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Evaluation of Motijheel City Centre Off-Street Parking Facility

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Abstract- With the growing of car ownership day by day and side by side lack of adequate parking facilities, the problem of parking has become a serious issue. To address this feature, both various restrictive type of measures and development of off-street parking facilities are usually undertaken. The capital of the country is not an exception of this persistent problem. With a view to reduce congestion by solving parking problem, several off-street parking facilities have been constructed in and around Central Business District (CBD) of Motijheel area. Field investigation suggests that the facilities are constructed without following the general guidelines of off-street parking policy as well as without carrying out Traffic Impact Assessment (TIA). Particularly, to host more than 400 cars at a time, 9 storied parking facilities including basements -cum- 30 storied commercial building has been constructed without considering the parking generation induced by this skyscraper and most importantly constructed exactly on a T-junction. That is why, instead of solving problem rather it is expected that it would create more traffic problem. This paper attempts to focus on the impacts of this commercial-cum-parking complex on Motijheel commercial hub. Preliminary investigation suggests that this mega structure has been built without keeping any set back from the road, without keeping provision of loading- unloading facilities, without any parking facility at ground floor rather adding two mezzanine floors which force parkers to make several unnecessary turns both at entry and exit. These above mentioned issues will be addressed elaborately in this paper. Finally, parking related policies and guidelines will also be highlighted as such there is a need for revision in local code of giving permission of such development at junction and most importantly Traffic Impact Assessment (TIA) is also needed to see the impact of any commercial establishment on active road.

Keywords- *Off-street parking, T- junction, TIA*

I. INTRODUCTION

In Dhaka, up to 2003 number of registered private cars were 87,866 whereas after May, 2013 it climbed up to a grand total 1,85,619 which indicates more than doubling the figure in 10 years only [1]. The total number of motor vehicles is 7,45,953 after May, 2013 showing 24.8% of private cars which caters only 5.1% of total trips [1], [2]. Obviously, these increasing private cars require not only street space to move but also require space to park as well as loading – unloading space. The situation is much worse in the main commercial area of Dhaka namely Motijheel.

To alleviate the parking problem, city authorities are putting their concentration on building off-street parking facilities. Again, these parking facilities have also commercial spaces in it which in turn is producing a considerable amount of trips. In this paper, the biggest off-street facility of the capital, Motijheel city centre has been chosen as an example and it is shown that this off-street parking structure will not solve the parking problem in Motijheel area rather it will make the current condition worse. Its location is exactly on a T-junction which will definitely reduce the productivity of the junction. Besides, no frontal access road has been kept to aid the loading-unloading feature. Moreover, prior to build this mega structure, no TIA was conducted to test its adverse effects on active road. To see the negative effects of ignoring above mentioned aspects, a study was conducted on this off-street parking facility which is subsequently described in the following sections.

II. METHODOLOGY

Motijheel city centre is situated in between *Dainik Bangla- Shapla Chattar* corridor (Figure 1). Parking related data was collected from department of Urban and Regional Planning (URP) of Bangladesh University of Engineering & Technology (BUET). Parking usage survey has been done to obtain data on the extent of usage of parking spaces. Three time frames have been selected for this survey: 9:00 -11.00 AM, 12:.00 PM – 2.00 PM and 3.00 PM-5.00 PM. The survey has been done with 30 minutes interval. At a particular time, a surveyor recorded the registration number of the cars parking in the study area by going from Dainik Bangla to Shapla Chattar of the parking area. After 30 minutes interval, the surveyor again recorded the registration number and this time starting from the Dainik Bangla again. The survey was done on a typical week day, free from factors likely to result in non representative characteristics.

