A CASE STUDY ON EVALUATION AND DESIGN OF ON-STREET PARKING IN NARASARAOPET TOWN IN ANDHRA PRADESH

G Leela Suresh¹, Dr R Ratna Prasad², T Venkateswara Rao³

¹Department of Civil Engineering, VVIT, Guntur, Andhra Pradesh, India
²Department of Civil Engineering, VVIT, Guntur, Andhra Pradesh, India
³Department of Civil Engineering, VVIT, Guntur, Andhra Pradesh, India

*Corresponding Author: Gsuresh@vvit.net

Abstract. One of the most significant transport issues has been the lack of parking policies. Parking problem in the central business districts and major cities across the globe is trending. When we look at Narasaraopet, market growth and training contribute to a rise in transport facilities and thus parking problems. Lack of off-road space and the propensity to park vehicles near the destination contributes to high demands for parking. Further reasons for increased demand are car ownership and low efficiency of the transit system. These factors reduce the main wagon route width, reduce the flow speed, boost crash rates and generate excessive traffic congestion. There is therefore a need to provide parking on the lane. So by means of in-out or sampling of a fixed time or license plate scheme, we have to assess the current on-street parking conditions in Narasaraopet and see whether it's appropriate or not. If they're not enough, we need to prepare Narasaraopet on-street parking conditions. In this research, proposed techniques should be implemented by the transportation department from an effective point of view of transportation system.

Key words. on street parking, parking volume, parking requirements, parking bays

1. Introduction

Parking is a place where a car can be stored. Parking areas in cities where the availability of parking is a primary concern of car users are considered to be among the basic land uses. The parking problem is one of the burning issues in the CBD of metropolises due to increasing population concentration, rapid urbanization and certain economic activities. Parking issues in all sorts of places can be found. Owing to large volumes of traffic in comparatively small spaces, City centre is impacted by its inability to have sufficient areas for parking. A major concern for the transport engineers has been the rise in demand for parking loads as a result of the rapid growth in private vehicle ownership in India. Parking demands are typically made by on- and/or off-road parking provisions.

One of the main topics of movement control is the behavioral pattern of road car parking. The city's road system's capacity management is essential to ensure that street parking is properly administered on high demand roads. On-street parking slows down, assists and interrupts traffic flow, particularly if vehicles are maneuvering in and from the curb; but if on-street parking is properly planned, modified and properly included in the calculation of traffic capacity, using an equation model, the disruption of on-street parking to traffic flow can be reduced. There are unique problems associated with mixed traffic in urban streets in increasing international locations.

The same street area is shared by peasants, bicycles, taxis, motorcycles/scooters, auto rickshaws, bike-rickshaws and different modes of transport, which generate inefficient conditions under which the economic potential of cities is stolen in developing world locations. These problems are yet to be overcome due to various causes. They are becoming more complicated because of the inability to settle these matters. The scenario is more disturbing if motor cars are kept in rising foreign locations. Road control and road regulation, as well as road installations, require a number of road
studies in order to plan, build and operate them.

The city’s road system’s capacity management is essential to ensure that street parking is properly administered on high demand roads. On-street parking slows down, assists and interrupts traffic flow, particularly if vehicles are maneuvering in and from the curb; but if on-street parking is properly planned, modified and properly included in the calculation of traffic capacity, using an equation model, the disruption of on-street parking to traffic flow can be reduced. There are unique problems associated with mixed traffic in urban streets in increasing international locations.

The same area is shared by pedestrians, cyclists, taxis, engines, motorcycles/scooter, car rickshaws, cycling rickshaws and different transport modes which are inefficient types of mobility that are stolen from urban economies in the growth of international locations. These problems are yet to be overcome due to various causes. They are becoming more complicated because of the inability to settle these matters. The scenario is more disturbing if motor cars are kept in rising foreign locations. Road control and road regulation, as well as road installations, require a number of road studies in order to plan, build and operate them. Their characteristics become tougher and time consuming with various aspects of traffic flow in the region. Furthermore, it is not possible to draw on experience in this area with a large range of traffic and transmission due to practical difficulties.

This study has been aimed to evaluate the traffic parameters of on-street parking system by proposing the new methods which include the collection of data and analysis under recommended analysis techniques and to compare the results with original transportation properties.

2. Methodology and data collection

In order to collect the aforesaid parking data, parking surveys are carried out. In-out surveys, fixed-period sampling and license plate methods were the most common surveys performed in parking. Parking Characteristics: The research aims at understanding the existing parking patterns in the region under study and the general parking issues. Parking on the road or kerb parking, the parking pattern, the smooth flow of traffic caused by parking and un-parking activities and the incidents involved during parking operations also have to be investigated. If the car park is offstreet, minimum, maximum and average walking distance values should be identified to reach various destinations after the vehicle has been parked.

Parking space inventory: There is a complete survey of the area under research and a map of every place where kerb parking can be provided and off-street parking facilities to satisfy the parking demand.

