

Review Article

A Review of issues relating to Choice of Parking

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Abstract

Civil engineers work on all construction projects which help to solve the problems by facing challenges and shapes the communities, cities. Fundamentally parking is a problem of space. With the growing culture of automobile dependency in Indian cities, the demand for parking spaces are sky rocketed. It has become a call out for the traffic engineers in designing the towns and cities. It is essential to conduct traffic surveys in order to design the facilities. Therefore it is imperative to arrive at the solution that on one hand provides for space for parking while simultaneously managing demand for parking on the other hand. No mater which technologies are developed the well being of community and the town centre demands great thought should be bestowed with parking needs and how best to fulfill them. A systematic study of the parking characteristics and demand and regulatory measures that are possible for controlling parking is of great help to traffic engineer as well as town planner. This paper states a laconic study by understanding, defining the problem which helps to bring out the solutions.

Keywords: *Parking effects, parking facilities, smart parking technology, transportation life-cycle assessment(LCA), parking lot design.*

1. Introduction

With the high percentage of vehicle ownership in India, parking has become a conflicting and confusing situation for a number of people. Whether at an airport, bus stations, shopping centers, problems with parking can hurt local business and decrease the quality of life for residents.

Besides the problem of space for cars moving on the road, greater is the problem of space for a parked vehicle considering that private vehicles remain parked for most of their time.

The infra-structural growth of our cities is unable to keep up with the growing demand for spaces to park. The resultant scarcity of parking space has begun to spill over to other aspects of urban life. So as long as there is inexpensive provision for parking, there will be an increase in usage of private vehicles, further abetting the problem.

It is an impact of transport development. So parking studies recognize the importance of planning for a sufficient 'cushion' in excess of the necessary spaces.

Current parking planning practices are inefficient and often ineffective at solving parking problems. Minimum parking requirements tend to be excessive because they are generally based on demand surveys performed in automobile-dependent locations, and so require more parking than needed in areas with good

travel options, accessible land use, or transportation and parking management programs. Yet this overabundance of supply does not eliminate parking problems because spaces are often unavailable for priority uses or are difficult to access. The real problem is not inadequate supply, it is inefficient management.

2. Ill effects of parking

Parking has some ill-effects like congestion, accidents, pollution, obstruction to fire-fighting operations etc.

Congestion: Parking is a magnet that attracts traffic. More parking, more traffic jams.

Congestion and parking are also interrelated since looking for a parking space (called cruising) creates additional delays and impairs local circulation. In central areas of large cities, cruising may account for more than 10% of the local circulation

This leads to the lowering of the road capacity. Hence, speed will be reduced, journey time and delay will also subsequently increase.

Aiming to reduce the traffic, the present On-street parking system should be reduced and regulated off-street parking facilities should be provided. This would not only reduce congestion in these areas but also allow for the space otherwise used for parking to be used in a more equitable manner.

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Fig.1 Traffic congestion due to parking

Current parking planning practices tend to create a self-fulfilling prophecy of excessive parking supply, under pricing (abundant supply results in most parking being free) and increased automobile-dependency, which further increases parking demand. These practices are also inequitable since they force non-drivers to subsidize parking costs, reduce travel options for non-drivers, and reduce housing affordability.

2.1 Current on street parking systems adopted are

2.1.1 Angular Parking

The vehicles are parked at an angle. It may be a 30 degree angle or 45 degree



Fig.2 Vehicles parked at 45 degrees.

2.1.2 Parallel Parking

The vehicles are parked one behind the other. The Parking lot is designed as per the area required if Parallel Parking is adopted. It has been surveyed that the area required for Parallel Parking is much lesser that required for Angular Parking.



Fig.3 Vehicles parked in series- Parallel parking

2.1.3 Perpendicular Parking

The vehicles are parked at right angle to the road, but perpendicular parking has more disadvantages than advantages



Fig.4 Perpendicular parking

Though on street parking is more economical than off street parking, the latter is preferable since it is more advantageous in every other aspect other than cost.

Off street parking like Multi-level car parking systems can be adopted in cities to accommodate large volumes and develop their infrastructure.



Fig.5 Multi-level car parking (manual)

2.2 smart parking technology

To reduce downtown pressure points, city planners are turning to solution providers and lot device manufacturers for help in building smart parking and traffic management systems. Some early systems in development include the installation of sensors embedded in pavement (or on top of the pavement) to collect data on open spaces and make the real-time parking availability data is transmitted to digital signs located outside a parking garage. The driver knows the location of the available parking spot and, as a bonus, knows immediately the cost of parking.

