

Housing for All

Affordable Housing within the city limits of Mumbai under PMAY 2022

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Abstract: “I see the space around me, but not in any use. I see the space around me but it does not have any character. I see the space around me, but that space is a dead space.” I see a lot of slums around me, “**Architecture by the poor**” than “**Architecture for the poor.**” In this thesis, the main objective of optimizing the housing development and construction is to achieve **quality, productivity and flexibility, together with reducing time and costs. Also understanding their living conditions, the social and cultural structure along with the business model.**

The proposal aims at improving the **culture of the community by not only providing them basic infrastructure but also provide a scope for development by improving the standard of living.** Integrating the present character of the community as well as the place along with future demands and needs will be one the key aspects of this project.

Keywords —Affordability, PMAY, Affordable housing, Unaffordability, Low Cost Materials, Housing Typology, Design Principles

I. INTRODUCTION

Majority of the population in the world today live in cities. The migration of people towards cities has largely occurred after industrial revolution. Cities, as compared to villages or towns, started providing a lot of employment opportunities giving rise to a stable life and a high standard of living. The people working in the secondary and tertiary sectors over the years has increased manifold. Such a phenomenon is described as urbanization. According to Cambridge dictionary, urbanization is defined as, ‘*the process by which more and more people leave the countryside to live in cities.*’ The urban population in 2015 accounted for 54% of the total global population, up from 30% in 1950 and it is expected to increase to 60% of world population by 2030. [1]

Urbanization also has its negative effects. The number of people migrating to the city is on a rise whereas the capability of the city to provide facilities to the growing population is decreasing. Such a situation gives rise to a poor standard of living affecting the health and hygiene of the people along with the city as a whole. As a result, cities are divided into urban rich and urban poor. Urban poor are defined as the population living below poverty line. The cities, especially in the developing countries, have a large population living in slums. A slum is defined as ‘*a densely populated urban area marked by crowding, dirty run-down housing, poverty, and social disorganization.*’ [2]

II. HOUSING

A. Primary Need

Housing is one of the most complex sectors in the fabric of any place. The way it functions is different from a public or a commercial space. Approximately 70% of the built architecture around us is residential architecture. As people spend nearly 50% of their time in their houses, the way they are designed has a great impact on each individual’s life. Due to practical problems of *space crunch, population explosion, poor quality of materials, improper management of planning*, housing has taken a toll. Over and above the economic disparity has only aggravated the problem

there by creating poor structures in terms of appearance and functioning.



Fig 1a: Financial situation affecting Housing
(Source – By Author)

B. Unaffordability: in Urban Areas of India

The designed houses today do not compliment the user type and household structures that people live in today.

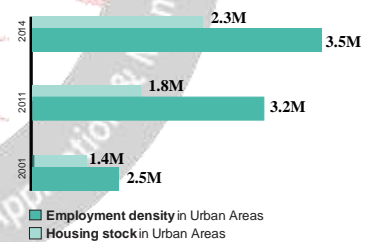


Fig 1b: Employment v/s Housing in Urban Areas.
(Source- Census 2011 and NSS Report)

City Realities:

- People are striving towards optimising the opportunities of employment offered by the city, in order to increase their household incomes.
- Today, it is not only the individuals sustaining themselves in this urban scenario but a variety of family structures coming from varied backgrounds with the hopes of boosting their quality of life.
- Due to the standardization of housing modules, these users are forced to make do with what is available to them, irrespective of their needs.
- This leads to unfair management of the entire system. Areas more specific for the user’s requirement shall be allotted rather than what is stereotyped for his use.

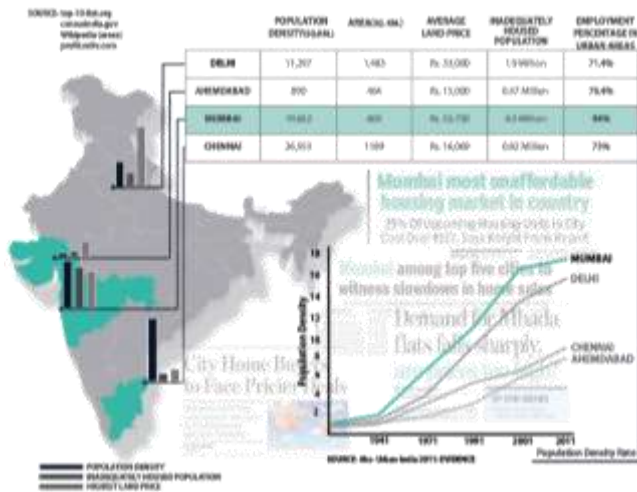


Fig 1c: Population Density Rate in India
(Source – iibs – Urban India2011: EVIDENCE)

C. History of Mumbai

Mumbai has been growing for five hundred years, even though it was built on what initially looked like very weak foundations. In 1534, the Portuguese captured the islands and established a trading center (or ‘factory’) there. The Portuguese called the place Bom, Bahia, meaning ‘the good bay’, which the English pronounced Bombay. The city has continued to grow. In 1864, there were 816,562 living there. By 1991, the population of the whole of Bombay (which had spread beyond the islands) was 9,900,000. The city changed its name in 1995 to Mumbai, after Mumba Devi, the stone goddess of the deep-sea fishermen who originally lived on the islands before they were driven out by the East India Company.



Fig 1d: History of Mumbai
(Source – Housing.com)

D. Housing Typologies in Mumbai

As any other urban area with a vast history, Mumbai has several kinds of house types developed over various stages of its history. Also, till date, all these housing types are being used in some way or the other; nothing is wasted as being old or dilapidated.

1. Chawl Typology

In this type of housing design, units designed for the masses were simple with only the basic necessities of an individual. A building was designed with at least 20 to 30 units per floor which were connected with central passages. The services core was planned either in the center of the building or on the ends.

