look into functional and aesthetic features likely to enrich the tourists‟ experience, and understanding the types of narratives of places that attract visitors. One thing is evident; physical features and aesthetics are not enough. Reinforcing heritage components of a site with its history and cultural features ensures sustainable tourism. Tourists are attracted to

interact with the culture and experience parts of the associated history. Display of cultural features and historic artifacts and mere beautification of the outer skin of heritage buildings are not sustainable. (Naser,N. 2003)

Walkability is a major feature in tourist oriented City Centre. Understanding features and trends of developing pedestrian friendly landscapes for tourists is necessary. Amongst major issues associated with pedestrian tourism are accessibility, safety, orientation, distances, and activities in areas connecting major attractions. (McManus, 1998).

Identifying routes for a pedestrian network requires locating major attractions that are worth visiting. A plan for network routing could follow different concepts; for example, it could go through the site trying to narrate a story of the history along the route .Understanding directions and requirements of urban heritage tourism prior to analyzing the physical status of the site can affect the ability to easily identify potential locations and routes in the urban landscape. (McManus, 1998).

2.9 Relative Importance of Different Major Factors for Walkability.

The complex and hierarchical arrangement of streets, buildings, and public and private spaces constitute the urban physical environment. This involves dictation about sidewalk and crosswalk condition, disabled access, proximity towards shops and transit facilities, road lighting and signage. (Nasser, N. 2003).

A. Sidewalk Condition

Sidewalk and street are the vital organs of the city, they are the main public places, and they determine the physical appearance and attractiveness of a city. So, street and sidewalks are not just a service that carries people from one point to another point. It‟s more than that. Sidewalk connectivity is an important issue. Poorly maintained sidewalks force people to use street to walk. Not only that they increase social interaction between people. (Jacobs, Allan B. 1993).

B. Crosswalk Condition

Crosswalks are the second most important area. The wider the crosswalk the dangerous it becomes. Crossing should be well defined at any case. Hatched marking is better than just thin lines on either side. It should be clearly visible at night. A raised sidewalks better serves to slow down the car and provide safety for the pedestrian (Jacobs, Allan B. 1993).

C. Road Lighting and Signage.

Streetlight not only allows people to move with ease at night the added benefit, it is also prevents crime and ensures safety. Street signage gives people information. In bus stops the route information with timetable allows people to plan ahead. Clear visible stop sign improves pedestrian safety. (Jacobs, A. B. 1993).

D. Proximity to Shops

Successful streets have activities around them. Neighborhood shop generates pedestrian traffic. It allows social interaction between people. The distance for a small neighborhood shops can be 1/8th of a mile in an accessible transit distance such as bus stops is 1/4th of a mile. (Jacobs, A. B. 1993).

2.10 Elements of the Built Environment that Encourage Walking

It is important to understand what elements of the built environment contribute to walkablity. There are many environmental elements that encourage walking, and they exist at different geographical scales. Some elements, such as land use mix, exist at a large scale, others, such as pedestrian amenities, are at street level. In addition, the city and streets consist of overlapping layers of networks and land use patterns. There are some general rules of thumb that we can follow to consider the area as walkable: (Roberts, P. (2000),)

- A area where the automobile is not the only option to move,
- Pedestrian facilities are present to offer the dwellers a fair choice to move.
- Area with adequately designed sidewalks that allow disabled access.
- Area with safe to walks in terms pedestrian safety,
- Crosswalks are adequately marked and people can easily cross the streets,
- Area with less instances of crime.

How can we define an area as walkable?

The meaning of walkability can be described in many ways. It depends on the structure and scale of the area, which is the human scale, where every resident has the opportunity to walk to the nearby shop, park or access facilities like public transportation within an acceptable walking distance. This can be considered as a walkable area. A distance of 400meters is

generally accepted as maximum to foster regular pedestrian movement and regular transit use. (Ewing ,1999).

Positive Outcomes of Walkable area

This study focuses on walkablity as it relates to prevent heritage damage. Walkable areas have the ability to encourage more social interaction and greater community involvement, which in turn leads to greater social capital within the community. Social capital has been defined as the social networks and interactions that inspire tourist and reciprocity among citizens (Leyden, K. M. 2003), It has also been linked to additional community benefits such as crime prevention and economic development.

In addition, walking for transport decreases the number of trips a person makes by car. This has the potential to reduce greenhouse gas emissions and therefore to increase air quality. (Ewing R., 2011). A reduction in greenhouse gas emissions is critical to mitigating climate change and protecting the natural environment. Other environmental benefits of walking rather than driving include reduction of noise pollution, conservation of land, and alleviation of traffic congestion quality (Ewing R., 2011).

2.11 Walkability and Tourism

Walkability should be a magnet for tourists‟ to experience places. The cities that accommodate most tourists are large multifunctional entities into which tourists can be effortlessly absorbed and experience, largely on foot the spaces within the cities quality (Ewing R., 2011). A place is walkable when 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 the journey throughout the network (Southworth M, 2005). The physical features, urban design qualities and individual psychological and physical reactions are interrelated and influence the pedestrian‟s choice to walk (Handy, S. L. 1996). Compared to other street users, tourists are those who travel at lower speed which make both distance and streetscape texture more relevant (Naser, N. ,2003).

2.12 Components of Walkability

The built environment has a strong influence on whether people choose to walk, for walking to become a competitive or favored mode in a City. The necessary elements for a walkable community have been grouped into four overarching components. Quality of the journey, urban form, pedestrian infrastructure, and policies and programs (Smart Growth Planning, 2006).

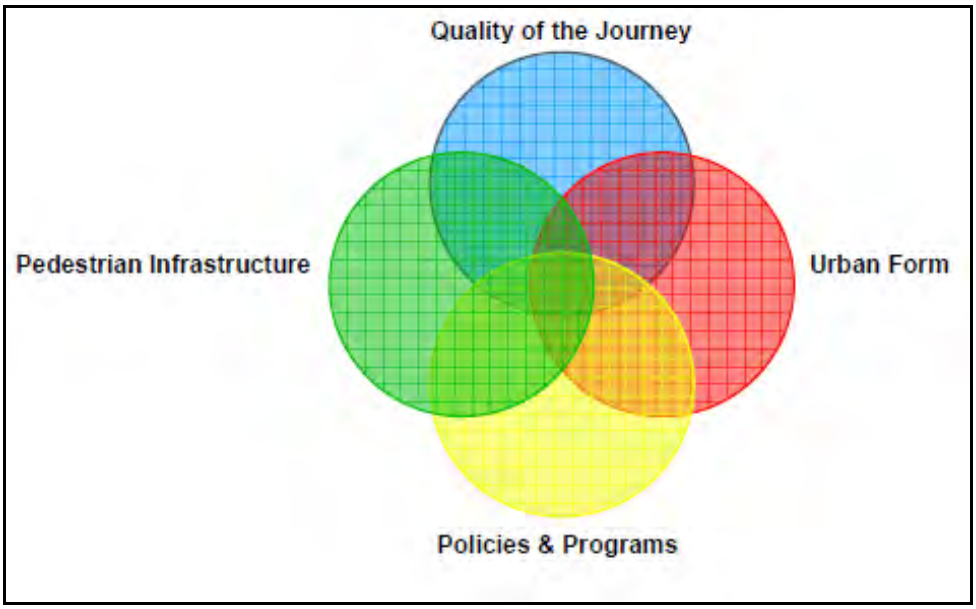


Figure 2.2. Components of walkability

A. Quality of the Journey

Security: A feeling of security is created through building placement, population density, window transparency, street connectivity, and aesthetics. (Jacobs, J. 1961)

Safety: Real and perceived pedestrian safety threats such as tripping or pedestrian-vehicle collisions are influenced by vehicle speeds and volumes, sight lines, distance between pedestrians and automobiles, and lighting for visibility(Jacobs, J. 1961)

Convenience & Efficiency: The placement of multiple complementary destinations within walking distance of a home or office allows pedestrians to perform many errands at once.

Comfort: The provision of seating, temporary wind or sun shelter, and public restrooms are attractive to individuals and families, and are especially important to seniors.

Complexity: Color, texture, and building articulation create a high level of complexity which encourages pedestrians to continually return to a place. (Jacobs, J. 1961)

B. Urban Form

Scale various land uses concentrated within about 400 meters increases walkability because it is relatively easy to walk this distance and may be easier than other forms of travel.

Block Size: Ideal block size is 350 to 500 meters in circumference.

Connectivity: High connectivity leads to more dispersed motor vehicle traffic, reduced walking distances, and easier access to transit and pedestrian attractions. (Jacobs, J. 1961)

Streets: Streets internal to neighborhoods should be narrow enough to encourage low vehicle speeds and be comfortable and safe for walking.

Destinations A range of services should be found in close proximity to housing. Mix of Uses, Mixed use neighborhoods' have a variety of land uses, such as offices, retail, and a mix of residence types. (Jacobs, J. 1961)

Density High residential and commercial densities increase the number of pedestrians.

Legibility is a term used to describe the ease with which people can understand the layout of a place. By making questionnaire surveys, Lynch defined a method of analyzing legibility based on five elements: paths, edges, districts, nodes and landmarks. He defined these as follows:

Paths: familiar routes are the channels along which the observer customarily, occasionally, or potentially moves. They may be streets, walkways, transit lines, canals, railroads. These are the major and minor routes of circulation that people use to move out. A city has a network of major routes and a neighborhood network of minor routes. (Ewing, R. 2000).

Districts: - areas with perceived internal homogeneity are medium to large sections of the city, conceived of as having two dimensional extents, which the observer mentally enters inside of, and which are recognizable as having some common identifying character.

Edges:- dividing lines between districts are the linear elements not used or considered as paths by the observer. They are boundaries between two phases, linear breaks in continuity: shores, railroad cuts, edges of development. (Ewing, R. 2000).

Landmarks- point of reference are another type of point-reference, but in this case the observer does not enter within them, they are external. They are usually a rather simply defined physical object: building, sign, store, or mountain. The prominent visual features of the city are its landmarks. Some landmarks are very large and seen at great distances. Some landmarks are very small (e.g. a tree within an urban square) and can only be seen close up. Landmarks are an

important element of urban form because they help people to orient themselves in the city and help identify an area. (Ewing, R. 2000).

Node: - centers of attraction that you can enter. Those are the strategic spots in a city into which an observer can enter, and which are intensive foci to and from which he is traveling. They may be primary junctions, places of a break in transportation, a crossing or convergence of paths, moments of shift from one structure to another. Or the nodes may be simply concentrations, which gain their importance from being the condensation of some use or physical character, as a street-corner hangout or an enclosed square. (Lynch, K. 1960).

C. Pedestrian Infrastructure

Sidewalks A minimum width of 1.5 meters, regular maintenance, and buffers from traffic are important factors in making walking comfortable (with a minimum clear walking width of 1.0 meter). (Lynch, K. 1960).

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

Street Crossings Factors include intersection geometry and controls, crossing width, and providing pedestrian refuge to break up wide crossings.

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.

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.

Access to Buildings should provide direct access to pedestrians, without forcing them to enter through parking lots.

D. Policies and Programs

Design Standards and Guidelines: Standards and guidelines should ensure that adequate facilities are provided for pedestrians including sidewalks, curb ramps, and bus shelters.

Roadway Operation Standards: Operation standards (e.g. intersection level of service) should balance the needs of all users (e.g. motorists, transit users, cyclists, and pedestrians).

Zoning Bylaw: Zoning legislation should support land uses and development patterns that encourage walkable communities.

Area and Neighborhood Plans: Land use and transportation plans should establish the urban form elements that allow walking to be a convenient travel option for residents.

Administration Support and Funding: The support of local government and investment in pedestrian oriented infrastructure is crucial to create more walkable communities.

Implementation: Implementation requires the support of decision makers and stakeholders, as well as funding to execute plans and programs. (Jacobs, J. 1961)

2.13 Conceptual framework of Walkability

Since Jane Jocobs‟ seminal work in the early 1960s, many urban design theorists have made creative contributions to the theories of good walking environment (Jacobs, J. 1961). They tried to answer the question: What makes for an enjoyable walking experience rather than simply what creates an efficient walking flow? Unlike researchers with transportation backgrounds, they looked at non-functional aspects of walking, such as sense of security and visual interest.

According to this body of literature, other pedestrians are no longer impediments to anyone‟s walking travel. They attract more pedestrians and street activities (Lynch, K. 1960) and increase the sense of security (Jacobs, J. 1961). The elements of a good pedestrian environment should be addressed at the street level (Lynch, K. 1960). Residential streets should serve not only auto drivers but all kinds of users sharing the space (Southworth M. and Ben-Joseph, 2003).

Pedestrian access also needs to be improved by leveling walking routes and eliminating grade separation (Lynch, K. 1960). Automobiles are a threat to the pedestrians that need to be tamed (Lynch, K. 1960) or have their negative environmental effects buffered (Allinson, J., 1996). Theorists are also interested in how pedestrians perceive their walking environment: the unfolding vistas experienced as one moves through the traditional townscape (Lynch, K. 1960), and the perception of space should be related to the time of movement (Lynch, K. 1960). Perhaps the most important work in this field is (Jacobs, J. 1961). She paid attention to the values of the walking environment, which had been overlooked, such as a sense of security and pedestrian comfort. She insisted that a sense of security in a public space is critical and can only be maintained by the existence of other people pedestrians, shop owners, and restaurant customers (Jacobs, J. 1961).

