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A Study of on-Street Parking Vehicle in Sonipat City

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Abstract: ***Street parking is a type of common parking, known for its efficiency in terms of land area use and convenience to motorists, because they allow them to park the vehicles near destinations point. There are some advantages and disadvantages of on- street parking that continue to vary depending on the circumstances. Today, urban transport planners are facing difficulties and want to know where and when kerb parking should be provided confirming that the benefits and drawback of it. Again, if the query arrives about parking pattern, it should be parallel parking or inclined. Before leaving or limiting parking in the street, you must explore in different aspects which has already done. After an extensive review, we come to the conclusion after the study that on-street parking should be probhited on some major streets. It should be constructed on minor roads as it can provide a safe user friendly environment in this context. The objective of the study is to cover important locations of Sonipat city which having high number of on street parking problem. In all the survey we cover almost four sites that is Gandhi chowk sector 14, Tulip point, Dada Bhature wala Restaurant, Kache-Quarter. The study consists of a survey on the use of car parks by the fixed period sampling method. We suggest, kerb street parking should be parallel, not angled, because later it is dangerous in all respects. The study also suggest some prohibition of on-street parking at some defined locations.***
Key Words: Accumulation profile, parking demand, Parking Demand Model, parking duration, parking supply.

I. INTRODUCTION & LITERATURE REVIEW

The growing population with a rapid pace in different part of India, resulting in a variety of parking issues in all of them. Important part of the transportation system is parking. It has a significant impact on traffic management. Now a days, parking problems are caused by a lack of space therefore we try to lower the amount of space available to alleviate the problem. Due to Less availability of space in Urban Areas has boosted the parking space, particularly in retail malls, public places, and office buildings. It also has an effect on the development of transportation. With the increasing number of automobiles on the road, the problem of parking has grown out of control in many towns and cities. Due to a lack of parking places, drivers are forced to park their vehicles on the Curb side, causing traffic congestion, delays, and accidents, as well as reducing the effective road width. If we do a Proper Study on parking demand and parking characteristics in a particular area, then it is beneficial to town planners and town engineer and we make a good parking space.In 2018, Nilesh Pawar performed 3 type of survey during their study that is: Reconnaissance survey, Demand and Supply graph, Parking survey. To get out of this problem, if in the city we introduce the price of parking, so that people reduce the usage of own private vehicle and automatically transfer to Public Transport. The parking problem is caused by the increasing concentration of human activities on limited land, both residentially and commercially. Every vehicle driver would prefer to park his vehicle as close as possible to his destination in order to reduce walking distance. As a result, parking spaces in the central business district areas (CBD) and other high-traffic locations are in higher demand. In 2012 Priyanka Kolhar conducted in the CBD covering area around 750m radius for the city bus station where traffic congestion is very high due to the many commercial activities carried out in this area. To reduce this problem, she suggests that if any parked vehicle is find in busy area the heavy parking fee should be raised on that vehicle. License plate number method was conducted by Janak Parmar in 2017. The survey was done at each interval of thirty minutes and noted vehicles number which occupy the space in parking lot. In 2014 Sudipta Chowdhary, Questionnaire types parking survey is conducted with the drivers, and various information are collected. The average demand for street parking is 350 cars per hour and the car capacity is 216 cars per hour. The ratio of accumulation to supply is 1.62.Some different type of method conducted by Saptarshi Sen in 2016 using SPSS, the model of the parking application is obtained. The data comes from survey is used to form the regression equation. Final words say that, vehicle demand is very high in upcoming years so we take measurable precaution on control the peak demand. Due to increased road traffic in urban cities over the last decade, there has been a significant and tremendous increase in the demand for parking spaces. During peak hours, this has resulted in a shortage of on-street parking space in the office and retail district Communities .Parking demand also has a negative impact on the economy and the environment.

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II. METHODOLOGY OF THE STUDY

A. *Proposed Methodology*

The objective of this study is to determine the parking demand and supply of Sonipat city, which has a population of 2.78 lacs, it also suggests the measures how to resolve the problem of parking in Sonipat city. The city of Sonipat in Haryana was chosen for the study due to the ease with which data could be collected.