Merits:

- This type could house large part of the population during pre-independence period.
- As the dwelling units were small the rents of such typology were also comparatively less.
- The common spaces designed between a pair of buildings in use for community and social gatherings,

Demerits:

- The increasing number of luxury and amenities between the masses cannot be housed in such a typology as the dwelling units were designed only to satisfy basic necessities.
- Privacy of an individual is not guaranteed.
- Common toilets for all the people staying in such typology.

2. Government Quarters Typology

This was planned for the people who worked in the public sector of the city. The typology that was designed was as per the post of the worker in the government institution. Higher the ranking better the standing of living. This is similar to the concept of chawls to house the masses but provide more spaced housing for an individual.

Merits:

- This typology provides individual toilet for the units.
- It housed people working for the government.
- This concept was a successful approach for the short stay in the city.

Demerits:

- This typology took large number of lands in the city, as resulting in land scarcity.

3. Mixed Income Typology

The government had to provide housing for the people who are working for the private sectors or an individual level. The demand for these masses is more than the public-sector workers as their abundant growth in the private sector. The solution was a housing type for all the income groups who worked for the private sector. Hence, the government came up with a Maharashtra Housing and Development Association.

Merits:

- This typology house peoples of all the races. Hence, creating a social mix in the vicinity.
- Affordable to all the income groups.

Demerits:

- As the cost of such a typology is minimal, it is only produced in quantity and not in quality.
- In the aim of housing, majority of the population-built environment is maximum forgoing the open environment.

4. Site and Services Typology

As the designers started understanding the importance of open environment, a new approach came into picture between the built and unbuilt spaces. In this typology the services are well connected. Open spaces are planned after

series of units to balance the built and unbuilt spaces. This also provides space for social gatherings.

Merits:

- Properly connected
- Planned open spaces
- Incremental approach to make this type affordable to the masses.

III. UNDERSTANDING AFFORDABILITY

A. Parameters of Adequacy

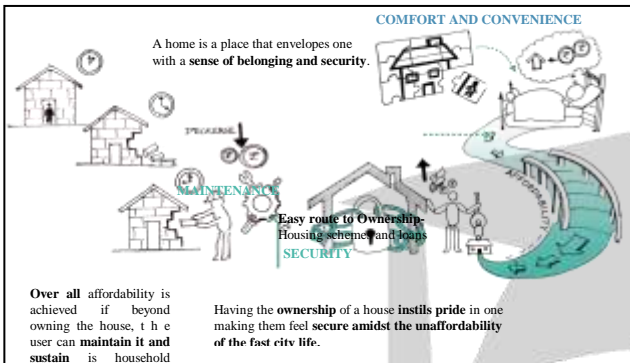


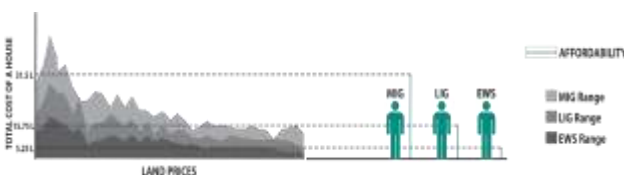
Fig 2a: Defining Adequacy Parameters
(Source – By Author)

The Concept of Affordability:

The inevitable outcomes of urbanization like land shortage; leading to the soaring land prices, the high density of population; leading to increased pressure on basic city infrastructure, has led to inadequate conditions of livelihood. The conditions governing this adequacy are:

- **Aesthetically Pleasing:** If a house can promise, the socially fragile, protection from eviction on legal grounds it qualifies to be adequate for the user.
- **Temporary Nature of Shelter:** Owning a house is the ideal situation but with the unaffordability encompassing the city today, “living” in one is the next best option. It can create a sense of belonging, just as an owned house, if designed to suit the lifestyle of the user.
- **Legal Security:** Bare minimum provisions of water, electricity, sanitation, light and ventilation to maintain a healthy standard of hygiene.

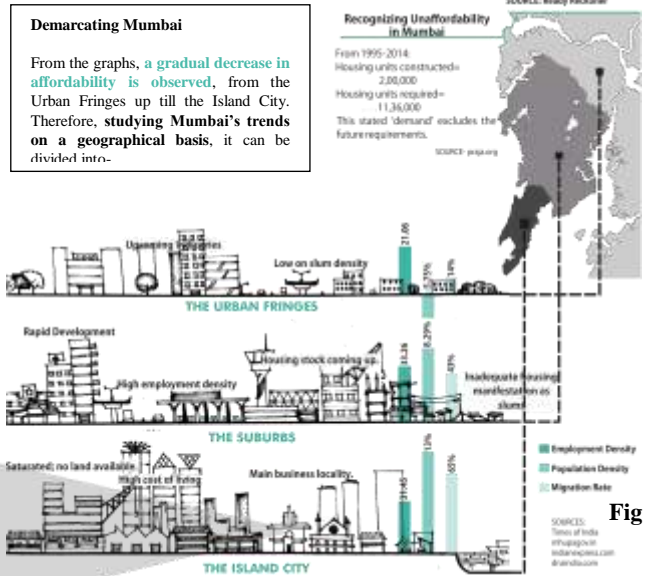
B. Mumbai and its Trends of Affordability



Average price of a 250 sq. ft house= Rs. 28,00,000
 Average annual income of a house= Rs. 2,40,000

12 times the income as compared to the 3 times established to declare affordability.

SOURCE- praja.org



2b: Recognizing Unaffordability in Mumbai

IV. HYPOTHESIS

“If the urban lifestyles are changing, why isn't the housing provided for all?”

Affordable Housing in Mumbai through the process of up-gradation by re-arranging spaces, re-structuring, re-organizing activities, re-construction of houses/buildings, re-establishing network of built – unbuilt, re-framing, re-defining of policies for improvement of existing fabric.



