



## Sustainable Social Housing in Pulianthope, Chennai.

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### Abstract

*While various attempts are made to avoid homelessness, the growth of homelessness is slowly decreasing in Chennai, India. One of the attempts is to provide homes for the homeless to clear the existing slums in Chennai city. To relocate such a large group of people can be achieved by densifying the existing housing or building new housing. In keeping the expense of land in Chennai city I proposed the existing old housing with proper justification to increase the standard and population of the housing. Surveys are made in existing and recently developed housing to avoid the same problem repeating in the proposed design. The Zoning and orientation, Master planning, typical floor orientation, Daylight factor & window to floor area ratio, building envelope and common services are proposed fully based on the user's lifestyle to give them the comfort of living in new housing.*

**Keywords:** Housing for Homeless, Social Housing, Economically Weaker Section, Sustainable Housing, Studio Apartments.

clearly and to find a designed solution for it. The survey is done to understand the problems, case studies were done to find the solution to the problem. The proposal was made based on the solutions.

The core area of the design was focused on sustainability. All the sustainable criteria are achieved in the proposed design with proper explanation and justification.

#### 1.1 Aim

To design and integrate sustainability in social housing through the adoption of sustainable building materials and systems for the economically weaker section.

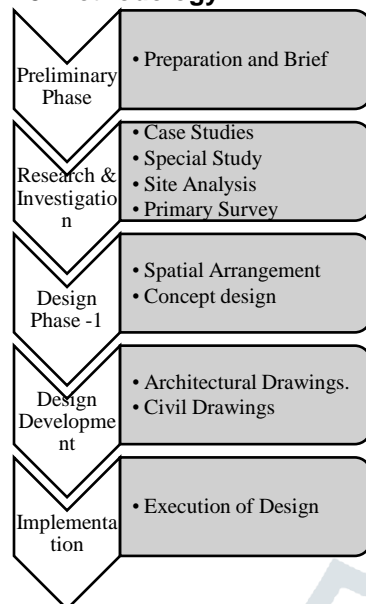
#### 1.2 Objective

- To minimize the difference between the previous lifestyle and the present.
- To identify housing types for the homeless by analyzing their lifestyle.

### 1. Introduction

Sustainable social housing is targeted at the economically weaker section category. It is proposed in 4 out of 10 acres of existing housing site. Though the existing housing lost its standard it needs to be standardized and densified like it was done on redeveloped site of 6 out of 10 acres. But in the redeveloped site still, there were a lot of problems exists. The problems need to be understood

### 1.3 Methodology



## 2. Background studies

Studies about the background of the economically weaker section, categories of people belonging to the economically weaker section, About the family income of the economically weaker section, their family owning agricultural land limits, residential flat area limits, residential plot area limits, and studies about who does not fall in economically weaker section category.

Studies about sustainable development, the need for sustainable development, and Real estate principles. All the above parameters were studied thoroughly to gain knowledge about the subject and to focus on targeted data collection before proceeding with the proposal.

Sustainable development criteria of social, economic and environmental for sustainable housing like physical building, energy, waste management, water and grey water, site and surroundings, human behaviour, quality of housing, culture and values, communication and transportation, Safety and comfort living, price and availability, etc. all are considered and studied for the proposal.

A complete study about sustainable social housing was studied in Auroville to understand the materials and design aspects of the social housing.

## 3. Inference from Case Studies

The site was selected based on the design requirements, Sustainability, and Solution to the problems based on the questionnaires survey.

1. Visitor centre, Auroville.
2. Nochikuppam, Chennai.
3. Pattalam recently developed a housing board, in Chennai.
4. Interlace, Singapore.

All the studies were analyzed and used as a part of the proposed design.

Residential floors are connected horizontally with all the towers are interconnected. Horizontally space with additional terraces increases the green areas from 100% to 108%. Community living shows the best result than normal high-rise towers. The gardens and green spaces are allotted at different levels and on different sides. Well-ventilated light and air space throughout the building. Waste management is studied, Energy management is studied, and Water management is studied.

To get connected easily by connecting apartments, instead of separating the apartment, increasing green spaces, increasing common spaces, bringing daily activities inside the apartment, merging the present lifestyle in the design, allotting more spaces for chit chatting, allotting spaces for carts, implementing water management strategies, implementing power management strategies, Implementing waste management strategies.

## 4. Data Collection

Tamil Nādu urban habitat development board has a site in Pulianthope of 10 acres which holds 35 low-rise buildings. Each building has 16 dwelling units in the year 2017. In early 2018 Tamil Nādu, the urban habitat development board planned to improve the standard and density of the housing.

