

Determination of Level of Service of Agrabad to CEPZ Road at Chittagong in Bangladesh

Kutub Uddin Chisty, Md. Ashraful Islam, Shahjalal Misuk

Abstract—Chittagong is the commercial capital of Bangladesh. Here Agrabad is one of the most commercial activity centers of Chittagong. Due to many light industry and commercial land use, Agrabad to CEPZ road at Agrabad is the only major road of Chittagong port city which encompasses a huge number of vehicles every day. It has many junctions which distribute traffic flow in different roads. In these junctions vehicles gather at some conflict point to create traffic jam and make the performance of the road downward. This study is parallel focused on the existing level of service with traffic volume, capacity, and speed by traffic survey. After all of these analyses the performance of the road is determined with finding the factors that influences the performance.

Keywords—Level of service, Traffic volume, Speed, Influences factors.

I. INTRODUCTION

URBAN transport is destined for land transport of people in urban areas. The term ‘transport system’ refers to socio-technological systems of transport for people and loading goods [3]. Roads on urban spaces are fundamental means of communication and transaction [1]. Thus the roads need to be well-functioning and efficient to serve the demand. As becoming industrialized city and divisional town with a port, Chittagong is the second largest city in Bangladesh having a higher transportation demand. In order to keep the wheels of development, moving a sound road system is must. Many light industry and commercial land use and residential area are developed by the both side of the Agrabad to CEPZ road. According to traffic and transportation study roads can be categorized according to their service that they provide service to the users. To determine the performance of a road, level of service (LOS) is an important factor. Again, Level of service is a qualitative measurement that characterizes operational conditions within a traffic stream and their perception by motorists and passengers.

For this purpose this study requires to conduct different survey such as volume survey. For measuring speed, moving

observation method and the geometric design of the road must be analyzed. The traffic service quality or flow of the road may vary with time and different days. The focus of LOS is to relate the traffic service quality with a given flow rate of traffic. By level of service it can be understood the present traffic situation on a given facility of the road. This study will be helpful in determining the performance of the road and service of which level it serves to its users. This will help in future development of the road

A. Objectives

1. Defining Level of service of Agrabad to CEPZ road.
2. Determining the factors that are affecting the performance of Agrabad to CEPZ road.

II. LITERATURE REVIEW

The level of service (LOS) is an important part for designing a road so that the policy makers or the transport planners can understand the extent of problems that the drivers are facing in their daily life. Transportation plans no longer focus solely on roadway solutions. In below there is a traffic problems in Dhaka City as well as quantifying LOS of the walkways as a case study. Dhaka, the capital of Bangladesh, has been selected as the study area for LOS research. Five different blocks have been selected too to get different information and Level-of-Services on the walkways. Farmgate, one of the major junctions of Dhaka City is considered as a major commercial and transit block. The other blocks are: New Market: one of the major shopping areas, Motijheel: the CBD or the central business district, Malibagh: the residential and shopping mix, lastly, Mohakhali: the major transit area. Problems are also different in the respective blocks which have been included in LOS research work [4].

A. Volume Survey Methods

LOS will be determined on the basis of volume-capacity ratio. For the calculation, volume survey is must need.

There are different methods of volume survey such as:

- Manual methods.
- Combination of manual and mechanical methods.
- Automatic devices.
- Moving observer method.
- Photographic method [5].

B. Speed Survey Method

Measuring journey speed there are different methods such as:

- ✓ Moving observer method.
- ✓ Registration number method.

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- ✓ Elevated observer method [5].

C. Capacity Calculation

Capacity of a road can be calculated by using following formula [5].

$$C = (1000 V)/S$$

Here v is speed & s=average spacing of moving vehicles.

D. Passenger Current Unit (PCU)

Passenger current unit varies on vehicles types.

III. STUDY AREA SELECTION

Agrabad is the central business district of Chittagong, Bangladesh. It is located on the south side of the city under the

Double Mooring Thana but some parts of the Halisahar [2]. It is directly connected to the Port of Chittagong.

TABLE I
PASSENGER CAR UNITS FOR DIFFERENT VEHICLES [5]

Vehicle type	PCU
Passenger car	1.0
Tempo/ Human hauler	0.5
Baby taxi/ Auto rickshaw	0.5
Truck	2.0
Bus	2.5
Mini-bus	2.0
Rickshaw	0.8
Bicycle	0.2
Pushcart	4.0
Motorcycle	0.3

