Redefining Boundaries: A Design Proposal for a Migrant Worker Communal Housing Plan in Al Quoz, Dubai, UAE

By

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Acknowledgment

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Abstract

Being born and brought up in the UAE, I had the privilege of watching Dubai transform from a desert port into a thriving metropolis with the third-most skyscrapers in the world. With the increased demand for migrant workforce due to large projects like Expo 2020, the UAE and the rest of the Gulf are going through a transformation that could affect their migrant workers. Since 2014, about 34,000 laborers have died in the Gulf due to exploitative working and living conditions. I believe it is crucial to evaluate the impact of design, and for this thesis, I am proposing a redesign of the UAE’s migrant worker housing to provide more humane housing conditions for the low-income, diasporic migrant worker population living in the UAE.

The current ‘labor camps’ in the UAE are extremely overcrowded and lack basic amenities. The design solution aims to meet the needs of the migrant workers in the effort to provide humane living conditions. I will propose a portable, sustainable, and flexible communal housing model that will serve the current migrant workers and possibly their families in the future. The site will include integrated introverted-extroverted spaces, which will be built up of modular typologies that can change over time as demographics and needs change. The spatial arrangement of the building typologies with mixed functions could contribute to the social and cultural integration of the migrants in various ways.
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Chapter 1: Introduction

The UAE’s urban landscape has been shaped by the intense ethnonationalism embedded in its society as well as intersectional class relations. In the UAE, although migrant workers cannot become legal citizens, they are essential to the country’s development and integral to understanding the country’s nature of citizenship and cultural identity. While the political pre-conditions of the UAE define a limited population, questions of adequate housing, leisure, and autonomy recur in the Gulf States and other areas increasingly dependent on migrant labor subordinate to the needs of citizens, ranging from Hong Kong to European countries such as Germany. In Hong Kong, for example, there are roughly 336,000 migrant domestic workers, the majority of whom are Filipina (Zigmund, 2020). In all of these places, there are often physical as well as cultural barriers that limit migrant workers’ access to necessary resources, which prevents them from fully participating in economic and social life.

‘Laborers’ are the low-income immigrants, mostly from South Asia, who work in the service sector such as taxi drivers, construction workers, and security guards. They are often not accompanied by their families due to their low salaries, thus, over three-quarters of Dubai’s population are men (Reichenbach, 131). They send remittances abroad to their families to financially support them. In 2018, migrant remittance outflows in the UAE were estimated to be $44.4 billion (Jones, 2020). The categorization of individuals based on nationality and profession continues to have an impact on spatial segregation in the UAE.

The UAE implements exclusionary policies to maintain the transient lifestyles of labor migration and to prevent permanent integration. Immigrants are employed based on labor policies that restrict their working and social lives and are used to ensure that they eventually return to their country of origin (Wakefield, 115). For the Emiratis, this is a form of cultural
survival and maintains exclusive access to citizenship rights. Yet, migrant accommodation in the UAE is used as a mechanism for social and spatial marginalization.

In a 2019 report, “Working and living conditions of low-income migrant workers in the hospitality and construction sectors in the United Arab Emirates”, the authors interviewed migrant workers through focus group discussions (Fargues, Shah, Brouwer, 4). 50% of the interviewed workers said their workload was too heavy for the income it brings. The kind of work the male laborers do often differ from what they were told before taking the job. Only 10% of the interviewed workers reported that their salary was the same as written in the contract, while 37% said it was not. While only 3% of the workers staying in labor camps were unsatisfied with the living conditions, 57% said that the rooms were overcrowded. The migrants’ main recommendations were: “better implementation of the laws, institute labor inspections by the government, provide for voting rights for representation in the camps, appoint trained healthcare professionals in the camps, and assign health benefits or health insurance for the workers” (Fargues, Shah, Brouwer, 5).

**Setting the Background: Current Migrant Worker Housing in the UAE**

The immigration of workers from overseas into Dubai is an overlooked humanitarian issue; from the moment they are deceived into an idealized lifestyle, to their day-to-day living/working conditions, all the way to the lack of rights as humans. 90% of the UAE’s workforce are mostly low-wage and semi-skilled workers from Africa, Asia, and elsewhere in the Middle East, and over the last two decades, the number of immigrants has almost doubled (Qadri, 2020). There are physical, social, and economic barriers put in place that marginalize the migrant population whose rough camps are located far outside cities, have become
run-down, and are overcrowded with transient contract laborers. Accessibility to adequate housing and social spaces is limited for migrant workers. These ‘labor camps’ often lack electricity and even air-conditioning in the 122 degrees Fahrenheit heat (Wakefield, 116). The flats are “fit for only a single-family and are packed with 14 to 16 workers” (Kanna, 70). The government announced ‘minimum standards’ for labor camps in 2007. These requirements include at least three square meters of space for each person and one toilet for eight people (UAE Government, 2021). Nonetheless, many of the labor camps remain in poor condition.

The current labor camps in UAE (figure 1) only house men; the majority of the women migrant workers are employed as housemaids, who often end up living at their employer’s home as a full-time maid. Alternatively, they choose to live with their families in apartment ‘bed spaces’ (portions of a bedroom put for rent and separated by a wall of fabric). These labor camps are often owned by individuals and are rented out by private firms to house their employees for

Figure 1: Image of a room in a labor camp in the UAE (source: image by Bendiksen)
a temporary period. Therefore a migrant worker’s stay depends on the work contract they have. Once their work contract is completed, they either have to find a new job or go back to their home country.

The Need for Affordable Housing

Although the UAE is making efforts to improve laborers' lives due to pressure from international non-profits such as the International Labor Organization, there are minimal reformations to the policies that impact laborers. During the interviews I conducted for my Hanna Holborn Gray research, a young expatriate entrepreneur mentioned that “there is very little legislation and direct jurisdiction around how they structured the governance and policy in labor camps, [which] I think goes from company to company. Of course, there are basic human rights [and] governance on a national level, but I think very little of it speaks to [the] safety and protection of those and labor camps of actual human need versus what they receive ". She also pointed out that “it’s hard to generalize and I think every business has their policies under which they structure these labor camps”.

