International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 07 | July 2021 www.irjet.net p-ISSN: 2395-0072

DESIGN OF PARKING LANES AND PARKING FACILITY AT PATHANAMTHITTA

Ajay P Shaji[1], Gowri Sanker[2], Harikrishnan S[3], Sudheesh Kumar S[4], Leena V P[5]

[1-4]*Student, Civil engineering Department, Musaliar College of Engineering & Technology, Pathanamthitta, India*
[5]*Assoc. Professor, Civil engineering Department, Musaliar College of Engineering & Technology, Pathanamthitta, India*

Abstract - *Transportation requires parking space to park vehicles. If parking of vehicles are not in a disciplined manner, it can disrupt traffic flow and cause traffic congestion. Parking problems which we often encounter is due to parking of vehicles on road sides. This type of parking will incur a loss for both the driver and the public, if not properly managed. Road parking leads to road reduction and a disruption to traffic performance. In order to overcome traffic congestion due to the lack of parking spaces, suitably designed parking lanes and parking facilities are constructed. Lanes are to be provided at the college road from Pathanamthitta Head Post Office (Gandhi square) to Stadium Jn Pathanamthitta. The parking facility is to be provided at the plot in front of the municipal library, Pathanamthitta.*

Key Words: Parking, Questionnaire survey, Traffic volume survey, Total station survey

1.INTRODUCTION

The paradox of transportation vehicles is that they are most studied when they are the least used, i.e. when they are in motion, while they spend most of their time stationary or parked. Parking is the act of stopping and disengaging a vehicle and leaving it unoccupied. Some buildings have parking facilities for use of the building's users. Countries and local governments have rules for design and use of parking spaces. Parking on one or both sides of a road is often permitted, though sometimes with restrictions. It is the unstudied link between transportation and land use. If parking of vehicles are not in a disciplined manner, it can disrupt traffic flow and cause traffic congestion. Proper parking area one thing which is very difficult to find in towns and cities. If there are no parking areas, people are tempted to park vehicles on sides of the road. This can disrupt traffic flow and cause traffic congestion. This type of parking will incur a loss for both the driver and the public, if not properly managed. Road parking leads to road reduction and is a disruption to traffic performance.

In order to overcome traffic congestion due to the lack of parking facilities, the simplest method to overcome this difficulty is to properly design and construct parking lanes on road sides. Parking lane means a lane usually set on the sides of the streets, designed to provide on-street parking. The width and design of the parking lanes will depend upon the total width of the road and area.

2. SELECTION OF AREA

The area of study is the road from Pathanamthitta Gandhi square to stadium junction. This area is the centre portion of Pathanamthitta town and consist of many famous shops, banks and important government buildings like the post office. This is the road connecting Pathanamthitta town to the TK road and some other major district roads. The selected road is a one-way road and lacks parking facilities which forces people park vehicles on road sides.

The selected site for parking facility is the plot in front of municipal library, Pathanamthitta.

3. OBJECTIVES

- To identify and analyse the present scenario of parking facilities
- To conduct traffic volume survey and questionnaire survey
- Collect necessary data for the design of parking lane and parking facility
- Analyse the data obtained

4. SCOPE OF THE PROJECT

- To reduce traffic congestion
- Parking in a secure and designated parking slot
- Reduce travel time to reach destination
- Reduce fuel consumption

5. DATA COLLECTED

5.1 Questionnaire survey

It is the type of survey conducted to know the amount of traffic flow in any area. Traffic volume survey was conducted in a week and on a public holiday day at a point near Pathanamthitta Head Post office. Number of vehicles in each hour is estimated. Vehicles are categorized as two-wheeler, Autorickshaw, car, Light carriage vehicles, Bus. The number of vehicles are converted into PCU (Passenger Car Unit) and the average of the data is determined.

