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# Study on Urban Vehicles Parking Characteristics and Analysis

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**Abstract:** *The transport infrastructure contributes substantially to the state economy. Parking is an essential component of the transportation system. This essential component causes some major problems that are created by the increasing vehicle traffic. Some of the issues related to parking are congestion, delay, accident, pollution etc. It has an impact on transport development. The availability of less space in urban areas has increased demand for parking space especially in central business area.*

*In Chandigarh Due to increase in traffic congestion, there has been significant increase in demand for parking spaces. As the number of vehicles are increasing, the parking area for offices and shopping mall complexes have become inappropriate. This increasing demand has also lead to economic, social and environmental losses. Thus the optimum utilization of space and its control is a great challenge faced by the planners now a day.*

*The purpose of this Parking Inventory Report is to equip policymakers, community members, developers, and parking facility operators with information about an issue that is often the source of conflict, cost, and congestion within Center City. The information offered in this report can help guide decisions to ensure that parking is provided and priced at rates that meet the needs of commuters, visitors, businesses, and residents, while also advancing the City's broader goals of economic development and sustainability.*

**Keyword:** *car parking, congestion, parking accumulation, parking duration, delay.*

## I. INTRODUCTION

### A. General

Chandigarh, nick name is “The City Beautiful” which is obliged to a Chandi temple and an adjoining Fort for its name. it is located at the foothills of Shivalik range of Himalayas. Chandigarh is also known for its beautiful gardens. Chandigarh is the first planned modern city of India designed by Le Corbusier, a famous French architect of that time and he built the final plan to build the city of Chandigarh. He was accompanied by several other architects and added a touch of artistry to the city buildings. The buildings were made of bumpy bricks in proper geometrical shapes which is now an identity of the Chandigarh.

Chandigarh is a city and a union territory of India that serves as the capital of the Indian states of Haryana and Punjab. As a union territory, the city is governed directly by the Union Government and is not part of either state.

Chandigarh is bordered by the state of Punjab and Haryana. Chandigarh is considered to be a part of the Chandigarh capital region or Greater Chandigarh, which includes Chandigarh, and the city of Panchkula (in Haryana) and cities of Kharar, Kurali, Mohali, Zirakpur (in Punjab).

## II. PARKING PROBLEMS IN CHANDIGARH

A necessary element of a city is parking. The supply of parking spaces in Chandigarh is a growing concern among planners and residents. According to the Chandigarh Transport Administration, an estimated million cars drive the roads of Chandigarh daily. With 800,000 vehicles registered in the city, car parking is erratic, most drivers parking wherever they find space. On residential streets, car owners are taking over driving lanes, although there is space for parking lanes. In the markets, tuk-tuks, two wheelers, and cars compete for space, often not using designated spaces. Since Chandigarh is planned city provides parking nearly everywhere from parks and schools to markets and houses. However the daily influxes of cars from outside the city and the high number of vehicles per household have resulted parking shortage in certain areas. Large market areas such as Sector 22 and the Madhya Marg markets experience the most congestion. Although there are pay-to-park systems lots are consistently full during the day especially between 5-9pm. It is observed that the parking shortage was often due to inefficient use of the lots rather than lack of space. Drivers frequently ignore marked spaces taking up as many as two full spaces with one vehicle. Consequently a full lot will contain fewer cars than spaces.

### III. DESCRIPTION OF FIELD PARKING STUDIES

In this investigation, some of the congested areas of sector 22-C of Chandigarh have been taken into consideration and parking studies conducted to check the adequacy of the existing and planned parking spaces by assessing the present parking demand and the future demand by projecting the present demand data up to year 2022. This sector is comprised of hotels, cinema, markets, schools, temples, health center and residential buildings. Hence it is necessary to carry out the field parking studies in this sector. The sector has been divided into five workable pockets shown in fig.1 and the layout of Sector 22-C chandigarh is shown in fig. 2

Classification Of Parking In Different Pockets

S.NO	Identification Number	Location of pockets
01	Pocket-A	Parking lot in front of Govt. Flats.
02	Pocket-B	Parking lot in front of Park.
03	Pocket-C	Parking lot in front of Market.
04	Pocket -D	Parking lot backside of Market.
05	Pocket-E	Parking lot back side of Dispensary.

