Road Parking: Challenges, Issues and Opportunities

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Abstract

In most of Indian cities traffic congestion increased by Urban population and Traffic volume on road with practical solution not coming from Urban Planner and any Government Body. transportation planning main objective is effectively planning of road network to safe, rapid, economical and efficient movement of people and goods. Indian Traffic condition is heterogeneous nature and pedestrian movement not considered in road network planning. Indian Transportation planning in Three Phases 'Engineering, Enforcement and Education' or The "3-Es". Engineering Phase is constructive. This phase deals with improvement of road geometrics, providing additional road facilities and installation of suitability designed traffic control devices. Education may be possible by sufficient publicity and through schools and television. It aims at improving the human behaviour for improved traffic performance. Enforcement usually made through traffic laws, regulation and control.

This paper can study better lifestyle and better opportunity for employment are the primary factors for rural to urban migrations and continuous increase in the urban perimeter of cities. In such situation, the role of central business areas of urban centers, known as CBD, become crucial, as they are the important links between the old and the new development. A transportation system can describe as a conveyance system which passes on people and freight across urban areas and nation as a whole. Surat City as it is one of the fastest developing cities in the world and due to vast development, transportation problems are reaching its peak.

Multi-level Parking systems for some time have provided relief since they come with a number of advantages – optimal utilisation of space, lower maintenance and operational cost, lower construction cost, secure and environment-friendly nature, comfortable for the drivers, cost saving for builders by saving height or depth. Multiple Level Car Parking Systems are much in vogue a method of automatically parking and retrieving cars that typically use a system of pallets and lifts and signalling devices for retrieval. They serve advantages like safety, saving of space, time and fuel space but also need to have an extra and a very detailed assessment of the parking required, space availability and traffic flow.

Key words: *Traffic congestion, sustainable transportation system, urban transportation, transportation demand, smart city planning, parameters for sustainable transportation system, road layout.*

1   Introduction

Increase in vehicle population in the face of the limited road space used by a large variety of motorized and non-motorized traffic has heightened the need and urgency for a well thought out project on the issue of road

congestion. Although as a part of city mobility plan, Public transport bus services operating over few routes of the walled city area; traffic, delay in journey, congestion and accidents have not changed significantly. Hence, enhancing the existing situation of infrastructure in the walled city area is among the fundamental needs.

The study area chosen is Surat City as it is one of the fastest developing cities in the world and due to vast development, transportation problems are reaching its peak. This is due to high vehicular count in Surat city which is approximately 24,21,043 in 2015 and lack of sufficient public transportation. Amplified urbanization gives rise to problem of congestion. As cities are growing, it will be important to plan and build new facilities for both public and private transport. There is a strong relationship between parking facilities and traffic flow characteristics in the city.

Due to rapid growth in population, increase in movement of the traffic flow rate has created. Although shopping centers have their own parking facilities, people tend to park on the street and go to underground parking only when no space is available on the street.

2   Objectives

- To study the existing parking demand of each parking lots.
- To evaluate the adequacy of parking facilities to meet the parking demand at Surat.
- To estimate the revenue generated on account of paid parking.

3   Parking statistics

- 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.

- 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.

- Parking load Parking load gives the area under the accumulation curve. It can also be obtained by simply multiplying the number of vehicles occupying the parking area at each time interval with the time interval. It is expressed as vehicle hours.

- Average parking duration It is the ratio of total vehicle hours to the number of vehicles parked.

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

- 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

    Parking index = parking load/parking capacity $\times$ 100

4   Effects of parking

- 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 increase. The operational cost of the vehicle increases leading to great economical loss to the community.

- Accidents Careless manoeuvring of parking and unpacking leads to accidents which are referred to as parking accidents. Common type of parking accidents occurs while driving out a car from the parking area, careless opening of the doors of parked cars, and while bringing in the vehicle to the parking lot for parking.

- Environmental pollution They also cause pollution to the environment because stopping and starting of vehicles while parking and unpacking results in noise and fumes. They also aced the aesthetic beauty of the buildings because a car parked at every available space creates a feeling that building rises from a plinth of cars.

- Obstruction to firefighting operations Parked vehicles may obstruct the movement of firefighting vehicles. Sometimes they block access to hydrants and access to buildings.

5   On street parking

On street parking means the vehicles are parked on the sides of the street itself. This will be usually controlled by government agencies itself. Common types of on-street parking are as listed below. This classification is based on the angle in which the vehicles are parked with respect to the road alignment. As per IRC the standard dimensions of a car is taken as 5× 2.5 meters and that for a truck is 3.75× 7.5 meters.

1.Parallel parking: The vehicles are parked along the length of the road. Here there is no backward movement involved while parking or unparking the vehicle. Hence, it is the safest parking from the respective. However, it consumes the maximum curb length and therefore only a minimum number of vehicles can be parked for a given kerb length. This method of parking produces least obstruction to the on-going traffic on the road since least road width is used.

