Re-Weaving Mumbai

Re-discovering Industrial heritage in the Indian Sub-continent

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A.A. 2024/2025

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Threads of History, weaving a future
Re-weaving Bomaby.

acknowledgements.

foreword.

Lost in transition

A city is perceived by the users in ways varied, however there is always a mental map of the city that is constructed in one's mind as they traverse through the old lanes, walk past dilapidated buildings, high rises, street vendors, landscapes and other users of the same space. In this aspect, every city is different from each other, they hold different naratives with various perspectives but, an assessment of each city has some primary parameters that helps the navigator to define it in their memory. In simple words, this creation of a mental map is based on the elements Kevin Lynch has put forward in his book ' The Image of the city'. While he pens down the different imagable aspects of a city from the perspective of an urban planner, it's essential to notice that even the most common man has acquired the ability of perceiving the city through these same elements. While they are easily visible to the user and are directly perceived, most cities have some parts that need a further look and deeper investigation. These are areas that have often been neglected, forgotten or could not keep up with the world's pace. Such places have abundant history, years of patina on its surface that has the ability to tell stories from yesteryear but, they have been rendered as mere eyesores or brownfields of the city. This research tells the story of one such similar place, that has lost its value and integrity to time, with little or no remians of its past glory. While the beautifully crafted buildings of the past claimed its position in the books and records of heritage, these strcutures were over-looked mostly because of its industrial character. Its architecture and history were barely acknowledged and its role in the urban sphere is comparable to an object that has served due course of its time and is in need of replacement. This little memoir of industrial heritage that once stood tall, now remains hidden amidst the soaring development in the heart Mumbai, in a precinct that was once called Girangaon or the mill village.

abstract.

A prototype for future revitalisation

Industrial heritage, with its unique narrative, often occupies a significant position in the discussion of cultural, economic, and historic aspects in the West, while its relevance is mostly overlooked in the Indian context. Often seen as a remnant of the industrial past, the country in general dismisses it, leading to the vandalism, demolition, and ruin of structures associated with it. Most of the industrial structures are viewed as an eyesore to the city without offering the bleak potential of revitalising it. Their constant neglect has led to various industrial sites being demolished, gentrified, and transformed without retaining even a part of their history and integrity. This research delves into one such scenario where a prior mill village, "Girangaon, in Mumbai has completely transformed over time with barely any remains or memory of it. The research takes the approach of decoding the onset and spread of industrialisation in India by analysing the various factors that catered to it, such as trade, socio-politics, economy, and culture. The timeline of establishment of industries, migration of workers, their living conditions, and the decline of the mills are understood in order to create an overview of the time period. Subsequently, the analysis of various mill districts within Girangaon, its present condition, and the possibility for revival in the present context are understood. The identification of the Lalbaugh precinct with the Indu mills in focus further takes the research into a niche so as to develop a prototype that can demonstrate the revitalisation of such abandoned structures within the urban sphere. The approach involves the mending of the detached mills to create a system of spaces that caters to the public in various ways in a city that generally lacks open areas and public infrastructure. The project incorporates the history, culture, cuisine, theater, and work life into its spaces with a view to provide the citizens with the need of the moment within the structures of the past. This approach creates a heritage trail depicting the city's history through the establishment of a cultural hub in the old mill village, which can be explored in ways varied. The project details the approach taken, using the case of Indu Mills 2 & 3, which are proposed to be converted into a textile mill museum with open spaces, a restaurant, workshops, craft centers, and historic remains.

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Sometimes the essence lies in realising spaces that have been overlooked for centuries. A lot can change when the tools of architecture are put to use in the right way and this is what the city of Mumbai needs at the moment in order to revive what's slowly slipping away into oblivion

the question.

Is Industrial heritage in India an opportunity lost in transition?

India's industrial heritage has a unique narrative, one that can be explored by tracing back to its economic and social roots. To fully understand industrial heritage, it is necessary to understand how India industrialised and what factors led to its industrialisation. Despite its massive role in laying the foundation for development, the remains of the industrialization period have mostly faced an unfortunate ending. While most of them have been demolished to make way for future developments, very few still remain, but as an eyesore to the city, even fewer have been redeveloped or restored. Moreover, the lack of interest in industrial heritage or the failure to identify its cultural relevance has often led to its neglect and demolition.

The lack of awareness, the weak legal framework for the protection, and fast-paced urbanization further account for industrial heritage in India is vastly overlooked. While there is growing recognition to document it or even convert it as part of adaptive reuse, industrial heritage in India is still an opportunity lost in transition. The full potential of reviving these structures to breathe new life into them lies in understanding their history, heritage, culture, significance and relevance within the context and community.

While most of the heritage associated with India's industrialization are few and scattered across the country, they are subjected to vandalism, demolition, gentrification, conversion to slums and even being grounds for immoral activities. However, if rediscovered properly before the opportunity is completely lost, they hold the potential of becoming active centres of tourism, hospitality, recreation, museums, education centers, community hubs, and even areas depicting living history experiences associated with memory, culture, and sustainability.

How can these sites of lost opportunity be identified?

Researchers, historians, and architects have recently been trying to raise awareness of industrial heritage by promoting its documentation and its re-purposing. While they have laid the groundwork on the subject, the revival of these sites on both building and urban levels is still in its infancy in comparison to other cultural heritage. The identification of industrial heritage and sites in transformation should start from the understanding of history and factors that led to industrialization, the rise of the industrial sites in India, factors that led to its decline, and its effect on the community and its present state. The identification and study of one such industrial site based on its role in India's industrialization will eventually lead to the formulation of a framework that aids in rediscovering similar sites.

How should these sites be rediscovered to breathe new life into it?

The understanding of these sites can be achieved by delving into their timeline, historical background and its future potential which is the very essence of this study. The paper aims to explore a neglected industrial site of great relevance by tracing the roots of its industrialisation, identifying its importance, its rise and fall, so as to suggest future directions for its revival, rediscovery and reintegration into society and urban fabric while protecting its history. While the study is focused on a site in particular, the process would aid in providing a framework that helps to conduct similar studies on other sites across India and to shed light on the importance of reviving them before the opportunity to make their cultural identities are lost forever.

Fig. 01: Industrialisation periods across the globe © Author
Reference: Mark Williams, A Stratigraphical Basis for the Anthropocene 2014

one.

Former colony to factory

1.1 INDUSTRIAL REVOLUTION

Marking its advent in Great Britain during the mid-18th century, industrialisation spread across the globe within a century, transforming and reshaping society on various levels. Britain, also known as the workshop of the West, pioneered inventions such as the steam engine, power loom, cotton gin and so on, which revolutionized the manufacturing industry. The rapid technological advancements and mechanization that were put forward, as a result, boosted productivity and the economy. The movement spread into continental Europe from the late 18th to the early 20th century and witnessed a period of development and advancement (Britannica, 2024)..

Despite fuelling global trade and inventing new materials that redefined the architectural narrative, the Industrial Revolution had negative impacts such as the pollution of air and water which started to raise environmental concerns. Moreover, the cities started to develop haphazardly as a result of urbanization caused by the mass migration of workers. On the other hand, the colonies of these European powers were highly exploited in order to extract raw materials that were needed for manufacturing goods. This in turn affected the local establishments and the local craftsmen (Berger & High, 2019).
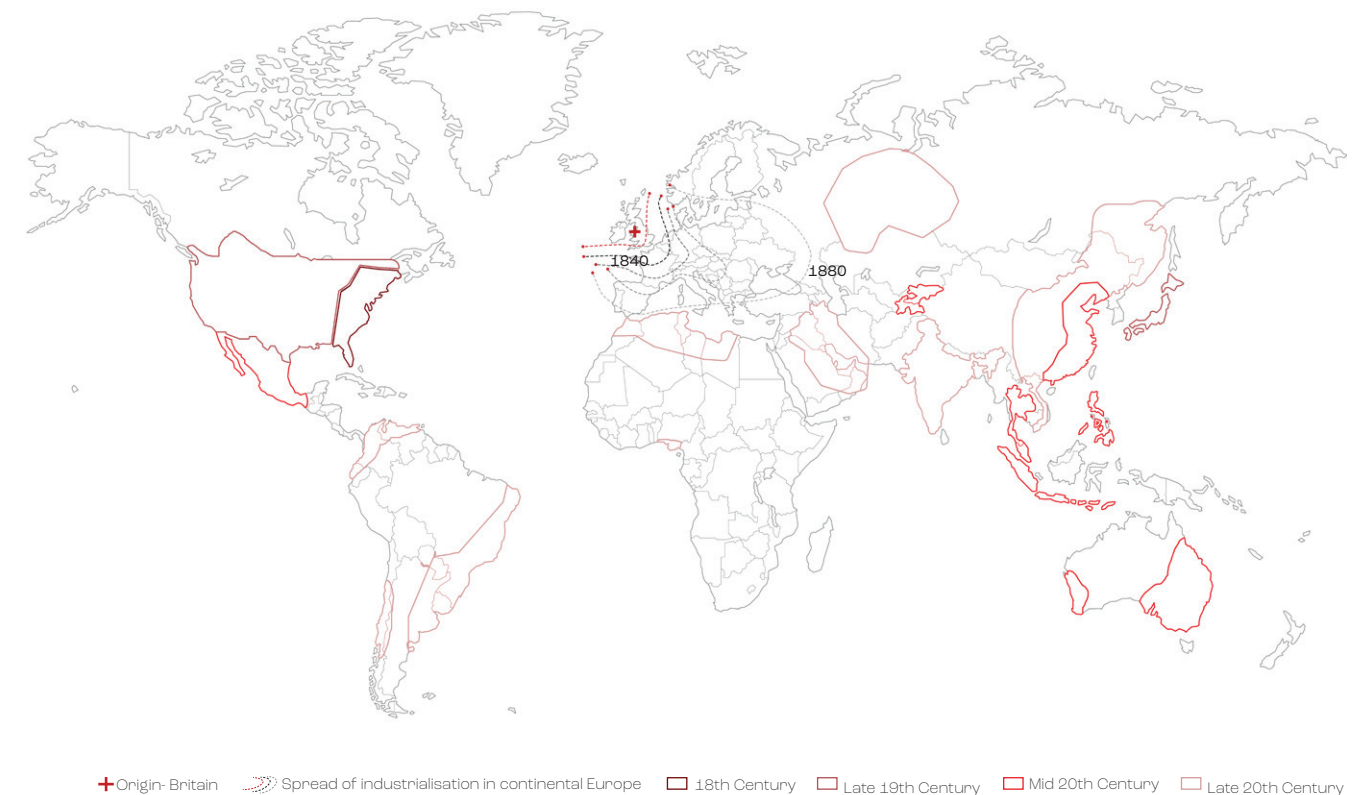

Fig. 02: India and its location in the global south
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1.2 INDUSTRIALISATION IN THE GLOBAL SOUTH

The global south is a term used to address the developing nations in Africa, Asia and Latin America that have had a complex relationship with industrialisation due to colonial exploitation. These countries are characterized by uneven development as opposed to the West where the Industrial Revolution was a homegrown phenomenon that enabled it to develop systematically (Chant & McIlwaine, 2009).

India's position in the global south has been shaped by its experience with colonialism and subsequent hindered development.Industrialisation was introduced in India in the 18th century by the British however, it was not expansive as in the west. It did lay the foundation for future growth and development. India being set as a ground for sourcing raw material to the west was the primary factor that led to its moderate industrialisation. Prior to being set as a ground for sourcing raw materials and markets for finished goods[1] by the West, India had a long-standing trade network with the rest of the world that led to its economic growth and development. This was in turn the very reason for its colonisation by several European powers. global leader in textiles, Indian craftsmanship produced high-quality fabrics that were in high demand worldwide for centuries (Gupta, 1980).

The onset of industrialisation in India can be attributed to its colonisers as they built railways and other primary infrastructure for moving raw materials and finished goods. Despite having skilled artisans and craftsmen whose textiles were even sold via the Silk Road, India's handloom and handicraft industry declined due to the mass export of raw materials and the flooding of the Indian market with cheap fabrics produced in the West. Moreover, India's lack of infrastructure and skilled labour further accounted for a hindered industrialisation in addition to the stringent British policies that prioritised export.

Despite these challenges, India began to industrialise in the latter half of the 19th century with textile industries being set up by independent entrepreneurs. Following its success, industries like coal mining and steel also came into being. However, it was after India's independence in 1947 that large-scale industrialisation started to take place with an aim to produce in India and subsequently export finished goods. The country prioritised industrial growth and laid a strong foundation for petrochemical, steel and manufacturing industries that aimed to create a self-reliant economy instead of importing. Moreover, the economic reforms of 1990, provided for an increased participation of the private sector and foreign investors leading to a more dynamic and service-oriented industrial landscape (Nomura, 2019). It is important to note that all these developments were centralised around the aspect of trade and commerce.

1.3 THE ROLE OF TRADE

India's history with trade is culturally rooted and can be historically traced back to as far as 1100 BC. India's trade network extended far beyond the Indian ocean spreading to countries surrounding the Mediterranean as well as the far East. Prosperous in trade, India mainly traded cotton, fabrics, metals, spices, etc which were of high demand in the west. The nature of trading evolved over the years and the materials traded between countries varied. India traded with Greece, Middle East, Germany, ancient Rome and Mesopotamia, China, Japan, Java among many other countries which led the European powers to believe that anyone controlling it could surely rule the world. The evolution of trade across the different time periods is thus crucial in understanding how India was colonised which subsequently laid the seeds of industrialisation (Hans, 2023) (Otsuka & Sugihara, 2019).

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1 Indian raw materials were used to produce goods in the West which were then sold in Indian markets. This was done with a view to improve British economy and affected Indian markets.
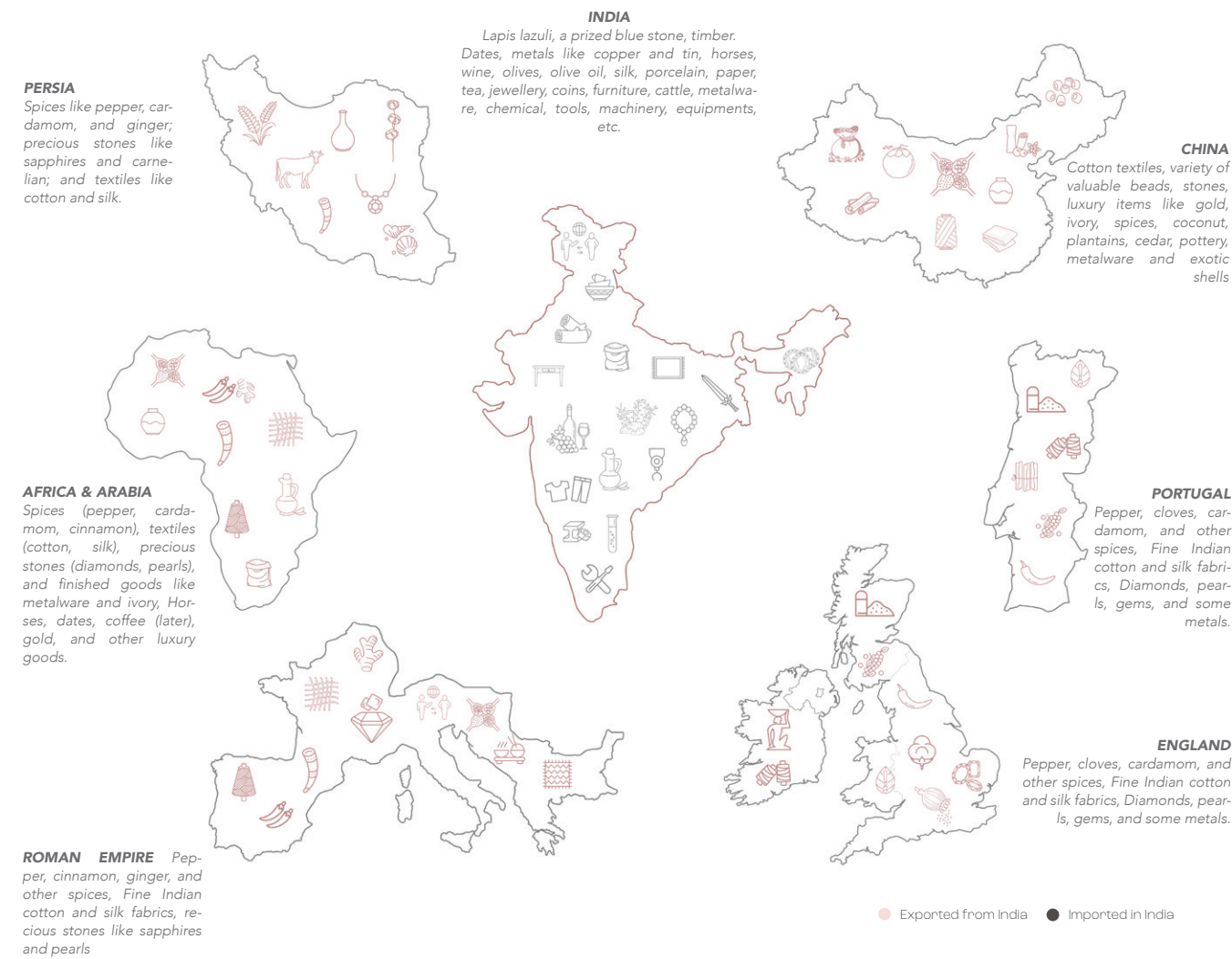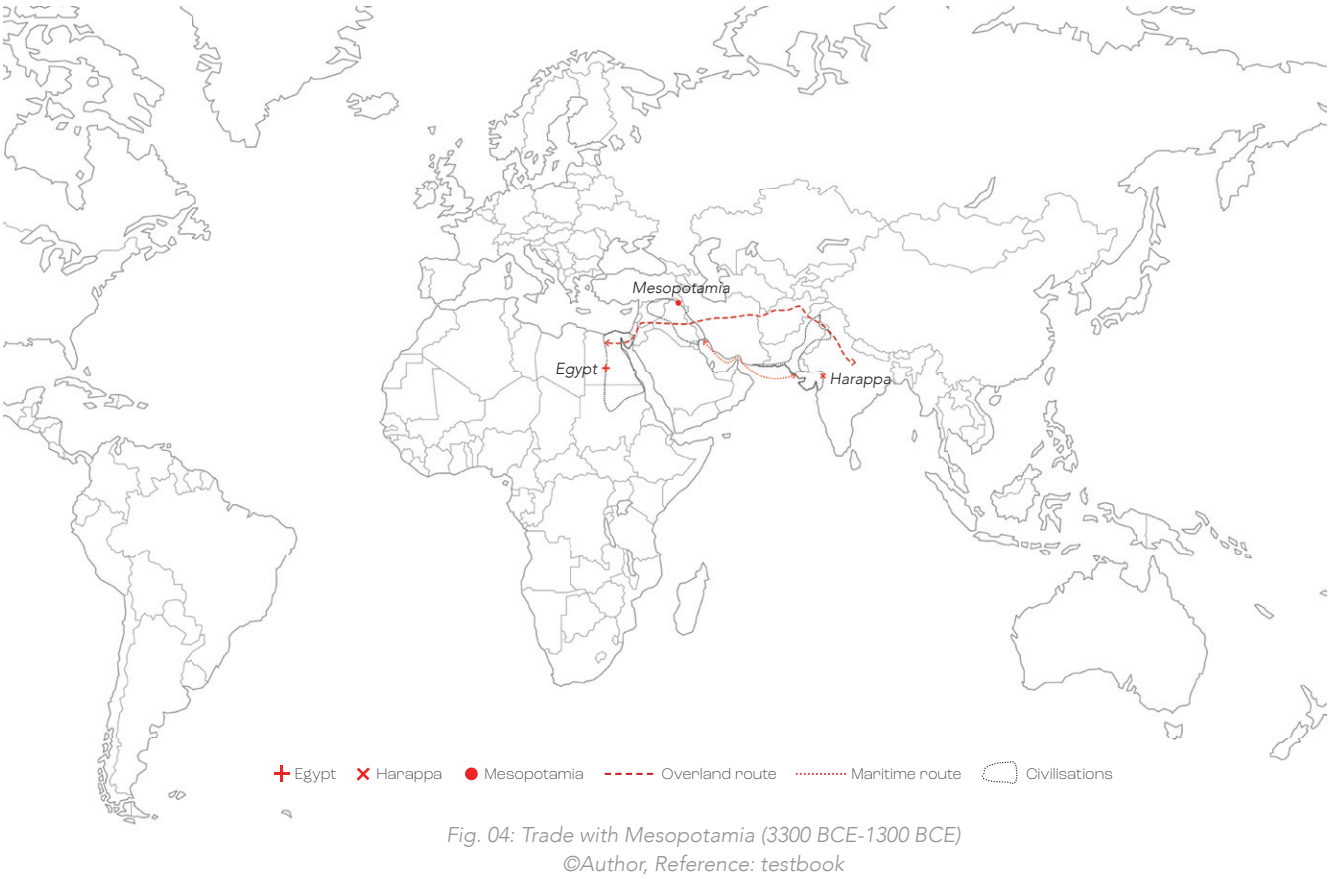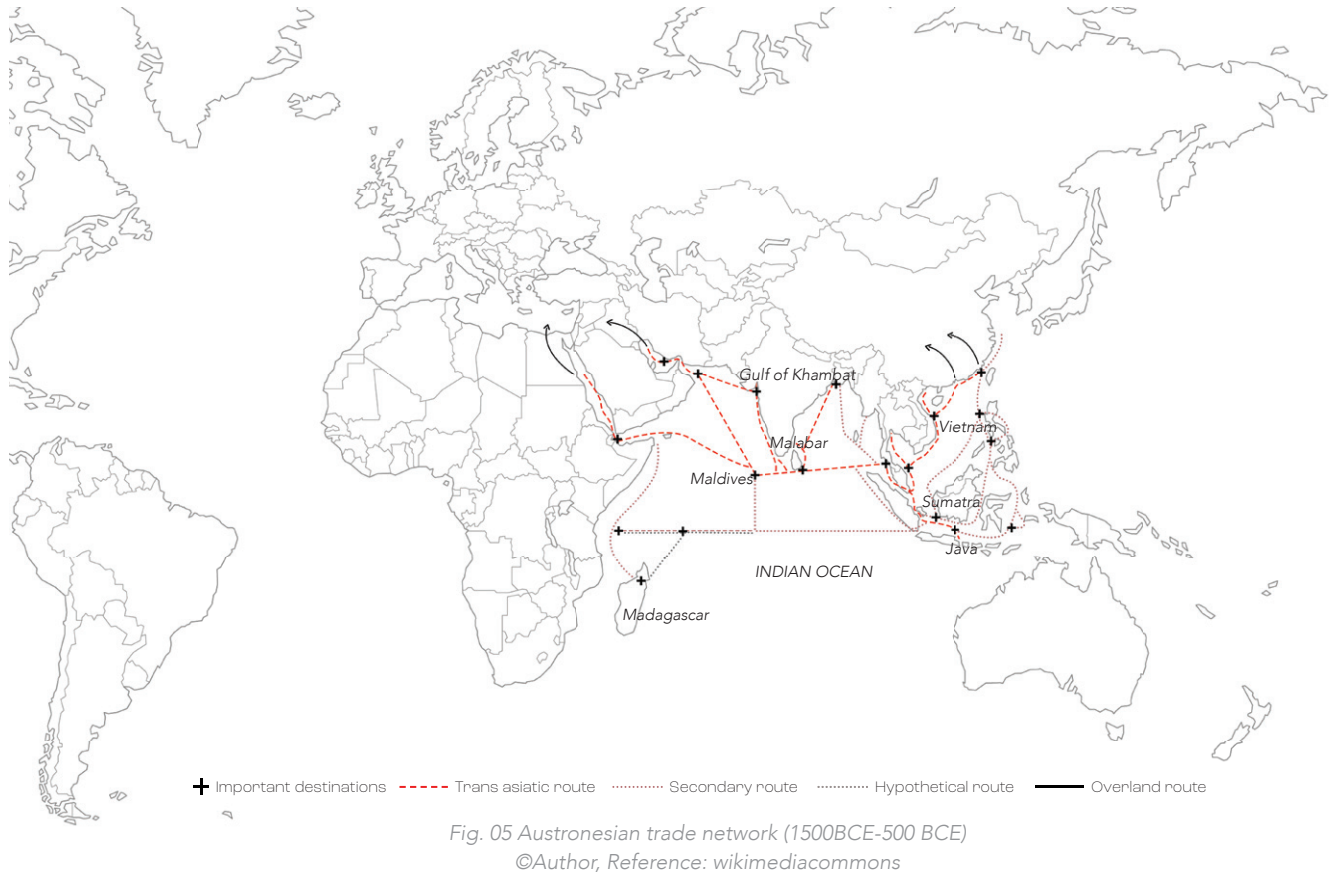

PERSIA
Spices like pepper, cardamom, and ginger; precious stones like sapphires and carnelian; and textiles like cotton and silk.

INDIA
Lapis lazuli, a prized blue stone, timber. Dates, metals like copper and tin, horses, wine, olives, olive oil, silk, porcelain, paper, tea, jewellery, coins, furniture, cattle, metalware, chemical, tools, machinery, equipments, etc.

CHINA
Cotton textiles, variety of valuable beads, stones, luxury items like gold, ivory, spices, coconut, plantains, cedar, pottery, metalware and exotic shells

AFRICA & ARABIA
Spices (pepper, cardamom, cinnamon), textiles (cotton, silk), precious stones (diamonds, pearls), and finished goods like metalware and ivory, Horses, dates, coffee (later), gold, and other luxury goods.

PORTUGAL
Pepper, cloves, cardamom, and other spices, Fine Indian cotton and silk fabrics, Diamonds, pearls, gems, and some metals.

ENGLAND
Pepper, cloves, cardamom, and other spices, Fine Indian cotton and silk fabrics, Diamonds, pearls, gems, and some metals.

ROMAN EMPIRE Pepper, cinnamon, ginger, and other spices, Fine Indian cotton and silk fabrics, recious stones like sapphires and pearls

● Exported from India   ● Imported in India

Fig. 03: Traded material with different countries (33oo BCE- mid 20th Century)
©Author

Mesopotamian trade (3300 BCE-1300 BCE): The Harappan Civilization or the Indus Valley Civilization, flourished in the Indus Valley region of what is now Pakistan and northwest India. With commercial relations set up by the Harappans in Afghanistan, Iran and Rajasthan, they engaged in long-distance trade networks, reaching regions like Mesopotamia (present-day Iraq, Iran, Kuwait), Central Asia, and the Persian Gulf as per documented evidence dating back to 2356 BC. Evidence suggests a well-developed maritime trade network and land routes with ports like Lothal in the Gulf of Kutch in Gujarat facilitated trade by sea and land and was carried out by merchants and middlemen from Dilmun. The Arabian Sea and the Persian Gulf facilitated trade with further west and Persian civilisations respectively. The traders travelled by means of animals and bullock carts on land and, sturdy boats built of wood, possibly reeds, sealed with bitumen for watertightness and a combination of single mast cloth sails and oars likely propelled it, allowing them to navigate depending on wind conditions. Finished goods like pottery, terracotta, beads, shell products and cotton textiles were exported along with raw materials like wheat, barley, sesame and minerals. They imported metals like copper, tin and gold which were not readily available in the region. Luxury items like 'lapis lazuli'[2] and turquoise were among the most prized imports. However, shifting political landscapes, environmental issues and new trade practices led to the decline of the civilisation (Hans, 2023).

