Vol. 36 · March 2019
https://doi.org/10.7719/jpair.v36i1.684

Print ISSN 2012-3981
Online ISSN 2244-0445

Mobility and Walkability: An Analysis of Urban Design Elements around Divisoria, Cagayan de Oro

AR. ROMEL M. ELTANAL
https://orcid.org/0000-0001-6559-5082
romeleltanal@gmail.com
University of Science and Technology of Southern Philippines
Cagayan de Oro City, Philippines

Originality: 100% • Grammar Check: 100% • Plagiarism: 0%

ABSTRACT

Mobility and Walkability is an important concept in urban planning. The term is built around the concept of providing healthy communities, reducing dependency on automobiles and improving health consciousness to people. Based on factors including connectivity, densities, amenities, and socio-economics, this research focused on the analysis of urban design elements in relation to mobility and walkability of pedestrians around Divisoria District, Cagayan de Oro City through the influence of street networks around the area. Using data and actual survey helped locate high rates for walkability within the district. Additional qualities such as distance, safety, socio-economic and public spaces also play a role in the rates of mobility and walkability around the district. The urban design elements as facilitators take place within all types of developments around the area, but the number of barriers hinders mobility and walkability. Analysis of barriers and facilitators produced design guidelines that will promote mobility and walkability for new districts and urban development in the future. The findings suggested that urban design elements are important in achieving mobility and walkability.

Keywords — Mobility, Walkability, Urban Design, Urban Planning, Urban Design Elements, Public Space.

INTRODUCTION

We are faced with barriers as pedestrians at one point or another when traversing the networks of streets in Divisoria, Cagayan de Oro. Utility shafts, uneven elevation, and informal street vendors to name a few hinders people to access the sidewalks of the streets fully. On the other hand, we see ramps, trees, and shrubs for shading and visible law enforcement personnel which promotes high walkability score. The planning of street networks and pedestrian connectivity throughout a city helps define how a city continues to expand and grow. Maneuvering streets and sidewalks to become more accessible and pedestrian friendly can be a challenge if not established from the infancy of the development, but it can be done as long as multiple of the important elements within the city's infrastructure is highlighted. The characteristics of urban design elements help differentiate the ability to walk around the area compared to commuting in very short distances defined by the barriers and facilitators of mobility and walkability.

According to Design, (2013) 824 King St. Suite 103 Alexandria, VA 22314; 2018, there are five (5) Urban Design Elements, these are; Buildings, Public Space, Streets, Transport, and Landscape. Where, 1) Buildings; are the most pronounced urban design element – it gives shape and texture articulation by forming the streetwalls of the city. A well-designed building and groups of buildings incorporate together to create a sense of place. 2) Public Space; public spaces are the social halls of a city – the venue of people gathering making the quality of life vibrant or subdued. This type of urban design element varies from grand squares and plazas to small community parks. 3) Streets; they are connections between spaces and places. They vary according to dimension and scale as well as the character of buildings that are found on the street. Street ranges from grand avenues and boulevards to small pedestrian pocket street. Street patter and form is a big part that defines a city and makes it unique to others. 4) Transport; these are systems connecting all parts of the city and enable movement of people and goods throughout the development. These are roads and pedestrians forming the system of movement of a city. The equilibrium of this transport system will define how friendly and hostile to people a city would be. The best among cities are

the ones that advance pedestrian experience while minimizing the use of private cars on the road. 5) Landscape; is the interconnection of greens through urban parks, street lane trees, plants, flowers and other vegetation around the city. It creates beauty and character between urban design elements found in the city. The landscape ranges from grand parks to small intimate pocket gardens.

Most definitions of what the perception of users determines a walking-friendly environment. This attribute is not related to urban design; instead, it is connected to urban form instead which raises issues from the designer's point of view. Addressing the microscale or street level urban design characteristics in the city reducing the chance of neglecting urban form outside the urban designer's scope when existing land use, density, and even the street network pattern will be designed in macro-scale. In a pedestrian-friendly city, one should look into the urban design elements existence and pattern to uplift the quality of mobility and walkability towards its end-users (Cao, Handy, & Mokhtarian, 2006). According to a research conducted by Yang and Diez-Roux (2012), walking is an important concept in the fields of transportation and public health; a distance of 400 meters is often used as an acceptable walking distance in U.S. research studies. Walking is the basic form of transportation when people walk more we reduce the travel of carbon-consuming transportation making our community healthy. Healthy trends nowadays promote walking from short to mid distances which are seldom observed in Divisoria making the practice a must to do if urban design elements will offer a conducive to walking environment. With these, the Divisoria District of Cagayan de Oro is considered to be an inclined walking environment. With the rising interest in active living and bigger concern for the quality of public space, many audit instruments have been introduced by researchers who focus on the streetscape environment and measure the physical components or features related to walkability — given existing data collected, guaranteed that the scores in determining the degree of walkability in specific streets reliable (Clifton, Smith, & Rodriguez, 2007).

