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# Automobiles as Significant Driver for Changing House Forms in Lucknow

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**Abstract:** Local byelaws in Lucknow allow parking for four wheelers in middle income group and higher income group houses only. In contrast even house owners of lower income groups and economically weaker sections also possess four wheelers. Due to gentrification and increasing purchasing power number of vehicles is increasing in Lucknow creating parking problems. The automobile is an integral part of our lives; society has accepted its necessity, yet the requirement of parking needs to be incorporated in the mindset of society. This paper aims to investigate the design strategies and policy recommendations to solve parking related problems of residences. Authoritative intervention is also advocated in terms of policy formulation and implementation. These guidelines will provide appropriate information for already constructed houses and for new proposals which would help all the stakeholders in solving parking problems.

**Keywords:** Plotted development, parking, portico, byelaws, built forms, classes.

## I. INTRODUCTION

Before the use of automobiles, the houses in Lucknow had high plinth with number of steps to traverse. Houses in constructed (abadi) areas had no front, rear and side setbacks. Houses were constructed abutting the roads, with few higher class had front setbacks for various activities. Big houses had large covered outdoor spaces for outdoor activities e.g. public gatherings, etc. as per needs. Bye laws were looked after by Municipal Corporation in Lucknow.

Transport plays a major impact on lives of human beings. Everyone has to commute daily to their work places and back to their houses and also for other activities like shopping, socializing, dropping their wards to schools, etc. Availability of insufficient and less reliable transport options lead to people buying their personal vehicles for their regular and intermittent needs. Lack of transport options everywhere act as serious drag on further time management and wastage of other resources of people. Increasing number of vehicles create more air pollution, for which more plantation is required to absorb/dilute the CO<sub>2</sub> concentration levels in the environment.

## II. AUTOMOBILES AND THEIR NEED

As per census records population of Lucknow in 1972 was 0.81 million, in 2011 was 2.81 million, in 2012 was 2.9 million, in 2017 was 3.38 million, projected figures for 2018 comes to 3.47 million. Population of Lucknow increased 4 times in 45 years.

As per Statistical Year Book India 2017, in 2012 there were 69 cars per thousand population and 363 two wheelers per 1000 population which translates to 0.20 million cars and 1.05 million two wheelers. In 2015 there were 0.26 million cars and 1.37 million two wheelers in Lucknow. It amounts to approximately 7% population owning cars and 36% population owning two wheelers and the quantity is increasing day by day. Creating space for two wheeler parking is not a big issue in houses as it needs less space and it can be parked inside the rooms also. Two wheelers are normally parked inside and are rarely seen parked on roads at night, whereas four wheelers require parking space which is roughly five times the space required for two wheelers. Owning a vehicle is a necessity for some, while it is a status symbol for few others. Development of road infrastructure, easy availability of vehicle loans by financial institutions, affordability and increasing purchasing power is motivating the population to own a vehicle, without thinking that whether they have provision for parking or not.

In 1972 when Lucknow Development Authority was formed and planned Nirala Nagar, the plot sizes were: for HIG 557.62 sq. m. (60'x100'=6000 sq. ft.), for MIG 297.39 sq. m. (40'x80'=3200 sq. ft.) and for LIG 167.28 sq. m. (30'x60'=1800 sq. ft.). Now in Gomti Nagar the plot sizes are: for HIG 200 sq. m., for MIG 112.5 sq. m., for LIG 62 sq. m. and for EWS 30 sq. m. Plot sizes have reduced on similar road widths leading to high density and high number of vehicles per dwelling units.

Colonies are growing on outskirts of the city on Faizabad Road, Kursi Road, Sitapur Road, Hardoi Road, Kanpur Road and Sultanpur Road, along with urbanization of peri urban areas in Lucknow. Transport modes are available depending on the density of development there. Nearly half of the Lucknow population resides in undeveloped/underdeveloped colonies with less width of roads

and high density and large number of vehicles. Real estate market is evolving as according to Lucknow Master Plan 2031, 70% of U. P. is set to become urban.