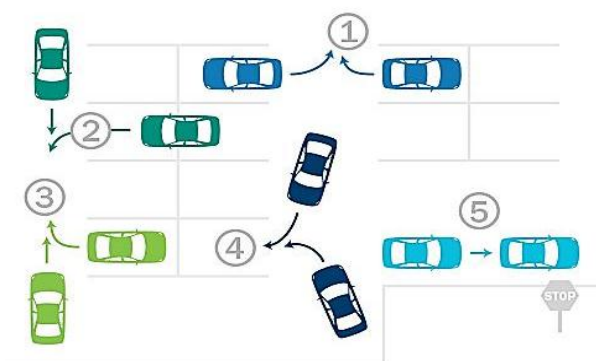


Fig.6 Smart parking system adopted in malaysia

The data collected from these sensors is also useful for area traffic management solutions, where urban city planners analyze the information to manage rush hour congestion, determine the occupancy rate of available parking spaces, calculate peak parking times and rates by city block and optimize traffic signals for better flow.

Therefore, besides these traditional methods of parking, embracing these new technologies might help to overcome the parking issues that the country is facing right now.

Accidents: Careless maneuvering of parking and unparking leads to accidents which are referred to as parking accidents. Common type of parking accidents occur 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.



Source: Dreg, David. "Car Accidents: Determining Liability in a Parking Lot." AboutCarAccidents.com. NOLG, n.d. Web. 21 Mar. 2014. <<http://www.all-about-car-accidents.com/resources/auto-accident/car-accident-claims/determining-liability>>

Fig. 7 5 Types of parking lot accidents

Automated car parking system

As against cars being driven on ramps or carried in car lifts to different levels in conventional multilevel parking, cars are driven at only one level for parking or retrieval. Cars are parked in steel pallets – a target pallet rides up or down to the driveway level at the press of a button for parking or retrieval.

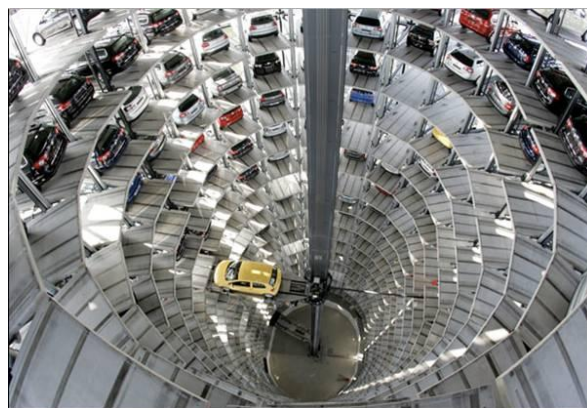


Fig.8 Automated car parking system

Advantages of automated car parking

- 1) A multi-level vehicle parking systems ensures not only safety to the vehicles parked within it, but also ensures creating a total pollution free environment.
- 2) Full exploitation of land usage upto 90% is ensured compared to 67% in other comparable systems
- 3) The hassle of searching for an empty spot would be eliminated
- 4) Drivers can retrieve their vehicles from a secure waiting area and are less likely to risk their personal safety.
- 5) Ideal for individuals with limited mobility or special needs.
- 6) Automated parking system consumes less power for lighting.
- 7) The plot area requirement for an automated parking system is less than a typical conventional car park system.

Environmental pollution

Surprisingly little about how parking infrastructure affects energy demand, the environment, and the social cost of vehicle travel. Passenger and freight movements are often the focus of energy and environmental assessments, but vehicles spend most of their lives parked. Because abundant free parking encourages solo driving and thus discourages walking, biking, and the use of public transit, it greatly contributes to urban congestion. The environmental impacts of parking and the driving it promotes are often borne by local populations and not the trip-takers themselves.

The transportation life-cycle assessment (LCA) framework allows us to understand the full costs of travel, including energy use and environmental effects. Past LCAs, however, have focused on evaluating the resources directly used for travel and have not considered the extensive parking infrastructure, including the costs of its construction, operation, maintenance, and raw material extraction and processing. This narrow focus is understandable given

the diversity of parking spaces and the lack of available data on parking infrastructure.

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

Underground parking system may serve this purpose and allow the smooth flow of vehicles on road without causing any obstruction.