Some of the reasons that the people liked this project are;

- Time required to travel the destination will be reduced.
- Traffic congestions in this area will be reduced.
- A safe place to park their vehicle

5.2 Traffic volume survey

It is the type of survey conducted to know the amount of traffic flow in any area. Traffic volume survey was conducted in a week and on a public holiday day at a point near Pathanamthitta Head Post office. Number of vehicles in each hour is estimated. Vehicles are categorized as two-wheeler, Autorickshaw, car, Light carriage vehicles, Bus. The number of vehicles are converted into PCU (Passenger Car Unit) and the average of the data is determined. PCU is calculated using the following data in Table

Table -1: PCU VALUE

Type of vehicle	Passenger car unit (PCU)
Two-wheeler	0.5
Autorickshaw	1.2
Car	1
Light carriage vehicles	1.4
Bus	2.2

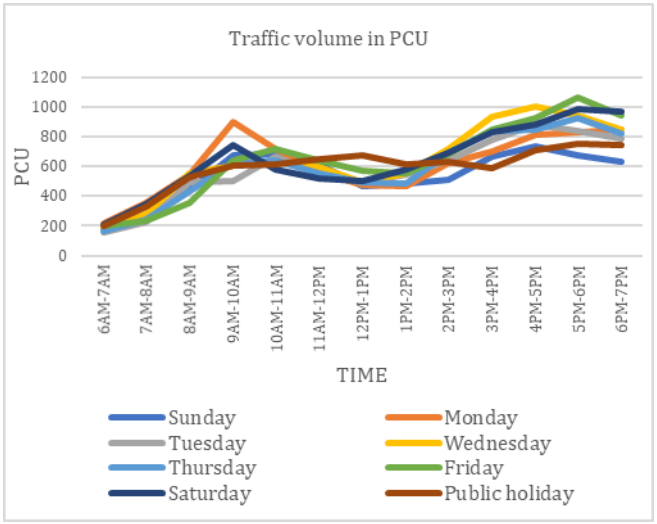

Chart -1: Traffic volume data

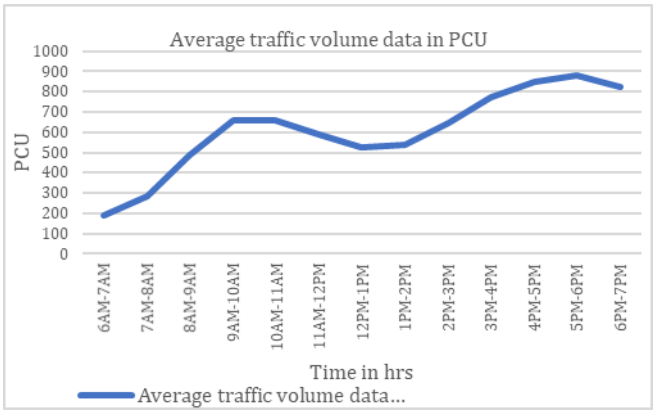

Chart -2: Average traffic volume data

5.3 Soil investigation

The proposal is to construct a multi storied building for parking at the site. The site is located in the Pathanamthitta town within the stadium compound and immediately opposite the municipal library, Pathanamthtta. Low lying land has been reclaimed with imported fill. A narrow drain is noticed at the southern boundary with the stadium. The site is currently at a lower elevation in comparison to the market road in the front (northern side). The terrain is flat. Soil investigation was undertaken to study the subsoil conditions at the site and to recommend suitable foundations for the proposal structure. The details collected from the report of the soil investigation conducted for the proposed library building at Pathanamthitta for district panchayath.

5.4 Total station survey

The total station is a surveying equipment combination of Electromagnetic Distance Measuring Instrument and the Electronic Theodolite. It is also integrated with microprocessor, electronic data collector and storage system. Field work can be carried out very easy by using a total station with high accuracy.

Fig -1: Total station

6. OUTLINE USING AUTOCAD

6.1 Parking Lanes

The selected road for the design of parking lanes has a span of about 500m which is a portion of the Pathanamthitta-Kaipattoor road. The lanes are designed in such a way that spaces for taxi stand, tempo stand, shops with frontage and bus stop are avoided. The plan is divided into 3 parts, the first part can accommodate 18 bikes and 2 cars(Fig 2).The second part can accommodate 21 bikes and 20 cars(Fig 3).The third part can accommodate 18 cars(Fig 4).So as per the design a total of 39 bikes and 40 cars can be parked without any congestion within the specified span.

