IV. PARKING MANAGEMENT

4.1. INTRODUCTION

Automobile traffic is essential for the instance of the business and commercial life of the CBD of any major city. Of the total of about 800,000 person trips presently made daily to the central zone of CBD in Madras, nearly 40 per cent is by fast moving vehicles. In addition, about 300 vehicle trips are made to CBD by trucks. Further, about 800 fast vehicle trips pass through the area. There is a maximum accumulation of 1008 vehicles in this area during the period between 17:00 and 18:00 hours on a typical working day besides a large number of cycles. Lack of efficient parking management has resulted in the carriageway being used as the parking place bringing in its wake chaotic traffic conditions such as traffic jams, low travel speeds and also high accident proneness. Though a huge amount of money is being spent on improving the carriageway in CBD, the allocation for parking facilities is negligible. Hence the present parking facilities fall short in quantity and quality even to meet the present demand.

The urban development plan for Madras has envisaged that the CBD will not only continue to be the principal focal point for the city, but also play an enlarged role to serve a greater area. The CBD area is passing through a process of urban renewal, from its low rise structures to high rise buildings of
intensive use. The threefold increase in its attractiveness during the next two development decades resulting in increase of employment places from 20,000 to about 60,000 is likely to be realized sooner than anticipated. In order to support the expanded role of the CBD area, it is necessary to initiate positive steps to regulate the movement and accumulation of vehicles in this area.

### 4.2 SCOPE OF THE PRESENT STUDY

This study attempts to analyze the role of parking in the CBD, the present and future demand, and the availability and potential for development of facilities. It is also attempted to establish the immediate short-term measures and long-range policies towards better parking management so as to obtain the required coordination between land use and transport as a built-in measure for ensuring the efficiency of the CBD with the increasing demands of the vehicles and vehicle users.

Due to time, manpower and financial constraints, the scope of the present study has been limited to the following:

i) To determine the parking characteristics in the study area by conducting necessary surveys; and
ii) To suggest appropriate parking policies and regulations for ensuring efficient use of the available parking facility and for providing new facilities.

The scope of the study is to develop solutions of parking management that relates to its proposed role as an element of TSM. Alternative parking management strategies are identified; their effects on the transportation system are discussed. The analysis uses survey data collected in the CBD area of Madras Metropolitan Area. The selected strategies are considered in terms of their suitability as supply or cost – related measures.

4.3 NEED FOR A PARKING POLICY

Underground parking garage at the University of Minnesota.
Uncontrolled street parking impedes loading and unloading for buildings abutting the road and also leads to serious traffic congestion by reducing the effective width of the carriageway.

Lack of control leads to much of the space being occupied all day by long – term parkers. This sharply reduces the turnover of space which could be better used by perhaps 8 to 10 short – time parkers. Therefore a comprehensive parking policy required control on amount, type, location and use of the parking facilities available.
Any restriction on the location, duration of parking has an immediate effect on traffic. Parking is one of the most powerful, indirect techniques traffic from going into the CBD. By a carefully management policy, private car journeys to the major centres during the peak period can be persuaded to shift the public transport.

While it is necessary to allow limited on–street parking, the selection of location for on–street parking needs careful consideration. The balance between good living and working conditions and the convenience of the motorists should be achieved to suit the local circumstances. The location and design of off–street parking can also have a marked effect on the standards of environment of the areas in which they are located and those which they are intended to serve. The parking policy must therefore, deal with the effect of parking on both traffic and environment.

Any approach to parking problems must be comprehensive and its implications fully realized before implementation. The parking policy must be effective, feasible and capable of integration with a wide range of other measures. The policy must be supported by continuous and firm enforcement measures, and should be flexible to accommodate changing traffic problems and new developments.
4.4 PARKING MANAGEMENT STRATEGIES

A parking management strategy is a measure taken to alter the supply or cost of parking to either reduce automobile travel in a selected area or to make the operation of the urban highway system more efficient. The action needed for the strategy are viewed as a component of TSM actions for parking management.