Fig. 04: Trade with Mesopotamia (3300 BCE-1300 BCE)
©Author, Reference: testbook

Fig. 05 Austronesian trade network (1500BCE-500 BCE)
©Author, Reference: wikimediacommons

Austronesian maritime trade network (1500-500 BCE): The Austronesians were people of Southeast Asia, particularly Indonesians who established a major maritime network in the Indian Ocean that eventually became a part of the Silk Route from the 2nd century BC to the 15th century AD. Indian merchants, traders and kingdoms played an active role and India's geographical location made it the epicentre of the trade network. The trade was dominated by Austronesian seafarers with the involvement of Indian and Arab traders. The presence of port cities like Lothal further accounts for the robust maritime network that was established during this period. The Indian Ocean became the primary channel that connected Southeast Asia, India, the Arabian peninsula and East Africa; the Arabian Sea connected the Harappan ports in Gujrat to Mesopotamia and beyond; the Persian Gulf facilitated trade with civilizations bordering the Persian Gulf and the Bay of Bengal facilitated connections with Southeast Asia and potentially further east. The traders travelled by means of Catamarans, double-hulled vessels offering stability for long voyages as well as outrigger canoes and single-hulled canoes with a stabilizing outrigger float. For longer journeys, they might have employed larger ships capable of carrying more cargo. The exports included cotton textiles, a variety of valuable beads by Harappan and Indian artisans and stones like carnelian[3] along with luxury items like gold, ivory, and exotic shells which were mutually exchanged. Despite trading goods, the network also exchanged culture, ideas, and crops like rice, wheat, and other staples. The rise of new trade routes, political instability and shifting economic focus led to the decline of the trade network (Hung, 2017).

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2 Lapis Lazuli is a blue stone of Persian origin, found in Sumarian areas of Mesopotamia, that was mainly used in Jewellery.

3 Carnelian is a semiprecious stone with a reddish brown colour that used to hold spiritual and ornametal values in the civilisation.

Trade with Romans (130 BCE- 3CE): India's trade with the Roman civilisation is one of the most significant as it flourished for centuries. Although limited trade prevailed, it was with the rise of the Roman Empire and improved sailing techniques that trade was strengthened. The Red Sea served as the primary route connecting Roman ports in Egypt such as Myos, Hormos and Berenice with the Indian port on the West coast (Muziris[4] and Barga-za). Even though Cran and overland routes existed, it was less preferred due to the time and risks involved in traversing through Central Asia and the Middle East. Merchants, government officials, rulers, traders, sailors and artisans actively participated in the trade, both promoting and regulating it.

Due to the long distance travelled, the traders had to rely on sturdy ships built in wood with a single mast and square trail. The predictable monsoon winds aided the traders in sailing eastward during the southwest monsoon and returning westward with the northeast monsoon. India exported spices as it was highly prized for their flavour and medicinal properties, fine cotton and silk fabrics; emeralds, sapphires, pearls and Ivory for creating decorative objects. On the other hand, India imported Roman gold, wine, red coral for jewellery and ornamental purposes and, bronze and glassware goods from Roman workshops. The trade was not just limited to the exchange of goods but facilitated cultural exchange with influences seen in art, literature and even cuisine. Several factors like political instability in both empires and the rise of Sassanid Persia[5] in the Middle East contributed to the decline of trade after 300 CE (Evers, 2017) (Lischi et al., 2020).

Fig. 06 Roman trade network (130 BCE-3 CE)
©Author, Reference: thecollector.com

Greater India Buddhist Period (c. 3rd Century BCE - 13th Century CE): The period witnessed a surge in trade practices due to the spread of Buddhism and maritime advancements. Trade routes facilitated the exchange of goods, but they also helped to spread Buddhism and Buddhist culture with its influences seen in art, literature and architecture. Trade flourished between the 3rd century BCE and the 7th century CE with the Bay of Bengal Route serving as the primary route, connecting Indian ports on the east coast (Tamralipti) with Southeast Asian ports like those in Funan (present-day Cambodia) and Srivijaya (present-day Sumatra and surrounding areas). The Andaman Sea on the other hand connected South Indian ports with ports in Myanmar and Thailand. Gujarati and South Indian traders played a prominent role in the trade, establishing relations with Southeast kingdoms. Trade was also facilitated by Buddhist monks who acted as cultural intermediaries while travelling for pilgrimage and missionary work. The network was well-established with trade guilds that provided support and regulation.

Family-run businesses also had a significant role in the trade network. The traders used sturdy ships similar to the ones used during the Indo-Roman trade, with single mast and square sails while the traverse was reliant on the monsoon. Southeast Asian vessels with multiple sails and hull designs were also used for transport. Indian merchants exported highly desired goods like fine cotton, silk fabrics, glass, gemstone beads, bronzeware and iron tools. Buddhist statues, scriptures and other religious items were also exchanged during trade, helping to spread the religion. The cross-cultural influence in art and architecture via trade had a long-standing impact on all the areas involved. However, the rise of Islamic kingdoms in Southeast Asia and political changes in India led to a gradual decline after the 7th century CE (Rai Verman, 2012).

Fig. 07 Greater Buddhist period Silk road trade network (7CE-18CE)
©Author, Reference: Gunawan Kartapranata

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4 Muziris was a prominent prot in the Malabar region of Kerala and played a relevant role in the industrialisation of outhern India.
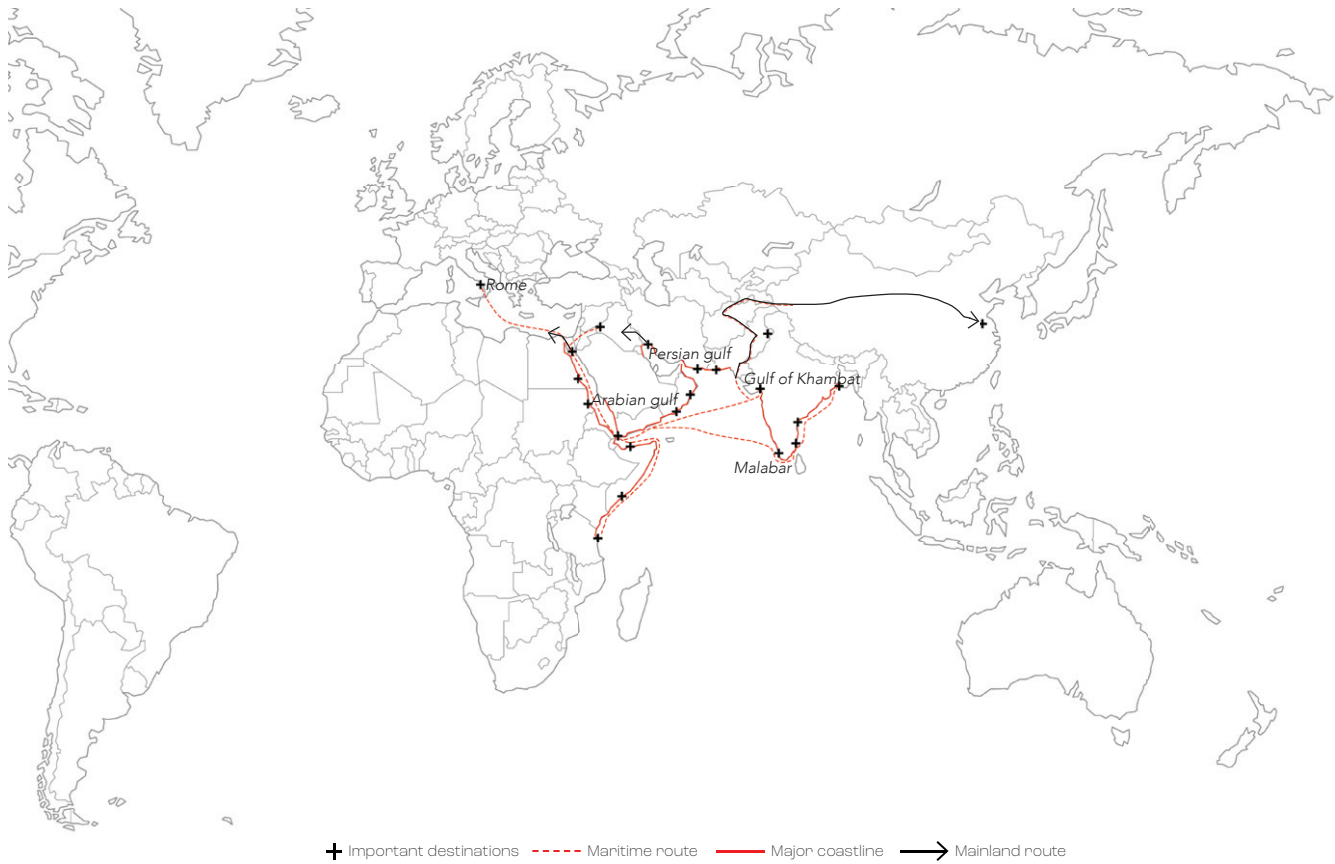5 The last dynasty of ancient Iran.

Medieval Muslim Period (7th-18th Centuries): During the medieval Muslim period, Indian trade was immensely dynamic and prosperous. The rise of the Muslim empires opened new routes with a wide range of commodities being traded. The network placed India as one of the major trading centres in the world due to its strategic location. The conquest of Sindh in the 8th century by the Arabs opened new trade routes westward. Later came the Delhi Sultanate, which, between 1206 AD and 1526 AD, promoted trade relations with Central Asia, West Asia, and Africa. Subsequently, the Mughal Empire, from 1526 to 1857 AD, presided over a golden age of trade and established an extensive network that boosted infrastructural development. Trade prospered with port cities like Aden, Jeddah, and Muscat in the Arabian Peninsula, while Hormuz and other ports acted as gateways for critical trade in the Persian Gulf. Gold, ivory, and slaves were imported from East Africa. Textiles and spices were exported to Central Asian markets. The spice trade with Southeast Asia was very significant for a very long period, with trade connections expanding west towards the Ottoman Empire[6]. This trade was largely dominated by the Muslim merchants, though the participation of Non-Muslim rulers, merchants, and elites was present. The Silk Route was also a part of this network and it connected Europe, the Middle East, Central Asia, and China. The route facilitated the trade of luxury goods, spices, and other valuable commodities. The Mediterranean Sea was a busy and important sea highway that linked North Africa, the Middle East and, Europe. The Red Sea on the other hand linked the Mediterranean Sea and Indian Ocean. Much trade took place off land because it was risky to carry goods by land. The main transport vessels were dhows and single-mast ships. The mainstay of transportation for overland trade routes was camel caravans. Between Afro-Eurasia, the extensive network spurred the demand for exotics, such as silk and spices, while manufactured textiles, metalware, and ceramics flowed alongside the necessities of rice and olive oil. Unfortunately, the slave trade also prospered in this period, revealing the complexity and diversity of this age of global commerce. Bengal, Surat and Masulipatnam became centres of complex trade routes as well as the port cities along the Malabar coast- Cochin, Calicut, Cannanore, and Quilon that traded with Arabs and Chinese. The rise of European maritime powers and the disruption of trade routes after the Mongol invasions led to a gradual decline after the 15th century (Jain, 1978).

6 One of the greatest empres built by the Turks and spread across parts of Southeast Europe, Northern Africa and West Asia betweem14th and 20th century.
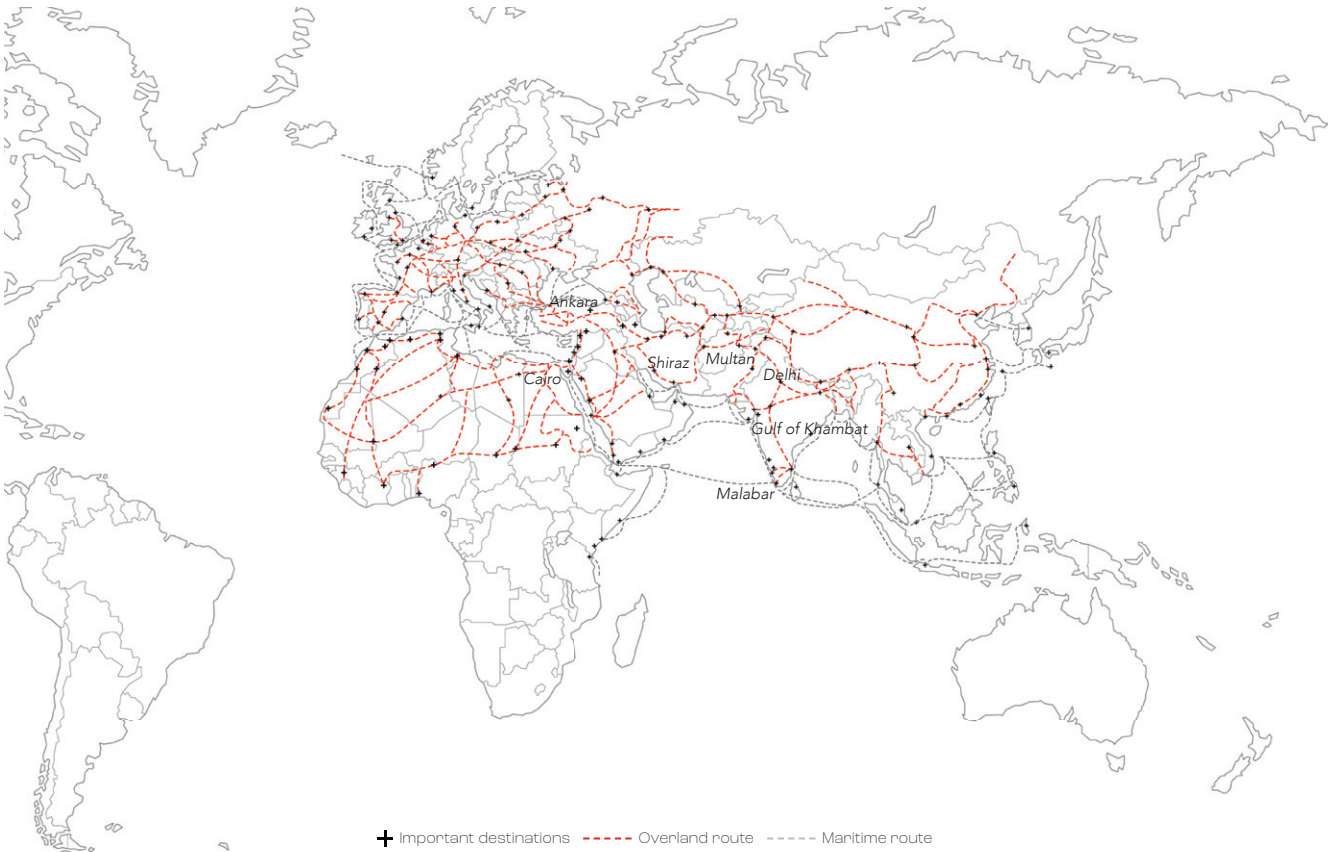

Fig. 08 Medieval Muslim Period trade network (7CE-18CE)
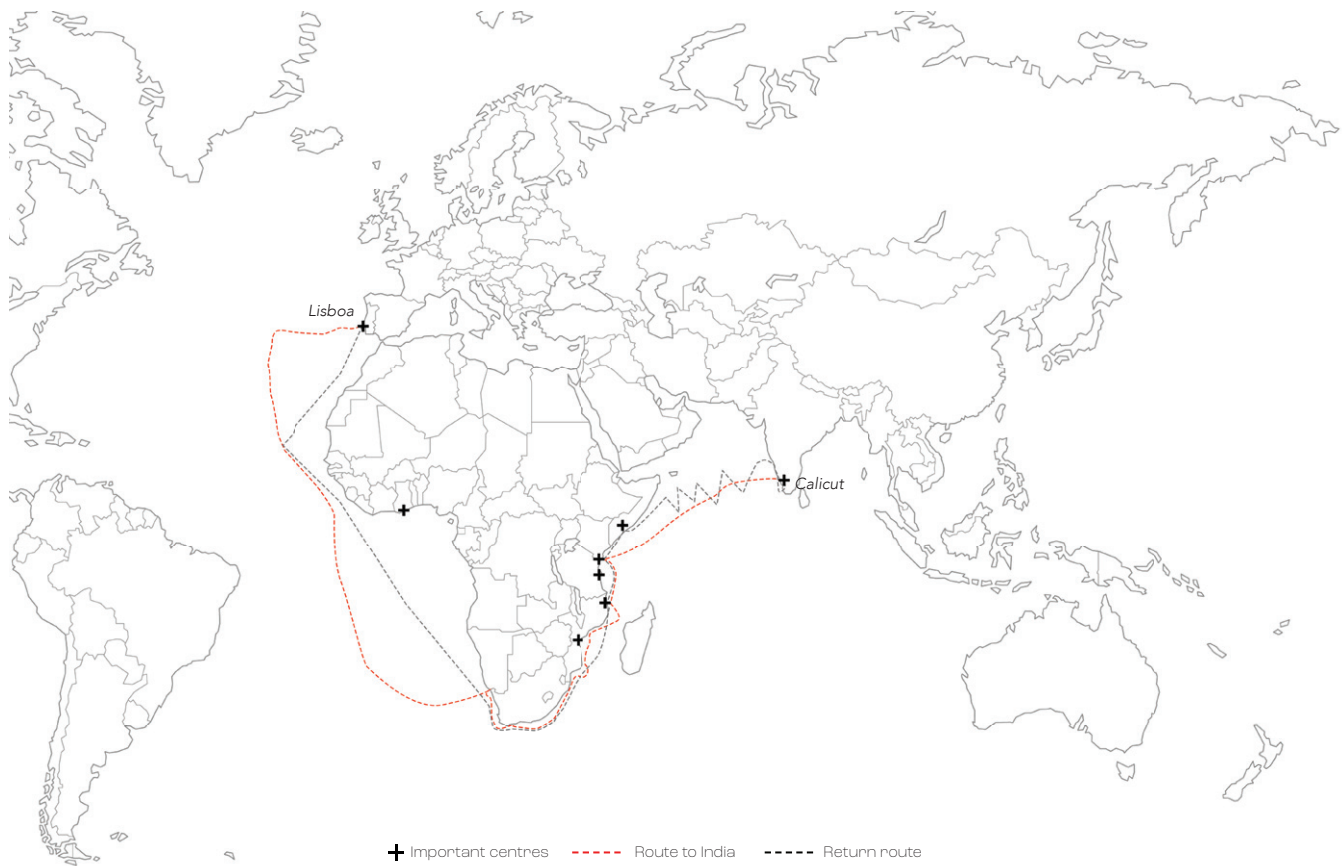*©Author, Reference: Ahmed Danyal Arif, London, UK*

Fig. 09 Portuguese trade network established by Vasco da Gama in 1498 (15CE-17CE)
©Author, Reference: britannica.com

The European exploration (15th – early 17th Century): The arrival of Vasco da Gama in in 1498 in Calicut was a crucial step in world trade . He discovered a direct sea route from Europe to India, thus bringing about a frenzy for spices and other treasures, and propelling Portugal to the forefront of the spice trade. Portuguese merchants, often with crown support, established trading posts and negotiated contracts for spices and other goods. Catholic missionaries often travelled with traders and strove to convert locals to Christianity while also serving as potential cultural go-betweens. Portuguese trade in India mostly prospered during the 16th century. It was weakened throughout the 17th century by rivalries with the Dutch and internal problems. It witnessed the arrival of the Dutch, in the early 17th century, and established the East Dutch company, which was the world's first joint-stock company, in contrast to crown-controlled Portuguese trade. They sought a monopoly on the spice trade in Asia, especially Indonesia, and utilized its resources to challenge established Portuguese dominance in India. The VOC[7] relied on Indian merchants to navigate local markets and facilitate trade deals, while it maintained a vast fleet and a well-trained army to ensure safe passage and protect their interests. The VOC's dominance in India thrived mostly in the 17th century, while in the 18th century, its influence gradually vanished amidst internal corruption and competition from Britain. Both the Dutch and Portuguese employed a well-engineered fleet of ships built for long voyages and capable of carrying large cargo. The Cape Route established by the Portuguese was to remain in use by every European power until the opening of the Suez Canal. This route connected Europe to India by sailing around Africa. The new route revolutionized trade patterns and eliminated traditional overland routes dominated by Arab and Ottoman merchants. The most valuable products of this trade were pepper, cinnamon, cloves, nutmeg, and ginger; these spices were of great importance to European food preservation and medicine and for culinary purposes. Fine Indian cotton and silk fabrics became the leading demands among the upper classes of Europe. The other valuable products traded included gems, precious stones, and ivory. The Dutch also focused on bulk goods like saltpetre, a vital ingredient in gunpowder, which was important for their military strength (Burnet, 2017).

7 The VOC known as the Vereenigde Oostindische Compagnie was a Dutch trading company that carried out and established trade in Asian countries.

The British and East India Company (17th – mid-20th Century): The British East India Company emerged as a dominant power in Indian trade, eventually becoming a colonial power. The EIC got its royal charter in 1600 and established the first trading posts in the 17th century, rose to dominance in the 18th century, and obtained substantial political power by the middle of the 18th century. This eventually translated into a political influence that culminated in what is called the British Raj, established in the 19th century (1858). First, the EIC availed itself of the traditional Cape Route around Africa, competing with the Portuguese and the Dutch. The EIC then gradually built an infrastructure of trading posts and inland routes across India for the purpose of local trade. The opening of the Suez Canal shortened the distance between England and India by a lot making trade easier and cheaper. Merchants, administrators, and military leaders employed by the EIC oversaw trade, established outposts, and eventually wielded substantial political power. While Indian rulers first cooperated with the EIC for trade advantages, in the course of time they were put under growing pressure and even manipulated. Along with the rise of British influence, private British traders also contributed to Indian trade but under the control of the EIC. The EIC relied on well-equipped sailing ships for long voyages between Britain and India. British East India Company's trade with India was mostly in luxury as well as strategic goods. Classic exports like Indian cotton and silk textiles remained in demand throughout Europe. Spices such as pepper and cloves remained valuable. The EIC was also involved, however, in a number of more questionable endeavors. They became one of the largest exporters of opium to China, earning enormous revenues despite the addiction and destitution it caused. They also specialized in raw materials, such as saltpetre for gunpowder and indigo dye for British fabric mills. The trade brought considerable wealth to the EIC, reinforcing how multifaceted, and at times exploitive, colonial commerce was. Britain looked at India as a ground from where it was able to source raw materials and as a huge market for its finished goods. The building of infrastructure such as railways, post offices, and ports that facilitate trade emerged as the early advocates of industrialization in India. The rise of nationalism and independence movements in the early 20th century ended the 3-century-long colonisation of India by the British (Evers, 2017) (Bonfatti & Brey, 2020).
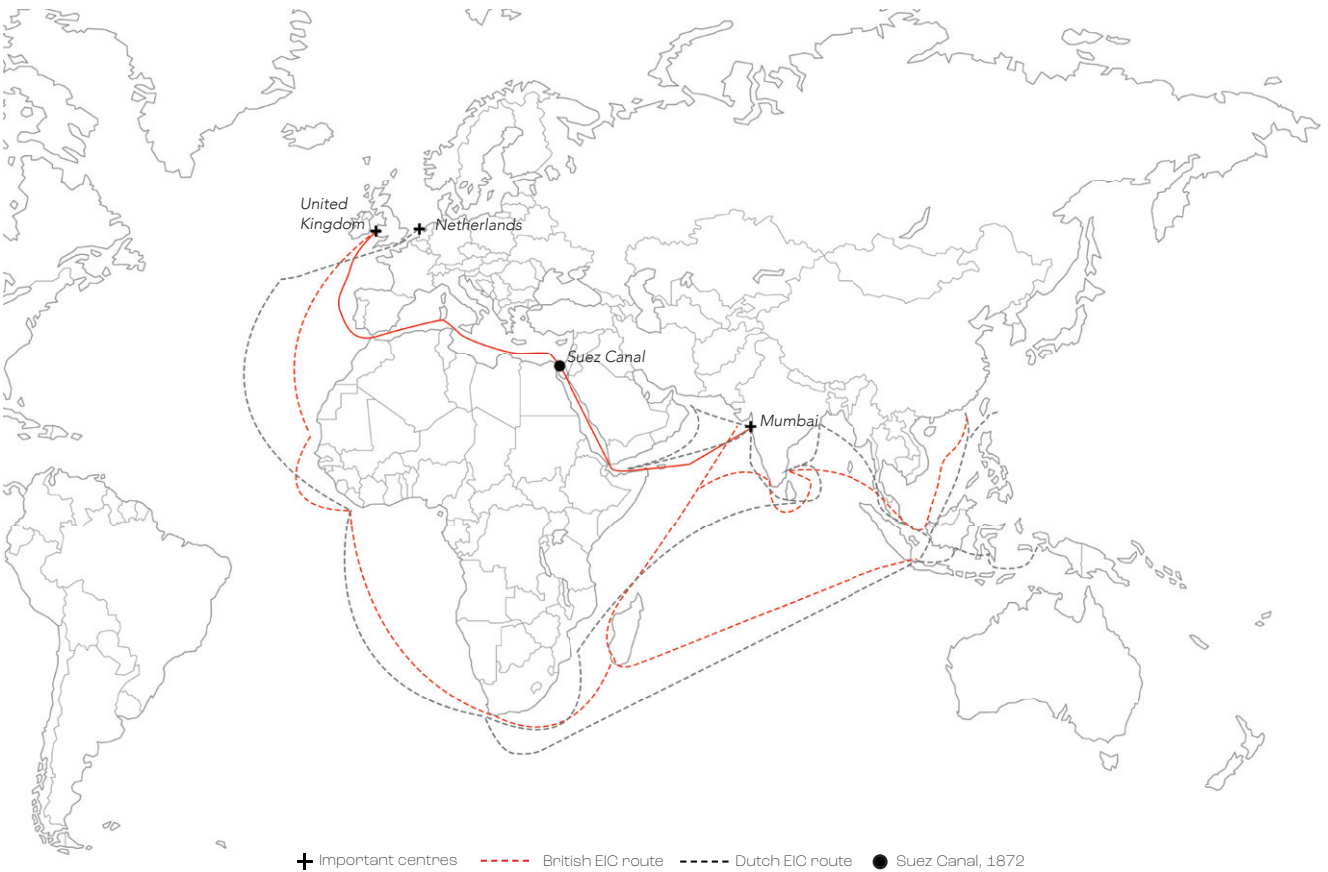

Important centres   British EIC route   Dutch EIC route   ● Suez Canal, 1872

Fig. 10 East India Company and Suez canal trade networks (17CE-20CE)
©Author, Reference: Doyoung Ahn '19

1.4 THE BRITISH AND INDUSTRIALISATION

Trade between India and England had a considerable impact on both economies. While it favoured Britain to a huge extent, it had negative consequences for Indian industries. Profit from Indian trade supported the Industrial Revolution of Britain, thus establishing its position as an eminent economy of the world, while India 'became the grounds for resource extraction'. The infrastructure set up for this purpose eventually laid the seeds of industrialisation in the subcontinent. The British Raj curtailed mass industrialisation in India for raw material extraction and prioritised their own industrial growth (O'Brien & Inikori, 2022). Despite this, some Indian entrepreneurs emerged during this period, paving the way for future industrial progress.

The British invested in infrastructure projects in India such as railways and ports to facilitate trade, source raw materials out of India and bring finished goods back in. This benefited the commercial interests of the British but, Indian artisans and entrepreneurs gained limited exposure to British machinery and technology, which affected their ventures later. Even with such little exposure and knowledge sharing on advanced technology and industrial processes, Indian entrepreneurs like Jamsetji Tata[8] utilized those sectors the British mostly ignored like jute processing, sugar refining, and flour milling. While Bengal flourished, Jute became a material of great demand. Later on, in the 1850's the foundations for the cotton textile industry were laid in Mumbai. Despite EIC's futile attempts to create an iron and steel industry, it was finally established by Jamshedji Tata and his son Dorabji in 1907, producing pig iron in 1911 and steel ingots in 1912.

Furthermore, Indian nationalism or the Swadeshi Movement[9], which picked up pace in the early part of the twentieth century encouraged some industrialists to set up industries within the country to minimize dependence on British products. In short, the process of industrialisation during the British rule in India can be termed as the loss of opportunities and the spirit of Indian entrepreneurship as they challenged the process of de-industrialization of the Indian economy by the British to foster the development of a country in the midst of a struggle for freedom (Tomlinson, 2013). Also, other enterprises from Britain, the United States and Germany[10] contributed to industrialisation in India as well.

