

DESIGN OF MULTILEVEL PARKING FACILITY BASED ON TRAFFIC VOLUME STUDIES AT JAGADAMBA JUNCTION

Vinay Anand D.¹, Naahida Tabassum², B. Madhav Reddy³

¹Assistant Professor, Department of Civil Engineering, Vignan Institute of Information Technology(A), Duvvada

²Student, Department of Civil Engineering, Vignan Institute of Information Technology(A), Duvvada

³Student, Department of Civil Engineering, Vignan Institute of Information Technology(A), Duvvada

ABSTRACT

Due to rapid increase in traffic and insufficient payment dimensions in the interiors of the city, it has become very important to analyze the traffic behavior. Jagadamba junction is selected as the site for carrying out the project. The project mainly concerns with the traffic behavior, the parking behaviors and space constraints due to them. This paper tries to address these issues through traffic studies at Jagadamba Junction. A detailed traffic study and vehicular parking study was conducted and cumulative data has been presented. The paper gives a detailed plan, 3D illustration and design of multi level parking facility centrally located to the study area with a radius of around 500 metres using Auto CAD, 3D Max and STAAD Pro respectively.

Keywords: *Multilevel Parking, Parking study, Traffic Study, AutoCAD, STAADPro, 3D Max*

INTRODUCTION

Vizag is one of the most rapidly urbanizing cities. Enormous growth in business opportunities, as well as rising urban population and incomes has led to strong demand for better infrastructure and services. From a sleepy town just about a decade ago when pedestrians were the kings of the road, today Visakhapatnam has metamorphosed in to a bustling city packed with killer road chock-a-block with buses, cars, bikes and autos with hardly any room for pedestrians.

- GVMC has a population of 18.15 lakh as per 2011 census.
- Staggering decadal growth of 75% observed between 1991-2001.
- By 2021, Vizag will be a major city in the country.
- The urban agglomeration will grow to 35lakh.

Car parking is a major problem in urban areas in both developed and developing countries. The rapid increase of car ownership in many cities suffers from lack of car parking area with an imbalance between parking supply and demand. This imbalance is partially due to ineffective land use planning and miscalculation of space requirements, High parking tariffs and traffic congestion due to visitors in search for a parking place is also a major concern across many metropolitan cities.

Modern technology has produced a variety of new solutions and techniques in this respect because car parking solutions are not an end in itself but rather a means to achieve in layer community goals in order to improve urban transportation and make cities more livable and efficient.

The main objectives of the study are as follows:

- To identify a location which has a lot of traffic congestion due to on-street parking at no parking zones in the city.
- To study the traffic behaviour at the location and plan for peak hour traffic study.
- To prepare a rough plan for designing a multi-storey parking facility.
- To design the multi -storey parking facility.

METHODOLOGY

Detailed traffic study was followed by investigating reports, planning according to GVMC norms and then designing as per codal provisions.

DATA COLLECTION



The data was collected from the areas surrounding Jagadamba Junction. The on-road vehicular parking data at No Parking Zones of cars and bikes was tabulated and a cumulative data is presented in the form of Cumulative tables by extracting the data. Cumulative graphs for both cars and bikes were prepared for determining the peak value.

Table 1 Cumulative Car parking accumulation data

	0min-30min	30min-1hour	1hrs-1hrs30min	1hrs30min-2hour	2hrs-2hrs30min	2hrs30min-3hrs	Total
9am-12noon	12	17	26	36	17	11	119
12noon-3pm	12	23	39	20	6	4	104
3pm-6pm	13	15	13	23	33	47	144
6pm-9pm	19	17	1	37	4	7	112
total	56	72	96	116	70	69	479