Less width of roads promote use of personal vehicles as public transportation can run only on wider roads. Other transport modes are available only on busiest nodes and on less busy roads viable options are limited. The problem with transport infrastructure is that when government invests more money it encourages more traffic and it results in residents switching over from public transport to personal modes. This triggers in more purchasing of vehicles leading to extra burden on buyer to create adequate parking spaces in the already built environment.

### III. AUTOMOBILES AND THEIR EFFECTS ON HOUSE FORMS

In economically weaker section (EWS) houses, road width starts from 3.0 m. to 9.0 m., resulting in less space on roads for parking after utilizing the road for the intended purpose. Even EWS persons possess two wheelers and few possess four wheelers, with no parking space in their plot sizes, are parked on roads leading to congestion. EWS houses area is 25 to 30 sq. m. which can hardly accommodate 1 car on ground, with little space left for other activity. Same problem is faced by lower income group (LIG) houses, road width starts from 7.5 m. to 9.0 m.. Middle income group (MIG) is somewhat sensitive and some are providing parking spaces. Higher income group (HIG) provide parking spaces but some of them possess more than one vehicles and the parking space is insufficient to accommodate all their vehicles. Moreover, only one dwelling unit is allowed on a plot, as per local bye laws, few had rented their extra built up spaces, leading to increased number of vehicles and aggravating the parking problem. Joint families are residing in some houses; some accommodate number of families, including persons residing for menial jobs and care. This increases the number of vehicles and their parking related problems.

As HIG plots are facing wider roads, not less than 12.0 meters, and parking space is not provided within the premises, cars are invariably parked on roads, increasing traffic congestion. Initially, after the formation of development authorities act detached and semi-detached typology of houses were developed for affluent class and row house typology for classes with less purchasing power. Detached and semi-detached houses had options for parking spaces in side setbacks. Residents are constructing houses on high plinths resulting in larger ramps eating the right of way, whereas bye laws allow only 1.0 m. ramps outside the plots. Further, ramps are made of highly polished/smooth surface materials, instead of rough surfaces, leading to accidents.

Further, sanctions are obtained on municipal drawings with basements utilized for parking, converted later to other commercial uses which results in encroachment of roads for parking. Same is the case with stilt floors which are granted approval for parking, converted to usable floors. Setbacks are also encroached upon to suit vested interests. As authorities are not strict in submission of completion drawings, these are a common feature in many Lucknow residences, resulting in parking menace.

It seems that authorities are regularizing the individualized practices, if attempted by many in society, and are least bothered to curb them; like illegal constructions, encroachments, non adherence to byelaws, land use conversions, parking on roads, etc. to name a few. Municipal Corporation, instead of controlling the road side parking, is penalizing residents by imposing road parking tax and generating revenue. In this way society is subsidizing the system of individualized consumption practices.

In front setback no permanent structure is allowed, yet porticos are constructed up to the boundary line, as after consuming side setback no space is left. If the house owner buys vehicle later, he encroaches front setback. Moreover, if front setback is not wider enough to accommodate vehicle, boundary walls and/or gates are bulged outside to create parking. Parking spaces had eaten up the green spaces, as more paved areas are required to accommodate increasing number of vehicles.

Porch/portico for car parking is allowed by local bye laws at a level lower than the floor level, with or without columns, but some residents have constructed it similar to floor levels using it as terrace/gardens or constructing rooms on one or more floors above it to serve their various needs. Some go for double height or triple height porches just for aesthetical reasons.

Except HIG houses local bye laws have no mention of porch spaces but owing to gentrification upper classes are occupying houses meant for lower classes. This necessitates the provision of porch spaces in all typology of houses.

Due to gentrification lower income group houses are been converted into higher income group houses leading to changing skyline, more FAR and ground coverage.

Further, with the intrusion of HIG into lower classes complex problems related to socio-cultural nature are generated which results in status and class differences, class discrimination and segregation, etc. This interrupts the socio-cultural fabric of the society by and large.

**IV. LOCAL BYELAWS AND THEIR INTERPRETATION**

In previously constructed regions, for development/redevelopment/reconstruction proposals local bye laws state that for existing road width less than 4.0 meter, space for road widening should be left and after that front setback will be counted. Basement construction is not allowed in non-commercial plot areas less than 200 sq. m. For plot areas less than 200 sq. m. ground coverage, FAR, front setback and basement construction provisions are shown in Table-1.