McKinsey Global Institute defines ‘affordable housing’ as housing costs that consume no more than 30 to 40 percent of household income (McKinsey, 1). In the UAE, there is no conventional structure for affordable housing. According to a 2018 Deloitte report, ‘in Dubai, rents or mortgage repayments are deemed affordable if they are less than Dhs9,300 per month – or approximately Dhs 112,000 per year’ (Deloitte, 54). In 2019, the average sales price for a studio apartment in Dubai was Dhs670,000, but prices vary greatly depending on the location. A studio apartment in Jumeirah Lake Towers can cost Dhs 675,000. The same property in International City would be half that price (Burke 2019). Given that the average wage in 2019
was Dhs 16,775 (Burke 2019) and the cost of living is relatively high, I believe that there is a significant need for affordable housing in the UAE.

Goals of this Design

This thesis intends to propose a community-based and socially inclusive design on a migrant worker housing plan that provides affordable and sustainable solutions for the marginalized low-income migrant workers in the UAE. The aim is to design an architectural solution that is physically, socially, and culturally more inclusive than current facilities for the migrant workers in UAE, in the effort to provide more humane living conditions rather than the current 'labor camps’ with few shared amenities and overcrowded rooms. The model can be used to make flexible 'worker communities' which include a space for leisure and other necessities required in a residential area. If reproducible, this model might also begin to reduce the systematic divide between the high-income nationals and the low-income migrant workers and might be recreated in other areas where global social and spatial segregation have shaped cities. It is also an attempt to use functional architecture and space to address the lack of affordable housing in the UAE.

About 69% of the UAE’s population is male (The World Bank, 2019). This gender imbalance is largely due to the country’s high dependence on foreign male labor, especially in the construction industries (The National, 2021). On the other hand, female laborers often live in better conditions in the private homes of their employers or sponsors but also face precarious situations. While this design primarily focuses on the male populations of the laborers and the housing they currently live in, this model is flexible and can also be applied to an affordable housing community plan as well to accommodate the female migrant workers.
With an evaluation of Dubai’s current urban planning which excludes laborers from the rest of society, we can come closer to developing a model that encourages social inclusion rather than exclusion. By integrating public spaces designed to be inclusive, we can potentially reduce microsegregation between national and non-national groups in the UAE and will foster a sense of familiarity between these groups. This community-level change could have an impact on the individual migrant worker groups as it creates a sense of belonging and positively contributes to their mental and physical health. The main goals of this project are: (1) to use social engagement philosophies to achieve a physically, socially, and culturally more inclusive communal housing model, (2) create a flexible and sustainable design in a challenging environment, (3) design a model that is portable, affordable and easy to assemble.

**Chapter 2: Design Explanation**

**Who is Going to Invest in this Project?**

Labor camps may be either rented out by construction firms or by the workers themselves. These firms then have the added cost of transporting their workers back and forth between the labor camps and the construction site. For the former, this prefabricated model can be initially marketed as a product to private firms to lower their costs of transport and housing for their migrant workers. This model will be a prefabricated, easily demountable, low-cost, sustainable, and flexible housing plan that construction firms can buy and set up either close to at the construction site itself.

The migrant workers, by contrast, can either rent out or buy the housing units in installments to eventually have more space to potentially live with their families and create an extended community within an area. Depending on how much space is available in an area,
these prefabricated units can be either stacked on top of one another or spread out across a larger area of land similar to the one I propose in this paper. This concept stems from Balkrishna Doshi’s low-income Aryana housing plan, where one of the objectives was to "create a balanced community of various socio-economic groups" (Hill, 2018). This project enabled high-income buyers to subsidize loans for the lower-income properties; any funds that went beyond the average plot cost went into a common trust that the poorer families could use to buy and expand their homes. Plus, lower-income residences were evenly distributed among Aranya’s six sectors, rather than all in one sector; service charges were scaled to income level, and training centers were provided for residents to gain construction skills.

The Concept

Many factors influence the design for laborers, including flexibility, sustainability, materiality, and modularity. However, some factors will take precedence over others, especially in a project of this scale. While flexibility and sustainability are important aspects in a communal housing plan, planning that involves a combination of modular housing and introverted-extroverted spaces is crucial to create a sense of community as they provide the opportunity for open structural growth of the community while creating pockets of comfort zones in a hot and humid climate.

Integrating Introverted and Extroverted Spaces

Public spaces in the UAE often exclude laborers, both implicitly and explicitly. For instance, the Majaz Park in Sharjah has regulations that state only families and women are allowed, whereas single men are not. Most laborers do not have their families in the UAE, so many of them are not allowed in the park as they are seen as ‘bachelors’. The park is surveilled
by security guards walking around the area at all times. While malls do not have such restrictions, laborers are still put under high surveillance by security guards.

In a local newspaper article, journalist Suryatapa Bhattacharya describes how laborers feel unwelcome in public spaces. The article quotes an Indian construction worker in Abu Dhabi, Surinder Singh, where he describes his experience: “There are the malls and the Corniche, and even that is shut out to us. In the malls, there is an uncomfortable feeling around us if there are too many of us. The security will follow us around. And I don’t want to spend my only day off in the week walking in the mall alone, without my friends. That is the only way the security guards will not pay attention to you” (Bhattacharya, 2009). In this way, socio-spatial divisions in the UAE are mainly in the form of “soft boundaries” as Reichenbach describes, where exclusion is spatially expressed through subtle means.

Through shared interactions and experiences, the migrant workers construct a sense of belonging. From my observations in the UAE, I have identified how laborers use public space to reproduce their identities abroad (figure 2). For instance, in parks, museum grounds, and empty building plots, Sri Lankan, Indian and Pakistani workers often play games of cricket. Playing cricket could be seen as both a leisure activity and as a way of connecting with their homeland. Sports is one of how laborers create a sense of belonging in the UAE. However, since the labor camps are positioned away from the city, most laborers do not have the means to have access to these leisure spaces.
Migrant workers are pulled from their countries and at the end of a long day at work, they thrive on social interactions to create a sense of belonging. This design incorporates introverted and extroverted spaces where people can interact with each other at various scales. Amenities and communal spaces play a large role in the design to bring people together. These introverted spaces are semi-private gathering sites where people can interact on a smaller scale. On the other hand, extroverted spaces are public gathering sites at a significantly larger scale. This allows people to interact with each other at different levels of privacy. I have included a combination of semi-private and public spaces to allow for a leisure space that is easily accessible for the laborers, where planned and unplanned interactions occur within the site. This
may also lead to a mixing of different demographics from the surrounding areas. In this design, I aim to use the combination of these dynamic public-private spaces to foster relationships and connections between humans and the environment, and between the residents themselves through shared experiences and cultures. In this way, the model allows migrant workers to create places that foster social dynamics and community resilience.