FRAMEWORK

Mobility and Walkability are dependent on the Urban Design Elements found in a given area which details both the facilitators that promotes walking and barriers that prevents people from doing so. Evaluation and analysis of these elements will determine design guidelines to promote more the mobility and walkability value of a place.

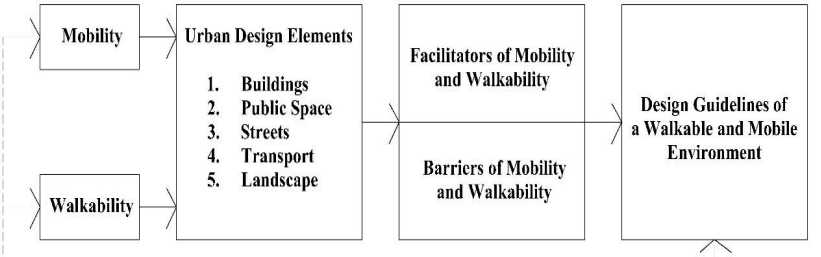

Figure 1. Conceptual Framework of Urban Design Elements Influencing Mobility and Walkability of People in a Given Area.

OBJECTIVES OF THE STUDY

This study is generally aimed at analyzing the issue and present condition of mobility and walkability of as to street networks and urban design elements around Divisoria, Cagayan de Oro City. Conducting a study that provides people with the directional strengths and weaknesses surrounding the area to help improve mobility and walkability of pedestrians. The specific objectives of the study are as follows; (1) to identify the barriers and facilitators of mobility and walkability around Divisoria, Cagayan de Oro City; (2) to analyze the urban design elements of Divisoria, Cagayan de Oro City on how it affects mobility and walkability in the area; and (3) To provide a design model and guidelines that is ideal for enhancing mobility and walkability of pedestrians for the new developments of the city.

METHODOLOGY

In this chapter, the research methodology used in the study is described. The geographical location of the district where the study will be conducted, the research design and the population and sample are described. The research instrument used to collect the data, including the methods implemented to maintain validity and reliability of the instrument are described.

Research Design

An explanatory case study is used to seek to answer the questions that are seeking to explain the presumed causal links in real-life interventions. An in-depth and detailed examination of the subject of study as well as its related contextual

conditions (Babbie, 2014). Physical characteristics of the urban design elements were recorded in the location.

In this study, descriptive research was used to describe the actual characteristic of the data. The best approach is conducting an on-site investigation. It has the aim of describing the actual conditions of urban design elements and examine why the observation exist and what implications it imparts to mobility and walkability. The dependent variables in the study are mobility and walkability while independent variables where the five urban design elements namely; buildings, public spaces, streets, transport and landscape.

The research will examine the data within the barriers and facilitators of mobility and walkability, related to street networks to selected random pedestrians of Divisoria Area, Cagayan de Oro. The main research components include: (1) identification of barriers and facilitators of mobility and walkability; (2) analysis of the potential mobility and walkability of the pedestrians from the primary survey data to be collected and examined; (3) comparison and analysis of walking and commuting people to and from one block to the other within the 400 meter common standard, according to Jarret Walker (Access, Basics and Stop Spacing, April 24, 2011); (4) analysis of specific urban design elements that provide the mobility and walkability to the area.

Research Site

The study will be conducted in the streets of Divisoria District, Cagayan de Oro City, Misamis Oriental, Philippines. With a radius of 400 meters from Kiosko Kagawasan at Plaza Divisoria as the focal point. The approximate area of the sample district is 785,000 square meters or 50.24 Ha., having more or less 35 streets at maximum 1-kilometer length including blocks with intersections and 20 meters length of the shortest block with intersections.

