synergistic heterogeneity

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Synergistic

*adjective*
relating to the interaction or cooperation of two or more organizations, substances, or other agents to produce a combined effect greater than the sum of their separate effects

Heterogeneity

*noun*
the quality or state of being diverse in character or content
choice of studio

I think architecture has the power to, in conjunction with other disciplines, address the problems that need to be resolved this century, and I personally wish to use my own skills to address the pressing issue of housing for the masses. For me, housing projects embody humanity’s aspirations while attempting to tackle some of its greatest challenges. This is a topic I chose to pursue at TU Delft as well as in my undergraduate program, having taken the MSc 2 Global Housing studio in my first year. I chose the Global Housing MSc 3 Studio in order to build on what I’ve learned from the Ghana Studio and continue developing strategies and a knowledge base on affordable housing. By attempting to solve some of the problems of over-population and inadequate housing in the Global South, I believe that it will be possible to anticipate and prepare for similar conditions around the world. The Mixing Mumbai studio will help me culminate my experiences and aspirations while pushing me to create meaningful architecture for humanity.
historical background

Growth of a City

Bombay City started as a series of small islands that gained their significance when they became the site of a British trading outpost (Class Research, 2019, 9). Over time the city grew and land was reclaimed from the Arabian Sea to conjoin the islands into what is now known as Mumbai City. The population grew and fluctuated with the growth of the port activities and a plague that wiped out a significant portion of its early population. As the port city became a hub for the textile industry after the American Civil War, it attracted people by the masses and its population exploded. The city core became too dense and so settlement started to creep northward. By the 1950’s Bombay City and the resulting Bombay Suburbs were inhabited by 2.3 million people (Class Research, 2019, 79). In an attempt to alleviate the congestion and limit northward expansion, Navi Mumbai was created in the 70’s, located to the East of Bombay (Class Research, 2019, 105). While this was effective for a time, it did not curb expansion as was anticipated, and by the 90’s expansion to the urban periphery was underway (Class Research, 2019, 137). Virar and Nalasopara, located at the Northernmost points of the rail line but still within reach of Mumbai City became key destinations for new migrants as they were still connected but much more affordable than Mumbai (Class Research, 2019, 172).

Figure 1: Garment factory workers
Bombay’s position as a trading outpost kickstarted its economic growth. Manufacturing and other industry quickly formed a significant part of its economy, locating themselves near the port. In the 1850’s it became Britain’s main source of cotton, due to the American Civil War, and so the textile industry grew very rapidly, taking over as one of the main industries in the city. By the 1950’s, around the time of India’s independence, manufacturing diversified and the economy remained strong. This period saw a shift from agriculture to trade, commerce and construction, with manufacturing still keeping a tight hold of its key role (Class Research, 2019, 86). However, the 70’s were a time of major change for Mumbai, as many textile mills closed due to a long standing workers’ strike and rising operating costs. Mumbai transformed to a centre of banking, finance, oil, transport, healthcare and communications (Class Research, 2019, 114). While this event triggered this transition from manufacturing to services, there was a severe loss of jobs which then translated to a growth in the informal sector. People who had previously worked in the mills became hawkers, taxi drivers, mechanics, vendors or worked in recycling. The land where the mills once stood was turned into prime real estate for residential complexes and upscale leisure facilities (Class Research, 2019, 148). The city transformed from a hub of production to one of services, thereby alienating a vast majority of its working class and skilled labour population.
From the very beginning, Mumbai or Bombay, was made up of migrants. Its main population growth, at various points throughout its history, occurred primarily through migration (10 h&s data). It was a popular place for people fleeing poverty, war and religious prosecution, as well as an attractive place for work and aspiration. ‘Floating populations’ or seasonal migrants existed as early as the 19th century (Class Research, 2019, 32). These were people who would work at the port during a portion of the year and then return to their village homes during monsoons when port activity would die down. This pattern of seasonal migration persists even today. A considerable number of migrants moved to Bombay as a result of the increase in cotton production. This, in turn, cause a drastic rise in population. In 1947 India gained its independence, and with it came an influx in migrants from Pakistan. By 1961, migrants formed 64% of the total population of Mumbai (Class Research, 2019, 88). That majority of these migrants came from rural areas, many of which either followed the seasonal cycle or chose to permanently settle in the big city.

Migration

Figure 3: Migration to Bombay 1500-1850’s
The political climate within Mumbai started to heat up (even more) after the Indian Independence in 1947. There appeared to be much tension between the Marathi speaking people and the Gujarati speaking people who resided in the areas of and near Mumbai. In 1960 the Marathi speaking people in Mumbai and surrounding area got to remain in what then became Maharashtra, while the Gujarati-speaking residents moved north to Gujarat. Unfortunately, the Gujarati people held all the high-paying jobs, so even though many left the province, the Maharashtrians still felt unease. This was further amplified with the apparent threat that migrants from the south were pushing the Marathi out of jobs. Tensions built up and sparked the rise of the Shiv Sena party, a far-right group which demanded better positions for Maharashtrians (Class Research, 2019, 93). In 1985 the party came into power and clearly showed preferential treatment for Maharashtrians. Their ‘Sons of the Soil’ ideology promoted hiring people born in the state and advised against hiring migrants. Migration from outside of the state diminished. The party also started the Slum Upgrading Program, due to the fact that a lot of their support came from Marathi youth living in slums. Neo-liberalism really took hold in Mumbai with the 1991 liberalization of the Indian economy. The real estate market took slum land for redevelopment and used the now prime real estate to develop luxury housing. Affordable housing for the working classes was in very short supply but in high demand (Class Research, 2019, 137). The deregulation of markets, reduction of taxes and encouragement of foreign investment strengthened the economy but created a much wider gap between the rich and the poor. The rural populations began to struggle with high debt burdens and higher suicide rates (Class Research, 2019, 146). Shiv Sena was elected again in 1995 and during that period they started a lot of infrastructure, slum clearance and beautification projects. However, most of these projects really only benefitted the wealthier classes and made life more difficult for those who were already struggling.
mumbai today

Mumbai today is bursting with a population of 23 million in the Mumbai Metropolitan Region which counts for one of the top 5 densest cities in the world (Class Research, 2019, 172). Nalasopara alone has a population of 460,000 but is already extremely dense due to many informal settlements and extremely densely redeveloped chawls. Maharashtra as a whole is 45% urbanized at this stage (Class Research, 2019, 149). Seasonal workers are as prevalent as ever, being left with the options of working in construction, hotels, textiles and manufacturing, transport and domestic work. These workers have no guaranteed place to live, due to their temporary nature, and so they live in rented rooms, open spaces, slums, pavements and work sites.

Economy

India was the 6th strongest economy in 2017 (Class Research, 2019, 182), and is on track to taking second place by 2050. It is interesting to note, however, that only 10% of the workforce was working in the formal sector in 2017, meaning that the overwhelming majority of people work in the informal sector which provides no social or job security, no benefits and is often characterized by bad working conditions and low wages (Class Research, 2019, 186). The informal sector can be split into a few different categories: agriculture, manufacturing, construction and trade. The formal economy heavily relies on these unregulated informal jobs, so one cannot really exist without the other. Currently, there is a strong shift from agriculture to more service based work, and this puts greater strain on rural farmers.

Figure 5: Migrant working in slum
Since Prime Minister Modi was elected in 2014, he has encouraged a lot more foreign investment, privatized healthcare and lifted regulations on the environment (Class Research, 2019, 200). Again, these neo-liberal actions have served to strengthen the divide between rich and poor and made access to services something only available to higher income groups. In 2009, 61.6% of the Indian population consisted of middle income households, the largest income group in India (Class Research, 2019, 188). They are also the largest consumer group for housing and have influenced housing design to reflect the aspirations of a middle class lifestyle. Affordable housing is now the fastest growing segment in Indian real estate, but as of recently, the term is now used to define affordable housing for all income groups from EWS (Economically Weaker Section) to HIG (High Income Group). Of these income groups, the MIG (Middle Income Group) are the largest consumer group of housing. Unfortunately, the urban poor, who would otherwise be the key group for affordable housing, are excluded from the formal housing sector (Class Research, 2019, 186). The most recent government initiative to provide housing comes in the form of the PMAY Housing for All Initiative which aims to build 20 million affordable homes for the poor by March 31, 2022 (Class Research, 2019, 205). Since 2015 the initiative funded the construction of 3.9 million homes but is very far from reaching its 20 million target. In addition, a Credit Linked Subsidy scheme was attached to the program, allowing people in EWS, LiG and MiG groups to receive an interest subsidy for home loans. Of course these schemes are only partially government funded and mainly developer driven, so most of the homes built were not in convenient locations.
The first few months of the Global Housing Studio were spent doing group research that was to help us understand the situation we would be dealing with, especially before going to India. This culminated in a two-part book detailing the history of Mumbai and how it evolved in population, culture, economy, politics and also housing. The other facet of the research was done in the form of article and book analysis and presentations. Each week a few articles were presented to the class and discussed, all spanning topics such as housing, policies, the human condition. In addition to that, we spent time reading Richard Sennett’s book ‘Building and Dwelling’. It was during these early months that I came across a recurring phrase: seasonal migration. It seemed like a unique phenomenon at first, but was often mentioned very casually as if it was a very normal occurrence (which in India and many other countries of the Global South, it is). I first read about it when doing research on (international) and mapping migration patterns in India, and then again in Sennett’s book. As is mentioned, it is something that was always part of the history of Mumbai and continues to prevail today, however it seems that the seasonal migrants is a group that no one really seemed to care about or discuss in further detail. Finally, i heard about the plight that seasonal migrants go through in their goal to help their families prosper from a short analysis of Arrival City. That was when I knew that this was something to look into — it was a unique but common condition that presented a clear design problem, how to create temporary affordable housing for these seasonal migrants.

Figure 7: Pottery Worker in Dharavi
housing in India

The housing sector has seen some change, especially since the 1991 economic reform when affordability shifted from being state-led to market provision. While that had its positive repercussions and certainly showed an increase in quality of dwellings and percentage of home ownership, it also had its downsides, the most major being a widened gap between rich and poor. In this section, I will give a rundown of affordable housing and policies from the 1947 onwards and compare that to the situation today.

Affordable Housing & Policy since 1947

Post-Independence, the government played a key role in the provision of housing for the poorest segments. Two strategies that were used were the Sites & Services approach and state-funded public housing (Sengupta 2014). The Sites & Services approach consisted of a site that would be provided with the necessary infrastructure and sold to family at very low cost, allowing the new owners to build their home incrementally and on their own. This approach relied heavily on cost recovery and replicability - both very neo-liberal principles. Unfortunately, the building process did not follow building codes and so state-funded Public Housing provision became the choice method. This, however, resulted in a very low housing output, high maintenance costs and a lot of allocation discrepancy. The need was not being satisfied in the least. —from 1970-2000 there was 1 unit built for every 5,000 people (Sengupta 2014).