**TABLE I  
CONSTRUCTION RELATED REQUIREMENTS FOR CONSTRUCTED REGIONS**

S. No.	Construction related requirements	Standards according to plot areas	
		till 100 sq. m.	101-200 sq. m.
1	Ground coverage	75%	70%
2	F.A.R.	2.0	1.75
3	Front setback	1.2 m	1.2 m
4	Basement	not permissible	not permissible

Regarding reconstruction proposals for plot areas larger than 200 sq. m., byelaws for new regions will be applicable. According to local byelaws, setbacks for residential buildings in plotted development are shown in Table-2. These setbacks will be applicable in new subdivisions/layout plans and in developed/developing regions where setbacks are not fixed. Stilt floor is allowed in detached buildings only.

**TABLE II  
SETBACK NORMS FOR RESIDENTIAL BUILDINGS IN PLOTTED DEVELOPMENT**

Plot area (sq. m.)	Set-back (meter)			
	Front portion	Rear portion	Side-1	Side-2
(a) Row housing				
till 50	1.0			
more than 50 to 100	1.5	1.5		
more than 100 to 150	2.0	2.0		
more than 150 to 300	3.0	3.0		
(b) Semi-detached				
300 to 500	4.5	4.5	3.0	
(c) Detached				
more than 500 to 1000	6.0	6.0	3.0	1.5
more than 1000 to 1500	9.0	6.0	4.5	3.0
more than 1500 to 2000	9.0	6.0	6.0	6.0

In side setback maximum 3.0 m wide and 6.0 m. long portico is allowed. Above portico no construction is allowed. Parking garage minimum 2.5 m. wide and 5.5 m. long with maximum height 2.4 m. is allowed. Ground coverage and F.A.R. Standards for Residential development (Residential plotted) are shown in Table-3.

TABLE III  
GROUND COVERAGE AND F.A.R. STANDARDS FOR RESIDENTIAL PLOTTED DEVELOPMENT

	Ground coverage (%)	F.A.R.
(a) Constructed/Developed regions		
• till 100 sq. m.	75	2.00
• 101 – 300 sq. m.	65	1.75
• 301 – 500 sq. m.	55	1.50
• 501 – 2000 sq. m.	45	1.25
(b) New/Undeveloped regions		
• till 100 sq. m.	65	2.00
• 101 – 300 sq. m.	60	1.75
• 301 – 500 sq. m.	55	1.50
• 501 – 2000 sq. m.	45	1.25

Parking norms are: 23 sq. m. for open parking, 28 sq. m. for covered parking, 32 sq. m. for basement parking, and 16 sq. m. for mechanized parking. Parking arrangement standards for residential development are shown in Table-4.

TABLE IV  
PARKING ARRANGEMENT STANDARDS FOR RESIDENTIAL DEVELOPMENT

Use	Plot areas (sq. m.)	Number of Equivalent Car Space (ECS) minimum area 13.75 sq. m.
Residential (Plotted)	101 – 200 sq. m.	Minimum 1 ECS
	201 – 300 sq. m.	2 ECS
	more than 301 sq. m.	1 ECS per permissible unit

Local byelaws stipulate that along with proposal plans submitted for approval separate parking plan is mandatory, showing parking space for all types of vehicles and their circulation arrangements for entry and exit. This provision does not record the number and types of vehicles plot owner possesses or is likely to possess in near future for residential buildings, seems to be documented properly. Up to 200 sq. m. residential plot only one vehicle is computed, which is debatable, creating further parking problems. Assumptions for computing one vehicle for up to 200 sq. m. residential plot seems to be cross checked, as number of vehicle owners is increasing, with few possessing more than one vehicles. Parking in front setback is permissible in non-residential plot areas up to 100 sq. m.

Completion certificate for residential buildings on less than 300 sq. m. plot area is not required according to local byelaws. This should be required to cross check the parking arrangements of number and types of vehicles plot owner possesses.