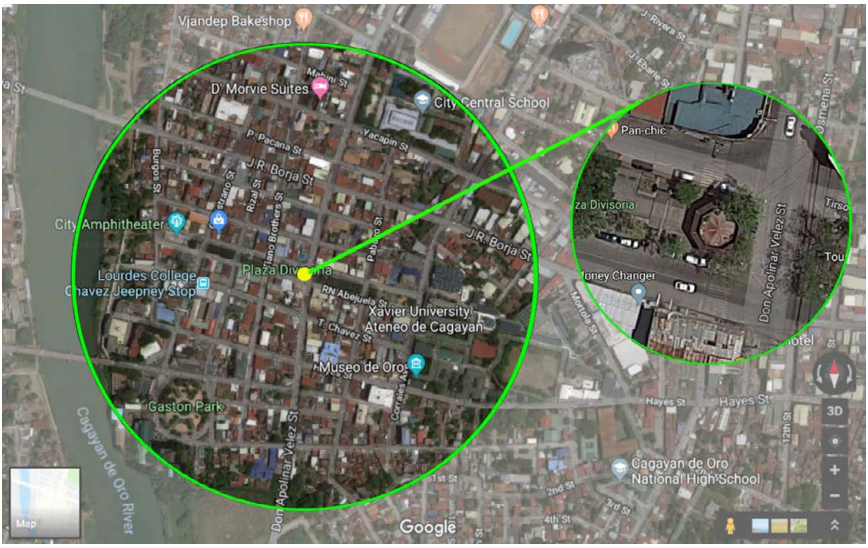

Figure 2. The 400-meter Radius of the Area of Study at Divisoria, Cagayan de Oro City and Kiosko Kagawasan located at Don A. Velez – T. Neri – RN Abejueala Sts. at Plaza Divisoria as the central point.

Data Gathering

Data gathered are form related studies and other literature from the internet. The researcher made interviews from local government unit personnel and common people around Divisoria which is found essential in the formulation and construction of the research.

The researcher thoroughly studied the evaluation and analysis of the five urban design elements specific on each quadrant namely; buildings, public spaces, streets, transport, and landscape. The researcher recorded all available visual data using tables and point system scoring to attain mobility and walkability score.

The Design (2013) mobility and walkability index was enhanced and used for local setting to achieve the intended results.

RESULTS AND DISCUSSION

The results from the evaluation and analysis are provided in four parts. The first part provides the street as an urban design element and sidewalk flow requirement evaluation and analysis. The second part presents the road classifications, carriageway, and a variety of pedestrian and vehicular users of the street. The third part establishes the prominent buildings and landmarks, the year of construction evaluating the architectural character and visual impression to adjacent buildings and its conformity to present laws. The last part evaluates the sidewalk landscape and buffers requirements that will be analyzed to know its impact on mobility and walkability of the area. Each part provides a summary of the overall outcome of the urban design elements study. Audit tools are a systematic observational method which demands that personal data be collected by an observer within a targeted environment. There is also considerable variation in the level of details measured by each audit tool; some focus only on a couple of features while others are more in depth that addresses many different environmental characteristics (Brownson, Hoehner, Day, Forsyth, & Sallis, 2009).

Overview of the Study Area

The four quadrants used in this study represents significant urban design elements found Divisoria Area, Cagayan de Oro City (Tables 1, 2, 3 & 4). The 98 specific streets, street junctions, and street lines within the four hundred meter radius from Kiosko Kagawasan, Plaza Divisoria, Cagayan de Oro City, represented the place of study divided into four quadrants where the evaluation of the urban design elements will be analyzed. Plaza Divisoria is comprised of various street classification and carriageway widths, different building occupancy type and architectural character which reflects the architectural trend during the time of its construction. The appreciation of people in the area to the different landscape requirements is also very wide. The mode of transportation to arrive from one place to another in the area was also evaluated. Evaluation and analysis of the urban design elements in the area support in the formulation of the guidelines of a mobile and walkable environment that helps provide a healthy community and less dependency on cars for future developments.

Analysis No. 1: Street vehicular traffic flow and sidewalk requirements

The data evaluation on street vehicular traffic flow and sidewalk requirements is evaluated and analyzed in quadrant 1, northeast of the area of study (Table 1). Two national secondary roads are found in the area making it the busiest streets in terms of pedestrians and vehicular traffic in the area and the remaining 92% of the streets belongs to city and barangay roads as per Department of Public Works and Highway road classification standards. 87.5% of the streets, junctions and street lines mobility and walkability due to uneven floor levels of sidewalks, building walls encroaching to sidewalks, obstruction from utility posts and lines, sidewalks being utilized as illegal parking of adjacent buildings. 79.16% of the streets does not promote Person with disability ramps and no tactile strips can be found even for the fact that the easternmost portion of Divisoria is a known blind massage center of the city. While 87.5% of the streets have visual traffic rules and regulation signs, some are dilapidated and most are not visual to motorist due to degradation from a long time installation without maintenance.