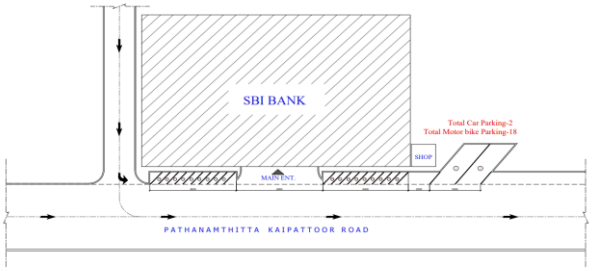

Fig -2: Parking lane 1

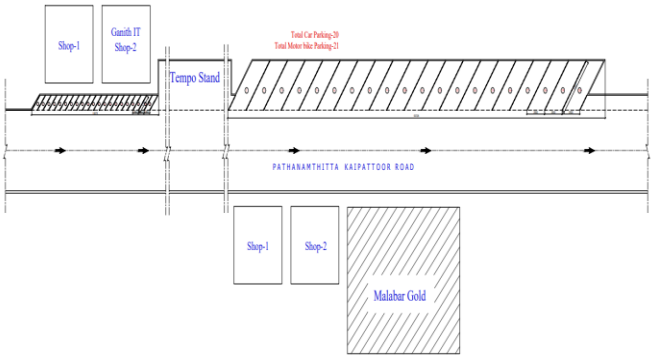

Fig -3: Parking lane 2

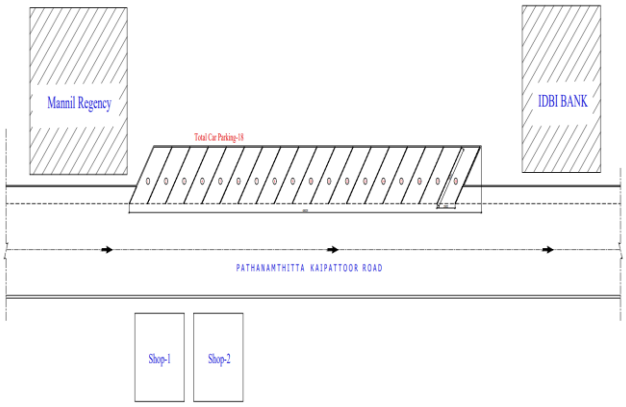

Fig -4: Parking Lane 3

6.2 Multi-storey parking

The multi-storied car parking has been designed as a G+2 building. Size of the building is 45×14m. AutoCAD is used for the drawing.