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8 Founder of the Tata Group.
9 A nationalist movement that called for the boycotting of Western products follwing the partition of Bengal in 1905.
10 Missionaries and technology transfer fuelled industrial development in various parts of the country.

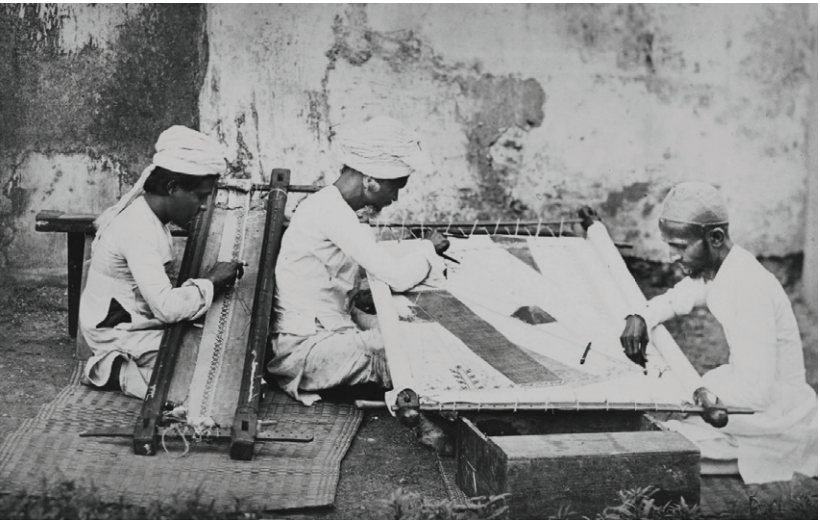*Fig. 11 Spinning wheel (c.1900's)*
© Old Indian Photos

Fig. 12 Artists of local Indian textile industry (1873)
©Trustees of the British Museum.

Birth of Indo-Saracenic Style: With colonisation and industrialisation, a new architectural style[11] emerged in India that blended both the local and Anglican features. The style known as Indo-Saracenic style introduced steel, concrete and glass into Indian typologies. The style was mainly adapted into administrative and public buildings. It varied with region and their traditional architectural styles. The Victorian style was of great prominence and was highly integrated. To cite an example, the Chhatrapati Shivaji Maharaj Terminus, Mumbai showcases the grandeur of British raj as well as the local architecture into it. (Sheeba et al., 2018).

_____

11 The style was adaptive in nature, it used the royal style along with the traditional so as to emphasise grandeur while responding to climatic and geographic needs. This alos helped the local people to relate with the new style.

Fig. 13 Mumbai Poona Mail, 1863
© Wikipedia

Fig. 14 Indo-Saracenic style railway station, Victoria Terminus (Chatrapati Shuvaji Terminus) Mumbai, 1863
© BCCL, 2020
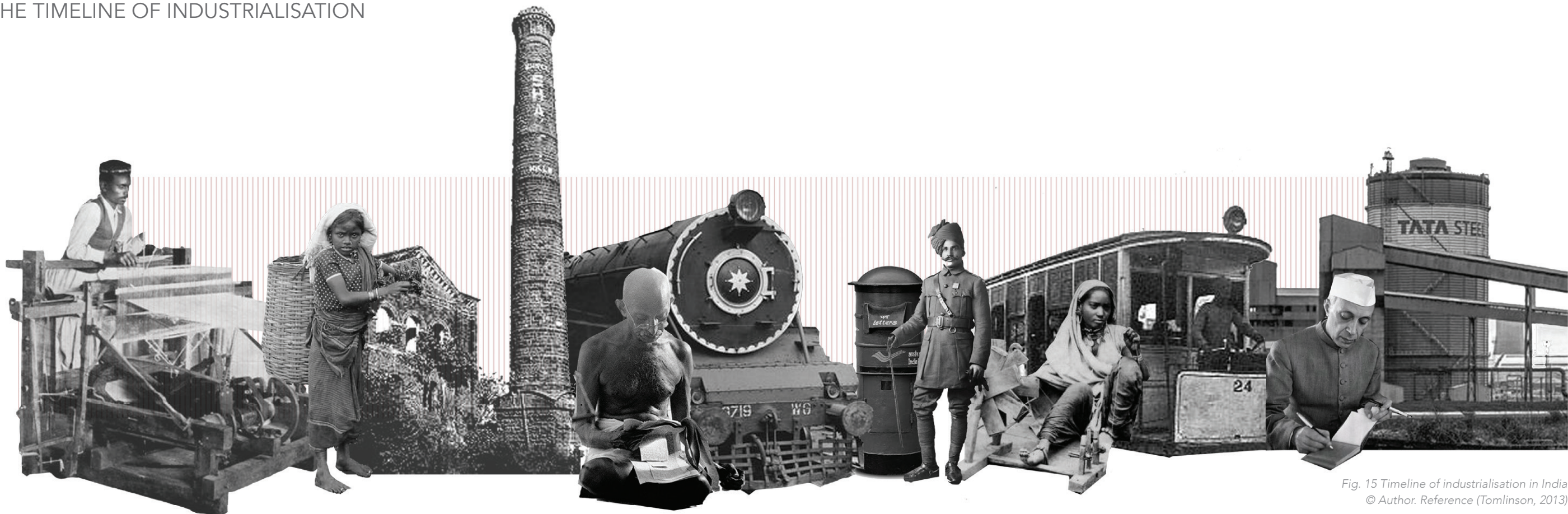
Fig. 15 Timeline of industrialisation in India
© Author. Reference (Tomlinson, 2013)

1757 Establishment of East India Company

1774 Beginning of extraction sites

1818 Establishment of Production sites

1819 Establishment of Ports

1830-1840 Establishment of Tea and Coffee plantations

1843 Banking Insurance

1853 Establishment of Railways

1854 First Cotton Mill in Mumbai

1858 Establishment of British Raj

1858 Establishment of Ports

1868 Postal Services

1870 Small blast iron furnace in Kulti, Bengal

1897 Beginning of Hydroelectric power generation

1901 Establishment of Petroleum refineries

1906 Private enterprises

1907 First steel factory by TATA

1927 Broadcasting services

1940 Aviation Industry

1947 India gains Independence

Irrigation and steel

Nationalisation of coal and railways

Green revolution

Indo China war 1962

Indo-Pak war 1965

Indo-Pak war 1971

1969-1974 White revolution

1980-1985 Electronics/ High technology

Economic Liberalisation

74th Amendment

1992-1997 Environmental sustainability

God governance discourse

2012-2017 City improvemnt / City Renewal / City extension

ATAL / JNNURN SMART CITY

1800 COLONIAL 1947 POST-INDEPENDENCE 1991 POST-LIBERALISATION

Fig. 16 Expansion of Port 1875, building Sassoon docks to facilitate trade and connection to railways
© Indiennes – Material For A Thousand Stories

Fig. 17 East India Company and Suez canal trade networks (17CE-20CE)
©Author, Reference: Doyoung Ahn '19

1.6 PROCESS OF INDUSTRIALISATION

Pre British India: While India possessed a strong craft industry[12], mainly textiles, there was a lack of the crucial factors that would propel a full-blown industrial revolution. Social hierarchy, class structure, focus on agriculture, limited technological advancements and fragmented political landscape concludes that the social and economic structures lacked the necessary ingredients for an indigenous industrial revolution on the scale of what occurred in Europe (Gupta, 1980) (Perlin, 1983).

The Colonial period (1700–1947): Industrialisation in India by the British was closely interwined with the infrastructure set up to facilitate trade by the British. But it is not just the British who fuelled this movement, it also involved an active participation by enterprises from other western countries like Germany, Switzerland[13] and the United states as well as local industrialists (Chibber, 2006). This massive transformation redefined the economy, opening more jobs in the market to support mass manufacture of products and raw materials, leading to the migration of people to centres of activity causing rapid urbanisation. Industrialisation in India was mainly focused in three port cities, namely Mumbai, Kolkata and Madras. The areas also developed in terms of more housing, hospitals, schools and institutions being set up. Industrialisation in the 1700's occurred around the coastal stretch and later spread to the interior parts with the introduction of more railway connections and infrastructure. Cotton, jute, tea and coal were among the primary industries that were set up (Riello & Roy, 2020). The American civil war[14] (1861-1865) further accelerated industrialisation as there was an increased demand in raw cotton and textiles due to its shortage in the west. Moreover, the second world war led to the development of industries like iron and steel, sugar, cement, sugar and paper (Bonfatti & Brey, 2020).

Post-Independence Period (1947–1991): After independence, five-year plans focusing on building a strong industrial base were developed, which prioritized heavy industries like steel, power, and machinery, which also deviated from the primary focus away from the textiles. This time also witnessed the introduction of scientific and technological institutions in India. (Tipnis & Singh, 2021) (Ray, 1982).

Post-Liberalization Period (1991–present): During this period a lot of changes were made in the Industrial policies of India. This led to changes like increase in privatization and economic globalization[15]. It also led to a rise in information technology, services and modern manufacturing, through which the industrial landscape changed, which has led to a growing focus on environmentally conscious practices in the recent years. (Tipnis & Singh, 2021).

_____

12 The craft industry of India has been prominent since the Indus valley civilisation with many small scale and homegrown businesses suffering during the British colonial rule.
13 The Basel Mission from Switzerland played a major role in indsutrialisation of South India.
14 The war lasted from 1861-1865 as a fight for umanitarian and economic rights.
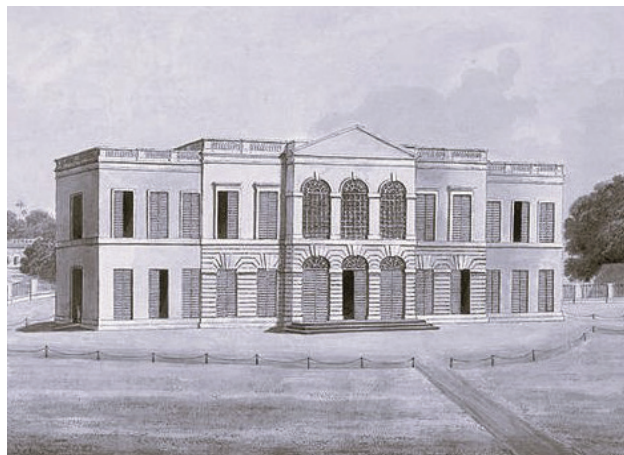15 India's part in the global economy has enabled it to grow drastically since 1991

Fig. 20 Bombay Spinning and Weaving company, 1854, interior view
© Circle.TH, 2024

Fig. 18 East India Company's factory in Cossimbazar,1658
© Puronkolkata, 2014

Fig. 21 Elgin Mill in Kanpur,1864
© protosphinx.in
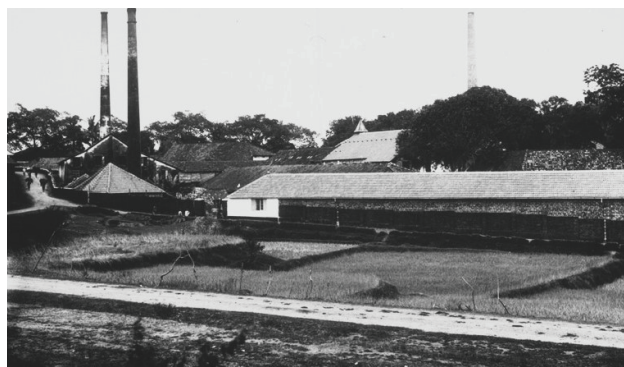
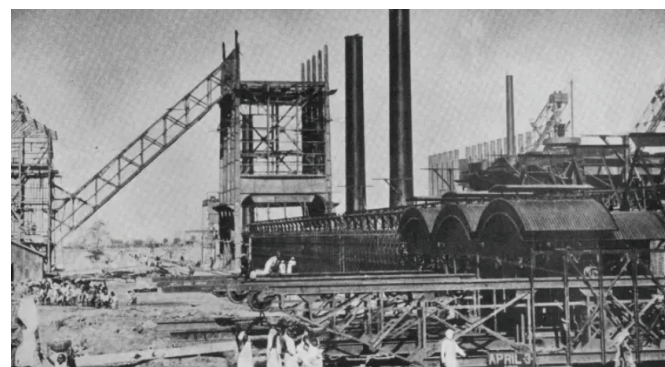Fig. 19 Jeppoo Tile Works, 1902, Mangalore by Basel Mission
© Basel Mission

Fig. 22 TISCO, Jamshedpur,1907
© Desk, N. 2021

1.7 KEY ACTORS AND MILESTONES

British East India Company, 1600-1874: The East India Company, established in 1600 focused on trade, competing with the other European companies. It focused mainly on the trade of goods like spices (initially dominated by the Dutch), Indian cotton textiles (popular in Britain), Indian opium and other goods like salt, indigo, metals and even slaves. The major presidencies of the EIC were set up in Madras, Bombay and Bengal. The success of the EIC led to increased control of the British Crown[16], which ultimately took over the company's territory and powers, and thus the EIC turned into a tool of British colonialism in India (Tan & Chan, 2007).

Basel Mission, 1834: The Basel Mission founded in Switzerland in the year 1815, was a charitable organization which arrived in Malabar in 1834, when the British EIC allowed non-British missions[17] in India. They established printing presses, weaving mills, and tile factories and also provided technical training and various job opportunities in several industries across India. The mission was mainly established in Bengal, Karnataka and Kerala (Stenzl, 2010).

1855, Acland Mill: The first jute mill established in India, set up at Rishra, along Hooghly River, near Kolkata. The mill was established by British entrepreneur George Acland and Bengali financier Babu Bysumber Sen in the year 1855 (Singh, n.d).

Bombay Spinning and Weaving Company, 1854: Realising the potential in exporting cotton, local entrepreneurs started setting up textile mills. The Bombay Spinning and Weaving Company was one of the first textile mills thus set up in the Tradeo district of Bombay by Cowaszee Nanabhoy Davar on 7 July 1854 (Tiwari et al., 2006).
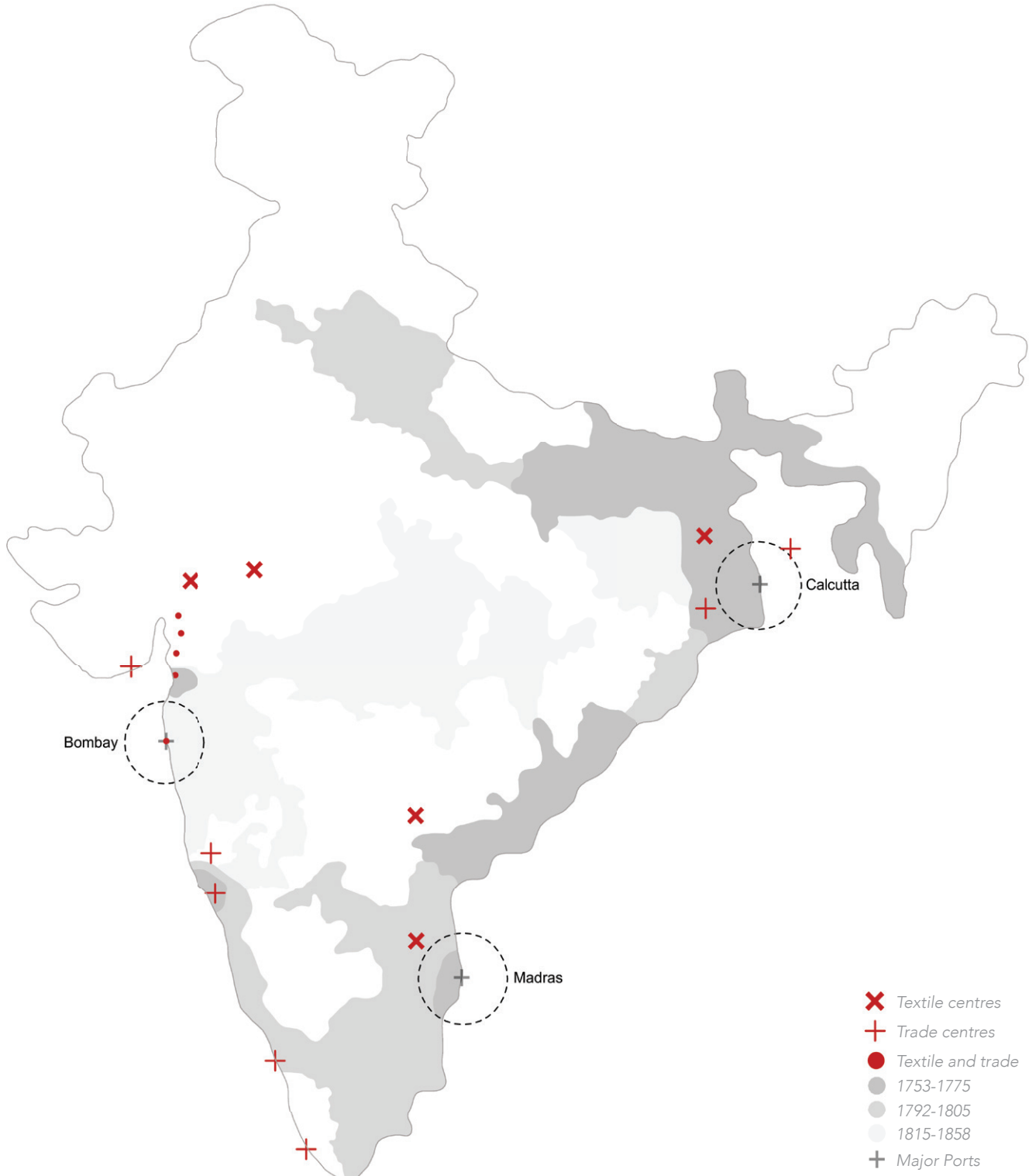
Year: 1864, The Elgin Mill: It was one of the first textile mills set up in 1864 at Kanpur by the British. The mass production of raw cotton and cotton textiles in the region gave it the nickname Manchester of the West (Elgin Mills Co. Ltd., Cawnpore, n.d).

Tata Iron and Steel Company or TISCO,1907: Iron and steel making had been a part of Indian industries since long. However, the 18th century witnessed a rise in demand for iron and steel eventually leading the entrepreneurs Jamsetji Tata and Dorabai Tata to set up an iron and steel manufacturing plant in Jamshedpur, Jharkhand in 1907 (KHARIA, n.d).

---

16 The EIC was an independent company which was later acqquired by the British Crown. From then on all trading activities were carried out directy by the Crown.
17 Christian missionaries that spread the religion across the country.

Calcutta

Bombay

Madras

✗ Textile centres
✚ Trade centres
● Textile and trade
  1753-1775
  1792-1805
  1815-1858
✚ Major Ports
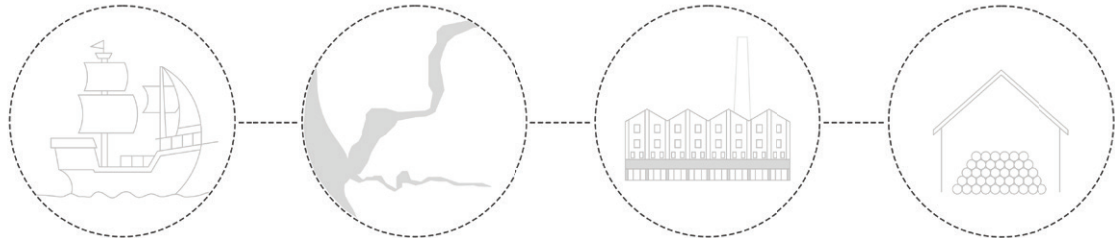
Sea- transport; Hinterland-raw material; Factories and warehouses- along coast

Fig. 23 Expansion of industrialisation and relation between sea and land
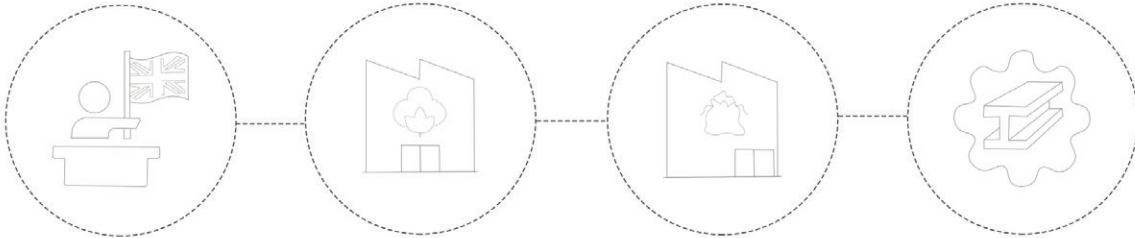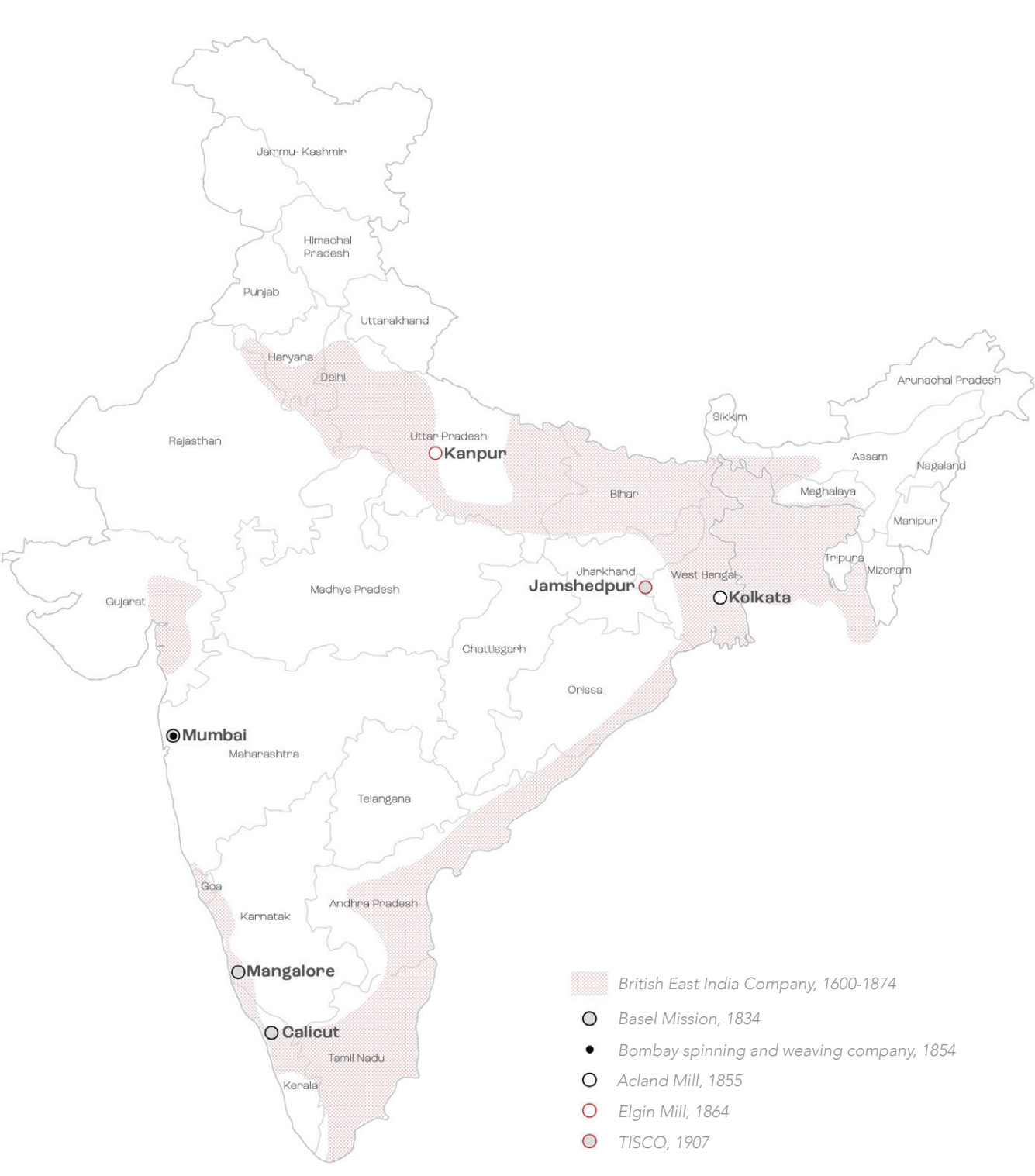*© Author, Reference: Tipnis & Singh, 2021*

Jammu-Kashmir

Himachal
Pradesh

Punjab

Uttarakhand

Haryana
Delhi

Arunachal Pradesh

Sikkim

Rajasthan

Uttar Pradesh
○ Kanpur

Assam

Nagaland

Bihar

Meghalaya

Manipur

Gujarat

Madhya Pradesh

Jharkhand
Jamshedpur ○

West Bengal
○ Kolkata

Tripura Mizoram

Chattisgarh

Orissa

Maharashtra
◉ Mumbai

Telangana

Goa

Andhra Pradesh

Karnatak
○ Mangalore

Tamil Nadu

○ Calicut

Kerala

British East India Company, 1600-1874
○ Basel Mission, 1834
• Bombay spinning and weaving company, 1854
○ Acland Mill, 1855
○ Elgin Mill, 1864
○ TISCO, 1907

Fig.24 Mapping India's first industries, before independence
© Author, Reference: Report: Inventory of Industrial Heritage of India, 2019
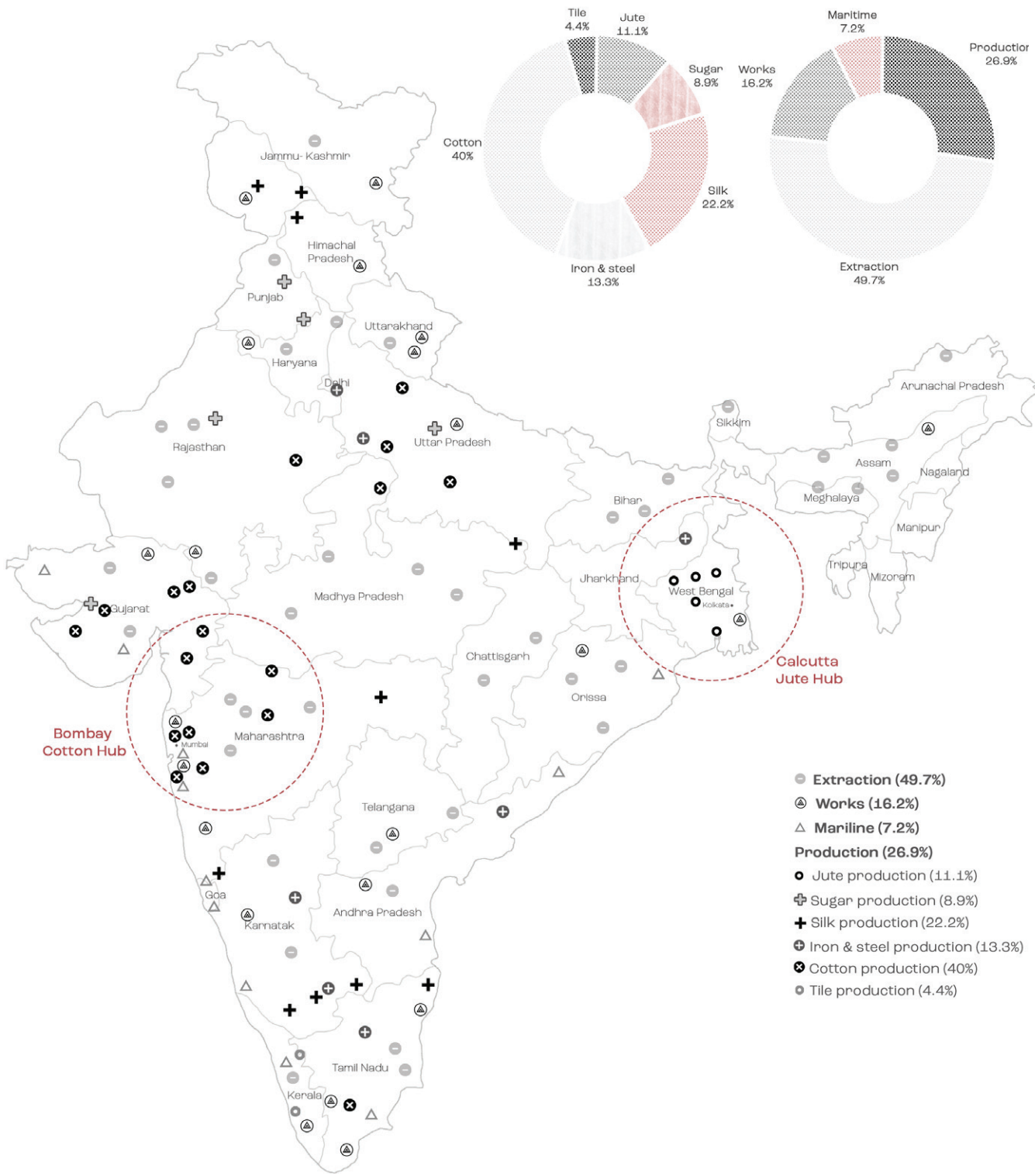
India's industrial legacy is a result of its technological development and economic growth that was brought about by societal changes.The chronological typology of the industrialization in the country can be broadly categorised as pre-industrial, proto-industrial, industrial, and post-industrial periods[18]. These include fields of extraction, production, transport, communication, trade, commerce, works, and port/warehouse. The architecture of these industrial establishments are of various types such as Brutalist, Victorian, Modernist, and Post-Modern buildings. Despite having such rich architectural typologies, the state of industrial heritage is questionable with no proper care or legislation set in order to protect it.