On 12.0 meters and wider road plots, local bye laws have permitted the limited commercial land use on any floor, with no change in FAR and ground coverage, in the form of consultancy offices for various professionals in their residences. It worsens the parking problem as customers and staffs park their vehicles on roads. However, offices are running on less than 12.0 meters wide roads also. Instead, this limited commercialization should be allowed with rider of adequate parking provisions only. Government should provide incentives in form of increased FAR, etc. for those who provide full parking spaces inside their premises.

### V. PROPOSALS FOR CREATING PARKING ARRANGEMENTS IN RESIDENTIAL BUILDINGS

The contribution of private vehicles cannot be ignored in light of public transport not feeding to all the members of the society. A suitable policy framework is required to provide incentive to those who use public transport so that load on creating more parking spaces is minimised. Road tax should be increased for persons owning more than one vehicle and for large space consuming vehicles. Effluent class possesses various types of vehicles and is changing them frequently. It also implies that the users pay for what they get which in turn implies more road tax and parking fees to be levied on residents without parking spaces - in turn betterment of the overall environment is achieved. Pollution tax should be levied on the residents buying vehicles. Often the equity concerns are neglected as non vehicle owners are living in polluted environment created by vehicle owners, this should be subsidized in some form. Heavy taxes should be imposed on vehicle buyers who reside on or near public transport networks, to discourage casual buying of vehicles.

The emphasis should be on development and popularizing of environment friendly non-motorized modes of transport e.g. bicycles and providing cycle tracks in colonies. Further, introduction of pathways will promote pedestrian movement. Development and promotion of alternate modes of transport like 4 wheeler and 2 wheeler taxi, bicycle etc. to provide an efficient service for passengers/freight by public transport providers will minimise the lure of possessing vehicles, and burden of parking. Car, scooter pool options should be promoted and followed. For less travel and less days of travel, persons should not be encouraged to buy vehicles.

Along with the municipal drawings, development authority should ask the plot owner to attach the registration papers of all the vehicles his family members possess and likely to possess in near future, to evaluate the provision of parking spaces on that plot beforehand. Moreover, new vehicle owners should be asked to procure no objection certificate from local development authority or Municipal Corporation for adequacy of parking space in his residence, before registering the vehicles. Residents should be restricted to buying small cars or sizes compatible with their plot sizes/parking spaces. Registration papers for vehicles should be issued when no objection certificate has been given by development authority or Municipal Corporation after physically verifying the parking spaces.

The emphasis should be on parking free roads. Those who can afford should go for stilt floor parking or construct basements. Stilt floor can be used for parking on all sizes of plots. Basements can be used for parking in larger plots only as approach ramp consumes more space. Parking provisions in stilt floor or in basements dictates the spacing of structural components i.e. columns and/or walls and beams and height of built forms, resulting in varying skylines in a neighbourhood. Front setbacks should be wide enough on all types of plots to accommodate parking.

Spaces for driver/(s) needs to be accommodated within the residential plot – local bye laws are not addressing the issue seriously. There shall be provision of single/family accommodation for drivers apart from servants and caretakers spaces, as servant rooms are provided in HIG class flats and plots.