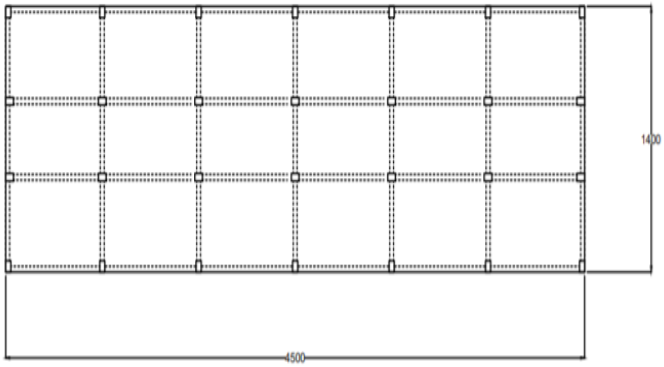

Fig -5: outline of Multi-storey parking

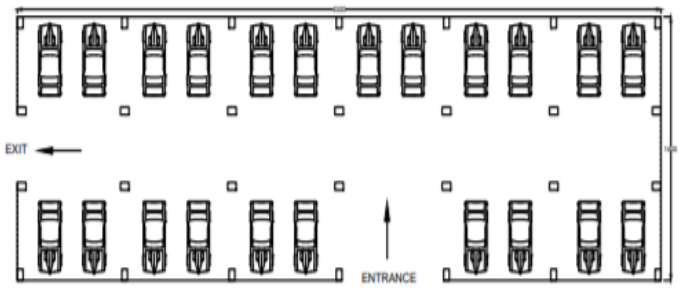

Fig -6: Ground floor plan

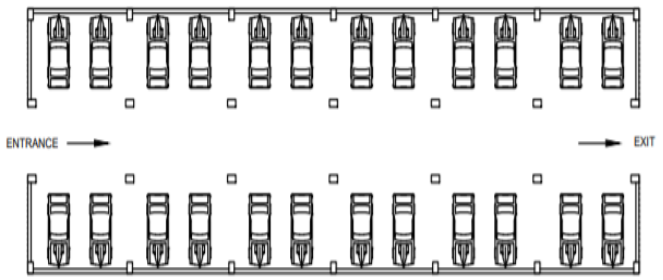

Fig -7: First floor plan

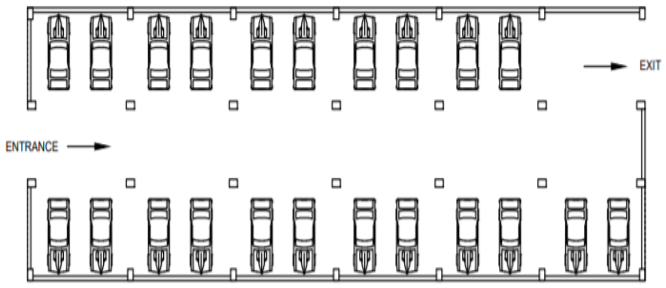

Fig -8: Second floor plan

7. STRUCTURAL ANALYSIS

STAAD. Pro is a structural analysis and design software which is widely used to analyse and design structures for bridges, towers, buildings, transportation, industrial and utility structures. It is one of the software applications created to help structural engineers to automate their tasks and remove the tedious and long procedures of the manual methods.

Fig -9: 3D view of structure

7.1 Steps involved in analysis

The following steps were involved in the process of analysis and design using STAAD. Pro

➢ Frame of the building was created in the software by using the plan created using AutoCAD as reference.

➢ Support conditions were assigned.

➢ The member properties were assigned for beams and columns.

➢ The loading cases were given to slabs and beams.

➢ The analysis of the frame was done.

➢ The concrete design of beams and columns were done.

7.2 Shear force diagram, Bending moment diagram and Displacement diagram

Shear diagrams is analytical tools used in conjunction with structural analysis to help perform structural design by determining the value of shear force at a given point of a structural element such as a beam. Deflection is the degree to which a structural element is displaced under a load.

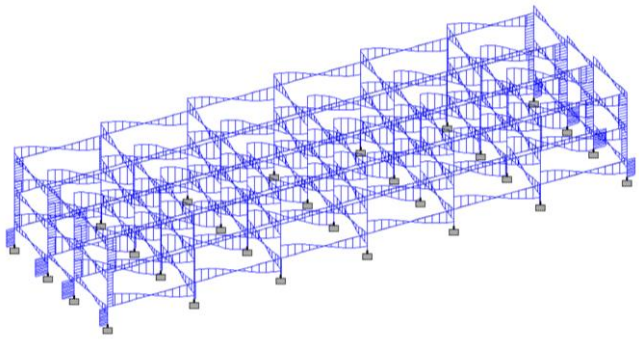

Fig -10: Shear force diagram

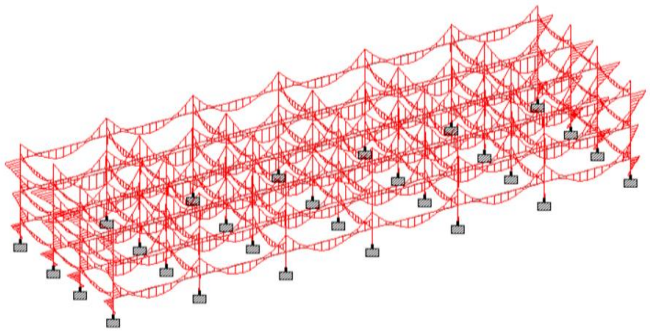

Fig -11: Bending moment diagram

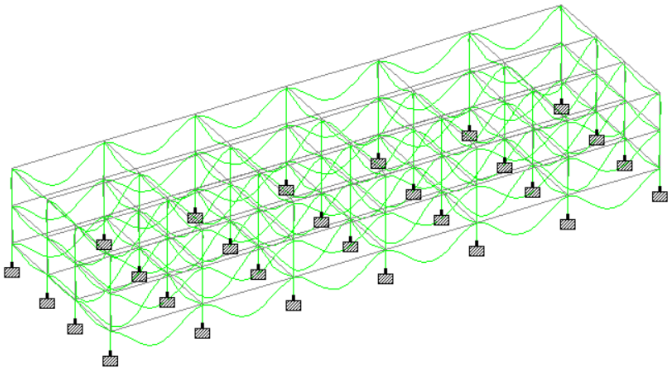

Fig -12: Displacement diagram.