Issues in Conservation of Industrial Heritage in India: The lack of legislation[19] or integrated policies to protect industrial heritage at a national level is one of the major issues in heritage protection. This results in different sites being treated differently due to varying local/ municipal jurisdictions. Moreover, the absence of procedures for maintaining the intangible industrial heritage such as oral histories and cultural customs further complicates the conservations made (Tipnis & Singh, 2021).

Lack of Recognition and Legislation: Most of these industrial heritage sites are not recognized under national legislation for protection and hence are threatened by abandonment, demolition, or redevelopment of the sites. This is mainlt because industrial heritage is not considered as mainstream heritage other than by professionals (Tipnis & Singh, 2021).

Threats from Development Pressures: The historic industrial areas of the cities are lost to sprawling city growth and developments. These sites are demolished or revamped with no care for its integrity thus eroding their heritage values and historical worth. As this progresses phenomena progresses, these sites become less representative of its original intend (Tipnis & Singh, 2021).

Failure to identify as heritage: The buildings of the industrial period are sunject to being replaced by new construction due to the little recognition awarded as industrial heritage. This erases history and breaks the link between the past and present (Tipnis & Singh, 2021).

Intangible Heritage Preservation: Most of the time, conserving the industrial heritage emphasizes the protection of edifices, structures and physical elements. While its important, the stories, skills, and traditions associated with it often gets ignored. The protection of these intangible elements are the least protected when it comes to heritage conservation (Tipnis & Singh, 2021).

Fragmented Conservation Approaches: Protection and preservation of industrial heritage sites has a fragmented approach. The protection of these sites are often influenced by the local political climate. With varying political powers, interests and even corruption, the focus often shifts from the protection of these isolated sites and more towards personal benefits (Tipnis & Singh, 2021).

Awareness and Stakeholder Engagement: The general lack of recognition of the value of industrial heritage among the general public, policymakers, heritage professionals, and urban planners is a significant barrier to prioritizing its conservation. The effective preparation of sustainable conservation strategies, along with the long-term security of industrial heritage sites, involves the active participation of various categories of stakeholders, such as governmental organizations, non-governmental ones, social enterprises, and local communities (Tipnis & Singh, 2021).

Fig. 25 Inventory of India's Industrial Heritage
© spacematters.in

⊖ **Extraction (49.7%)**
⊛ **Works (16.2%)**
△ **Mariline (7.2%)**
Production (26.9%)
◍ Jute production (11.1%)
✚ Sugar production (8.9%)
✛ Silk production (22.2%)
⊕ Iron & steel production (13.3%)
✖ Cotton production (40%)
◌ Tile production (4.4%)

18 The various periods are reflective of changing societal, economic, political and even architectural landscapes across the country.
19 Unlike many other countries India lacks a legislation at the national level that accounts for heritage. It is mostly done at regional or local levels with many organisations, offices and members thus making the overall co-ordination difficult.

The historical development of Indian industry cannot be fully understood without acknowledging its intercon-nectedness with European and global industrial history as it functioned as the ground for extraction of raw mate-rials. The industrial sites that emerged during the mid-19th century focused mainly on cotton, wool, indigo, spic-es, coal, mineral mines, iron and tea. These sites were supported by infrastructure and communication facilities like railways, postal services, shipping, electricity and auxiliary facilities like warehouses, residences, healthcare, docks, offices, stations, bridges, etc.

Bombay, Kolkata, Ahmedabad, Kanpur and Surat became the industrial centres of India where most of the indus-trial buildings erected were constructed using modern materials imported from England and mainland Europe[20], as well as local materials like, clay tiles, terracotta, bricks etc. The South of India, especially the cities of Manga-lore and Calicut become producers of Clay tiles, bricks and even textiles.

Following independence, dams, chemical plants, power stations and other infrastructure were also developed. Despite these industrial developments, the recognition of these sites as important and their recognition as na-tional heritage is often along the weaker line, attributed to their demolition, neglect and abandonment. Indian National Trust for Art and Cultural Heritage (INTACH) has identified 174 sites across the country which are mostly situated in Arunachal Pradesh, Gujrat and Andhra Pradesh while only 2 sites have been designated the World heritage title, namely the mountain railways and Victoria Terminus (CST), Mumbai.

As per the data (Falser, 2001) only a 0.4% of industrial heritage is considered for protection while the rest are clearly neglected. This includes important sites such as: Agra Foundries, Delhi Mills and Mumbai mills.   How-ever, in the recent years there has been a rising interest in redeveloping Industrial sites. A case is that of Mum-bai's former ice factory transformed into a café by Malik architecture, a warehouse in South Mumbai that serves as an art and design center, and Vadodara boasting a cultural center housed within a historic Alembic industrial shed (Gupta, 2023). Some of the former industrial sites of Historic importance are:

Agra Foundries: They are a cluster of around 1000 foundries in the city of Agra famous for the Taj Mahal. These foundries date back to the Mughal period. During the British rule, they emplyed CNG based iron casting tech-nology that was imported from Britain to produce machines and spare parts. However, the foundries were shut down due to rising pollution concerns (Gupta, 2023).

Indian Railways: A vital part of India's development and heritage, the Indian railways are a testament to the country's industrialisation and ability to connect across various geographies. The Mountain railways such as the Darjeeling Himalayan Railway, Nilgiri Mountain Railway, Kalka-Shimla Railway and Chhatrapati Shivaji Maharaj Terminus are classified world heritage sites that also showcases major engineering feats. However, its history and active role in industrialisation is not as prioritised as the heritage from previous centuries (Gupta, 2023).

20 The introduction of new materials especially in construction were sourced from England due to less availability in the initial period. how-ever as time progressed, India started manufacturing it.

Fig. 26 Delhi Mills, 1874
© University of Michigan Library

Delhi Mills: The Delhi cloth and general mills also known as DCGM was a pioneer in the Indian textile industry and was established in 1889. It shaped the industrial landscape of Delhi during its prime and even diversified into sugar, chemicals and other industrial sectors. It is one of the best examples of how dynamic the Indian industrial sector was in the late 1900's (Gupta, 2023).

Mumbai Mills: Once the centre of India's textile industry, Mumbai had over 130 mills by the early 1900's in its mill village called Girangaon. These mills shaped not just the economy but created a new social fabric that was highly inter-linked with its workers as well as its surroundings. Despite thriving and becoming the main grounds of cot-ton export, it soon collapsed due to rising pressure from worker's union. Moreover, globalisation and competiton also impacted its existence. While some of these mills still stand as silent testament to its time, most of them have been re-developed or demolished to pave way for future development. The Phoenix mills and Kamala mills are some cases that were transformed as a part of Mumbai's tranformation into a modern metropolis (Gupta, 2023).

Merging of the Islands (18th-20th Centuries): The boom of the cotton industries in Bombay witnessed a surge in the migrant population that led to a rising demand for space. As a result, the government undertook land reclamation projects[21] starting in the 18th century to pave way for future developments. By the 20th century, the developments had started to create new land between the islands by filling up the water body with earth reclaimed from the sea. This process ultimately merged the seven separate islands into a single landmass, forming the foundation for the modern city (Ring et al., 1996).

20th Century and Beyond: After India's independence in 1947, Bombay continued to develop with a faster pace, constructing new highways, bridges, expanding port facilities and eventually becoming the financial and commercial capital of the city. Although with the change in economic policies[22], the textile industry collapsed, the city continued to retain its prominence.

_____

21 The reclamation projects were started under the colonial rule and is still continued.
22 The post-independence economic policies prioritised industrial development in fields of telecom, steel, coal etc with reduced importance to the initial factories like textiles, jute etc.

Fig. 27 Bombay fort and connected islands, 1850
© theguardian.com

two.

Bombay: The city of looms

2.1 THE CITY

Bombay, once a group of seven islands in the Konkan coast in possession by the Portuguese, were originally home to the Koli people, known for their fishing skills. The seven islands namely, Colaba, Old Woman's Island (Little Colaba), Bombay Island, Mazagaon, Parel, Worli, and Mahim were acquired by the British East India Company from the Portuguese as part of a royal dowry in 1668. This marked to be a significant turning point for the Bombay as well as the country as the British invested heavily in developing Bombay as a major trading port after recognising its potential of being a strategic deep harbour. The British built fortified structures like the Bombay fort but mainly constructed causeways to connect the separate islands, thus facilitating movement and trade (Deshpande et al., 1981).

The rise of Bombay (18th-19th century): The opening of the Suez canal in 1869 marked Bombay's position as a global trade centre. Moreover, the first railway line in India from Bombay to Thane that opened in 1853 brought more developments and trade. This helped the transport of raw materials thus, creating a boom in the cotton textile industry, with numerous mills being set up. All of this established Bombay as a major trade centre in India while its geographic location further strengthened its dominance.

Fig. 28 Location of Bombay in India
© Author

Fig. 29 Bellin Map of Bombay, 1764
© Mumbai Heritage

Fig. 30 Kolis, the aboriginal fishing community of Bombay, 1961
© scroll.in

Fig. 31 Ships in Bombay harbour with Gateway of India and Mumbai castle in the backdrop, 1731
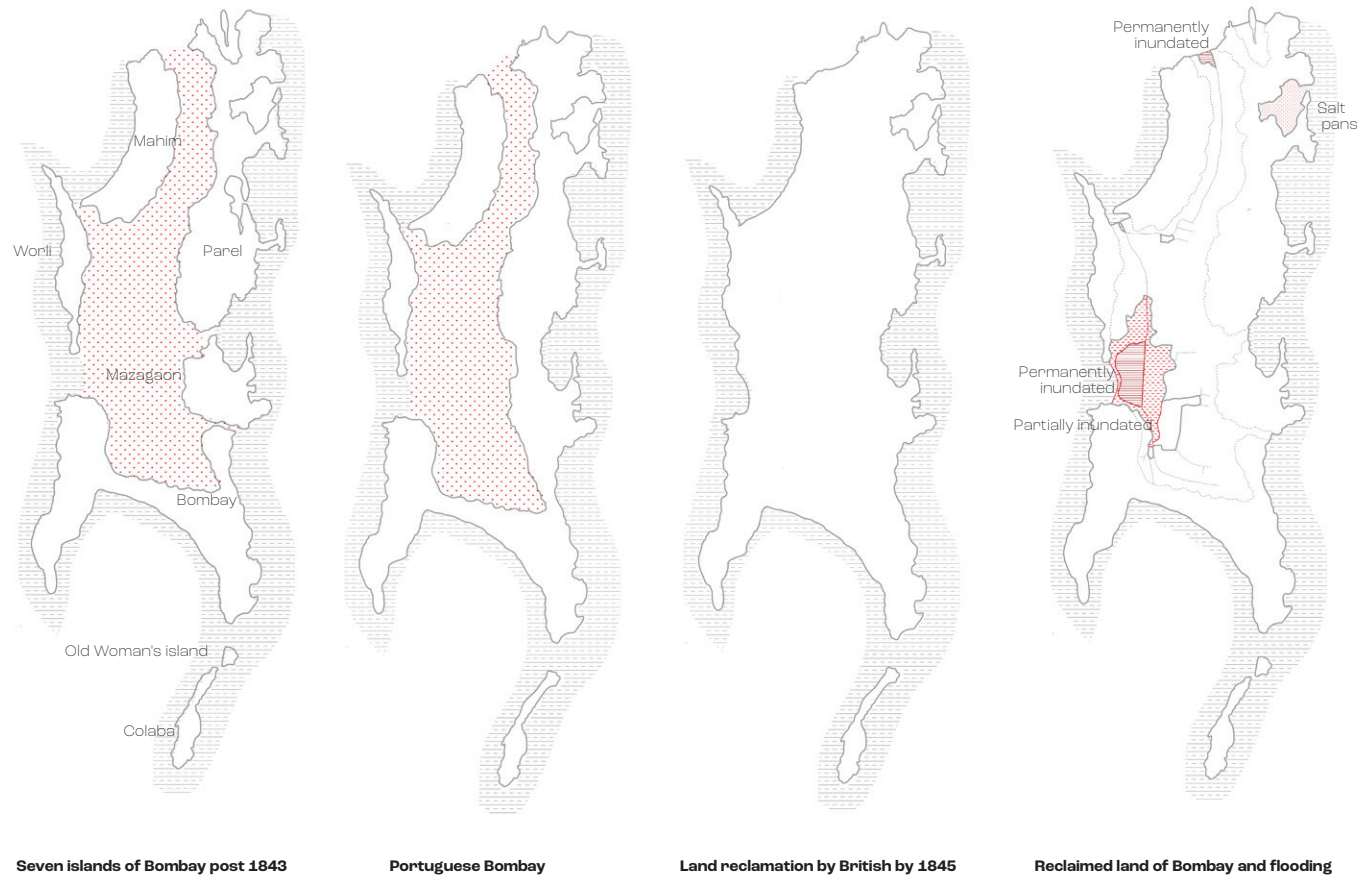*© Samuel Scott*
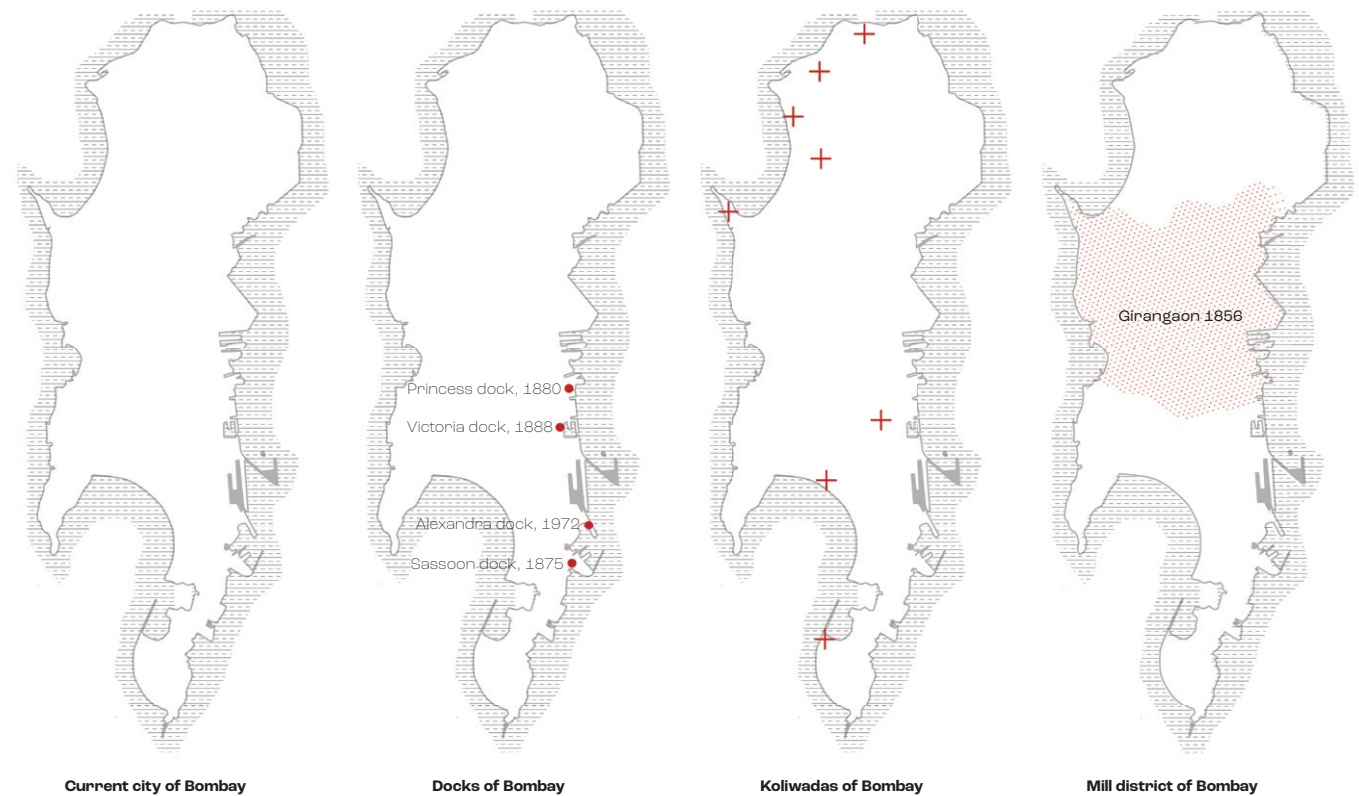
Fig. 32 Development of Mumbai over the years
© Author, reference: 'Making Bombay Island': land reclamation and geographical, conceptions of Bombay, 1661e1728, Tim Riding

2.2 BOMBAY AND THE COTTON INDUSTRY

Strategic harbour to trade centre: Following the acquisition of Bombay by the British EIC[23] in 1661, they identified the potential the city held in being a strategic harbour and subsequently developed it as a trading port with all supporting infrastructure. Bombay's deep and well protected natural harbour offered a safe anchorage for ships all throughout the year and it served as a gateway to the vast hinterlands that were rich in agricultural produce. The harbour became a crucial part of the city as it provided easy access to a plethora of goods while also making loading and unloading cargo more efficient. Trade flourished, with commodities such as salt, rice, ivory, textiles, and metals being exchanged, while Indian and British merchants boosted commercial activity by the late 17th century (Benjamin 2013).

Rise of trade: During the 18th and 19th centuriesm, Bombay became a major exporter of raw cotton, supplying it to Britain. For this purpose, the British East India Company invested heavily in developing infrastructural facilities like port services, warehouses, railways and roads. Bombay became India's major trade centre at this point with large volumes of goods being traded daily. The city also became a major exporter of raw cotton, providing raw materials for the British textile industry. This boom attracted diverse communities of traders, artisans and labourers who came to the city for a better livelihood (Adarkar & K. Phatak, 2005).

The American war: The Civil war from 1861-1865 created a major disruption in cotton supplies from America. This created a huge demand for Bombay cotton which eventually led to a surge in cotton exports. With Britain turning to India for its textile needs, Bombay became the base for India's cotton textile industry (A. Logan, 1958).

The birth of the cotton industry: India produced high quality cotton which was of great demand in the British textile industry, in the regions around Bombay. This led to the city being a major raw cotton exporter around the mid 19th century, with cotton industries being set up across Bombay. The first successful cotton mill, the Bombay Spinning and Weaving company was set up in 1854 by Cowasjee Nanabhoy Davar, marking the beginning of Bombay's textile ventures. Despite the active presence of the British, these industries were mostly set up by Indian entrepreneurs. Parsi families who were traditionally involved in trade were the main financers of these mills. As time progressed, more mills were set up and Bombay solidified its position as a bustling textile centre with 13 mills in 1870 and around 83 mills in 1915. The area with these mills came to be known as Girangaon (the mill village) and had a diverse workforce which created a new social system (Deshmukh, 1976).

Migration of workers and rapid urbanisation: As trade flourished there was a massive demand for labor in various sectors like loading, unloading, transportation, storing and managing goods as well as in supporting services like packing, shipping and insurance. The rising need for jobs and Bombay's booming trade attracted workers, with people coming to the city from nearby villages and agricultural areas in search of better jobs.While this included workers skilled in the fields of carpentry, metal works, etc who worked in the factories, there were also a huge number of unskilled laborers who performed manual tasks like loading and unloading cargo (Bhushan Upadhyay, 1990).
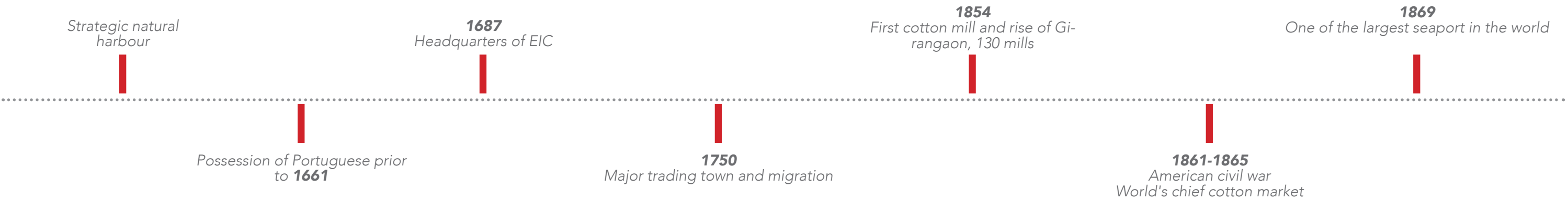
Decline of the cotton industry: Despite thriving for a while, factors like recession, international competition and internal trade unions contributed to the decline of the Bombay Cotton industry. Moreover, the post independence liberalisation policies and shift to telecom, steel and other modern industries further affected the decling state of the cotton mills. The textile industry also faced a strong competition from Japan and by 1953 the number of mills shrunk to 53. Bombay on the other hand continued to thrive as a major commercial and financial centre with most of its history being overshaowed by development and urban sprawl. Additionally, modernisation and mechanisation created a decline in demand for manual labour, thus affecting the working population[24]. The lack of income and active job losses led the factory owners to abandon the industries, sell off the land in part or full, or even redevelop it (Wolcott & Clark, 1999).
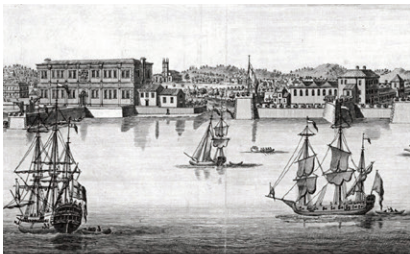
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23 The British East India Company
24 Most of the workers had lost their jobs following the strike and were penniless.

2.3 EVOLUTION OF THE COTTON TEXTILE INDUSTRY

Mumbai's evolution from a city of 7 island to what it is today is quite remarkable. The city was under the control of various local and foreign powers and transformed itself from being a fishing millage, to an industrial city and now the finance capital of India.

Strategic natural harbour

1687
Headquarters of EIC

1854
First cotton mill and rise of Girangaon, 130 mills

1869
One of the largest seaport in the world

*Possession of Portuguese prior to **1661***

1750
Major trading town and migration

1861-1865
*American civil war
World's chief cotton market*

Bombay Port, 18th century

Cotton market Bombay

Bombay street, 1912

Women workers in textile industry

The mill district Girangaon

EIC fort, 1665

Bombay Docks, 1931

Cotton bales for export, 19th century

Byculla Mill district

Chawls in Bombay

Fig. 33 Evolution of Mumbai over the years
© Photos.com/Thinkstock, Margaret Bourke-White, Mary Evans Picture Library, Indiennes – Material For A Thousand Stories, Wikimedia Commons, TICCIH, indiatoday.in, past-india.com (2), worldhistory.org (Top left to bottom clockwise)

2.4 GIRANGAON, THE MILL VILLAGE

Once a bustling "mill village," Girangaon, presently Central Mumbai, was the heart of Mumbai's textile industry. It comprised of the areas Tardeo, Byculla, Mazgaon, Reay Road, Lalbaug, Parel, Naigaum, Sewri, Worli, and Prabhadevi, which collectively formed Girangaon. Former traders such as the Tatas, Petits, Wadias, Currimbhoys, Thakerseys, Sassoons, Khataus, Goculdas, Cottons, and Greaves owned the mills. This central area housed over 100 mills at its peak, employing thousands and shaping the city's growth.

Girangaon's mills played a crucial role in Mumbai's development into a major industrial city as well as its wealth and expansion in the latter part of the nineteenth century. Girangaon, included an area of 600 acres (2.4 km2), excluding the residential quarters or Chawls of the laborers which were erected in the vicinity of the mills by the mill owners. The 20th century Bombay was formed a distinct culture that the mill workers, who lived in a community, nurtured. The majority of the mill workers were from the around the Mumbai region with a majority of Koli community (Jain, 2015).

Before mid-19th century: Since the time of the British, Calcutta was the administrative and trading center in India, overshadowing Bombay. Nevertheless, major historic events like the defeat of the Marathas[25] by the British Raj and the opening of the Suez Canal stimulated the trade activities in Bombay. Over the years, the American Civil War which led to global depression and the decline of opium trade in China paved the way to textiles to develop as the dominant industry in Mumbai (Khedkar, 2018).

