LEVEL OF SERVICE ANALYSIS OF SELECTED WALKWAYS CORRIDORS IN JOHOR BAHRU.

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I dedicated this project work to my “Heart Throb” Lubabatu Abdullahi Katako

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ABSTRACT

Most individual trips whatever the primary mode used, begin or finish with a walk section; so walking is fundamental component of all travel. Walking behaviour and pedestrian flow characteristics lay the foundation for the planning and design of pedestrian facilities. Therefore the needs to access pedestrian facilities should be considered in the design of transportation facilities. Pedestrian facilities includes sidewalks, paths, crosswalks, stairways, curbs cuts and ramps, and transit stops. Accurate estimation of these facilities should be conducted so as to reduce congestion and promote walkability in central business district (CBD) for a sustainable society. However conventional ways of assessment are flawed, new approaches must be constantly investigated to improve on the current estimation methods. The study evaluates the walkways and crosswalks in the city square of Johor Bahru. Video graphic survey methods was used for pedestrian counts, having advantage over the manual method. Flow, speed, density and effective width of the walkway were the variables measured. Some on the positions identified, others back in the lab or office after extracting the data from the video. Hand tape, masking tape, stop watch and video camera/ tripod stand were the tools/apparatus used on various positions for collecting data. The flow rate calculated, in conjunction with HCM were used to estimate PLOS. Regression analysis was conducted on the flaws identified so as to improve on the current method of estimation.

ABSTRAK

Kebanyakan perjalanan individu apa sahaja cara utama yang digunakan, mula dan / atau selesai dengan seksyen berjalan kaki; supaya berjalan adalah komponen asas semua perjalanan. Tingkah laku dan aliran pejalan kaki berjalan Ciri-ciri meletakkan asas bagi perancangan dan reka bentuk kemudahan pejalan kaki. Oleh itu keperluan untuk mengakses kemudahan pejalan kaki yang perlu dipertimbangkan dalam reka bentuk kemudahan pengangkutan. Kemudahan pejalan kaki termasuk kaki lima, laluan, crosswalks, tangga, sekatan luka dan tanjakan, dan perhentian transit. Anggaran yang tepat mengenai kemudahan ini perlu dijalankan untuk mengurangkan kesesakan dan menggalakkan walkability di daerah pusat perniagaan (CBD) untuk masyarakat yang mapan. Walau bagaimanapun cara konvensional taksiran adalah cacat, pendekatan baru perlu sentiasa dikaji untuk memperbaiki kaedah anggaran semasa. Kajian ini menilai laluan pejalan kaki dan crosswalks di dataran bandaraya Johor Bahru. Video kaedah kajian grafik digunakan untuk kiraan pejalan kaki, yang mempunyai kelebihan berbanding kaedah manual. Aliran, kelajuan, ketumpatan dan lebar berkesan untuk laluan itu pembolehubah diukur. Sesetengah pada kedudukan yang dikenal pasti, yang lain kembali dalam makmal atau pejabat selepas mengekstrak data dari video. Pita tangan, pita pelekat, jam randik dan kamera video pendirian / tripod adalah peralatan / radas yang digunakan dalam pelbagai jawatan untuk mengumpul data. Kadar aliran dikira, sempena HCM digunakan untuk menganggar PLOS. Analisis regresi telah dijalankan ke atas kelemahan yang dikenal pasti, bagi memperbaiki kaedah semasa anggaran.

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LIST OF SYMBOLS

PLOS	-	Pedestrian Level of Service
LOS	-	Level of Service
RTOG	-	Right turn on green
LTOG	-	Left turn on green
RTOR	-	Right turn on red
CBD	-	Central Business District
MBJB	-	Majlis Bandaraya Johor Bahru.
HCM	-	High Way Capacity Manual.
V_{ab}	-	Sidewalk Flow
V_{do}	-	Pedestrian Joining Queue
V_{co}	-	Outbound Crossing Pedestrians
V_{ci}	-	Inbound Crossing Platoon
W_{ab}	-	Width of Sidewalk
C	-	Signal Cycle Length
S/W	-	Sidewalk

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

Walking is by far the most important mode of transport, as it not only act as a crucial link in the intermodal transfer in major activity centres, but also helps to fulfil recreational and utilitarian trips. While designing circulation systems, it is important to recognize that walking is not only an integral part of the network, but also that this mode can fulfil many activities in an environmentally sensitive way (Sheilar Sarkar, 2002). Every trip begins and ends with walking. Yet the pedestrian is often forgotten among the traffic planner's other concerns. Both his access problems and internal circulation problems have been generally neglected, although the later has received more attention recently. In both instances, the main concern is to provide the pedestrian with safe, direct and pleasant walking experience (Low Ing Huat, 2005). The movement of pedestrians in the urban environment is vital for sustaining the social and economic relationships essential to city life. Walking enables individuals to have direct contact with the environment and other people, enables the passage of people from place to place, and makes possible the access of pedestrians to areas where vehicular movement is not possible or is not desirable for safety or ecological reasons (Abishai Polus, 1983).