8. CONCLUSIONS

In the modern world where parking space has become an enormous problem, it has become important to avoid the wastage of space in towns and cities. On-street parking is also very important in the development of a place as it improves the public accessibility for parking. In places where over 100 cars need to be parked, this system proves to be useful in reducing wastage of space. The multi-storied car parking has been designed as a G+2 building. We plan the layout of the building regarding codes in order to facilitate maximum utility. Estimation was done and an approximate cost of construction for the project was calculated. The project has helped us gain a fair amount of knowledge on structural analysis and design of reinforced concrete and to have a great experience on STADD PRO & AutoCAD software.

REFERENCES

[1]. S.B. Baglane, M.S. Kulkarni, S.S Raut, T.S. Khatawkar, "Parking Management System" (2014).

[2]. Assoc.Prof.Dr. Lajqi Naser, Ass.Prof.Dr. Lajqi Sheptim, Prof. Dr. Doci Llir, "The Methodology For Vehicles Parking Analysis: Case Study-City Of Prishtina" (2017).

[3]. Dr. Kirty Mohan Sharma, Parmesh Prajapati, Mridul Jain, "Problem Of Parking And Their Possible Solutions With Special Reference To Kota City" (2017).

[4]. Shanshan Yang, Lixia Huang, "Research On Planning And Management Of Urban Parking Lot-Taking Hangzhou As An Example" (2017).

[5]. Rajat Boob, A.P. Biswas, "Analysis And Proposal For Construction Of Parking Facility At MIT College Campus" (2018).
[6]. Naitik Gandhi, Jayesh Juremalani, "On-Street Parking Problems In CBD Area And Remedial Measures A Case Study Of Godhra City" (2019).
[7]. Rajat Boob, A.P. Biswas, "Analysis And Proposal For Construction Of Parking Facility At MIT College Campus" (2018).
[8]. Naitik Gandhi, Jayesh Juremalani, "On-Street Parking Problems In CBD Area And Remedial Measures A Case Study Of Godhra City" (2019).
[9]. Pranav. D. Desai, Karan. K. Bijwe, Saurabh. S. Bora, Dnyaneshwar. A. Aware, "Analysis Of Parking Trends And Design Of An Off-Street Parking System And Implementation Of Management Solutions On J.M. Road, Pune" (2019).
[10]. Janak Parmar, Pritikana Das, Sanjaykumar M. Dave, "Study On Demand And Characteristics Of Parking System In Urban Areas: A Review" (2019).
[9] Bhasker Vijaykumar Bhatt "A Study on Parking Needs at Intersections – Case of Surat T. P. Schemes." International journal of engineering research, (2014).
[11] Meet K. Hingrajia, Pratik D. Vagadia, Vidhi H. Khokhani, "Parking Management Blueprint For Rajkot – Solution To Urban Transport Problems", International Journal of Research in Advent Technology, Vol.3, No.9, 2015
[12] Morency, C., B. Saubion, and M. Trepanier, "Evaluating the Use of Parking Spaces in Strategic Urban Areas Using Travel Survey Data", in 53rd Annual North American Meetings of the Regional Science Association International 2006: Toronto, On.
[13] M R Rajashekara, Mohammed Kalandar Khan, Nikita Anil Moodi, "Demand assessment of multilevel car parking in Garuda mall", IJRET: International Journal of Research in Engineering and Technology, 2014
[14] Parmar Vibhuti N., Prof. Siddhartha Gupte, Prof. N. B. Parmar, "Modelling The Response To Chargeable Off-Street Parking Policy For Two-Wheeler And Four-Wheeler On Urban Street Of Busy CBD Area", IJSRSET, 2016
[15] Roess, R.P., E.S. Prassas, and W.R. McShane, "Parking in Traffic engineering", Fourth Edition 2011.
[16] Tong, C.O., S.C. Wong, and B.S.Y. "Leung Estimation of parking accumulation profiles from survey data", Transportation, 2004. 31, 20.
[17] Sonila Sonker, "Planning & Designing of a Multi-Level Vehicle Parking at Aakash Ganga Shopping Complex Bhilai (Chhattisgarh)", Imperial Journal of Inter Disciplinary Research, 2017.
[18] Wang. T. (2014). "Analysis on the Case of Planning and Design of Urban Commercial Buildings Parks".
[19] Upendra singh dandotia, Rakesh Gupta, Mukesh Pandey, "A study of analysis and design of multi-level parking", 2016, IJEDR, Volume 4, Issue 2.