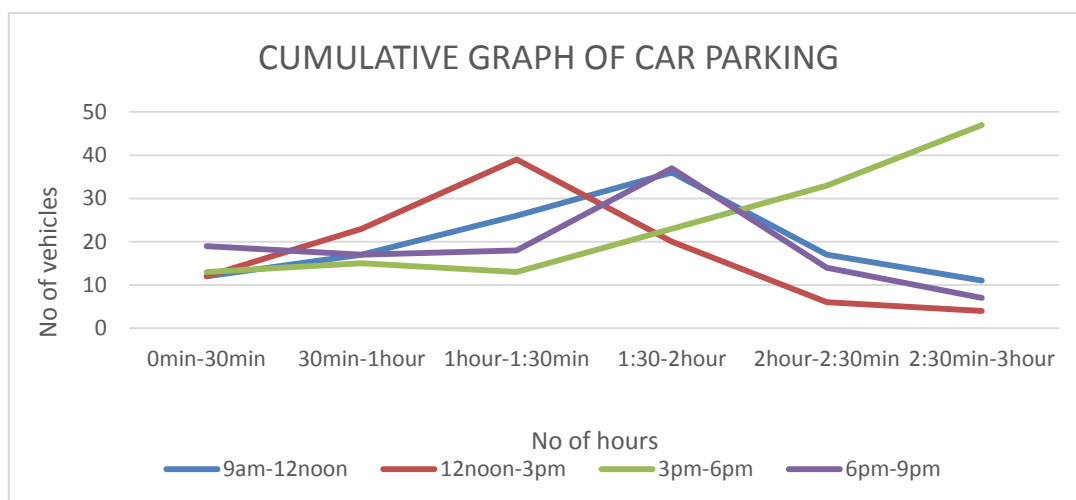


Fig.1 Cumulative graph of parked cars in our selected area

Table 2 Cumulative bike parking accumulation data

Timings	0min-30min	30min-1hr	1hrs-1hrs30min	1:30min-2hours	2hours-2:30min	2:30min-3hours	Total
9am-12noon	70	81	79	81	89	79	479
12noon-3pm	87	80	88	87	76	81	499
3pm-6pm	71	75	85	76	85	99	491
6pm-9pm	85	87	85	88	90	68	503
Total	313	323	337	332	340	327	1972

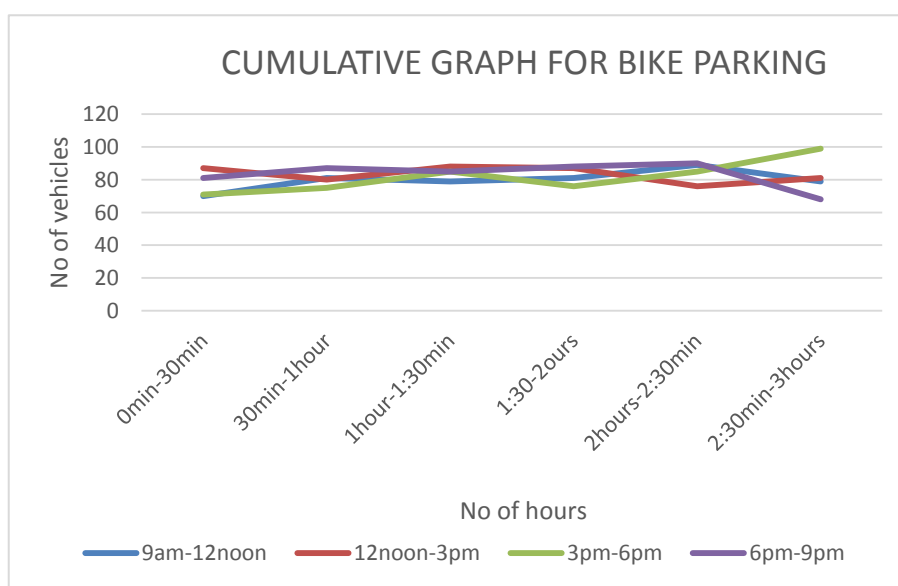


Fig 2 cumulative graph of parked bikes in our selected area

ANALYSIS AND RESULTS

Based on the extracted vehicular parking data, we have prepared the car parking and bike parking plans. We selected the area of 80mx60m which is located equi-distant radially and centrally for the given area. We planned G+4 floors in which G+2 floors consists of 4-wheeler parking spaces and 3,4 floors have 2-wheel parking spaces. Below is a plan prepared in 2D and 3D using Auto CAD.