Public housing production 1970-2000:

1 house per 5000 people

Housing Strategies:

| Sites & Services | ✓ | Pro poor in concept | × | In site assembly
| Public Housing | ✓ | Income-eligible household with highly subsidized rent | × | Low overall output Allocation discrepancy High maintenance costs |
The 1991 economic reform embraced privatization and foreign investment and the GDP soared as a result. From then on, 54 million homes were provided, housing quality improved and home ownership drastically increased (Sengupta 2014). Then a housing boom took hold in the 2000’s with rapid property appreciation. House prices in big cities rose drastically; price in Kolkata rose by 85% and 26% in Mumbai by 2009 (Sengupta 2014). With that there was a rise of the middle class which widened the income gap and made housing unaffordable for the lowest segments.

Multiple housing schemes were devised, each tackling the issue from a different angle - from resettling slum dwellers in low-cost homes (JNNURM and VAMBAY schemes), to expecting a minimum percentage of land from every development to be set aside for EWS/LIG housing (NUHHP scheme), to one that limited the floor area of residential units in a bid to increase the number of units produced (Noida & Huda). Public Private Partnerships (PPP) were also a key tactic for the government to provide housing without any real cost through cross-subsidization. The 1995 Slum Rehabilitation Scheme heavily relied on the property market, it was only possible by allowing developers to make a profit selling additional market homes on the cleared land (202 h&s data). If this wasn’t enough to cover the costs of resettling slum dwellers, they were also allowed to build additional dwellings at another location, often resettling the slum dwellers in very disconnected parts of the city, thus increasing their commuting, maintenance, utility costs and keeping them away from their places of employment. However, one key issue that still needed resolution and prevented dwellings from being truly affordable was that developers determined what was affordable pricing (Sengupta 2014).
As of recently, the definition of ‘affordable housing’ has changed from one with a negative connotation, to one that is even appealing. The reason for this is because the definition was broadened and is no longer synonymous with ‘low-cost housing’. Instead, affordability levels are determined for each income group (EWS, LIG, MIG1, MIG2, HIG)(Sengupta 2014). While this new definition is more attractive for developers, it also means that they can provide housing for the higher income segments and still claim to fulfill a need. The other key issue with this new definition is that it ignores a number of other important factors other than income alone: household size, location of the housing, quality and amenities, commuting costs, utility and maintenance costs (Sengupta 2014). In the end, ‘affordable housing’ can still be very unaffordable to the lowest segments of society who earn below the EWS threshold; the people who need it most are still not benefitting from this renewed interest in affordable housing.

The newest development scheme for affordable housing is the Pradhan Mantri Awas Yojana initiative (PMAY) as part of Prime Minister Modi’s “Housing for All” campaign. This initiative aims to build 20 million homes for the EWS and LIG segments by 2022 and has funded the construction of 3.9 million homes since 2015 (205 h&s data). The affordable housing is possible through in-situ slum redevelopment with the private sector, a Credit Linked Subsidy, PPP, and beneficiary-led home construction (205 h&s data). The aforementioned Credit Linked Subsidy is available to the EWS, LIG, MIG1 and MIG2 segments and allows them to get an interest subsidy of 6.5% on their home loan, with the condition that no family member owns a house in any part of India (205 h&s data). The aim of this subsidy is to incentivize home ownership, as opposed to rental. The PMAY initiative is far from being on track to reaching its 20 million home goal, so it is still failing to provide sufficient housing for those who really need it most.

**Figure 8: PMAY Scheme**
India’s middle class comprises roughly 40-60 percent of the overall population (Class Research, 2019, 188; Ramanathan 2019). Yet even though it is such an important group, the true size of this population is unknown, as even the definition of what is considered middle class is ever shifting; it could range from 78 to 604 million people (Ramanathan 2019). Over the period of 2004 to 2012, the middle class has roughly doubled in size (Madhura Karnik 2016). Rather than clumping everyone into a single middle class, it has been acknowledged that India has multiple middle classes, each with different views and aspirations (Ramanathan 2019). There are five middle classes that can be identified in India: the Rural Middle Class, Public Sector Middle Class, Urban Private Sector Middle Class, Trader Middle Class and the Rising Middle Class (Ramanathan 2019). It is this last category that has been growing rapidly and accounts for the doubling of the middle class population over the past years (Madhura Karnik 2016). The Rising Middle Class belong to the lowest tiers of the middle class, defined as spending from 2 USD to 6 USD per day (Madhura Karnik 2016).

There are four parameters that can distinguish the middle classes: location, occupation, education and vehicular ownership (Ramanathan 2019). The rising middle class does not conform to the traditional expectations of the ‘middle class’, as many of them rose to join the middle class rather than being born into it. They earn more than those in the weaker economic sections not because they occupy different jobs, but because they have more family members working than their poorer counterparts (Hemali Cchapia 2016). They may be educated but their fathers were likely illiterate (Ramanathan 2019). Contrary to expectations, many of these lower middle class citizens work as carpenters, street vendors, drivers and wall painters, to name a few (Madhura Karnik 2016). From my own interviews, I learned that they often work very long hours and some still use their home as their main place for income generation. Their wealth is the least stable of the other middle class groups, meaning that they are most at risk of losing their middle class status in case of economic trouble.
While it seems that very little separates the Rising Middle Class from the Lower Income Group, it is their aspirations and values, in addition to few assets, that make them stand out as a separate group. They tend to live in smaller families, and prioritize educating their children with extra private lessons and sending them to private schools, rather than living lavishly. Many own cell phones and a watch or a clock, a television and pressure cooker. The majority have electricity and many own gold jewelry, which can be classified as “aspirational expenditure” (Hemali Cchapia 2016). Some own two wheelers, but are not likely to own more expensive assets. This new middle class has more in common with their less fortunate counterparts, making them the ideal group for this project as they are in search of extra income, stable assets for security and understand the plight other groups experience.
seasonal migrants

India alone, has a rough total of 139 million internal migrants (Sharma 2017), of which 10.8 million are seasonal or temporary migrants (Keshri and Bhagat 2010). This seasonal migration is a natural part of urbanization — as developing countries like India have been shifting focus away from agriculture to the industrial and tertiary sectors, their rural populations have started to follow (Keshri and Bhagat 2010). Seasonal migrants spend much of their lives oscillating between city and village, in search of extra income to support their families back home (Saunders 2012).

Rural families throughout India are struggling to make ends meet with agriculture alone, especially with the rising costs of seeds as well as the need for home upgrading and schooling for their children (Saunders 2012). In order to manage these added costs and gain some economic stability, these families diversify their economic activities by sending members to work in the city (Keshri and Bhagat 2010, Saunders 2012). Young men and women travel to the city, in search of temporary work, only to go back 6-10 months later for the harvesting season (Sugathan and Jayaram 2018). They continue this circular migration pattern for years on end, sending money back to the village each month (Saunders 2012). Eventually, some will choose to join the 100,000 people who settle in the city, buying into the promises of freedom and prosperity (Saunders 2012). Consequently, this starts a chain migration process prompting family members and neighbours to also move to the new “urban village” (Saunders 2012). This process can take generations or it can transpire within a single lifetime until the whole family and/or village have stopped relying on agriculture, completing the migration transition (Saunders 2012).
The informal sector is the main employer of these low-skilled seasonal migrants, the majority of whom work in construction, textiles and manufacturing (Sharma 2017). Other vocations include domestic work, rickshaw pulling, hotel labour, street vending and general labour (Keshri and Bhagat 2010). Regrettably, migrant workers are easily exploited by their employers who often cut their earnings, delay payments and provide no benefits. It is common to see workers on a construction site without any safety gear — workplace safety is usually ignored. Unfortunately, many workers don’t know their rights or are too afraid to speak up in case of abuse and exploitation (Chandran 2018).

Figure 12: Street Vendor in Nalasopara
Next to employment, seasonal migrants face the challenging task of securing temporary accommodation. Their options are limited, commonly consisting of sleeping on the open ground, in shelters, renting a room crammed with multiple other people, renting a room in a slum, or more frequently, sleeping on the work site (Chandran 2018, Sharma 2017). The latter of these options is perhaps the most concerning; while sleeping on the work site saves money, it also means that workers are available at all times of the day and night, making them vulnerable to further exploitation. In the words of Gangaram, a migrant worker, “I have never seen Ahmadabad city outside the factory. My body and mind always revolves around these machines.” (Sugathan and Jayaram 2018). He works and lives in a garment factory along with 19 other people who sleep, eat, bathe and cook in between the machines (Sugathan and Jayaram 2018). During peak times, Gangaram works 18-20 hours a day and sometimes in odd times of the night. Living on site disintegrates the line between work and personal life of these individuals.

An additional struggle seasonal migrants have to face is the lack of identity. Many lack the proper documentation to prove their identity or address. Without any proof of address, seasonal migrants are unable to open bank accounts, purchase SIM cards, access food and fuel ration cards, or even schooling for their children (Rao 2015, Sugathan and Jayaram 2018). Most importantly, they cannot vote without a voter ID. In states like Gujarat, this voter ID is incredibly hard to attain; migrants must have lived within the state for at least 10 years to be able to vote or even access subsidies (Rao 2015). They are not regarded as citizens, rather scrutinized as a nuisance to the city.
The challenges faced by seasonal migrants moving to the big city are many: low-paying, hazardous work, poor access to health care, lack of education & formal skills, no protection of the law and inadequate housing. At the root of these challenges are the three key factors: lack of education, lack of citizenship, and lack of home (ownership). Low levels of education result in few secure, well-paying job options and an absence of basic literacy. This impacts a person’s ability to secure housing, defend their rights against abusive employers, find a better job and keep themselves healthy. Without an identity, seasonal migrants are powerless and voiceless to change their situation; they cannot access essential services and properly settle in the city. Lastly, without adequate housing, inhabitants are exposed to numerous health risks from scarcity of water, shelter and proper sanitation. Upward mobility is only possible with education, citizenship and proper housing; unfortunately most seasonal migrants who have chosen to claim the city as their permanent home never experience any form of upward mobility (Sharma 2017).

Regrettably, there is very little that has been done for these people who form such a big part of the Indian economy. In fact, they have been ignored by authorities, often treated as an ‘invisible population’ at best (Rao 2015). Their meagre incomes prohibit them from being able to afford the luxury of a house in the slums; instead, the best arrangement comes in the form of a rental room shared with 10 or more other tenants, no running water and rents of about 500 rupees per person per month (Sugathan and Jayaram 2018). The few government efforts to do something about the situation have been unsuccessful. In 2010, the Supreme Court ordered cities to provide homeless shelters, each meant to house 100 people (Chandran 2018). Most cities did not build any. Another scheme that did not work was a nationwide housing subsidy for construction workers.
to buy homes in government-built projects and the provision of pre-fabricated units at construction sites of public projects. Strict conditions and long wait times rendered these initiatives fruitless (Chandran 2018). More recently, the Modi government introduced the Housing for All scheme to help build 3.7 million homes in 2018-2019, however it leaves much to be desired (Sugathan and Jayaram 2018). The scheme provides permanent housing that doesn’t cater to the needs of the temporary worker who is looking for a more flexible arrangement (Sugathan and Jayaram 2018). Temporary migrants have been excluded from affordable housing schemes and due to their inability to vote, they are continuously ignored by politicians (Sharma 2017).