Underground Parking System

From the urban design or urban planning perspective, it seems that a shared, underground parking garage may be the closest thing to sustainable car parking. Underground parking garages have many sustainable features

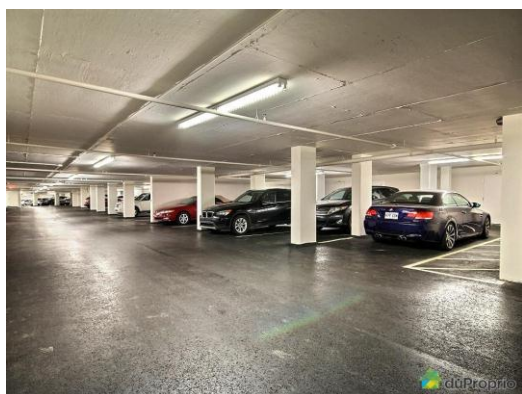


Fig.9 Underground Parking System

Underground parking garages eliminate a wide range of non-sustainability issues that accompany aboveground sustainable parking, including:

- No storm water runoff.
- Control of liquid Pollution.
- Control of solid waste.
- More green space.
- No obstruction of views.
- No obstruction of sunlight.
- Car noise abatement.
- No contribution to heat islanding.
- More safety comes from the virtual elimination of weather-related problems and height-related risks, such as falls, that are possible with aboveground parking garages.
- Increased security comes from the more limited access to underground parking garages compared to aboveground parking garages: there are fewer, more well-defined access points for vehicles and pedestrians.
- This limited access would be expected to have an inhibiting effect on criminal behavior inside the underground parking garages.

Theoretically, underground parking garages also provides a higher level of safety and security.

Therefore the parking facility or lot must foremost deal with the functional/Operational-as in providing for safe and efficient passage of automobile and driver. This is a very complex challenge as automotive, engineering and traffic issues relative to site locations must be integrated to create the appropriate solution. Therefore designing the parking facility requires an integrated design approach.

Design of Parking Lot

The design of a parking facility is very strongly influenced by its intended operation. The basic design elements and their associated operational features may be identified in successive steps as follows:

1. Vehicular access from the street system (entry driveway).
2. Search for a parking stall (circulation or access aisles).
3. Maneuver space to enter the stall (access aisles).
4. Sufficient stall size to accommodate the vehicle's length and width plus space to open car doors wide enough to enter and leave vehicle.
5. Pedestrian access to and from the facility boundary and vertically by stairs, escalators, or elevators in multilevel facilities.
6. Maneuver space to exit form the parking stall (access aisles).
7. Routing to leave facility (access and circulation aisles).
8. Vehicular egress to the street system (exit driveway).Any revenue-control system (may involve elements of entry, exit, or both).



Fig. 10 Top view of a parking lot

Table 1 Number of accessible spaces to be provided depending on parking demand.

Total Parking Spaces	Required Accessible Spaces
1 – 25	1
26 – 50	2
51 – 75	3
76 – 100	4
101 – 150	5
151 – 200	6

Conclusions

Existing parking lots could be enhanced and/or enlarged and made more welcoming to attract more users off the street. In some instances existing parking can be redesigned to support new support activities. When the demand for parking exceeds the supply of spaces, the strategy is to allocate priority for different parking purposes based on the adjoining land use activity.

- 1) An event traffic management plan has to be developed.
- 2) As the land in metropolitan cities and other higher order cities becoming scarce and dearer and plots getting smaller conventional parking is proving infeasible. The solution for the parking requirements is the multi-level car parking system to maximize car parking capacity by utilizing vertical space, rather than expanding horizontally. The most popular choice in terms of technology preferred is automated
- 3) Increasing the parking spaces so that more vehicles can be parked.
- 4) Improving accessibility and pedestrian paths around parking spaces to make it more convenient to walk from parking space to the destination. This reduces the inconvenience of parking in a space that may not be very close to the desired location.
- 5) Parking management- it can be done by more usage of public transportation than private transportation as it entails both cost and monetary.
- 6) Charge motorists directly for using parking space. This will facilitate immediate recovery of cost and will also act as a tool of demand management.

- 7) The parking spaces in commercial districts should be priced higher to ensure the space of priority users-customers and clients of the particular stop/building.
- 8) Time variable pricing will be employed to increase charges, reduce demand and manage parking during peak hours.
- 9) Progressive prices can be charged to discourage long term parking. Long term counting must not be discounted.
- 10) Weekly or monthly pricing should be done for long term users, such as employees or residents. The space can be leased out, too.

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