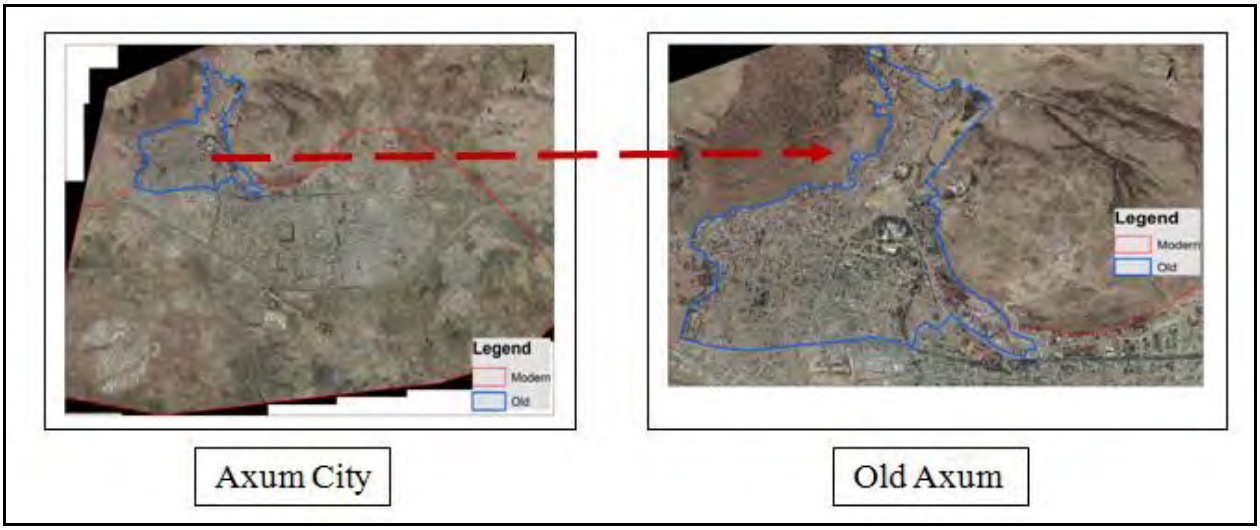
Chapter Three

3. Geographical Background of Axum

3.1 Location and Description

A. Location

The study area is located in Tigrai National Regional State, Central zone, at the historical and archaeological center of Axum town at about 240 km northwest of the regional capital city Mekelle and 1018km from the national capital city of Addis Ababa. Based on the current administrational structure the action area is grouped under HaweltiTabia. Geographically; the project area lies between an elevation of 1900m and 2560m above sea level and bounded between geographic coordinates of 469108m E and 1561383 m N and of 469951m E and 1562524mN.



Map 3.1. Location of the Study Area

B. Description

The major component of the project is destination development in Axum and environs, focused on tourism product which entails two aspects (the quality of the cultural experience, both tangible and intangible, and, the quality and variety of the supporting supply side service providers). Among the many infrastructure related interventions of the action area, improvement of visitors walking Routes in Axum is the main focus. The improvement of

Visitors walk Routs in the old Axum district covering an overall area of 157.94 hectares and developing tourist circulation routes around the historic areas stretching on a total of 26.82 kilometers.

3.2 Topographic Feature

The project site is an ancient urban settlement, flat landscape at the southern part outreach to gentle slope at the northern part situated in the verge of the mountain. The project is surrounded by mountains and hills in the north. The surrounding mountains are bare lands, characterized by steep to very steep slopes nature. Topographically the catchment of the study area and its vicinity are characterized by plateau, bare and grazing land mountains and undulating surfaces with an elevation ranging from 2000m to 2570m above mean sea level and characterized by steep to very steep slopes nature.

3.3 Climatic Features

A. Rainfall

It is situated in the southeastern part of Tekeze river basin with bi-modal rainfall pattern with the wet season extending from June to September. The project area is classified in the tropical rain climatic zone. In the climatic group the mean annual rainfall of the area is 797.30 mm. The maximum and minimum rainfall is received during the months of August and February respectively.

B. Temperature

In the target area, as in all other places of Ethiopia and in all places in the tropics, the altitude of the sun is always high, making solar radiation intense. The variation in the amount of solar radiation received daily is small throughout the year. Temperature is high during the day and is considerably reduced at night causing the daily range of temperature to be large. But in the case of monthly averages, variation is minimal and the annual range of temperature is small. This holds true in both the highlands and lowlands. Slight seasonal variations in the angle of the sun's rays and the length of the day are primary controls on temperature, resulting in a yearly temperature range that is less than the daily range. The mean minimum monthly temperature is expressed between 5.10C September and 5.7 0C in June and the mean maximum monthly temperature range from 240c to 280c in May.

C. Prevailing wind direction and speed

Wind speed has a great impact on the evaporation process. If the wind velocity is more, the evaporation is more because the saturated film of air containing water vapor tends to move very easily which makes easier the diffusion and dispersion process of vapors, causing more evaporation. The annual average speed of the prevailing wind is 6.2 km/hr. The wind speed has its maximum and minimum values of 12.3 km/hr and 4.11 km/hr at July and January, respectively. The wind direction is E-W.

D. Sunshine hours

Sunshine hours vary from mean 5.1 in July to 9.4 in May. The mean monthly sunshine hours of the target area is calculated. The maximum sunshine hour is recorded in May (11.4 hours) and April (8.4 hours) whereas the minimum one is in July (5.1 hours) and August (5.4 hours). Generally, the maximum sunshine hours are found in dry months whereas the minimum are in very highly rainy months.

Summery from the topography and climatic feature

The topographic and climatic features are most factors in determining the walkablety of the people in a specified area. In the study area the streets are laying from north to south mean the major roads. Same roads are lying from East to West which is difficult to walk in the afternoon if there is no shading. So considering sun orientation during pedestrian development is important.

Considering the rainfall data is important in designing the drainage line. Storm water is a major effect in deteriorating the pedestrian network. The topography of the area is more flat in nature but in the North and East part of the study area is mountainous. So considering the topographic nature in designing of the pedestrian network is important. In general considering of the climatic and topographic features of the study area during design of pedestrian network is important.

Chapter Four

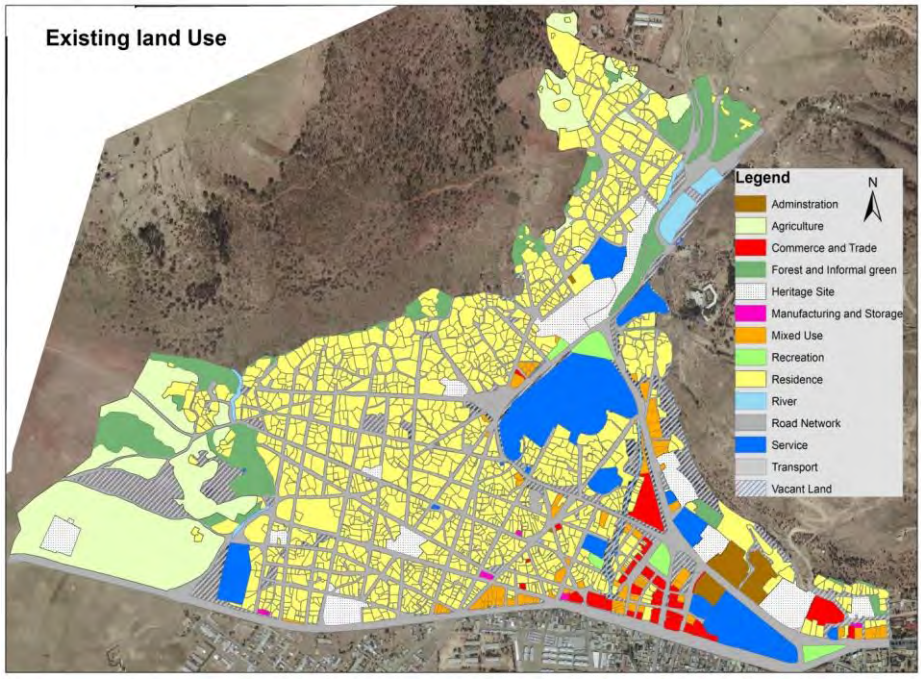
4. Built Environment Background of Axum

4.1 Spatial organization

The project area covering a total area of 157.94 hectares is composed of different land use elements. The dominant land uses that define the historical landscape of the area are the residential and the religious areas. The core structure is based on three public spaces. The connections of these open spaces are functioning like corridors. The nodes and the connecting corridors create the spatial organization while the functions of the areas connected to these spaces develop their land use structure.

A. Land use category

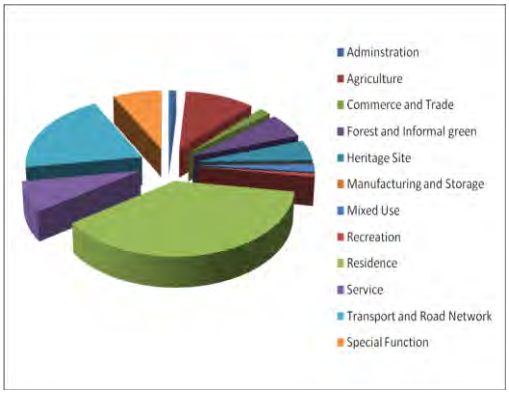
The land use map illustrates how much of the study is comprised of residential uses. Other land use functions are found in the study area like Mixed-use, commercial, Parks & public space, street network and Heritage Area.



Map 4.1. Existing Land use of the project area

Table 4.1 Existing land use of the study area

Land Use Classification	Area in ha.	Percentage
Administration	1.8	1.14
Agriculture	16.91	10.71
Commerce and Trade	2.84	1.80
Forest and Informal green	9.52	6.03
Heritage Site	7.9	5.00
Manufacturing and Storage	0.17	0.11
Mixed Use	2.92	1.85
Recreation	1.29	0.82
Residence	59.53	37.71
Service	11.61	7.35
Transport and Road Network	31.5	19.95
Special Function	11.87	7.52
Total	**157.86**	**100**



- Majority of the Existing land use of the study area is Residential function which covers 37.71% of the total land use of the area.
- Recreation, Service and commercial activities cover 1.29%, 7.35% and 1.8% respectively this indicates that there is less activities that attract to people of the area and it‟s surrounding.
- It needs Intervention to compromise the area to increase different activities.

Proximity to Shops and Social Services

The ability to effectively access public and human services when they are needed is essential for population health and well-being and for functioning communities. Public services like schools, health institutions public toilets shops and cafeterias recreation areas museum, police, and ambulances, post offices are part of the everyday fabric of our society. Geographic proximity is only one component of access to public and human services, but it is the only component that we can effectively map. (Other factors include levels of service availability, cultural appropriateness of the services, hours of operation, and eligibility criteria.) In the case of public safety and emergency services, proximity can also affect response times, which can significantly impact the services‟ effectiveness. Living or working in close proximity to

services that residents use regularly can also promote walking and biking, which improves health and reduces vehicle trips.

B. Public Spaces

There are public use open spaces in the project site and its influences area. The most known spaces are:

a) The Stele square,
b) Daero Piazza and
c) Daero Ela Piazza.

a) The Stele square

The open space in front of the standing Stele covers a total area of 1.13 hectare. It is a space where cultural, religious as well as current social events are performed. Major ceremonies include the festive of annual St. Marry (Mariam Tsion), the finding of the true cross, Ashenda, and part of epiphany. National holiday; like the Flag day, Ginbot 20; in commemoration of the fall of the Derg and regional holiday, Yekatit 11.

Map 4.2: The stelae Square map

Access

The site is well connected by collector roads in two directions with the main city Center of Axum. Beside the functions as an open space, the area is the major access for the Tsion church, and the Stele Park. The access to Mai Shum also crosses the open space.

b) Daero Piazza

The Daero Piazza has an open space that sizes up to 1.35 hectares. It is the liveliest of the three with urban functions. Currently, it is sustaining activity of traders, public transport (BAJAJS) connection point, pedestrians and vehicles crossing the space. The large tree sited on raised steps in the centre is the major landmark of the open space. The Mesob market is also a major

event that takes place once a week on Saturdays. The gas station is the only incompatible use that is situated at the eastern central part of the site. As it is already proposed on the thematic master plan it needs to be relocated.

Access

- It is highly accessible area from all directions of the city.
- The site is well connected by collector roads in four directions to the main city Center of Axum and two local roads.
- There are hierarchy of streets and pattern in terms of local and collector road system.
- All collector roads are paved by cobble stone and asphalt.

Map 4.3 : The Daero Piazza Square map

Open Space: there are two types of open spaces at this area:

- The first one is around the Daero, where there is a big plaza used as open market , car parking & breathing spaces for shoppers in the form of courtyard .
- The second one is found in the adjoining triangular block at the northern side of the big plaza. This courtyard is poorly functioning at this time.

Land use

The functions surrounding the open space are the key for the provision of its active urban life. Garment shops, retailers, people sitting and sewing in the arcades line the sides of the square. The predominant land use is commercial that leans more to the urban dwellers than tourism.

Map 4.4: The Daero Piazza Square map

Major physical features seen at the square includes:-Central Fountain, Gas Station, Arcaded Shopping, Library, Old Italian Houses, Open Market, Bajaj Station, Car Parking, Electrical Poles & Tele Lines.