Analysis No. 2: Carriageway and variations of pedestrian and vehicles of the street

The carriageway of the road right-of-way, a variety of pedestrian and vehicular users is evaluated and analyzed in quadrant 2, northwest of the area of study (Table 2). Two national secondary road has 12.00-meter carriageway width. Most streets at 56% have a carriage width of 7.50 meters and the remaining 40% of the streets have the carriageway of 7.00 meters. 28% of the total streets of the area is accessed by all variety of pedestrians namely; students, adjacent building users, area residents, tourists (local and international), used as access to other parts of the city, exercise, and leisure. They use these determined streets because major modes of transportation access these streets all parts of the day. The 64% of the streets are observed to be non-conducive to tourism, exercise and leisure activities due to the dilapidated situation of buildings making the said activities unsafe in some areas. Only 36% of the area is readily accessed by some routes of jeepneys and motorelas as a form of public transportation. The rest can be easily accessed only by use of private cars and taxis which is higher in fair pricing. The 100% Loading and unloading areas do not have roofed waiting for areas and shed making it difficult for pedestrian mobility experience comfort and safety during the rainy season and hot months in the city.

Analysis No. 3: Prominent buildings, landmarks, architectural character and visual impression to adjacent properties and conformity to existing laws.

To determine the prominent buildings and landmark and architectural character of existing buildings in the and the evaluation of its visual effects to adjacent properties and conformity to existing laws are investigated in quadrant 3, southwest of the area of study (Table 3). Most buildings found in the area of study is being used from its original building occupancy type while others at 16.6% are adaptively re-used into another more beneficial building occupancy type. Divisoria's long age and history at 4% of the prominent buildings found in the area was built during the 1920s, 20% were built during the Mid-American Colonization Period to Pre-World War 2 Period, 11.5% were built during the Post-World War 2 Period and 51.5% were built from the 1970s to present, making the area of study rich in various architectural character from as early as 1920s to present. 61% of the old and present buildings in the area has parking spaces of either conformed to the building code or a parking space obstructing the flow of pedestrians on the sidewalk.

Analysis No. 4: Sidewalk buffers and landscape requirements

The evaluation of present sidewalk buffers and landscape requirements analyzed to know its impact on mobility and walkability in the area is determined in quadrant 4, southeast of the area of study (Table 4). The area of study has 6 blocks of small islands that offer linear and clustered alternative tree lines mostly of mahogany in specie. Only 12 streets and junctions offer either liner or clustered alternative tree lines and canopy not more than 5 trees. The 13% of these tree canopied tree lines fall to the linear alternative classification while 57% falls to the single or isolated tree only. While 30% of the streets do not have any existing tree or tree lines at all making mobility and walkability very difficult especially during the hot and rainy months of the year. These blocks offer bleachers and good shade refuge to pedestrians from the high temperature of the environment. Only one circumferential fountain with the pond is found in the study area making water features a scarce landscape requirement. All the streets have individual planting pots from building users who are observed to be substituted to the 69% only existing planting boxes in the area of study. The data presented denotes that the area of study is prone to the heat island effect due to the full concrete pavement which is directly observed to the area of study even in areas presented to have parks. On the next pages, Tables 1.1, 1.2, 1.3 and 1.4 will show the District/Area Mobility and Walkability Score of quadrants 1, 2, 3 and 4 of the study area.

Q1-Q4 District/Area Mobility and Walkability Score

Table 1. Quadrant 1 District/Area Mobility and Walkability Score

District/Area Mobility and Walkability Score

Q1 Quadrant 1 of the 400.00 Meter Radius from the Kiosko Kagawasan, Plaza Divisoria, Cagayan de Oro City