Started demolishing 6 acres of substandard housing and built a new high-rise building in the year 2019, For the remaining 4 acres of the site there is no official proposal yet but in future, it will get redeveloped as it happened on the 6 acres of the site. So, the remaining 4 acres are selected for proposal.

Google earth's history of the site from the year 2017 is collected and showed a total site area of 10 acres. All the data based on social housing for category EWS is collected to Propose the design in a national standard. The design is to go with Rules and regulations for EWS like setbacks, maximum heights, passage, etc. all the required data are noted as per DCR Tamil Nadu. The data collected is combined and studied for the proposal.

Environmental conditions for the site are collected for different mediums like Natural drainage, rainwater harvesting, Solid waste management etc. and what data is required for sanction to get the sustainable certificate is collected. Indian Standards for social housing like minimum clearance and circulation for different rooms are collected.

International Sustainable development goals for adequate, safe, and affordable housing were studied. Schemes following Sustainability at the national level and state level are studied to follow sustainability in the design.

## 5. Inference from the Survey

Survey about the age of respondents, Gender of the respondents, Employment status of the respondent, educational qualification, Present air quality, present waste management, electricity, maintenance, overcrowding, present crime rate, clean drinking water, recreational area, present water condition, Rainwater

collection, present disposal system, etc. Questionnaires survey is conducted onsite to note the current problems and expectations. All the necessary data, figures and tables are identified for the Proposal of sustainable social housing.

### 5.1 Physical needs are identified by the survey questionnaires as follows

Rooms according to the number of people, Adequate light and water supply, good drainage of water, Provide adequate space for cooking.

### 5.2 Psychological needs identified by the survey questionnaires as follows

Need for security, need for privacy, need for love and belonging, need for self-actualization, need for identity and creativity.

### 5.3 Social needs identified by the survey questionnaires as follows

Access to community facilities, Family participation in community life, Economic stability, and clean surroundings.

Activity mapping is carried out on the site marking the parking place to understand the space necessary for parking and the comfortable distance from the house to the parking and to understand the required number of parking per dwelling unit, marking the dumping garbage to understand the waste management and disposal habits of the residence so to propose the waste management system to solve the present garbage dumping problems to avoid the health problems caused from mosquitos and environmental disease.

Gathering space is mapped out on the site to understand the user gathering and meeting points and times are noted to understand the timing when the users are meeting, and intervals of the meeting are noted to understand the meetup periods. The gathering space is observed and analyzed to understand the activity done while gathering. All were observed and proposed for the gathering space in the design, buying & selling space is provided, and Space for chit-chatting is provided. The tree is proposed to get the feel and look of the street gathering

All Vertical services consist of Stairs and lifts. It is connected to all corridors. It is the first design element to connect all. All the stairs act as a quick escape as well. Each vertical service is placed at almost an equal distance. The vertical core holds the corridor visually.

All horizontal services consist of corridors. It is connected to all dwelling units. It is the design element to connect as user-friendly. All the corridors act as quick escapes as well. Each horizontal service is placed at almost an equal distance. The vertical core holds the corridor visually.

The apartment block contains 21 to 24 Dwelling units. 34 Apartments are designed in this housing. It acts as light and shadow throughout the housing. It creates a passive cooling effect. Each Apartment is connected very wisely and is very beneficial to each other.

The total plot area for the development of the proposed project is 16000 sq m. Area Summary for the

on the floors. 4 gathering spaces on every 4 floors. The gathering space on the first 4<sup>th</sup> floor is North and south, the gathering space on the 8<sup>th</sup> floor faces east and west and the 11<sup>th</sup> floor faces North and south. So, all four sides were covered to engage the views on all sides.

## 6. Analysis and findings

The site is well analyzed by thorough inspection. Area, topographical survey, site, surroundings and activity mapping etc. have all been analyzed and mapped. By analyzing similar projects problems and solutions were identified. All the questionnaires were analyzed to produce the proposal's physical, psychological, and social needs.

The top location like basin bridge railway station, Jawaharlal Nehru stadium, central railway station and Egmore railway station distances are marked on the map from the proposed site. The proposed site is analyzed by the parking of the bike, dumping garbage, water pumping and storing, gathering, cycling, biking, walking etc. are marked as activity mapping.

Identified the user activities on the ground as follows

Seating below the tree, Selling/ Buying things from the cart, Chit chatting, Connecting on/ through streets.

Some housing boards within the city limit were developed recently to increase the density but failed to notice the previous lifestyle of the people. So, the recently developed high-rise building also comes with problems like

Overcrowding in the stilt area, waste management, dividing them through heights and towers, less communication etc.

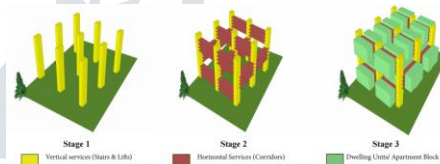


Figure 1 Stages of conceptual form development

Ground coverage is given, Project requirement and where it is derived from the tabular column is given below.