25 Refers to the kingdom of present day Maharashtra.
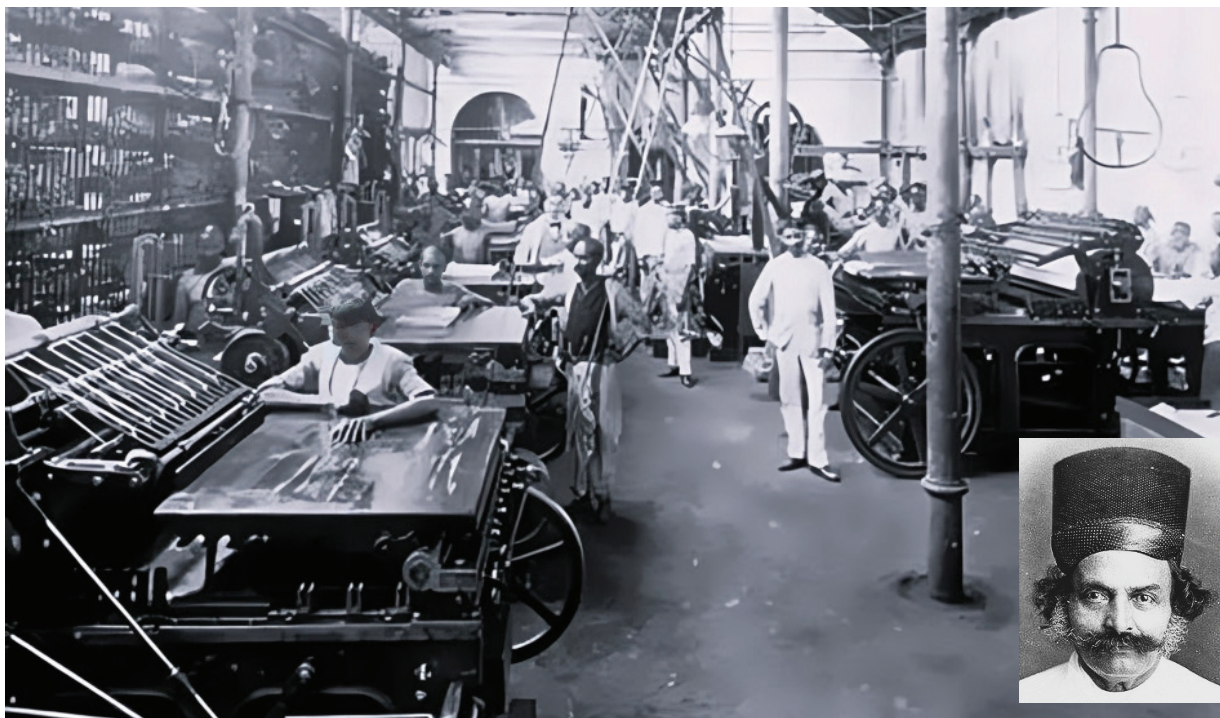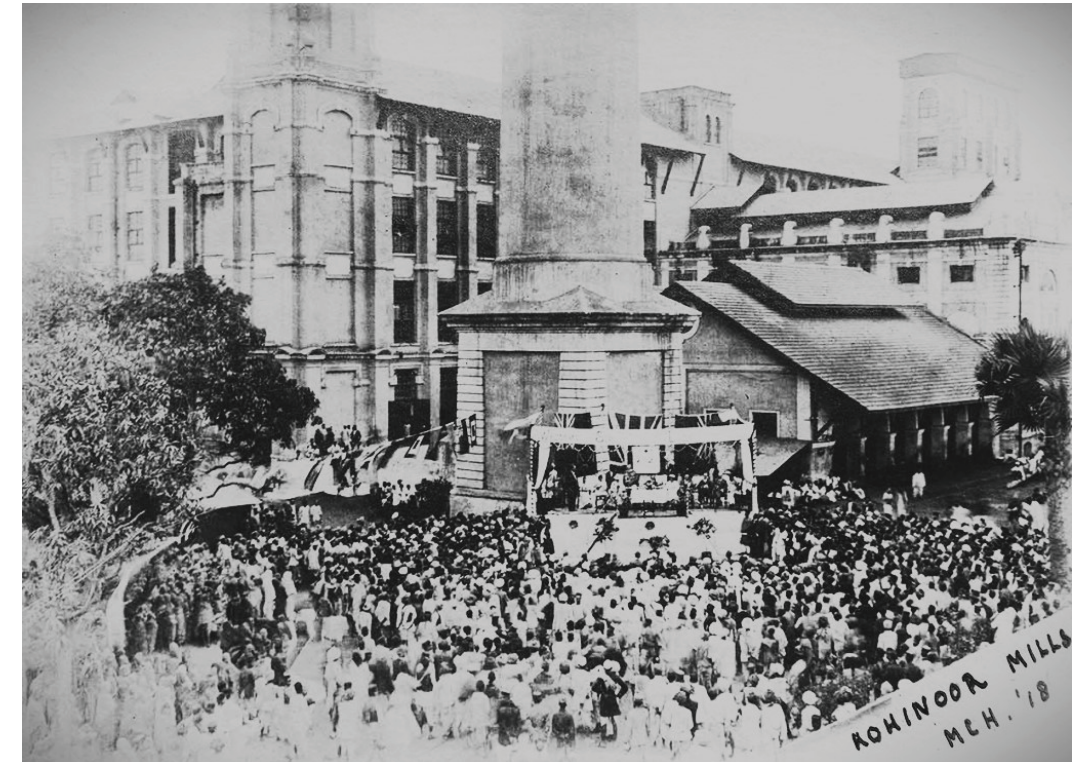
Fig. 35 : Inauguration of Kohinoor mills, 1918
© past-india.com

1854 Bombay Spinning and Weaving Company: The first mill in India, Bombay Spinning and Weaving Company, was set up in Bombay on July 7th, 1854, (production began on February 7th, 1856) by Cowasjee Nanabhoy Davar, a Parsi[26] industrialist, along with 50 leading merchants of Bombay. It was a cotton textile mill, located in Tardeo, which employed about 6000 people during that time. Platt Brothers, a British firm is known to have supported the development of this mill. Cowasjee Nanabhoy Davar can be recognized as a pioneer in the foundation of cotton industries in India, where women were also found to be employed (Adarkar & K. Phatak, 2005).

Girangaon Until 1970's: By the end of 19th century, as part of the British rulers' policy, 80 more textile mills were set up in the city, on lands which were leased to the mill owners at very low prices. Housing was provided to the industrial workers to promote them to settle in the city. Peasants from poverty struck rural areas moved to the city by the prospect of steady work and by 1930s, about two-thirds of the adult working population in the city worked under the textile mills. The spatial concentration of these textile mills, and the workers' settlement led to the creation of Girangaon, the "village of mills". This included areas of Tardeo, Byculla, Mazgaon, Reay Road, Lalbaug, Parel, Naigaum, Sewri, Worli and Prabhadevi. The workers used to live in close proximity to the mills, in one room tenements built by the mill owners called chawls. Girangaon had developed a rich physical and social infrastructure around that period with roads, railways, hospitals, chawl committess and cultural organisations.

26 The Parsis or Parsees were Zoroastrian refugees from Iran who fled to India during the time when they were persecuted by the Arab Muslims.

Fig. 34 : Cowasjee Nanabhoy Davar, Bombay spinning and weaving company © whatshot.in, www.hercircle.in, The Social Inquilab 2017

By 1975, about 52 mills were developed in Girangaon which employed 250,000 workers and covered nearly 600 acres of land (Adarkar & K. Phatak, 2005), (Adarkar et al., 2005).

GS

FS

E

D

B

C

A

Mumbai Municipal divisions

GIRANGAON

Location of Girangaon

2 Km

0 Km   6 Km

NAIGAON

PRABHADEVI

WADALA

PAREL

LOWER PAREL

LALBAUG

SEWRI

CHINCHPOKLI

TARDEO

RAEY ROAD

BYCULLA

MAZAGAON

Districts of Mill village

Fig. 36 : Girangaon and the mill districts
© Author, Reference: The Problems of Textile Industry in India. A Case Study
of Ichalkaranji by Nimit Patni
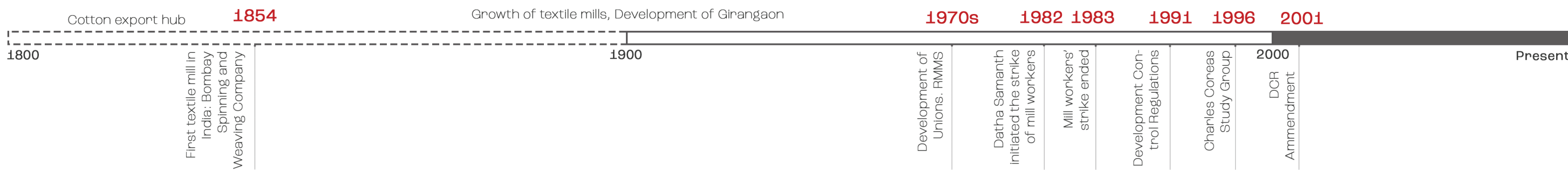
Fig. 37 : Timeline of Mills
© Author

Cotton export hub   **1854**   Growth of textile mills, Development of Girangaon   **1970s**   **1982 1983**   **1991**   **1996**   **2001**

1800   1900   2000   Present

First textile mill in India: Bombay Spinning and Weaving Company

Development of Unions. RMMS

Datha Samanth initiated the strike of mill workers

Mill workers' strike ended

Development Control Regulations

Charles Coreas Study Group

DCR Ammendment

1970s RMMS: Rise of trade unions was the major event happening during this period. The Congress-led Rashtriya Mill Mazdur Sangh (RMMS) became prominent during this time and even though the union perceived to be pro-owner biased, RMMS became the approved union of that time. This became the starting of the tension between the mill owners and the mill workers (Khedkar, 2018).

1982: Great strike: Mini strikes and protests by mill workers were regular due to the discontent over the wages. In the year 1972, Dr. Datta Samant, who was dedicated to the workers' rights, emerged as a major leader and was elected as the union leader and state legislator. The famous Great strike of 1982, which lasted for 18 months, was led by Dr. Samant, took place in January 1982 because of a major clash with the mill owners. The demands of Dr. Samant were high wages, workers' rights, education allowance, paid holidays and so on. The most problematic demand was to remove RMMS as the official union, which led to the conflict with the interests of the Government and the politicians who noticed the raising power of Dr. Samant, who they feared could become a dominant union leader. Over 250000 workers participated in the strike, which led to the shutting down of 58 mills and leaving about 150,000 people jobless. (Khedkar, 2018) (Kagal et al., 1981)

1983 Aftermath of the strike: The strike collapsed with no concessions given for the worker as the government refused all the demands that were put forward by Dr. Samant and the mill workers. Many mills closed permanently; migration of textile industry took place out of Bombay as power looms eventually took over the textile sector. All these led to countless workers being jobless (Khedkar, 2018) (Kagal et al., 1981). There were many reasons other than the strike which led to the shutting down of the mills. The mill owners started to divert their profits to start other industries than ploughing them back to the textile industry. By 1980s, the mill owners recognized the growing demands of the workers and started to outsource production in small towns like Bhivandi, where there were no unions and the workers could be exploited. When the mill owners started realizing the real estate potential of the mill lands, they started declaring the mills 'sick 'and selling the land. By the end of 1980s, the mill owners stopped the workers' wages for month to starve them into submission to accept voluntary retirement, which ultimately compelled them to agree to unjust settlements and to accept inadequate VRS packages, which were never paid regularly. The mill owners also started to carry out unauthorized construction and renting for non-industrial purposes on the mill lands which were leased to them solely for industrial uses (Adarkar et al., 2005) (Kagal et al., 1981).

1991 Development Control Regulations: The sale and development of mills that were labelled sick were allowed to be sold and developed under Section 58 of the DCR. The land use could also be changed from industrial to commercial or residential and the Floor Space Index could also be increased under this law, which benefited the mill owners to gain more profit (Adarkar et al., 2005). Under the regulation, the mill lands were supposed to be equally divided between the mill owners, Municipal Corporation (for public open spaces) and with the Maharashtra Housing Area Development Authority (for public housing, half of which was meant for mill workers' housing). The major issue which arose was due to the mill owners not following the one-third rule and selling off more land than what they are allowed to, without sharing for public good. One such example which came up during this period is Phoenix Mall (built in 1996) (Krishnan, 2000).
1996 Charles Correa's report: A study group was appointed by the Maharashtra Government to analyze the potential of developing the mill lands. The study group was headed by a famous architect Charles Correa. The study group examined 24 mills that were owned by NTC, as permission was not granted for the analysis of the private mills by the owners. The group proposed the idea of pooling land from different mills to create a more holistic planning for the city. However, the report was not made public by the Government.

2001 Modified DCR[27] rule: This amendment, which the chief minister had promised to be in favour of the public, altered the one-third rule and gave the mill owners more land, while reducing the share of MHADA and BMC, which turned out to hurt them significantly (Adarkar et al., 2005). Even though the environmental groups challenged this rule, the Supreme Court acted in favour of the amendment. This regulation drastically worsened the condition of the mill workers as they were provided with very little housing and public spaces (Mhaskar, 2013).

27 Development control regulations

Fig. 38 :Great strike of 1982; Datta Samant union leader
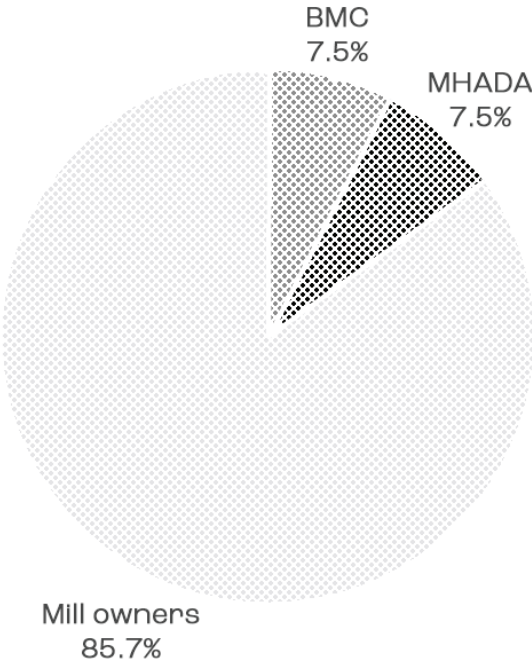*© mid-day.com, libcom.org*

BMC
7.5%
MHADA
7.5%
Mill owners
85.7%

MHADA
33.2%
BMC
33.4%
Mill owners
33.4%

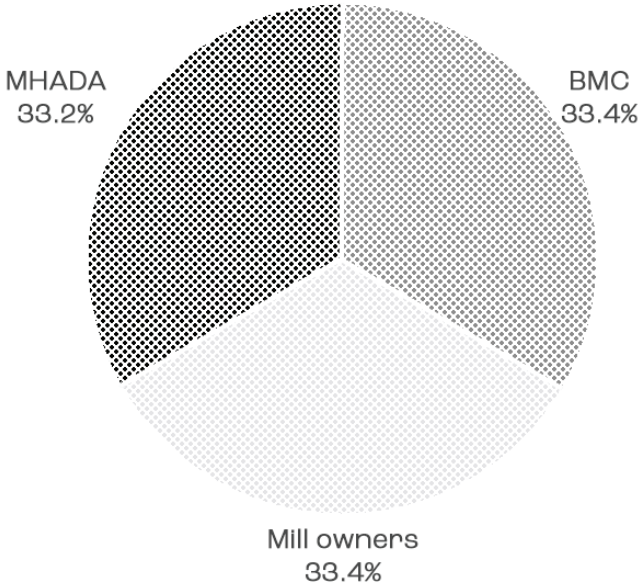*Fig. 39 Distribution of mill lands as per DCR 2001*
© Mhaskar, 2013

Fig. 39a Distribution of mill lands as per DCR 1991
© Mhaskar, 2013

1883
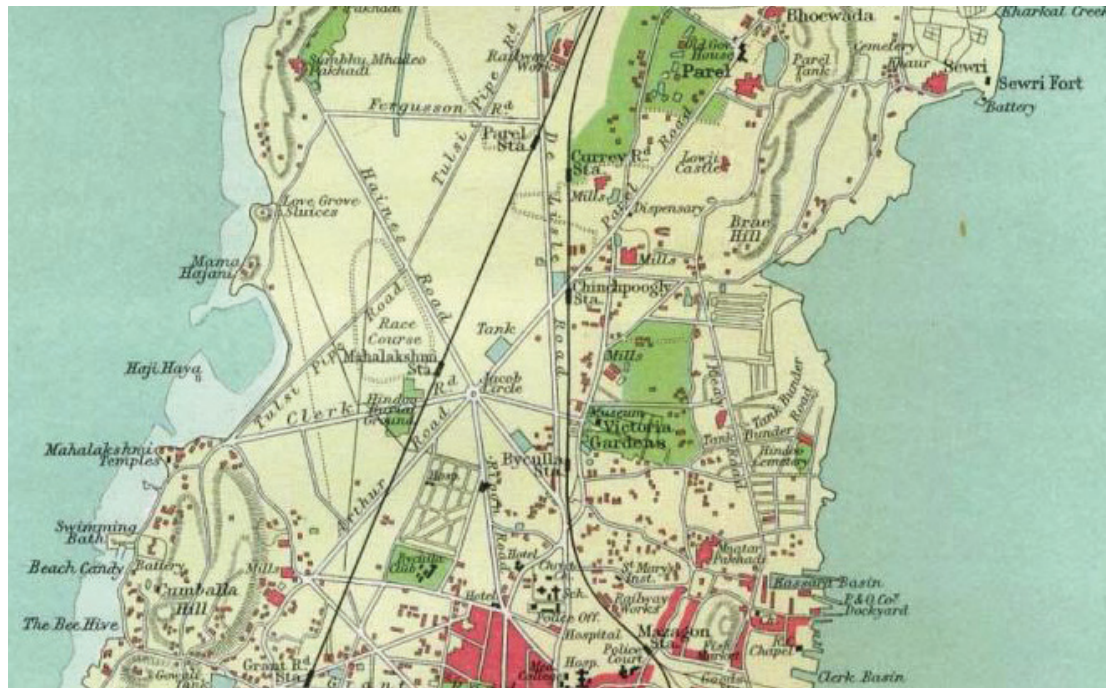
Fig. 40a Map of Mumbai, showing the mill district in the year 1883© themaphouse.com

1909

Fig. 40b Map of Mumbai, showing the mill district in the year 1909© The Gazetteer of Bombay City and Island. Volume 1. Bombay, India 1909

1955

Fig. 40c Map of Mumbai, showing the mill district in the year 1955 © past-india.com

1980

Fig. 40d Map of Mumbai, showing the mill district in the year 1980 ©themaphouse.com

three.

Life in a mill

3.1 THE MILL WORKERS

The mill workers in the early periods came from the Konkan region, the coastal belt of Maharashtra. People from Pune, Satara and Kolhapur are also found to have migrated to Bombay as the textile industry grew (Khedkar, 2018). These workers, who left their families behind, mostly came from poor backgrounds in search of better economic opportunities. The mill owners, The Bombay Development District (BDD) and Bombay Improvement Trust (BIT) constructed low cost single or double room tenements called Chawls, which had shared toilets and common spaces, for accommodating the mill workers (Adarkar & K. Phatak, 2005).

Even though the workers left behind their families initially when they came to Bombay, over the years their families joined them and dwelled in multiple chawl rooms. The cramped chawl culture indicates that the workers were given very low wages. The chawl culture gave rise to "khanavalas" which are dining spaces that are run by women and "Gaonkari mandals" or village committes[28], which were run by the mill workers to recreate a sense of belonging as what they had in their home villages (Adarkar & Menon, 2004).

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28 Similar to Indian Panchayats
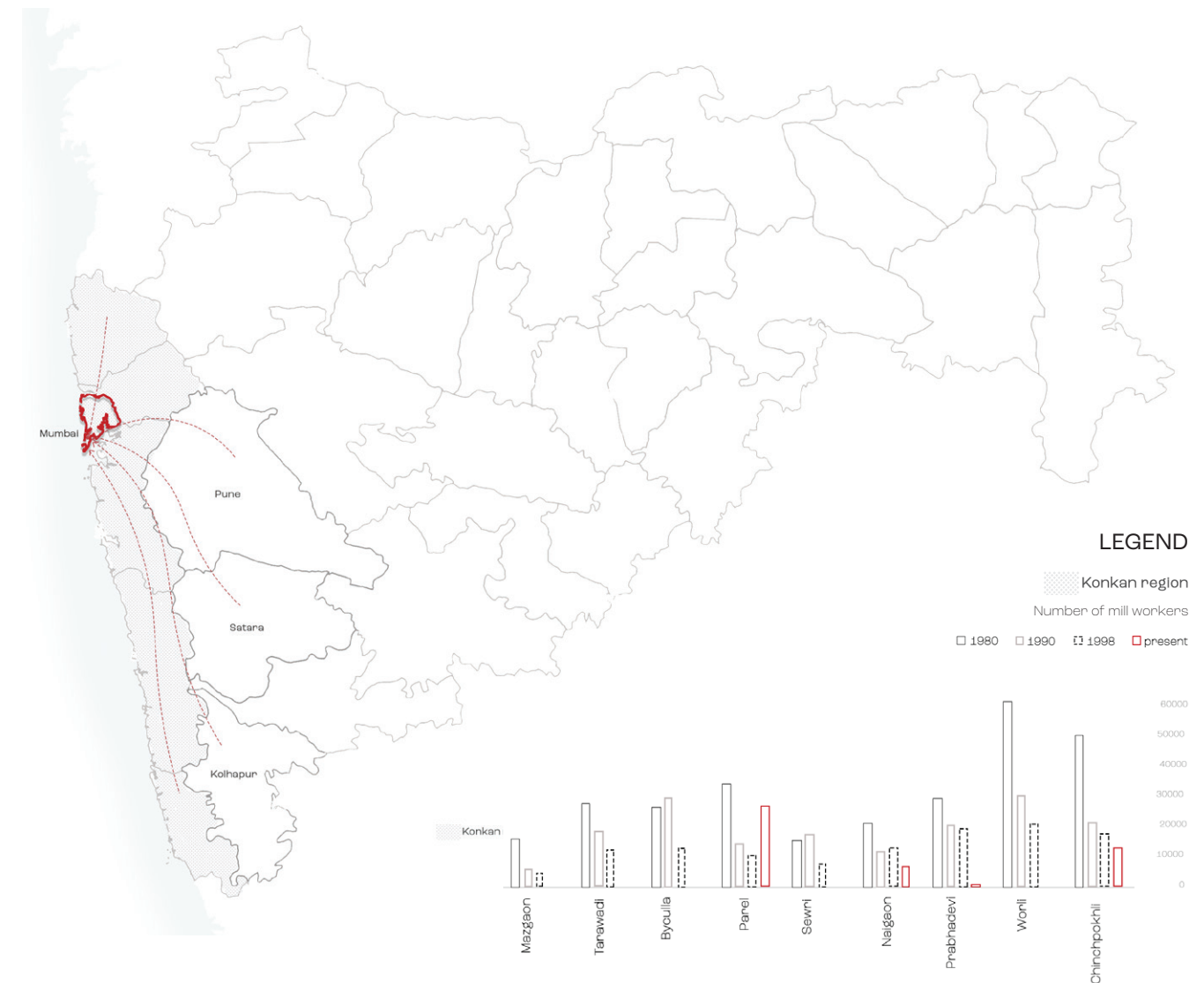
3.2 CHAWLS

The Chawls were housing units built by the Mill owners starting in the 1800's following the mass migration of workers to the city due the textile industry boom. These residential quarters were built in close proximity to the mills and was a new typology in housing design. They were compact units of area ranging from 100 to 200 square feet, with common spaces and toilets. Although buit to accomodate the workers, private landlords soon realised the potential of monetising it and started constructing more Chawls to meet the rising housing needs. As the population of Mumbai rose, the initial migrants felt the need to establish a permanent presence in the city, thereby bringing their families to live with them. This shared living culture in compact households with 4 or more people fostered a new and distinct communal living environment. Although linked to the industrial past, the Chawls have marked its own identity in the city, housing not just mill workers but people from different walks of life (Sanyal, 1963).

3.3 CHARACTERISTICS OF CHAWLS

The initial chawls were built back to back, with a single storey and had single room apartments with shared toilets. As the families of the immigrant workers started to move in, these one person apartments declined in demand. Newer typologies with space for a family were built by private landlords which gained traction and were in high demand. The chawls soon became a typology that had inexpensive rent which was affordable to even the lowest income groups. Chawls emerged as the most common and valuable housing typology even in the public sector after its adaptation by the Bombay Municipal Corporation (BMC, founded in 1865). The Bombay Development Department (BDD) under the British constructed the most number of chawls in Central and South Mumbai. Presently, the BDD has over 206 chawl structures under them, dispersed across the city namely in: Worli (120), NM Joshi Marg (32), Sewri (12), and Naigam (42) (Sarkar & Bardhan, 2020).

Structure & Design: The typical chawls were Indo-Gothic[29] multi-storeyed buildings with 2 to 5 floors due to land constrictions. Each dwelling unit had one to two rooms or even more and a balcony. The corridors, toilets and courtyard were common spaces and fostered communal living. The smalled unit were called "Kholis" and had a signle room with an area of 20 squre metres. In some cases the toilets were placed outside the building and in others, each floor had a common kitchend and toilet. The courtyard was a multi-functional space used for socialising, drying laundry, gathering and even relaxing.

The Chawls developed by the public sector and mill owners were individual buildings with single-room dwellings placed on each side of a central corridor. On the other hand, the private chawls had two room dwelling with a corridor along one edge. While the Chawls are mostly similar in terms of use, they had distinct characteristics with diifeerent dispositions (Finkelstein et al., 2011).

Social and Cultural Aspects: The compact spaces and shared facilities fostered a strong sense of community among the residents. The presence of people from various backgrounds created a vibrant societal system. More-over, the minimal privacy and inter-dependece often displayed resourcefulness in utilizing their limited space for cooking, sleeping, and storage (Sarkar & Bardhan, 2020).

Challenges: The historic chawls were once a solution to Mumbai's hosuing crisis. However, the state of most of these mills are abysmal presently with issues like over-crowding, lack of basic amenities and safety concerns. There are barely any attempts being made to revive or preserve them. Although there is a growing movement to preserve chawls as a vital part of Mumbai's heritage, modern chawls replace the older ones raising the question of how these structures can be re-integrated.

29 A fusion of Indian and European influences

Fig. 43 A view of Chawls in Mumbai
© Perrine Philippe

Fig. 44 A street in a Chawl
© Perrine Philippe

3.4 LOCATION OF CHAWLS

Mumbai has chawls spread all over the city with some of the prominent ones being located in areas like Phanaswadi, Khotachiwadi, Agripada, Wadala East, Kamathipura, Bhandari Chawl, and even pockets along 175 Walkeshwar Road. The historic chawls on the other hand are mostly located in the ex-mill district of Girangaon with major concentrations found in regions like Worli, Parel, and Lower Parel. The famous BDD[30] chawls are also located in this area (Padora, 2020).