The following TSM actions are recommended for managing and controlling parking:

i) Elimination of on – street parking in congested areas, especially during peak hours;

ii) Regulation of the number and price of public space;

iii) Favouring of short – term users over all – day in the provision of curb space parking;

iv) Provision of off – street parking facilities (surface of multistoreyed) for low occupancy vehicles and to facilitate transfer to transit and other high occupancy vehicles; and

v) Strict enforcement of parking restrictions.
The parking management and complementary strategies are indicated as follows wherein ten basic means of managing parking and the corresponding complementary actions that may be required to sustain mobility when restraints are placed on the parking supply are indicated.

1. Improving vehicular frequency
2. Reducing travel demand
3. Parking management
4. Promoting human powered mobility
5. Promoting high-occupancy vehicle use
6. Para-transit improvements
7. Transit improvements

Impediments to the application of parking controls include the following:

i) Presently commuter automobile parking in CBD is free.

ii) Public, political and business interests generally oppose parking regulations because they feel that their personal freedom is eroded.

iii) Strict enforcement of parking regulations is not economically feasible with the existing commuter trends and the limited enforcement personnel.

iv) Evaluation of the effectiveness of various parking strategies has been limited.

v) Available literature shows that increasing parking fee has little effect on parking demand.
As a result of these problems, the policies that set no limit on the parking supply in an area are ineffective in controlling car travel.

An alternative measure is to reduce the traffic volume by implementing the 'limited access' or 'no entry' regulations. No entry regulations for the slow moving vehicles into these areas will improve the traffic movement during selected hours. High parking charges for low occupancy vehicles and long – term parkers will encourage innovative measures like car pool and thereby improve mobility.

Thus parking management strategies can be divided into those control measures that affect the supply of parking and those that regulate by pricing the parking.

4.5 REGULATORY MEASURES FOR ON – STREET PARKING

Though on – street parking is an unproductive use of the expensive carriageway, the social and economic considerations in our urban centres do not permit complete prohibition of on – street parking. However, by judicious application of parking regulations, it would be possible to minimize the adverse effects.

One of the methods to meet the additional demand for parking is to impose the restrictions on parking duration so as to enable sharing of the space by many users. The Bureau of Public roads in USA has suggested a time limit of
30 minutes for curb parking. But a slightly longer time, possibly 60 minutes, may be recommended for conditions in Madras.

**SUGGESTED PARKING CHARGES**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Type of facility</th>
<th>Applicable policy mechanism</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Municipal Parking Facilities:</td>
<td>Increase cost per hour directly Fix flat fares for FN and AN separately.</td>
</tr>
<tr>
<td></td>
<td>a. Off-Street</td>
<td>Imposing surcharge for any parking over 4 hours. Adopt telescopic increase in parking charges.</td>
</tr>
<tr>
<td></td>
<td>b. On-Street</td>
<td>Fix parking meters, calibrated on some pricing policy and charge accordingly.</td>
</tr>
<tr>
<td>2.</td>
<td>Parking spaces provided by the employers for staff / Business for commuters</td>
<td>Free parking for high occupancy and pool vehicles. Fix parking charges depending upon vehicle occupancy and duration.</td>
</tr>
</tbody>
</table>

The parking duration survey conducted shows that about 23 per cent of the parkers stay less than 30 minutes and nearly 72 per cent of them stay for less than 60 minutes. It is therefore suggested that controlled parking zones with time restrictions be created and that the restrictions be enforced through parking meters monitored by Traffic Police / Wardens.
4.6 METERED PARKING

A simple system of coin operated parking meter may be suitable for developing countries like India. The meter is operated by inserting the appropriate coin which activates the clock mechanism of the meter. A needle shows the time bought on the time scale and it will start moving across the time scale on the face of the meter until the purchased time has expired. Thereupon an indication will appear on the meter and the excess charge period comes into operation. When this period also has expired another red indication will appear on the face of the meter denoting that the motorist is liable for prosecution and the vehicle may be towed away at the owner’s expense.

This system is intended to favour short – term parkers and to increase the parking turnover. The time limit has to be carefully chosen varying differently for different locations ranging from 30 to 60 minutes.