1) *Study Area Definition:* In the first phase we determine the study area, location & parking inventory in order to determine the available parking space which allot in Sonipat city and as well as existing parking issues.

2) *Collection of Data*

Data of parking is collected in two types such as:

a) *Fixed period Sampling***:** In this method the number of vehicles parked is counted at selected site during starting of the survey and after a fixed interval of quarter an hour, we again count no of vehicle till up-to 3-4 hrs. during peak hour of a selected site. The parked vehicle data is converted into passenger car unit value by multiply the PCU factor. The maximum PCU value is the max demand of a particular site.

b) *Parking supply for parking space availability:* The number of cars, three-wheelers, and two-wheelers that could fit in the available parking area on the road at various study sites during peak hours of parking is used to calculate the parking supply. Vehicle data is converted to PCU (passenger car units) by multiplying it by the PCU factor described in IRC: 106-1990 and the parking supply in terms of passenger car spaces is calculated

3) *Data Analysis:* This is the third stage of this study, which will determine the percentage utilization of existing parking in the study area. Using the existing parking demand, the study will be able to identify current parking situation and develop proposals to address them. Based on a survey of the parking lot, the current parking demand is determined. Maximum parking demand and supply statistics are used to calculate the percentage utilization of existing parking spaces.

III. DATA COLLECTION AND ANALYSIS OF PARKING STUDY

A. *Sites for Data Collection*

Data was collected from different sites of Sonipat city, in such a manner that we cover the main locations of Sonipat city where on-street parking demand is very high and supply is not in a sufficient amount. The sites selected are given here:

Site along sector 4 main market Sonipat city:

1) Gandhi Chowk
2) Tulip point
3) Dada Bhature wala Restaurant
4) Kache quarter Road(Famous Shopping Market of Sonipat city)

All the selected Site are shown in photo 1



Figure 1 Layout Plan of Sonipat City

B. Data Collection and Analysis

1) *Fixed Period Sampling:* In this method we count the number of vehicles parked at selected site (Either car, bike or any vehicle) during the starting of the survey and after a fixed interval of quarter an hour, we again count no of vehicle till up-to 2 to 3 hrs during peak hour of a selected site. The parked vehicle data is converted into passenger car unit value by multiply the PCU factor. The maximum PCU value is the max demand of a particular site.
2) *Gandhi Chowk Sector 14:* Parked vehicle data of Gandhi Chowk in given in tabular form below. Peak Parking demand value obtained from this site is 30 PCU (Passenger car unit) per quarter an hour interval in the time period of 9:30-9:45 am. The graphically representation is also shown of this site.

a) Gandhi Chowk

Timing	Car	Two Wheelers	PCU	In	Out	Accumulation	Occupancy
9.00-9.15	8	32	24	0	3	37	92.5%
9.15-9.30	5	32	21	0	0	37	92.5%
9.30-9.45	6	28	30	0	3	34	85%
9.45-10.00	4	32	20	7	5	36	90%
10.00-10.15	4	32	20	5	5	36	90%
10.15-10.30	2	30	17	0	4	32	80%
10.30-10.45	3	35	20.5	0	8	38	95%
10.45-11.00	4	33	20.5	1	2	37	92.5%
18.00-18.15	9	29	23.5	5	4	38	95%
18.15-18.30	3	28	17	0	7	31	77.5%
18.30-18.45	4	33	20.5	8	2	37	92.5%
18.45-19.00	4	32	20	4	5	36	90%