_____

30 Bombay development department

LEGEND

1	Bhatia Chawl
2	Swadeshi Chawl
3	Atmaram Chawl
4	Mota Mandir Chawl
5	RK Chawl
6	Gandhi Chawl
7	Hira Baug/Ram Baug
8	BDD Chawl
9	Ambedkar nagar SPA
10	Pratiksha nagar MHADA
⊕	Chawl locations
▢	MHADA housing

0 Km   2 Km   6 Km
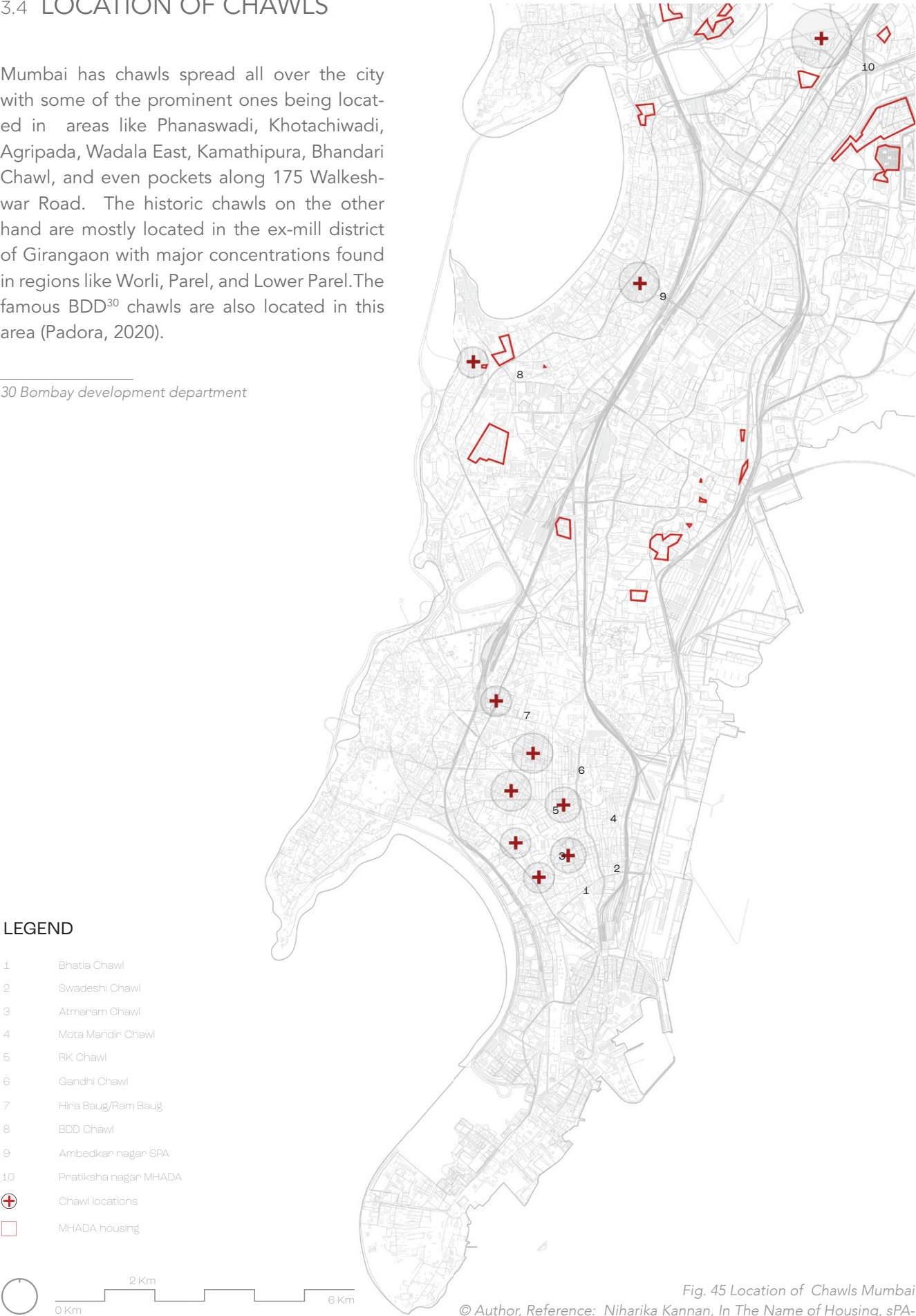
Fig. 45 Location of Chawls Mumbai
© Author, Reference: Niharika Kannan, In The Name of Housing, sPARE, Mumbai

3.5 CHAWL TYPOLOGIES

UNIT AREA (SQ.M)

67 SQ.M
54.1 SQ.M
44.5 SQ.M
39.3 SQ.M
40 SQ.M
35.4 SQ.M
30 SQ.M
27.8 SQ.M
30 SQ.M
30 SQ.M
26 SQ.M
25 SQ.M
25 SQ.M
24.11 SQ.M
24 SQ.M
23.7 SQ.M
20.0 SQ.M
17 SQ.M
16.6 SQ.M
16.5 SQ.M
14.5 SQ.M
14 SQ.M

MOTA MANDIR MANDIR · ATMARAM CHAWL · SWADESHI MARKET CHAWL · BDD CHAWL · BHATIA CHAWL · SEASIDE SOCIETY · RK CHAWL · SITE AND SERVICES · SAMBHAJI NAGAR SRA · PRATIKSHA NAGAR MHADA · AMBEDKAR NAGAR SRA
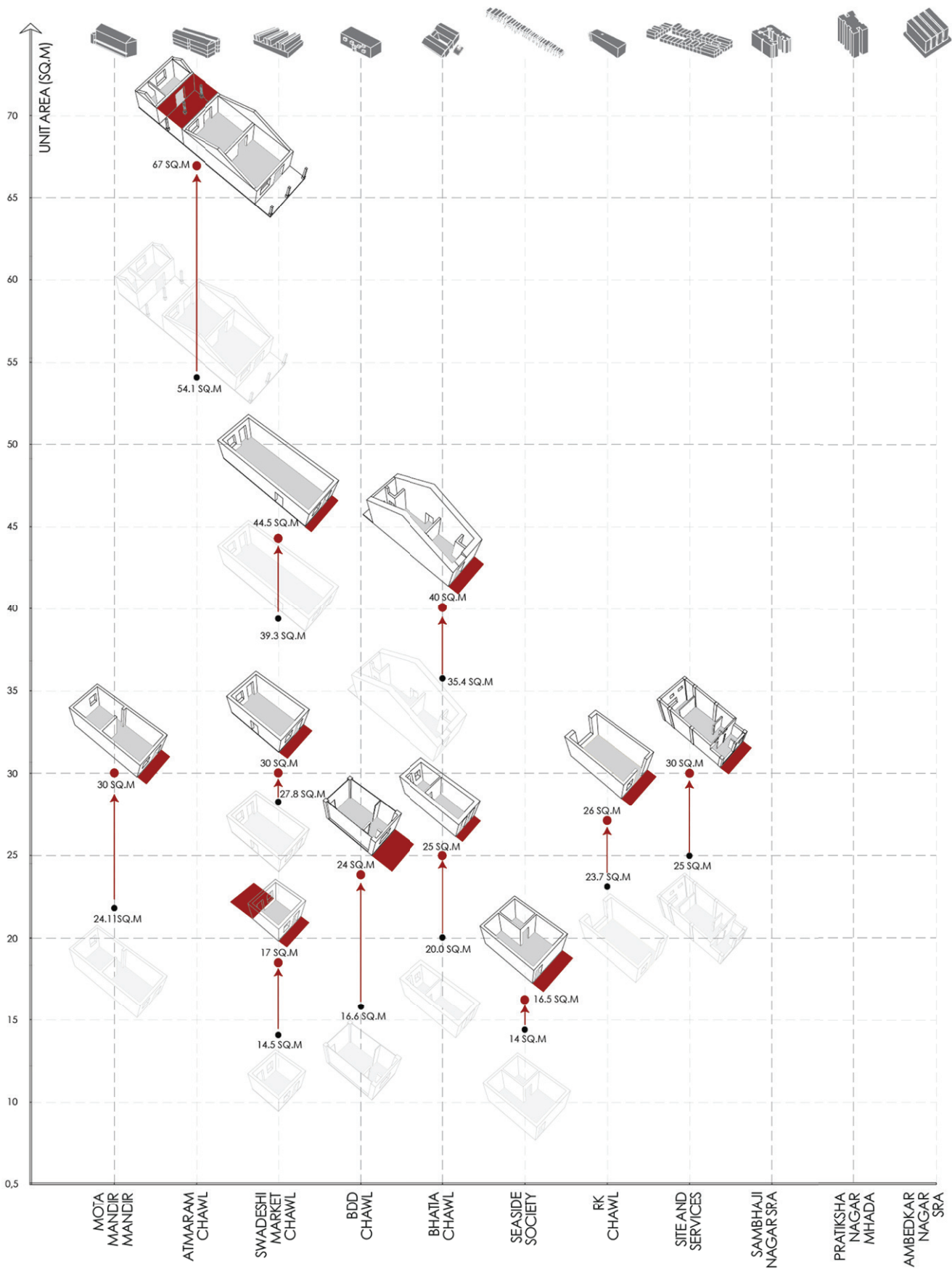
Fig. 46 Chawl Typologies
© Niharika Kannan, In The Name of Housing, sPARE, Mumbai

3.6 CHAWL CULTURE

Ever since its inception, the Chawls have been vibrant cultural hubs during festivities. The residents come together to celebrate festivals and promotes a sense of unity. The areas in and around the chawls tranform in order to cater to activities pertaining to the celebration (Padora, 2020).
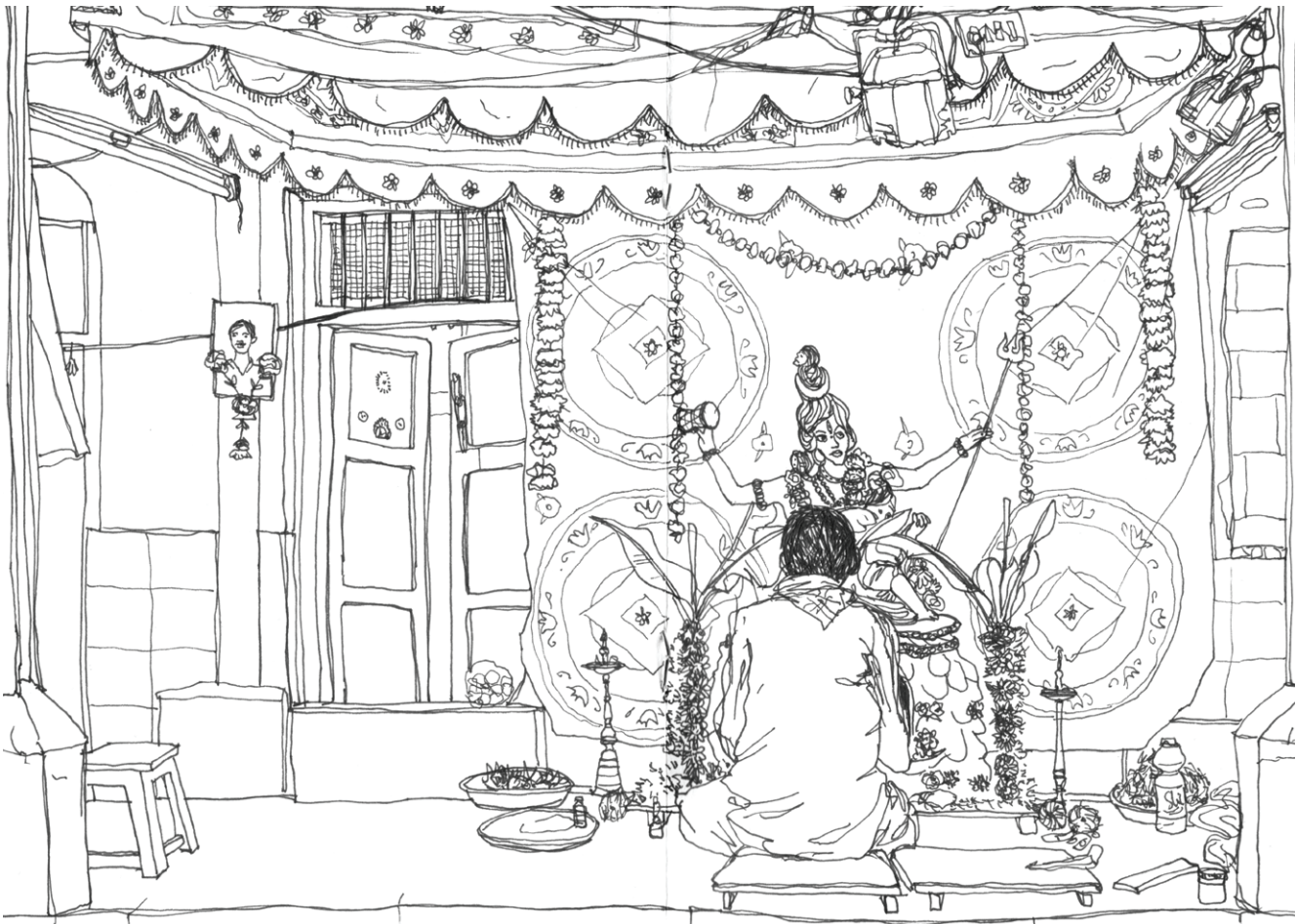
Fig. 47 Chawl and culture
© Perrine Philippe
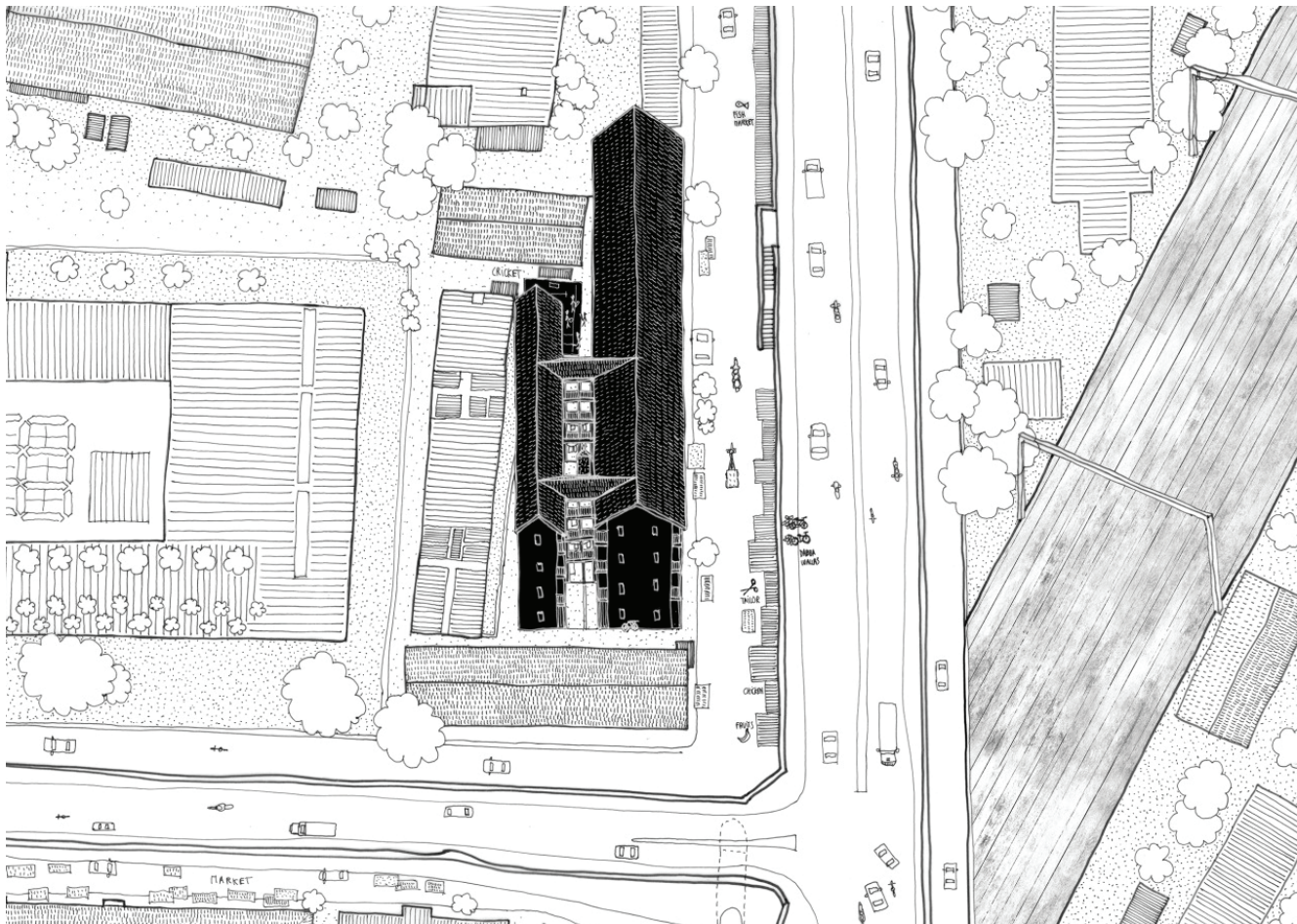
Fig. 48 A street in a Chawl
© Perrine Philippe

Fig. 49 Chawl against a high rise
© Tejal Pandey

Fig. 50 Inside a Chawl unit
© Tejal Pandey
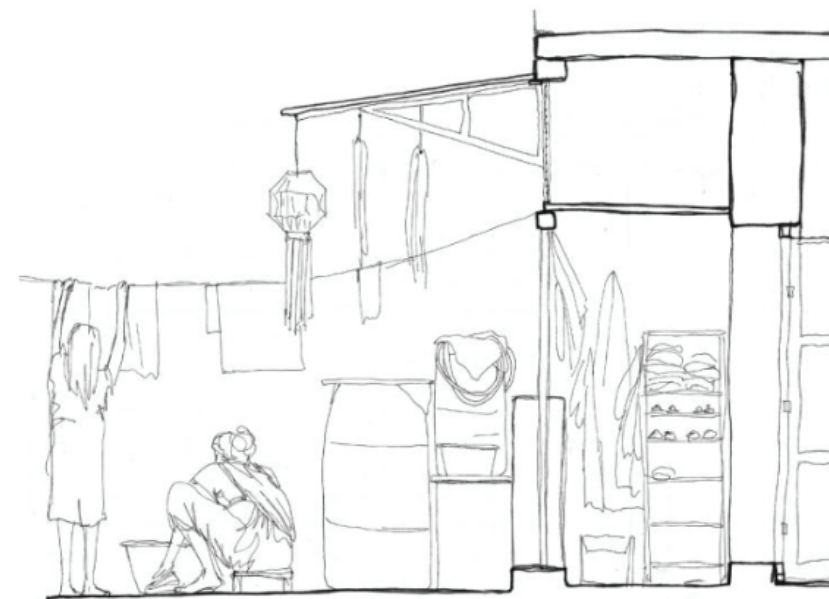
Fig. 51 Chawl elevation
© Rohit Lahoti
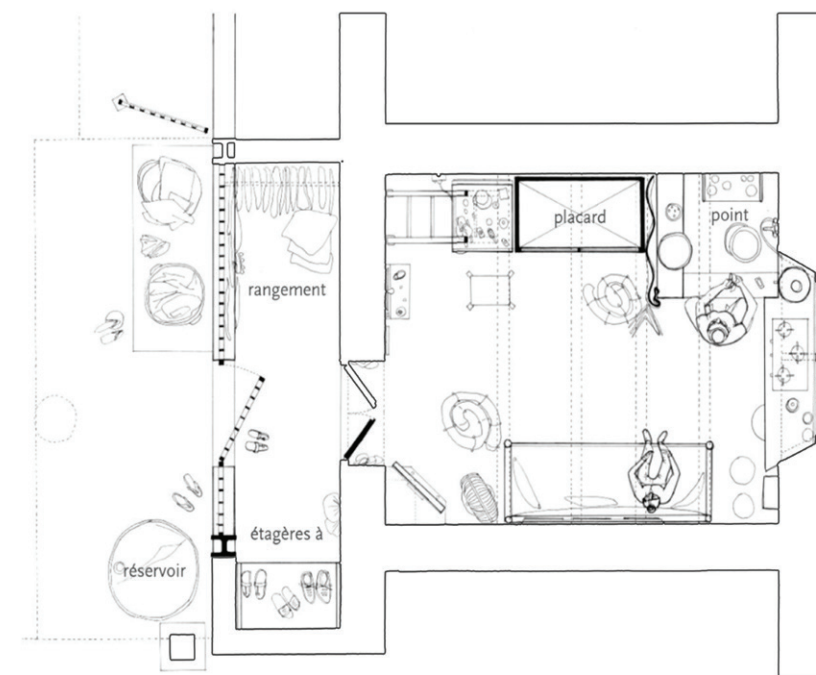
Fig. 52 Kohli, the smallest unit in a Chawl (not to scale)
© Perrine Philippe

3.7 CHAWL LAYOUTS
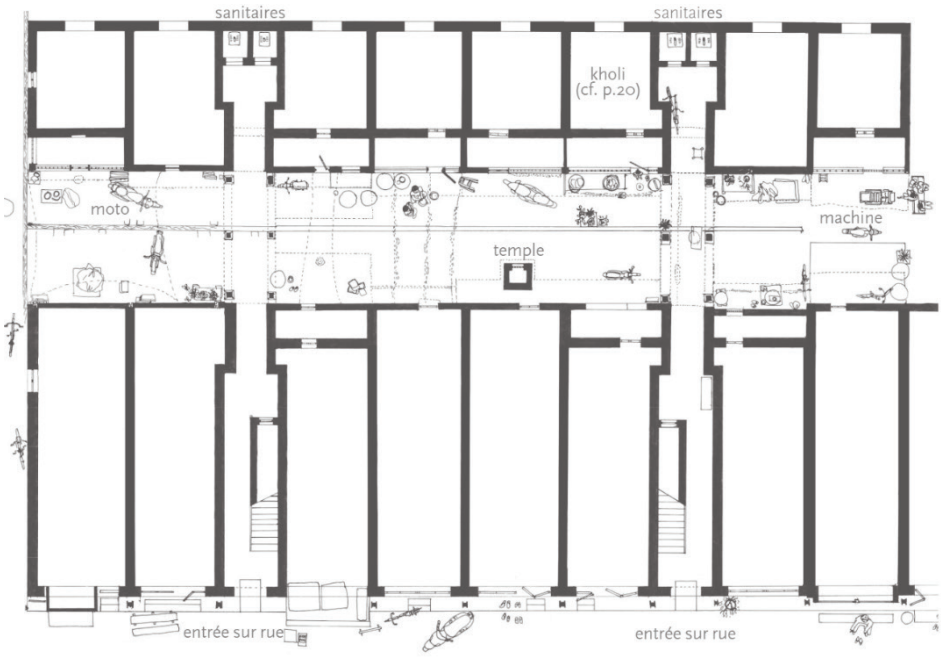
Fig. 53 Independent Chawl buildings separated by a street (not to scale)
© Perrine Philippe
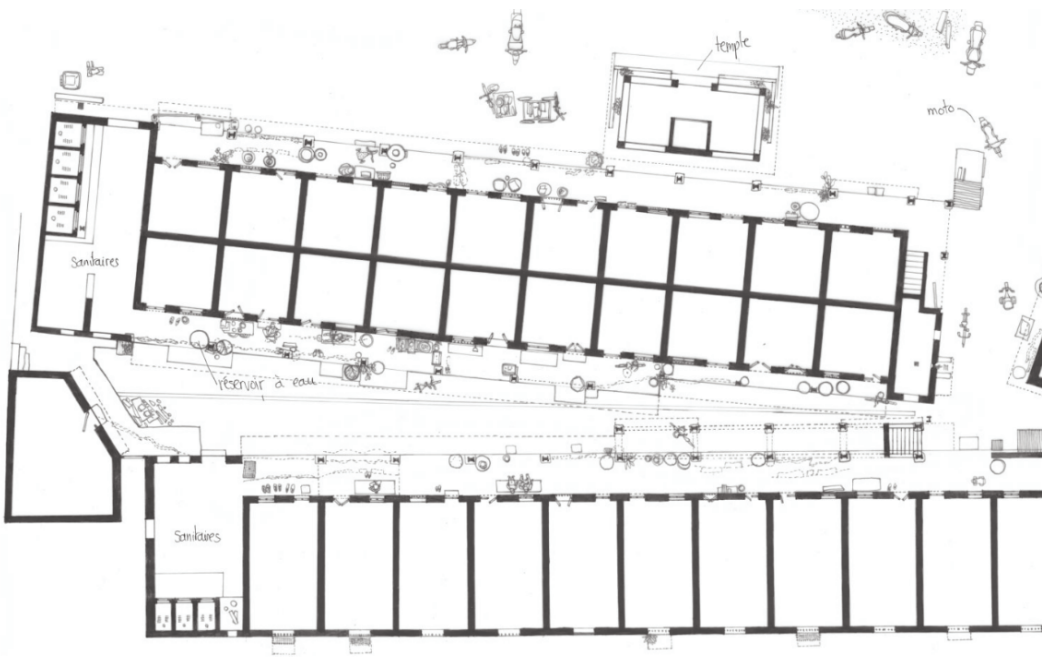
Fig. 54 A chawl with a central couryard (not to scale)
© Perrine Philippe
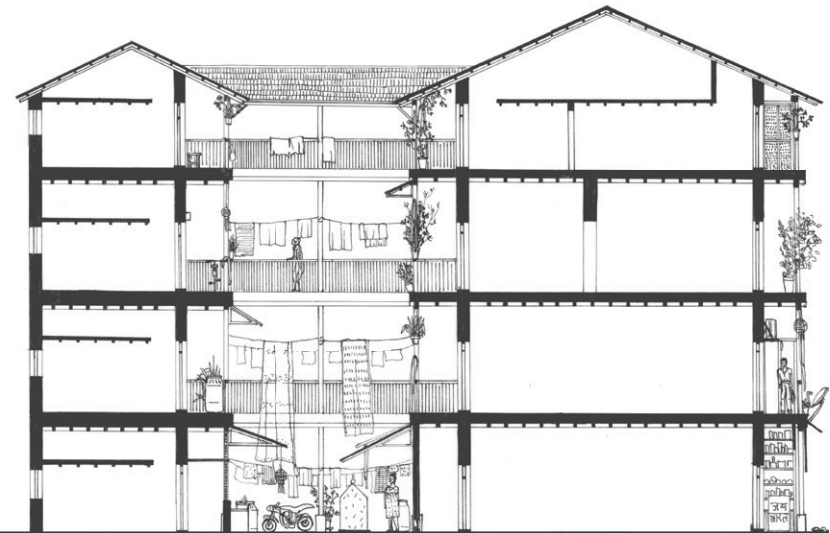
Fig.55 Cross section showing the courtyard in a chawl (not to scale)
© Perrine Philippe

3.8 CHAWL AND THE STREET

Fig. 56 Street as a commmunity space (not to scale)
© Niharika Kannan, In The Name of Housing, sPARE, Mumbai

Fig. 57 Activities extending into a street
© Niharika Kannan, In The Name of Housing, sPARE, Mumbai

Fig. 58 Street as a cultural identity (not to scale)
© Niharika Kannan, In The Name of Housing, sPARE, Mumbai

Multifunctional Area: The street is transforming in nature catering to various needs throughout the day. The mornings often have residents praying or exercising, followed by busy evenings when vendors selling tea and snacks as people gather and children play games (Padora, 2020).

An Extension of Living Space: The compact nature of the units often leads to a significant part of the daily activities spilling out onto the streets. It becomes a space where people gather, children play, residents do laundry and even vendors set up temporary stalls. The street become the extension of the home in that sense (Padora, 2020).

3.9 OLD VS NEW CHAWLS

Traditional chawls prioritised practicality and meeting the hosuing needs. They were long, mutli-storeyed building called bar chawls or single storey rows with small basic flats called baithi chawls. They had shared amenities alike toilets and kitchens in order to maximise space usage.

The modern chawls, on the other hand, are more contemporary in design. Although they retain the basic layout of the former, they have features like larger flats, en-suite bathrooms, and modern amenities like balconies. These chawls are more expensive and not affordable or tigh-knit like the traditional ones (Padora, 2020).
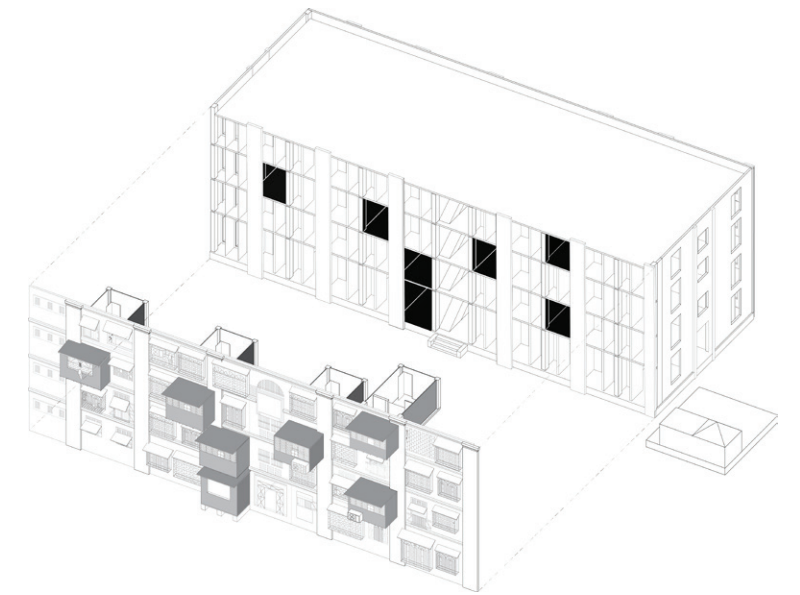
Fig. 59 A Modern Chawl with flat roof
© Niharika Kannan, In The Name of Housing, sPARE, Mumbai

UPVC Doors and Windows
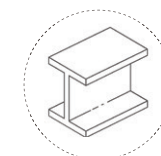
Steel

Reinforced cement concrete

Materials

Materials

Fig. 60 A traditional chawl with pitched roof
© Niharika Kannan, In The Name of Housing, sPARE, Mumbai
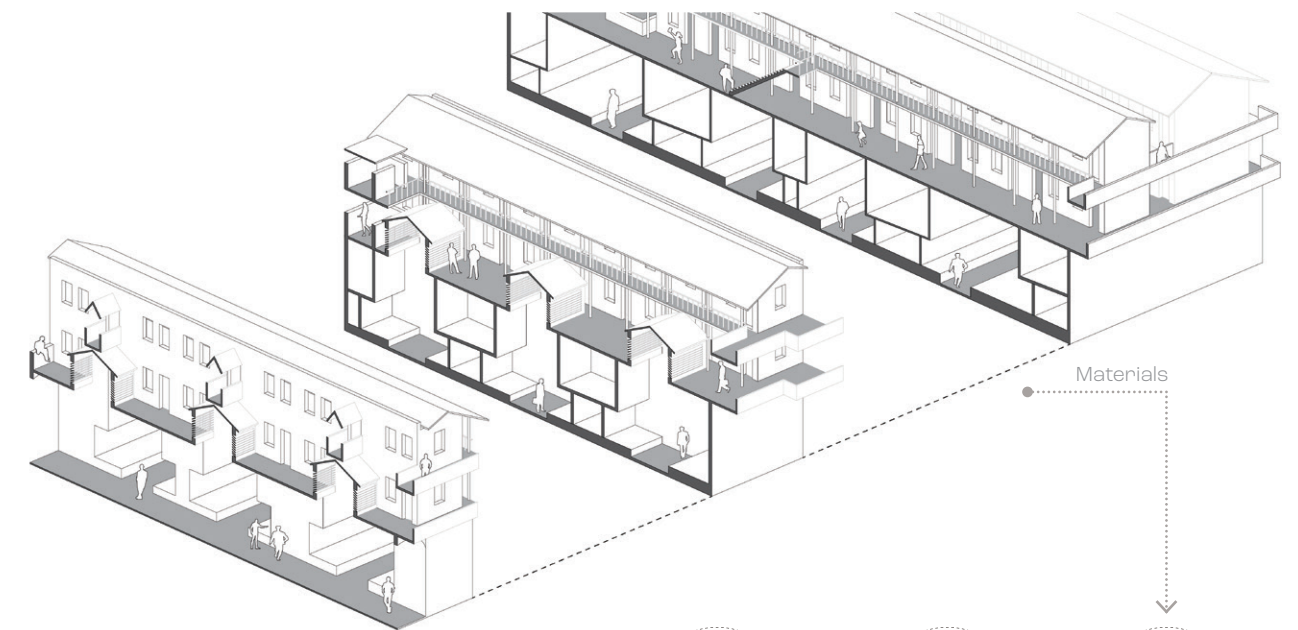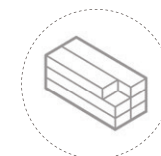
Timber
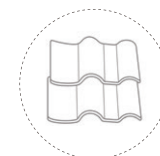
Clay tiles

Brick and lime mortar

four.