2. 30◦ parking: In thirty-degree parking, the vehicles are parked at 30◦ with respect to the road alignment. In this case, more vehicles can be parked compared to parallel parking


3.45◦ parking: As the angle of parking increases, more number of vehicles can be parked. Hence compared to parallel parking and thirty-degree parking, more number of vehicles can be accommodated in this type of parking.

4. 60◦ parking: The vehicles are parked at 60◦ to the direction of road. More number of vehicles can be accommodated in this parking type.

5. Right angle parking: In right angle parking or 90◦ parking, the vehicles are parked perpendicular to the direction of the road. Although it consumes maximum width kerb length required is very little. In this type of parking, the vehicles need complex manoeuvring and this may cause severe accidents. This arrangement causes obstruction to the road traffic particularly if the road width is less. However, it can accommodate maximum number of vehicles for a given kerb length.
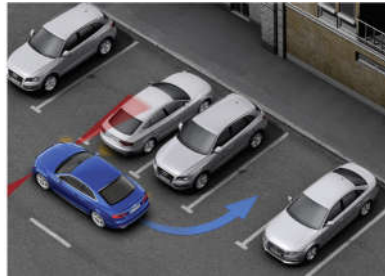
6   Off Street Parking

It is defined as the parking facility used in most of the urban centers, where they allot some space for parking nearer to the main roads and at shorter distance away from main area of the traffic stream. Such parking are called off street parking. These kinds of parking are operated by public agencies /private firms.

Generally, off street parking means parking vehicles anywhere on the streets like garages, private lots and the drive ways. It can be on indoor and outdoor sites. A typical off street parking facility is as shown below.

Types of off street parking:

1. **Surface car parks** Outside surface parking refers to large paved areas used for extensive vehicle parking—beyond the incidental parking provided for individuals, official government parking, and short-term drop off—located adjacent to a building.

2. **Roof parks**

3. **Mechanical parks**

4. **Underground car parks**

Design considerations for off street parking:

• To create multiple small parking areas rather than a large area.

• Reducing the extensive grade operations using topography designs.

• Reduce the number of entry and exit.

• Make sure that the distance of at least 15 meters is provided for the proposed parking area   entry and exit.

• To increase aesthetics in the design and in use for integrating planted islands.

Advantages:

• It can avoid the traffic rush at malls and specified places like market place, public places etc.

• There is no delay and congestion.

• Avoid confusion and create good visibility.

• Provides safety to the vehicles and pedestrians.

• Provides convenient parking spaces (parking area orientation) and it should align with parking rows that is perpendicular to the pedestrian crossing.

• Create user walking distance.

7   **General Considerations**

   • In assessing the parking provision in association with development the Department will normally expect developers to provide an access to the site in accordance with the current standards Where appropriate, developers will be required to demonstrate there is adequate provision of space within the

site, for parking, manoeuvring, loading and unloading to fulfil the operational requirements of the proposed development.

- Where developments incorporate more than one land use which are functioning simultaneously, e.g. a warehouse containing a large office or a public house containing a restaurant, the combined figures applicable to both uses will apply. Conversely, in multi-purpose development where it can be shown that separate uses operate at different times of the day greater flexibility will be applied.

- Floor areas quoted in the guidelines relate to Gross Floor Area unless otherwise stated.

- The term 'one space' used in the standards refers to standing area only and the recommended minimum dimensions for a car space are 4.8 metres by 2.4 metres. The term 'commercial vehicle space' used in the standards refers to the standing area required for the general type of commercial vehicle which would normally serve the particular development.

- The following are standard space requirements of some typical vehicles. These may be used as basic minimum reference values but different layouts such as parallel, herringbone and in-line, have slightly different overall space requirements and detailed layout of parking spaces will be site specific.

  Car 2.4 metres x 4.8 metres

  Light Vans 2.4 metres x 5.5 metres

  Rigid Vehicles 3.5 metres x 14.0 metres

  Articulated Vehicles 3.5 metres x 18.5 metres

  Coaches (60 seats) 3.5 metres x 14.0 metres

  These dimensions refer to standing space only and do not take account of access, manoeuvring space or space required for loading/unloading.

- Operational parking space for commercial and service vehicles will depend on the type attracted to a development and should provide for manoeuvring space to enable vehicles to exit the site in forward gear.

- Best practice on the number, size and layout of parking spaces reserved for people with disabilities and general guidance on the provision of appropriate related facilities is set out in the Department's guide 'Access for All'.

- The Department will, on request or as necessary, provide advice on the parking requirement for developments not covered by these standards taking into account the number and size of vehicles likely to use the proposed 0development at any one time and wider Government policy on transportation. (Wong, July, 2010.) (Y. Cho, 2010) (Ahmad, 2008)

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