Modularity and Materiality

The concept of modular housing and prefabricated homes has been around for over a century. Modularity and prefabricated housing allow for an ‘open structure’ design as it makes the space flexible and allows it to reflect changes based on residents’ needs. Materiality also plays an important role when designing for efficiency in hot and humid climates such as in Dubai. By using a combination of heat resistant yet durable materials along with passive-cooling methods, natural factors such as the Sun, humidity, and wind can be controlled to an extent to create ‘microclimates’ or pockets of spaces that are cooler in comparison to their surrounding environment. The design incorporates traditional architectural elements used in Middle Eastern and Indian architecture and proposes the spatial arrangements of new building typologies with mixed functions that could contribute to the social and cultural integration of the migrants in various ways.

Chapter 3: Precedent design projects

I have selected and analyzed multiple precedent architectural design projects to inform my understanding of modular, sustainable and affordable communal housing. These case studies gave me an insight into a variety of architectural techniques and forms which have
influenced my design approach. They gave me more insight into the spatial organization, materiality, user experience, and the social activities that define public and private spaces.

**Anguri Bagh by Yasmeen Lari**

One of the projects that inform this design is Yasmeen Lari’s *Anguri Bagh* project, which is situated in a hot, arid climate similar to that of the UAE. In Lari’s project, she designed 6,000 homes for an affordable housing project in Punjab, Pakistan. She used local, low-cost materials to build these structures. The dwellings were arranged in blocks of two- and three stories which were grouped in clusters forming narrow pedestrian streets and public spaces (figure 3).

![Image of one of the buildings in the Anguri Bagh Housing](Source: Kazi Khaleed Ashraf, Aga Khan Visual Archive)

*Figure 3: Image of one of the buildings in the Anguri Bagh Housing (Source: Kazi Khaleed Ashraf, Aga Khan Visual Archive)*

The varied typology clusters created a dynamic townscape. Within clusters, the kitchens are an enclosure within the veranda and bathrooms are open to the courtyard. The spatial forms
speak to the integrated functions. The clustering of the buildings minimized construction costs and maximized sun protection. One of Lari’s main aims for this project was to create a lively environment that would suit the lifestyle of the people. For this precedent, I wanted to focus on how each space encourages social interactions. The narrow pedestrian streets are multipurpose and function as a children's playground, a place for socializing, where people may take their charpoys (string beds) out; a vendor’s selling place; above all they provide space for human interaction. In addition to the form of the design, materiality played an important role in this project. All the materials, except the steel beams, were sourced locally. Brick was used for the walls, the floors and roofs are made of reinforced concrete, and the doors and windows are made of wood (Garcia, 2020). This project shows us that to design a meaningful space, we need to take into consideration the needs and value of the life of the communities that are going to use the space.

Primary School by Diébédo Francis Kéré

Similar to Lari, this project is also an example of climate-sensitive architecture. Diébédo Francis Kéré put forward a design project of a Primary School in Burkina Faso. For this design precedent, I was drawn to the materials Kéré used to provide thermal protection. The measures taken into consideration included cost, climate, resource availability, and construction feasibility (ArchDaily, 2016). To maximize results with minimal resources available, Kéré used a combination of clay and mud for the building. He applied a modern technique of the traditional clay building methods to create the structure. The use of clay had many benefits, including being cheap and easy to produce while providing thermal protection. The walls were protected from the rain using an overhanging tin roof (figure 4).
By adopting architectural methods and thermal protective materials, Kéré made the interior living spaces overall cooler than the surrounding environment. The perforated clay ceiling allowed for ventilation, pulling cool air from the interior windows and releasing hot air out through the perforated ceiling. This feature reduced the ecological footprint of the school and alleviated the need for air-conditioning. Traditional cultural practice, low-tech and sustainable techniques were used so that the Gando villagers could participate in the process, allowing for the best quality building structure while simplifying the construction for workers. This project became a symbol of community and collectivity (ArchDaily, 2016).
SOS Children’s Village by Urko Sanchez Architects

Urko Sanchez Architects present another example of climate-sensitive architecture that informed my design. For the SOS Children’s Organization, they designed a 15-home village in Djibouti - a site known to have the hottest temperatures on Earth. Urko Sanchez Architects built the homes using local techniques, which allows it to speak to the surrounding built environment. The narrow streets cast a shade on one another and provide natural ventilation in the corridors. This is a feature that I used in my design to provide shade between the building structures and the courtyard.

Using an open-structured layout, they formed pedestrian-only streets and playing fields for the orphaned children, creating a sense of community. The compound was built using a reinforced concrete structure, infilled with precast concrete blocks and coated with a pale Cemcrete finish to help reflect harsh sunlight (Astbury, 2019). I also draw on how the architect uses perforated walls to allow for ventilation and increase natural lighting within the interiors (figure 5). The buildings were placed in such a way that they created an internal playground. The homes were closed to the surrounding streets, creating a sense of privacy for the residents (Tzenkova, 2016). They were arranged in a specific way to balance private spaces with the need for security and "organic surveillance" by the SOS staff who look after the children (Astbury, 2019).
The Changodar Housing Colony by HATCH Workshop

HATCH Workshop’s design of the Changodar Housing Colony in Ahmedabad, India, is an example of how modularity can be used to foster a sense of community for migrant workers (figure 6). This labor colony was built directly on the construction site of Changodar where the workers were building a large apartment scheme. Usually, laborers migrate from rural areas to work as unskilled labor on construction sites in the cities. The Changodar Housing Colony’s design is temporary, it can be dismantled and relocated to other construction sites when needed.
The design includes a 3m X 3m modular grid. Units are arranged as clusters forming communal shaded verandas, and accommodate 500 people. The project has 72 units and includes 29 toilets; a crèche and a communal area for men, freeing up the veranda spaces for families, women, and children. The site also has a semi-private courtyard space and shaded outdoor areas (Kumar, 2018). I was interested in this project because of its ability to be transportable and flexible depending on the resident’s needs. Furthermore, the ways in which communal spaces were integrated into this design also informed my design.
Another project that added to my understanding of the concept of modularity and prefabrication is Prasoon Kumar’s Billion Bricks project (figure 7). The team of architects and engineers designed a shelter solution that addresses both housing and climate crises in different parts of the world, including the Philippines and New Delhi. Billion Bricks homes is the world’s first carbon-negative, self-financing home. This project was designed for 200 million rural homeless people in India. Their technology ensures that the homes built do not add negative impacts to the environment. Through the combination of technology such as integrated solar roofing systems and simple prefabrication structures that can be quickly assembled, the technology produces four times the amount of energy it needs for itself.