Fig 3: Current Housing Scenario
(Source: By Author)

V. AIMS & OBJECTIVES

- a) To study occupational communities that live and work at one particular place understanding their history, present living conditions, their characteristics and pattern of working.
- b) To analyse the problems in the existing scenario and trying to find a solution that concentrates on development of the community as a whole.
- c) To design housing modules in way which concentrates on accommodating employment opportunities and development of the business model as a whole.
- d) To design a model that solves the existing problems and sustains in the long run giving opportunities to develop.
- e) Step towards ‘Housing for All – Urban’ by 2022.

- f) This is not only about housing but a healthy livelihood for all the respective beneficiaries with comfortable future.
- g) Understanding issues at various levels-
 - 1. Policy
 - 2. Planning
 - 3. Development
 - 4. Management
- h) Understanding the process carried out before possession and after possession to the respective beneficiaries
- i) Understanding Private and Public Relations.
- j) Understanding State and Central Gov's role.
- k) Construction Technologies
- l) Building Materials for quick and sustainable construction.

VI. LIMITATIONS

The limitations in such a project will not only be to give a better solution in terms of spatial quality but also do it within a certain range of funds that will be available. A project based in a busy metropolitan city means a lot of land issues along with various bye laws will also have to be dealt with while giving a solution. Developing affordable housing in Indian cities faces significant challenges due to several economic, regulatory and urban issues. Whilst the lack of availability of urban land, rising threshold costs of construction and regulatory issues are supply-side constraints, lack of access to home finance is a serious demand-side constraint, which impacts the ability of low-income groups to buy housing in the organized sector. Whilst some of these are gradually being mitigated, concerted efforts are required by multiple institutions to facilitate mass development in this sector.

VII. RESEARCH METHODOLOGY

Development of large-scale affordable housing is the greatest necessity of urban India today, Indian cities lack low-income housing, which has resulted in the proliferation of slums and unorganized real estate across the landscape. Whilst this is detrimental to the planned growth of cities, it is also restrictive to slum dwellers who are deprived of basic civic amenities and fail to be an equal citizen. Large-scale urban developments are becoming increasingly difficult due to lack of land parcels, congested transit routes, lack of finance, rising input costs and regulatory hurdles.

However, it is vital that these issues are addressed urgently so that a comprehensive framework can be established in ensuring the development of affordable housing.

1. As the project is concentrated on studying the community and their interaction and how housing as an effect on it, most part of the research will be used in documenting the present housing typologies on site along with studying the geographical topography, climate and social fabric of the

users in the area as they form an important part in the designing process.

2. Other part of the research will be focused on identifying the reasons of what keeps the community together and what infrastructure they are lacking in hindering their development although they form an important part of the city. Rapid urbanization and its effects on the present housing typologies, their pros and cons. Such research will be done studying books that talk about urbanization and its effects. Interacting with the users gives a better idea on the present conditions in such an urban setting.

3. Defining a design brief and a proposal after analyzing the problems, the pros and cons of the community and the site and context as a whole for further intervention.

A. Demand Side

- Incentive developers to develop affordable housing.
- There is a need to formulate guidelines that would help to identify right beneficiaries for affordable housing projects. This would help in ensuring the reach to right beneficiaries and avoid involvement of speculative investors into the projects.
- Creation of the National Population Register and issuance of unique identity through Unique Identification Authority of India will become crucial steps in identification of right beneficiaries, if they are linked with income levels.
- Innovate on micro mortgage financing mechanisms to ensure a larger reach.
- Effective financing through micro mortgages by utilising the reach of Self-Help Groups (SHGs) and other innovative financing mechanisms would ensure that housing finance is available to large sections of LIG and EWS populations.
- Real estate developers are incentivized to develop affordable housing. Schemes for redevelopment and slum rehabilitation should be developed with incentives that generate sufficient returns for the developers whilst controlling the development density. The cost-benefit analysis of regulations should be carried out from a development perspective to ensure that schemes to facilitate the development of affordable housing are feasible.
- Adequate availability of land should be ensured for housing and infrastructure by computerization of land records, use of Geographical Information Systems, efficient dispute redressal mechanisms and implementation of master plans.

B. Supply Side

- Incentive developers to develop affordable housing
- Streamline land records to improve planning and utilization of land
- Adequate availability of land should be ensured for housing and infrastructure by computerization of land records, use of Geographical Information Systems,

1 st FIVE YEAR PLAN (1951-56)	2 nd FIVE YEAR PLAN (1956-61)	3 rd FIVE YEAR PLAN (1961-66)	4 th FIVE YEAR PLAN (1969-74)
Construction of houses for Government employees and weaker sections. Housing for the refugees from Eastern and Western Pakistan. Introduction of Low-income group housing scheme (1954)	The Industrial Housing Scheme was widened to cover all workers. New schemes were introduced, namely, Rural Housing, Slum Clearance and Sweepers Housing.	Scheme for providing loan to Middle Income Group , with funds provided by LIC	Rural water supply schemes were taken up under the program of community development.
5 th FIVE YEAR PLAN (1951-56)	6 th FIVE YEAR PLAN (1956-61)	7 th FIVE YEAR PLAN (1961-66)	8 th FIVE YEAR PLAN (1969-74)
Schemes for ameliorating the condition of the backward.	Provision of Rs.96 crore for scheme (IDSMT) Rs.1.60 crore is being provided for R & D in order to improve the formulation of policy on urbanization and urban development.	Rs.930 crore in the states sector for provision of infrastructure facilities.	Long term objectives – "Shelter for All" To strengthen the infrastructural facilities.
9 th FIVE YEAR PLAN (1951-56)	10 th FIVE YEAR PLAN (1956-61)	11 th FIVE YEAR PLAN (1961-66)	
Strengthening of vulnerable houses in EWS & LIG category. National Urban Housing and Habitat Policy, 2007.	PPP are preferred mode for construction and operation of infrastructure services. JNNURM is directed to provide improved urban services.	More investment on infrastructure sector including irrigation, drinking water and sewage from 5 percent of Gross Domestic Product in 2005-06	

efficient dispute redressal mechanisms and implementation of master plans.