Re-visiting the mills

4.1 THE MILLS

Following the strike and abandonment of the mills, Girangaon started to lose its industrial character slowly. The city being a victim of fast-paced development barely retained any blackfields. The area transformed catering to the need of the moment. While this happened, the mill structures slowly disintegrated, sometimes losing its plaster, while at other times its roof collapsing. It did not take much time before the structures had disappeared into oblivion. While some were entirely demolishes, some were sold it parts or redeveloped. The very few structures that managed to survive this phenomenon was rare until the authorities decided to revive them.

The first attempt can be seen in 1996 by Architect Charles Correa, who documented the public mills lands, their structural integrity and proposed a possible solution in in redevloping them. While his idea was based on the 1/3rd rule of dividing the land for various uses, he also emphasised not selling off the land as parcels to prevent gentrification.
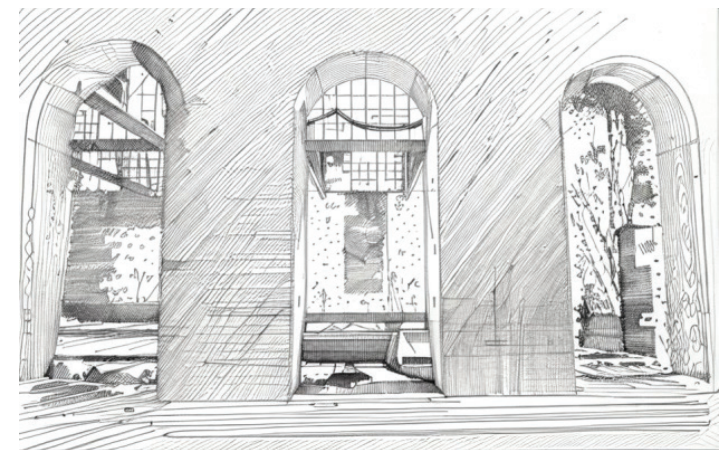
Fig. 61 A traditional chawl with pitched roof
© Niharika Kannan, In The Name of Housing, sPARE, Mumbai

4.2 MILL LAND DETAILS

Mumbai Textile mills (NTC) 67, 293sq mts

1991
☐ BMC 33%
☐ MHADA 34%
☐ Owner 33%

2001
☐ BMC 16%
☐ MHADA 13%
☐ Owner 71%

Piramal mills (private) 35000sq mts

1991
☐ BMC 33%
☐ MHADA 27%
☐ Owner 40%

2001
☐ BMC 4.3%
☐ MHADA 3.7%
☐ Owner 92%

Matulya mills (private) 21,374 sq mts

1991
☐ BMC 33%
☐ MHADA 27%
☐ Owner 40%

2001
☐ BMC 1.8%
☐ MHADA 2.2%
☐ Owner 96%

Jupiter mills (NTC) 45,058sq mts

1991
☐ BMC 33%
☐ MHADA 27%
☐ Owner 40%

2001
☐ BMC 1.1%
☐ MHADA 0.9%
☐ Owner 98%

Phoenix mills (private) 69,413sq mts

1991
☐ BMC 33%
☐ MHADA 34%
☐ Owner 33%

2001
☐ BMC -
☐ MHADA -
☐ Owner 100%

Kamala mills (private) 38,327 sq mts

1991
☐ BMC 33%
☐ MHADA 27%
☐ Owner 40%

2001
☐ BMC -
☐ MHADA -
☐ Owner 100%

Fig. 62 Mill wise land distribution in the year 1991 and 2001, developed by UDRI
© Author, Redrawn from Adarkar et al., 2005

4.3 CHARLES CORREA'S STUDY GROUP REPORT

Fig. 63 Architect Charles Correa
© MIT.edu

The government of Maharashtra appointed a group led by architect and planner Charles Correa[31] to develop a report on the development ideas of the mill lands of Girangaon. Out of 58 mills, only 25 NTC[32] mills were allowed for the study as the private mill owners did not grand permission to document their mill lands (D' Monte, 2006).

The redevelopment plan focused on dividing land equally between the city, public housing authority and the mill owners. Focus was given on conserving heritage structures and creation of centers for art, design and technology. Improvement of transportation with better roads, pedestrian circulation and public transportation facilities were considered in the planning. Creation of open spaces like parks and plazas were one of the other aims of the study group. Better employment opportunities, low-income housing development and redevelopment of slums were also into consideration while generating the redevelopment plans. The idea of pooling land to create landmarks and public spaces was also put forward in the report (Surve, 2011).

31 Indian architect and planner who was a pioneer in the modern architecture scenario of the nation.
32 National textile corporation.
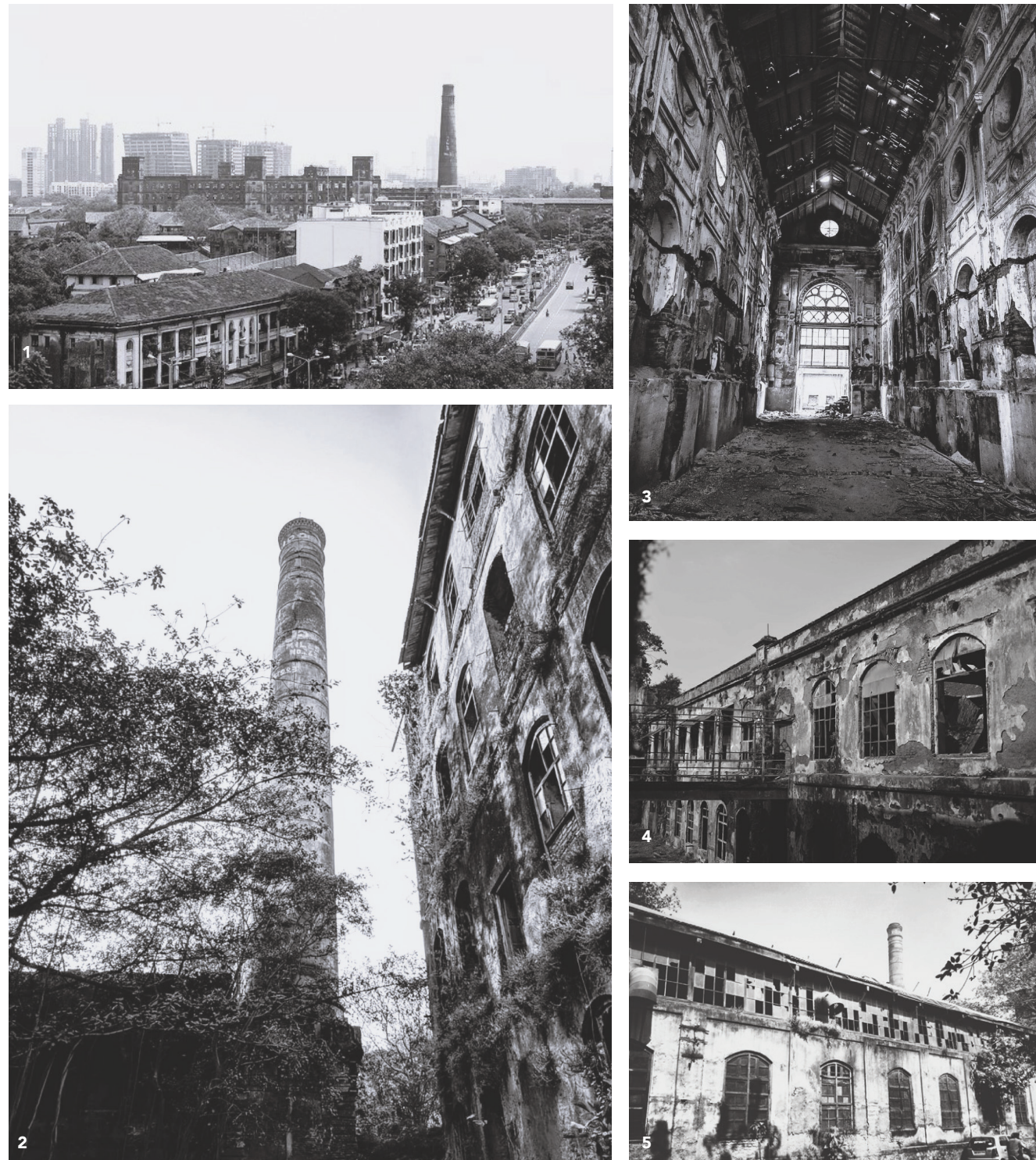
Fig. 64: 1_Mill village Girangaon © Swapnil Bhole/ Pukar; 2_ Chimney of Indu mills © Shekhar Krishnan; 3_Interior of InDu mills no 2 & 3 with Indo-Saracenic features © Shekhar Krishnan; 4_Arched windows Madhusudhan mills © Sachin Salunkhe; 5_InDu mills clerestory lighting and pitched roof © Shekhar Krishnan.
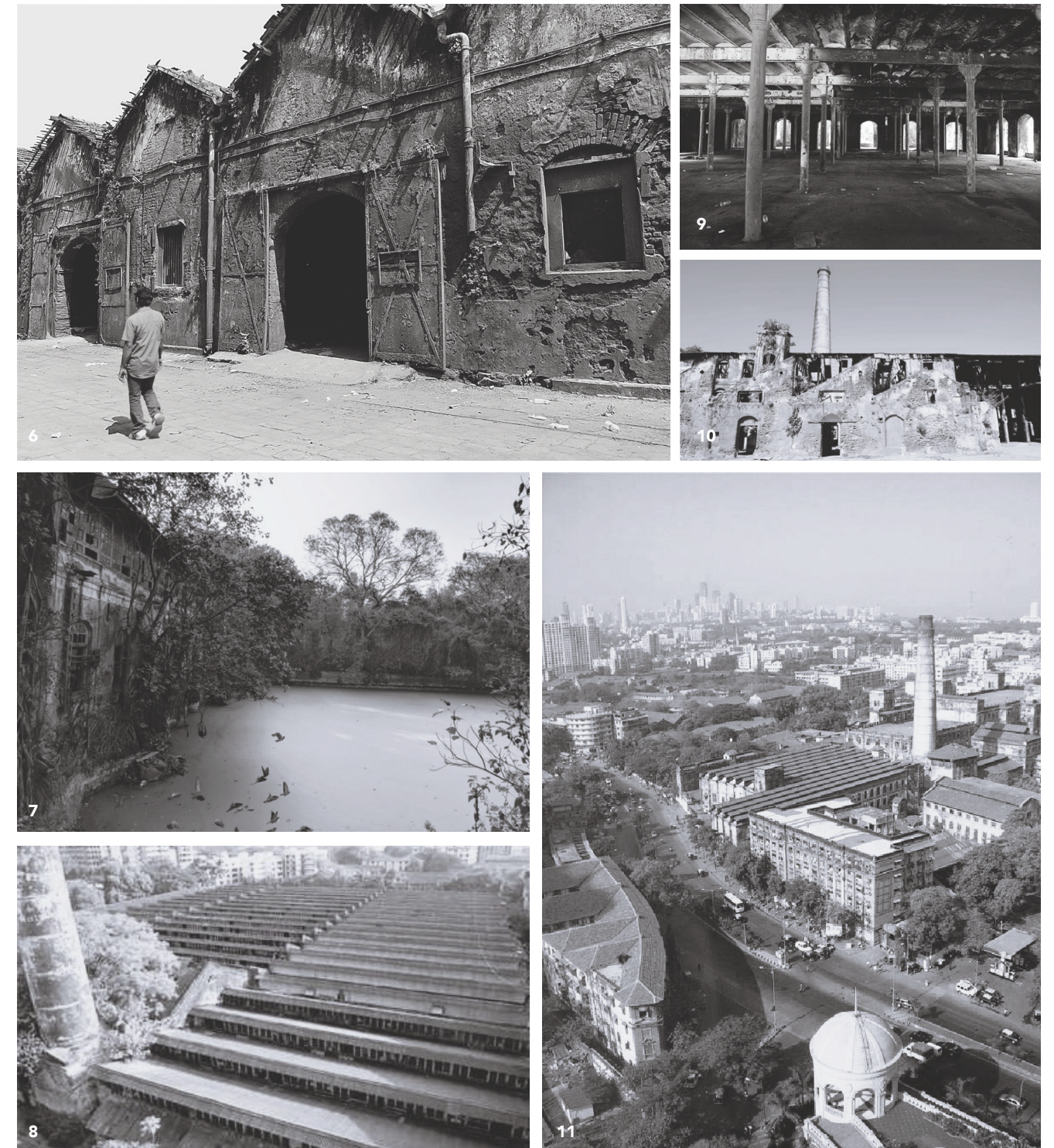
Fig. 65: 6_Abandoned godown Madhusudhan mills © Sachin Salunkhe; 7_Cooling Pond InDu mills no 2 & 3 with Indo-Saracenic features © Shekhar Krishnan; 8_Roof of a defunct mill © Mumbai Mirror; 9_Interior of an abandoned mill © Sachin Salunkhe; 10_Facade of Mukesh mill in ruins © outlookindia.com; 11_Transformed mill district © Vinay Surve
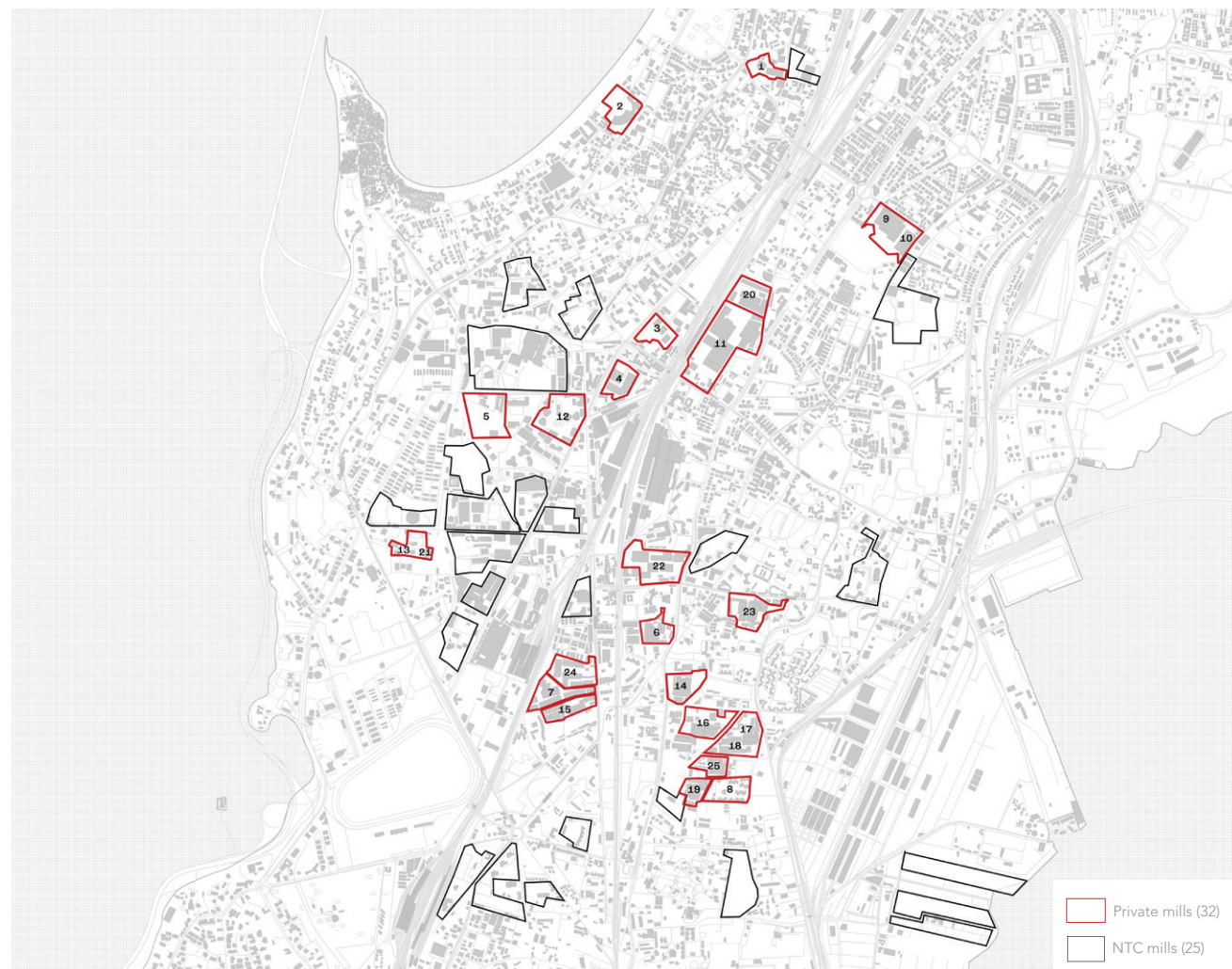
Fig. 66 Private and NTC mill location
© Author, Redrawn from Correa, 1996

Private mills (32)

NTC mills (25)

0 Km   1 Km   3 Km

········· New linkages
———— Pedestrian connections
- - - - Railway lines
———— Main roads

Fig. 67 Transportation analysis by Charles Correa's study group
© Author, Redrawn from Correa, 1996

······· Boulevards
▭ Maidans
� Street corner plaza

Fig. 68 Open spaces analysis by Charles Correa's study group
© Author, Redrawn from Correa, 1996

4.5 DETAILS OF THE STUDY GROUP REPORT

The report is found to have focused on two major issues. One is the urban planning which was solved with the idea of pooling mill lands and the second was regarding the industrial heritage which was proposed for adaptive reuse (Correa, 1996).

On the proposed plan by the study group, Floor Space Index (FSI) was utilized which allows the owners to attractively redevelop the existing mill lands. The idea of pooling lands from different mills based on the one third formula was adopted, which could result in a city-wide planning approach. A design proposal of "golden triangle"[33] was initiated by the study group were several mills of the Parel- Lalbagh area are combined to develop a public space which would be larger than existing prominent landmarks of the city (D' Monte, 2006).

Regarding the adaptive reuse potential of the industrial heritage, the study group identified 170 structures in 3 types. First, for adaptive reuse: Robust structures for offices, industries and artists' studios. Second, for ensemble value, which would contribute to the character of the place and the third, which could be demolished and converted to commercial spaces (Correa, 1996).

_____
33 Creation of a triad using the mill lands

70% Owner's choice

Mill owners 33%

30% Industrial job oppourtunities
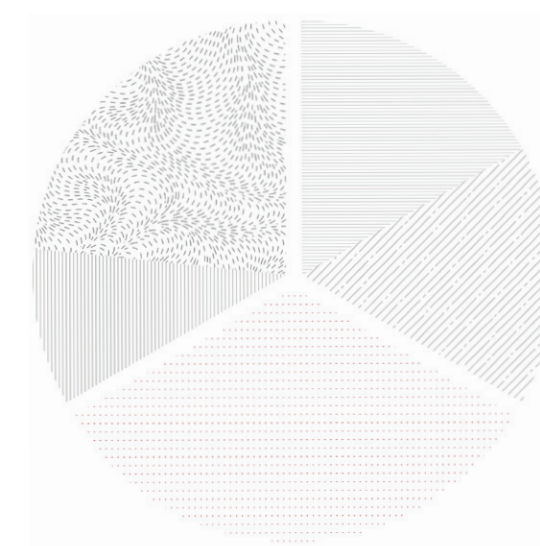
Mill workers 50%

MHADA 33%

Low income housing 50%

Open spaces 33%

Fig. 69 Diagram showing the percentage of mill lands allocated as per the suggestions of the mill workers
© Author, Redrawn from Correa, 1996

The mill workers and union responded positively towards the plans that were put forward by the study group and also provided their constructive suggestions which included that 30% of the land given to the mill owners should be developed into small industries where they could work. Another suggestion was to allocate 50% of the public housing to the workers. Unfortunately, the Government did not make the report public (Adarkar, 2020).

Bharat mills
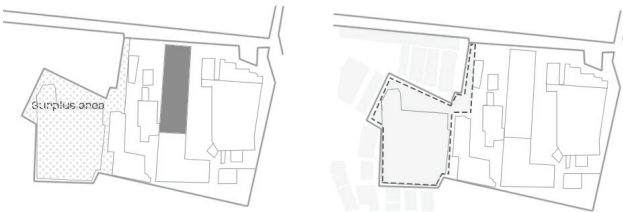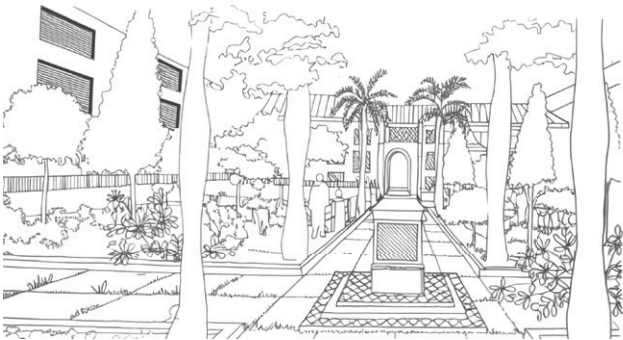
■ Must be retained   ▨ MHADA

Kohinoor mills
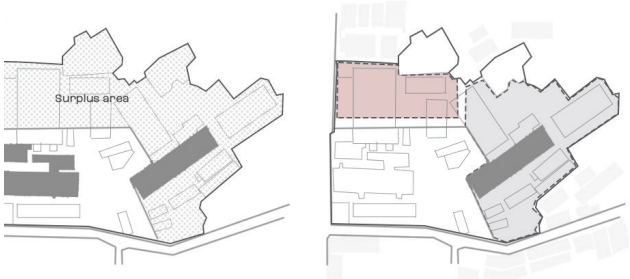
■ Must be retained   ▨ Public use   ▨ MHADA

Fig. 70 Adaptive reuse potential of mills by Charles Correa's study group © Author, Redrawn from Correa, 1996

Parel district
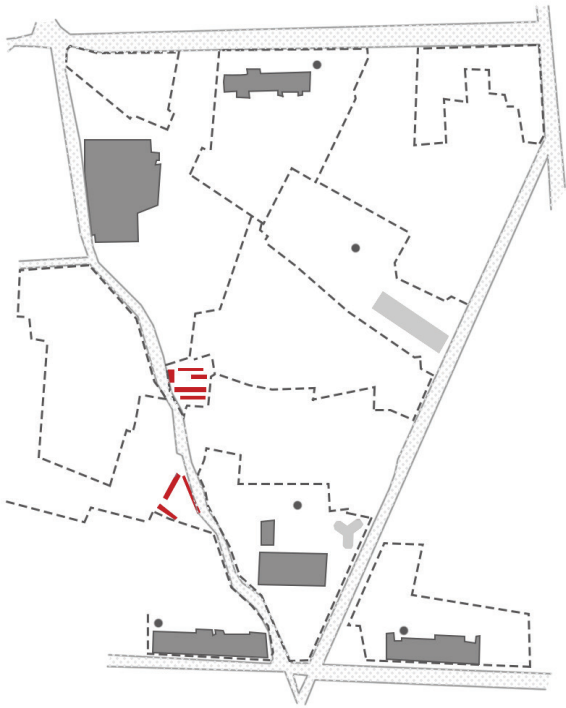
■ Conservation structure
■ New developments
■ Existing structures

Lalbaugh district
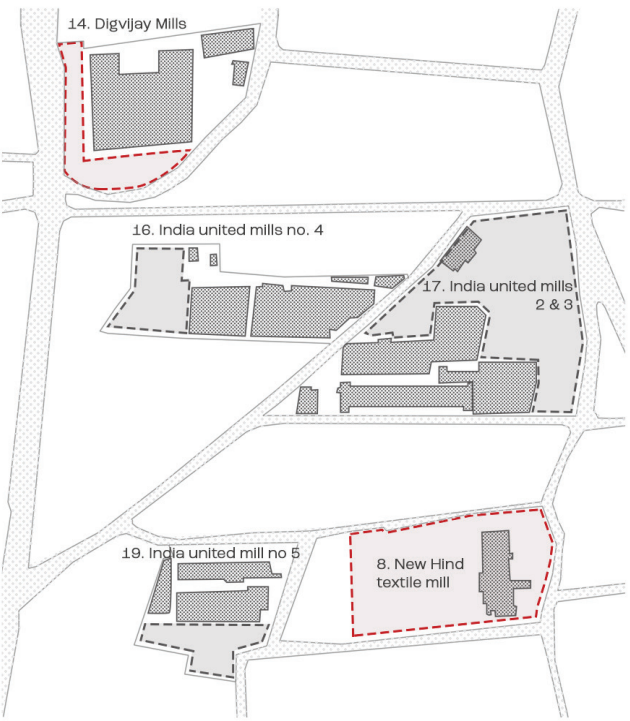
▨ Public use   ▨ MHADA

Fig. 71 Land pooling and golden triangle proposal by Charles Correa's study group © Author, Redrawn from Correa, 1996

five.

The mill lands transformed

5.1 THE URBAN MILLSCAPE

The mill lands transformed over the years and so di the city. The city's rise to a commercial and financial capital with fast-paced development continued to attract people from different parts of the country. This led to a lot of changes in the city and its dynamic. These changes have also affected the mill lands to some extend an vice versa.

The urban development has resulted in dense built up areas, with very less green spaces. The reclamation of land[34] on the other hands has created a risk for flood and landslide in certain areas. The transport and servies despite being better in comparison to other aspects of the city, it still lacks certain features. Moreover the city's high real estate prices and social disparity has led to an increase in the number of slums. Amidst all of this, the heritage sites and the mill lands remain somewhat lost in translation. While the heritage structure are well-preserved, the 500 acres of mill lands continue to remain an eye-sore.