Table 1 On-street parking of vehicles in Gandhi Chowk sector 14

Average Occupancy= 89.35%

b) Tulip point Mall

Timing	Car	Two-wheeler	PCU	In	Out	Accumulation	Occupancy
9.00-9.15	5	24	17	0	0	29	72.5%
9.15-9.30	3	30	18	7	3	33	82.5%
9.30-9.45	2	31	17.5	0	0	33	82.5%
9.45-10.00	8	26	21	4	3	34	85%
10.00-10.15	6	24	18	0	4	30	75%
10.15-10.30	3	26	16	1	2	29	72.5%
10.30-10.45	5	27	18.5	3	0	32	80%
10.45-11.00	7	25	19.5	0	0	32	80%
18.00-18.15	3	27	16.5	0	2	30	75%
18.15-18.30	4	25	16.5	1	2	29	72.5%
18.30-18.45	4	26	17	2	1	30	75%
18.45-19.00	6	26	19	4	2	32	80%

Table 2 On-street parking of vehicles in Tulip Point Mall
Average Occupancy= 77.71%

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Similarly data is collected for two more sites

a) Dada Bhature Wala Restaurant

b) Kache Quarter Road and graph for all the four sites are plotted which are shown below.

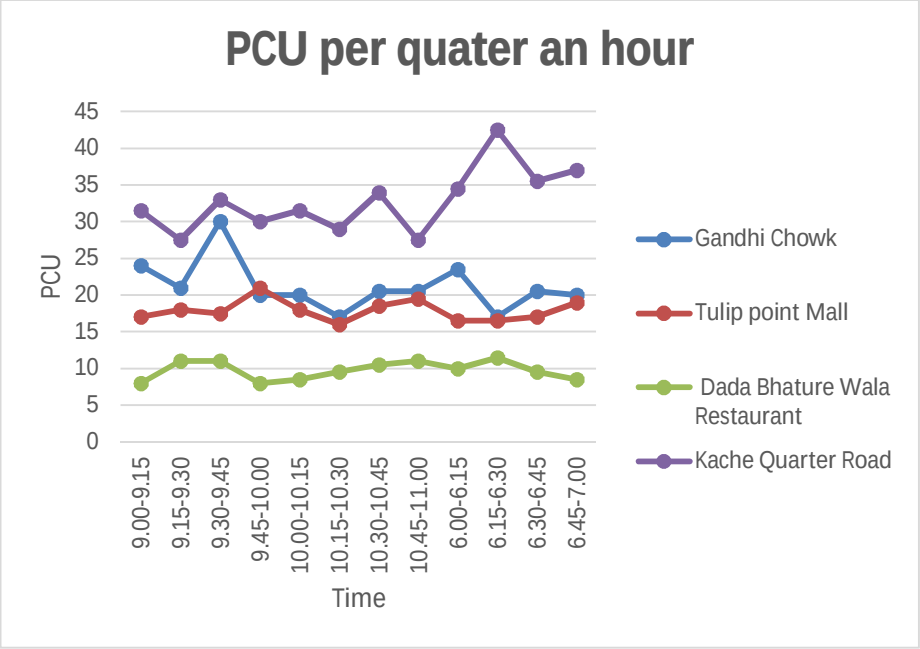


Figure 2 variations of PCU per quarter hour with time for all four sites

S.No	Name of the parking site	Max parking demand value in PCU	Time for peak parking	Reason for max parking
1	Gandhi Chowk	30	9.30-9.45P.M.	Due to hub of Phone Shops in that area
2	Tulip Point Mall	21	9.45-10.00A.M.	Parking due to many shops in mall and people come for shopping.
3	Dada Bhature wala Restaurant	11.5	6.15-6.30PM	Famous for Chole Bhature shops in whole Sonipat city, visitors are come for Eating.
4	Kache-Quarter	42.5	6.15-6.30P.M.	Biggest-shopping market of Sonipat city. Visitors are come for shopping purpose.

Table 3 Maximum parking demand value of all the four sites

3) Parking Supply (Space): The number of cars, three-wheelers, and two-wheelers that could fit in the available parking area on the road at various study sites during peak hours of parking is used to compute the parking supply. The obtained vehicle data is transformed into PCUs (Passenger Car Units) by multiplying it by the applicable PCU factor stated in IRC: 106-1990, and the parking supply in terms of passenger car spaces is calculated. The maximum parking supply (parking spots) of all 4 sites is shown in Table 3 and Figure 3.