Parking demand: The accumulation term parking indicates the cumulative number of vehicles parked in a given location over a defined period of time. Depending on the timing of the day and the venue, demand for parking increases from the beginning to a maximum in the afternoon and decreases later in the night. The time a car spends on a parking spot is the time of parking. The number of parking spaces in a parking lot is a percentage of total available parking spaces. The number of times the parking space was used during the day is generally measured as parking turnover.
3. Results and Discussions

Design of parking at Mallamma center:
- Parking length available = 220m
- Number of bays available for parking = 205
- Angle of parking at present = 60°
- Total width of road = 16.77 m
- Parking width = 2.17 m
- Travel width available = 14.6 m
- Length occupied by street hawkers and parking = 3.12 m
- Number of bays required for parking from the collect data is = 398
- Land acquired for construction of road = 16.77 m

From the above collected data we should understand there is no place for the extension of present existing road and at a time we have large parking volume. Present parking angle is 60° which is insufficient for present parking demand. From that vehicles are parked sides of the carriageway which leads to decreasing of the travel width up to 21.3% and increasing of the journey time. For overcame of all this problems change the angle of parking from 60° to 45°.

![Graphical Representation of the Peak Parking Demand of 6 Days](image)

Design of parking at Kota center:
- Length of the road = 128.6m
- Parking length available = 257.2m
- Number of bays available for parking = 0
- Present parking system = not existing
- Total width of road = 5.55 m
- Travel width available = 3 m
- Length occupied by street hawkers and parking = 2.55 m
- Number of bays required for parking from the collect data is = 316
- Land acquired for construction of road in FMB = 28.67 m
Width available for extension of present road = 23.12m
Width taken for providing of parking system = 4.5

From the above collected data we should understand there is sufficient place for the extension of present existing road. But now all shops occupy the total road width only 5.55m is available. Out of the available width both parking and vehicle moment has occur so the number traffic jams are observed and the travelling time also increases this lead to unfavorable conditions to the road users. So necessary to improve the road width and providing of sufficient parking system to avoid the traffic jams and for creating of free flow conditions. The available road width is only used for the vehicle moment and side parking is provided by extension of shoulders 2.25m both side of the carriage way.

Fig 2. Graphical Representation the Peak Parking Demand Of 6 Days

Parking length we provide = 257.2m
Present parking system = not existing
Number of bays required for parking from the collect data is = 316
Designed dimensions of 60° parking = 2.2m × 1.07m
No of bays designed for parking = 321
For future purpose we provide extra bays = 5
Design of parking at more center:

- Parking length available = 542.72m
- Number of bays available for parking = 0
- Present parking system = not existing
- Total width of road = 10.9m
- Travel width available = 4m
- Length occupied by street hawkers and parking = 6.9m
- Number of bays required for parking from the collect data = 920
- Land acquired for construction of road in FMB = 13.725m
- Width available for extension of present road = 2.825m

From the above collected data we should understand there is sufficient place for the extension of present existing road. But street hawkers and road side parking leads to reduction of carriage way width. Which leads to decreasing of the travel width and increasing of the journey time. Out of the available width both parking and vehicle moment has occur so the number traffic jams are observed and the travelling time also increases this lead to unfavorable conditions to the road users. So necessary to improve the road width and providing of sufficient parking system. The available road width is only used for the vehicle moment and side parking is provided by extension of shoulders.

Fig 3. Graphical Representation the Peak Parking Demand Of 6 Days
Parking length available = 542.72m  
Present parking system = not existing  
Number of bays required for parking from the collect data is = 920  
Designed dimensions of 60° parking = 2.2m × 1.07m  
No of bays designed for parking = 678  
No of bays designed for of street parking = 242  
We have no place for providing on street for 242 bays so park that vehicles on off street parking in and around of 1km there is no government land.

Design of parking at Palnadu center

Length of road available = 125m  
Number of bays available for parking = 0  
Present parking system = not existing  
Total width of road = 15m  
Travel width available = 7.6m  
Length occupied by street hawkers and parking = 7.4m  
Number of bays required for parking from the collect data = 293  
Land acquired for construction of road in FMB = 21.73  
Width available for extension of present road = 2.825m

From the above collected data we should understand there is sufficient place for the extension of present existing road. But street hawkers and road side parking leads to reduction of carriage way width. Which leads to decreasing of the travel width and increasing of the journey time. Out of the available width both parking and vehicle moment has occurred so the number traffic jams are observed and the travelling time also increases this lead to unfavorable conditions to the road users. So necessary to improve the road width and providing of sufficient parking system. The available road width is only used for the vehicle moment and side parking is provided by extension of shoulders.
Fig 4. Graphical Representation the Peak Parking Demand Of 6 Days

Parking length we provide = 250m
Present parking system = not existing
Number of bays required for parking from the collect data is = 293
Designed dimensions of 60° parking = 2.2m × 1.07m
No of bays designed for parking = 312
For future purpose we provide extra bays = 19

