

Study of Mixed Parking Area for Four Wheelers and Two Wheelers

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Abstract— This work summarizes the ongoing researches about the study of mixed parking area for four wheelers and two wheelers at PGI Chandigarh. The main focus of this research was to improve the parking problems of PGI Chandigarh. Shortage of parking space is turning out to be a big problem at the Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh. It isn't just a problem of staff or patient, it's a trouble for anyone who works at the premier institute. How many lives are put at risk because those accompanying patients have to struggle to find a parking space while a patient's condition deteriorates. A recent study has found that more than 13,000 vehicles, including around 7,000 cars, enter the institute everyday against the parking capacity of just over 3,000 cars. The excessive delays occur with low running speeds and traffic congestion at various junctions and midblock sections. The biggest parking facility at the institute is the multi-level parking in front of the new OPD building. It has a capacity to accommodate 550 cars. The institute is mulling to construct a new parking facility with capacity of around 750 cars at a cost of 119 crore. It will be the biggest parking facility at the institute and will be built in the area between the New OPD block and Advanced Eye Centre. To find a parking space at PGI is not an easy task. The institute has around 9,000 employees and it caters to around 6,000 patients in outdoor patient department everyday and around 2,000 patients remain admitted for the indoor care. Not only patients, even doctors and employees are facing the parking problem. Each day from 9am to 10pm, the road leading to the PGI witness traffic jam. Many patients and their relative's park vehicles in the sector 11 market, while others leave cars alongside the road.

Keywords: Parking Area, Four Wheelers, Two Wheelers

I. INTRODUCTION

India is a developing country. It has the second largest road network across the world at 4.7 million km. This road network transports more than 60 percent of all goods in the country and 85 percent of India's total passenger traffic. Road transportation rapidly increased over the years with the improvement in connectivity between cities, town and villages in the country. movement of goods. Congestion has clearly grown year by year. It has created a number of problems. Due to congestion, it takes longer time to reach at work in the rush hours. Parking system can also take advantage of innovative technologies in order to improve the ease and convenience of payment charges/rates for parking. Proper design of parking space is very important for good transporting system. If there will be lack of parking space and facility then it will be a disorganized condition for everyone. But designing of any parking facility is not an easy job. It seeks a lot of parameters which we need to know, we need to find out with the help of simple data by applying some techniques. The Indian roads carry almost 90

percent of the country's passenger traffic and around 65 percent of its freight. In India sales of automobiles and movement of goods by road is growing at a rapid rate. Cognizant of the need to create an adequate road network to cater to the increased traffic and movement of goods. Congestion has clearly grown year by year.



Plan Layout of Pgimer Chandigarh

A. Objectives and Scope of Study

- To analyze existing parking demand and its characteristics for P.G.I Chandigarh.
- To analyze and evaluate existing parking area for P.G.I Chandigarh.
- To analyze future parking needs. The parking of past year is studied and other alternatives are discussed.
- To analyze the peak hours in which the vehicle congestion takes place.

B. Description of Field Parking Studies

In this investigation, some of the congested areas of Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh have been taken into consideration and parking studies conducted to check the adequacy of the existing and planned parking spaces by accessing the present parking demand and the future demand by projecting the present demand data. Hence it is necessary to carry out the field parking studies in this Sector. The Sector has been divided into three workable pockets shown in fig.3.2 and as detailed below:-

S.NO	Identification Number	Location of pockets
01	Pocket-A	Public parking new OPD PGIMER.
02	Pocket-B	APC public parking PGIMER.
03	Pocket-C	PGI staff parking.

Table 3.1: Classification of parking in different pockets

C. Parking Characteristics

Before taking any measures for the betterment of conditions, data regarding availability of parking space extent of its

usage and parking demand is essential. It is also required to estimate the parking fares also. Parking survey is intended to provide all these information. Since the duration of parking varies with different vehicles several characteristics are used to access the parking need. The following parking characteristics are normally important.

- 1) Parking accumulation: It is defined as the number of vehicles parked at a given instant of time. Normally this is expressed by accumulation curve. Accumulation curve is the graph obtained by plotting the number of bays occupied with respect to time.
- 2) Parking volume: Parking volume is the total number of vehicles parked at a given duration of time. This does not account for repetition of vehicles. The actual volume of vehicles entered in the area is recorded.
- 3) Parking load: The parking load describes the area which has particular vehicle distribution under particular time interval. It is expressed as vehicle per hours.
- 4) Average parking duration: It is the ratio of total vehicle hours to the number of vehicles parked.

$$\text{Parking duration} = \frac{\text{Parking load}}{\text{Parking volume}}$$

- 5) Parking turnover: It is the ratio of number of vehicles parked in duration to the number of parking bays available. This can be expressed as number of vehicles per day per time duration.

$$\text{Parking turnover} = \frac{\text{Parking volume}}{\text{No. of bays available}}$$

- 6) Parking index: Parking index is also called occupancy or efficiency. It is defined as the ratio of number of bays occupied in time duration to the total space available. It gives an aggregate measure of how effectively the parking space is utilized. Parking index can be found out as follows

$$\text{Parking index} = \frac{\text{Parking load}}{\text{Parking capacity}} \times 100$$

II. METHODOLOGY

The following types of parking studies have been conducted in each of the above mentioned sub-areas:

- 1) Parking survey.
- 2) Parking usage study by In and Out method.