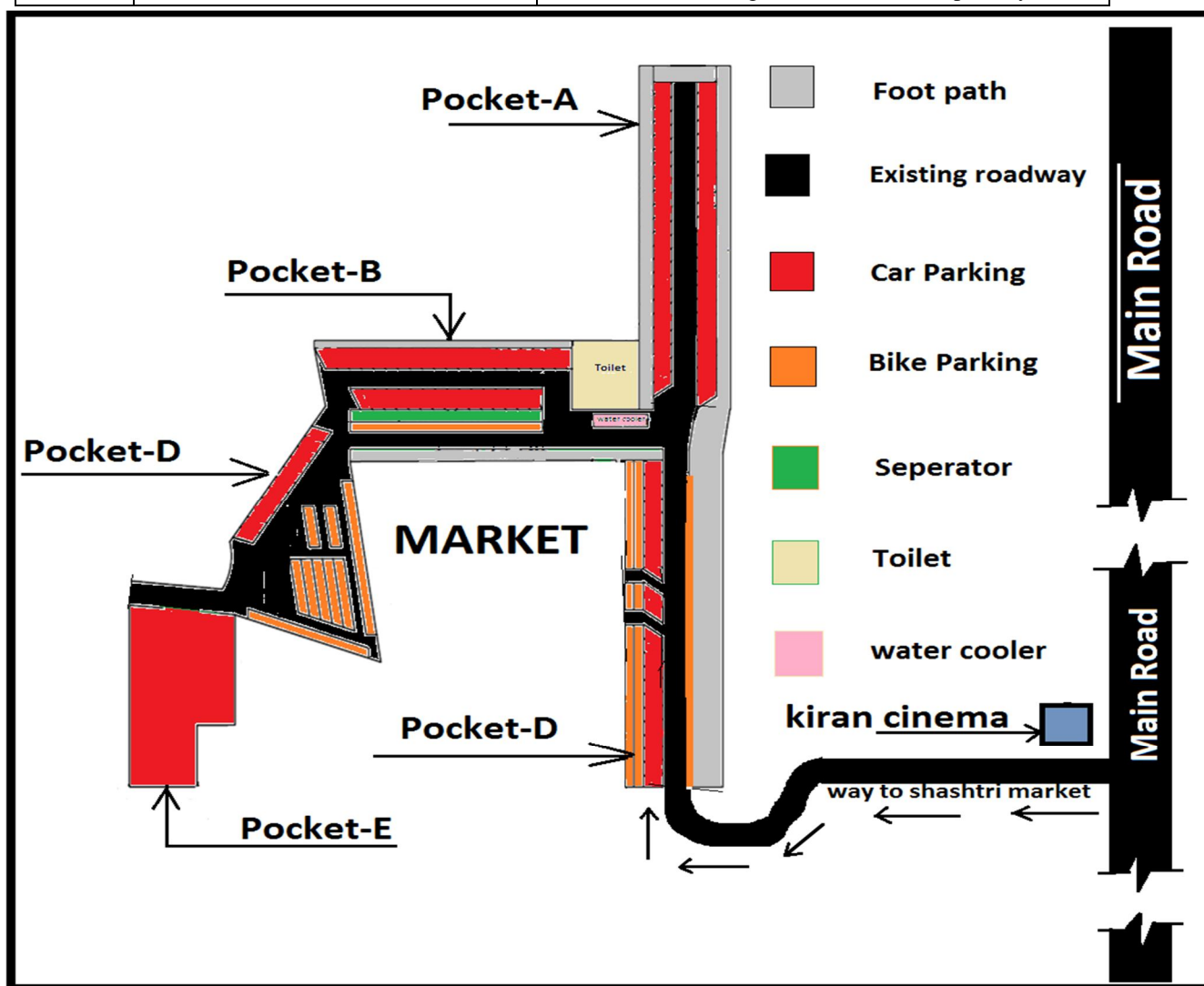


Fig.1 Parking area pockets

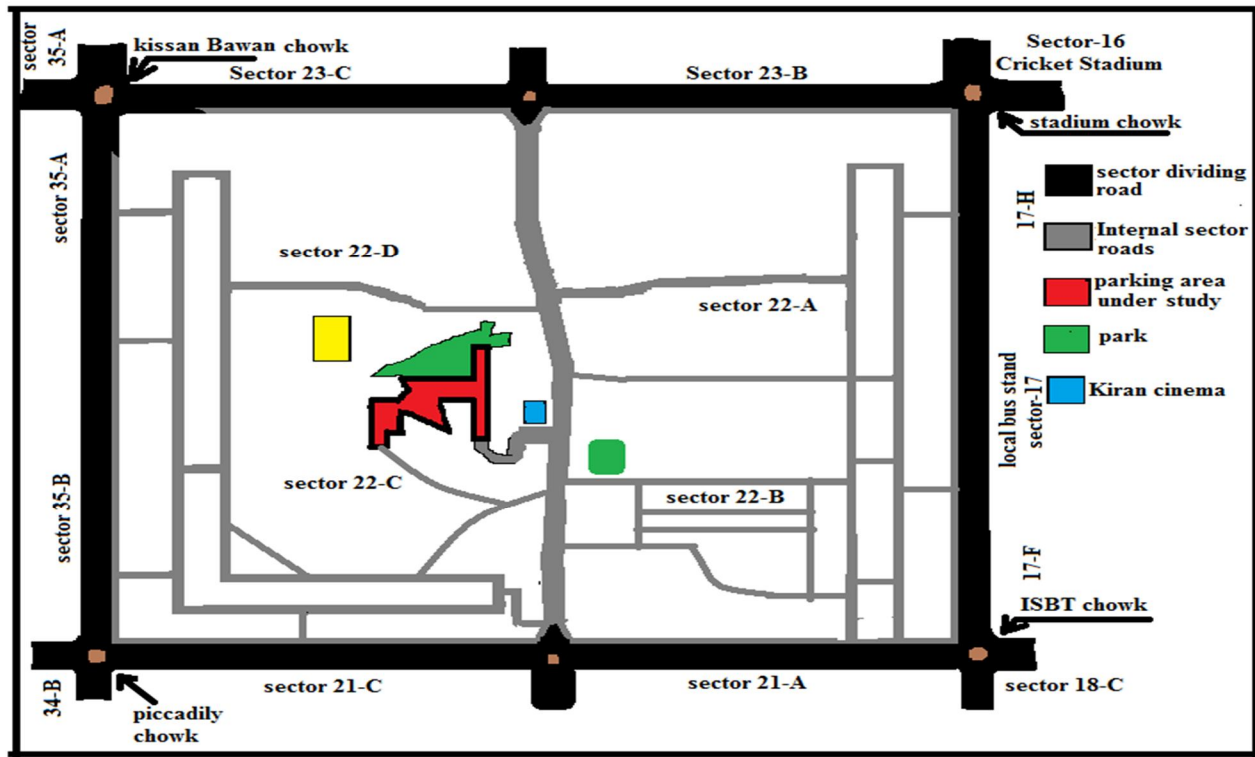


Fig.2 Layout plan of sector 22-C

#### IV. METHODOLOGY OF DIFFERENT PARKING STUDIES CONDUCTED

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

##### A. Parking Surveys

Parking surveys are 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 maneuvering's and circulation a value of 2.5m×5m as recommended by I.R.C. (clause 11) has been used. Similarly the total area required for the parking of 1 cycle 2m<sup>2</sup> area is provided as recommended by I.R.C.

##### 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 also 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 incharge, at some unsuitable angles.

### V. OBSERVATIONS AND DATA ANALYSIS

It gives brief description of parking studies conducted in sector 22-C. The analysis of the data collected from the field studies has been presented below.

#### A. Parking Lot

The entire study area of Shashtri market of sector 22-C Chandigarh has been divided into five pockets. The parking lots have been assigned a particular section for the purpose of identification. The division of the entire study area along with identification number is presented in table 1.

#### B. Parking Capacity of Various Pockets

The available parking capacity at 60° angle parking which is the present pattern of parking in all the sections and ultimate parking capacity which is the maximum possible parking capacity when the vehicle are parked at 90° angle have been calculated and tabulated below.

TABLE 1  
COMPARISON BETWEEN EXISTING CAPACITY AND ULTIMATE CAPACITY

S No.	Section No.	Location	Existing Capacity (at 60° angle)	Ultimate Capacity (at 90° angle)
1	Pocket-A	Parking lot in front of Govt. Flats.	45cars/No Scooter	51cars/ No Scooter
2	Pocket-B	Parking lot in front of park	37cars/43 Scooter	42cars/43 Scooter
3	Pocket-C	Parking lot in front of Market.	22cars/180 Scooter	25cars/180 Scooter