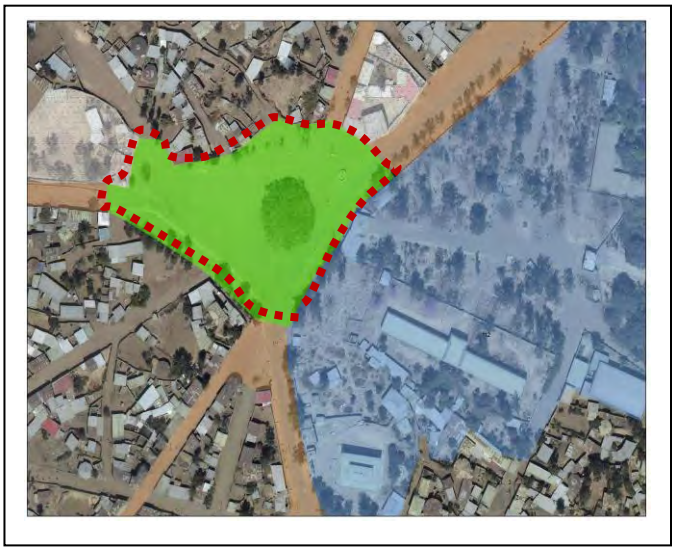
Social Aspect

This space has a lesser significance in the religious practices of Axum but has a wide range of activities in terms of social and cultural activities. Informal activities are also common around the Daero Piazza. Major social and cultural activities performed at the square includes:-

- Musical Concert
- Theatrical Performances
- Informal Open Market
- Shopping Activities
- Recreational Area

c) Daero Ella Square.

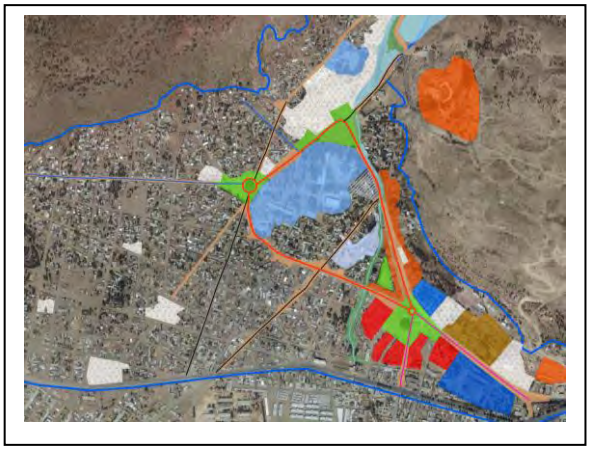
This is the open space where religious practice is takes throughout the year. All of the major religious ceremonies" processes either completely or partly are performed hear. It has an overall area of 0.78 hectare.



- The Daero Ella has also important significance in relation to Saint Yared whom legend describes as having been blessed with the art of putting scripture into song.
- The large tree sited on raised steps surrounding the base of the tree is the major landmark of the open space. This is a very important area where social gatherings are conducted.

Map 4.5: The Daero Ella Square Map

4.2 Street design and circulation patterns



- Some three patterns of streets layout are largely observed in this old quarter of which the grid layout is the dominant pattern in the old Axum. There is an intersection at the South of the main Stele site where three street radiate to run to East, South and West direction. Residential houses are concentrated in a linear manner along the streets.

Map 4.5: Existing Street Network and special function map

Size and characteristics of existing streets

Street in the study quarter vary in length from 50m to 1km while their width ranges from 6m to 20m. However, there are still pedestrian ways having a width less than 6m.Quality of the streets in the study area is of cobble stones which construction.

Sidewalks and pedestrian Circulation: most of the study area has not enough side walk for pedestrian they use the main road for walking. There is no well connected pedestrian accses in the stady area ike marked pedestrain crosing Zebra crossing.

Sit-ability and Site Amenities: when we see the stady area frist of all there is no side walk to implment or to put those aminities in the side walk.

Photo 4.1: Different Pictures of the street and paths

Transportation system: in the study area most of the people use walking as means of transport.

Curbs ,Buffer and barriers: when we observe the study area there is no buffer and other amminities that are comfortable for the pedestrian movement.

Pedestrian Facilities : in the study area there is no pedestrian facilities,like dust bin, street furniture, and other amenities.

Troust attraction sites

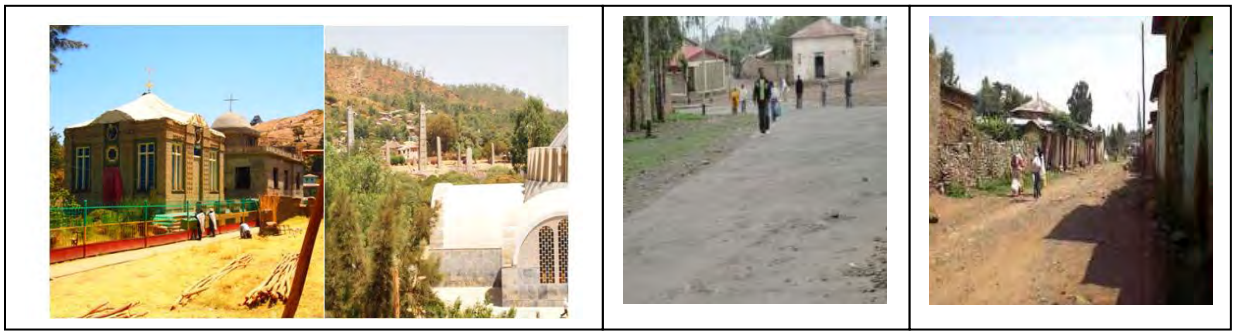


Photo 4.2: Tsiyon Mariam and local paths surrounding area

Road Lighting **and Signage :**The use of signs and pavements markings, as well as details on how these traffic control measures should be employed.

- **Street Pavement Materials:** The study are street pavements are Cobblestone under construction, gravel and earthen.
- **Path size:** in the study area there are different sizes in terms of road hierarchy most of the study area widths are from 4 - 20m.
- **Existing condition of the route:** most part of the routes are not good for walking because the street being rough and the pavement material being not uniform.

Photo 4.3: The relationship between building and path

On and Off street parking: there is no on and off street parking in the study area but they use along the road side without permission.

4.3 Building characteristics of the study area

Photo 4.4: Different tourist attraction sites

Building patterns the distribution of residential buildings and streets in the old quarter have different patterns. Residential buildings are distributed in different parts with different manner and patterns. In the south, southeast and central northwest mainly along major streets the density of houses are comparatively high. On the other side, the blocks are more of rectangular irrespective of the different forms of traditional buildings and plots,except in the northern and eastern peripheries, which are the result of the grid pattern. But blocks in the west of Tsion Mariam church have different forms such as rectangular, triangular,trapezoidal ones.

Photo 4.5: Buildings and selection of construction material

Building Use function and Height: Dominant building function are residence same buildings along the streets serve as show room of the heritage and commercial activities. most buildings in the stady are are G + 0.

Photo 4.6: Building frontage and pedestrian walkway

Building construction material: Most of the buildings of the old quarter both traditional and modern have wall made of stones. The walls of the traditional houses and their fences were constructed with stones of small types having circular or similar shape mostly of granite nature. On the other hand, modern houses were built with prepensely dressed stones mainly of trachytic and basaltic nature extracted from quarries. The inner and outer front walls of both buildings are mostly plastered with chicka/mud/ mortar. The roof cover is presently corrugated iron sheet.

In regard to paintings, different color paintings are applied to several buildings walls and entrance fence gates, thus, the front sides of the buildings erected west side of the steal are painted mostly with bright green and cream color that may magnify the green beauty, while these along the eastern side have mainly white and cream colors contributing to the magnificent view of the surrounding areas. There are also several buildings with clear blue paint. Other buildings with royal blue, violet and other strong color paints are commonly used for houses having functions other than residential such as commercial or other similar activities. Finally, it is common in Axum that fence gates or main entrance of houses gate separately painted with bright green, cream or other similar color that may contribute to the decoration of the area and the minimization of the monotony of the common stone and chicka/mud/ color.

4.4 Landscaping analysis

Aesthetics ,Vegetation cover and shade In the study are there are different vegetations covers among which are ,Fickes Sur/Warka/ , Gravilia robista, Shaines mole /tikur berbere/, Yediredawa zaf,

Photo 4.7: Landscape of sites

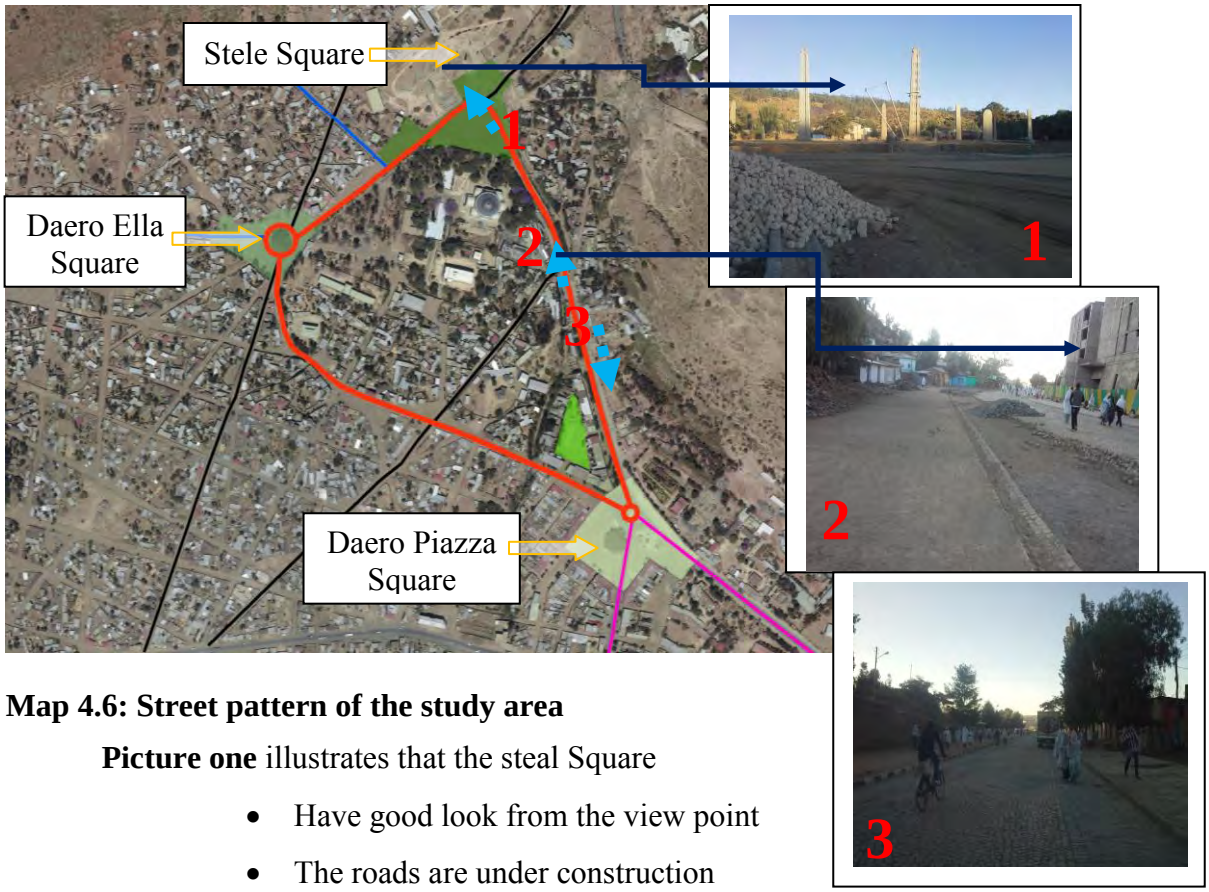
- The study area have a good vegetation cover in private buildings which is important in the conservation of the environment.This vegetation cover increases the tourist atraction because vegetation is the mojor factor in rehabilitating. As the picture shows as the color of the building is contrasted with the srounding area.

4.5 Utilities

Drainage Line: in the study are there is artificial and natural drainage lines that drain the storm water to the lower elevation. but the designs of the drainage lines are not proportional with the amount of the runoff. this storm water dicreases pedestrian movment.