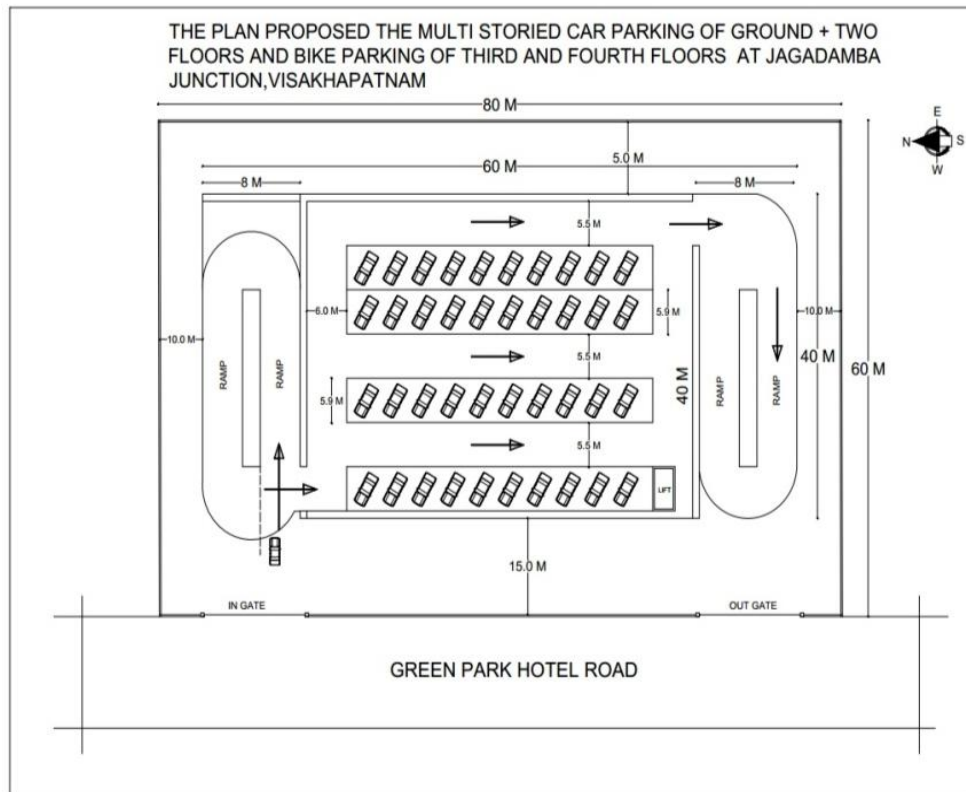


Fig. 3 Plan for car parking

Following are the dimensions of the parking space provided for cars
 Length-5.9m, Width-2.75m, Vehicle to vehicle distance 5.5m (Driving strips)
 The provided front space to the building is 15m from the main entrance. Also backside is 5m and side space is 10m. We have prepared complete plan in accordance with the global north direction. Each floor will accommodate 40 cars and for each row 10 cars will be accommodated.