4	Pocket-D	Parking lot back side of Market.	11cars/123 Scooter	13cars/123 Scooter
5	Pocket-E	Parking lot back side of Dispensary	24cars/No Scooter	29cars/No Scooter

### VI. CONCLUSIONS

#### A. Following conclusions are drawn

For pocket-A, as per the present parking conditions there is 60° angle parking but they can be redesigned to increase the parking space for the vehicle users if we provide 90° angle parking for pocket-A by doing so parking capacity will be increased by 13.22 percent of vehicles. For pocket-B, as per this parking area site condition parking of vehicles at 90° angle shall not be due to workability/maneuverings of vehicles in small portions of suitable moving area. Keeping in view less space available 90° can accommodate more vehicles, as compared to 60° angle. The parking capacity will be increased by 6.25 percent of vehicles. For pocket-C, the available foot path stretch is 65.96m x 8m is area. This foot path stretch can be used for car parking and the parking of vehicle at 90° can accommodate 26 no. of additional vehicle in pocket-C.

For pocket-D, as per the present parking conditions there is 60° angle parking but they can be redesigned to increase the parking space for the vehicle users if we provide 90° angle parking for pocket-D by doing so parking capacity will be increased by 3 percent of vehicles. For pocket-E, at present there is no marking in this block. There is a lot of vacant space available but is not utilized properly so when other blocks are full vehicles can be parked in this block. If we provide 90° angle parking in this pocket capacity is



increased by 20 percent of vehicles. Further, it may be added that certain other aspects be considered like time limit in parking avoidance of illegal parking installation of parking/no-parking signs and enforcement of parking rules. Parking attendant should be recruited who will receive the vehicle from owner and the park the vehicle in specified bay to avoid delay and congestion.

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