Photo 4.8: Drainage Line and Storm water relationship

4.6 Walkability Analysis by Serial Vision



Map 4.6: Street pattern of the study area

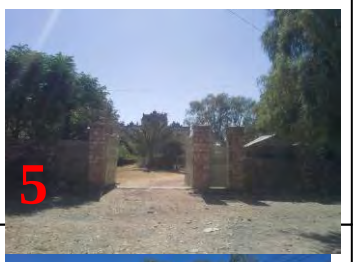
Picture one illustrates that the steal Square

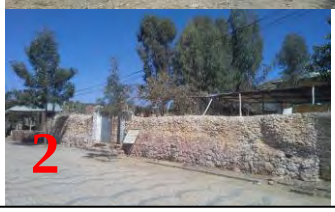
- Have good look from the view point
- The roads are under construction
- The beautiful view of the background/the green mountain and the sky view/

Picture two illustrates that the new building for museum

- It is out of scale from the surrounding
- it covers the view of the church
- the construction material is not similar with the existing buildings

Map 4.7: View Corridor from Ezana Park to Daero Piazza





Picture one illustrates that the Negisha Hotel

- It was constructed out of local materials
- It is a traditional hotel
- It was respect the previous architectural features

Picture Two illustrates that the historic site

- It is found along the street and is viewed easily
- There are no activities around it.
- The street was named but not visible from all direction

- ❖ Picture three fuel station which is in compatible
- ❖ Picture four the tope view of the Daero Piazza
- ❖ Picture Fife Library
- ❖ In general this rout is full of closed or blind well that decrease social activities

Picture one illustrates that the historic site

- It is found along the street and viewed easily
- There are no activities around it.
- The street was named but not visible from all direction
- It shows good landscaping

Map 4.9: Tourist attraction site along the rout

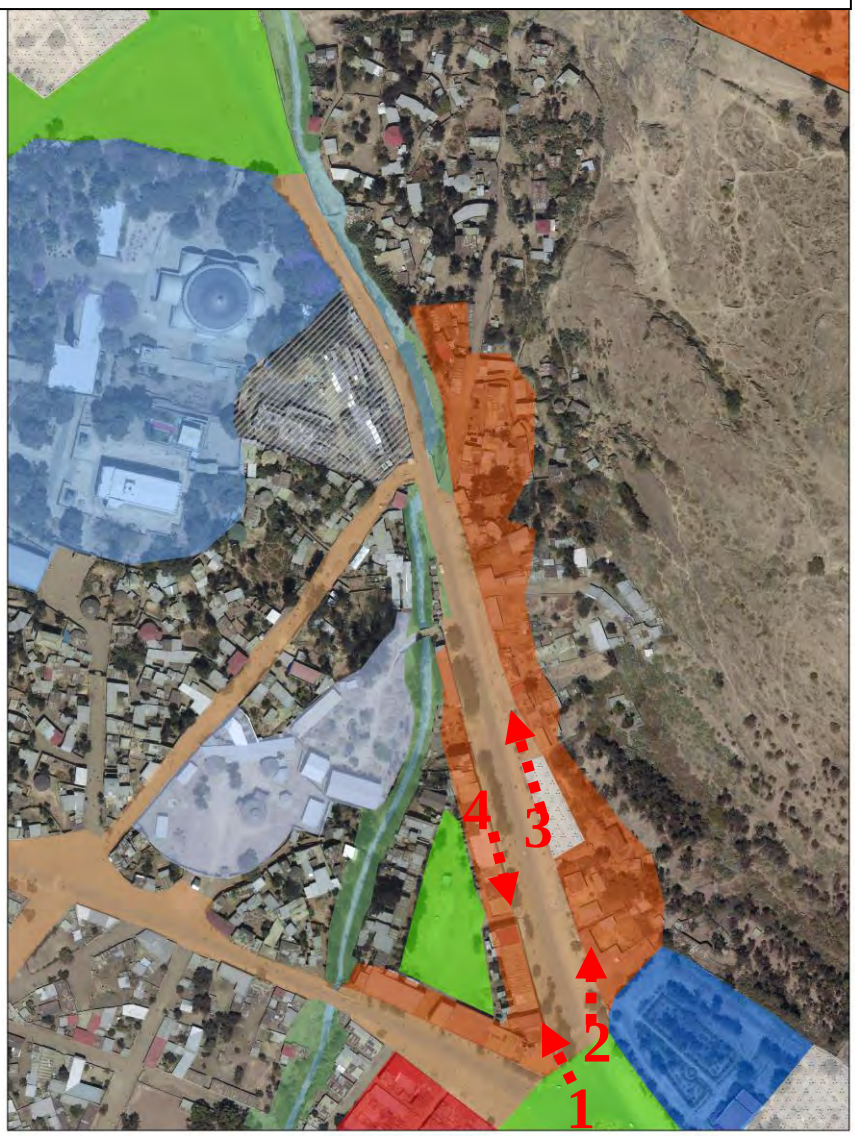
Picture two illustrates that the historic site

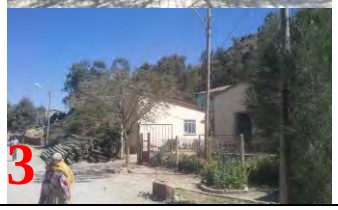
- Have good look to the north west
- both sides of the road are dead end
- well furnished street and side walk
- trees are not planted

Picture three illustrates that the historic site

- Easily viewed from the street
- The pedestrian walkway serve as temporary west disposal site
- There are utility lines and poles that interrupt pedestrian movement

Map 4.10: View corridor from Daero Piazza to Stelae Square





Picture two illustrates that cultural shop

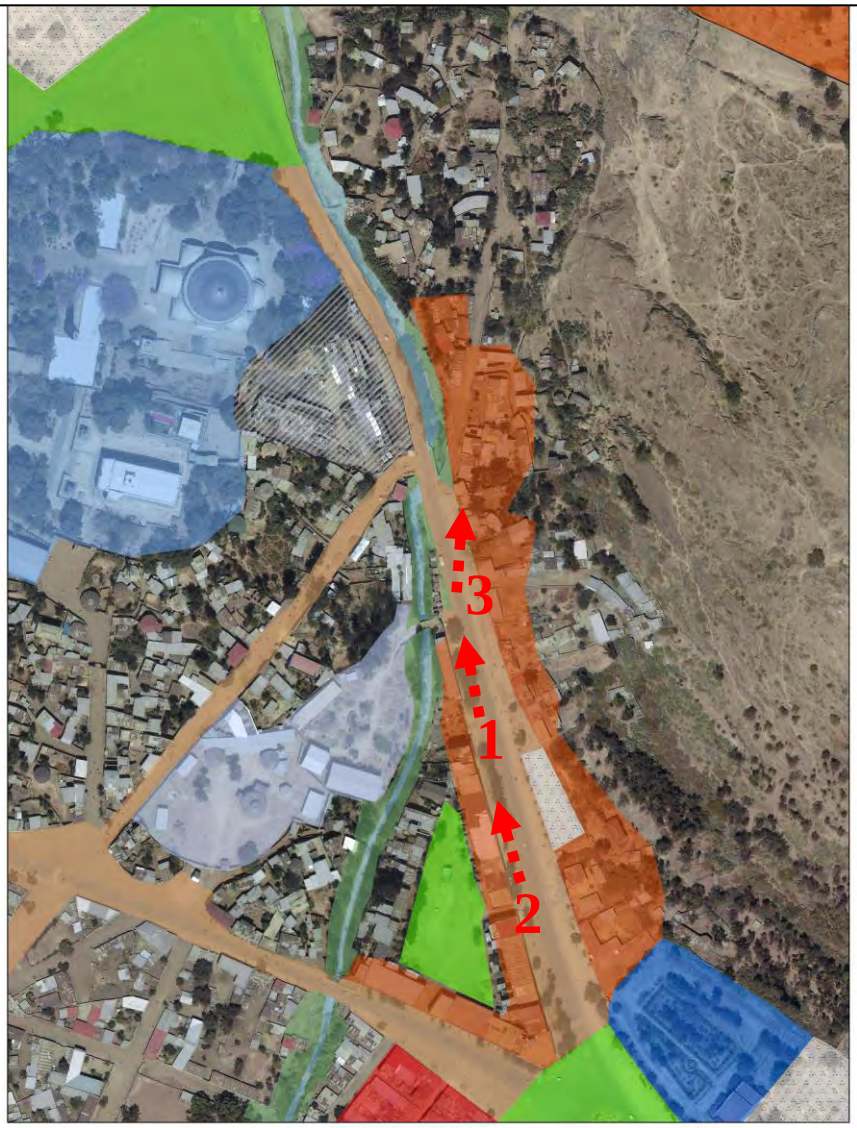
- Full of cultural equipments
- There are no activities around it.
- It shows good landscaping

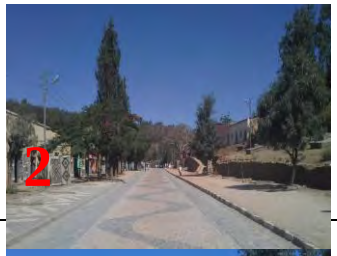
Picture three illustrates that there are service office / postal and Telecommunication/

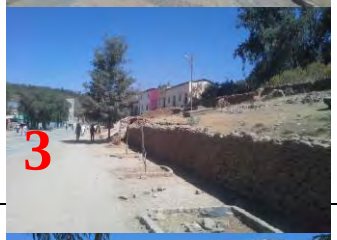
- This office use the side walk as a store
- over crowded the pedestrian was affected

- Tourist attraction site along the rout

Map 4.10: View corridor from Daero Piazza to Stelae Square







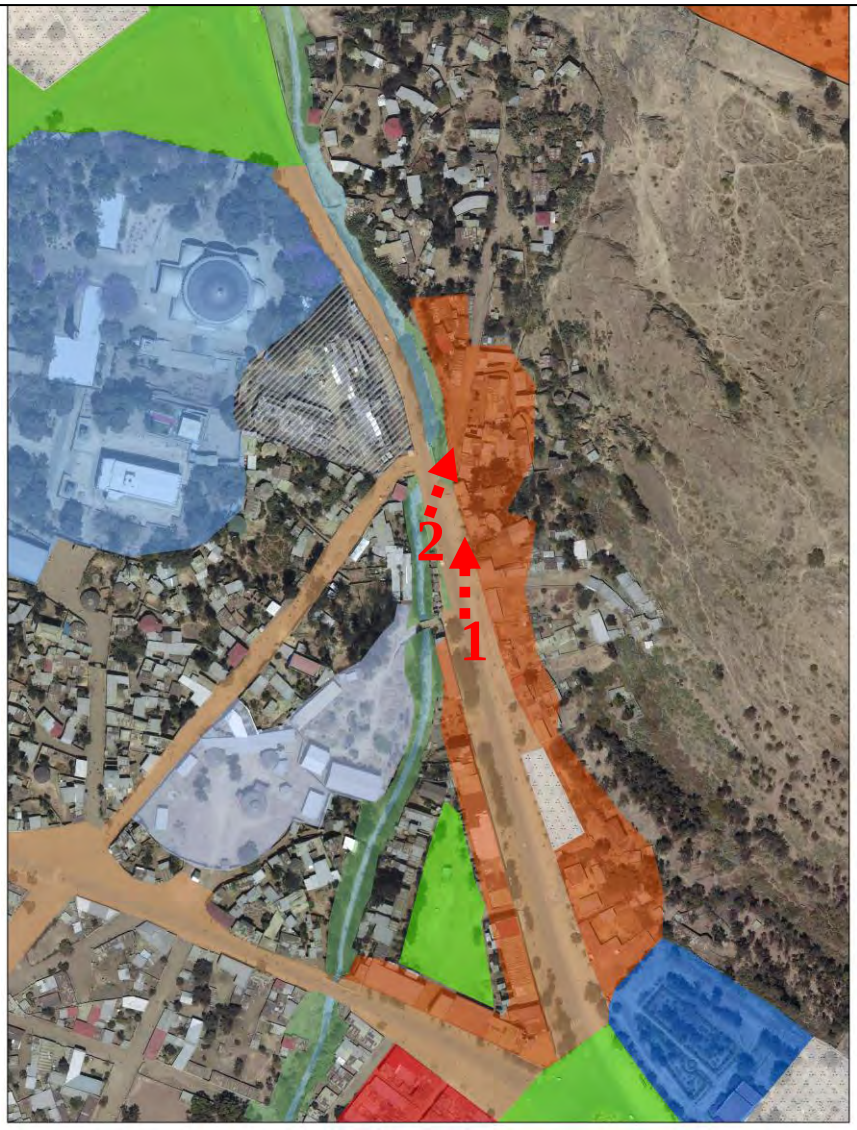
Picture three illustrates that with respect to landscaping of the site

- There is good landscaping design but lacks trees
- Uses local material for construction
- There are no commercial activities
- Has a good view to North as viewed from this point
- It considers for all pedestrian users

Picture one and two shows as the landscaping of the site

- there is good landscaping good pedestrian finishing
- use local material for constriction
- have interesting view to North as viewed from this point

Map 4.10: View corridor from Daero Piazza to Stele Square



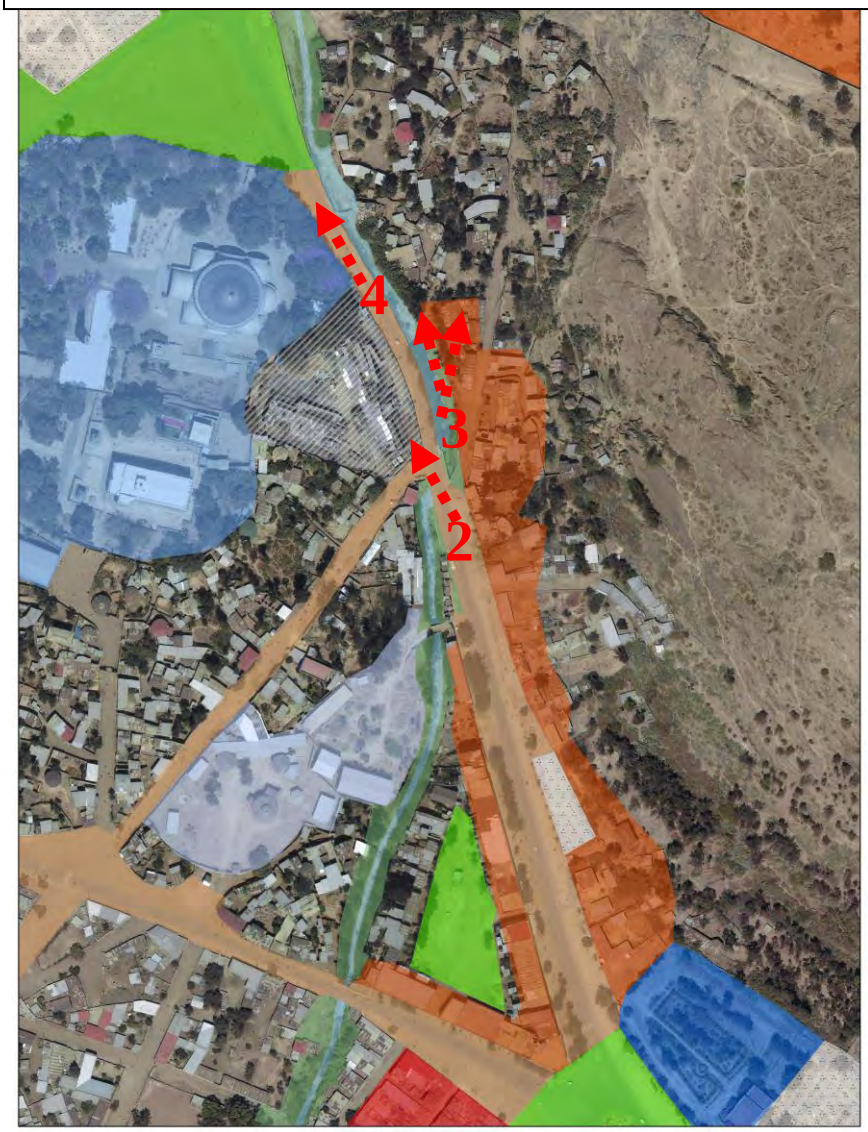
Picture two illustrates that the landscaping of the site