- Include mass housing zones in city plans and develop them within a planned schedule.
- Some cities have already dedicated zones in their master plans for development of affordable housing. Whilst this needs to be replicated in other cities and towns, it should be ensured that they are developed within a planned schedule.
- Enact rental housing schemes in urban areas.
- Authorities of MMRDA have experimented with rental housing schemes, but these have not been very successful as a proper framework has been missing for such schemes. Limitations in such schemes include development in far-flung areas, which are not suitable as affordable housing locations and lack of means to identify end users.
- Formulate policies for greater participation from private sector in the way of technological solutions, project financing and delivery.

VIII. SUBJECT OF RESEARCH

A. Urban Housing Policies Under Five Year Plan

By the 1980s government started realizing that with limited resources it cannot address the mammoth housing problem and a strong need was felt for the private sector participation. The Seventh Five-Year Plan recognized radical reorientation of all housing policies and stated that “major responsibility of house construction would have to

be left to the private sector, in particular the household sector”. Furthermore, it stated that the government should be involved in housing “not so much to build but to promote housing activity”

B. PM’s Vision: Housing for All

The Pradhan Mantri Awas Yojana (2015) envisages to provide housing to all by 2022. The mission seeks to provide 20 million housing units and take up slum rehabilitation projects. According to the mission guidelines, an ‘affordable housing project’ shall have a minimum of 35% of the houses for the Economically Weaker Section (EWS) category.

EWS households are those having an annual income up to Rs. 3,00,000 and a dwelling with a carpet area of up to 30sq.m. Low Income Group (LIG) is defined as having an annual income between Rs. 300,001 up to Rs. 600,000 and a dwelling unit having carpet area up to 60 sq.m. Slum is defined as a compact area of at least 300 population or about 60-70 households of poorly built, congested tenements in unhygienic environment, usually with inadequate infrastructure and lacking in proper sanitary and drinking water facilities. The program provides an interest subsidy of 6.5 per cent on housing loans with tenure of up to 15 years for EWS and LIG, which works to nearly Rs 100,000 to Rs 230,000 per unit. It mandates house in the name of women, or joint ownership.

PMAY(U) Mission Highlights:

- Pucca house to all eligible urban households by the year 2022
- Ownership of houses to be in the name of adult female member or in the joint name
- Flexibility to States - appraisal and approval at State level
- 100% houses with Toilets

Beneficiaries:

Beneficiary under PMAY (U) should belong to EWS, LIG or MIG category and should not own a pucca house anywhere in India.

C. Rent Control Act

In 1939, a rent control measure was enacted by the British Government to give protection against the indiscriminate rent hike by landlords on the rental structures called ‘chawls’ which came up during the industrial boom in Mumbai, after 1st World War, which gave accommodation to the older residents and the new migrants from the poorer section. To avoid adverse consequences an industry and business, Government intervened to impose rent control act, which allowed only regulated and marginal increases in the rent. The ‘**Rent Freeze**’ imposed after independence preceded the act. On the outset, the act helped the poor to maintain the accommodation that they might have lost.

There were a few empirical studies on the adverse effects of the Rent Control Act on the housing market. It was observed in that study that the original objectives of the Rent Control Act were never understood. A number of adverse economic effects were witnessed in Mumbai. Some of them are as follows:

- Lack of interest was shown by the private sectors in the rental housing, owing to the heavy investments, rising prices of the lands and materials etc. this made the private sectors to invest in the MIG & HIG, ownership basis apartments.
- The structure rented were never maintained properly either by the landlord or the tenants which caused deterioration and reduction in the housing stock.
- The act acted as a subsidy for the businessmen to take over residential area as the amount of the rent was found to be far below their capacity.
- Many flat owners did not give their flats on rent or lease in fear of losing control over them due to the Rent Control Act, which was totally in favour of the tenants. According to Government of Maharashtra, around 2 lakh flats were kept locked up by the owners and sold for speculative purposes.

D. Rent to Own Scheme

A new yojana has been passed by the government to support house rentals among migrants. Such migrants who qualify can take in access to houses on rent from the government for a number of years. After this, a migrant can own the property by paying the cost for it in a series of installments.

This new scheme is called the Rent to Own scheme and is a key part of the National Urban Housing Rental Housing Policy. This is being organised by the housing ministry. It is especially a point for the ongoing efforts to allow people to get more access to a variety of properties, particularly the housing for all efforts that are working around the country. The act is to be placed in front of the Cabinet for final approval. Individual states should be able to run the scheme on their own terms after it is ready. This is especially being designed to help replace some of the older rent control laws that have confused a number of landlords around the country.

