Parking management plan for commercial area of city.
A case study of old city, Vadodara

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ABSTRACT
Now a days we have tendency to face numerous parking issues because of urbanization. Vadodara town is endlessly increasing and there is staggering growth in population and because of that there is a increase in number of vehicle and frequent conveyance movement on the road, that cause parking problem and serious holdup within the peak hours. Due to lack of off-street parking and poor service quality of transit system within the CBD area individuals are forced to park their vehicle on the streets resulting in produce immense on street parking demand. This study cares with Vadodara town. Besides this, there's a new that must be focus that however individuals park and put off their vehicles from the foremost engorged places in peak hours. A main objective of this study is to spot the issues in existing parking scenario and by grouping parking survey knowledge. This study will facilitate us to seek out innovative solution to the present issue like increasing vehicle density, capability of parking and poor parking facility etc. It investigates issues with current parking designing, discusses the prices of parking facilities and potential savings from improved management, describe specific parking management methods and the way they'll be enforced.

Keywords: Parking management, CBD area, on street parking, off street parking

1. INTRODUCTION
Transport is the single biggest issue for urban environmental debates. In Vadodara, the unskillfulness or lack of urban transport services and infrastructure is one in all the most important impediments to the economic process and concrete productivity. Every day more and more vehicles are being added to the Vadodara transport network. Many of the citizens are having more than one vehicle. Increasing motorization, poorly in operation transport services, inadequate road maintenance, short bike ways and walkways, poor traffic management, lack of social control, transport education and culture square measure contributory factors to congestion, road accidents, and pollution. Parking is an important urban transportation element. It has various long term and short term impacts on individuals, communities, and transportation systems. One of the problems which create road traffic is parking. They require space to park where the occupants can be loaded and unloaded. Parking affects mode of choice as Individuals having an automobile will probably choose to access their destination by automobile, if the parking is conveniently located at the destination, and if the cost of parking is reasonable. In other words inexpensive or free and plentiful parking is an incentive. Parking is a substantial disincentive for using private automobiles.
2. **AIM**

The aim is to provide solution for parking problem in commercial area of city.

3. **STUDY AREA PROFILE**

The area which has been selected for the study is CBD area of Vadodara city which is the busiest area due to commercial activities which lead to high trip attraction and there is mix use of vehicle.

![Figure 1. Study area](image-url)

4. **DEMOGRAPHY**

The population of Vadodara city is increasing day by day. Growth of population in past years are shown as below.

<table>
<thead>
<tr>
<th>Year</th>
<th>Status</th>
<th>Population</th>
<th>Area (Km²)</th>
<th>Density/ Km²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971</td>
<td>MC</td>
<td>467487</td>
<td>78.13</td>
<td>5983</td>
</tr>
<tr>
<td>1981</td>
<td>MC</td>
<td>734473</td>
<td>108.22</td>
<td>6800</td>
</tr>
<tr>
<td>1991</td>
<td>MC</td>
<td>1061598</td>
<td>132.22</td>
<td>8029</td>
</tr>
<tr>
<td>2001</td>
<td>MC</td>
<td>1411228</td>
<td>168.23</td>
<td>8388</td>
</tr>
<tr>
<td>2011</td>
<td>MC</td>
<td>1752371</td>
<td>270.21</td>
<td>6485</td>
</tr>
</tbody>
</table>

Table (1): Growth Rate of Vadodara City

*Source: Census 2011*
5. VEHICLE DATA

The city transportation system is predominantly dependent on roadway systems. The road network is experiencing heavy congestion.

<table>
<thead>
<tr>
<th>2 Wheeler</th>
<th>3 Wheeler</th>
<th>4 Wheeler</th>
<th>Passenger</th>
<th>Goods</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900278</td>
<td>74706</td>
<td>422592</td>
<td>21379</td>
<td>112846</td>
<td>3283</td>
<td>2535084</td>
</tr>
</tbody>
</table>

Table (2): Type of vehicle

Source: Vadodara RTO

Figure 2. Type of vehicle

6. POPULATION PROJECTION

As per the Census records, the population trends show that the continuously increasing population can be seen along with the fact that the rate of growth in each decade is decreasing. This can be connected with the fact that there had been sudden industrial establishments. Population projection is done by arithmetic mean method.