Exclusionary politics and lack of housing provision cannot be allowed to go on; the millions of seasonal migrants across the country cannot continue to be extorted and then left to fend for themselves. Evidently, there is a real void in the market when it comes to short-term rentals or flexible housing arrangements (Chandran 2018). By providing seasonal migrants with housing options that suit their transient needs, they are given the key to the city. Having a place to call home outside of the workplace liberates workers from being used by their employers. The home is one crucial element of emancipation for these migrants.

Figure 13: Construction Workers in Dharavi
Rising house prices and increased mortgage interest rates had people moving toward the rental housing market in 2008 (Singh and Komal 2009). There was an increased demand for rental accommodation in the form of flats, apartments, houses or rented rooms especially in metropolitan areas such as in Delhi and Mumbai. As such, Paying Guest (PG) accommodation became a popular choice for those living in the city, who could not afford their own property. PG accommodation takes the form of a single (or multiple) rented room(s) in an owner-occupied dwelling, where the PGs pay for boarding whilst living with the host family. Facilities are shared and sometimes meals can also be included in the arrangement. This type of arrangement is beneficial to both parties, as it gives the owners extra income, using unoccupied rooms and it is a safe, cheaper housing option for students, women or professionals coming to work on study in the city.

The ideal host for a paying guest accommodation would be one that co-resides with the boarders, taking on the role of a parental figure and forming strong bonds with the guests (Bowen 2015). Of course, this directly appeals to (international) students who are studying far from home. Many international students who need short-term accommodation turn to guesthouses, paying guest arrangements and budget hotels (Rana and Singh 2004). Even those students who need to spend a few years in a city are getting pushed out of organized student housing as supply is inadequate for the demand (Garg et al. 2014). In Bangalore, for example, 35% of students were living as paying guests.

The best method for securing a place to live is through personal networks. Frequently, accommodation is found through a friend-of-a-friend, thus making the two parties more ‘trustworthy’ and therefore more akin to family members rather than complete strangers.

Overall, the concept of the PG is one where a tenant and a landlord share similar living facilities and have a more personal bond beyond that of a traditional relationship between the two parties. Perhaps, there can be a way to use this common practice into the design of a dwelling where two dissimilar groups can co-reside.
I visited an area west of the railway line, called Sri Prastha. This neighbourhood was known as a middle class neighbourhood and has been in existence for over 30 years. During my brief visit, I was able to talk to a few members of the community there, some of whom were in the lower-middle class income group. Many faced some level of hardship when it came to work and providing enough for their families.
Sri Prastha was a desirable place to live, despite its initial shortcomings. It was the first housing complex in Nalasopara to have running water through the Sharat Power Project (or Surya Project), even though it was only 20L every morning. There was a strong land mafia present, however, and a lot of political tension. The land mafia wouldn’t allow the municipal corporation to do things and controlled the water supply and tanks, making it difficult for the municipality to get involved. In addition, the developer who sold the homes never gave the owners their deeds, so they could register their flats but were not the technical homeowners. Many building residents formed societies and some of these societies were able to take the developer to court to get their deeds, but this was a lengthy process that not many could afford.

This is still the case, and the developer still owns the property but is also the one planning to redevelop it. The redevelopment is welcomed by Noel and many others in the community. The buildings are cracked, there is a lot of exposed steel and as that expands, it causes further cracks. Noel had a slab fall on him while he was sleeping in his home, and his wife dodged a similar accident at another time. There is much leakage and seepage in the homes, the homes are in a general state of despair. Even though the societies charged the residents maintenance fees, many estates never saw any maintenance. In some buildings, there are no societies so when things break down determined residents would hound everyone out to collect fees to get repairs done. The complex also has begun experiencing regular flooding because nearby projects have blocked some outlets for water drainage. The redevelopment project was proposed 10 years ago, and there is still no idea as to when it will actually happen as the developer is nearing bankruptcy. When it does, homeowners like Noel will get two years of rent for free in the new apartments and the developer will take care of their moving and expenses.

Noel lives here with his wife and two kids and moved to Sri Prastha 19 years ago. He now works near Meera Road Station, previously it was near Andheri. When he was younger his family used to live further south in a Mumbai slum, in a relatively spacious home. They eventually came under the SRA scheme but quickly realized that they would only be entitled to half the home they used to have in the slum and were worried about his younger sister’s safety in one of the new high-rise apartments. So they decided to sell their SRA apartment to some Spanish Nuns and bought a 2 BHK apartment here in Sri Prastha in 1999.

Sri Prastha complex was built in 1988, so the buildings are now 30 years old. It includes more than 200 houses designed for middle class families. The apartment types vary from 1RK, 1BHK and 2BHK and are usually occupied by 4-6 people per family. Each building has two wings and is organized on a split-level system with two units per floor, to a total of three floors. Many people on the ground floor converted their exterior balcony space into an enclosed room, using it for various purposes.

The empty flats that can be seen are investor flats for people living outside India. The developer, VJ Kamla, has been planning to completely redevelop the area to erect 21 storey towers meant for higher income residents. Aarav mentioned that this will become very expensive property once that happens.

Krishna came from Uttar Pradesh looking to find a job in Mumbai. He comes from a large family of 33 members, many of whom are from the area. In his current living situation, there are only three of them in a 1BHK apartment; he lives with his brother, who established roots here first, and his mother. As a result, he doesn’t know many of his neighbours, though his brother does.

Krishna now works from home for a California-based IT company. He hangs out with his friends at the beaches or at restaurants, not spending too much time in the neighbourhood. On the other hand, many of the women in the neighbourhood tend to spend social time within the proximity of their homes. The area is characterized by middle and upper middle class residents, with a mix of renters and owner-occupiers.

Yogesh originally comes from a village near Delhi, where his father was a school principal. Upon his father’s death, Yogesh decided to move to Nalasopara because it was cheaper to maintain the same standard of living for him and his mother. He particularly liked that Sri Prastha felt more like a village than housing in the big city. The two of them live together in a 1BHK apartment on the ground floor, which is 495 sf in area with an additional 225 sf of garden space. The cost of owning such an apartment is 35 lakh or 10,000 rupees per month for a rental.

Yogesh sells property from within the neighbourhood to all over Mumbai and surrounding cities. He normally travels to show his clients different homes, usually taking the train or his own scooter. He does these trips 5-6 times per day, working from 10 am to 10 pm. All of his customers find him through word of mouth referrals so Yogesh is very well connected and knows everyone within Sri Prastha. In addition to this, he has converted his garden area to his very small office and a prayer room/temple where 50-60 people gather for worship on specific days. According to him, Fourth Road is where everyone likes to get together, as opposed to the multiple courtyards available to every building.

There are 3 churches, 2 mosques and one temple within Sri Prastha to reflect the mix of religions that are practiced by its residents.
problem statement

Migrant workers form the base of the Indian economy working in its most prominent sectors however they are treated inhumanely, with no access to vital services (such as running water, healthcare, education), no legal identity and no provision of adequate housing. These people are living far below an adequate standard of living, which is contrary to many of the United Nation’s Sustainable Development Goals.

Figure 16: Mumbai Building
research question

How can a development that integrates flexible accommodation into the existing lower-middle class fabric accommodate the needs and aspirations of seasonal migrants while helping them transition to life in the city?

Naturally that questions the nature of these aspirations as they change through time as well as the ability of both parties to co-exist and gain from this co-existence. The exploration of these questions will be instrumental in understanding the plight that seasonal migrants face and how that can be (partially) overcome through the design and provision of dignified housing.
The Design Assignment, in response to the Research Question, seeks to establish a model for co-housing the two groups (lower-middle class families and seasonal migrant workers) in a mid-rise housing block in such a way that dwellings are flexible to be maintained in use throughout the year and each group can foster its own social network.

The chosen location of this prototype will be in Sri Prastha, in western Nalasopara, as it is currently housing a lower-middle class population in decrepit housing blocks that are ripe for redevelopment. A promising model will be one that allows both groups to gain from their co-existence, reduces the concentration of poverty in cities, aids in removing the stigma associated with migrant workers and proves as a viable model for new lower-middle class housing developments. The solution should be one that can be implemented across India.

Figure 18: Dharavi resident
My goal is to develop an alternative to the inadequate state of housing for seasonal migrants. The provision of flexible, affordable rental dwellings will allow them to gain a foothold as citizens of the city. The research and outcome of this project will devise a way to integrate a new housing type into the fabric of the urban centre, in this case the city of Nalasopara. The model deviates from current developments in its mix of rental units attached to permanent lower-middle class housing, while introducing a flexibility to the relationship between the two dwelling types that is currently unaccounted for. The simplicity of this architectural concept frees it from its dependence on external organizational efforts. The project mainly involves the developer, owner and tenant. Housing blocks are to be implemented on multiple sites; those slated for urban redevelopment or green or brown-field sites. In combination with context-specific urban strategies, this model can be used to create unique urban situations without taking on the unsightly characteristics of the tower blocks scattered across Mumbai’s skyline today.

It is the hope that such a model would begin to alter societal perceptions and positively affect the migrants, lower-middle class families and the buildings themselves. By introducing this group of seasonal migrants to areas of the city traditionally inaccessible to them, they will no longer be forced to live in zones where the concentrations of poverty is the highest; this will hopefully help them break out of the migration cycle much sooner. By fostering even the slightest connections with the more privileged families who rent out their units to migrants, these workers may begin to see more secure job opportunities and have better access to information as well as services and amenities. Normalizing the presence of seasonal migrants and clarifying their role in society will ideally lead to acceptance and citizenship, rather than disapproval of those in positions of power. Having the owners of these dwellings live in a nearby or attached apartment also means that the maintenance of the structure will be kept up, as opposed to the neglect of duties that happens with standalone rental units. Conversely, having a rental property will help the lower-middle class families pay their bills as new dwellings are often on the brink of being unaffordable. Similar to a Paying Guest, this rental unit will provide value for both parties in question. The flexible nature of the dwelling will allow for changes that occur in the lives of both the lower-middle-class family and the seasonal migrant, altering use as needed.

When the whole world is moving towards mass urbanization, people making the life-altering move need all the help they can get. These people are not just numbers, they are human beings fleeing to cities with dreams, aspirations and the promise of freedom—many lives are sacrificed in pursuit of this better life, it is time for cities to stop crushing those aspirations.
method

The complex objective to design flexible housing for a transient population brings forth two clear issues to be researched: the flexible dwelling and the lifestyle of the seasonal worker. Two research methodologies that align well with the issues at hand are typology and scenario planning, which, in combination, will allow me to tackle the research question most effectively.