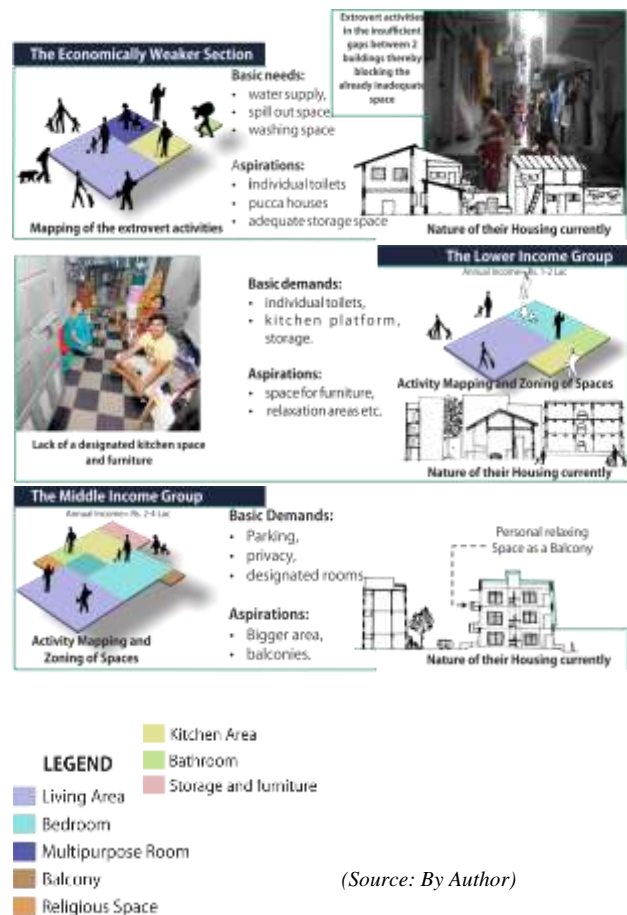
The new scheme will work with a number of essential points in mind:

- Tenants will have a set schedule in terms of how much it will cost for them to find properties. Migrants will typically have to spend a couple hundred or thousand rupees for each pay period through the new program.
- The properties that are included will be located around most major cities around the country. They are especially expected to be around Delhi, Mumbai and Kolkata with the potential to expect the reach around to more spots in future.
- All agreements will be mutually provided to property owners. They will have the full option to get into the program and will receive the full right to change the proper amounts to migrants and to work with proper payment plans for when the rent period has expired.

Currently this scheme is in pipeline so there is no process to apply and there is no application form available. The scheme may be a part of Pradhan Mantri Awas Yojna [3]

E. User Study & Analysis

A categorical study of various income groups in order to understand their **demands and expectations** from a house as well as their **aspirations** which may not come under their capable means.



IX. LOW COST BUILDING MATERIALS

IMPROVEMENT OF MUD: Mud is only a material available everywhere in abundance free of cost and is being used as building material from centuries. But such types of houses are temporary in nature, prone to erosion by heavy rains. The disadvantages of mud can be overcome by suitable improvement in design and construction techniques.

STABILIZATION: The strength of mud is improved by adding cement, lime, bitumen or fibres and it also becomes resistant to water, its main enemy. Cement stabilized mud blocks, using 3 to 10% cement by weight moulded in mechanical machines are better than adobe mud bricks.

NON-ERODABLE MUD PLASTER: Central Building Research Institute, India has developed an economical but effective process to protect mud walls by applying non-erodible mud plaster. Non-erodible mud is prepared by mixing bitumen cutback (Bitumen & Kerosene oil mixture) with a specified mud plaster. Soil should consist of clay 20-25%, sand 40-45% and remaining part may be silt, peat, loam etc, but it should be free from organic matter. Bitumen of 80/100 grade penetration and kerosene oil are mixed in the proportion of 5:1 (by weight) for preparing cutback. 64 kg of cutback is required for one cubic metre of soil. Non-erodible mud plastered walls are resistant to water erosion.

TERRA-COTTA SKIN TO MUD WALLS: Centre for Science for Villages, Wardha, India has developed technique of providing potter made tile lining to mud-walls protecting them from rain and moisture. In place of potter made tiles, Kiln-fired brick or tiles may also be used to protect mud walls from rains. These tiles/bricks can be fixed with mud mortar & pointed with cement mortar.

IMPROVED THATCH ROOF: An effective treatment for rendering the thatch roof fire resistant and water repellent has been evolved by Central Building Research Institute. It involves plastering of thatch layers by the specified mud plasters. Top & bottom of the thatch roof is plastered with non-erodible mud plaster, which makes it durable & fire resistant too.

WARDHA TUMBLER TILES: These tumbler tiles are cast by potters and used as roofing. These have been developed by Centre for Science for Villages, Wardha. This kind of roof keeps the heat & cold out. These tiles require no under structure, yet can bear the weight up-to 1-0 tonne/m². Life is about 50 years & requires no repairs. Being light in weight (135kg/m²), the roof is safe even in future earthquakes.

FERRO-CEMENT: Ferro-cement is a thin walled versatile high strength cement based composite material made of cement mortar reinforced with one or more layers of wire mesh closely bound together to create a stiff structure unit with high performance. The desired compressive strength of Ferro-cement is generally 25 N/mm² at 28 days & mix ratio recommended is 1:2 to 1:2.5 ;(cement: coarse sand) and water/cement ratio should be 0.4 by weight. It can be used in the construction of pre cast toilet units, water tanks cycle sheds.

FLYASH-SAND LIME BRICKS: These are produced from fly ash and sand and lime used as binder. These bricks are cheap, and have good crushing strength.

SFLYASH BASED LIGHT WEIGHT AERATED CONCRETE WALLING AND ROOFING BLOCKS: A process of mixing fly ash, quick lime/cement and gypsum, foaming agents such as aluminium powder, produces these. These are cheap and lightweight blocks mostly used for non-load bearing partition walls.

CEMENT BONDED FIBER ROOFING SHEETS: Cement bonded fibre roofing sheets are made by profitably utilizing coir waste coconut pith, wood wool etc., in combination with cement as binder for production of corrugated or plain roofing sheets. These sheets require less cement and so they are cheaper than other roofing sheets available in the market.

GYPSUM BASED CEILING TILES, PANEL BLOCKS AND DOOR/WINDOW SHUTTERS: There are manufactured from calcined gypsum obtained by processing phosphonys an industrial waste of fertilizer plants. The panels are strong, lightweight, resistant to fire and works as a thermal insulative and cost of the product is cheaper.

PRECAST STONE BLOCKS: These are of larger size than brick and are manufactured by using waste stone pieces of various sizes with lean concrete of 1:3:6 mix.