Parking Demand by Purpose

The parking demand for cars is analyzed according to purpose of the trip as in the following table.
PARKING DEMAND FOR CARS BY TRIP PURPOSE

(PER CENT OF VEHICLES TO TOTAL)

<table>
<thead>
<tr>
<th>Road</th>
<th>Work</th>
<th>Shopping</th>
<th>Banking</th>
<th>Social and Recreation</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adyar</td>
<td>17.2</td>
<td>54.2</td>
<td>4.5</td>
<td>2.9</td>
<td>8.2</td>
</tr>
<tr>
<td>T.Nagar</td>
<td>22.2</td>
<td>62.3</td>
<td>5.0</td>
<td>7.7</td>
<td>8.5</td>
</tr>
<tr>
<td>Nungampakkam</td>
<td>11.1</td>
<td>60.4</td>
<td>12.1</td>
<td>15.6</td>
<td>4.3</td>
</tr>
<tr>
<td>Saidapet</td>
<td>09.2</td>
<td>31.1</td>
<td>34.4</td>
<td>27.8</td>
<td>2.2</td>
</tr>
<tr>
<td>Percentage</td>
<td>14.9</td>
<td>52.0</td>
<td>14.0</td>
<td>13.5</td>
<td>5.8</td>
</tr>
</tbody>
</table>

It is seen that shopping trips predominate at 52 per cent of total. This is understandable as the CBD area is predominantly a shopping area. Work, banking and recreation trips account for about 14 per cent each of the total parking. The purpose wise analysis according to time is given in.

PERCENTAGE DISTRIBUTION OF PARKING DURATION BY PURPOSE

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Time in Hours</th>
<th>0&lt; 30</th>
<th>30 to 1h</th>
<th>1 to 2</th>
<th>2 to 3</th>
<th>3 to 4</th>
<th>More than 4 hours</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work</td>
<td>....</td>
<td>8.7</td>
<td>...</td>
<td>...</td>
<td>0.6</td>
<td>5.6</td>
<td>14.9</td>
<td></td>
</tr>
<tr>
<td>Shopping</td>
<td>17.2</td>
<td>25.6</td>
<td>3.4</td>
<td>2.8</td>
<td>2.9</td>
<td>...</td>
<td>51.8</td>
<td></td>
</tr>
<tr>
<td>Banking</td>
<td>1.0</td>
<td>7.9</td>
<td>6.1</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>14.0</td>
<td></td>
</tr>
<tr>
<td>Social and Recreation</td>
<td>3.6</td>
<td>5.2</td>
<td>3.5</td>
<td>1.1</td>
<td>...</td>
<td>...</td>
<td>13.5</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>1.8</td>
<td>1.5</td>
<td>1.6</td>
<td>0.4</td>
<td>0.2</td>
<td>0.3</td>
<td>5.8</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>22.6</td>
<td>48.9</td>
<td>14.6</td>
<td>4.3</td>
<td>3.7</td>
<td>5.9</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

This shows that about 49 per cent of parkers stay between 30 to 60 minutes.
Parking Turn Over

Parking turn over is obtained by dividing the number of vehicles parked in a stated time by the number of parking spaces.

PARKING TURNOVER RATIO OF CBD AREA

<table>
<thead>
<tr>
<th>Road</th>
<th>Total Parking Accumulation Pcu</th>
<th>Available capacity</th>
<th>Turn over Rate PCU/Space/Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adyar</td>
<td>696</td>
<td>75</td>
<td>9.3</td>
</tr>
<tr>
<td>T.Nagar</td>
<td>1752</td>
<td>65</td>
<td>29.2</td>
</tr>
<tr>
<td>Nungampakkam</td>
<td>2045</td>
<td>100</td>
<td>18.4</td>
</tr>
<tr>
<td>Guindy</td>
<td>1155</td>
<td>66</td>
<td>15.2</td>
</tr>
<tr>
<td>Saidapet</td>
<td>872</td>
<td>45</td>
<td>21.1</td>
</tr>
<tr>
<td>For the Zone</td>
<td>6520</td>
<td>351</td>
<td>18.6</td>
</tr>
</tbody>
</table>

The maximum turnover of pcu / space / day occurs on T. Nagar at 29 and the minimum on Adyar at 10 with the average turnover for the entire zone being 18.6.