Figure 7: A building unit from the BillionBricks Project (source: ArchDaily)
The solar roof extends beyond the roof of the house to create a shaded verandah. The additional energy is sold to neighboring industries and powers other communal facilities. As a result, this design system generates additional income for the residents. In regards to amenities, they installed separate systems for electricity, water, and waste which were standardized into plug-and-play units. This eliminated the need for additional labor and reduced the dependency on public utilities. I was further drawn to this project because, at a broader scale, the design ultimately developed communities with opportunities for development. It presents an opportunity to shape the future of our world, where everyone can be a homeowner while mitigating climate change (Billion Bricks Homes, 2020).

Cortex Shelters by Cutwork

The architecture and design firm Cutwork designed a low-cost, durable housing unit model for refugee camps using roll-out cement paneling (figure 8). The construction process requires no building experience or tools. These 250-square-foot structures are extremely durable, fireproof, waterproof, insulated, and have windows for light and ventilation. Compared to traditional concrete shelters, this structure used 90% less raw material and is three times stronger. Although they are designed as temporary housing, they can last up to 30 years. Concrete composite is lightweight, durable, and three times stronger than traditional concrete. The sheets are draped over a steel beam structure and then hardened in place when water is added (Nielsen, 2019).

Additional features can be outfitted to the interiors, including toilets and electric stoves. Solar panels were also added to provide electricity for lighting and electronics. This is another example of modular housing that is easy to assemble. The materials can be flat-packed and
pieced together in under 24 hours (Nielsen, 2019). This project was interesting to me because of the use of materials and the internal structure of the building. This helped me understand how to create strong foundations for my building structures while making them easy to assemble and transport.

Figure 8: Assembling of building and interiors (source: Dwell)

Amsterdam Orphanage by Aldo van Eyck

The Orphanage in Amsterdam designed by Aldo van Eyck in the mid-1950s is another example of modular housing (figure 9). It can be seen as almost a small ‘walled in city’ with a core, square public space in the middle of the site. The individual structures are built as modular pieces, and they are built onto one another to create a range of spaces with different amenities. These dynamic spaces create a flexible, growing city. The modular pieces create an inside-out and outside-in dynamic and create a non-hierarchical sense of community by breaking down the hierarchies of space (Fracalossi, 2019). This precedent informed my understanding of designing flexible spaces that give the opportunity for expansion depending on the needs of the residents.
Balkrishna Doshi questioned the concept of ownership and believes that ‘building homes is about creating a sense of belonging, about participatory involvement and about the expression of aspirations, relationships, and desires’ (Mollard, 2019). In 1983, Doshi was commissioned by the Indore Development Authority for the Aranya project (figure 10) in response to an acute shortage of affordable housing. This project was designed for Indore’s Economically Weaker Sections (EWS) and the slum and street dwellers. For the Aranya project, Doshi designed 6,500 unit homes built-in 1989 (Hill, 2018). Doshi used a “sites and services” approach, where amenities such as electricity, water, and sewage systems were provided, but the houses were
built minimally. This allowed residents to shape the space according to their fundamental needs and lifestyles.

The units were made of load-bearing brick on a concrete plinth with walls plastered and painted. Doors and windows were fabricated on site. While the growth of the site was planned, it was still informal in the sense that it departed from modernist grids and hierarchies (Mollard, 2019). I was drawn to this project because of the social streetscapes defined by the balconies and front stairs; each space has multiple uses. For instance, the stairs are not just for going up and down, they are also used as smaller social gathering spaces. Intimacy is preserved in the introverted niche and private corners. On the other hand, there are also extroverted communal spaces such as the courtyards where residents can interact at a much larger scale. These open

Figure 10: Arayna Housing (source: Awasarkar, 2021)
spaces are planted with plants such as bottlebrushes, casuarina, and eucalyptus trees. Every 10 clusters of houses shared a courtyard, and each section had its own green space and one larger public space for the whole community. The combination of these private-public buffers and indoor-outdoor relationships created a sense of flow within the spaces (Awasarkar, 2021). This concept of interweaving extroverted and introverted spaces within a site informed my design. It allows for social interactions at multiple scales.

Doshi believed that a home should evolve with its residents and the spaces themselves should have multiple uses (Awasarkar, 2021). He tried to include the residents in the design process as much as possible. For instance, he allowed the homeowners to choose the material, color palette of the house, the number of bedrooms, and extra features such as an electrical stove. To create a balanced community of various socio-economic groups, Doshi allowed high-income buyers to subsidize loans for lower-income properties. Any funds that went beyond the building cost went to a common trust that the poorer families could use to buy and expand their homes with. The lower-income residences were evenly distributed across all the sectors on the site, rather than all in one sector; service charges were scaled to income level; and training centers were provided for residents to gain construction skills (Hill, 2018).

‘ABC of Incremental Housing’ by Elemental

Two decades after Doshi designed the Aranya project, Alejandro Aravena and his team of architects designed four incremental housing projects (Lo Barnechea, Monterrey, Quinta Monroy, and Villa Verde) that were made available online for free as public knowledge and a resource. They aimed to create an ‘open system’ to address the issue of housing shortage by using already available resources and building capacity to that of governments and the market.
They believed that the problem could be addressed by making people part of the solution rather than part of the problem. The main principle for all four projects was to ensure a sense of balance between low-rise high density, without overcrowding, with the possibility of expansion (Hill, 2016).