- It is difficult for elderly peoples
- Uses local material for construction
- In the side walk there was a barrier like manhole
- Has good view to North as viewed from this point

Picture one illustrates that the landscaping of the site

- There is good landscaping design
- The retaining wall is good and well appearance
- Have good look to east side viewed from this point

Map 4.10: View corridor from Daero Piazza to Stele Square



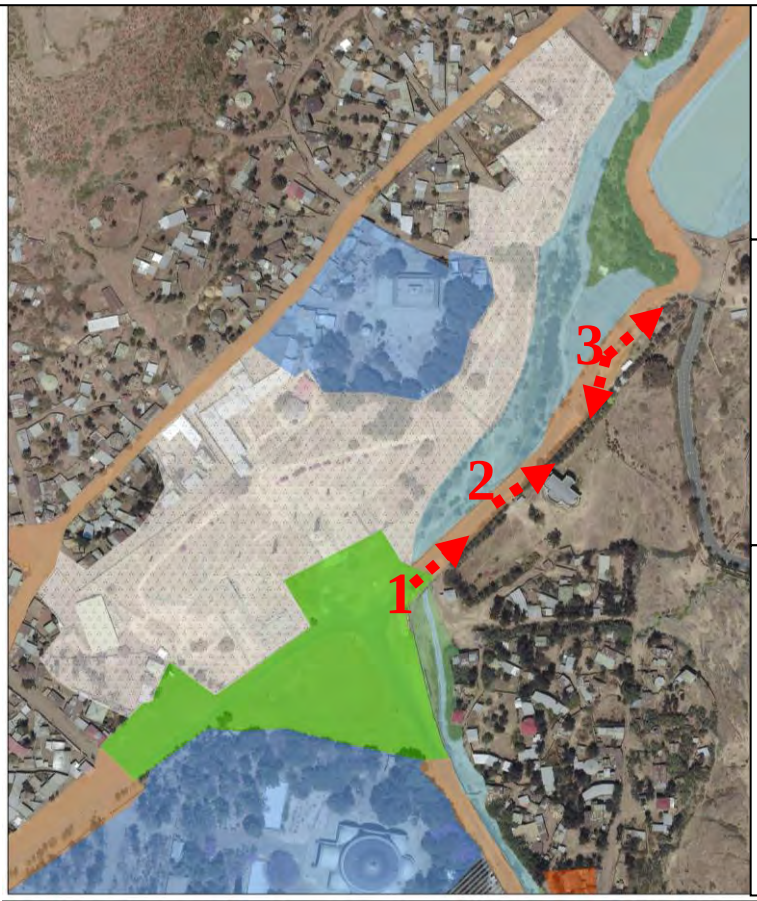
Picture two illustrates a big building/under-construction/

- it was under constriction but out of scale from the surrounding
- It blocks the view of the church and the stele
- It does not respect the surrounding buildings
- It is constructed by a different material from the area
- Has good view to the east as viewed from this point but the west side view is blocked

Picture four illustrates that the stele

- It was under constriction but out of scale from the surrounding
- Has good view from this point
- Street under construction

Map 4.11: View corridor from Stele Square to MyShum

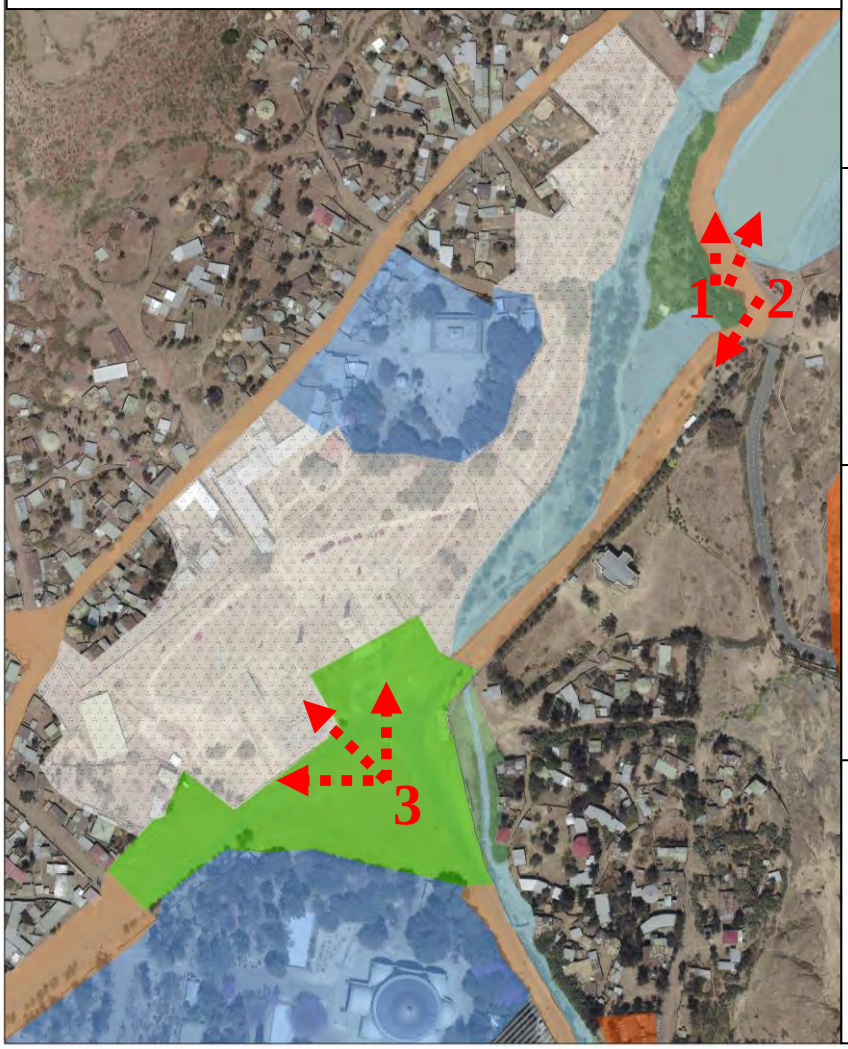


Picture three illustrates that the landscaping of the site

- the street has a good trees coverage and good vegetation around it
- Use local material for construction
- On the side walk there is a barrier like manhole water tank electric pole
- Has good view to the east as viewed from this point

- Tourist attraction site along and around the rout

Map 4.11: View corridor from Stele Square to My-Shum



Picture one illustrates that the landscaping of the timiket bahir/May-shum/

- Has a cultural importance
- The road pavement is of cobble stone
- Has good view to the east as viewed from this point
- This rout have a cultural and political importance
- In this rout there is no commercial activities to entertain the local people and tourists

Picture Three illustrates that the landscaping of the stele

- The area have a good look from three direction
- Have vegetation cover as a background
- it needs proper management in the perspective of landscaping

Map 4.12:View corridor from Stelae Square to Daero Ella Square

Picture one and three illustrates that the landscaping of the Daero Ella

- Has a cultural importance and undertakes different cultural ceremonies
- The road pavement is cobble stone which under construction
- Has good view on all sides as viewed from this point
- there is a landscaping in this area to enhance the cultural importance of the square

Picture Two illustrates that the landscaping of the street

- The area has a good street plants
- the street have 3m sidewalks and uses as a on street parking

Map 4.12:View corridor from Stelae Square to Daero Ella Square

Picture one illustrates that the landscaping of the Daero Ella

- Has a cultural importance
- The road pavement is cobble stone which under construction
- has good view on all sides as viewed from this point

Picture two illustrates that the landscaping of the St.Yared

- The area has good street plants
- the street has 2m side walk on both sides

Map 4.12:View corridor from Stelae Square to Daero Ella Square

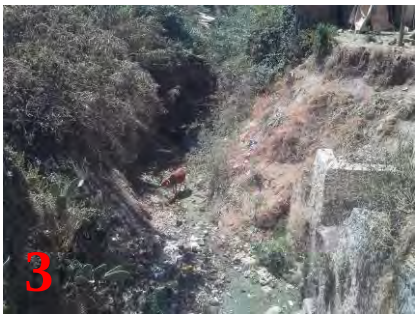
Picture one illustrates that the landscaping of the street

- There is a transformer that is a barrier for pedestrians
- The road pavement is of cobble stone which is under construction
- Has good view to the East and West as viewed from this point

Picture two illustrates that the heritage buildings

- The buildings are of good condition same of them are not constructed out of local materials.
- The street has 3m side walks

Map 4.12:View corridor from Stelae Square to Daero Ella Square



Picture two illustrates that the landscaping of cultural building

- Has a cultural importance and constructed by local materials
- The road pavement is cobble stone under construction
- Has good view to the East and West as viewed from this point

Picture three illustrates that the landscaping of the stream

- It is used as a waste damping site

Map 4.12:View corridor from Stelae Square to Daero Ella Square

Picture one illustrate the landscaping of the street

- The road pavement is cobble stone which is under construction
- Has good view on all sides as viewed from this point
- The street has 3m side walks

Picture two illustrate the open space and local paths

- The open space is not working as an open space but serves as production site for cobblestones.
- In this rout there is a pedestrian path but not well furnished

Map 4.12:View corridor from Stelae Square to Daero Ella Square

Picture one illustrates that the cultural building

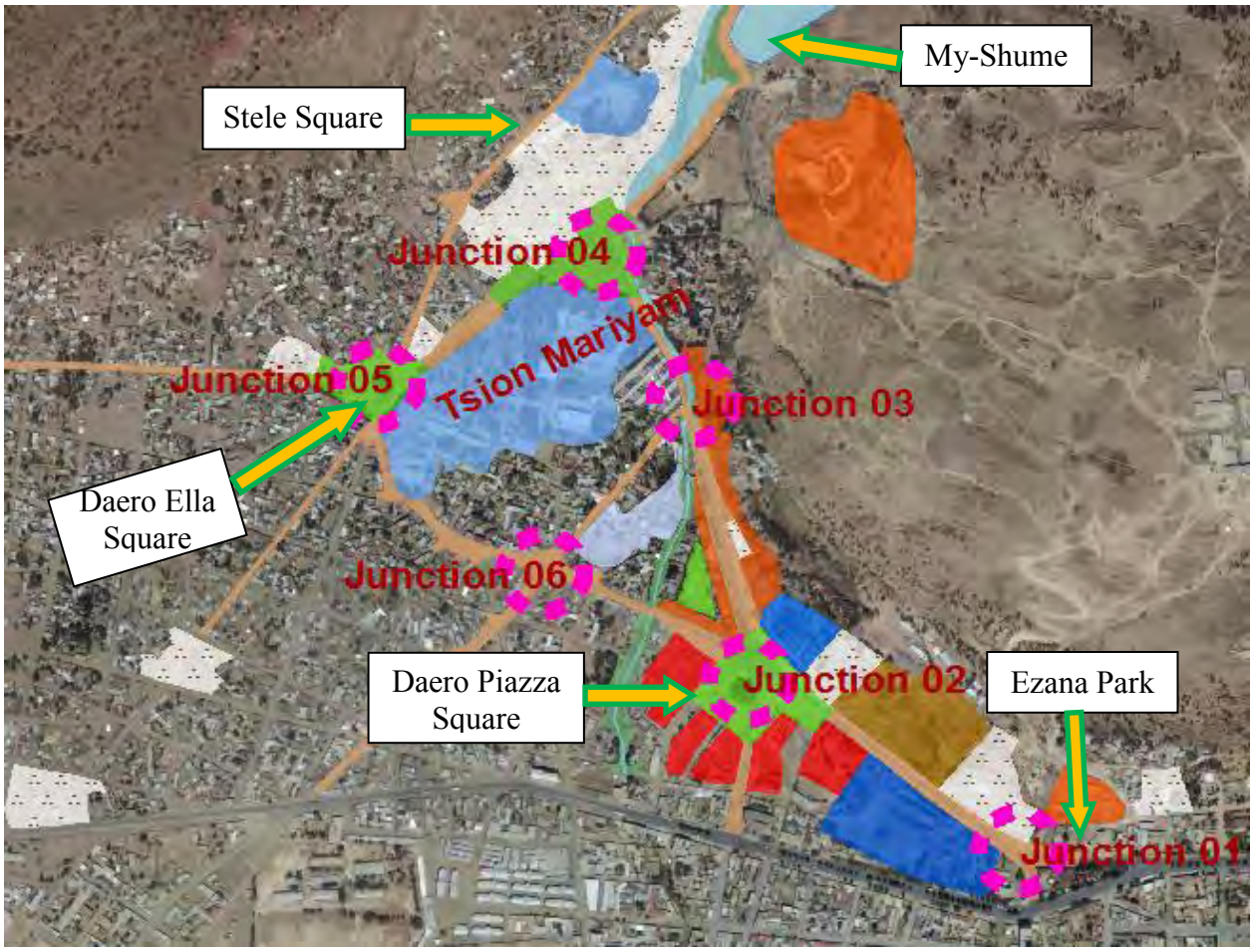
- The buildings are constructed by local material
- It is a arcade type of building
- It is a commercially active area
- Has good view on all sides as viewed from this point
- The commercial activities are not in service based

Picture two illustrates that the landscaping of the Daero Piazza

- The area has a good pavement
- Different activities take pales in this open space
- The area serves as a parking area
- It is accessible from all direction of the city

4.7 Pedestrian Travel Data

Pedestrian travel data in the old Axum was obtained from the pedestrian count in different junctions. The central focus of presenting the pedestrian count information is to identify the current mode split of people that live and work in the city. Transportation mode split refers to the choice of transportation a person selects to work, which includes walking, bicycling, public transport driving alone etc.