Walking has been a traditional mode of movement between places, irrespective of cities and countries. People walk with different purposes and in large numbers for their daily needs, especially in developing countries. This necessitates the provision of exclusive walking facilities. The width of these facilities in general is governed by the pedestrian volume. In situations where these facilities are either encroached or occupied by vendors and hawkers, or are poorly maintained, the pedestrian are forced to walk on a portion of the carriageway, side-buffers or shoulders. Parking of vehicles in these areas further pushes the pedestrians on the carriageway, thus increasing their interaction with vehicles and thus their risk. The behaviour of pedestrians observed across the cities or countries is affected by the culture of the place (Rajat Rastogi, 2004)

Most countries in the world are experiencing an unparalled growth in the use of private automobiles. Urban city like Johor Bahru has an increased car population rate. According to (Sheila Sarkar, 1993), substantial effort has been done to protect and to give preference to vehicular traffic, improving the overall street conditions in terms of comfort and convenience mainly to drivers (Zaly Shah & RODRIGUES DA SILVA, 2010). As a sequence, side walk and pedestrian paths are increasingly becoming non-regulated spaces when compared to urban spaces for motorized modes. Particularly in developing countries, pedestrian paths are often narrow, with irregular surfaces and poor maintenance(Michael Audi, 2010) stated that walkability is one of the many important considerations for suitable urban design. It is important to both residents and tourists to an area where good or bad the walkability experience can indirectly impact on public transportation system in a particular area.

The measurement of pedestrian level of service (PLOS) is a tool which ensures that pedestrian facilities are balanced with vehicular facilities and other land uses. HCM provides two components in its level of service calculation: a quantitative measure of pedestrian flow rates and a table that helps planners derive a LOS grade from the flow rate. The HCM pedestrian LOS grade is designed to be an objective measure of congestion on a pedestrian facility. It also provides a set of empirical data that highlights the limitation of this basic method and suggest way to localize the LOS calculation based on various factors, e.g. pedestrian trip, purpose, age, and group size. A large body of research has confirmed that a favourable walking environment is a necessary condition for promoting walking and neighbourhood interaction. In recent years, considerable interests in improved walking environments have been generated to encourage non-motorized transportation modes to reduce pollution emissions and to improve public health (Wey & Chiu, 2013).

Pedestrian activity can be a major component in urban street capacity analysis, and pedestrian characteristics are an important factor in the design and operation of transportation systems. Concentrated pedestrian movement occurs at public events, in and near transit terminals, high-rise buildings, department stores, theatres, stadia, parking garages, and other major traffic generators. Pedestrian safety, trip patterns, and convenience are also a necessary consideration in all multimodal traffic and transport studies (Minhans & Moghaddasi, 2013).

The concentration of pedestrian activity at street corners and crosswalks makes them critical traffic links for both sidewalk and street networks. An overloaded corner or crosswalk not only affects pedestrian convenience, but can delay vehicle turning movements, thereby reducing the capacity of the intersection and connecting streets (Minhans, Shahid, & Hassan, 2015).

The principles of pedestrian flow analysis are similar to those used for vehicular flow. The fundamental relationships among speed, volume, and density are similar. As the volume and density of a pedestrian stream increases from free-flow to more crowded conditions, speed and ease of movement decreases. When the pedestrian density exceeds a critical level, volume and speed become erratic and rapidly decline.

Pedestrian flow on sidewalks is affected by a reduction in effective walkway width caused by various items of street “furniture”, such as parking meters, light standards, mail boxes, and trash cans, and by interruption to flow caused by traffic signals. The traffic signal cycle also results in queues of waiting pedestrians at street corners, which decreases corner circulation capacity and concentrates crossing pedestrians into denser platoons (Moghaddasi & Ali, 2013).

The level-of-service (LOS) concept, first used to define relative degrees of convenience on highways, is also applicable to pedestrian facilities. With this concept, such convenience factors as the ability to select walking speeds, bypass slower pedestrians, and avoid conflicts with others are related to pedestrian density and volume. The concept can also be applied to degrees of crowding in queuing areas, such as sidewalk corners, transit platforms and other waiting areas(Manual, 2000).

1.2 Problem Statement

The principles of highway capacity were suitably adjusted to evaluate pedestrian facilities. Though simple to apply, it suffers a serious setbacks relating to performance of sidewalk with various qualitative dimensions of walking such as footpath surface condition, walking environment comfort, safety and potential of vehicle conflict. Characteristics of pedestrian, like size and walking pace localised to a nation without considering a more universal situation. Pedestrians are treated like vehicles, there behaviour inadequately represented. Qualitative parameters are ignored or not comprehensively considered, street dimension facilities and furniture are equally not considered. Quality of walking environment considered unimportant. The criteria for various level of service (LOS) for pedestrian flow are based on subjective measures that may be somewhat imprecise

1.3 Objectives of the Work

a) To estimate Pedestrian Level-of –service PLOS on sidewalk and crosswalk.
b) To examine the insufficiency in the HCM method of estimating PLOS.
c) To suggest measures to improve on the current methods of estimating PLOS.

1.4 Scope of Work

a) Seven locations were chosen for pedestrian counts, within Johor Bahru.
b) Walkways of foot-over bridges, crosswalk and sidewalk were involved.
c) Morning peak dry weather conditions.
d) A period of one hour survey counts at each selected site.
e) Survey conducted to estimate speed, flow, and density of pedestrians.
f) Analysis of data is based on flow variables and geometric variables for estimating LOS.

1.5 Significance of Study

The significance of the study is to determine the pedestrian level of service (PLOS) and establish a new approach in suggesting an alternative way of estimating PLOS that qualifies the service levels more closely.

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