Percentage Composition of Parked Vehicles

Considering the study area as a whole, the composition of the total parked vehicles is given.

COMPOSITION OF PARKED VEHICLES IN CBD OF MADRAS

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>Accumulation per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cars</td>
<td>37.4</td>
</tr>
<tr>
<td>Vans</td>
<td>2.3</td>
</tr>
<tr>
<td>Autorickshaws</td>
<td>15.5</td>
</tr>
<tr>
<td>Two-wheelers</td>
<td>29.8</td>
</tr>
<tr>
<td>Trucks</td>
<td>1.5</td>
</tr>
<tr>
<td>Cyclerickshaw/Slow moving</td>
<td>13.5</td>
</tr>
</tbody>
</table>
The percentage of slow moving vehicles utilizing the curb space is as high as 14 per cent in view of the absence of any special parking regulations for slow moving vehicles.

**Parking Duration Characteristics**

Distribution of parking by length of time is a vital consideration in the design of parking facilities. The cumulative percentage distributions of parked periods of vehicles in the study area. Details regarding purpose of trips are also included in the Table. It is seen that in the study area 22.6 per cent of the parkers stay less than 30 minutes, 48.7 per cent stay between 30 to 60 minutes and remaining 28.5 per cent stay for more than one hour.

For the purpose of this study, short – term parkers have been defined as those who park for duration less than an hour. Others are classified as long – term parkers.

**DEMAND ACCORDING TO PARKING DURATION FOR CARS**

**(PER CENT OF VEHICLES TO TOTAL)**

<table>
<thead>
<tr>
<th>Road</th>
<th>Duration of Parking in Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; ½</td>
</tr>
<tr>
<td>Adyar</td>
<td>23.4</td>
</tr>
<tr>
<td>T. Nagar</td>
<td>19.8</td>
</tr>
<tr>
<td>Nungambakkam (West)</td>
<td>18.7</td>
</tr>
<tr>
<td>Usman Road (East)</td>
<td>24.3</td>
</tr>
<tr>
<td>Saidapet</td>
<td>26.9</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td>22.6</td>
</tr>
</tbody>
</table>
The details of parking duration for cars parked on the five roads studied. It is seen that excepting on Nungambakkam (West), over 80 per cent of parkers on other roads are short term parkers. The highest incidence of short – term parking is on Saidapet and is mainly due to the type of land use (Banking and officials). The highest incidence of long term parking is on Nungambakkam (West), where the land use essentially consists of offices, shops and other work centres.

The cumulative parking demand according to purpose is also plotted. It is evident that the 85 percent values for parking according to purpose are: over 4 hours for work trips, 82 minutes for recreation and 127 minutes for other trips.

**Walking Distance in Parking**

In any decision on off –street parking location, the acceptable walking distance should be considered. The results of the interviews conducted for thus study are summarized and plotted. It is noted that over 85 per cent of the car owners would accept the following walking distance, from parking space to their destination: 200m for work trips, 160 m for shopping, 130 m for banking, 190 m for social and recreation, 180 m for other.

**Opinion Poll Analysis:**

Opinion poll surveys were conducted on all the roads of the study area regarding the condition of the existing curb space parking facilities, for
construction of parking stalls, location of parking stalls and fees payable for parking. The survey, however, was restricted to car owners only. About 274 cars were covered in this interview.

The replies furnished to the questionnaire were analyzed. It appears that 32 per cent of car owner are satisfied with the present parking system. Also 56 per cent favour the provision of free parking lots. Regarding the maximum walking distance, 95 per cent of the car owners desired the walking distance to be limited to a maximum of 200 m, while 5 per cent are willing to walk more than 200m.

There is a general consensus among the shop owners that the curb frontage should be sent apart for the exclusive use of their customers so as to improve their business. They are also against the “no entry” or “one way” regulations and one side parking restrictions, further analysis has shown that if off- street parking facilities are provided, only 11 per cent of them are willing to pay some fees, while others want free parking.