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Year</th>
<th>Status</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1991</td>
<td>MC</td>
<td>1031346</td>
</tr>
<tr>
<td>2</td>
<td>2001</td>
<td>MC</td>
<td>1306035</td>
</tr>
<tr>
<td>3</td>
<td>2011</td>
<td>MC</td>
<td>1670806</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Projected</td>
</tr>
<tr>
<td>4</td>
<td>2021</td>
<td>MC</td>
<td>1982917</td>
</tr>
<tr>
<td>5</td>
<td>2031</td>
<td>MC</td>
<td>2295028</td>
</tr>
<tr>
<td>6</td>
<td>2041</td>
<td>MC</td>
<td>2607139</td>
</tr>
</tbody>
</table>

Table (3): Population Projection
7. VEHICLE DATA ANALYSIS

The road network is experiencing heavy congestion due to growth in numbers of vehicle ownership. The table shows that there is an increase in vehicle population and less use of public transport. Which also reduce the quality of life. For providing long term solutions to the parking problems, it is essential to estimate the future parking demand. Realistic projections have been obtained for future parking demand for the following years 2025 and 2030.

![Vehicle Growth Chart](image)

**Figure 3. Vehicle Growth**

8. ON STREET DEMAND AND SUPPLY

This area is witnessing large-scale commercial activities. The resultant demand is being forcibly occupied „on-street“. As per IRC area required for two wheeler is 2.5m x 0.8m, four wheeler is 5m x 2.5m. Supply for a given street is calculated as length of street / area of vehicle.

![Demand And Supply](image)

**Figure 4. Demand And Supply**
9. OFF STREET DEMAND AND SUPPLY

The off street parking facilities provided by authorities are not fullfilling the requirement of parking demand. Numbers od parking facilities provided in the CBD is not enought to satidy the demand of parking so it requireds more off street parking facilities to cover up the demand.

10. FUTURE DEMAND

From the above analysis it shows that supply is less and demand is more. So it is importand to analysis the future demand for the study area which will help to provide parking facilities for the future demand. The future analysis is done for the coming decad i.e for 2030. It clearly show that the demand for 2030 is increasing which need to provide a proper management plan for it.
11. RESULT AND DISCUSSION

1. Many of the users, park their vehicle for a whole day for no reason which create lack of parking and genuine parkers do not find place to park. So, it is important to have paid parking scheme to avoid unwanted parkers. From which the use of stretch can be done efficiently and genuine user will find a place to park the vehicle.

<table>
<thead>
<tr>
<th>Time Period</th>
<th>2 Wheeler</th>
<th>4 Wheeler</th>
</tr>
</thead>
<tbody>
<tr>
<td>First hours</td>
<td>5 Rs</td>
<td>15 Rs</td>
</tr>
<tr>
<td>Every additional hour after that</td>
<td>5 Rs</td>
<td>10 Rs</td>
</tr>
</tbody>
</table>

Table (4): Parking Rates

2. It is recommended that angular parking should introduce to this stretch, which increases the width of carriage way for smooth traffic flow.

3. Multi layer parking for 2 wheeler can be provided at existing surface parking near lehrripura gate. Which will increase the capacity of parking and space can be utilized efficiently.

12. CONCLUSION

- By introducing paid parking in CBD area, unwanted parkers will get filtered so parking space will used efficiently and genuine parkers will get the space easily.

- At present situation onstreet parking is done perpendicular at major roads, so it recommended to introduce angular parking. It will increase the parking capacity and width of carriageway, which will have smooth traffic flow.

- Mechanize 2 wheeler parking should introduce at lehrripura gate which will enhance the efficiency of parking capacity.

13. REFERANCE

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