Map 4.13: Selected Junction for Pedestrian Count

Table 4.2: Pedestrian count on selected Junctions

Day	**Target group**	**Peak hour /1:00-2:30 and 5:30-8:00/**	**Off Peak Hour /2:30-5:30 and 8:00-10:30/**
Monday	People	**635**	**321**
	Cycles	**20**	**6**
	Animals	**20**	**3**
	Animal carts	**-**	**2**
Tuesday	People	**453**	**98**
	Cycles	**5**	**2**
	Animals	**20**	**-**
	Animal carts	**3**	**4**
Wensday	People	**257**	**853**
	Cycle	**10**	**25**
	Animals	**-**	**20**
	Animal carts	**-**	**1**
Thersday	People	**256**	**153**
	Cycles	**6**	**1**
	Animals	**-**	**5**
	Animal carts	**1**	**-**
Firaday	People	**352**	**1905**
	Cycles	**10**	**1**

	Animals	-	-
	Animal carts	-	-
Satarday	People	**1235**	**321**
	Cycles	**30**	**9**
	Animals	**60**	**30**
	Animal carts	-	-
Sunday	People	**1532**	**325**
	Cycles	**40**	**6**
	Animals	-	-
	Animal carts	-	-

Source: own pedestrian count 2015.

The above table shows as the pedestrian movement in the study area was more in the weekend and in the peak hours. This leads as to do some intervention along the corridor that interactive the people in the area.

A. Pedestrian Perception about the study area

There are many factors that may affect the level of walkability in the study area within the community. Therefore, this study aims to determine whether the current pedestrian networks are suitable to develop a walkable area in old Axum by analyzing the level of walkability in the area.

Available evidence suggests that the study is one of the most archaeologically sensitive areas of Axum. Despite its archaeologically sensitivity, the whole area is almost covered with built up areas.

In order to evaluate the level of walkability between different types of street, a questionnaire survey was conducted on different junctions and streets.

A sample of the questionnaire survey can be found in Appendix. A total of 62 questionnaires and interviews have been distributed e within the study area. Although not all the interviewees are the majority of the residents or workers in some of the case studies, their responses ave already provided a representation. The following table outlines the profile of the survey with the pedestrian.

Table 4.3: Profile of pedestrian surveyed

Location /Junction/	Total number of interviewees	Type of interviewees in the study area		Age			
		Visitors	Residents or Workers	<18	18-40	40-65	>65
01	15	2	13	1	3	9	2
02	13	1	11	-	6	2	5
03	4	-	4	3	-	1	-
04	16	2	14	4	-	10	1
05	7	-	7	-	-	5	2
06	5	1	4	-	3	2	-

Source: Profile of pedestrian surveyed

Table 4.3 shows a diverse range of people in different age group giving response to the survey, which reflects a balance of needs and views from vary age group within the society. As mentioned above, apart from the data collection form the public for their opinions, walkability assessment on the area would be done with the criteria for a walkable area as the indicator through an onsite observation on the physical condition. An introduction of these indicators is listed in the table below:

Table 4.4: Walkability Assessment Indicators

Indicators	**Elements to access**
Connectivity	• Path distance to various destinations • Number of pedestrian connections in the area • Density of path intersections • Block size
Linkage to other modes	• Connection to other transportation mode to enhance the connectivity within the city area,
Land use patterns /Different Activities in the area/	• Land use pattern in the area related to surrounding environment

Safety	• Facilities along the pedestrian paths to provide safe walking condition in the area to the surrounding
	  • Lighting
	  • Conflict with vehicular traffic

Path Quality	• Width of pedestrian path • Walking environment and barriers, pavement etc. • Shading / Natural Sunlight / • Lighting • Continuity
Path Context	• Physical facilities and visual interest along the pedestrian path to entertain pedestrian • Path design of the street • Trees and landscaping • Interaction with street front • Lighting and views • Interaction with vehicular traffic for noise and air pollution

Source: Walkability Assessment Indicators

Table 4.5: Questionnaire survey results

Questions		Level of satisfaction towards the situation in the pedestrian Network					Total
		Very satisfied	Satisfied	Average	Unsatisfied	Very Unsatisfied	
Pedestrian Connectivity	Connection to the surrounding area	**2**	**3**	**42**	**10**	**5**	**62**
	Pedestrian circulations connecting surrounding area	**1**	**7**	**13**	**31**	**-**	**53**
	Do you always use these pedestrian routs in the area to the surrounding area?	**20**	**6**	**30**	**1**	**4**	**61**
	Which pedestrian rout would you prefer for connecting the area with surrounding area?	The street/ rout/ that conect the Dero piazza to Steal = 85% The street that connect Daero Ella to Dero Piazza = 15					

Source: Questionnaire survey results

Table 4.5;Questionnaire survey results

	Questions	Level of satisfaction towards the situation in the pedestrian Network					Total
		Very satisfied	Satisfied	Average	Unsatisfied	Very Unsatisfied	
Pedestrian Environment	Openness to public use	**6**	**9**	**35**	**1**	**10**	**61**
	Comfort	-	**5**	**40**	**6**	**3**	**54**
	Safety		-	**53**	**9**	-	**62**
	Quality of the pedestrian path	-	**5**	**9**	**35**	**6**	**55**
	Design of the pedestrian path	-	**3**	**1**	**46**	**10**	**60**
	Activities along the pedestrian path	-	**6**	**10**	**43**	**3**	**62**
	Any improvements that can be done on these pedestrian circulations?	❖ Some pedestrian paths are too narrow ❖ Some pedestrian path are too boring ❖ Good network it needs signage for direction ❖ Do not have enough activities along the pedestrian path ❖ Pedestrian path is uncomfortable and difficult to locate through walking					
	Which pedestrian walkway would you prefer to use for traveling around in daily life?	The route that passes from Daero Piazza to the Stele area					

Source : Questionnaire survey results

B. Walkability Assessment on Atudy Area and Data Analysis

In this section, the study area elements were examined with the indicators listed on the above table with the support of the results from the questionnaire surveys; to able to see whether these study area is suitable to develop in the future to create a walkable and sustainable area.

Connectivity

From the questionnaire surveys, more than half of the interviewees in the study area feel average satisfaction with respect to connection of the pedestrian network to the surrounding environment. Moreover more than half of them are not satisfied about the connection. They think that there is no enough pedestrian access connecting the housing unit to the surrounding community. The use of pedestrian path in the area was not well supported by the people since nearly all of the interviewees in the surveys will use the pedestrian path in the area to travel within the old Axum and to the surrounding area. However, these areas are in size and needs to have interesting activities along it to enhance the walking experience. From the survey on site, around 40% of the interviewees feel the connection of study area to the surrounding area to be not good.

Land use diversity of the study area

The study area does not have different land use patterns around and within. The building in the area is monotonous land use which are residence and retail shops/commonly cultural equipment/. A walkable area require a high density land use pattern in order to facilitate pedestrian travel in reasonable walking distances seeking their daily necessary goods. Although there are not much active land uses around at the moment, there will be more interesting and active land uses like the new /modern/ Axum area which is of diverse land use pattern. The study area will be surrounded by other residential and commercial activities to provide a balance land use between commercial and green areas.

Safety

From the opinions of the interviewees in the study, generally they feel the pedestrian paths are not safe to walk on .One of the possible reasons for the study area having low degree of sense of safety for the pedestrians is due to the pedestrian paths on the area being not smooth and well-constructed according to the expected standard. People cannot walk freely in a safe

condition especially the children and elderly tending to have a less concentration with regard to the condition of traffic and slow motion of walking practice. In addition to this, pedestrian paths in the area are not well furnished.

Path Quality

Majority of the interviewees in the study area found the quality of the pedestrian paths to be not satisfactory. Therefore a barrier is created for the people who are elderly, disabled and using wheelchair, although the pedestrian surfaces on the routes are not flat and smooth. Path Quality in the study area has generally received satisfactory comments from the results. 50% of the interviewees on site think it does a not satisfy quality walking environment.

This is because most of the pedestrian paths do not have good pavements along the pedestrian paths. They are not aesthetically attractive. Moreover, most of the accesses are not smooth surfaces and do not have ramps to be able to travel between the different levels for all with disabled people including those using wheelchairs.

The impact can be shown from the reposes from the interviewees on site with 50% of them thinking that the quality of the pedestrian path to be average and near 10% of them thinking that it is in an unsatisfactory condition.

Path Context

The study area does not have a rich path along the pedestrian network. First of all, retails shops are not located along the route. Therefore they limit interaction with the streetscape. Shops are not located along the pedestrian path on the study area. This is not only maintaining the pedestrian flow at different levels on the area, but also increasing the sense of safety with more vibrant activities. Gardens with seating, greenery, fountains and playground facilities also enhance the vibrancy of the area. However, since the area lacks signage to give directions in the estates this has caused an inconvenience to visitors as well as the residents in the city. Continuous retail stores exist along the edge of the route thereby enhancing the interaction with the streetscape, and providing a more interesting walking environment to the public and visitors. However, people think that the pedestrian paths generally lack greenery not having a richer landscaping. On the other hand, there is no sufficient signage inside the study area to give direction of the path connections to enhance walking experience for pedestrians.

There are no restaurants, cafes and greenery to enhance the vibrancy of the public area and there are no vibrant activities to attract pedestrians to walk around and have a pleasant journey. Building facades are mainly made of stone which make the streetscape attractive for pedestrians.

These streetscapes do not have any physical and visual interests for pedestrians. Hence, in the result of the questionnaire survey, there are only 10% of people satisfied with the current situation of the paths, while there are 20% who feel that it is in an average condition, and 50% of people who think it is an unsatisfactory walking environment.

Summary of Analysis

After the assessments of walkability with indicators on the study area, the following tables show data from the questionnaire surveys towards the preference of the form of pedestrian circulation taken from the interviewees and the summary of the results from walkability assessment. All these results have helped to put forth a Guideline and recommendation for the study area, Some recommendations will be forwarded to be able to create a more walkable environment in the old Axum city in the future by designers and city managers.

Table 4.6: Summary of Walkability Assessment on the study area

Connectivity	❖ Good connection of study area with other areas but lack of physical connection with the area ❖ Good connectivity and linkage with the adjacent environment, acting as a connector at different levels in the urban fabric.
Linkage to other modes	❖ The study area does not have any connection to other modes of transportation within a short walkable distance
Land use patterns	❖ The study area does not have a land use pattern inside and around the area to provide an environment with different activities for pedestrians within a walkable distance ❖ The land use functions that are found along the routes are mainly residential and retailing shops which focused on cultural materials. ❖ In the route from Ezana Park to Daero Piazza the land use pattern does not encourage wakabality because there is no

	activity along the route. ❖ The land use pattern along the corridor is incompatible to each other like library with administration offices.
Safety	❖ The area is not a safe walking environment for pedestrians with regard to separation of pedestrian movement from the vehicular traffic. ❖ There is no well shading to protect sun light. The corridor that starts from Stele Square to Daero Ella that viewed to west. in the afternoon it is difficult to along this corridor
Path Quality	❖ In the study area there is a barrier for the disabled, generally it is not a comfortable walking environment, because it lacks nice walking surfaces along the pedestrian paths. ❖ The pedestrian paths are not well paved and lack smooth walking surfaces. There are no ramps as connectors between different levels, in creating a barrier free walking path for all.
Path Context	❖ Along the pedestrian path there are no vibrant activities physically and visually and there is lack of signage to give direction ❖ There is no signage inside the study area to provide direction. ❖ There are no shops or activities along the pedestrian path in and around the study area.
View of the area	❖ The study area has good view to North and East. This is because of the two mountains. ❖ The two mountains are covered by vegetation. The mountain back of the stele serves as a background to the stele park. ❖ Developing view points on those mountains is important to attract tourists view from those points.

Source : Summary of Walkability Assessment

4.8 Major Findings

Connectivity

From the questionnaire surveys, more than half of the interviewees in the study area feel average satisfaction with respect to connection of the pedestrian network to the surrounding environment. Moreover, more than half of them are not satisfied about the connection. They think that there is no enough pedestrian access connecting the housing unit to the surrounding community.

Positively correlating with the degree of connectivity, small block sizes usually produce compact urban form. Smaller and shorter blocks fit to the scale of walking. The study area clearly shows that the street segments that are in poor condition are forming a pattern of network. Most of the roads are full of constraints.

From the study area and different literatures it is found that if a heritage area is more walkable and accessible to different tourist attraction sites. The heritage assets are more protected and preserved. In the study area the settlement is old and the buildings needs protection from disturbances by the new development.