4. Conclusion
   a) Mallamma Center
   Mallamma center is one of the center having more traffic in Narasaraopet. In this center a four road junction is present. Among four roads two roads contains on street parking at the middle of the road for bikes. On street parking with bay markings with an angle of 60°. Marketing is more in this center so we proposed this center to evaluate existing on street parking. For evaluation of existing on street parking we did different activities at this center they are
   - We done six days in and out survey with 15 minutes interval.
   - By this survey we count the number of vehicles parked at the bays and side of the road.
   - The road users parked their vehicles at the side of the road due to insufficient space at the middle of the road which is allotted for parking only.
b) KOTA CENTER

We should understand there is sufficient place for the extension of present existing road. But now all shops occupy the total road width only 5.55m is available. Out of the available width both parking and vehicle moment has occur so the number traffic jams are observed and the travelling time also increases this lead to unfavorable conditions to the road users. So necessary to improve the road width and providing of sufficient parking system to avoid the traffic jams and for creating of free flow conditions. The available road width is only used for the vehicle moment and side parking is provided by extension of shoulders 2.25m both side of the carriage way.

c) MORE CENTER

We should understand there is sufficient place for the extension of present existing road. But street hawkers and road side parking leads to reduction of carriage way width. Which leads to decreasing of the travel width and increasing of the journey time. Out of the available width both parking and vehicle moment has occur so the number traffic jams are observed and the travelling time also increases this lead to unfavorable conditions to the road users. So necessary to improve the road width and providing of sufficient parking system. The available road width is only used for the vehicle moment and side parking is provided by extension of shoulders.

d) PALNADUCENTER

This centre is busy with various activities; a number of commercial establishments, markets, government offices and the bus stand are situated here. Since most of these places are frequented by public and busy with floating population, the demand for parking is very high. On-street parking is observed on all the roads surrounding palnadu bus stand. Many cars and two wheelers are seen parked on sides of the roads. Both angular as well as parallel type of parking was noticed on almost all the stretches of the roads. This has reduced the capacity of the carriageway and endangering pedestrians and motorists alike. The frontage of almost all the roads in this area has been converted into commercial land use without taking into account the demand for parking of the vehicles. There is no planned parking space available. Based on collecting data at this center we proposed that:

The parking space is more in this center but there is no planned parking space.so if we provide 60 parking to two wheeler motor vehicles the parking space will be reduced. Which results increase in travel width and decrease in congestion.

References
[1] AlirezaNaseria (2013)“Analysis of On-street parking Impact of Traffic Flow Velocity” Middle-East Journal of Scientific Research, pp.652-657.
[2] Arjun C A and M.S. Nagakumar (2014)“Studies on On-Street Parking Using License Plate Method in Basavangudi, Bangalore”, International Journal of Emerging Technologies and Engineering.
[3] Charles Anum Adams, Richter Opoku-Boahen, M. Abdul MuhsinZambbang (2014)“Parking Management in Metropolitan Cities in West Africa Case Study of the Kumasi Paid Parking Scheme,Ghana”, International Refereed Journal of Engineering and Science, Vol.3, pp.01-08.
[4] Chung & Cassidy (2007)“Relationship between traffic density and capacity drops at three freeway bottle neck” Journal of Transportation Research Part B; Methodology, 41:82-95.;
[5] Marshall, W.E and N.W Garrick (2006)“Parking at mixed- use centres in small cities” Journal of the transportation Research board, No.1977, pp.164-171
[6] Russell and Anthony (1999) “A Parking search model” Journal of Transportation Research Part-B: Methodology, 41:82-95

[7] R.A. Asiyambola, A.A. Akinpelu (2012) “The Challenges of On-street Parking in Nigerian Cities’ Transport Routes” International Journal of Development and Sustainability, Vol.1, pp.476-489.

[8] L.R. Kadiyali, A Text book of “Traffic Engineering and Transport Planning”, Khanna Publishers, 2013.

[9] IRC-106 “Guidelines For Capacity Of Urban Roads In Plain Areas”, The Indian Road Congress, 1990.

[10] Sirous Heidar Reihani, Alireza naseri, Kasra Zehforoush (2013) “Modeling the Impact of On-street Parking on Main Parameters on Vehicular Traffic”, Journal of American Sciences, pp.99(5s).

[11] IRC-SP-12 “Tentative Recommendations On The Provision Of Parking Spaces For Urban Areas”, Indian Road Congress Special Publication, 1988.

[12] Y. Yorozu, M. Hirano, K. Oka, and Y. Tagawa, “Electron spectroscopy studies on magneto-optical media and plastic substrate interface,” IEEE Transl. J. Magn. Japan, vol. 2, pp. 740-741, August 1987 [Digests 9th Annual Conf. Magnetics Japan, p. 301, 1982].