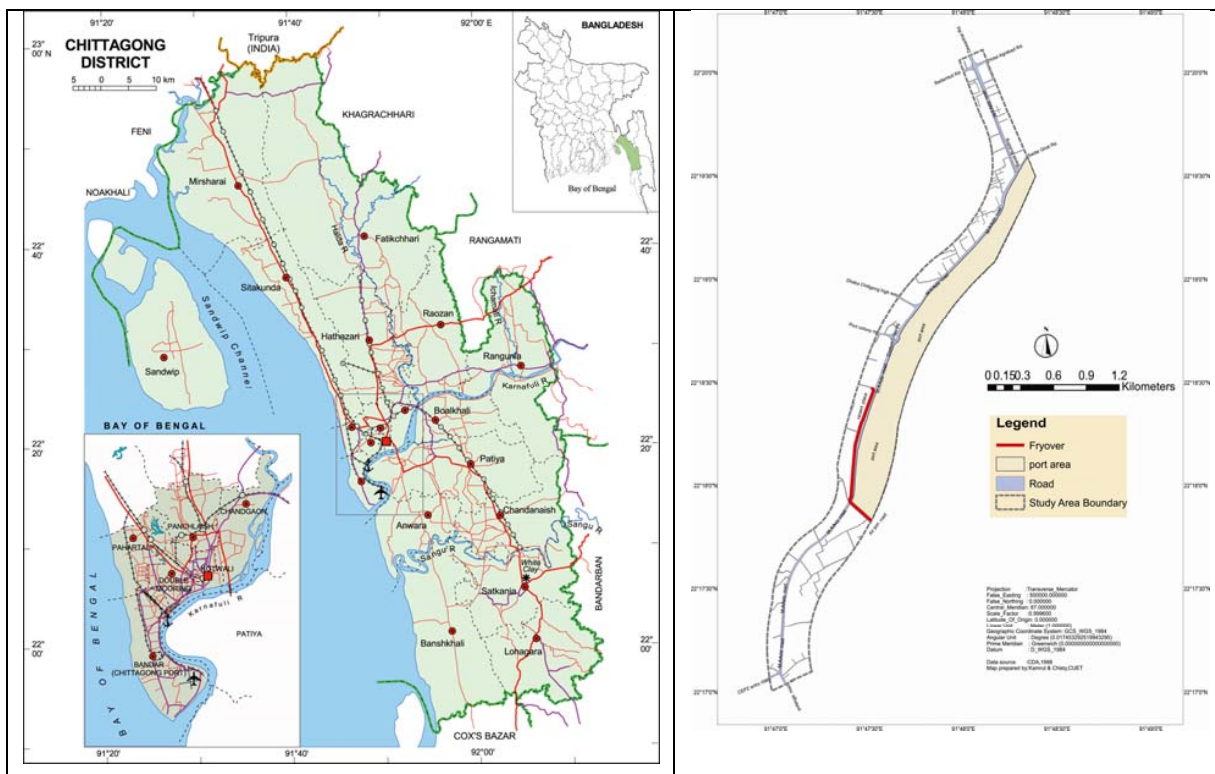


Fig. 1 Study area map

IV. METHODOLOGY OF STUDY

To determine the level of service, speed and volume of M. A. Aziz road is calculated by moving observer method because this method gives an unbiased estimate of the flow and data on speed and flow is collected at the same time. Manual methods are adopted to count vehicles in this study.

II. ANALYSIS

A. Calculation of Volume, Speed & Capacity

Six peak hours are selected for vehicle counts of Agrabad to CEPZ road directions. Then the vehicles count is expressed as

PCU/hr. From the field survey the flowing result of both direction of Agrabad to CEPZ road has been calculated.

- The volume of the Agrabad to CEPZ road is 1037.43 PCU/hr. (working day).
- The volume of the Agrabad to CEPZ road is 866.27 PCU/hr. (weekend day).
- The average volume of the Agrabad to CEPZ road is 952.85 PCU/hr. (weekend day and working day)
- The journey speed in this road = 21.68 K.P.H (working Day)
- The journey speed in this road = 24.21 K.P.H (weekend Day).

- f. The average journey speed in this road = 22.94 K.P.H (weekend Day and working day)
- g. The capacity of the Agrabad to CEPZ road is 1901.05vehicles per hour (working day).
- h. The capacity of the Agrabad to CEPZ road is 21.23vehicles per hour (weekend day).
- i. The average capacity of the Agrabad to CEPZ road is 2012.13vehicles per hour (weekend day and working day).
- j. The v/c ratio of the Agrabad to CEPZ road is 0.54(working day).
- k. The v/c ratio of the Agrabad to CEPZ road is 0.40(weekend day).
- l. The average v/c ratio of Agrabad to CEPZ road is 0.47(weekend day and working day).
- m. The journey Speed of this Road is 22.94 K.P.H.
- n. The average volume of the Agrabad to CEPZ road is 952.048 PCU/hr. And V/C Ratio is 0.47.

According to High way capacity manual of TRB-2000 for urban arterials the criteria for level of service are:

Level of Service	Overall Speed (K.P.H.)	V/C ratio
A	48	0
B	40	0.0-.12
C	28	0.12-.75
D	17	0.75-.95
E	14	1.0
F	>14	>1

B. LOS Curve for Weekend Day

In the lower graph (fig 2) the LOS is calculated on weekend of Agrabad to CEPZ road. The better LOS is found at the time of 11.30 am which is measured LOS level at D because shopping activity of general people is almost started after 11.15 am at weekend day. The level of service of another time is relatively worst at level of service F. The Potenga Sea beach is another important factor which affects the level of service of the whole day of weekend. Because the tourists are increasing at the weekend that is going to the Potenga Sea beach, Hotel Agrabad, Saintmartin etc. Besides this many are going to the shopping centers such as Akterujjaman center, Singapore market etc. so the number of vehicle is increasing which affects the Level of Service at this roadway.