**Passive cooling techniques**

Passive cooling uses free, renewable sources of energy such as the Sun and the wind to provide cooling, ventilation, and lighting needs for buildings. This would reduce the need for mechanical cooling. In her research article ‘Using passive cooling strategies to improve thermal performance and reduce the energy consumption of residential buildings in UAE buildings’ (2014), she discusses passive cooling strategies recommended specifically for UAE's hot arid climate. Energy consumption can be reduced by both harnessing natural ventilation and minimizing heat gain by combining strong shading techniques with double-glazed windows. Plus, green roofing acts as effective roof insulation (Taleb, 156). Traditionally, UAE’s local architecture used passive cooling methods before air-conditioning was invented. For instance, courtyards became a prototype in urban design strategies for hot arid climates. This type of architecture not only has efficient purposes but also added to the social aspect of the design. I believe a combination of natural cross-ventilation techniques and central cooling systems will be helpful to maximize cooling efficiency sustainably and cost-effectively. As the UAE is moving towards a more sustainable and ecological future, local and international architectural firms have been implementing both traditional and modern passive cooling techniques to avoid an increased cooling load. For example, the buildings in Madinat Jumeirah in Dubai have
integrated *burjeels* (wind towers) and courtyards into their architecture to further cool down their buildings.

The climate in the UAE is generally the same all year round with two main seasons. In the summer between May and October, temperatures range from 28 °C and 48°C. During the winter, between November and April, temperatures range from 17°C and 27°C (Taleb, 156). Wind in Dubai comes from different directions with a few variations in terms of wind velocity. Given that the northwest side experiences higher wind velocities, it is considered to be the best direction to exploit the wind.

For her research, Taleb specifically evaluated the passive cooling strategies in ‘Silicon Oasis Dubai’, a modern urban project that has a combination of residential villas and apartments, and commercial buildings. One of the passive cooling methods she discusses is ‘louver shading devices’ (Taleb, 158). These are positioned in the southeast facade of the building to block sunlight in the summer and allow wind to pass through it and cool the building. This type of shading is designed in such a way so that it blocks the sun in the summer and allows it to enter during the winter. They are placed horizontally and rotated at 45°. When the sun is high, the louvers block the heat but still allow light to pass through. Windows transfer large amounts of heat between buildings and their exterior environment. Double-glazed windows help decrease the heat gained from windows by creating insulation between the space of two glass panels. Wind towers provide a low-carbon ventilation system that delivers fresh air without the need for a mechanical system. The difference in air temperature and pressure directs the air into the building through the wind tower. Taleb suggests that to avoid turbulence from the rooftop, a taller windcatcher will provide negative pressure and better ventilation and fresh air. In the villas at Silicon Oasis, Dubai, the wind catchers have a louvered opening pointed
towards the northwest direction, which provides the most positive air pressure (Taleb, 159). Cross-ventilation helps with removing hot air and bringing in fresh air into the building while lowering the temperature inside the building. In Taleb’s case study, cross ventilation was encouraged by opening the terraces and windows.

Green roofing was another method Taleb discusses in her article. It is considered the best method of insulation for a roof (Taleb, 159). The roof is one of the main points for solar heat gain. Green roofing can be used as a strategy for insulation to reduce heat conduction to the interior of the building. It also produces oxygen for the environment and reduces the overall surrounding air temperature. Intensive green roofs require more maintenance than extensive ones, which involves planting a variety of light plants to create a light layer of insulation on the roof. Green roofs require drainages and barriers for roots, as well as channels for water. A combination of these methods in my design would help make the building more sustainable and affordable. For my design, I have included features that allow for cross-ventilation in the interiors, incorporated louvers to provide more shade on the walkways below, and arranged the building units around courtyards.

**Chapter 4: Site Map Analysis**

**Overview**

After evaluating the current labor camps in Dubai, I decided to choose Al Quoz as my site (Illustration 1). Since 1977, Al Quoz has been dominated by industrial factories, warehouses, and labor camps. Over time, it branched into a residential area mainly for Emiratis. In 2008, Al Serkal Avenue was established, which is an art district that attracts various groups of people from different parts of the world, ranging from artists to entrepreneurs (Haziq, 2019). Therefore, there is a range of socio-economic groups in this area that could potentially help with
the integration of the low-income laborers with the expatriates and national Emirati populations. Al Quoz is one of the few points in Dubai where the elite and low-income migrant workers cross paths (New York Times, 2016). Furthermore, this site is easily accessible by public transport such as the metro and public buses. Plus, rent in this area is significantly lower than in other parts of Dubai and it is not as densely populated as the rest of the city.

Illustration 1: Map of Al Quoz

Since Al Quoz is still predominantly an industrial area with lots of factories, the average annual air quality is classified as ‘moderate’ at 127 AQI. According to PlumeLabs, this is greater than the maximum annual limit established by WHO and long-term exposure constitutes a health risk (American Lung Association, 2020). Consistently monitoring the air pollution in this
area would be a good idea to maintain a clean environment for the residents. Recent technology such as the Internet of Things (IoT) can be used to track and measure greenhouse gas emissions in the air (Smith, 2018).

In Al Quoz 4, there is an already established migrant worker housing plan. I have chosen the Al Rostamani labor camp plot to be renovated into my proposed model. Currently, this building has a capacity of 1,500 people in 300 rooms, with two dining rooms, and one kitchen. The site is broken up into three sections, and its total area is 96,424.88 ft² (illustration 2). Most of the buildings in this area range from one-story to three-story buildings. Across the street from this site is an empty, abandoned lot that is used to park buses and cars. This extra land across from the current labor camp provides the opportunity for the migrant workers to expand their communal housing plan into that space if needed.

**Designing the Site Plan**

The design proposal aims to do the following: to use social engagement philosophies to achieve a physically, socially, and culturally more inclusive communal housing model; to create a flexible and sustainable design in a challenging environment; and design a model that is portable, affordable and easy to assemble. Keeping these factors in mind, I designed a site plan that attempts to combine introverted and extroverted spaces with modular typologies to encourage social interactions and provide more humane living conditions. The program consists of multi-functional, sunken courtyards to accommodate public gatherings, shared balconies for public circulation, communal green gardens, vendor spaces, external storage spaces, communal kitchens, indoor and outdoor dining areas, a public prayer space, along with other amenities.
such as bathrooms, showers, laundry areas with drying racks, medical service rooms and bike racks.

Depending on which direction the courtyard is facing, there are more or fewer two-story buildings. Illustration 3 shows us the Sun pathway for this specific region from January to June, between sunrise and sunset. Using GIS mapping skills, I created this diagram that helped me understand how the Sun can affect the building orientations and allowed me to identify which areas needed more two-story buildings. Most of the two-story buildings are placed in the third section of the site since it gets the most amount of light throughout the year. The north-facing facades receive the least amount of direct sunlight, which makes it the best direction for public communal spaces. The east-facing facade is most ideal for bedrooms as it only receives direct sunlight in the morning and cools down quickly by nighttime. Balconies, verandas, or brise soleils can be used to block sunlight on the west facades.