4.7 OPERATION PARKING NEEDS:

A survey was conducted to assess the operational parking demand in the adjoining wholesale trade area of the CBD. It was seen that on an average 3 car
spaces may be needed for every 1000m² of the wholesale trade for operational parking.

Operational parking requirement should be met to the maximum possible extent, if business efficiency in the CBD is not to be impaired. It is essential that adequate operational parking space should be provided in all new development in the central area by insisting on the developer to provide this as pre-condition for approval of the construction plan. The question of reserving on-street parking space for operational use at certain selected hours of the day may also be considered in order to completely prohibit deliveries of goods during peak hours.

4.8 FUTURE PARKING DEMAND:

A precise assessment of future demand is not possible in view of instability in prices of fuel and vehicles and the unpredictable changes in the behavioural characteristics of the users. However, it can be attempted to forecast the demand with due attention to the following factors:

(i) the trend of increase in car ownership;
(ii) increasing use of cars for shopping;
(iii) increase in capacity of roads to CBD;
(iv) public transport availability prospects and policy;
(v) increase in business area in CBD and
(vi) change in attraction of the area after redevelopment.
The basic assumption in arriving at the quantum of future demand for different uses is that the present CBD activities will continue and the CBD will be the focus of the metropolitan area planning to serve the needs of the area. A forecast for 2001 reveals that the parking supply will be totally inadequate. Immediate action is necessary to implement the parking management strategies so as to improve the overall mobility in the CBD.

A detailed demand forecast is out of the scope of the present study in view of manpower, financial and time constraints. So an annual average growth factor of 3 per cent is assumed, the same as adopted for Bangalore city, which is about 300 km from Madras and has may similar basic characteristics as in Madras. The present supply is obtained from actual surveys. The future demand is estimated by use of the above growth factor. The present supply and demand position on selected roads of Madras CBD is indicated in Table 6.18. Single lane entrances to parking lots bd 4.2 m wide and exist 3.0 m wide. Combined entrance and exist should be 7.8 m wide.

The normal practice in large lots is to use 90° parking. This is the most space productive way of parking. The arrangement not only fits better into rectangular areas with minimum space wastage but also permits the aisle to be used for travel in either direction, thus allowing the use of dead-end aisles which may permit a more economical design. Angle stalls are, however, easier for the driver to enter and leave and are preferred by them. They require narrow aisles.
4.9 OFF- STREET PARKING FACILITIES

The effective use of off – street parking facility depends on the walking distances involved for various work places. As far as possible this should be minimum, preferably less than 150m.

In places where common or shared parking facility in needed, the local authorities may provide such parking on collection of some nominal fee. At bus and train terminals provision of parking will promote ‘park and Ride’ travel. This modal transfer facility ensures better productivity for private and public transport vehicles besides being economical for the trip maker.

In busy localities such as CBD areas where enough space is not available for off-street parking lots, deck or roof parking may be provided. While designing the roof parking proper circulation area and parking can be safely provided to avoid accidents. The roof parking can be safely provided on the market complexes, community and recreation centers, where the grade separation between the vehicles and pedestrians are necessary and possible.

While designing multi – story parking garages, concepts consideration needs to be devoted to the floor arrangement and access ramp. One way ramp, with level floor arrangement is preferred. It is better to have open system without external walls so as to have natural ventilation. Since the available area is
normally limited, attendant optimum size with regard to time of parking and deparking is 400 stalls. To achieve this, 5 parking levels are desirable with 2.4 m floor heights. Location is also an important factor in the success of such garages.

**Recommendations:**

In summary, the following recommendations are suggested as possible TSM actions for parking management, with particular reference to conditions in Madras city.

(a) On–street parking should be allocation for use of sort – term parkers with a view to secure maximum use of the available facilities. Installation of parking meters with one hour maximum parking duration may be tried on busy roads in the CBD.

(b) Where the traffic volume exceeds the street capacity with the designed level of parking, it would be desirable to impose time restrictions for parking: e.g. No parking should be allowed during 10.00 to 11.00 hrs and 17.00 to 18.00 hrs excepts in the existing surface parking lot.