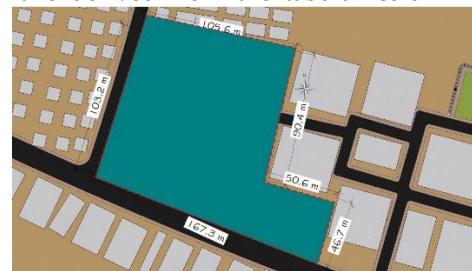


Figure 2 Site and its dimensions

The southern and western parts will be the proposed entry to the site which will be connected to the existing road on the east side of the site so it will be a well-connected road network. Which will allow all the users to use amenities provided on the site. So from the existing

site, people can use the amenities like Workshops, health centre, Nursey and primary school, park and open-air theatre.

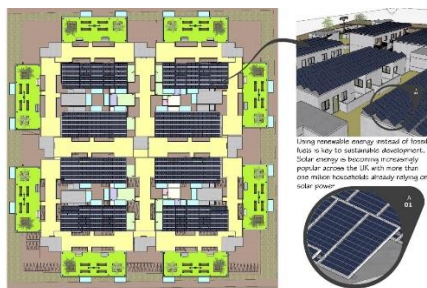


Figure 3 Roof Plan

Studio apartments are one out of two dwelling types proposed in the design, which is so necessary that it is proposed after the survey questionnaires. Here 3 people are the recommended population for this dwelling type. On entering the multipurpose hall of 5m x 6m there is a balcony attached to it of 4.4m x 1.2m from the balcony a toilet is attached bringing the essence of a past lifestyle where they used to enter the toilet after viewing the sky. So, each aspect of the past lifestyle is noted and analyzed to prepare the proposed design. A decent size toilet of 2.1m x 1.8m is proposed from the balcony. Studio and 1 BHK both are mixed-in floor plates connected from the common corridor. The common corridor is 3 m wide which gives the feeling of a street making them more comfortable chit-chatting and communicating with others.

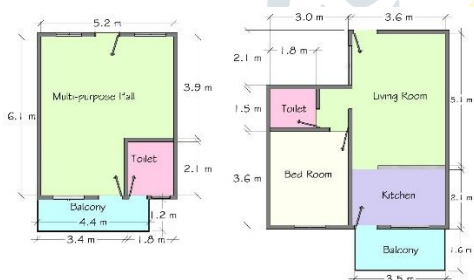


Figure 4 Studio Floor plan and 1 BHK floor plan

1BHK apartments are one out of two dwelling types proposed in the design, which is so necessary that it is proposed after the survey questionnaires. Here 4-5

people are the recommended population for this dwelling type. On entering the living room of 3.6m x 5.1m, a common toilet of 1.5m x 1.8m and the bedroom of 3.6m x 3m are attached. The living room kitchen of 2.1m x 3.6m is attached and the kitchen balcony of 1.6m x 3.6m is attached.

In the workshop, people can come, conduct, and train the users about various aspects of social, psychological and physical workshops. So mentally, economically as well as physically it benefits the users. Certain groups or individuals can visit with prior notification to the management to conduct or volunteer the user for the activities. The workshop is proposed on the site after coming through a lot of workshop space provided in the case studies and research papers.

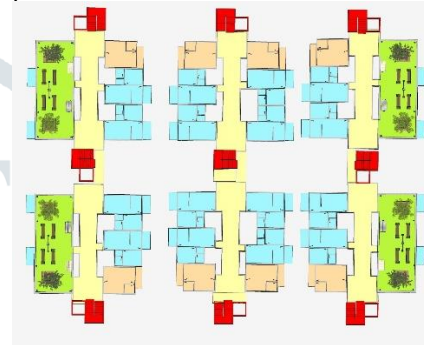


Figure 5 3rd, 7th and 11th floors

In the Health centre, people can come and consult a physician for their health problems. So people are monitored for their health continuously and regular health checkups are made for certain age groups to make a healthy and active community in the proposed housing. A health centre is proposed on the site after coming through the activity mapping by viewing the health conditions and environmental conditions of the site.

In the nursery and primary school students are allowed to study from LKG to 5<sup>th</sup> standard with all the basic amenities for the children. So the future of the community is well monitored and regulated with several courses of education, to gain knowledge and to increase the children's engagement in social activities in the community. A Nursery and primary school are proposed on the site after going through a lot of research papers.