At the center and third section of this site, there are large outdoor sunken courtyards that serve as the heart of the plan for social connectivity and direct sunlight. In this way, these main courtyards can be used by the migrant workers as an area to play cricket or as a space for other public gatherings. The central main courtyard is adjacent to the residential unit courtyards and smaller public spaces such as the prayer area, a communal garden, a medical service area, a kitchen, an outdoor and indoor dining area. The prayer area faces in the west direction towards Mecca. I placed the communal garden within proximity to the kitchen and dining area to make it easy to access when cooking. It is also close to the vendor space, in case the migrant workers want to sell their vegetables and herbs at their vendor spaces. This combination of private and public spaces allows for planned and unplanned social interactions.
Pedestrian and Vehicle Pathways

Walkability is one of the crucial factors in this design. As the urban population increases globally, cities are beginning to face new challenges arising from increased demands for infrastructure, transportation networks, and public spaces. This has led to a lot of research in re-thinking the livability of cities. Dubai is also seeking to balance between enhancing the livability and the quality of its urban fabric on one hand while maintaining a high-performing, efficient road and transport system. At the moment, Dubai is ranked as one of the highest car-oriented cities in the world with 550 vehicles per 1,000 residents (Montgomery, 89). The dependence on air-conditioning in buildings and vehicles has led to sedentary lifestyles and a poor public realm in many outdoor public spaces. So far, the result has been a fragmented urban fabric with low levels of walkability and high dependency on private vehicles (Montgomery, 88). According to the FutureXchanges report, 48% of Dubai’s residents do not walk because of a lack of walkable destinations (Montgomery, 97). Pedestrians often face many physical barriers and have to walk long distances to access daily needs. To broaden connectivity and accessibility, I focused on rethinking the distribution of public and social amenities not only in terms of the functional land-use planning approach but also based on elements of livability such as walkability and accessibility.

The street network I have implemented in this design has clear vehicular and pedestrian traffic segregation, drawing the vehicular road towards the peripheral main road and pedestrians or informal pathways. The main access points, buffer spaces between public and private spaces, streets, the space between building units, and the scale of these pathways allow ease to spaces and functionality. Illustration 4 shows the pedestrian pathways I have included in the site and illustration 5 shows the vehicle pathways. I gave more space for pedestrian
walkways to increase connectivity between the mixed-use developments and other amenities. The vehicle pathway runs along the perimeter of the site to allow for buses and cars to pass through, trucks to off-load or load materials, and fire trucks or ambulances to access the site in case of an emergency.

**Redefining the limits of public and private spaces**

When designing the site plan (illustration 6), I made sure to combine private, semi-private, and public spaces. Illustration 7 provides a broken-down legend for the site plan I designed. Illustration 8 highlights the public gathering spaces including the two main large courtyards, the residential courtyards, the communal gardens, and the shared balcony space within the residential areas. Illustration 9 highlights the individual residential squares on the site surrounding the main courtyards. Between each residential block, there are shared amenities such as showers, changing rooms, bathrooms, laundry facilities, and bike racks (illustration 10). Finally, illustration 11 highlights the extra amenities provided for the migrant workers, including vendor spaces, a communal kitchen, indoor and outdoor dining areas, and a medical service area.

The combination of Architecture design with Urban planning is more likely to foster communities with activities at a local level, but also at a metropolitan level with shared adjacent areas. Transient populations, such as migrant workers, are constantly on the move; they create a sense of belonging through shared experiences and cultures. This design study investigates strategies for developing a model that can provide support for a community often placed in transient situations to create an environment that accounts for the wellbeing of the migrant workers in the UAE.
The housing units are arranged around sunken courtyards which has a sustainable and social benefit to the design (illustration 12). Courtyard architecture became a prototype in urban design strategies for hot arid regions. In addition to a functional, crucial role for climate control, it has a traditional cultural relevance in Arab countries. The courtyard as a concept was used as a means to control the climate in an area to a certain extent. When they are implemented in a way as a sunken courtyard, it ‘provides integrated thermal interaction’ which is effective in modifying the climate (Al-Mumin, 105). Firstly, courtyards can be used as a circulation element allowing
residents to move between interior spaces. Secondly, the courtyard can have a secondary role for semi-private social activities. Furthermore, courtyards also provide lighting and ventilation, which has always had a fundamental role in a healthy environment.

**Illustration 12: courtyard layout**

**DESIGN LAYOUT**

A combination of two- and one-story buildings which are arranged in a way so that there is a shared gathering space between the buildings. This will provide shade for the walkways underneath this region. The lighter blue area is the balcony. There is a set of stairs behind the one-story buildings that leads to this elevated level. Depending on which direction the courtyard is facing, we can add or remove more two-story buildings.
There are three main thermal advantages for being sunken into the ground: (1) the prevention of solar radiation from reaching the roof and all embedded walls thus reducing the effect of one major heat gain source in buildings in the desert, (2) The reduction of infiltration rate which is another major heat gain source in desert buildings, (3) heat gained through the embedded walls and roof is also significantly reduced since the temperature of the surrounding environment (soil) is lower than the air temperature the outside in the summer season. In Kuwait, the soil temperature in mid-July at 3.0 m depth is around 31°C, while the air temperature aboveground reaches 45°C and more (Al-Mumin, 106). If the soil is shaded and covered with vegetation the soil temperature will be modified even further and its temperature could be lower than the measured 31°C. By integrating green spaces such as communal gardening areas within the courtyards, we can lower the overall temperature within the courtyards and the surrounding buildings. Using a combination of architectural techniques such as sunken courtyards and passive cooling strategies, we can lower energy consumption and improve thermal performance in the building units.

Introverted and extroverted spaces play a vital role in a communal housing plan with social amenities and public areas. Each residential square has a courtyard in the middle, which is an introverted, semi-private social space for residents to gather and socialize at a more intimate level (illustration 12). The residential courtyards only have two entrances (shown on the left and right in illustration 12), to create a sense of safety within the courtyard. These small courtyards surround two larger sunken courtyards that can be seen as a more extroverted, communal space where interactions between residents could occur at a much larger scale (illustration 8). These larger courtyards will most likely be used as a space for the migrant workers to play cricket or gather. By placing the smaller courtyards around the larger
courtyards, a sense of security is created within the site. The courtyard spaces have uses other than for social interactions.