C. LOS Curve for Working Day

From Fig. 3, the LOS of on working day of total roadway from Agrabad to CEPZ road is calculated. The better LOS is found at the time of 7.30 am which is measured LOS level at D because the movement activity of general people is almost started after 8.00 am at the working day.

The worst level of service is found at the time of 6.15 pm which is measured los level at F. Because it is the time to go home at 6.00 pm and the number of vehicles are increasing rapidly.

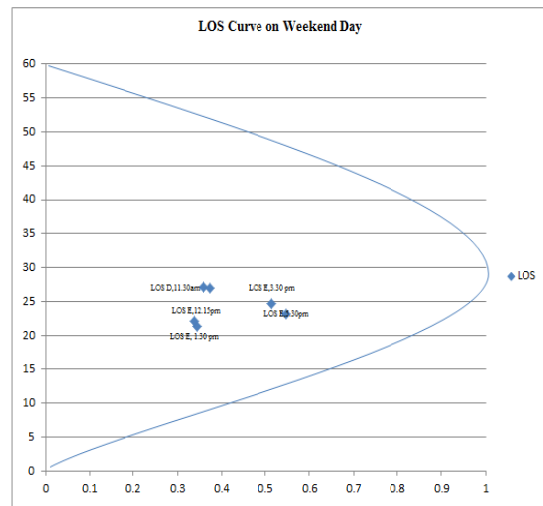


Fig. 2 LOS curve for weekend day

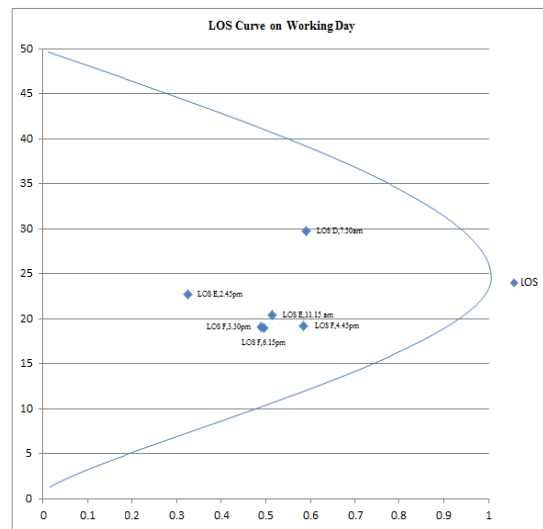


Fig. 3 LOS curve for working day

D. Existing Land Use

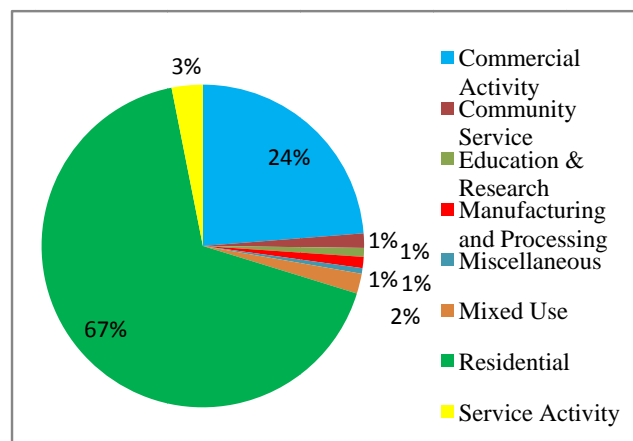


Fig. 4 Existing land use

Land use along the 100 meter buffer from the Agrabad to CEPZ road, there are a large amount of residential & commercial area of the total land use. Most of the famous markets also situated here such as Akterujjaman centre, Singapore market etc.

III. FINDINGS AND CONCLUSION

This study attempts to evaluate the performance of this road. During weekend day, the better los is found at the time of 11.30 am which is measured los level at D because the shopping activity of general people is almost started after 11.15 am at the weekend. The level of service of another time is relatively worst which is measured at level of service F because the tourists are increasing at the weekend who are going to the potenga sea beach, hotel agrabad, saintmartin etc. again during working day, the better LOS is found at the time of 7.30 am which is measured LOS level at D because the movement activity of general people is almost started after 8.00 am at the working day. The worst level of service is found at the time of 6.15 pm which is measured los level at F. Because it is the officials and business who goes to their home after 6.00 pm and the no. of vehicle is increasing rapidly. Variances of this LOS are affected following factors-

- Roadside Land use.
- Commercial & Educational activities.
- Bus Stoppages.
- On -Street Parking.
- Speed-Breaker.
- Grade separator and Signal system.
- Channelization.
- Internal access.
- Number of lanes and lane divider.
- Footpath.
- Drainage.
- Lateral clearance.
- Shoulders and Grades.

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