An analysis of spatial design practices in India provides an understanding of how space is used and which are the key spaces within the home. Precedent analysis of dwelling types by international architects clarified the limitations that exist as well as the opportunities, thus pointing out where something new can be created. Scenario planning will be a key method for the anticipation of a variety of specific events, needs and changes within the migrants’ lives and therefore the dwelling unit.

In addition to this, a micro-ethnographic approach was used as a way of gathering information about spatial and social practices in India, through the formation of a series of drawings on the patterns of daily inhabitation. The thesis itself will be centred on the concept of story telling through hypothetical and research-backed scenarios, using typology to complement and formalize the intangible concepts.

Figure 19: BDD Chawls
site requirements

- Has a regular grid
- Access to lower-middle class
- Needs diversification
- Needs (re)development
chosen site

Nalasopara

Mumbai City
The chosen site is called Sri Prastha and it is located in Nalasopara West. Sri Prastha is a housing complex, consisting of over 200 houses that were designed for middle class families. They still house the middle income group today.

**Background**

The complex was built in 1988 and was one of the first to have a water supply in the area. The housing is in the form of G+2 storey buildings organized in two wings. A total of 8 families reside in each wing (16 in the whole building), in a mix of 1Rk, 1BHK and 2BHK apartments.

Buildings were grouped so that one building front faces another building rear, creating a small courtyard in between. Residents formed societies to maintain the buildings, each society comprising of two neighbouring buildings. However, some building groups never formed societies and some societies were far more effective than others.
While the courtyard idea seemed to be a generous one encouraging of social interaction, the courtyards are rarely in use today. Residents have told me that no one really hangs out around the buildings, rather goes elsewhere outside of the community or gathers around the housing along the main roads.

Secondly, many of the original residents moved out and kept their apartment as investment property. There are some units which are entirely empty and many have become rental units. There is a serious lack of community in the area.

Lastly, many ‘owners’ do not actually own the deed to their home. So while the property is ‘theirs’, it is the developer who still owns the entire complex, save for a few societies which took him to court. The speculation that he might redevelop the site into high-end 21 storey towers discourages people from renovating their property.

Due to the non-functioning of the many societies, predominantly middle class residents and development speculation, the majority of buildings are beyond repair.

Figure 20: Sri Prastha main road
Issues it faces

Concentration of Middle Income Group
The concentration of only middle class families has meant that most of them did not stick around and have no real drive to maintain the properties. Also, most of them do not spend time in the area and so businesses do not thrive.

Housing is Falling Apart
The visible and anecdotal evidence of the dire state of the buildings proves that most of them are no longer fit to house residents.

Fuzzy Land Ownership
Owners do not entirely feel like owners and so they don’t invest much into the area. They are, however, looking forward to being given new apartments with 2 years of free rent once it is redeveloped.

Too Much Open Space
While it was a nice design gesture, this has left a lot of useless space in a very low-dense area that is mostly used as parking or garbage disposal. This space can be used more effectively and can be used to increase density.

Lack of Business & Amenities
As one resident told me, business is not thriving in the area. Shops open and close all the time. He also expressed the need to have amenities within the community - one of his two key priorities for the future.

People are Ready to Move
Residents have been looking forward to moving out of the derelict buildings and into new towers for almost 10 years now. This signifies a willingness to try something new, even if it is going to be more expensive for them.
As it is, Sri Prastha has demonstrated that a lack of variety in housing types, income groups and land uses do not make for resilient communities. This model will not work to keep the community stable for the future.

However, there is speculation that the developer who created the complex will tear everything down and replace it with 21-storey towers. These towers will likely follow the trend to wall-off the property and leave the areas around it as parking lots. They will also be catering to the higher income groups, meaning the current residents will be priced out from the area. This is not a desirable future for Sri Prastha, especially not considering the surrounding context.

A much better and more favourable future would be one of diversity. Diversity in housing types, in heights, in social and income groups, is one of the key ingredients to a resilient community. Where there is diversity, there is constant change, the area is more of a playground for experimentation rather than a hard fast set of forms and rules. A community in flux like this is able to better adapt to unforeseen change and is therefore going to sustain for longer.
design research
user group needs

The first step to designing for different sets of users is to understand their needs. It is important to see where those needs overlap and which ones are specific to each group. India’s lower middle class may have also started as migrants themselves, but they hold middle class aspirations. They look to help their children thrive, while valuing extra privacy and spending more time with their nuclear families. Seasonal migrants need more flexibility in their living situations and the ability to grow their networks and gain access to job opportunities. The following chart places those needs on a scale of public to private as well as ordering them in importance, the middle being the most important.
patterns of inhabitation

Part of the initial research that was conducted in India was the collection of patterns of inhabitation. These patterns were part of a micro-ethnographic study into the daily lives of locals in Nalasopara East. They fall into the categories: income generation, social spaces, borders, building techniques, domestic space and amenities. The following selection are the patterns identified which drive the design proposal on all scales.

Working & living side-by-side

Work space by day, sleeping area by night

Appropriation of corridor

Social Corridor

Intimate alleyways for women
Jalis are often used in common staircases of higher chawls to provide ventilation and cooling. When the air moves through the holes of the jalis it is compressed and thereby cools. Because of the compression the air also speeds up, creating a light breeze. Jalis often have geometrical shapes and provided some needed diversity to the facade’s.

The speed of interactions on the street front is extremely rapid, and people always take the fastest route to receive or deliver what they need. People often don’t even need to exit their vehicles to purchase their goods. The way people position themselves in the street scape means that people can purchase quickly.

Over the day the nature of the area’s sales strategy changes, the temporary and scattered stalls homogenise to form a night market which becomes more of a community event. Large number of women will appear around the time before dinner to shop for their groceries.

In Nalasopara space is one of the most valuable commodities. This results in various sub-renting out their space to people to make money. People live above shops and in some extreme cases people move out of their homes and rent the space to others as they have no other means of income.

In between the Chawls are the production workshops at the ground level. Generally these small subcontracting enterprises produce goods such as jewelry and garment to be sent to the center of Mumbai based on bulk supply and demand orders.
One of the first questions that comes up with regards to housing two very different societal groups, is how will they co-exist? Each group has its own needs and requirements, some of which do overlap, but many others that do not. Broadly speaking, there are two options: having the two groups physically detached from one another, or having them reside in the same building. Each option has its pros and cons. For example, having the two groups separated from one another gives residents more peace of mind that their homes and spaces are secure of potential ‘threats’. It also allows home owners to choose from any dwellings in the building. However, it also leads to nearly empty buildings during harvest seasons and a very low likelihood of building maintenance by the owners. There is no connection between the groups which means no ability to form expansive networks. Separation further reinforces prejudices between the groups and reduces the flexibility of the dwellings.

Conversely, co-housing the two groups can solve a lot of the previous issues, leading to positive mixing, greater flexibility and building maintenance. However, there may not be as much acceptance between the groups which could cause issues later on. Through weighing the pros and cons of each option, it became clear that the latter was the way to go for this design proposal.
precedents

In order to get a sense of how to design for different user groups under the same roof, I explored a number of case study projects from all over the world. Each project has specific features that help the different groups thrive and co-exist. The following precedent analysis explores projects which I consulted when designing my proposal.

De Muzen

De Muzen is a project in Almere, designed as housing for the elderly. It includes a mix of social housing, moderate and upper income dwellings. The complex is elongated and slightly curved with a central open ‘street’ on ground level. Dwellings look into the ‘street’ which acts as the main social space.

I liked this interior courtyard and that there were galleries looking into the courtyard/street, as this has a greater potential to foster community. It also seemed to have a very successful mix of dwelling types for different social (elderly) groups, which formally created a more varied layout. Lastly, the height variation between the building masses allows in more light and creates more interesting spaces internally, as well as changing the way the building is perceived from the outside.

Figure 24 (left): Cross section through De Muzen
Figure 25 (above): Courtyard & gallery view of De Muzen
Vrijburcht is another Dutch project that seems to successfully combine a very wide variety of social and income groups with many community amenities by dispersion and a central courtyard. The complex is wrapped around a central courtyard from where a number of building blocks form a porous wall on three sides. Each building block harbours a number of amenities such as a group home, a workshop/sailing school, a child care centre, a greenhouse, a guestroom, a theatre and a cafe.

There are a number of key takeaways from this project. I like that the dwellings look inwards, again reinforcing the idea of community and neighbours at least knowing each other by face. There is a dispersion of dwelling types and social groups throughout the complex, rather than focusing each group into one specific area. The numerous amenities give the complex life and make it a destination for the larger community. The architects designed for income generation within the home, with live-work units. And the courtyard is a larger social space that ties everything together.
WindSong Cohousing

WindSong is a co-housing development in British Columbia, Canada. This project was initiated by its residents as a bid to get away from traditional developments. The project is made of a central spine, or ‘street’, onto which all the dwellings have their front doors. Community amenities are located in the centre of the spine, making them easy to access by all residents. In addition, the complex also consists of a variety of dwelling types to support the needs of its residents.

The light-filled street not only acts similarly to a courtyard, but it also fosters neighborhood interaction as it also acts as a front yard for each home. The amenities make it a self-sufficient community which can also be a place of work and living for some of its residents.
Udaan is a low-cost mass-housing project by Sameep Padora Architects. The complex uses modular units to bring down costs and adds a variety of amenities to tie the community together.

This project makes space for social practices and patterns like the ones that were observed in Nalasopara. Like other precedent projects, it includes a ‘street’, but this one is above ground level. The generous galleries allow for residents to spill out into the space and use it as their own. There is provision for income generating activities on the ground floor, keeping to the pattern of working and living in the same space.
Key Takeaways

- Streets & inward-facing dwellings foster community
- Do include amenities
- A mix of dwelling types = better social mix
- Make space for income generation
design goals

Taking into account the key takeaways from the case study analysis, as well as the needs of the two user groups, I devised a set of goals that the design proposal should achieve. These are split into three categories: Urban, Building, Social. These goals target issues at all scales of the design as well as social aspirations aligned to the target groups.

**Building**

1. Minimum 20% seasonal migrant units in every building
2. (Migrant) Dwellings are flexible in use
3. Provide a variety of dwelling types
4. No visible markers of different groups from the building exterior
5. Communal ‘Street’ for migrants

**Urban**

6. More programmed open space
7. Attract people from outside of neighbourhood
8. Fill the gaps with missing amenities
9. Creating resilience by embracing change - future-proofing
10. Creating variety using few building blocks

**Social**

11. Create a sense of community
12. Promotive positive social mixing
13. Income generation possibilities
14. Privacy and transparency
urban design strategy

I have developed a strategy that can be used to transform existing (and new) urban spaces using the concept of layers. There are five layers to this: existing residential, amenities, circulation, open spaces and new residential.

These layers should be analyzed one by one, in this order (or one more appropriate to the context), in order to arrive at decisions on where things should be placed, and what spaces will be come places.