Safety

From the opinions of the interviewees in the study, generally they feel the pedestrian paths are not safe to walk on .One of the possible reasons for the study area having low degree of sense of safety for the pedestrians is due to the pedestrian paths on the area being not smooth and well-constructed according to the expected standard.

Majority of the interviewees in the study area found the quality of the pedestrian paths to be not satisfactory. Therefore a barrier is created for the people who are elderly, disabled and using wheelchair, although the pedestrian surfaces on the routes are not flat and smooth.

The result of the study shows that the physical character of old Axum is low scale in nature both along the commercial corridors and in the residential community as well. The land use map shows that the majority of the study area is comprised of residential uses and commercial activity which are focused on cultural equipment along corridors. There are no restaurants, cafes and greenery to enhance the vibrancy of the public area and there are no activities to attract pedestrians to walk around.

Building facades are mainly made of stone which make the streetscape attractive for pedestrians to walk. The key religious spaces around the Church Precinct will be better defined, well surfaced in patterned stone and provided with shade, seating and good lighting. The Ceremonial Street to the stele contains some delightful souvenir shops.

It‟s clear by the map layers that in terms of all of the factors considered the study area is in poor condition to foster the demand for walking. Lack of sidewalks and furnished pavements, inadequacy of drainage line, poor drainage network are witnessed within the site.

Satisfying attributes of successful pedestrian tourism such as continuity orientations and safety and security finding interesting routes between the identified major attractions enhance the pedestrian tourism experiences. The major issues affecting continuity is the pedestrian network which is not furnished or not well improved. In addition to this, those roads that have pedestrian walkways are also full of constraints. To walk along these roads requires pedestrian walkway improvements like upgrading and widening sidewalks to ensure an easy flow, and reinforcing visual perceptions and views of entrance points to the pedestrian paths and tourist attraction sites.

Availability of local durable construction materials in close proximity to the study area, There is a pedestrian paving using locally quarried stone, in a variety of textures and patterns. Good topography of the area and vegetation cover (composed of indigenous plants) exists in the study area and the people have a good culture in planting trees in its garden area.

The old Axum settlement building marks the starting point attraction for the pedestrian route. Old Axum Settlement is chosen for tourist mobility is the availability of different functions to increase mobility, different tourist attraction sites in near distance parking space in the beginning of the heritage site near to Daero Piazza.

In the study area in particular and the city in general it is found that there is no possible strategies and approaches to create a walkeble environment system that plays a major role in conserving heritage and creating a tourist attraction site. There is no clear pedestrian walkway map in the study area this lades tourists to use vehicles than foot to reach the tourist destinations.

Activity

From the land use analysis majority of the existing land use of the study area is Residential function which covers 37.71% of the total land use of the area. Recreation, Service and commercial activities cover 1.29%, 7.35% and 1.8% respectively this indicates that there is less activities that attract to people of the area and its surrounding.

The site survey shows that the area lacks public open spaces and outdoor recreational facilities. The community demands for the introduction of parks and open spaces in the area. The advantages of green spaces and outdoor public facilities within a heritage center are undisputable. Restructuring of the public realm to create conducive environment for public activities will assimilate and discharge economic, social and cultural merits.

Factors identified as major in correlating studies made on walkability, such as density, connectivity, and land-use mix affect walking behavior positively, especially by providing destinations directly within walkable distances. This may be the reason as to why they have been identified most frequently as significant in studies dealing with the quantity of walking. If walkability of the built environment is considered, distinguishing what influences the quantity of walking should be considered by providing destinations directly within walkable distances, rather than influencing the quantity negatively by affecting the direct quality of walking experiences. From all tools used in investigating and analyzing operations of the case area and user satisfaction, it was found that the place does not have the facility to accommodate various types of activities demanded and considered essential by residents of study area. And, from field observation, it was noted that there are no provisions for supporting outdoor activities occurring on the space though the activities taking place in existing area. With regard to users‟ perception of the space, it was found that almost all of users demand for the improvement of the space in order to satisfy their needs of walking.

Regulation

They make it easy to reach destinations directly and provide numerous route choices that make walking interesting and enjoyable. Large block sizes were found in the study area regardless of their land use functions. Large blocks are out of standard and most of the block sizes shown in the study area are more than 2 hectares, which might contribute in creating a less walkable environment.

Resolving orientation issues for tourists in the site requires coupling a developed signage system throughout the site with a tourism area that has identified landmarks and attractions to provide descriptions and promote locations. Inside the study area, there is no sufficient signage to locate the direction shown to different tourism attraction sites. Signage could have enhanced the walking experience for pedestrians. The connection between the stele field and the palaces defines the major historical and heritage axis in the city. In the existing situation of the site, the streets do not have active street sides like benches, restaurants and café where tourists and other community members can recreate. In addition to this the community does not have a place to shop or recreate.

New constructions of buildings and structures are going on without considering the context of the place. The size of buildings in terms of height and volume however should be strictly defined to avoid dominance over the old existing structures. In the study area heritage buildings suffer due to fragmentation caused by modern over scaled structures that overshadow the smaller scaled heritage structures and block proper pedestrian accessibility.

In the study area in particular and the region in general there are no well-defined policies and regulations to conserve the heritage area and to protect and emphasize heritage assets. Conserving the heritage of the old settlement of requires declaring the entire site as a regulated heritage district. The heritage set district incorporates a set of policies and regulations that govern future development and transformation of the site. Policies and regulations aim to protect and emphasize the heritage assets. Regulations aim to prevent further fragmentation of heritage buildings within blocks by preserving existing pathways. Restricting large scale developments, and specifying preservation mechanisms for heritage assets. In the study area in particular and the city in general there is no building height regulation to protect the existing heritage buildings.

In the area there is no regulation to traffic movement through the heritage destinations. It is found that the residents of the area need to be protected from heavy vehicles' movement through.

New development in the heritage site is constructed at this time example of this is the new building constructed near the Tsion Mariam church. Regulations also include design specifications for shop signs and advertisements. Regulation size color and shape of shops

signs to complement the heritage facades of buildings can enhance the heritage character and reduce visual disorder. Further research is required to develop policies that facilitate and encourage renovating and reusing privately owned heritage buildings.

Conservation

The tourist oriented network depends mostly on the existing backbone pedestrian network in the study area by identifying the major landmarks to specify origins, destinations and attractions in between. Components of the heritage landscape and traditional commercial activities are considered to identify attractions. In the study area there are different types of tourist attraction sites among them Aksum Obelisk, St. Tsion church, museum, Atse Kaleb and G/meskel's Tomb, Queen Saba, Gobo Dura, king Bazen's Tomb, Ezana park, Adi kilte, Mai-Shum, King Ezana inscription, Abune Pentelion church, and Abune Libanos church. There are also seventy seven historical, religious, and natural and park tourism resources as tourist attraction within 160 kms diameter around Aksum. But in the study area there is an underutilization of heritage for tourism and poor conservation of heritages/ parks as well as inadequate infrastructure and service provision for tourists.

Treating heritage components to complement the pedestrian tourist experience requires looking at heritage assets through preserving and enhancing the heritage values of the site and rehabilitating and reusing heritage buildings. In the study area most of buildings are old and need preservation and restoration to be useful for future generation.

Preserving the heritage landscape and emphasizing the culture are necessary to elevate tourist experience. Pedestrian tourists appreciate appearances of heritage assets and experience the culture of host community. Visual perception of heritage buildings especially in commercial districts is hampered by commercial shop signs and advertisements.

Most of the heritage buildings are owned by privately owners. The government cannot afford to renovate and protect all heritage assets in the site, especially privately owned heritage buildings. Heritage areas of the study area suffer from a verity of problems. The most negative problem is unregulated mobile on street tourist guide which is difficult to manage.

There are different identified heritage buildings for renovation and reuses. Rehabilitating the uses of those buildings add value to the tourist pedestrian experiences reinforce local culture and sense of place and illustrate examples from the selected buildings. The dominant residential

heritage buildings typology of Axum is ground building offers a variety of spaces and rooms that can adapt to different uses. Example to this heritage building is found proximity to the Daero Piazza square of the study area which is accessible from different part of the city. This building is a ground level relatively to other privately owned heritage buildings in the site this building is owned by government which is functioned as a court which is incompatible land use so changing of this building function to heritage use building is important in conserving the heritage and increasing tourist‟s mobility along the tourist corridor by increasing activities.

4.9 Conclusion

Generally the pedestrian paths are not safe to walk on .One of the possible reasons for the study area having low degree of sense of safety for the pedestrians is due to the pedestrian paths on the area being not smooth and well-constructed according to the expected quality of the pedestrian paths to be not satisfactory and also there is no enough pedestrian access connecting the housing unit to the surrounding community.

The government cannot afford to renovate and protect all heritage assets in the site, especially privately owned heritage buildings. The physical character of old Axum is low scale in nature both along the commercial corridors and in the residential community as well. The dominant residential heritage buildings typology of Axum is ground building offers a variety of spaces and rooms that can adapt to different uses. Preserving the heritage landscape and emphasizing the culture are necessary to elevate tourist experience. Most of buildings are old and need preservation and restoration to be useful for future generation.

Large block sizes were found in the study area regardless of their land use functions. Large blocks are out of standard, Lack of sidewalks and furnished pavements, inadequacy of drainage line, poor drainage network are witnessed within the site, and there is no sufficient signage to locate the direction shown to different tourism attraction sites.

There are no well-defined policies and regulations to conserve the heritage area and to protect and emphasize heritage assets. Conserving the heritage of the old settlement of requires declaring the entire site as a regulated heritage district. The size of buildings in terms of height and volume however should be strictly defined to avoid dominance over the old existing structures. In the study area heritage buildings suffer due to fragmentation caused by modern over scaled structures that overshadow the smaller scaled heritage structures and block proper pedestrian accessibility.

Chapter Five

5. Recommendation

5.1 General Recommendations for Improving Walkability

The research has shown that old Axum possesses many assets and opportunities for developing walkable area. These assets to make the environment more attractive and to encourage pedestrian friendly environment development.

Pedestrian Safety: 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 barriors to minimize conflicts with external factors .

Lighting - implement pedestrian scale 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/Screening - provide ample buffering throughout the area to protect the pedestrian physically and psychologically from vehicles. This can be in the form of landscaping, trees, planting strips and implementation of landscaping can provide shade and other benefits to the pedestrian.

Speed Limit - the recommendation is that the speed limit be reduced to 20km per hour both for pedestrian and conserving heritage building safety in study area.

Improving street-scaping and land use: provide pedestrian amenities and promote land uses that enhance walkability. walkability can be improved through land use planning.

Surface Features: Utility covers should be located outside the pedestrian travel zone. If this is not possible they should have a surface texture that is rough, with a slightly raised pattern.

Width and setback

The recommended minimum sidewalk width is 1.5m exclusive of curb and obstructions. 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 sidewalk.

Open space

The open space is proposed to facilitate its commercial activities, support the shopping areas around it with open outdoor services and recreational functions. Accessing the shops for supply

is the allowed vehicular access. The existing road going east west will continue to serve the accessing needs for the shops.

Parking areas

The design and location of parking areas is intended to reduce the dominance of automobiles and help to create a safe and aesthetically pleasing pedestrian environment. Parking areas are Sufficiently buffered from view at the major site seeing areas, the main parking area is situated at the visiting starting point at the open area in front of the tourism office. The removal of the gas station will further develop the parking capacity and discourage vehicles coming to refill purpose.

Pavement Materials

The pavement material is suggested for the area should be stone on all possible areas. Unique and attributing allocations of paving materials are used to assist the characterization of the overall mobility system.

- The height of buildings to be constructed generally varies depending mainly on proximity to the existing monuments' and other buildings environment, nature and behavior of soil, depth where ancient remains are found in the ground, the type of foundation to be designed, etc. But in the old quarter it is advised not to construct buildings having above two stories.
- Administrative and fuel station activities and the like that make the area subject to high motorized vehicles should be relocated from the old quarter and sites suspect of archaeological sensitive to other areas.
- Plantation along roads, streets and pedestrian pathways must be carried out in accordance with the cross-section illustrated in the road and access circulation network map.
- The distribution of electricity and telephone lines should be installed in over -head system while water pipes should be affected with care and professional assistance whenever underground pipelines required to be installed.
- It is advised that no major demolition of existing buildings should take place in the old quarter in order to construct new structure unless and otherwise situations proved difficult to adopt and use existing buildings for the proposed purposed. Conversely it is

recommended to readapt the existing houses either without modification for the function the site is assigned.

- ❖ Renovation and maintenance and modification of existing houses can be executed on permitted areas but always prior consent.
- ❖ Renovation and maintenance for ancient monuments' and traditional houses having cultural value should be allowed to enhance the attraction of the site to tourists. but the materials to be used for restoration should not be threats to the original and architectural beauty
- ❖ Removal of trees is necessary for those that tend to pose threats to ancient remains and obscure important views notably the standing stele as well as ancient and modern landmark buildings.
- ❖ Parking sites should be arranged in the beginning of the old quarter around the Daero piazza to ensure parking capacity mainly for visitors.
- ❖ Pedestrian pathways consist of footpaths interconnected with themselves and with other streets to provide exclusively to pedestrian and sometimes to emergency cars and trucks.
- ❖ Areas on which identified archaeological sites are located exclusively provided with pedestrian paths.

5.2 Conditions & Considerations for developing Guideline

Walkable Area: represent the basic building block for a city that is more sustainable socially, environmentally, and economically.

Livable Streets: Streets set the stage for many dimensions of community life. Well-designed streets also make it easier to meet community life.