IV. RESULTS

The information gathered from all four locations is compiled, and the usage of the available parking area is calculated by dividing parking accumulation by parking supply. Max parking accumulation/supply value obtained from Tulip Point Mall and min value obtained from Kache-Quarter, all the information give in Tabular 4 and Fig 3

S.No	Name of the parking sites	Max parking accumulation value in PCU	Max parking space value(PCU)	Accumulation/Supply Percentage
1	Gandhi Chowk	30	32	93.75
2	Tulip Point Mall	21	21.5	97.67
3	Dada Bhature wala restaurant	11.5	12.5	92
4	Kache-Quarter	42.5	49	86.73

Table 4 The Ratio of Maximum Accumulation to Parking Supply percentage
Average utilization: 92.54

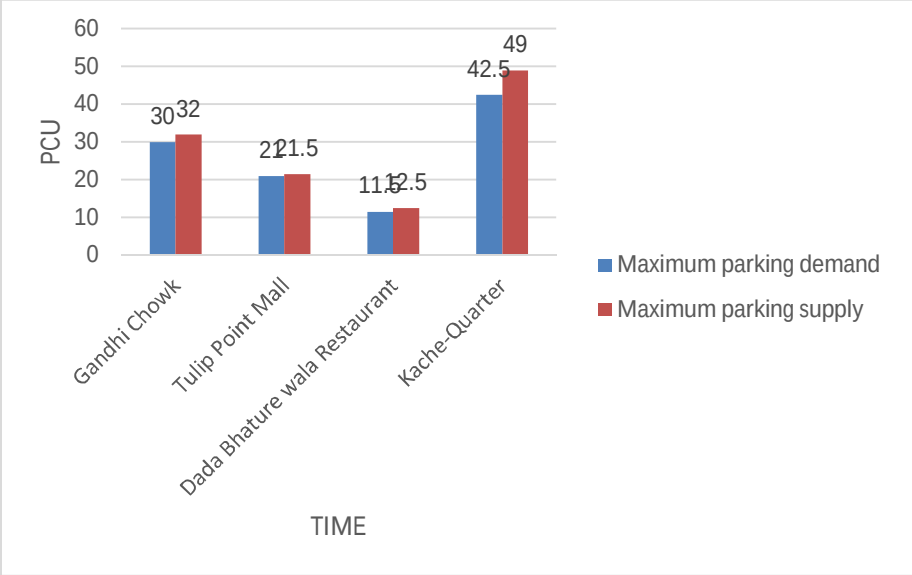


Figure 3 Maximum parking demands & parking supply of all the four sites

V. CONCLUSIONS

This study comes up with the subsequent conclusions:

1) Curb facility as well as off street facility is not properly provided at any of the selected area.
2) All the selected site are faced a Curb parking problem with motor cycles and car are in high amount.
3) All the selected site have a carriageway width of 9.3m in which motorcycle takes approx 2-4m after that problem of congestions start.
4) Tulip Point Mall parking is only for staff members while Sonipat station parking creates problem at entry and exit gate, In reliance mall proper off street parking facility available only in worst case when parking is full people park their vehicle outside the mart.
5) When the aim of the trip is recreation, such as seeing a movie in the mall, individuals are willing to pay the parking fees, however when the objective of the trip is shopping, banking, or short-term office work, they try to avoid paying for parking.
6) Even if provided a proper Curb parking at selected areas, but the parking demand is very high & space is very less during peak hours implying that separate parking lots should be provided on the available spaces close to the studied areas to address the parking problem.