Using this approach, I was able to place amenities in convenient spots based on the existing circulation, which was then altered to accommodate for the traffic to the new amenities. Open spaces followed and eventually it became clear what land was left over for building clusters. Through this process, I was able to create nodes of diverse functions and conditions that will spark urban activity.

The goal is to be able to use this strategy on any site in order to create more context-specific urban design.
sri prastha redevelopment

Here is the layering strategy as it applied to Sri Prastha. It is important to note, that the societies doing the redevelopment are in control of this process, so they are not necessarily going to follow this strategy. The strategy can be used as a starting point and represents the more ideal situation, however, maybe not the most financial feasible one.

In this layering, I took the viewpoint of the societies, placing buildings as they might do themselves. First, the faulty buildings were assessed based on structural integrity, and demolished. After analyzing the stock of amenities in the area, I decided that a hospital and a school were missing. Those were placed based on their accessibility from the main roads.

The remaining open spaces were assigned for building clusters, with the goal of creating a public link between the school and park, and the hospital and football field. A market space was also introduced as part of this link.

Two new streets were added, and two were narrowed from two lanes to a single lane.
Amenities Analysis

Sri Prastha was designed as a residential complex. It therefore had no provision for businesses and other amenities. What businesses do exist tend to be found along the main roads, in other buildings outside of the border of Sri Prastha, or exist in dwellings-turned-commercial spaces.

<table>
<thead>
<tr>
<th>Location of Amenities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed-use residential / educational</td>
</tr>
<tr>
<td>Mixed-use residential / health care</td>
</tr>
<tr>
<td>Mixed-use residential / religious</td>
</tr>
<tr>
<td>Mixed-use residential / restaurant/food</td>
</tr>
<tr>
<td>Mixed-use residential / commercial</td>
</tr>
</tbody>
</table>

Small Clinic

After-School Tutoring

Temples / Places of Worship
From this analysis, I identified a few missing amenities in the area, namely, a school, hospital and dedicated market/shopping area. The diagram shows the proposed location of these amenities within the community, taking into account their proximity to main roads and connectivity to the rest of the community. The locations were chosen after determining which housing blocks were to be demolished.

This is also keeping to the assumption that observed patterns in Nalasopara East would also take place here. For example, all clinics and pharmacies tended to cluster around hospitals, as did tutoring places near schools.

Amenities clusters in Nalasopara East
Schools and tutoring

Proposed major amenities
This is the current condition of Sri Prastha. However, most of the buildings there are in really bad repair and will need to be demolished.

Phasing

A few resident groups decide to redevelop their crumbling buildings. Some societies redevelop building pairs while others choose to replace single buildings.
The redevelopment expands. Some societies team up and redevelop larger blocks. There are now a few new building clusters and some more publicly accessible courtyards.

Additionally, some form large clusters, and are obliged to provide a public amenity, for example, a hospital.

This continues, with an additional large school being built. This school and surrounding tutoring businesses prove popular as people already brought their kids here for extra study space.

Some road narrowing happens, allowing residents access to flexible sidewalks and parking spaces.
At this point, multiple amenities have been created, as with some larger courtyards and public spaces. Most of the buildings in the most dire need have been redeveloped. This is just one possible direction that this redevelopment could have taken. There are infinite other possibilities that could take form, depending on the decisions of the societies.

This is a visual of what Sri Prastha could look like years down the road, beyond the extent of the project’s timeline. Again this is one of many possibilities. There is still variety being maintained with every cluster having a different mixture of new and existing buildings, garnering a different configuration and experience. It can continue to shift, nothing is ever “finished”.
Street Profiles

Primary Road

Secondary Road

Neighbourhood Road Narrowed by one lane
The existing urban fabric, shown here, follows a grid system. Since buildings are paired off into societies, parallel buildings form the basic plot size. From there, two different building typologies were created to suit varying conditions, while having a minimum number of variations. These types can be combined in numerous ways and at different scales to create unique urban conditions.

Building design:

- **Type I:** 35 dwellings, large courtyard space
- **Type II:** 51 dwellings, 2 courtyards, public & private

Existing plot: 40m x 32m
32 dwellings, with small courtyards
As per my building goals, there is to be a mixture of dwelling types, at least 20% migrant units, opportunities for work and a communal ‘street’. Amenities are also a must on the ground (and first) floor of each building. These amenity spaces would be rented out for businesses and should employ people who live in the building.

The buildings for this scheme are 9 storeys tall, however they were designed to be flexible in height. Ideally, they can range from 6 to 10 storeys and societies are free to choose what is appropriate for their lot.
type 1
Levels 4, 5, 6
1:200
Elevations

South Elevation
1:200
Sections

Cross Section
1:200

Design

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Sections
type II
Building Lobby
South Elevation
1:200

Elevations
Learning from my precedent research, I introduced a mixture of unit types to encourage a healthy diversity in residents. Where there is a lot of diversity, there is less of a means of comparison, thereby making it easier to ignore/disregard differences between people and groups.

As per the main principles of the building design, the seasonal migrants are situated on the lower levels, where they will be closer to the ground (as they may have been previously used to) and are less likely to use the elevators. On the ground floor, they are able to rent out a room or bed in a live-work unit, thereby having the chance to expand their space out onto the yard/sidewalk and/or run a small business from home. Additional rental units are found on level 2 along ‘the street’.

Some live-work units are reserved for lower-middle income families, while the landlords to the rental units live on the first floor apartments. Everything above the second floor consists of middle income units, mainly flats and some maisonettes.
Flexible Units

Unit flexibility is quite important in this situation, as transient residents tend to have diverse needs. Rental units are designed to be able to change in use throughout the year(s) allowing for some flexibility, yet clearly demarcating fixed layouts with load-bearing walls.

For example, a unit can house a number of migrants in a shared apartment, or it can be converted to a small bed and breakfast, or an office or other business space. It can also be a live-work unit, allowing the resident to run a business from their own home, or even manufacture goods, as is quite common in India.
This sample timeline is meant to demonstrate how a unit can be used throughout the year, while it is occupied by a seasonal migrant and when it isn’t. It explores the likely cycle of a migrant not only oscillating between city and village, but also gradually bringing their family members to the city with them.

**Flexible Timeline**

**ARRIVAL**
- Shared Room
- Paying Guest/Air BnB

**HARVEST**
- Business Space/Rented Office Space
- Family Gathering

**FUTURE**
- Owner’s Children Move In
- Siblings Arrive/Home Manufacturing
India has three harvest seasons, with different types of crops being associated with each season. The Khaif season is the most noteworthy as the majority of crops are harvested at the time. Interestingly, due to the overlap of these harvest months, it is possible for a family to rent out their home to seasonal migrants over the course of a full year, without the property remaining vacant for a number of months.
Life on the Street
The two building types were designed with the specific purpose of being able to form different configurations depending on the surrounding context. The slab typology (Type I) is meant to replace buildings of a similar footprint, and/or bring in more open (public) space. Type II is all about creating a corner condition. It has the added benefit of having a small public and a larger private courtyard.
The two types can be combined to create clusters over larger areas, thus replacing any number of existing buildings. For example, in this combination the top option is the most dense, and less ideal in terms of light and open space, but the second option is slightly more expensive to build.

Societies are free to choose their clustering options based on the qualities they are looking for and their financial constraints.
This creates a similar arrangement to the previous option, but it leaves much more open space that can also be used by the neighbouring societies. The top option is much more porous while the other is more inward focused and provides a higher level of privacy.
When four societies decide to group up, they can create a very interesting cluster. This would be considered a large cluster, and as such is also tied to some constraints. Large clusters are required to provide a large community amenity, which can come in the form of a building or open space. Of course, this means that the amenity can be sold or rented out, thus allowing the group of societies to gain an extra income and lower building costs.

To compensate for this requirement, large clusters that border main roads are able to build up to 10 storeys in height, to further offset building costs.
The following urban plans show examples of what the community could look like. There is a combination of different cluster sizes and community amenities. Even though there are only two building types used, there are enough options to create a very diverse community.
Section of Market Square
1:250

Elevation of Market Square
1:250
impressions

Community Playground
Small Square
Medium Sized Square
Large Square
View from Main Road
building technology
The climate conditions in Mumbai are that of a tropical monsoon climate. The city receives plenty of sunlight throughout the year, with temperatures ranging from 16 to 41 degrees.

The monsoon months from June to the end of September see a lot of precipitation which comes in heavy downpours, often causing flooding. The effects of Global Warming have been felt over recent years, as sea levels rose at a steady rate of 13mm per year and precipitation has been increasing during the monsoons (Group Research, 2019). While flooding is increasingly common, so is drought during the rest of the year. Mumbai is also facing a water shortage issue due to a lack of rainwater and potable water sources in the Summer months.
Residential units are housed in towers, each tower having four free facades with a 4 m wide gap between neighbouring towers. Westerly winds will flow through the gap and create a negative pressure on the internal facades, drawing air out of units. In addition, this gap between buildings will be used to encourage stack effect, additionally ventilating the building units.

The introduction of jali in bathrooms and corridors allows for privacy and constant ventilation throughout the day. Awning windows have been provided for middle income units, to allow for light and ventilation, while still allowing them to introduce air conditioning units later on. Jalousie windows are found in rental units, allowing for light and constant ventilation, assuming no need for further air conditioning units.
water management

Rainwater collection during monsoon seasons will yield a large quantity of greywater that will be used to flush toilets and for other non-potable uses. Each building is equipped with a few water towers which will drain water captured from the rooftops. The water flows through a turbine generator within the tower, thereby generating electricity to be used to light common areas and amenity spaces.

Gutters on the second level (the ‘Street’) also lead to the water storage in the building foundation. An overflow opening is made on the ground, first and second floors, allowing extra water to pour down and be collected. This opening is covered with a steel grate, allowing people to walk over it, while still allowing water and light to penetrate the circulation spaces.
The building towers form the building’s load bearing facade, made of structural flyash bricks with rebar reinforcement. Floor plates of the plinth will be made of poured-in-place concrete with clay pots as filler whereas the floors within the towers will be precast hollow-core slab units.

The concrete foundation is poured as one piece, like a tub, so as to be used for rainwater storage.
The roof of the building is to be finished with waste white glazed ceramic tiles. The tiles will reflect sunlight, thereby preventing the roof from overheating. More waste tiles are to be used as the finish for common spaces, so as to reuse the waste material, create a sense of identity on each floor and employ local labour.
Mumbai faces the disconcerting issue of massive amounts of construction waste. At one point, there was even a construction ban in the city, due to the issue which had gotten out of control.

Redeveloping Sri Prastha first requires the demolition of a number of existing buildings. The concrete from this waste will be brought to a facility in Mumbai, Godrej Construction, where it will be recycled into pavers and concrete blocks. The recycled concrete pavers will be used throughout the project, thus ensuring that construction waste is minimized and material is reused wherever possible.