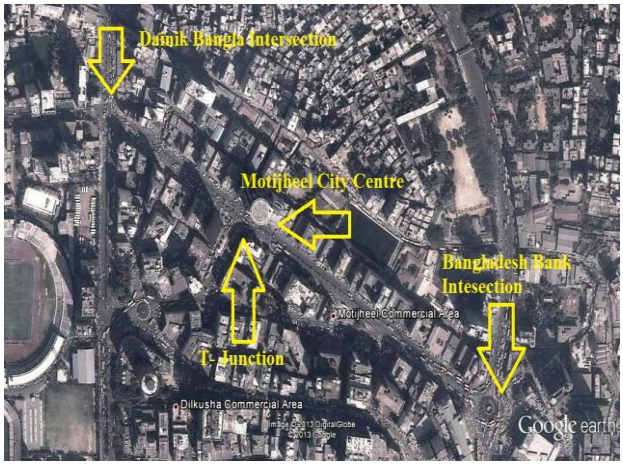


Figure 1: Location of Motijheel City Centre

III. RESULTS & DISCUSSUIONS

The results and discussions are described in the followings sub-sections.

A. Parking Volume

In *Shapla Chattar- Dainik Banlga* section total 670 vehicles were surveyed in 6 hours study period. This volume can be expressed in terms of vehicle per hour using the formula: Vehicle volume = Number of parked vehicles / Period of time. So per hourly average volume of vehicular parking are 111.67 which mean on an average in every hour 111.67 vehicles come into *Shapla Chattar- Dainik Bangla* section. As the time passes parking volume is increased.

B. Parking Accumulation

Parking accumulation is the total number of vehicles parked in an area at a specified moment. Parking accumulation varies from time to time.

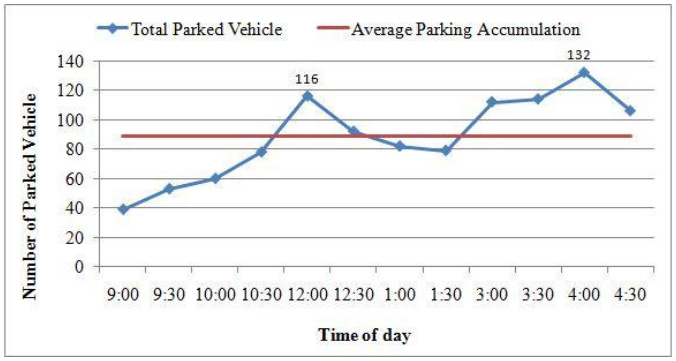


Figure 2: Parking accumulation curve in Dainik Bangla- Shapla Chattor segment. (Data obtained from Dept. of URP, BUET; Field Survey, 2011)

From the figure it is observed that parking accumulation is comparatively less in morning and high in the evening period. In this study area most of the buildings are mainly commercial buildings like bank, financing institutions etc. The transaction of these organizations starts after 10:00 am. So after 10:30 am the numbers of parked vehicles has been increased rapidly as a lot of people come here for different purposes. At 1:00 pm parking accumulation has been decreased and then it again increased after 3:00 pm. The highest parking accumulation has been found at 4:00 pm because the employers of different organization started to go back home. So a lot of private cars parked here and waited for their passengers. Average parking accumulation is 88.58 vehicles.

C. Parking Duration

Parking duration is the length of time that a vehicle spent in a parking space. It is more important than the number of parked vehicles. A single parking lot can accommodate one vehicle in a day or ten more vehicles in a day depending upon the average duration of parking. The average parking duration in *Shapla Chattar- Dainik Bangla* section is 0.88 hour or approximately 53 minutes.

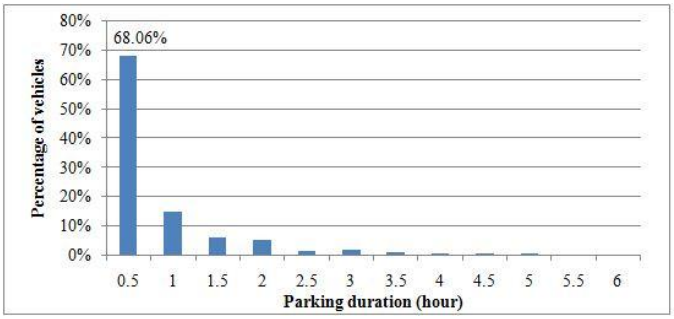


Figure 3: Parking duration of different vehicles. (Data obtained from Dept. of URP, BUET; Filed Survey, 2011)

In the Figure 3, it is found that 68.06% of the total vehicles parked less than half an hour and 14.93% vehicle parked less than one hour. The percentage of vehicles parked in the study area decreases with the increasing of parking duration.