Name of Street	BUILDINGS and Architectural Character Requirements (5.0 Points)	PUBLIC SPACE and LANDSCAPE Requirements (11.5 Points)	STREET Requirements (10.0 Points)	PEOPLE and TRANSPORTATION Requirements (20.0 Points)	Mobility and Walkability Score thru Color System
	Weight	Weight	Weight	Weight	
Don Apolinar Velez St.	2.00	7.00	7.00	16.00	32.00
Don A. Velez - Mabini Sts.	4.00	1.00	4.00	9.00	18.00
Don A. Velez - Yacapin Sts.	4.00	3.00	5.00	10.00	22.00
Don A. Velez - P. Pacana Sts.	0.00	0.50	4.00	11.00	15.50
Don A. Velez - J.R. Borja Sts.	4.00	0.50	3.00	12.00	19.50
Don A. Velez - Gomez Sts.	0.00	0.50	4.00	9.00	13.50
Don A. Velez - Cruz Taal Sts.	0.00	0.50	4.00	10.00	14.50
Pabayo St.	4.00	1.00	6.00	13.00	24.00
Pabayo - Yacapin Sts.	0.00	8.00	7.00	12.00	27.00
Pabayo - P. Pacana Sts.	3.00	2.50	5.00	12.00	22.50
Pabayo - J.R. Borja Sts.	0.00	2.50	6.00	13.00	21.50
Coralles St.	3.00	8.50	3.00	14.00	28.50
Coralles Av. - Ramon Chavez	4.00	6.50	2.00	10.00	22.50
Coralles Av. - Justo Ramonal	0.00	7.00	3.00	9.00	19.00
Coralles Av. - Domingo Velez	0.00	6.00	4.00	7.00	17.00
Coralles Av. - Yacapin Sts.	3.00	3.00	5.00	12.00	23.00
Coralles Av. - J.R. Borja Sts.	4.00	5.00	6.00	12.00	27.00
Aguinaldo St.	3.00	3.50	3.00	12.00	21.50
Aguinaldo - Justo Ramonal Sts.	0.00	5.50	3.00	9.00	17.50
Aguinaldo - Domingo Velez Sts.	0.00	5.50	2.00	10.00	17.50
Aguinaldo - Yacapin Sts.	0.00	5.50	3.00	10.00	18.50
Aguinaldo - J.R. Borja Sts.	3.00	5.50	4.00	12.00	24.50
Doña Nieves St.	3.00	2.00	3.00	10.00	18.00
Doña Nieves -Yacapin Sts.	4.00	2.00	3.00	10.00	19.00

Table 2. Quadrant 2 District/Area Mobility and Walkability Score

District/Area Mobility and Walkability Score

Q2 Quadrant 2 of the 400.00 Meter Radius from the Kiosko Kagawasan, Plaza Divisoria, Cagayan de Oro City

Name of Street	BUILDINGS and Architectural Character Requirements (5.0 Points)	PUBLIC SPACE and LANDSCAPE Requirements (11.5 Points)	STREET Requirements (10.0 Points)	PEOPLE and TRANSPORTATION Requirements (20.0 Points)	Mobility and Walkability Score thru Color System
	Weight	Weight	Weight	Weight	
Burgos St.	3.99	5.49	4.00	8.99	22.50
Burgos - Yacapin Sts.	0.00	2.99	3.00	7.99	14.00
Burgos - Pacana Sts.	0.00	3.90	3.00	6.99	14.00
Burgos - J.R. Borja Sts.	0.00	1.99	3.00	6.99	12.00
Burgos - Gomez Sts.	0.00	1.99	3.00	6.99	12.00
Burgos - Cruz Taal Sts.	0.00	0.499	5.00	6.99	12.50
Burgos - Tirso Neri Sts.	2.99	3.49	5.00	11.99	23.50
Burgos - R.N. Abejuela Sts.	0.00	3.99	5.00	11.99	21.00
Capistrano St.	0.00	5.99	5.00	13.99	25.00
Capistrano - Mabini Sts.	3.99	0.49	3.00	9.99	17.50
Capistrano - Pacana Sts.	0.00	0.49	4.00	9.99	14.50
Capistrano - J.R. Borja Sts.	0.00	0.499	3.00	8.99	12.50
Capistrano - Gomez Sts.	0.00	0.499	4.00	9.99	14.50
Capistrano - Cruz Taal Sts.	0.00	0.499	4.00	10.99	15.50
Capistrano - Tirso Neri Sts.	0.00	4.99	4.00	12.99	22.00
Capistrano - R.N. Abejuela Sts.	2.99	4.99	6.00	12.99	27.00
Tiano Bros. St.	0.00	6.49	6.00	9.99	22.50
Tiano - Mabini Sts.	3.99	0.49	3.00	9.99	17.50
Tiano - Yacapin Sts.	0.00	2.49	4.00	8.99	15.50
Tiano - Pacana Sts.	2.99	0.49	5.00	8.99	17.50
Tiano - J.R. Borja Sts.	0.00	0.49	5.00	7.99	13.50
Tiano - Gomez Sts.	0.00	0.49	5.00	8.99	14.50
Tiano - Cruz Taal Sts.	0.00	0.49	5.00	8.99	14.50
Tiano - Tirso Neri Sts.	0.00	4.49	6.00	12.99	23.50
Tiano - R.N. Abejuela Sts.	2.99	4.49	6.00	12.99	26.50