Additionally, these pavers are more structurally stable and longer lasting as compared to concrete and asphalt. Pavers are also easier to maintain and replace without disturbing or destroying the rest of the pathway, sidewalk or square.
After an analysis on possible load-bearing wall materials, it became clear that fly ash brick and concrete blocks are the best options due to their strength, water absorption and material consumption qualities. In addition, they are the more environmentally friendly choices which emit less carbon dioxide and require less energy to manufacture. They are both extremely reliable during the building process and more durable in the long-run.

However, it is important to note that India is struggling with a shortage of sand, so it is very important to reduce the amount of concrete used in construction. For this reason, fly ash bricks are the optimal choice.

<table>
<thead>
<tr>
<th>Material</th>
<th>Dry Density (kg/m³)</th>
<th>Compressive Strength (kg/m²)</th>
<th>Porosity</th>
<th>Water Absorption (%)</th>
<th>Thermal Conductivity (W/mK)</th>
<th>Mortar Consumption</th>
<th>Water Requirement</th>
<th>Breakage</th>
<th>Environmental Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clay Brick</td>
<td>1600 - 1750</td>
<td>30-35</td>
<td>More porous</td>
<td>15-25%</td>
<td>0.6 - 1</td>
<td>More</td>
<td>More.</td>
<td>10-12%</td>
<td>More CO₂ and energy used due to firing.</td>
</tr>
<tr>
<td>Fly Ash Brick</td>
<td>1700 - 1850</td>
<td>90-100</td>
<td>Less porous</td>
<td>10-14%</td>
<td>0.3 - 0.4</td>
<td>Less</td>
<td>Less.</td>
<td>~ 0%</td>
<td>Use fly ash (waste from power plants) Curing reduces energy use. Low CO₂ emissions.</td>
</tr>
<tr>
<td>AAC Block</td>
<td>1600 - 1920</td>
<td></td>
<td>Less porous</td>
<td>&lt; 10%</td>
<td>0.21 - 0.42</td>
<td>Least</td>
<td>Less.</td>
<td>~ 0%</td>
<td>AAC waste material is recycled during manufacturing. Low CO₂ emissions.</td>
</tr>
</tbody>
</table>

Load-bearing walls

<table>
<thead>
<tr>
<th>Load-bearing walls</th>
<th>Clay Brick</th>
<th>Fly Ash Brick</th>
<th>AAC Block</th>
</tr>
</thead>
</table>

**Clay Brick**
- **Properties:**
  - **Dry Density:** 1600 - 1750 kg/m³
  - **Compressive Strength:** 30-35 kg/m³
  - **Porosity:** More porous
  - **Water Absorption:** 15-25%
  - **Thermal Conductivity:** 0.6 - 1 W/mK
  - **Mortar Consumption:** More
  - **Water Requirement:** More
  - **Breakage:** 10-12%
  - **Environmental Impact:** More CO₂ and energy used due to firing.

**Fly Ash Brick**
- **Properties:**
  - **Dry Density:** 1700 - 1850 kg/m³
  - **Compressive Strength:** 90-100 kg/m³
  - **Porosity:** Less porous
  - **Water Absorption:** 10-14%
  - **Thermal Conductivity:** 0.3 - 0.4 W/mK
  - **Mortar Consumption:** Less
  - **Water Requirement:** Less
  - **Breakage:** ~ 0%
  - **Environmental Impact:** Use fly ash (waste from power plants) Curing reduces energy use. Low CO₂ emissions.

**AAC Block**
- **Properties:**
  - **Dry Density:** 1600 - 1920 kg/m³
  - **Compressive Strength:**
  - **Porosity:** Less porous
  - **Water Absorption:** < 10%
  - **Thermal Conductivity:** 0.21 - 0.42 W/mK
  - **Mortar Consumption:** Least
  - **Water Requirement:** Less
  - **Breakage:** ~ 0%
  - **Environmental Impact:** AAC waste material is recycled during manufacturing. Low CO₂ emissions.
Fly ash bricks are composed of water, fly ash, lime, cement, aluminum powder and gypsum. Their production saves a lot of energy as they are cured rather than fired, like traditional bricks. Fly ash is a byproduct of coal burning and so using it also keeps the ash from further polluting the environment.

The bricks are readily available in India. They are grey in colour but can and will have a painted finish for this project. Each building will get a finish of mineral paint. Every society will be able to choose from a range of six colours in order to give each building some identity. The colours are kept light so as to reflect as much light as possible, further reducing the heat building-up on exterior walls.

The bond chosen is the rat trap bond. This bond leaves voids running up the height of the wall, allowing for continuous reinforcement. It also uses about 25% less bricks and 40% less mortar than traditional masonry, which leads to additional cost savings.
### Floors

<table>
<thead>
<tr>
<th>Reinforced Concrete Slab</th>
<th>Clay Pot (Hollow) In Situ Concrete Slab</th>
<th>Prefabricated Hollow Core Concrete Slab</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weight</strong></td>
<td>100%</td>
<td>65%</td>
</tr>
<tr>
<td><strong>Concrete Required</strong></td>
<td>100%</td>
<td>80%</td>
</tr>
<tr>
<td><strong>Formwork Required</strong></td>
<td>Formwork Needed</td>
<td>Formwork Needed</td>
</tr>
<tr>
<td><strong>Time Required</strong></td>
<td>Time Consuming Ex 36 mo construction</td>
<td>Slightly More Time Consuming Ex 37 mo construction</td>
</tr>
</tbody>
</table>

### Acoustics

<table>
<thead>
<tr>
<th>Acoustics</th>
<th>Span to Depth Ratio</th>
<th>Quality &amp; Durability</th>
<th>Aesthetics</th>
<th>Ceiling Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>1/40</td>
<td>Relatively durable.</td>
<td>Clean &amp; simple.</td>
<td>If dropped ceiling, height is decreased</td>
</tr>
<tr>
<td></td>
<td>Spans of 3.6 - 7 m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Better</td>
<td>1/24</td>
<td>Relatively durable.</td>
<td>If done well, ceiling can be left exposed, adding a nice quality</td>
<td>Decreased height due to floor thickness</td>
</tr>
<tr>
<td>Better</td>
<td>Sound is deflected &amp; dispersed</td>
<td>Relatively durable.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sound is muffled in voids</td>
<td>1/40</td>
<td>Very durable.</td>
<td>Clean &amp; simple services can be hidden, smooth finish</td>
<td>Greatest floor-to-ceiling height</td>
</tr>
<tr>
<td>Sound is muffled in voids</td>
<td>Spans of 3.6 - 12 m</td>
<td>High Quality</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Another analysis was conducted with three different floor options. The clay pot hollow slabs and the hollow core slabs were compared to reinforced concrete slabs, which were considered the baseline (100%). The analysis concluded that both of the options were significantly better, particularly with regards to material savings. Each has its strengths and weaknesses. I concluded that both types of flooring would be used for their specific purposes. The in-situ clay pot floors would be used for the first 3 levels of the building that I consider the plinth. These floors allow for flexibility and customization with the floor slabs, which is particularly useful for that situation. However, pre-cast hollow core slabs are far more economical for the tower portions of the building for a few reasons. One of the key benefits of using a pre-cast system is the extreme savings in time, which in this project would save a lot of money. In addition, this method increases floor-to-floor heights, which is very useful in the Indian context, where extra height means extra storage space potential or even extra room for another bed. Also, the slabs are able to have the services hidden in the voids, and consume even less concrete. Their quality makes them more durable over time. For these reasons, the hollow core slabs will be used for the majority of the building construction, including the roof.
Clay pot hollow concrete slabs are also a form of ribbed or waffle slabs, albeit much less costly due to materials used and lower quality workmanship.

The pots are laid in rows, equal distances apart, and rebar is laid between them. The concrete is then poured overtop and allowed to cure, as normal. The pots act as the formwork but also become part of the final product, so they are non-recoverable. If done well, the pots can be left exposed and add a nice aesthetic quality to ceilings.
construction
Balcony & jali wall elevation

1:50

+ 12500

+ 9500

1030

2415

75 mm FLY ASH BRICK

JALI RAILING

SLIDING DOOR

GLASS PANEL

800

1800

1375

ADJUSTABLE TIMBER LOUVERS

AWNING WINDOW

FLY ASH BRICK SILL

FLY ASH BRICK JALI
Street gutter plan

- Brick sill
- Adjustable glass louvers
- Reinforced concrete fill

DIRECTION OF ROOF SLOPE

- Steel grate cover
- Mosaic floor tile finish, broken/waste tile

PLASTER FINISH

- 230 mm fly ash brick wall, rat trap bond
- Jalousie window, adjustable glass louvers
- Brick sill

- Half door, glass panel, top leaf

- Reinforced concrete fill

- Plaster finish

- Reinforced concrete fill

STREET GUTTER 1:20
Half door & jalousie window axo
Half door & jalousie window section

- 30 mm CONCRETE PRESSURE LAYER
- CERAMIC FLOOR TILE

- 150 mm HOLLOW CORE SLAB
- STEEL ANGLE LINTEL W/DROP EDGE

- ADJUSTABLE TIMBER LOUVER
- JALOUSIE WINDOW ADJUSTABLE GLASS LOUVERS

- 230 mm FLY ASH BRICK WALL, RAT TRAP BOND
- REINFORCED CONCRETE PRESSURE LAYER

- 1700 mm W/FRAMING & TRELLIS

- 425 mm CONCRETE PRESSURE LAYER

- 200 mm THK REINFORCED CONCRETE FILLER SLAB
- FILLER: CLAY POT

- 300 mm TOP LEAF GLASS PANEL
- ADJUSTABLE TIMBER LOUVER

- 2730 mm STEEL ANGLE LINTEL W/DROP EDGE

- + 9500

- + 6500

- CLAY POT

- 230 mm THK REINFORCED CONCRETE FILLER SLAB

- 300 mm CLAY POT FLOOR TILES

- 300 mm TOP LEAF GLASS PANEL

- ADJUSTABLE TIMBER LOUVER

- STEEL ANGLE LINTEL W/DROP EDGE

- JALOUSIE WINDOW ADJUSTABLE GLASS LOUVERS
Half door & jalousie window plan

1:20
Platform & foundation section

1:50

FLY ASH BALCONY W/ JALI PATTERN

HALF DOOR

GLASS PANEL

TOP LEAF

FLY ASH BRICK SILL

AWNING WINDOW

ADJUSTABLE TIMBER LOUVER

GROUND FLOOR HALF DOOR & PLATFORM DETAIL

1:20

CONCRETE STAIR RAILING

ENTRY GATE

ADJUSTABLE TIMBER LOUVER

±500

±0
detailing

The following are close-up details of key areas of the facade. This includes the roof, balcony ceiling, gutter, joint between the different floor types and the foundation.
Joining of floor types at tower & circulation spaces

- 30 mm Concrete Pressure Layer
- Ceramic Floor Tile
- Screed
- 150 mm Thick Hollow Core Slab
- Reinforced Concrete Beam
- Adjustable Timber Louver
- Half Door Glass Panel Top Leaf