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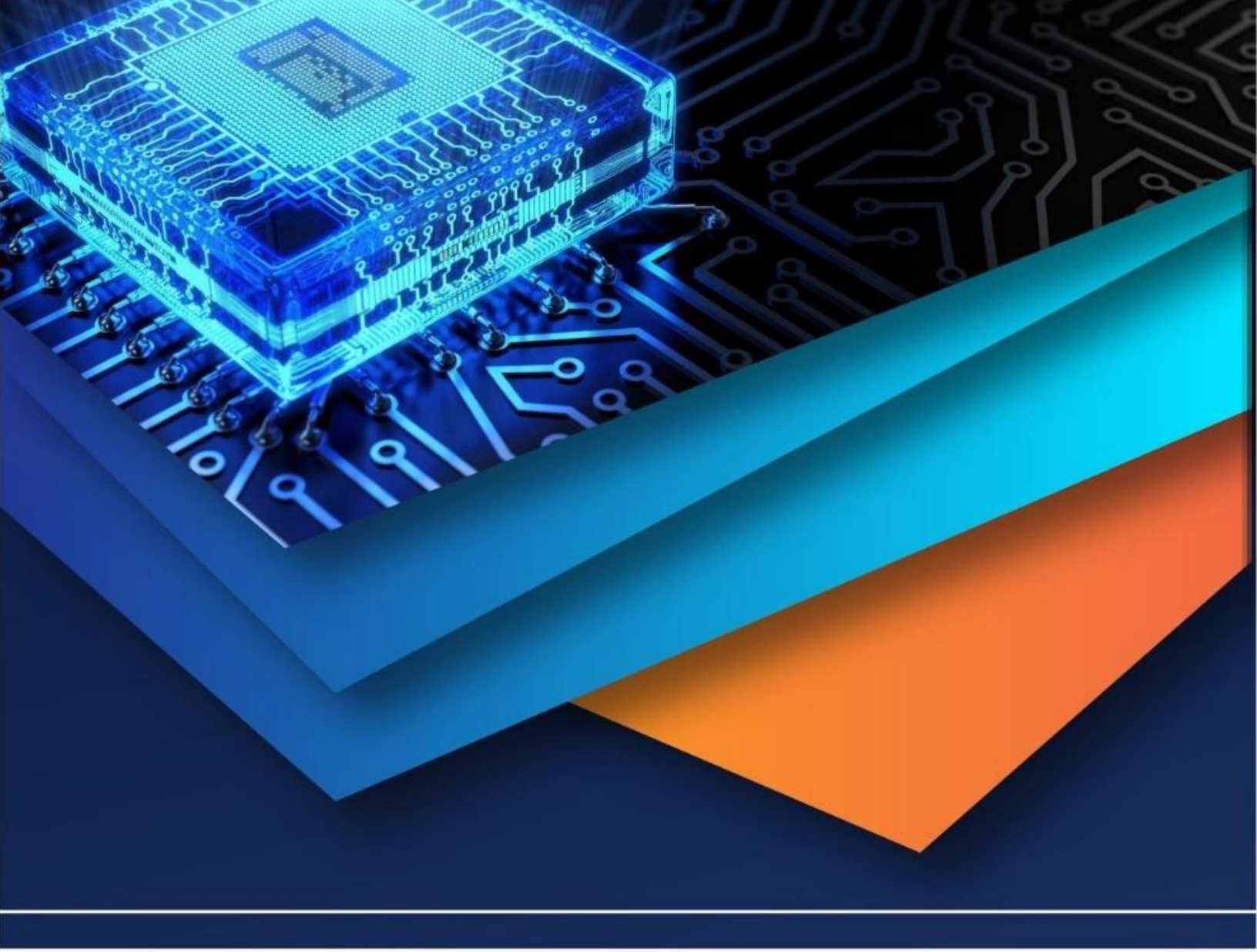
VI. RECOMMENDATIONS

Based upon results of the study, the following recommendations are made:

1) Proper on street parking is provided at all the selected sites as per the utilization percentage.
2) Parking limits will be strictly enforced and traffic police will have the power to do so.
3) Parking charges should be started on minimum amount so that every person park their vehicle in off street parking.
4) Where space for off street parking is less, ground floor paid parking should be started while planning for new parking lots designing.
5) All the drivers like cars, two wheelers, three-wheeler, particularly battery rickshaw, require proper education with the help of TV, radio to encourage them proper parking sense to avoid the problem of congestion on roads.

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