D. Overall demand in the corridor

Overall parking demand for the selected segment is given in following table.

TABLE I: ON-STREET PARKING DEMAND IN SHAPLA CHATTAR- DAINIK BANGLA (URP, 2011)

Number of Parked Vehicle	Duration (hour)	Demand (vehicle- hour)
456	0.5	228
100	1	100
40	1.5	60
34	2	68
9	2.5	22.5
12	3	36
8	3.5	28
3	4	12
3	4.5	13.5
3	5	15
1	5.5	5.5
1	6	6
670		594.5

So, it has been seen that it's only a single road of Motijheel commercial area and the extent of demand in the total area is so high. Without proper management, the authority is trying to increase the supply by constructing off-street parking facilities (details in following sections) whereas strict management can alleviate the problem in some extent.

E. Parking capcity of Motijheel city centre

Initially, it was said that 10 parking floors will be there but due to construction of generator room, one basement cannot be used for parking leading 9 floors to be used for parking. Now the parking capacity of the building is given below.

TABLE 2: PARKING CAPACITY OF MOTIJHEEL CITY CENTRE

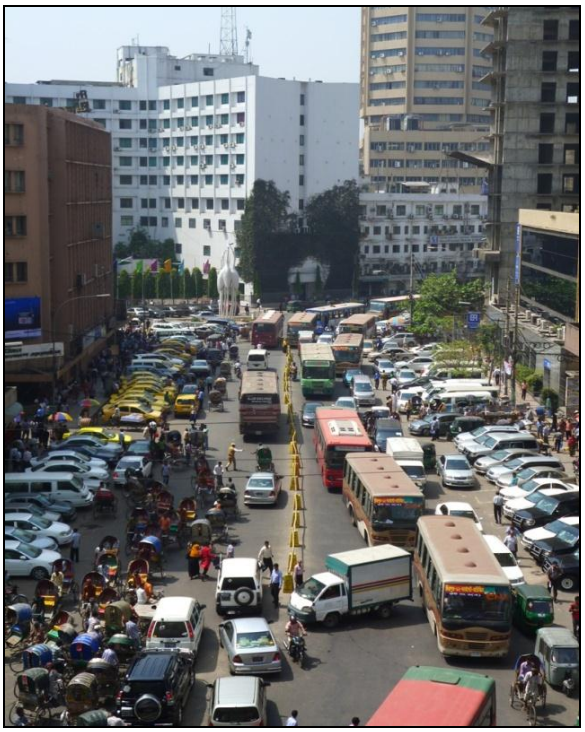
Floor	Capacity
Basement 1,2	47 each
1st to 6th Parking level	48 each
7th Parking level	26

This leads to a total of (47*2) + (6*48) + 26= 408 parking lots. Now, assuming that the building has uniform floor area in each floor which states (482,413/37)= 13000 sft almost in each floor [3]. So, 30 stories will have (30*13000) = 390,000 sft gross area equivalent to 36,229 sqm area. So, according to BNBC (Part-3, Chapter-1), it requires (36,229/200) = 181 parking spaces [4]. But it provides 408 spaces. So, only (408-181) = 227 spaces are available for outside parkers whereas the demand of parking in the road is found almost 600 vehicle-hour. In a study of Dhaka Transportation Coordination Authority (DTCA), the parking demand is to be found around 4000 vehicles in the Motijheel commercial area [5].

F. Analysis on Motijheel city centre

Before describing the findings two figures just in front of the building will be presented first. These will help to describe the situation better.