- ± 0
- ± 500
- ± 1200

 Foundation Detail

- 100 mm RCC Platform
- Mosaic Floor Tile Finish, Broken Tile
- Cement, Sloped
- Screed
- Ceramic Floor Tile

- 200 mm Thick Reinforced Concrete Filler Slab
- Filler: Clay Pot
- Mosaic Floor Tile Finish, Broken/Waste Tile
- Screed

- 200 mm Thick Reinforced Concrete Filler Slab
- Filler: Clay Pot
- Mosaic Floor Tile Finish, Broken Tile
- Screed

- 300 mm RCC Tub Foundation
- Rainwater Storage
- Recycled Concrete Pavers, Permeable
- 75 mm Fly Ash Brick Skirting
- 100 mm RCC Platform

- 70 mm Drainage Pipe
- Ø 100 mm Drainage Pipe
- 75 mm Fly Ash Brick Skirting
- 75 mm Fly Ash Brick Skirting
- 75 mm Fly Ash Brick Skirting
- 75 mm Fly Ash Brick Skirting

- 230 mm Thick Concrete Strip Footing
- 70 mm Drainage Pipe
financing structure

The goal of this redevelopment proposal is to remove the developer from the equation. In the case of Sri Prastha, and many other similarly structured housing developments, the decision power is given to the residents themselves. Societies mobilize and organize a larger board that will oversee the surveying of properties and repairs and maintenance of community infrastructure. The societies choose which buildings will be redeveloped and then secure loans to fund the construction. These will likely be a mix of bank loans and loans from an established community fund. Through the sales of extra units at market rates, the residents are able to lower the construction costs and therefore the prices of their own dwellings.

The idea is that a small percentage of profits are contributed to the community fund as well as a maintenance fund, allowing for the proper maintenance and renovation of infrastructure. With this structure, societies have the freedom to choose what they build, how tall it will be and are able to team up to make larger redevelopments.
financing

I analyzed the costs associated with numerous dwellings and commercial spaces in Nalasopara West. The table to the right shows the average market prices of the different categories of dwellings as well as the average cost of construction in Mumbai.

Using this information I was able to estimate the rough construction costs of the two building types. On the following pages, two financing options are set forth, one at market prices and one at the break even point. The data from the charts to the left was used to determine the market pricing of the units in building Type I and Type II.

The financing options are meant to be used as a starting point for estimating and understanding market values.
### Financing Option 1: Market Prices

<table>
<thead>
<tr>
<th>Type</th>
<th>1BHK</th>
<th>1BHK</th>
<th>2BHK</th>
<th>3BHK</th>
</tr>
</thead>
<tbody>
<tr>
<td>area</td>
<td>50 m² / 538 sf</td>
<td>60 m² / 645 sf</td>
<td>65 m² / 700 sf</td>
<td>100 m² / 1076 sf</td>
</tr>
<tr>
<td>price</td>
<td>2,440,000 Rs *</td>
<td>2,900,000 Rs</td>
<td>3,170,000 Rs</td>
<td>6,000,000 Rs *</td>
</tr>
<tr>
<td>x</td>
<td>4</td>
<td>2</td>
<td>17</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>total</th>
<th>9,760,000 Rs</th>
<th>9,800,000 Rs</th>
<th>5,890,000 Rs</th>
<th>24,000,000 Rs</th>
</tr>
</thead>
<tbody>
<tr>
<td>sale</td>
<td>109,450,000 Rs</td>
<td>75,384,000 Rs</td>
<td>34,066,000 Rs</td>
<td>45%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>1BHK</th>
<th>1BHK</th>
<th>2BHK</th>
<th>3BHK</th>
</tr>
</thead>
<tbody>
<tr>
<td>area</td>
<td>40 m² / 430 sf</td>
<td>50 m² / 538 sf</td>
<td>60 m² / 645 sf</td>
<td>65 m² / 700 sf</td>
</tr>
<tr>
<td>price</td>
<td>1,950,000 Rs</td>
<td>2,440,000 Rs *</td>
<td>2,900,000 Rs</td>
<td>3,170,000 Rs</td>
</tr>
<tr>
<td>x</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>25</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>total</th>
<th>1,950,000 Rs</th>
<th>9,760,000 Rs</th>
<th>11,600,000 Rs</th>
<th>36,000,000 Rs</th>
</tr>
</thead>
<tbody>
<tr>
<td>sale</td>
<td>154,560,000 Rs</td>
<td>109,254,000 Rs</td>
<td>45,306,000 Rs</td>
<td>41%</td>
</tr>
</tbody>
</table>

* This unit has a rental unit attached to it. The cost of the rental unit is reflected in the overall price.

### Financing Option 2: Break Even

<table>
<thead>
<tr>
<th>Type</th>
<th>1BHK</th>
<th>1BHK</th>
<th>2BHK</th>
<th>3BHK</th>
</tr>
</thead>
<tbody>
<tr>
<td>area</td>
<td>50 m² / 538 sf</td>
<td>60 m² / 645 sf</td>
<td>65 m² / 700 sf</td>
<td>100 m² / 1076 sf</td>
</tr>
<tr>
<td>price</td>
<td>3,012,800 Rs *</td>
<td>1,806,000 Rs</td>
<td>1,960,000 Rs</td>
<td>3,914,400 Rs *</td>
</tr>
<tr>
<td>x</td>
<td>4</td>
<td>2</td>
<td>17</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>total</th>
<th>12,051,200 Rs</th>
<th>3,612,000 Rs</th>
<th>33,320,000 Rs</th>
<th>15,657,600 Rs</th>
</tr>
</thead>
<tbody>
<tr>
<td>sale</td>
<td>75,460,000 Rs</td>
<td>75,384,000 Rs</td>
<td>76,000 Rs</td>
<td>0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>1BHK</th>
<th>1BHK</th>
<th>2BHK</th>
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<td>40 m² / 430 sf</td>
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<td>65 m² / 700 sf</td>
</tr>
<tr>
<td>price</td>
<td>1,268,500 Rs</td>
<td>3,174,200 Rs *</td>
<td>1,902,750 Rs</td>
<td>2,065,000 Rs</td>
</tr>
<tr>
<td>x</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>25</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>total</th>
<th>1,268,500 Rs</th>
<th>12,968,800 Rs</th>
<th>7,611,000 Rs</th>
<th>51,625,000 Rs</th>
<th>24,744,600 Rs</th>
</tr>
</thead>
</table>
| sale | 110,230,700 Rs | 109,254,000 Rs | 976,700 Rs | 0.8% | 0.8%

---

Financing Option 1: Market Prices

- **Type I**
  - 1BHK
  - 1BHK
  - 2BHK
  - 3BHK
  - Commerce
  - Construction

<table>
<thead>
<tr>
<th>area</th>
<th>50 m² / 538 sf</th>
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<td>34,066,000 Rs</td>
<td>45%</td>
</tr>
</tbody>
</table>

* This unit has a rental unit attached to it. The cost of the rental unit is reflected in the overall price.

Financing Option 2: Break Even

- **Type I**
  - 1BHK
  - 1BHK
  - 2BHK
  - 3BHK
  - Commerce
  - Construction
  - Profit

<table>
<thead>
<tr>
<th>area</th>
<th>50 m² / 538 sf</th>
<th>60 m² / 645 sf</th>
<th>65 m² / 700 sf</th>
<th>100 m² / 1076 sf</th>
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</thead>
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<td>1,806,000 Rs</td>
<td>1,960,000 Rs</td>
<td>3,914,400 Rs *</td>
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<tbody>
<tr>
<td>sale</td>
<td>75,460,000 Rs</td>
<td>75,384,000 Rs</td>
<td>76,000 Rs</td>
<td>0%</td>
</tr>
</tbody>
</table>

- **Type II**
  - 1RK
  - 1BHK
  - 1BHK
  - 2BHK
  - 3BHK
  - Commerce

<table>
<thead>
<tr>
<th>area</th>
<th>40 m² / 430 sf</th>
<th>50 m² / 538 sf</th>
<th>60 m² / 645 sf</th>
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<th>7,611,000 Rs</th>
<th>51,625,000 Rs</th>
<th>24,744,600 Rs</th>
</tr>
</thead>
</table>
| sale | 110,230,700 Rs | 109,254,000 Rs | 976,700 Rs | 0.8% | 0.8%
rental income

As seen in the previous tables, the units that are purchased with a rental unit attached are higher. Here I have looked at the average salaries of the migrant workers as well as the lower-middle income owner. I also found the average rent paid by a Paying Guest in Nalasopara West. This information was then used to determine how much a family could earn from renting the extra unit to seasonal migrants. The potential earnings are quite significant, almost earning as much as the yearly salary of the middle income owner.
community comparison

Current Situation:
Sri Prastha is lacking diversity in dwelling types, income groups, amenities and open spaces. For these reasons, it is not set up for resiliency.

Units per hectare: 200
Open Space: 3.88 m² per person
Families: 1,400
Migrants: 0
Amenities: ~11

Possible Future:
Sri Prastha harbours a diversity of groups and dwelling types, allowing for living and working in the same area. It is always evolving to adapt to change.

Units per hectare: 268
Open Space: 3.5 m² per person
Families: 1,584
Migrants: 1,184
Amenities: 130+
Value Comparison

Single Income Group
- 3 Dwelling Types
- Single Tenure
- Few businesses
- Few job opportunities
- Little community space & no attractions
- Few amenities
- Inconsistent or non-existent community & building maintenance

Mix of Income Groups - Inclusive community for seasonal migrants
- 5+ Dwelling types for different lifestyles & activities
- Mixed Tenure
- Many commercial units
- Many job opportunities within building & community
- More programmed open space
- Plenty of community amenities
- Design encourages maintenance, community board in charge of infrastructural maintenance
- Flexibility in building height and within units
Before
After Redevelopment
5 Years Later
This project proposal was set in Sri Prastha because the location satisfied a number of prerequisites. The idea is for Sri Prastha to act as an example of what such a (re)development could look like and how it would function. However, the framework that was set out is meant to be used on multiple locations, not only in Mumbai but anywhere in India as well.

Here I have identified a number of locations, only within Mumbai City which would satisfy most of the location requirements. All of these places have very regular urban fabrics and are predominantly middle or upper middle class communities. The state of the existing buildings is unknown, however many may need renovation or redevelopment in a number of years. This example goes on to prove that the project is not tied to its location, and can indeed be implemented at various locations. Greenfield sites are also a possibility, where the urban planning framework will become one of the main decision-making and design tools.
There is a very clear need for housing reform in India. There are millions of seasonal migrants who are unable to secure adequate housing and are forced to live in squalid conditions. My proposal sheds light on a new approach to housing that will benefit the different groups it aims to bring together. The project succeeds in housing over a thousand migrants in Nalasopara West. If it is implemented in various locations, it has the possibility of supporting many more livelihoods and give them a vital key to the city.