(c) The opposition from the public, political groups and business community often hampers the implementation of parking management policies. This needs to be concerned in evolving such policies, which will be of general benefit to the community.
(d) ‘No Parking’ warrants are to be issued after exercising utmost care. It would be desirable to institute such action gradually as bellows:

(i) Restrict parking to one side of the street
(ii) Parking allowed along limited lengths of roads only
(iii) Impose time restrictions at these locations
(iv) Increase parking charges
(v) Parking limited to para – transit vehicles only
(vi) Parking prohibited fully.

(e) On roads with carriageway less than 20 m, parallel parking only may be allowed, if parking is to be permitted, e.g. (i) Adyar (left side); and (ii) N.S.C. Bose Road North (left side). However, angle parking at 60o is suggested for roads with carriageway width more than 20 m: e.g. (i) T. Nagar (left side); and (ii) Nungambakkam (West) (West) (Right Side).

(f) Off – street parking facilities should be developed on roads where the demand has exceeded the parking supply. This development should form part of TIP. Suitable places for off – street parking facility are shown. They are: (i) Near ‘Flower Bazaar Police Station; (ii) Behind the Old High Court Buildings; (iii) In the MUC Complex; (iv) Near the express bus stand in the /High Court Compound; and (v) At the Rajaji Corner of the High Court Compound.
(g) As a trial measure, one multistory parking garage may be developed to accommodate about 200 cars near Fruit Market area. This will also serve as a park and ride facility for the nearby intercity bus terminal.

(h) Since the cycle movement is going to be predominant and increasing within the CBD, cycle parking facilities should be provided at the various terminals and near major activity centres and large establishments.

(i) A legislation creating separate authority to exercise parking management in each metropolitan area is necessary.

**MULTI LEVEL PARKING PROJECT**

Several years after they were suggested, multilevel vehicle parking facilities are yet to take off in Chennai despite a significant increase in the number of vehicles.

Sources in the Chennai Metropolitan Development Authority (CMDA) said a file pertaining to proposed multi-level parking facilities in the city is pending with the State Government for some time now.

Though the project figured in the policy documents several times, it did not progress beyond that. It was proposed “with a view to manage the burgeoning traffic problem,” in 2003 by the Housing and Urban Development Department in
seven locations - Panagal Park, Flower Bazaar, CMDA Tower in Egmore, Luz Corner, Purasawalkam, Central station and Kodambakkam.

“A pilot project at a cost of Rs.47 crore to provide for parking 450 cars and 750 two-wheelers at a time in existing car park area abutting panagal Park is under examination by the Government.” According to a budgetary demand that year. The project was to be developed on a Build-Operate-Transfer mode.

Mecon Limited, a Government of India enterprise, was hired to provide a feasibility report for developing multilevel car parking complexes at six locations, according to a CMDA brochure brought out in 2006. Land acquisition was scheduled to be in completion of the study.

The six locations to be taken up for the study were a strip of land east of Panagal Park, Broadway Bus Stand, MUC Ground near Flower Bazaar, the existing bus terminal at T. Nagar, Government Estate at Anna Salai and Metropolitan Transport Corporation workshop site on Pattulous Road.

Due to two wheeler parking in the North Usman Road near about 5000 to 6000 vehicles are parked in the both sides of the road. Due to this the MTC buses cannot run in the same speed. They must wait for some time to clear the Traffic Jam. Because of this they cannot reach the other terminus on time. This leads to Trip Loss. From the table 10 due to traffic jam 988 trips were cancelled. A bus runs for 6 trips in a day.
This states when approximately 82 buses doesn’t work for a day which leads to a total loss of Rs. 5,00,000/- approximately.

If we provide multilevel two-wheeler parking in the areas such as T. Nagar bus terminus for about two or three floors, all surrounding area two wheelers can be parked in it. This will lead to more space and the MTC buses can move freely. The following areas are recommended for multi-level parking:

1. T. Nagar
2. Saidapet
3. Basin Bridge
4. Tambaram
5. Flower Bazar
6. Theynmpet

This will also prove helpful in providing job opportunities to the physically challenged people. In this way Chennai Corporation can also yield some benefit.