Derived From	Project Requirement
Site survey	Studio apartments
Site survey	1 BHK apartments
Research paper	Workshop
Activity mapping	Health centre
Research paper	Nursery and primary school
Site condition	Management office
Case study	Outdoor dining
Site survey	Security
Activity mapping	Park area
Activity mapping	Open-air theatre

Table 1 Project requirement

Area of ground coverage for O.S.R, residence, services, institutional, recreation and open areas are divided in the proposed site, Area of dwelling units, etc. all are identified and calculated for the proposal. Project features are listed and derived from the calculations and requirements.



Figure 6 View of the proposed Design

The stilt floor is introduced to achieve the parking slot requirement. Which achieved 414 slots and solved the parking issue in the apartments. The two-way ramp is introduced for entry and exit on both sides. Sufficient OTS is given for ventilation purposes. Large buffer space is given for multipurpose use.

Area of ground coverage		
O.S.R	1600	sq m
Residence	4000	sq m
Services	250	sq m
Institutional	250	sq m
Recreation and open	9900	sq m
<b>Total property area</b>	<b>16000</b>	<b>sq m</b>

Table 2 Area of ground coverage

Energy and atmosphere are achieved by providing solar panels thus reducing energy consumption and increasing energy efficiency to reduce pollution. Materials and resources are Incorporated by recycling systems, use of sustainable materials and saving as many resources as possible during maintenance.



Figure 7 Elevation of the proposed design

Efficient use of water minimizes the use of water by recycling to reduce the building's water footprint. Indoor environmental quality is achieved by providing passive cooling where the air flows throughout the housing apartments for its occupants, such as air cleanliness, thermal control and noise pollution.

No. of parking slots required	
1 BHK	264
Studio	132
Visitors	30
<b>Total required</b>	<b>426</b>
<b>Total achieved</b>	<b>450</b>

Table 3 No. of parking slots required

The common space is designed very widely around 3m, In such a way that they carry the past lifestyle of street habit. The Zoning and orientation of the building have been done to minimize the harsh Solar radiation and to improve the comfort of the surrounding. This is important for occupant comfort in this climate.



Figure 8 Section of the proposed design

A gathering space is provided to chit chat & buy/sell things to fulfil the present lifestyle of the users.



Figure 9 View of the gathering space

Using renewable energy will save a lot more in expense in long run but the initial cost will be higher. Renewable energy is best for newly built community housing as the costs are shared initially and energy is saved and expense is saved in maintenance. It is best recommended for high-rise buildings.

### 7. Recommendation

The solution to the problem is achieved by designing many gathering spaces to divide the crowd forming in one place, Common way is widely designed to get a feel of the street. Seating, Pond and landscaping all are designed between apartments where there is a shadow for a long time which is best suitable for refreshing space. Very good design strategy for connecting people without affecting the past lifestyle of the people. This design strategy works well in a dense area without affecting the spread of the area. This design is also suitable for construction within the city limit for aesthetical and functional purposes.



Figure 10 View of the recreational space

## 8. Discussion & Conclusion

The Zoning and orientation of the building have been oriented in a way to minimize the harsh Solar radiation. The building shape affords mutual shading. Seating, pond and landscaping all are designed between apartments where there is a shadow for a long time which is best suitable for refreshing space.



Figure 11 Map showing Master Plan

STP is built at the lowest contour on site. Between apartments, the void has been created which provides very good natural ventilation potential as the predominant summer wind direction is well utilized. Corridors are connected to all the floors. The terrace is shaded with a Solar panel and high reflective tile. In common areas, day-lit led lights and timer-controlled systems are used for lighting in common areas & outdoor lights.

## 9. Reference

1. Tiwari, P., & Rao, J. (2016). Housing Markets and housing policies in India. SSRN Electronic Journal. <https://doi.org/10.2139/ssrn.2767342>
2. Elsinga, M. (2015, June). European Journal of Homelessness (online). ISSN 2030-3106 (Online) | European Journal of Homelessness | The ISSN Portal. Retrieved December 23, 2021, from <https://portal.issn.org/resource/ISSN/2030-3106>
3. Parker, C. (2021). Homelessness in the public landscape: A typology of informal infrastructure. *Landscape Journal*, 40(1), 49–66. <https://doi.org/10.3368/wplj.40.1.49>
4. Cohen, E. (2021, June 14). Housing the homeless: the effect of homeless housing programs on future homelessness and socioeconomic outcomes. Google Sites. Retrieved December 23, 2021, from <https://sites.google.com/g.ucla.edu/eliorcohen/research>
5. Rybka, A., & Brudnicka, A. (2018). Architecture in the process of social inclusion of homeless. *E3S Web of Conferences*, 49, 00093. <https://doi.org/10.1051/e3sconf/20184900093>
6. Kumar, P. (2015). Day & Night Shelter. Maharashtra State Women's Council. Retrieved December 23, 2021, from <https://mswncindia.org/>