For instance, the large courtyard space in the middle has communal gardens for the migrant workers to grow their vegetables and herbs that they can use for themselves while cooking meals or they can sell them at the vendor spaces. These are placed close to the kitchen and the vendor spaces for easy access. These courtyards are an important buffer area, where various daily activities and socializing can take place.

**Illustration 8: public gathering areas**

Amenities and Communal Areas

In addition to the courtyard spaces, I have included extra amenities that are required in a residential area. The southeast direction of the site’s middle section has a public prayer area, a
medical service room, plus an indoor and outdoor dining area attached to a communal kitchen (illustration 11). These are placed between the large courtyards to create a buffer zone between the two large sections of the site plan.

Illustration 11: Public amenities

On the west side of the middle section, there is a space for extra storage in case the migrant workers need to store more items. Between each residential square, I have placed a bike rack, a space for showers, restrooms, and changing rooms, and a place for laundry with drying racks specifically placed in areas with the most sunlight (illustration 10). These amenities are integrated into the site in such a way as to encourage interaction among residents between each residential block.
Within each courtyard area, there is a combination of two-story and one-story unit homes, which provides more shade to the surrounding areas. Each unit is joined to one another, which creates a common space along the corridor where people can stop to chat or place chairs to spend time outside. This encourages informal public activities and interactions between the residents. The one- and two-story buildings are arranged in such a way so that there is a communal balcony space (shown in light blue in illustration 12). This is an additional elevated shared gathering space within the residential blocks.

**Vendor Spaces**

On the weekends, most laborers stay at the labor camps and set up their outdoor markets within proximity to the premises. Often, laborers do not earn enough to spend at stores and restaurants with very little savings. At these open markets, they usually sell tea, textiles, vegetables, and other products and services such as used phones and haircutting at a much lower price than in the main city (figure 12).

In my design, the first section placed in the northwest direction of the site has a vendor space that is placed at the perimeter of the site facing towards the main street. Illustration 13 displays this site at a closer level. This site often has heavy traffic throughout the day (illustration 15). The corner in the west direction of this section has a small communal space where people can gather. It is a vantage point that has a lot of busy pedestrian traffic and would allow for social interactions to occur with people outside the site as well. This communal space is adjacent to the vendor spaces where migrant workers can sell their handicrafts or other products. This area becomes a prime site for commerce where the workers can not only sell their products to the other residents living on-site, but also to others who are just passing by the site.
Illustration 13: Vendor space

The main road has direct access into this commercial zone, and I added service roads to allow cars and trucks to pass by and off-load or load materials (illustration 13). In this way, the shops create a two-feet buffer zone between the traffic and the site. The service road loops around the vendor space, and connects back to the main access point (illustration 14). This allows vehicles to pass through efficiently. Furthermore, there is another communal green space behind the vendor space which creates another buffer zone between the public vendor spaces and the residential units behind it. This area gives the migrant workers opportunities to not only economically benefit from selling their handicrafts and produce, but also socially interact with others outside the site.
Water Conservation and Water Dispensers

Desalinated seawater is the main source of water for the UAE. Seawater from the Arabian Gulf is pumped into DUBAL, Dubai Aluminum factory to cool the aluminum smelters. It is then brought into the adjacent DEWA, Dubai Electric and Water Authority plants for power generation as well as desalination. The desalinated water then flows into the pipes for water consumption (Sawe, 2019). In the current labor camps, water is stored in large water tanks, and drinking water is stored in steel dispensers.
With the rapid increase in the rate of the population, water use has been growing globally at a very high rate. As water demand continues to rise, declining water quality has grown to be a global concern, water loss through leakage continues to prove a major issue both in the developed and developing world, and the long-term impact of climate change is unpredictable which makes planning difficult. The emirates desalinate the equivalent of four billion bottles of water a day. The New York Times mentioned that at any given time, the UAE has, on average, an estimated four-day supply of freshwater (Alderman, 2010). Thus, water conservation in the region is crucial. For this project, I researched both traditional and modern water conservation techniques. Historically, the desert state Rajasthan, India, has a range of ancient water conservation techniques. Water harvesting systems such as joharas or bawaris (step wells) are managed by communities in the arid Thar desert, which receives very low rainfall (figure 12). These traditional techniques, though less popular today, are efficient and are still in use to date. My paternal grandfather also had a similar water conservation system implemented in his house in Rajasthan at a much smaller scale which was used for generations.

Joharas are one of the oldest systems that were used to conserve and recharge groundwater. They are small earth dams that capture and store rainwater. Despite the limited rainfall in the region, it was still possible to collect a good amount of water. Four inches of water can result in the collection of around 2.5 gallons per square foot (Kumar, 2017). Traditionally, the spot for a johara was specifically chosen to optimize the collection of rainfall in the absence of any other water source to nourish the water bodies. While this is an efficient system in desert areas in India, this method might not be the most efficient way to assemble and transport. Therefore, I turned to other water conservation methods such as hydro-panels. The UAE has an atmosphere rich in water vapor since it is surrounded by water bodies.
Sea breeze circulation brings large amounts of water vapor inland during the day, which is trapped and forms fog during the night. Solar energy powers the panel. Solar energy powers the panel which drives fans to draw air into a water-absorbent material that traps water vapor from the air. The water vapor is then extracted and condensed which is collected in the reservoir. Minerals are then added to make drinking water (Source Co., 2021). In this design, there are easily accessible water dispensers for the residents within each courtyard. These water dispensers will have hydro-panels that transfer water vapor in the air into high-quality, sustainable drinkable water. This removes the cost of water delivery and drinking water logistics.
Chapter 5: Building design

One of the private spaces I plan to include in the design are the building units themselves. I will design a one-story building and a two-story building using modular structures, which will be placed around sunken courtyards.