Table 3. Quadrant 3 District/Area Mobility and Walkability Score

District/Area Mobility and Walkability Score

Q3 Quadrant 3 of the 400.00 Meter Radius from the Kiosko Kagawasan, Plaza Divisoria, Cagayan de Oro City

Name of Street	BUILDINGS and Architectural Character Requirements (5.0 Points)	PUBLIC SPACE and LANDSCAPE Requirements (11.5 Points)	STREET Requirements (10.0 Points)	PEOPLE and TRANSPORTATION Requirements (20.0 Points)	Mobility and Walkability Score thru Color System
	Weight	Weight	Weight	Weight	
Burgos St.	3.99	5.49	4.00	8.99	22.50
Burgos - Arch. Hayes Sts.	3.99	6.49	3.00	7.99	21.50
Capistrano St.	0.00	8.49	6.00	14.99	29.50
Capistrano - T. Chavez Sts.	3.99	6.49	5.00	12.99	28.50
Capistrano - Arch. Hayes Sts.	0.00	6.49	5.00	11.99	23.50
Capistrano - Gaerlan Sts.	2.99	8.49	3.00	9.99	24.50
Gaston Park Circumeferential	3.99	8.49	6.00	12.99	31.50
Rizal St.	2.99	3.49	5.00	10.99	22.50
Rizal - R.N. Abejuela Sts.	3.99	8.49	5.00	13.90	31.50
Rizal - Arch. Hayes Sts.	0.00	6.49	4.00	12.99	23.50
Rizal - Gaerlan Sts.	3.99	2.99	3.00	10.99	21.00
Rizal - San Agustin Sts.	0.00	0.49	3.00	10.99	14.50
Rizal - Dolores Sts.	0.00	0.49	3.00	10.99	14.50
Tiano Brothers St.	2.99	6.49	5.00	11.99	26.50
Tiano - T. Chavez Sts.	2.99	2.49	4.00	12.99	22.50
Tiano - Arch. Hayes Sts.	2.99	0.00	3.00	12.99	19.00
Tiano - San Agustin Sts.	0.00	2.49	3.00	10.99	16.50
Tiano - Dolores Sts.	0.00	0.99	4.00	10.99	16.00
Don A. Velez St.	2.99	6.49	7.00	14.99	31.50
Don A. Velez - T. Neri Sts.	0.00	5.99	7.00	11.99	25.00
Don A. Velez - RN Abejueal Sts.	0.00	5.99	7.00	12.99	26.00
Don A. Velez - T. Chavez Sts.	2.99	1.49	5.00	10.99	20.50
Don A. Velez - Arch. Hayes Sts.	0.00	0.49	5.00	10.99	16.50
Don A. Velez - Gaerlan Sts.	2.99	6.49	3.00	10.99	23.50
Don A. Velez - San Agustine Sts.	2.99	0.99	3.00	10.99	18.00
Don A. Velez - Dolores Sts.	2.99	3.99	6.00	10.99	24.00

Table 4. Quadrant 4 District/Area Mobility and Walkability Score

District/Area Mobility and Walkability Score

Q4 Quadrant 4 of the 400.00 Meter Radius from the Kiosko Kagawasan, Plaza Divisoria, Cagayan de Oro City

Name of Street	BUILDINGS and Architectural Character Requirements (5.0 Points)	PUBLIC SPACE and LANDSCAPE Requirements (11.5 Points)	STREET Requirements (10.0 Points)	PEOPLE and TRANSPORTATION Requirements (20.0 Points)	Mobility and Walkability Score thru Color System
	Weight	Weight	Weight	Weight	
Don A. Velez St.	0.00	6.49	7.00	15.99	29.50
Velez - Tirso Neri Sts.	0.00	1.99	5.00	11.99	19.00
Velez - T. Chavez Sts.	4.00	1.49	5.00	10.99	21.50
Velez - Arch. Hayes Sts.	0.00	2.49	5.00	12.99	20.50
Pabayo St.	3.00	0.99	5.00	9.99	19.00
Pabayo - Gomez Sts.	4.00	1.49	4.00	9.99	19.50
Pabayo - Cruz Taal Sts.	0.00	0.49	4.00	10.99	15.50
Pabayo - Tirso Neri Sts.	0.00	5.99	6.00	12.99	25.00
Pabayo - R.N. Abejuela Sts.	0.00	5.99	6.00	13.99	26.00
Pabayo - T. Chavez Sts.	0.00	2.99	4.00	9.99	17.00
Pabayo - Arch. Hayes Sts.	0.00	2.49	4.00	11.99	18.50
Pabayo - Gaerlan Sts.	0.00	0.99	3.00	9.99	14.00
Pabayo - San Agustin Sts.	0.00	0.99	3.00	9.99	14.00
Pabayo - Dolores Sts.	3.00	1.49	3.00	10.99	18.50
Corrales Avenue	4.00	2.49	3.00	12.99	22.50
Coralles - Tirso Neri Sts.	4.00	4.49	6.00	16.99	31.50
Coralles - R.N. Abejuela Sts.	0.00	4.49	6.00	16.99	27.50
Coralles - T. Chavez Sts.	4.00	1.49	4.00	9.99	19.50
Coralles - Arch. Hayes Sts.	4.00	2.49	3.00	9.99	19.50
Coralles - Hayes Sts.	4.00	0.49	3.00	11.99	19.50
City Health St.	4.00	6.49	3.00	10.99	24.50
Mortola St.	4.00	2.99	3.00	12.99	23.00
Hayes - City Health St.	4.00	6.49	5.00	11.99	27.50