(a)



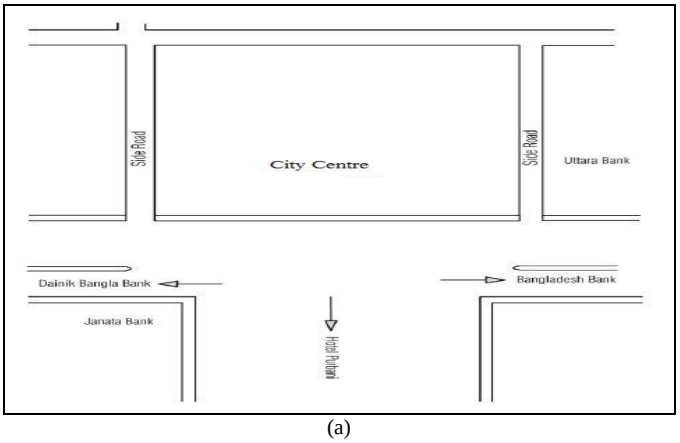
(b)

Figure 4: (a),(b) T-junction just infront of city centre.

The above figures describe the situation best. Prior to the full operation of the building, the almost two lanes are gone, when the building will be in full operation, there will be more attraction and the situation will get worse. Now, the findings are given below.

- From the drawing of the building it is found that, 1st parking level is from +8800 mm to +10925 mm. So, the first parking level is 30 ft above. So, addition of two mezzanine floor and no parking in ground floor will force the parkers to travel extra floors and make unnecessary turns. That is why, in consideration of the amount of turning required and the number of spaces a driver must pass, it is recommended that with ramped or sloping typed inter-floor travel system - the number of level should be limited to a maximum of six [6].
- No multi-storey park system should be at least 50m of a street junction to avoid conflicts in entry and exit of parking structure. This will experience such kind of incidents as it situates just in mouth of a T-junction (Figure: 4).
- The queue extends up to the building in afternoon peak.
- The structure offers no loading- unloading spaces, so it will severely affect the junction performance which will create bottleneck in Dainik Bangla road.
- The short time parkers will be reluctant to park in multi storey parking (specially in upper floors) as it will cost extra turning and charge whereas parking on street is free due to lack of weak management. It suggests strict enforcement on on-street parking.
- The entry and exit of the building is so narrow which is the side roads besides the building. The layout is given in Figure 5. So, from the upper right figure, it can be realized

that the narrow entry which is already occupied by car parking will delay the entry and exit (exit is also narrow like entry) of and from the building eventually making a queue in the active road leading to a bottleneck.



(a)

(b)

Figure 5: (a) layout of junction (Source: Prof. Dr. Md. Shamsul Hoque, BUET), (b) narrow entry is shown.

G. Synopsis

After above analysis, it has been seen that to alleviate the parking problem of Motijheel commercial area, off-street parking facility is being chosen by city authorities. Additionally, this facility will also act as a commercial space which in turn will attract more traffic. Besides, absence of frontal and rear access roads, lack of loading-unloading space, being just at mouth of a T-junction make this mega-structure a burning problem in the area rather problem solving.

IV. CONCLUSIONS & RECOMMENDATIONS

In this study, a very short filed survey was done in Dainik Bangla- Shapla Chattar segment, parking demand was calculated. In the selected segment, the highest parking demand was found in 3:00-4:30 PM and lowest in 9:00-10:00 AM. Besides, the number of short time parkers (between 30 minutes to 1 hour) here is found more than 70%. So, enforcement should be there for restriction of parking in peak hours and flexibility in light hours. There should be adequate signs along with markings for indicating sensitive places where parking is prohibited.

As traffic characteristics are different from the western cities, here along with car parking, loading- unloading feature must be given adequate importance. Besides, without frontal access road or without rear end access facility and enough setbacks from the road, large developments on junction should not be permitted. Moreover, prior to any large development, Traffic Impact Assessment (TIA) should be carried out to check whether the new structure has any adverse effect on existing road or not. Finally, the concerned authority should be strict about enforcement of laws.

V. ACKNOWLEDGEMENT

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