A. Parking Survey

Parking survey is conducted to collect the above said parking statistics. The most common

Parking surveys conducted are:

- 1) In and Out survey
- 2) Fixed period sampling
- 3) License plate method

Survey has been conducted for determining the ultimate planned parking area, the entire area is divided into five sub areas and the master plan of each sub area has been obtained from the office of chief town planner Chandigarh and the total area marked for parking has been measured. For the total area of equivalent car space including the area required for parking manoeuvring's and circulation a value of $2.5\text{m} \times 5\text{m}$ as recommended by IRC (clause 11) has been used. Similarly the total area required for the parking of 1 cycle 2m^2 area is provided as recommended by IRC.

B. Parking Usage Studies by In and Out Method

In this survey, the occupancy count in the selected parking lot is taken at the beginning. Then the number of vehicles that enter the parking lot for a particular time interval is counted. The number of vehicles that leave the parking lot is taken. The final occupancy in the parking lot is also taken. Here the attendant required is very less. Only one person may be enough. For quick survey purposes a fixed period sampling can also be done. This is almost similar to In and Out survey. All vehicles are counted at the beginning of the survey. Then after a fixed time interval of 1 hour the count is again taken. Parking surveys are conducted to collect the above said parking statistics. The most common purpose of this study was to determine the peak parking demand, the average parking duration and the distribution of the parking demand during the day in each of the pockets under study. Execution of design criteria at parking area site must be done accurately and not like at some place that instead of designing vehicular parking at 60° but marking wrongly done by the workers and not cross-checked by any qualified engineer in charge.

C. Days and Timings of Study

The entire sub-area under study comprises of buildings of different types at the premises of PGIMER (Post Graduate Institute Of Medical Education And Research). Therefore, the maximum parking in these areas could be observed on the normal week day which is any day from Monday to Sunday. The studies in each of the sub-areas have been conducted on three normal week days to get most appropriate results. Timings for the studies have been kept from 9:00 am to 6:00 pm in all the parking pockets. The round trip interval for each pocket in the present study estimated after number of initial trials was fixed at 60 minutes. Census table are then separately prepared from the data collected during the parking studies. These three pockets were then analyzed for the number of vehicles that visit the PGIMER area per hour. The analysis was done for the period from April 2020 to May 2020. For the total of 27 hours each parking was observed for the vehicles that visit per hour. Depending upon the number of vehicles calculated the parking lot with the heavy number of vehicles was redesigned. After that the alternates were designed.

III. CONCLUSIONS

On the basis of the investigation, the following conclusions have been made Parking is an acute problem worldwide if parking is not properly designed it will lead to the following Ill-effects.

- 1) Congestion: Parking takes considerable street space leading to the lowering of the road capacity. Hence speed will be reduced, journey time and delay will also subsequently increased. The operational cost of the vehicle increases leading to great economical loss to the community.
- 2) Accidents: If the parking operation i.e parking and un-parking is not done with Care, it will leads to accidents which are referred to as parking accidents. Common type of parking accidents which occur while driving out a car from the parking area are careless opening of the

doors of parked cars and while bringing in the vehicle to the parking lot for parking.

- 3) Environmental Pollution: Parking also causes pollution to the environment because stopping and starting of vehicles while parking and un-parking results in noise and fumes. Which causes not only environmental pollution but also affect the aesthetic beauty of the buildings because cars parked at every available space creates a feeling that building rises from a plinth of cars.
- 4) Obstruction to Fire-Fighting operations: Parked vehicles may also obstruct the movement of firefighting vehicles during fire. Sometimes they block access to hydrants and access to buildings. Therefore it is necessary to design and analysis the parking lots so as to minimize the above ill effects of parking and make the movement and operation of vehicles smoothly on the roads.

IV. RESULT AND DISCUSSION

In pocket-A by providing 90° Angle parking instead of 60° angle parking capacity will increase by 13.22 %. The parking capacity of pocket-B will increase by providing 90° angle parking. But due to less space maneuvering of vehicle is difficult. The foot path stretch of 65.96m x 8m area is available if utilized for car parking the capacity of pocket-C will increase. There is no marking in this area and vehicles are parked in haphazard manner. By providing 90° angle parking capacity will increase by 20%. The interpolation achieved as per data shown in table respectively are indicating the vehicular frequency from time to time for the parking purposes in this area. The average peak demand of parking in all pockets is between 10.00 am to 11.30 am and the peak demand in the afternoon is between 3.00 pm to 4.30 pm. Census were conducted in different pockets to collect data. The data obtained from these studies was analyzed and is presented in tabular form. These tables are mentioned.

A. Census Tables and Graphs of Different Pockets:

The observed data which is given above in the form of tables is then represented by graphs. The graphs are plotted between number of vehicles versus time. These help us in the determination of the different parking characteristics such as cumulative accumulation, capacity, inflow, outflow, total vehicles per pocket and peak hour of different parking pockets. These characteristics are important for parking studies. So, before designing any parking facilities through investigation of these characteristics is necessary. From the above studies it has been concluded. If we talk about the PGIMER Chandigarh, there is lot of congestion in parking areas. People park 2-wheeler in place of 4-wheeler parking. Therefore parking space is not properly utilized. Road side vendors use parking lots and footpath illegally as market.

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