Mobility and Walkability Score Guide

Exceptionally Conducive to Mobility and Walkability Street

80% - 100% or 37.2 - 46.50 Points

Moderately Conducive to Mobility and Walkability Street

55% - 79% or 25.58 - 37.10 Points

Non-Conducive to Mobility and Walkability Street

0.0% - 54% or 0.0 - 25.57 Points

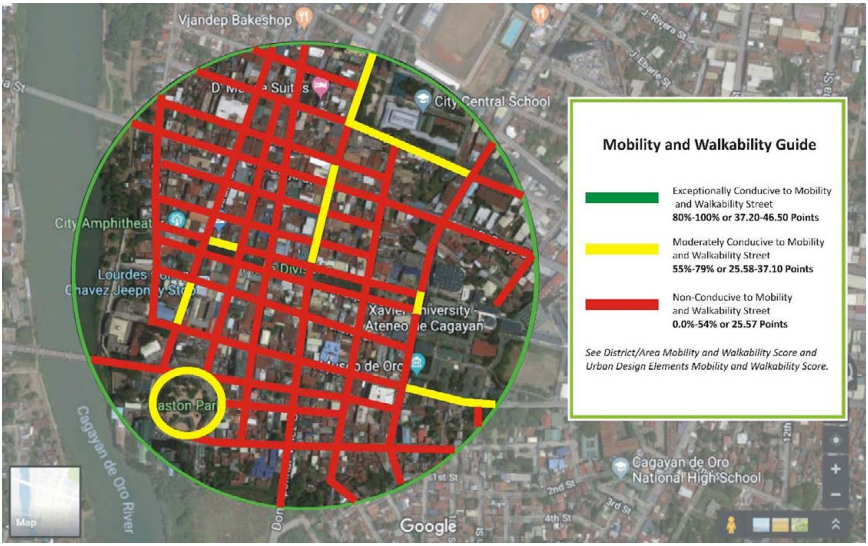

Figure 3. The Mobility and Walkability Guide of the study area at Divisoria, Cagayan de Oro City showing the Mobility and Walkability Guide; Green as Exceptionally Conducive, Yellow as Moderately Conducive and Red as Non-Conducive to Mobility and Walkability

CONCLUSIONS

The study identified five urban design elements namely; Buildings, Public Spaces, Streets, Transport, and Landscape that are important to determine the barriers and facilitators of mobility and walkability in Divisoria, Cagayan de Oro. Within the process of establishing the area of study and providing a comparison of available data evaluation and analysis between important requirements of

urban design elements. The barriers and facilitators of urban design elements are evaluated and analyzed to meet the requirements the pedestrians using the area of study.

The visual characteristics and conditions of the streets, street junctions and street lines that affects the mobility and walkability of the area of study by the quality of present conditions of sidewalks barriers like utility posts on sidewalk shoulders are found, multi-leveled sidewalks that discourage walking, thus making pedestrians prefer to walk on the carriageway, encroachment of building walls and illegally extended parts of the building, illegal parking areas prohibiting smooth movement of pedestrians in the area which does not promote mobility and walkability. Some junctions found on the national secondary roads in the area are provided with ramps for the ease of persons with disability in walking to move freely from one block to another but most are not compliant to existing laws. Street names and signs are found everywhere for the direction and guide of pedestrians from city traffic rules and regulation but most are in a state of degradation for no maintenance at all.

The actual visual survey provided the evidence needed to show how prominent buildings affect the totality of a certain area when they are well maintained and adaptively re-used into same building occupancy or of different building occupancy that fits its characteristic making a blighted area into a vibrant environment encouraging pedestrians to use even the most secluded street or part of a city. The prominent buildings and landmark plus the architectural character of existing buildings in the area from various construction era proved that the area of study is a thriving historical significance that one should enjoy and preserve for future generations.