In addition to providing housing, it aims at maintaining affordability for the groups involved and proposes a new, society-led scheme that no longer suffers from developer greed and market trends.

While the project has its flaws, for example, there is no guarantee that rooms will be rented exclusively to migrants, it allows for a level of flexibility that will help it adapt to changing circumstances. It should serve as a solid stepping stone in starting the discussion around housing temporary migrants and the benefits that this could bring. Let this be a model, hopefully one of many in the near future, of what could be done to begin solving the issues presented in this thesis.

Figure 31: Migrant woman in Dharavi
India is one of the many countries in the Global South to experience mass urbanization, mass migration and considerable economic growth. Its cities cannot handle the influx of migrants and so these people are left to fend for themselves. Mumbai can be seen as a microcosm struggling to deal with the issues that come with increased economic output and a wider gap between the rich and poor. Mumbai City was a migrant city from the time of its foundation. Over its history, it has become home to a diverse range of social, ethnic and religious groups. It acted as a safe haven during times of distress and as a place of opportunity. Today, it is home to nearly 20 million people, many of whom are migrants who settled in the big city. As Mumbai’s economy is shifting from being primarily based on manufacturing and agriculture to providing more services, rural families are experiencing greater debt burdens, earn less for the amount they produce and struggle to put their children through school. Their solution is to send family members to the city in the hopes that they will find work and support their families in the village. These new city dwellers fall into the category of “seasonal migrants” who move back and forth from village to city following harvest cycles. Seasonal migrants form the poorest of the poor in India and often live in slums, pavements or, more commonly, the workplace.

The challenges that the temporary migrants face are many: no access to essential services, extremely low-paid, hazardous work, extortion and a lack of adequate housing. I believe that solving the housing issue is one important step towards ameliorating the lives of these people who contribute a lot to India’s growing economy. As such, my project looks to house migrants and lower-middle class residents in the same community, allowing each group its privacy while encouraging them to grow and benefit from one another’s presence.

**Figure 32: Water truck in Rahmat Nagar**
The topic of housing temporary migrants is a very relevant one in architecture during this time of mass urbanization and lack of affordable housing — housing has been turned into a commodity rather than a basic right. It has become clear that existing approaches may not be enough and a widened gap between rich and poor is detrimental to cities. This calls for new solutions to the issue, often ones that attempt to mix social, racial, religious and income groups, in order to create resilient, sustainable communities. As cities all over the world are also beginning to experience massive growth and struggle to keep up with housing their newly urbanized populations, the solutions that are being devised for cities like Mumbai, such as my own, can be adapted to suit the future needs of other major world cities.

To elaborate, my project focuses on compelling two very different social groups to co-exist in the urban and more private spheres, precisely because the two groups need each other to sustain their lifestyles and to form resilient communities in uncertain times. I think that this is what architecture is about: creating and influencing conditions for the betterment of health, safety, community, local economy and upward mobility. On a wider scale, the project has a strong urban presence and really aims to create community beyond the singular building. And on the smaller scale, the project looks to implement sustainable design concepts in the Indian context, using locally available materials and turning climatic challenges into opportunities. In this sense the topic is relevant and demands that I use skills and knowledge that spans across multiple disciplines that all encompass the Master of Science in Architecture, Urbanism and Building Sciences.
The Global Housing Studio has devised a set of research methods that form an integrated approach to tackling architectural issues. Primarily, it focuses on the methodologies of micro-ethnography and typological study as a way to balance the social and analytical aspects of architectural research. In my opinion this is a very strong approach as it ensures that the resulting design is more holistic in its perspective and ability to resolve architectural and societal challenges. The view of the architect is thus not only focused on what is architecturally or typologically appropriate, but also draws on local customs and living patterns to inform design, layout and community integration.

The first phase of the studio was structured to give us a solid foundation of knowledge on the state of housing in India and background knowledge on Mumbai City, in order to help us choose a research topic. Within this collaborative phase, mainly targeted toward typological and background research, I worked on mapping urban morphological, ecological and infrastructural links, gathered data on economy, population, migration, culture and history, analyzed case studies of current affordable housing developments and did a literature analysis on housing policies. The book “Building and Dwelling” by Richard Sennett was an additional resource in supplementing and broadening our knowledge base.
As part of the micro-ethnographic research, we conducted a comparative study in both India and the Netherlands. This was one of the most eye-opening bits of research as we had to go out to the chosen location and speak to locals and observe their behaviour. It emphasized the differences in the Western and South-Asian way of life - community, personal interaction, organization of space, space requirements and generation of income. The documentation of these patterns was done in the form of drawings of typical examples of each observed pattern, coming together to form a book that was consulted throughout the design process.

The individual portion of the research was started when we went to Mumbai and I visited Sri Prastha. To expand upon the initial micro-ethnographical research, I conducted my own interviews with residents, entered homes to understand their layouts, mapped various amenities and their uses and continued reading literature related to the topic of migration. Using this information I came up with a storyline and characters representing the two social groups in order to understand their daily lives and needs. These story lines came together to form scenarios that later informed the design. I also expanded upon the case study analysis (analyzing typologies) by looking into more international and Indian examples that encouraged social mixing. To summarize, the individual research methods I used were similar to what we had already done as a studio and were meant to further elaborate on certain topics. I supplemented the micro-ethnographic pattern research through interviews and by mixing in the more literary approach of scenario planning.

My personal research serves to augment the small pool of information about temporary migrants, adding to it the architectural and social perspective that some studies lack. My contribution should read as a case for looking into the seasonal migrant condition more seriously and be used as an approach to resolve some of the key issues migrants face in the city.
The micro-ethnographic research approach required spending time in the neighbourhood of Rahmat Nagar watching and talking to people to get a sense of their living conditions and ‘patterns of inhabitation’. This approach brought with it some ethical dilemmas pertaining to the way the research was conducted and how it was interpreted. One of the key methods of ethnography is to live and be amongst the people in question to get a sense of their struggles and daily life practices. Due to the fact that we only had two days to conduct this type of research, we spent a lot of time during those two days taking many photos and recording people’s actions. Taking photos was perhaps the hardest thing to do, as I felt like I was intruding, and had no right to photograph everyone without their knowledge and consent. While it seemed that no one really minded, and some people really wanted to have their photos taken, it also altered the research itself: the act of recording changes the results gathered.

Because the research gathering phase was so short, we relied heavily on our interpretations of what we saw to craft the story and thus the resulting research outputs. Even though we were aware of it becoming an issue, it was too easy to romanticize the slum situation, concluding that people really do prefer to live in communal environments with their entire families. Certainly, this interpretation and romanticization may have skewed further understanding of user needs and wants. It also seems that we all got caught up in a very black and white categorization of people based on their perceived social status and income group. When dwellings are meant for the middle class, they are automatically considered rich and lavish, when in reality that is not and may...
not be the case. The research also excluded interaction with these other income groups; we exclusively spoke and observed people in the poorest segments. There was no means of comparison between the groups. Overall, the research dilemmas were mainly rooted in the intrusive nature of the gathering of information and the speculative nature of interpreting it.

Some of these smaller issues were carried on into the design stage. I had to make assumptions about the specific needs of each group based on a small sample of observations. More importantly, the mixing of these two very different social groups should be subject to further research. While evidence points to the fact that a lot of lower-middle class families started off as migrants, there is also the argument that they no longer want to be associated with the negative image of migrants. Should my design and/or approach be implemented, the issue of social mixing would certainly be the main one to determine whether the concept could be a successful one.
It was during the first phase of research that I began to notice a pattern of seemingly unaddressed issues related to seasonal migrants that piqued my interest. The combination of further literature research and my visit to Sri Prastha helped me figure out my design hypothesis - that combining housing for the lower middle class with seasonal migrants would alleviate the issues that were faced by each group. The collective and individual research I conducted set a very strong base for my project and helped me to design for the Indian context. The design took a more iterative approach, first being informed by the various case studies and the observed social patterns, then by addressing needs at the urban scale and back to the building scale. Rather than working on the different scales of buildings, units, details and urban form at specific stages, we were challenged to always keep everything in mind and zoom in and out frequently. This really urged me to design something that works on all scales but also prevented me from getting stuck in the details and forgetting about the big picture. While the iterations were a bit slow, I think this incremental design process helped me refine my concepts and thus the places and dwellings I was designing.
I do feel that the design eventually departed from the initial case studies I was loosely following and took a life of its own. The critical feedback I got from my tutors helped me identify areas of improvement and challenged me to find more effective solutions which helped align the project with the design goals. I would say that the most effective part of the research consisted of the study of social practices. That study helped me define formal goals on the part of the dwellings, for example having a communal street for the migrants to be able to expand out onto, creating live-work units that allow for at-home manufacturing or even running a small business, and providing space and access to necessary amenities, keeping in mind that smaller amenities tend to cluster near larger ones. While my project is intended to be replicated all over the country and maybe even outside of it, I feel that it took (a positive) root in the Indian context.

Figure 39: My first design iteration at P2
Migration is ever increasing around the world, as people are more willing to relocate for work or chances at a better life. The topic of housing seasonal migrants is a particularly interesting one as it focuses on mobile populations and therefore different lifestyles, something the Western world is also beginning to notice as a trend. Similar factors drive migration: people are looking for well paying, stable work, fulfillment, a better standard of living and a purpose. Temporary or contract work is becoming more common as is the constant shift from living in one city or country to another. My research project addresses this temporality, focusing on seasonal rural-urban migration, and provides a theory that can be used to predict, understand and respond to the challenges it poses for cities and the migrants themselves. I think a lot of what I am doing is transferrable beyond the Indian context and can become useful research for housing models for this mobile population.

The overall urban goal is to create a future-proof, resilient community—one that adapts to changing residents, encourages local business activity and provides a safe, affordable and healthy living environment that helps its residents set a strong base in life. This is achieved through a mix of social groups and tenure options, provision of necessary amenities, repeatable building blocks that can be clustered to create unique conditions and an urban planning framework that allows for flexibility based on current and future needs. This goal aligns with the UN’s sustainable development goal of Sustainable Cities and Communities which includes targets for safe, affordable housing, inclusive and sustainable urbanization and universal access to safe, green, public spaces. My work
thus far has been focused on these three topics, especially inclusive and sustainable urbanization, as well as safe, affordable housing. These three targets are also components of what I would define as a resilient, future-proof community, which I demonstrate in my design through the provision of large plots of open space, a new access link to the community park, as well as by integrating migrants into traditionally lower-middle class neighbourhoods, and providing a model for affordable housing. Shifting the attention to housing this abandoned group of society opens up the discussion on the definition and provision of “affordable housing” in India, and sheds light on the opportunities that arise from mixing social groups with regards to sustainable and inclusive urbanization. In this regard, my project works to provide a possible solution to the temporary migrant housing crisis and starts the discussion for more inclusive and future-focused housing policy and design.

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