PRECAST HOLLOW CONCRETE BLOCKS: These are manufactured by using lean concrete mixes through block making machines. The cavity in blocks provide better thermal protection and these also do not need external or internal plastering.

PRECAST RCC DOOR AND WINDOW FRAMES: These are cheaper, stronger fire resistant, termite resistant and sustain temperature & humidity.

PRECAST PLANK AND JOIST FLOORING/ROOFING: These are precast RC planks, supported over precast RCC joists. Cost saving is up to 20% and time saving in construction is up to 12%.

X. CONCLUSION

After going through the policies and studies, some major conclusions can be derived:

RENTAL BETTER HOUSING

The rental housing option is not considered a viable part of affordable housing in Mumbai. As migrants come for work, they need houses to live in. These can be rented too; they need not be purchased. If the existing housing stock is freed up for rentals, the situation may improve even before more land is made available for new construction.

Considering PMAY, and all the schemes together, it would seem that Ministry of Housing and Urban Poverty Alleviation MOHUPA has not understood that for the urban poor, who unlike many of their rural counterparts do not own the underlying land, **RENTAL IS FAR MORE VIABLE THAN OWNERSHIP.**

All over the world, urban LIGS are predominantly in rental housing.

To make rentals affordable to the poor, different countries have found different solutions. In the United Kingdom, it is non-profit housing associations that own and manage properties that incorporate low-income housing.

The idea of having policy is subjected to the local conditions and it varies from city to city and condition to condition and hence the policy is to be revised for understanding the category of housing requirement and providing the same.

To congest the metropolitan cities, housing colonies for the EWS, LIG and MIG need to be developed in the peripheral regions of the city. Affordable housing is best achieved when done in clusters as against application on single dwelling units.

The affordable colonies should be well connected with the city center by means of various transports to make the workplace easily accessible to the inhabitants.

In the housing colonies, the inner paths can be used as the means of pathways and pedestrian commute whereas main roads can be at the outer part surrounding the colonies. This provides easy accessibility as well as safety.

By the use of shared spaces, collaborative housing, etc., housing shortage can be curbed without compromising with the living standards of inhabitants. High density can be achieved by the use of shared spaces without suffocating the inner environment of the housing society. Proper land-use planning of the region should be done and the policies must be strictly implemented so as to prevent the inadequacy in the development of land. By application of low-cost infrastructure services, housing cost as well as maintenance cost can be decreased substantially.

The shift of business destinations and, hence, the demographic profile of the habitation also suggests the theory of western suburbs emerging as the most sought after location for the average working class. In a costly property market like Mumbai, the western suburbs have emerged as a safe haven for affordable projects and the infrastructure upgradation is also making some of the locations very attractive.

suburbs in recent times. There are many factors behind the rise and growth of affordable housing in the western suburbs. These include the shift of corporate headquarters, availability of land parcels, improved road connectivity with the Western Express Highway, better rail connectivity from Panvel to Churchgate and last but not the least, softening of prices in many of the established localities of the central suburbs.

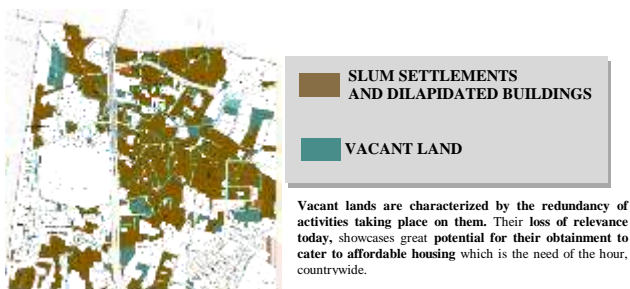
Fig 10.1b: Article Source: Indian Real Estate Forum

XI. DESIGN PROPOSAL

A. Acquiring land in Western Suburbs of Mumbai

With the private builders building only high-end residential stock for profit maximization, fewer housing options for the poor who desire to stay here for their livelihood. This leads to them resorting to squatting, setting up slums or living in unsafe dilapidated buildings.

Within the western suburb several forms of manifestation of inadequate housing are observed. Land can be acquired by tapping either of these manifestations of inadequacy.



K-EAST WARD

Fig 11a: MAP SOURCE: Reclaiming Urbanism in Mumbai

In the DP 2034 MCGM has proposed several measures wherein the affordable housing stock will be created.

- By proposing affordable housing scheme by given additional FSI.
- By increasing slum redevelopment housing FSI to 4 instead of 3
- Increasing the FSI for MHADA Scheme.
- Including Vacant Lands & No Development Zone in development zone which is turned as “Special Development Zone” which shall also aid in the demand for affordable housing stock.
- Increasing TDR potential accordingly to the road width.
- Allowing majority of the reservations proposing in DP 2034 developable reservations including R.G. and P.G. area (under accommodation reservation).



B. Site Selection Criteria

Affordable housing cannot be divorced from basic civic and social amenities that are available or planned for the future. To enhance the housing stock without a corresponding augmentation of services would be disastrous in a city where infrastructure is already creaking.

It is expected that the opening of lands in the city limits according to the new DP 2034 will encourage the PPP model to build affordable homes as most of the land parcels are in prime locations.

At the state level, Mumbai’s draft Development Plan 2034 – a blueprint for the development of the city for the next 20 years – has “affordable housing” as a separate and new category of land reservation for the first time. However, this land is reserved only in scattered pockets, on which the Development Plan envisages building just 25,000 units of affordable homes.

- The selected site should preferably be in the city limits of Mumbai as per the new DP 2034.
- Should be preferably in the vicinity of existing infrastructure, so as to minimize delay and cost in extending various services to scheme
- Should have a proper approach
- The site must be housing friendly considering transport, vegetation, context, electricity, water supply, security, etc.