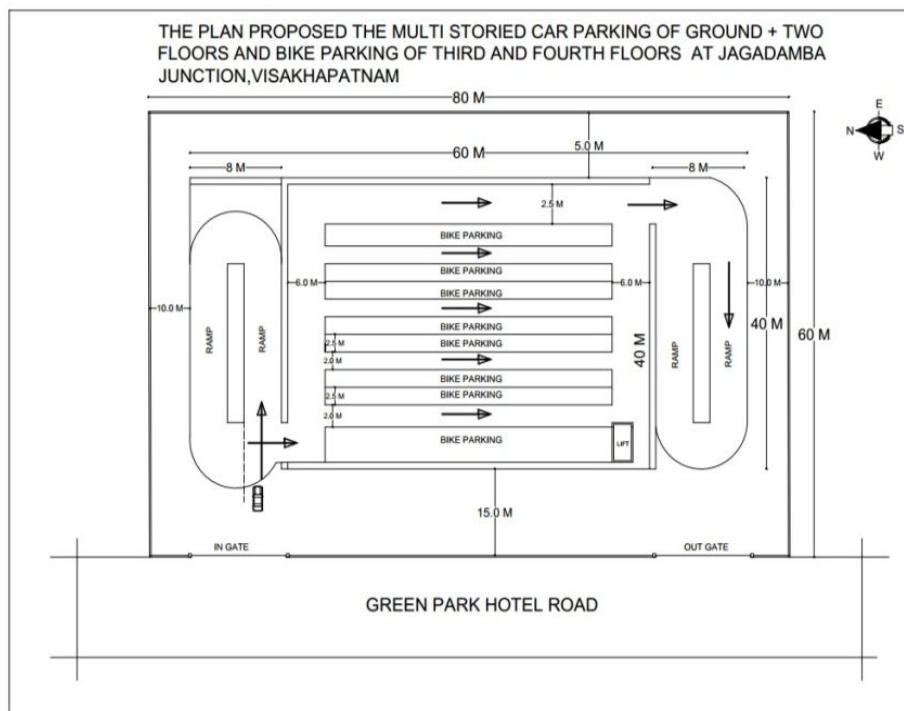


Fig. 4 Plan for bike parking

Following are the dimensions of the parking space provided for bikes.
 Length 2.5m, Width 1.5m, Vehicle to vehicle distance 2.0m
 The provided front space to the building is 15m from the main entrance. Also backside is 5m and side space is 10m. We have prepared complete plan in accordance with the global north direction. Each floor will accommodate 288 bikes and for each row 32 bikes will be accommodated.



Fig. 5 3-D Multi-storeyed parking building

Fig 5 illustrates the 3-D Multi storeyed parking, which is prepared in 3-D MAX software. This is based on the plan which is planned for the cars and bikes.

DESIGN OUTPUT

***** CONCRETE TAKE OFF *****

(FOR BEAMS, COLUMNS AND PLATES DESIGNED ABOVE)

NOTE: CONCRETE QUANTITY REPRESENTS VOLUME OF CONCRETE IN BEAMS, COLUMNS, AND PLATES
 REINFORCING STEEL QUANTITY REPRESENTS REINFORCING STEEL IN BEAMS AND COLUMNS D
 REINFORCING STEEL IN PLATES IS NOT INCLUDED IN THE REPORTED QUANTITY.

TOTAL VOLUME OF CONCRETE = 421.0 CU.METER

BAR DIA (in mm)	WEIGHT (in New)
8	127111
12	201533
*** TOTAL=	328644

369. PERFORM ANALYSIS

370. FINISH

CONCLUSIONS

- The location which has lot of traffic congestion due to on-street parking at No-parking zones in the city was identified at Jagadamba Junction.
- The peak hour data and traffic behavior at the location were studied and cumulative graphs were derived accordingly.
- 2D & 3D plans were derived using AutoCAD and 3D Max software.
- A design was carried out in accordance with the plan using STAAD Pro software.

REFERENCES

- Upendra singh dandotia, Rakesh gupta, Mukesh Pandey,2016, “ A study of analysis and design of multi-level parking”, International journal of engineering develop and research, volume-4 ,Issue -2, page no:1412-1414.
- B.Vamsi, Dr. Dumpa Venkateswaralu, Dr. D V Rama murthy, 2017 “ Design and analysis of multi-storey parking”, International journal of research of sciences and advanced engineering, volume-2, Issue-17, page no:23-31.
- Sonila sonker, 2017, “ Planning and design of a multi-level vehicle parking at aakash ganga shopping complex bhilai (chattisgarh)”, Imperial journal of interdisciplinary research, volume-3, Issue-1, page no:1372-1378.

- Sayyad Jamaluddin, Batliwala Ibrahim, Rajput Sohil, Sandeep Khorasiya, Khanrahim, 2017, “Multi-storey parking system at Vadodara railway station”, International journal of advance engineering and research development, volume-3, Issue-1, page no:01-05.
- Promad K.R, Venkatesh K, Pavan R Praveen Kumar M.B, Gajendra DR, 2017, “Analysis and design of multi – storey parking building proposed at jalahalli cross, banglore”, International research journal of engineering and technology, volume -5, Issue-6, page no :1019-1024.
- Motshidisi Segola and adewole S.Oladele “ traffic congestion and mobility solutions for franciston road Trnsportation network system” Botswana international university of science and system” Botswana international university of science and technology, volume6 Issue2, June 2017 Page no: 1814-1816
- Haseeb UI Hassan, Dr Rakesh gupta “study on urban vehicular parking characteristics and analysis ” international Journal for research in applied science & engineering technology [URASET], ISSN: 2321-9653, volume 5 Issue IX, september 2017 page no: 805-811
- Rakesh Gupta and Vrudani Vaidya “ study and analysis of multi-level parking facility ” international journal of civil and structural engineering research, ISSN 2348-7607, Volume-2, issue-2, year oct 2018 Page no: 33-40.