One-Story Building Unit Design

The one-story unit building’s dimensions including the walls are 13’ x 11’ x 9’.
Illustrations 16, 17, 18, and 19 illustrate different perspectives of the building design. The one-story building will house two migrant workers and will include: two beds, two side tables, two closets, a shoe rack outside, a common space with a small collapsible coffee table, and mashrabiya screens next to the bed spaces to achieve privacy (illustration 20).
Illustration 20: Interior plan drawing of building unit

These screens can also be used on the walls to indicate the direction in which Mecca is. This transforms the lower section of the building into a multi-functional space, allowing workers to use the common space as a more private prayer room as well (in comparison to the public prayer area). Both beds are elevated to allow for more space underneath. This extra space below the beds can be used for storage, a desk, or lounging. The roof of the building has solar panels that provide extra electricity in the building for interior lighting, charging electronics, or allowing for activities such as cooking on an electric stove.

The materials used in this structure are inexpensive, durable, and resistant to heat and impact. It uses a combination of polycarbonate, glass-fiber reinforced concrete (GFRC), and steel beams for the internal structure (illustration 16). Polycarbonate is an alternative to glass in facades as it has different levels of translucency and can provide optimal transmission and diffusion of light. This allows the possibility to create dynamic and expressive facades. This material is light, flexible, recyclable, durable, resistant to impact, and includes UV protection, in addition to resisting temperatures between -40°C and 115°C. GFRC is highly durable and can be modeled into almost any shape or color. Plus, the installation of GFRC panels is cost-effective, efficient to put up, and are easy to maintain. The internal steel structures in the building units also have high heat and impact resistance. Prefabricated steel beams are easy to put together for modular housing construction. The front part of the roof has an adjustable shade made out of polycarbonate that can be moved up or down depending on how much shade is needed. The front and back facades of the building unit are perforated to allow cross-ventilation to occur in the space (illustration 18). With the perforations, the walls become an important piece of
furniture and liminal space. These perforations are placed carefully in the back to allow cool air to pass through the facade while maintaining the privacy of the residents.

Illustration 16: Building unit materials

A flow of air will be created as hot air rises and cool air flows downwards. By having perforations on opposite walls, the air is allowed to enter from both sides, cross the space, and exit from the opposite direction. Furthermore, the exterior walls are covered in a light color to repel more heat and reflect most UV rays. Adding too many perforations would let more heat into the building and would reduce the amount of privacy, therefore we need to be careful not to add too many large windows.
Illustration 18: side elevation showing perforations in walls

Illustration 19: Sketch of the one-story building
Two-Story Building Unit Design

The two-story building has a similar design layout to the one-story buildings. Illustrations 21, 22, and 23 illustrate what the two-story buildings look like. It houses four migrant workers. Similar to the one-story building, the two-story building units also include perforations in the walls for cross-ventilation, elevated beds, solar panels on the roof for extra electricity, and additional space underneath the loft for storage and lounging (illustration 22). Each floor of the two-story building units has the same interior layout as the one-story building (shown in illustration 20). The first floor of the building has a shared balcony that runs across and wraps around the building units (highlighted in illustration 24).

Between the two-story buildings, this elevated communal balcony also acts as a social space in addition to the sunken courtyards where residents can gather and interact with each other. There is a set of stairs on the side of the one-story buildings that leads to this elevated level; each residential square has two sets of stairs. This balcony provides shade for the units and walkways underneath, which further cools down this area. The roofs of the two-story buildings also have louvered shades to cool down the stairs and areas underneath them. The two-story buildings also have an extended shade over the balcony area made out of polycarbonate. In this way, the buildings can cool down the areas around the site throughout the day, which further reduces the need for air conditioning or electrical fans.
Illustration 21: Elevations and plan of two-story buildings

Illustration 22: Side elevation showing perforations in facades
Chapter 6: Reflection

The speed at which the UAE has developed is unprecedented; Dubai has built the most skyscrapers in the world in 2020 (Nair, 2021). Nonetheless, there is a juxtaposition between the sprawling man-made islands and the lives of the migrant workers who built them. Around 10,000 migrant workers built the Burj Khalifa, and with no laws governing minimum wages in the UAE, few workers reported making less than $10 a day (Ghaemi, 2006). As a designer I appreciate Dubai’s architectural wonders, however, it is also a stark reminder of their systemic exploitation. While access to adequate, affordable housing in the UAE for migrant workers is limited, after extensive research, I believe there is still much room for further research on the Gulf’s urbanism in Dubai, and this can be applied to many other regions around the world that are dependent on migrant workers.
In just one year, the pandemic has made inequalities starker. This is especially important because those who are disproportionately affected are often people who experience socio-economic marginalization. We keep saying, “keep your distance,” but how do you do that when 10 people are forced to live in one room? This is why it is important to build inclusive cities with access to adequate and affordable housing, clean water, safer infrastructure. What makes a city inclusive goes beyond small design interventions — we need to approach architecture and urban planning more broadly and holistically.

It does not take grand gestures to make cities better for all. There are many initiatives are empowering communities with inclusive and sustainable solutions. The starchitect Yasmeen Lari has a similar point of view; her work advocates for simple design interventions to create vast social change. By implementing a more human-centered approach, we can create micro-solutions that could lead to a global change.

Cities are facing complex issues like rapid urbanization, climate change, and a lack of natural resources. Plus, at the same time, we are in the midst of a global housing crisis. There are not enough affordable homes to meet the demand and cities are becoming increasingly socially unequal, unaffordable, and unsustainable. To make affordable homes a reality, we need to challenge existing models of development. By making better design decisions when creating living spaces, we can reimagine future planning that takes people’s preferences and concerns into consideration.

Maslow’s hierarchy of needs represents basic physiological needs for self-actualization or self-fulfilling needs. The most basic need is shelter, which is found at the bottom of the pyramid. This need must be met before individuals can reach “self-actualization” or become contributing
members of society. Currently, most low-income migrant workers in the UAE have limited access to this basic need with sufficient amenities and resources. This design thesis acknowledges an overlooked humanitarian issue where migrant workers are marginalized and presents an architectural intervention that can provide support for the creation of a sense of community in transient situations.

I chose to do a design thesis because I believe that design has the power to address the socio-cultural issues I have observed, not only in the UAE but in other parts of the world that are increasingly dependent on migrant workers. For the entirety of this project, I spent a lot of time asking myself what a good design should look like. I questioned how we could prioritize liveability, sustainability, and affordability through design. The main objective of this project was to design a space for migrant workers to reclaim a sense of belonging and foster an environment of sociocultural engagement. Instead of creating more boundaries, I believe that when architecture and urban planning are combined, barriers between public and private spaces are diluted and places of synergies, interconnections, and exchanges are formed.

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