C. Potential Site

A demonstration plot of 5 acres is delineated for the purpose of adequate affordable housing basis the new DP 2034.



Proposed Affordable Housing RR 2.2 in DP 2034 K East Ward.

Fig 11.1c: DP 2034, MCGM.Com

Site Location – Pascal Ground, Jogeshwari east
Site Area – 5 acres
F.S.I. – 4 (as per new DCR2034)
Proposed Modifications as per new DP.

1. To be used for residential purposes as per the provisions of the DCR 2034.	2. The plot area shall be as per the approved layout plan.
3. The plot area shall be as per the approved layout plan.	4. The plot area shall be as per the approved layout plan.
5. The plot area shall be as per the approved layout plan.	6. The plot area shall be as per the approved layout plan.
7. The plot area shall be as per the approved layout plan.	8. The plot area shall be as per the approved layout plan.
9. The plot area shall be as per the approved layout plan.	10. The plot area shall be as per the approved layout plan.

Fig 11.2c: DP 2034, MCGM.Com



Fig 11.3c: DP 1991, MCGM.Com



Fig 11.4d: DP 2034, MCGM.Com

The site can be **approached directly from the western express highway** and the is surrounded by **6m wide internal roads** on all four sides



Fig 11.1d: Google Image of the Site



Fig 11.2d: Site Surrounding Description

E. Vision, Mission & Aim

User Sensitivity:

- Utilization of spaces in order to give a scope for personalization
- Ensuring prolonged and consistent maintenance

Land Acquiring Strategies:

- Direct the authorities' focus to land acquiring strategies to procure land at a nominal rate
- Reduce the complexities involved in resolving design planning, thereby concentrating on qualitative efficiency of the project.

Rapid Construction:

- The use of material and technology that will save time
- Fast manifestation of design to reduce wastage through prolonged design returns.

Sustainable Value:

- Reuse materials
- Cost effective technologies that consume less resources thereby giving out lesser wastes

Aesthetic Value:

- To incorporate aesthetics through a structural system and not just as a decorative element

Community Value:

- Participation of users affected directly or indirectly, to efficiently plan spaces for optimal use
- Incorporate user opinions to prevent the design from being susceptible to redundancy

Fig 10e: Objectives of Design (Source – By Author)

F. Derived Design Principles



D. Site Analysis: Need for Neighborhood
 The site chosen for the implementation of the affordable housing scheme is currently a vacant land.

- The dense residential built up in its vicinity forms an atmosphere conducive to the housing purpose to be achieved on this land.
- The informal squatting noticed on the defunct patches encompassing this site, indicate the desire of the target user to live here.

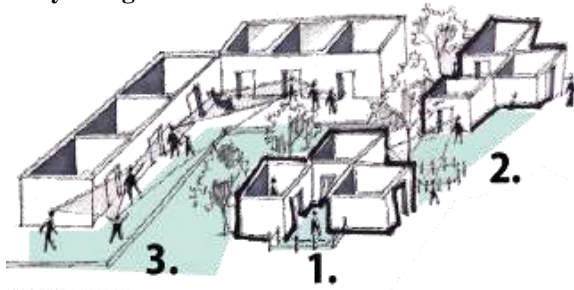
The entire Pascal Colony is about 65 acres of land out of which the potential site is chosen for affordable housing scheme.

Design Vision

- **Strengthening the site-to-surrounding relationship**
Harnessing the potential of a housing scheme in **collaboration with public facility** giving a **response to the context** through an architectural intervention which would be a catalyst for the **overall development**.
- **Contextual Response-** Keeping in mind the **existing fabric of the neighbourhood**.
- **Consideration of User Type-** Taking into account **varying family structures** and incorporating their type in the scheme.
- **Participatory Planning-** The aspirations of the existing users, potential users and agencies, should have **complimenting ideologies**.
- **Imageability-** Design element to allow **customization of it by the user** so as to lend each of them a **unique identity**.

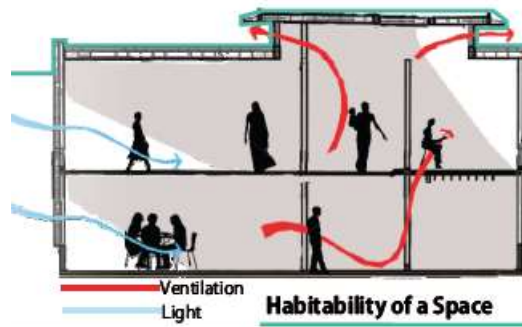
Planning

- **Incentives to Access Anchors-** Generation of tangible and intangible anchors to increasing the incentive to experience the site.
- **Hierarchy of Spaces-** The planning of spaces to **enhance the experiential quality in gradation** of privacy and interaction, to promote **good quality of community living**.



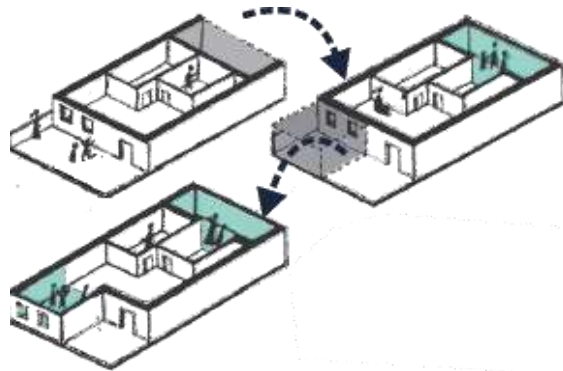
Built Form

- **Habitability of a space-** The most appropriate configuration of designing a module is based on an in-depth **study of the anthropometrics** of the user and the **architectural factors that affect the usability and functionality of the space**.
- **Structural system-** A mechanism that would cater to **affordability, ease of usage, flexibility and user requirements**.
- **Core to unit ratio-** Having the **optimum number of units** to be serviced by a core and its ancillary functions, **increases the cost efficiency of the design**.