Street-Facing Architecture: Streets are more attractive and safe when they are lined with building entrances and windows, rather than parking lots or blank office doors.

A Sense of Place: The Study area has a unique heritage that is rooted in its climate, topography, history and cultural traditions. Buildings should create coherent and well-shaped public spaces.

Pedestrian Connections: The City should encourage pedestrian circulation networks that provide relatively direct connections between homes and jobs and the retail, civic, or other facilities that can serve them.

Street Facing, Frontage and Entrances of Buildings: In the study area and along corridors, mixed use buildings are encouraged to provide needed housing and desirable retail conveniences. Blank walls should not face streets or trails.

Contextual Design: Architectural heritage and, in all improvements, encourage a sense of place that is rooted in Axum"s unique heritage and cultural traditions.

Urban Form: Protect Architectural heritage and, in all improvements, encourage a sense of place that is rooted in Axum"s unique historic feature and cultural traditions.

Street Standards, Design and Networks: Street standards should be adopted that balance the needs of vehicles and pedestrians, and support adjacent land uses through their design.

Tree Planting: The City should pursue a citywide program of tree planting. Street trees should be placed between the curb and sidewalk.

Street Lights: street lighting should implement to the perspective of pedestrian comfort and community identity, and identify ways that street lighting can attain a more traditional form and scale especially in the study area.

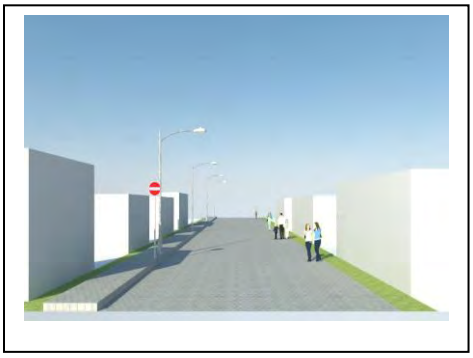
5.3 Detail Recommendations and Guidelines

Walkability is strongly influenced by elements of the built environment. Based on the urban design elements found through the literature review to increase walkability, this part proposes a set of guidelines for walkability. These guidelines are intended to guide development toward a more walkable corridor.

Good pedestrian facility design must certainly be applied to future building projects but design features must also be implemented in retrofitting existing infrastructure. Pedestrian needs and facilities should be considered at the inception of all public and private projects and addressed as part of the total design solution. The following are the general proposed guideline for pedestrian design:

Providing Safety from Traffic

These elements of the built environment will help provide pedestrian protection from traffic and make the pedestrian setting perceivably safer. In order to create a walkable environment, it should be



- Designated pedestrian crossings should be marked for greater visibility and to direct pedestrian traffic across the street.
- Crosswalks should be located at intersections to provide maximum connectivity for the pedestrian and intersections are the best place for pedestrian crossing.
- Midblock crossings should be used when blocks are greater than 130m in length in order to keep pedestrians from going too far out of their way to cross the street.
- The pedestrian environment should be safe and the pedestrian network should be accessible to all.

- The pedestrian network should provide continuous direct routes and convenient connections between destinations, including homes, schools, shopping areas, public services, recreational opportunities, and transit.
- The pedestrian environment includes open spaces such as plazas, courtyards, and squares, as well as building facades that give shape to the space of the street.

Curb extensions should be used at crosswalks in areas with a great deal of pedestrian activity. They increase the area of the pedestrian realm, increase pedestrian visibility, and help to slow traffic.

- Curb extensions should only be used in areas where there is an on-street parking lane into which the curb may be extended.
- The curb should be extended no further than the edge of the travel lane; preferably at least 0.3m should be allowed off the edge of the travel lane.
- The area of extension should be at least the width of the sidewalk, but wider is preferred to increase pedestrian visibility.

Defining the Street Edge

A defined street edge helps to delineate the pedestrian realm and enhances the pedestrian experience.

Ratio of building height to street width: When buildings are in scale with the width of the street, a pleasant, enclosed pedestrian space can be achieved. If the street is too wide for the scale of the buildings, it will feel open and difficult to traverse for the pedestrian. If the buildings are too tall for the scale of the street, the street may begin to feel cramped and constricted (Jacobs, 1993).

Spacing between buildings: The closer together buildings are along a street, the more they begin to form a defined street edge for the pedestrian. Buildings along the street should be built as closely together as possible in order to create a more perceptible street edge.

Building orientation: Buildings oriented to the street help create an inviting, pedestrian oriented space.

- A building should be oriented so that its main facade looks toward the street and its main entrance opens onto the street.
- Loading docks and other service entrances should be located in back of the building so as not to disrupt pedestrian flow.

Building setback: Buildings directly abutting the pedestrian thoroughfare provide definition to the pedestrian realm; buildings separated from the street create discontinuity in the pedestrian experience.

- Buildings should be set back as little as possible from the right of way; preferably, setbacks should be zero.
- When necessary, off-street parking should be located in back of buildings; it should never be located between the building and the street.

Providing a Pleasant Aesthetic Experience and Visual Interest

These elements build upon the important elements of traffic safety and street definition to create a comfortable, interesting pedestrian experience.

Sidewalk 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 without making the street realm too wide for the scale of the buildings.
- Cafe seating or other appropriate building-related uses should be encouraged to occupy space on the sidewalk.
- Sidewalk widths can vary, but typically they should be a minimum of 1.5m wide (clear width) on local residential streets, and can be 2-5m on collector and arterial streets, or sometimes wider in special districts.
- The pedestrian environment should be used for many things.

Street trees: Trees along the street can make walking an enjoyable experience by providing visual stimulation as well as protection from the elements. They can also act as a buffer between pedestrians and traffic.

- Trees should be located no more than 8 to 16 m apart in order to provide definition along the street.
- An area of at least 1.5 by 1.5m per tree should be provided in order for trees to be successful.
- Trees should be a locally appropriate species and should be of an upright type whose canopy will not spread too far toward buildings along the street.

  Like Olea Africana/Woira/,Jacaranda Mimosfolia, Gravela Robusta ,Schinus Molle/Tikur Berbere/,Cupressus Lusitanica,Junipus Indigenous/Abesha Tsid/,Delonix Rigia,Callistemon Citrinus…

  The trees should be:

  - Quick shade
  - Less pruning of drooping branches
  - More natural, upright form develops
  - Trees are less susceptible to wind damage

- Visual Enhancement Vegetation that strengthens the appearance of the stele field and improves the street definition of space and overall enhance the process of tourist‟s travel at the sites.
- Glare and Reflection Reduction Possible reflection from corrugated iron sheet roof covers
- Air Purification - Vegetation to remove dust and pollutants from the air as well as provide fresh breath around the attraction areas.
- Street Shading - Vegetation that reduce temperatures by shading the ground and by the cooling effect of the walking areas which encourages movement on foot.

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: Well-placed benches invite the pedestrian to rest, creating a comfortable walking experience.

- Benches should be provided in locations that experience heavy pedestrian traffic in order to provide a respite for weary travelers, a meeting place, or a place to wait for others.
- Benches should be conveniently located adjacent to the pedestrian walkway, but should not impede pedestrian traffic.

Signs: Signage helps orient the pedestrian and also provides visual interest.

- Signs should be 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; an additional sign should hang perpendicular to the walkway to be read by those approaching on the sidewalk.

- ❖ 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 2.5m above the roadway or sidewalk.
- ❖ Parking signs. Should be located in the road area approximately 0.5m from the curb.
- ❖ Advertising signs. No advertising signs, including temporary signs such as sandwich boards should be permitted in the pedestrian travel zone at any time.

Building width: Smaller building width creates a greater variety of uses and activities, which also provides more visual interest for the pedestrian.

- ➢ Buildings should be as narrow as possible in order to create variety along the street.
- ➢ When buildings take up more than half the block, articulation and a variety of materials should be used to visually break them up.

Building variety: Variety in building types and materials helps break up the monotony along the block and provides visual interest for the pedestrian.

- ➢ Buildings should be given a variety of treatments different materials and colors, a variety of window and awning types in order to provide interest along the street and to avoid a massive wall of monotony.
- ➢ The character of buildings situated together on a block should have complementary qualities one particular style or quality should not stand out too much from everything else in order to give the street a pleasing character for pedestrians.

Transparency of building entries and facades: A transparent facade provides another source of visual interest. It creates a comfortable environment by inviting pedestrians along the street and allowing them to feel connected to what is going on in the buildings around them

- ➢ Building fronts should be as transparent as possible, with windows and doors along the street front to create an inviting pedestrian environment.
- ➢ Blank walls fronting the street should be avoided.

Lighting

Lighting of streets and the adjacent sidewalks, walkways, and shoulder increases pedestrians‟ safety, security, and comfort, and encourages walking. Typically, the street lighting system in

urban areas provides adequate illumination for pedestrians. New lighting system is being introduced to replace the existing street light system, it may be possible to incorporate light posts and fixtures that are more pedestrian friendly (shorter and more in scale with pedestrians, and with less harsh light sources). 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.)

Site Amenities

- Site amenities include trash receptacles, dumpsters, ash urns, benches, tables, fountains, telephone booths, bus shelters, kiosks, walls, fences, monuments, memorials, flag poles, gazebos, bike racks, and picnic shelters.

- With proper planning and design, site amenities become a cohesive link that has a positive effect on the overall appearance of the tourist walking routes. Site amenities need to be compatible with the adjacent architectural features.

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Annex

Questioners and interviews format

1. The variation in Urban elements like open spaces, pocket spaces tall buildings trees
2. The ground pavement type and facades treatment and variation in architectural styles
3. perception of local residents and tourists about such variations
4. Visual relation between narrow streets and wider streets
5. The relation between open spaces and streets
6. Well known element or any urban structure (building tree or others)at the beginning and end of the each street
7. special use or activities along each street/ special features
8. Which activity attract them more to that particular path
9. Tourists perception regarding to that particular feature

Walker friendliness An attractive area promotes walking.	Yes	No
• Are the paths free from obstructions such as overgrown vegetation, sign poles, advertising boards		
• Are there trees along the route to provide shade and a pleasant environment?		
• Are there any points of interest (e.g. historical markers, public art, parks, community gardens)?		
• Are the street frontages interesting and attractive (e.g. landscaping, fences, shop fronts)?		
Comfort The design of streets and pedestrian places and the ability to access facilities along a route promote walking.		
• Can people walk side by side on the walkways, particularly people with prams and people in wheelchairs?		
• Are there adequate seats to stop and rest, particularly for older people and young children?		
• Can you access toilets along the route?		
• Are there places to shelter from rain and hot sun?		

• Are the paths easy to walk on, with consistent and even surfaces for pushchair, wheelchairs etc...		
Safety Street lighting, safety measures and well maintained paths promote walking.		
• Generally, do you feel safe on this walk?		
• Can you see other people around as you walk?		
• If you were to walk this route at night?		
• Are pedestrian lights or zebra crossings conveniently located with schools, parks, retirement homes, shops etc.?		
• Do you feel safely separated from the road traffic?		
• Are crossing points free of obstructions such as vegetation and parked cars that limit your view of the traffic?		
Convenience and connectedness Having direct routes between homes, shops, workplaces and other destinations is important. Compact and connected neighborhoods create shorter distances between destinations and promote walking.		
• Is there pedestrian signage on the route such as maps identifying play areas and distances to shops?		
• Does this route lead to a destination such as a school, cafe, library, workplace or sporting facility?		
• If you walked to a cul-de-sac or dead end, was there a safe route linking you through to another street?		

Vehicle Traffic		
Number of lanes	○ No lanes ○ 1 lanes ○ 2 or more lanes	
Two-way traffic	○ Yes ○ No	
Vehicle Speed / Posted Speed Limit	○ No Vehicle speed limit ○ 10 kph ○ 15 kph ○ 20 kph	○ 25 kph ○ 30 kph ○ 35 kph ○ > 40 kph

Sidewalks	
Width of sidewalk	○ No sidewalk ○ Less than 1.5m feet ○ 1.5 m – 2m ○ 2m – 3m ○ > 3m
Sidewalk surface condition	○ No sidewalk ○ Significant impediments in surface ○ Few impediments in surface ○ No impediments in surface
Large sidewalk obstructions	○ No sidewalk ○ Permanent obstructions ○ Temporary obstructions ○ Both permanent and temporary obstructions ○ No obstructions in sidewalk
Presence of curb	○ Yes ○ No
Trees	○ Continuously lined ○ A few trees; sporadically lined ○ No trees
Public seating	○ Yes ○ No
Presence of buffers	○ Parallel street parking not time-restricted ○ Parallel street parking time-restricted ○ Grassy or paved margin ○ None
Land Use	
Type of land use	○ shops or businesses of any type
Public art/historical sites	○ Yes ○ No
Safety and aesthetic qualities	
Pedestrian-scale street lighting	○ Yes ○ No

Construction Sites	○ Yes ○ No
Abandoned Buildings	○ Yes ○ No
Perceived Walkability: Please circle the number that your thinks best describe this road	
Street segment is visually attractive for walking.	○ Strongly Agree ○ Agree ○ Disagree ○ Strongly Disagree
Street segment feels safe for walking.	○ Strongly Agree ○ Agree ○ Disagree ○ Strongly Disagree
Are there obvious strong odors anywhere on this street segment (Like, vehicle exhaust, urine stench, rotting garbage, etc)?	○ No Odors ○ A Little Odor ○ Some Odors ○ A lot of Odors
How noisy do you find this street segment?	○ No Noise ○ Little Noise ○ Some Noise ○ A lot of Noise
How walkable do you find this street segment?	○ Not Walkable ○ Very Walkable