The findings of the study as far as sidewalk buffers and landscape is concerned, it does not offer most of the landscape requirements that help mitigate the reduction of storm water runoff to reduce local flooding and control temperature extremes to stay cooler in summer and provide shades from canopy during hot months. Minimal locations on the site where a full-grown individual or alternatively planted trees are found make the area very hot all year round which makes pedestrian mobility and walkability unfavorable. In addition, non-compliance to basic landscape requirements plus the extreme concrete and asphalt pavement of the area promotes heat island effect even in areas presented to have parks. Only one circumferential park with a fountain is located at the southernmost part of the site makes public activities in large volumes impossible. Individual planting pots from residents and building users of the site cannot

support in the lowering of the temperature of the area instead they give individuality and non-connectivity to landscape features of other buildings.

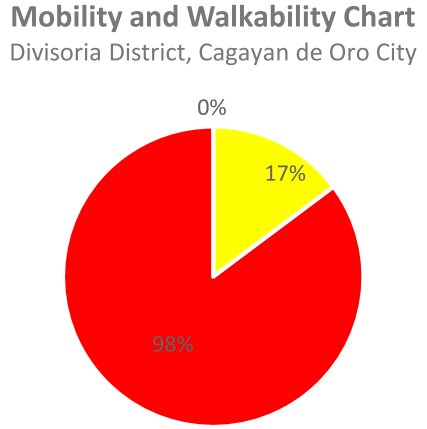

Figure 5. The Mobility and Walkability Chart of 98 streets, junctions and blocks of Divisoria District, Cagayan de Oro City showing the Mobility and Walkability Guide; Green as Exceptionally Conducive, Yellow as Moderately Conducive and Red as Non-Conducive to Mobility and Walkability

Based on the findings of the study 0% of the streets found in Divisoria District, Cagayan de Oro are exceptionally conducive to mobility and walkability, 17% or 17/98 area moderately conducive to mobility and walkability while 98% or 81/98 of the streets are non-conducive to mobility and walkability.

TRANSLATIONAL RESEARCH

The findings of this study are highly suggested to be forwarded to the relevant departments of the local government unit of Cagayan de Oro to improve the mobility and walkability situation of Divisoria. A revisit to the study area must be conducted to assess what the LGU would provide to improve the present condition of mobility and walkability score of the area.

RECOMMENDATION

The study identified areas of importance for further study in relation to enhancing mobility and walkability. Facilitators of mobility and walkability must be taken into consideration in designing a new city or development. Strategic public utility vehicular routes are important in inviting people to walk and access streets especially when provided comfortable loading, unloading and waiting area at strategic parts.

A modern, clean and safe public utility transport that promotes mass transportation and ease the flow of traffic from illegal parking and too much number of individual private cars on the street. Setbacks and parking areas should be conformed to existing laws and regulations so that no obstructions or like will prescribe the movement of a pedestrian using the sidewalk by whatever means.

LITERATURE CITED

Babbie, E. (2014). Reflections on PSA. *The American Sociologist*, *45*(2-3), 134-136. Retrieved from https://doi.org/10.1007/s12108-014-9209-x

Brownson, R. C., Hoehner, C. M., Day, K., Forsyth, A., & Sallis, J. F. (2009). Measuring the built environment for physical activity: state of the science. *American journal of preventive medicine*, *36*(4), S99-S123. Retrieved from https://doi.org/10.1016/j.amepre.2009.01.005

Cao, X., Handy, S. L., & Mokhtarian, P. L. (2006). The influences of the built environment and residential self-selection on pedestrian behavior: evidence from Austin, TX. *Transportation*, *33*(1), 1-20. Retrieved from https://doi.org/10.1007/s11116-005-7027-2

Clifton, K. J., Smith, A. D. L., & Rodriguez, D. (2007). The development and testing of an audit for the pedestrian environment. *Landscape and Urban Planning*, *80*(1-2), 95-110. Retrieved from https://doi.org/10.1016/j.landurbplan.2006.06.008

Design, U. (2013). The Art of Creating and Shaping Cities and Towns. Retrieved from https://bit.ly/2IQ3GnG

Yang, Y., & Diez-Roux, A. V. (2012). Walking distance by trip purpose and population subgroups. *American journal of preventive medicine*, *43*(1), 11-19. Retrieved from https://doi.org/10.1016/j.amepre.2012.03.015