Unit

- **User sensitive modular design-** A study of the aspirations and the existing routines of the user helps design spaces that can be personalized to their requirements.
- **Incrementation-** The option of flexibility and **adding usable space** to the unit as per the **increased means of the user**.



G. Design Program

- A 5acre site to design Affordable Group Housing to create a healthy livelihood for people from different income levels.
- Designing as per demand of the site context.
- Creating a language of design to operate single window clearance for further housing projects.
- Understanding role of every actor from Demand as well as Supply side at every stage to speed up the whole process of housing.
- The main aim is to not transfer the residents to a flat typology system but to do architectural intervention that respects the current fabric and working pattern and facilitate with a system for personal as well as community growth.
- Intervening at such a critical place in the densely populated metropolitan city of Mumbai will set an example to deal with the issue of community and social housing.

XII. PROGRAM STRUCTURE BASED ON MONTHLY INCOME & SAVING CRITERIA

For EWS(Economically Weaker Section)
Monthly Income criteria = Upto Rs. 25,000

Average Monthly Family Saving = Rs. 10,000
 Considering E.M.I. = Rs.5000
 Period = 20 years
 For 1 year = Rs.5000 x 12months = Rs. 60,000
 For 20 years = Rs.60,000 x 20 = Rs.12,00,000
 Down Payment = Rs.2,00,000
 PMAY subsidy = Rs.2,50,000
Total cost of 1unit of EWS = Rs.12,00,000 + 2,00,000 + 2,50,000 = Rs. 16,50,000

Carpet area = 300 sq.ft
 Built-Up Area = 300 sq.ft + 20% = 300 + 60 = 360sq. ft
 Construction Cost = Rs.2,500 per sq. ft
 Construction Cost of 1 unit of EWS = Rs.2,500 x 360 = Rs. 9,00,000
 Other Cost = Rs. 1,00,000
Construction Cost of 1unit of EWS = Rs. 10,00,000

PUBLIC PRIVATE PARTNERSHIP MODEL For EWS

Construct = Private, Loan = Government, Profit = Private/Government
 Total Cost of 1unit of EWS = Rs. 16,50,000
 Total Cost(Government) + 15% of Total Cost(Private) + Government Project = Rs.16,50,000
 Rs. 10,00,000 + 1,50,000 + 5,00,000 = Rs. 16,50,000
 Government = Rs.50,000(Instant) & Rs. 14,50,000(in the span of 20 years)
 Private = Rs. 1,50,000(Instant)

For LIG(Lower Income Group)

Monthly Income criteria = Upto Rs. 50,000
 Average Monthly Family Saving = Rs. 20,000
 Considering E.M.I. = Rs.10,000
 Period = 20 years
 For 1 year = Rs.10,000 x 12months = Rs. 1,20,000
 For 20 years = Rs.1,20,000 x 20 = Rs.24,00,000
 Down Payment = Rs.4,00,000
 PMAY subsidy = Rs.2,50,000
Total cost of 1unit of LIG = Rs.24,00,000 + 4,00,000 + 2,50,000 = Rs. 30,50,000

Carpet area = 450 sq.ft
 Built-Up Area = 450 sq.ft + 20% = 450 + 90 = 540sq. ft
 Construction Cost = Rs.2,500 per sq. ft
 Construction Cost of 1 unit of EWS = Rs.2,500 x 540 = Rs. 13,50,000
 Other Cost = Rs. 2,00,000
Construction Cost of 1unit of LIG = Rs. 15,50,000

PUBLIC PRIVATE PARTNERSHIP MODEL For LIG

Construct = Private, Loan = Government, Profit = Private/Government
 Total Cost of 1unit of EWS = Rs. 30,50,000
 Total Cost(Government) + 15% of Total Cost(Private) + Government Project = Rs.30,50,000
 Rs. 15,50,000 + 2,32,500 + 12,67,500 = Rs. 30,50,000
 Government = Rs.1,67,500(Instant) & Rs. 26,50,000(in the span of 20 years)
 Private = Rs. 2,32,500(Instant)

For MIG(Middle Income Group)
 Monthly Income criteria = Upto Rs. 75,000
 Average Monthly Family Saving = Rs. 30,000
 Considering E.M.I. = Rs.15,000
 Period = 20 years
 For 1 year = Rs.15,000 x 12months = Rs. 1,80,000
 For 20 years = Rs.1,80,000 x 20 = Rs.36,00,000
 Down Payment = Rs.6,00,000
Total cost of 1unit of MIG = Rs.36,00,000 + 6,00,000 = Rs. 42,00,000

Carpet area = 600 sq.ft
 Built-Up Area = 600 sq.ft + 20% = 600 + 120 = 720sq. ft
 Construction Cost = Rs.2,500 per sq. ft
 Construction Cost of 1 unit of EWS = Rs.2,500 x 720 = Rs. 18,00,000
 Other Cost = Rs. 3,00,000
Construction Cost of 1unit of MIG = Rs. 21,00,000

PUBLIC PRIVATE PARTNERSHIP MODEL For MIG

Construct = Private, Loan = Government, Profit = Private/Government
 Total Cost of 1unit of EWS = Rs. 16,50,000
 Total Cost(Government) + 15% of Total Cost(Private) + Government Project = Rs.42,00,000
 Rs. 21,00,000 + 3,15,000 + 17,85,000 = Rs. 42,00,000
Government = Rs.2,85,000(Instant) & Rs. 36,00,000(in the span of 20 years)
Private = Rs. 3,15,000 (Instant)

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2. **Ar. Sameep Padora**- Architect
3. **Hussain Z Indorewala** - Assistant Professor
4. **Mayank Gandhi** – Social Activist
5. **Nayan Shah** – COO, CEO – Mayfair Housing
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