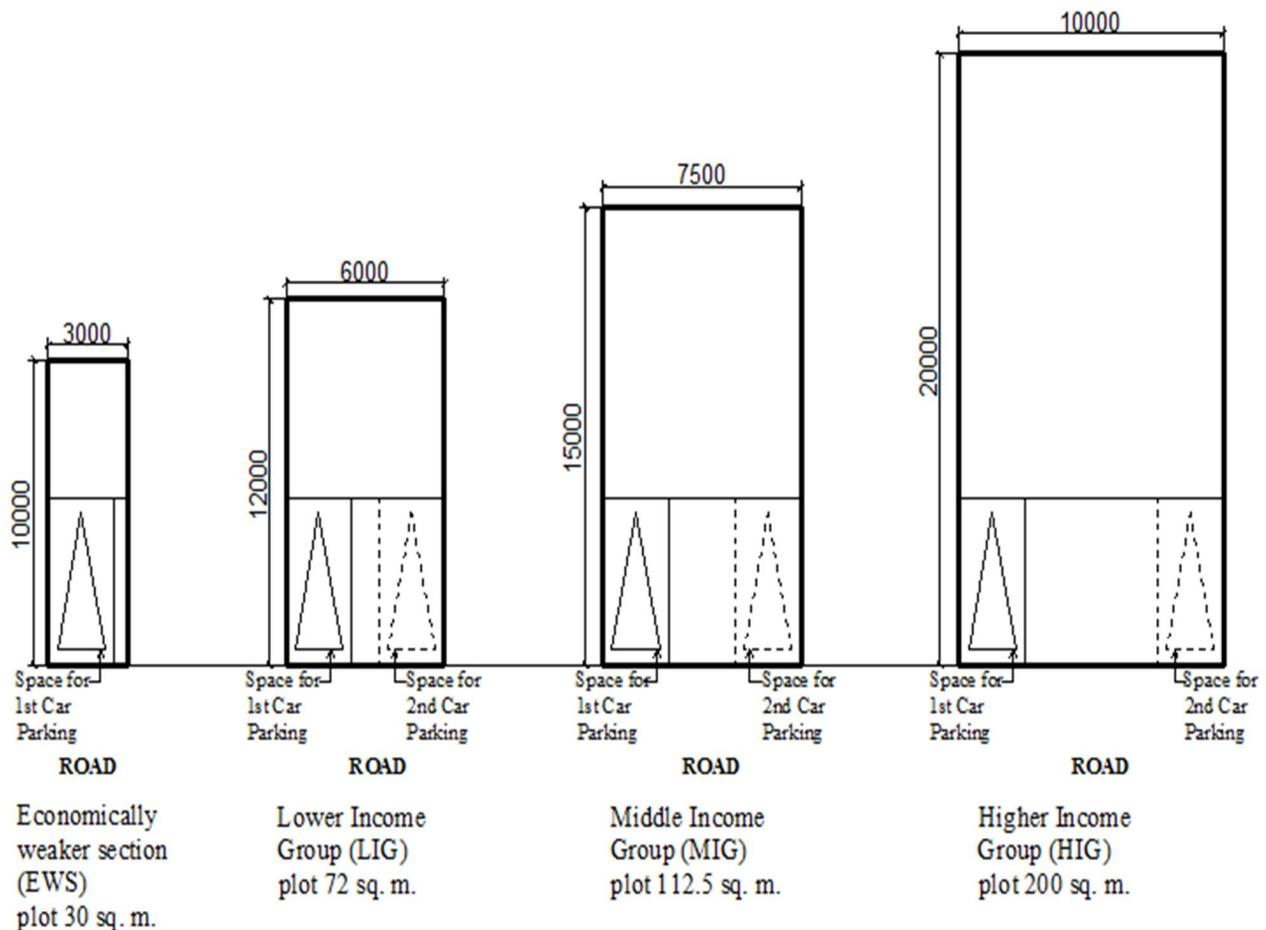


Fig.1 Proposed parking arrangements for contemporary residential plot sizes in Lucknow.

Regarding the availability of parking requirements in EWS and LIG plots, the need issue is debatable. Yet, if need of four wheeler is created, the plot owner should carve out the parking space in his already constructed house. Covered or open parking space should be created with an area of 13.75 sq. m. ECS (Equivalent car space), as laid down in local bye laws, with minimum width of 2.5 m. in all sizes of plots. For already constructed houses, the bye laws will come into force when they acquire a four wheeler or opt for new construction of the house, whichever occurs earlier.

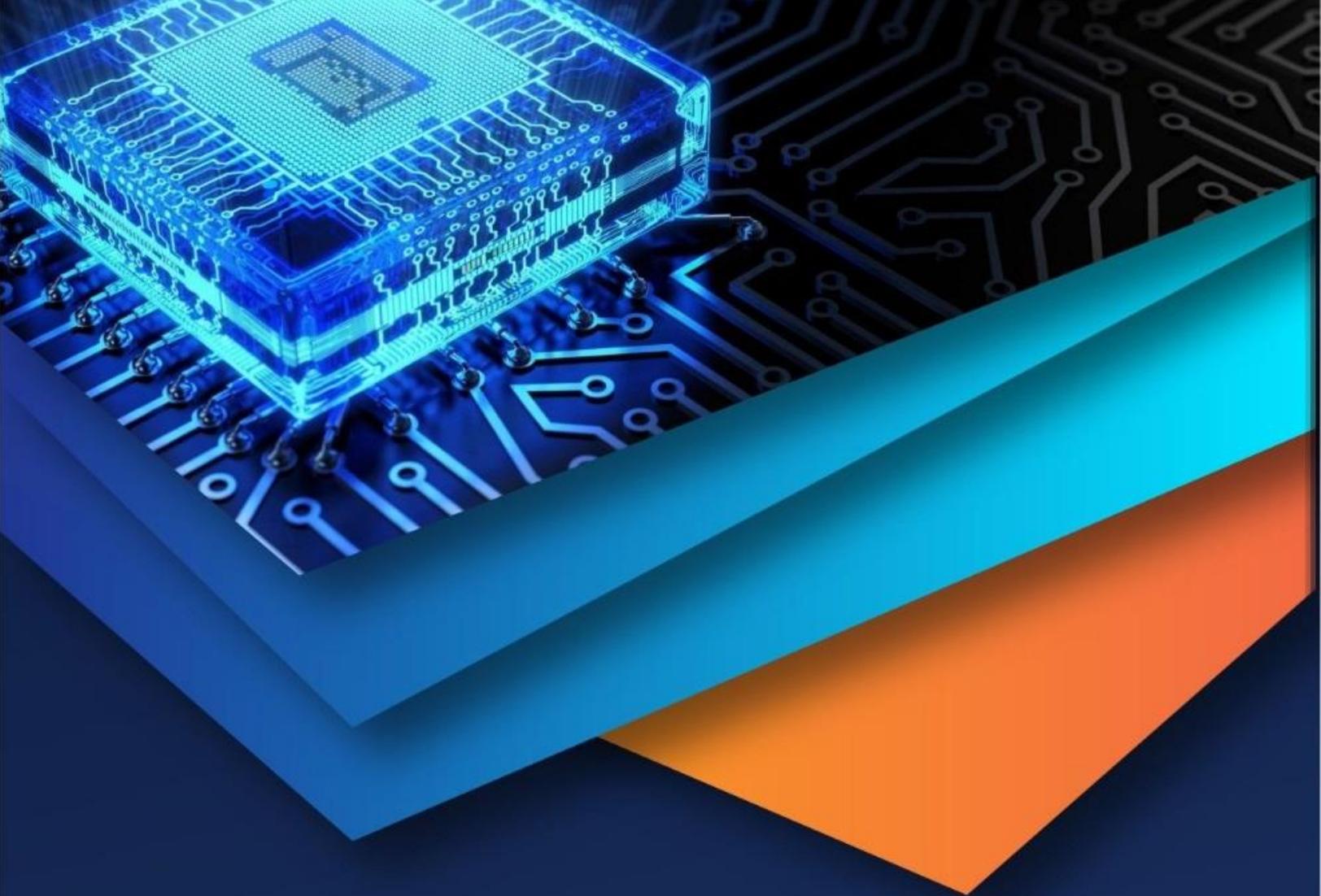
Front setback should be 5.5 m. wide with clear height of one floor on ground floor to accommodate future ownership of vehicles by house owners and front setback on upper floors shall be as per local bye laws. If front setback of 5.5 m. is left vacant on all sizes of plots, it will take care of future parking arrangements. The construction in EWS and LIG houses should be such that in front minimum 2.5 m. wide and 5.5 m. long spaces are available, and if need arises front wall can be demolished to accommodate parking. Fig. 1 shows the contemporary plot sizes and proposed parking arrangements, which conveys that one car in EWS and two cars in LIG houses can be accommodated easily. In MIG three cars and in HIG four cars can be accommodated.

## VI. CONCLUSION

Bye laws for parking arrangement and management for residential structures should be addressed in detail taking into account all the issues in the larger interest of all the stakeholders of the society. Bye laws in context to parking should be framed in such a manner that choice, comfort, convenience and technology are compatible to masses. Parking provisions should be vehicle dependent instead of space. Vehicle should act as determinant in creating/designing spaces for all types of houses instead of the traditional approach of providing parking based on space and status parameters. Completion certificates should be made mandatory to check compliance of parking norms.

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