_____

34 Bombay has been reclaiming lands for centuroies which has led to issues like flooding and high tide affecting coast lines

Fig. 72 Land pooling and golden triangle proposal by Charles Correa's study group © Author, Redrawn from Correa, 1996

5.2 PRESENT DAY MUMBAI

Mumbai is one of the most populous cities in India with a high value and demand for land. It's role as India's financial capital in addition to being a thriving metropolis accounts for the high built density in the region. The population density per hectare is 369 in Mumbai with informal settlements accounting for about 49% of the total housing criteria (Atlas of Urban Expansion, 2016). The areas with high built densities are the slum settlements and the low income housing zones. The area has a high built ratio in comparison to the unbuilt. The high rise apartments and dense cluster of settlements account for the area being an urban jungle in certain areas. In addition to this, the mill lands are defunct areas with abandoned and unused mills which has failed to transform into areas of potential over the years (Chalana, 2012).

LEGEND

■   Solids | Built

──   Transport networks | Boundaries

2 Km
0 Km   6 Km

Fig. 73 Figure ground plan
© Author

5.3 TRANSPORT

Mumbai has a well-developed transportation system that connects the central and northern parts of the city. The city also offers a variety of transportation options like trains, buses, ferries, auto rickshaws and taxis. The Brihanmumbai Electric Supply and Transport Undertaking have bus services that connect to almost all parts of the city and are an affordable option. Local trains are the most vital transportation means as most of the city's population is dependent on them. Ferries run in certain parts along the western coast and offer a scenic mode of transit. Despite this, connectivity remains an issue due to traffic delays and the separation of the Eastern side from the western side to the railway lines (Shaban & Sattar, 2023).

LEGEND

──   Railway overbridge
----   Ferry to Elephanta
----   Western coastal road 1
─●─   Central railway
─+─   Western railway
----   Bus routes / main roads
--×--   Harbour
──   Trans harbour link
──   Metro line
──   Western coastal road 2
🚗   Ferry Points
●   Nodes

2 Km
0 Km   6 Km

Fig. 74 Transport network of Mumbai
© Author, Reference: loginmumbai.org

5.4 OPEN SPACES

Central and South Mumbai lacks the presence of well organised open spaces. The area with its dense residential and commercial areas have barely any space left for parks or recreational areas. Mumbai in general has prioritised development over creating public infrastructural facilities causing issues like encoachment and slum creation. The very few open spaces within the city are in poor condition due to improper management. The lack of seating, toilets and greenscape has a negative impact on the well being of the citizens as they have very few spaces for exercising, relaxation and community interaction (Das et al., 2015) (Hwang et al., 2020).
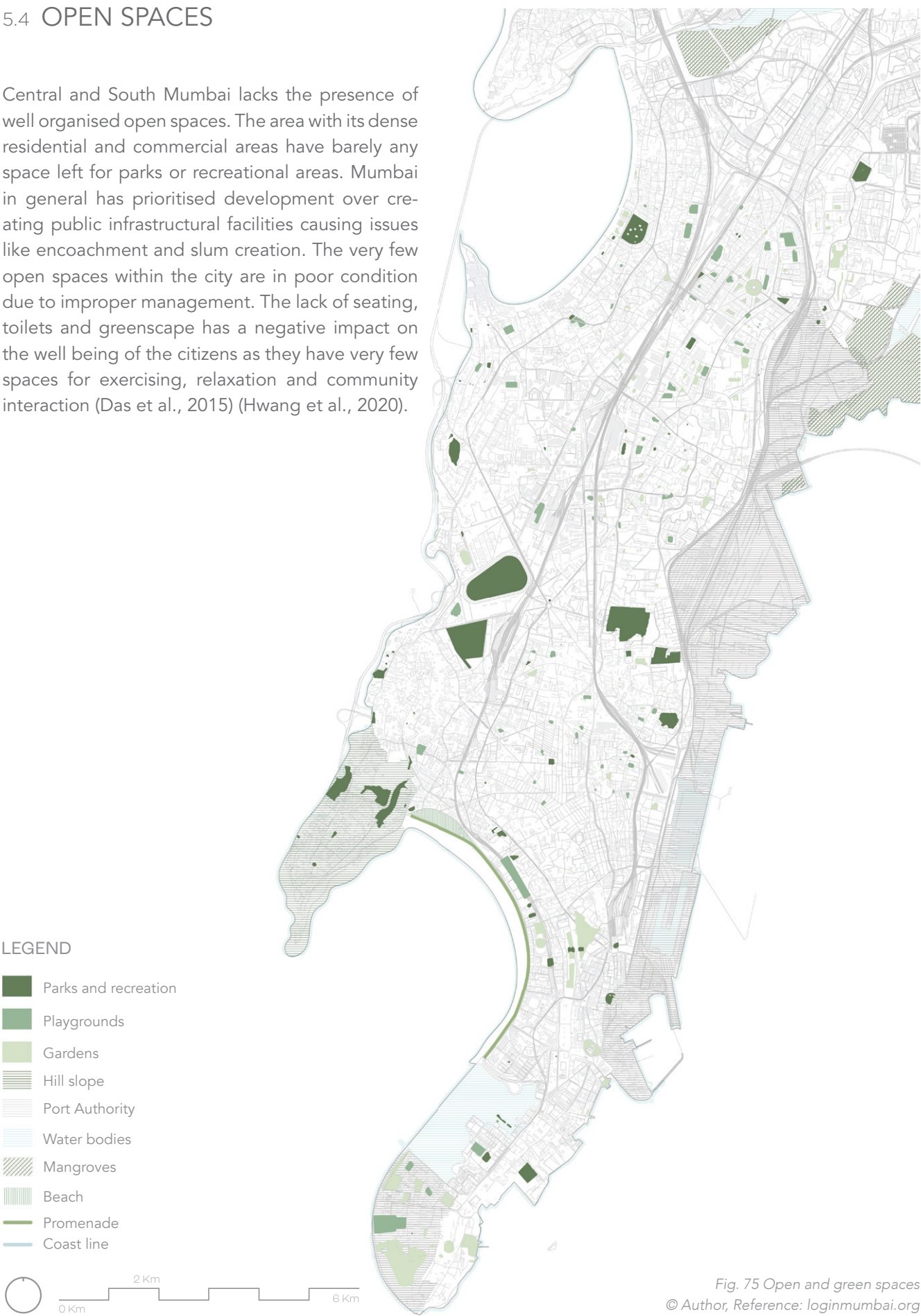
5.5 FLOOD AND LANDSLIDE AREAS

Land reclamation from the sea has made Mumbai susceptible to both landslides and floods. The natural terrain in addition to the joining of the islands has created these issues for a long time. A study conducted by the Indian Institute of Technology-Bombay (IIT-B) idnetified several areas of the city as highly vulnerable. Moreover, the high built-up area and lack of drainage and storm water management add to the existing causes. While the low lying areas are prone to flooding, the hilly areas of Malabar hill and Pali hill are susceptible to landslides especially during the monsoon season (Solanki et al., 2024).

LEGEND

- Parks and recreation
- Playgrounds
- Gardens
- Hill slope
- Port Authority
- Water bodies
- Mangroves
- Beach
- Promenade
- Coast line

2 Km

0 Km   6 Km

Fig. 75 Open and green spaces
© Author, Reference: loginmumbai.org

LEGEND

+ + + Flood prone zones

Landslide zones

2 Km

0 Km   6 Km

Fig. 76 Flood and landslide risk zones
© Author, Reference: citizenmatters.in
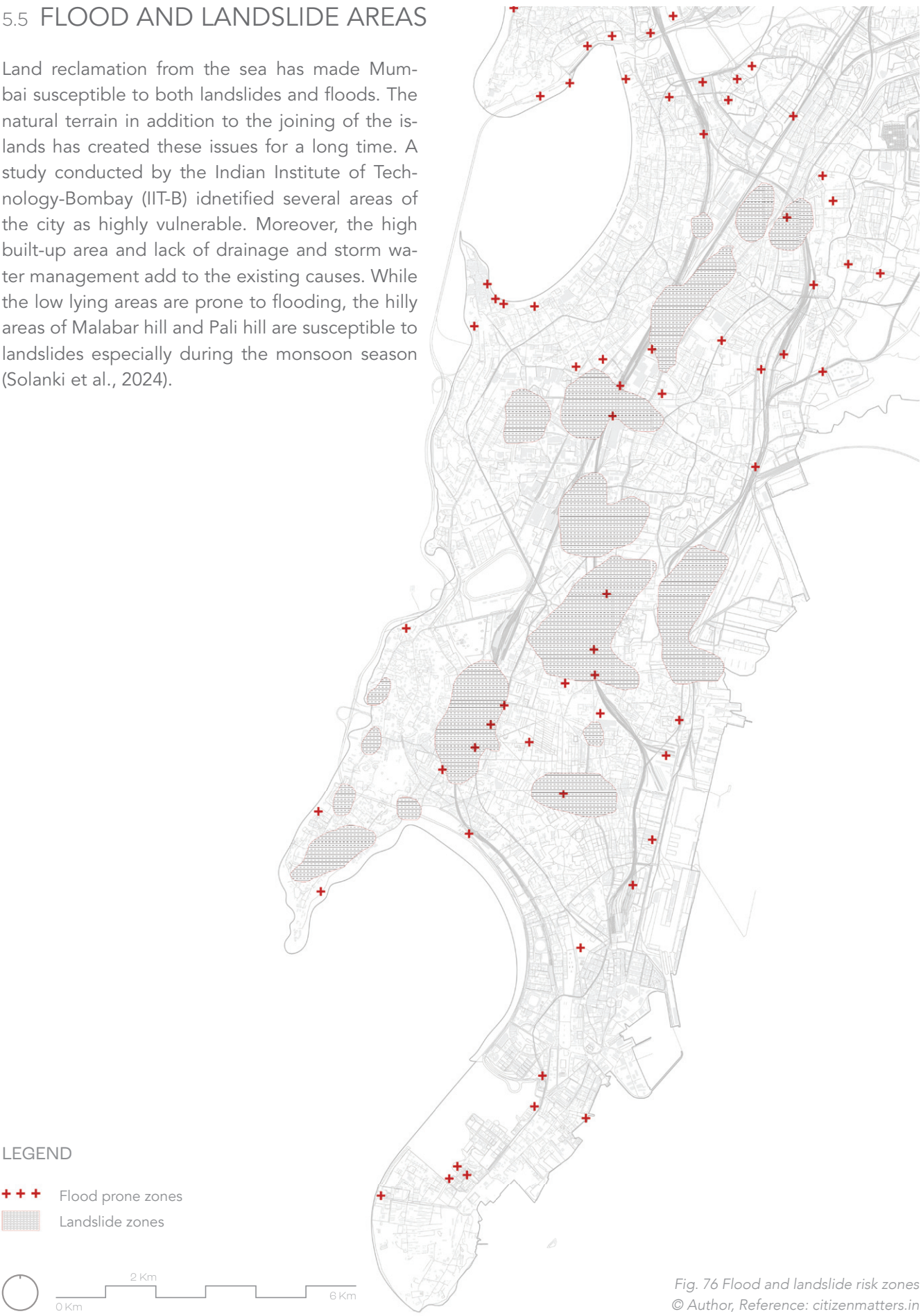
5.6 SLUMS AND ENCROACHMENTS

Fast development, high immigration, and lack of land have resulted in the encroachment of spaces and creation of slums. Most often, dense settlement and sprawl lead to a lot of the city not receiving proper amenities and services. The huge social and income disparity results in a juxtaposition of housing from high-end to slums. The under-developed areas of the city constantly faces the issue of becoming slums creating a pressing need for affordable hosuing within the city (Sharma et al., 2021).

LEGEND

▨ Slum areas

✚ Slums on Amenity zones

✚ Slums on industrial lands

● Slums on Residential/housing zones

● Slums on open area

◉ High slum intensity areas

2 Km
0 Km   6 Km

Fig. 77 Slums and enroached spaces
© Author, Reference: P. K. Das & Associates
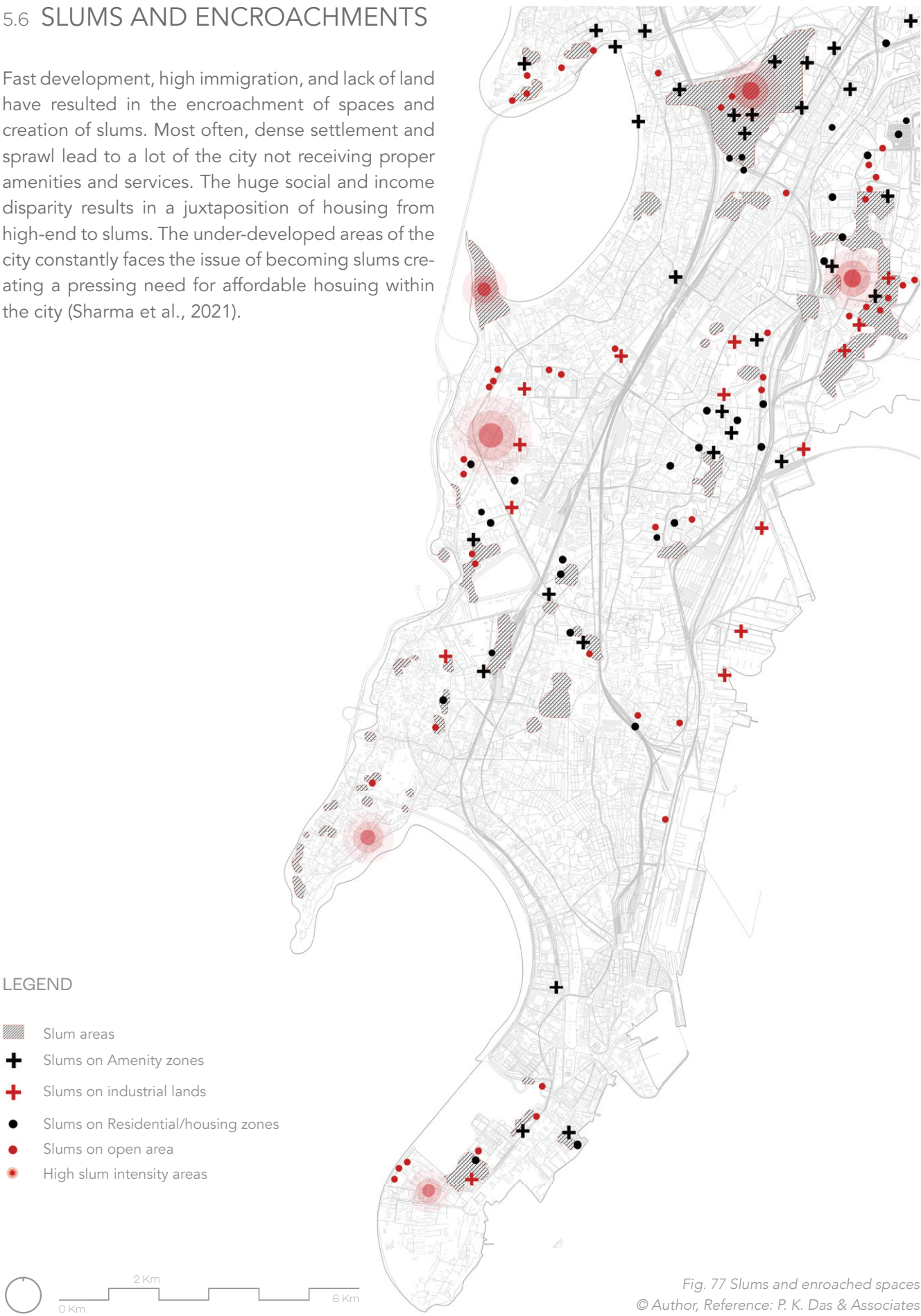
5.7 SERVICES

The region has a vast number of service facilities that aids social living as well as boost activity. Two major railway stations are part of this area in addition to the presence of social amenities, like schools and hospitals. Many religious buildings, like churches, temples, and mosques, are also present here, which highlights the diverse culture of the population. These services contribute to both the upper and lower class people that make up the social strata of the region.

LEGEND

■ Railway station

✕ Private Hospital

✕ Government hospital

● School

✚ Church

✚ Mosque

✚ Temple

2 Km
0 Km   6 Km

Fig. 78 Service
© Author, Reference: loginmumbai.org
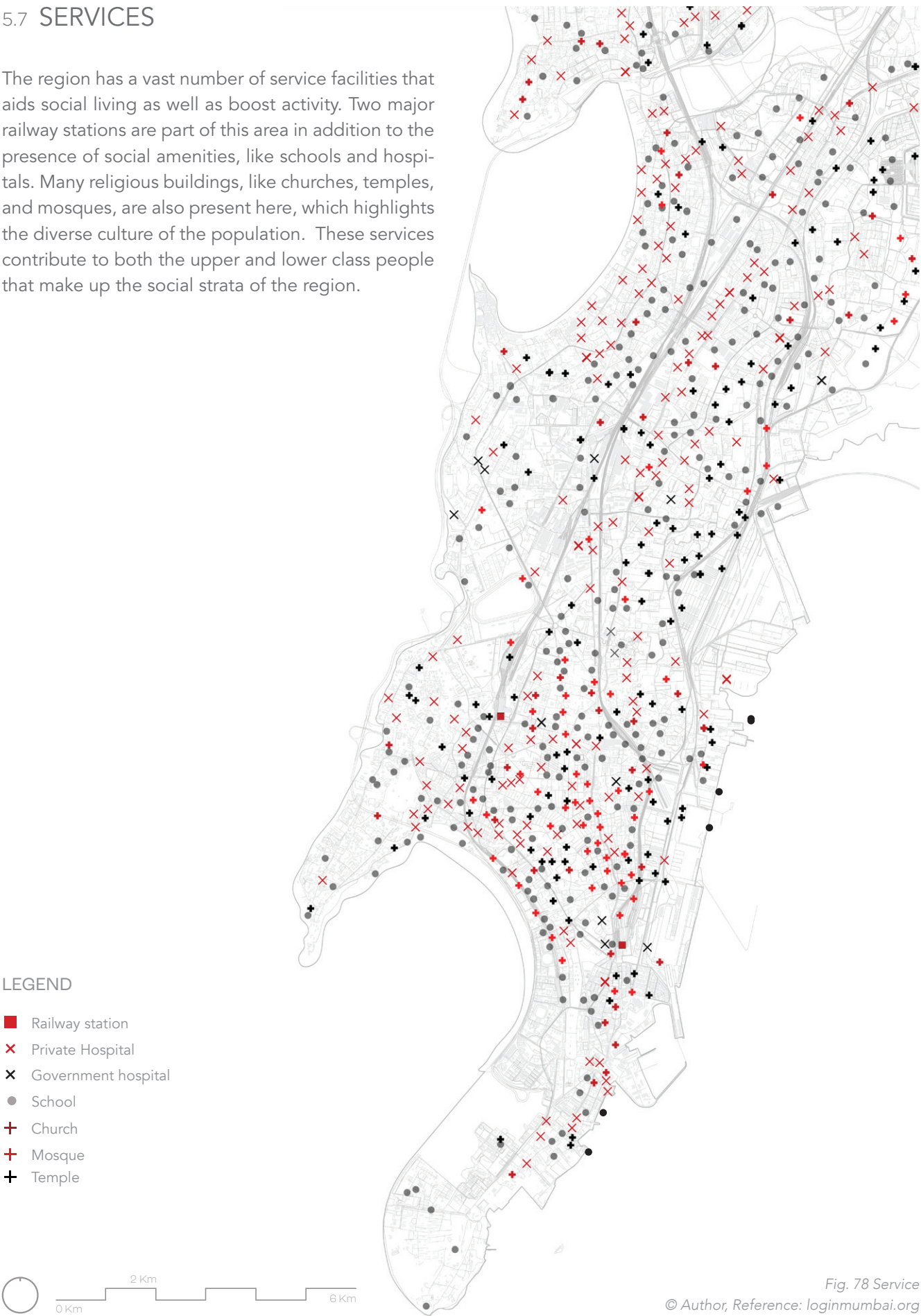
5.8 HERITAGE SITES

Mumbai is a city with rich heritage that is show-cased by its heritage and archaeological sites. The architecture of Southern Mumbai is representative of its colonial past and takes after the Victorian Gothic or Indo-Saracenic style of architecture. The Fort area, Marine drive, Elephanta caves, Walkeshwar and other areas have architectural marvels with varying styles. The density of these sites are more in the southern part of the city in comparison to the central region where the mills are present.

LEGEND

+	Landmarks
+	World heritage site
+	Heritage and archaeological sites
●	Docks
●	State Archaeological site
▨	Areas with high number of heritage sites
▭	Areas with moderate heritage sites

Fig. 79 Heritage and archaeological sites
© Author, Reference: loginmumbai.org
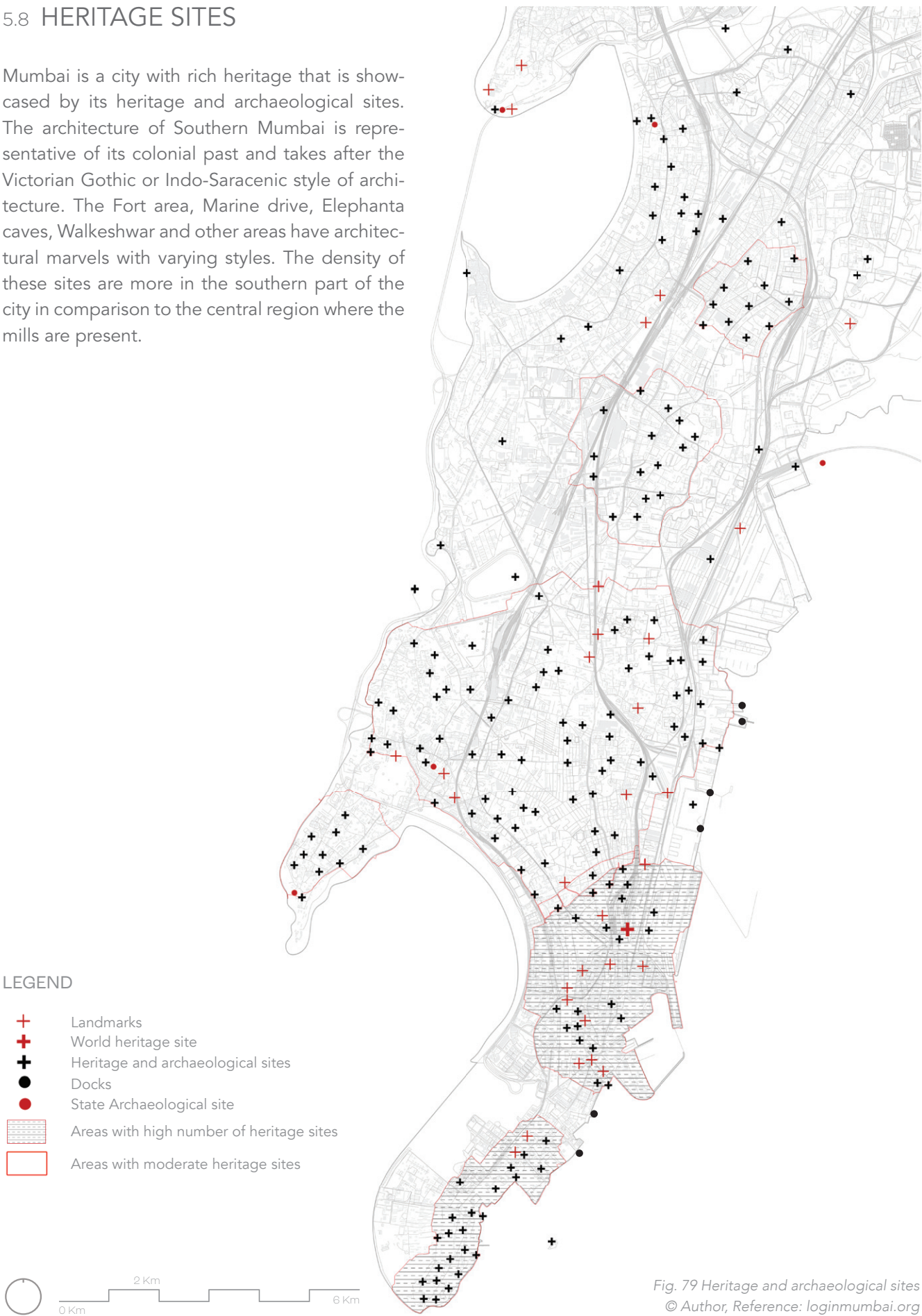
5.9 REAL ESTATE PRICES

Mumbai's real estate market is one of the most expensive in the world due to the high demand and lack of land. The prices vary from place to place depending upon the neighbourhood, size, typology and facilities available. While South Mumbai's Marine drive is one of the most expensive areas, both central and southern regions have areas with luxury apartments that cost 3 crores and upwards. The area with the mills are among the expensive whereas the prices are lesser near the Port land.
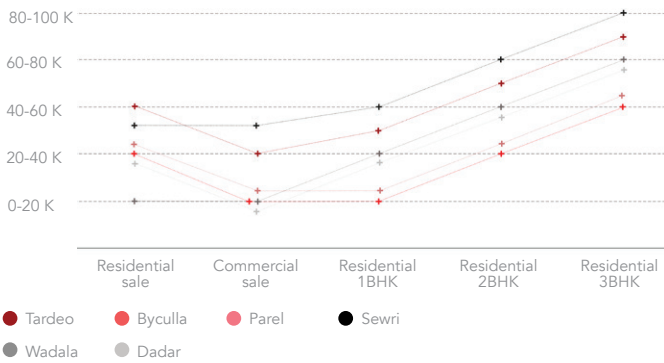
Fig.80a Real estate price in Girangaon
© Author, Reference: realestatemumbai.com

Legend for chart:
● Tardeo ● Byculla ● Parel ● Sewri
● Wadala ● Dadar

LEGEND

Land price INR/sqm

▨	140901-236100
▭	403001-739200
▨	236101-403000
▨	81201-236100
▨	0-81200
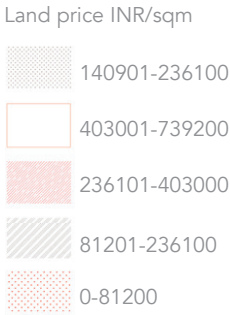
Fig. 80 Real estate values
© Author, Reference: loginmumbai.org

5.10 HEAT ISLAND EFFECT

The urban heat island effect is a rising problem in Mumbai due to fast paced urbanisation. The destruction of natural landscapes to make space for new construction has created a hotter environment in the city in comparison to the nearby rural areas. Moreover, factors like scarce green cover, dense built up areas and use of heat trapping construction materials have worsened the heat island effect in the city. This has made living conditions worse especially in slums, giving rise to health issues and heatwaves in the concrete jungle.

LEGEND

Temperature difference

0.95-1.27 degree celsius

1.27 - 1.59 degree celsius

Fig. 81 Heat island zones
© Author, Reference: Intelloc mapping service mapmyops

5.11 GIRANGAON AND THE CITY

Girangaon is located not only in the center of the island, but also to the whole metropolitan region which starts from the Fort area in the South to the Suburbs of North and also to the new bridge which connects Sewri to Navi Mumbai and the rest of the state. This central positioning provides Girangaon a lot of potential as it acts as a connection between north and south of Mumbai (Adarkar et al., 2005).
Central Mumbai known for its incredibly high built-up

Ballard Estate (18 acres)

Nariman point (65 acres)

Fort (400 acres)

LEGEND

NTC mills (25) = 270acres

Private mills (32) = 315 acres

Total = 595 acres

Fig. 82 Location of Girangaon with respect to the city
© Author, Redrawn from Adarkar et al., 2005 developed by Urban Design Research Institute.
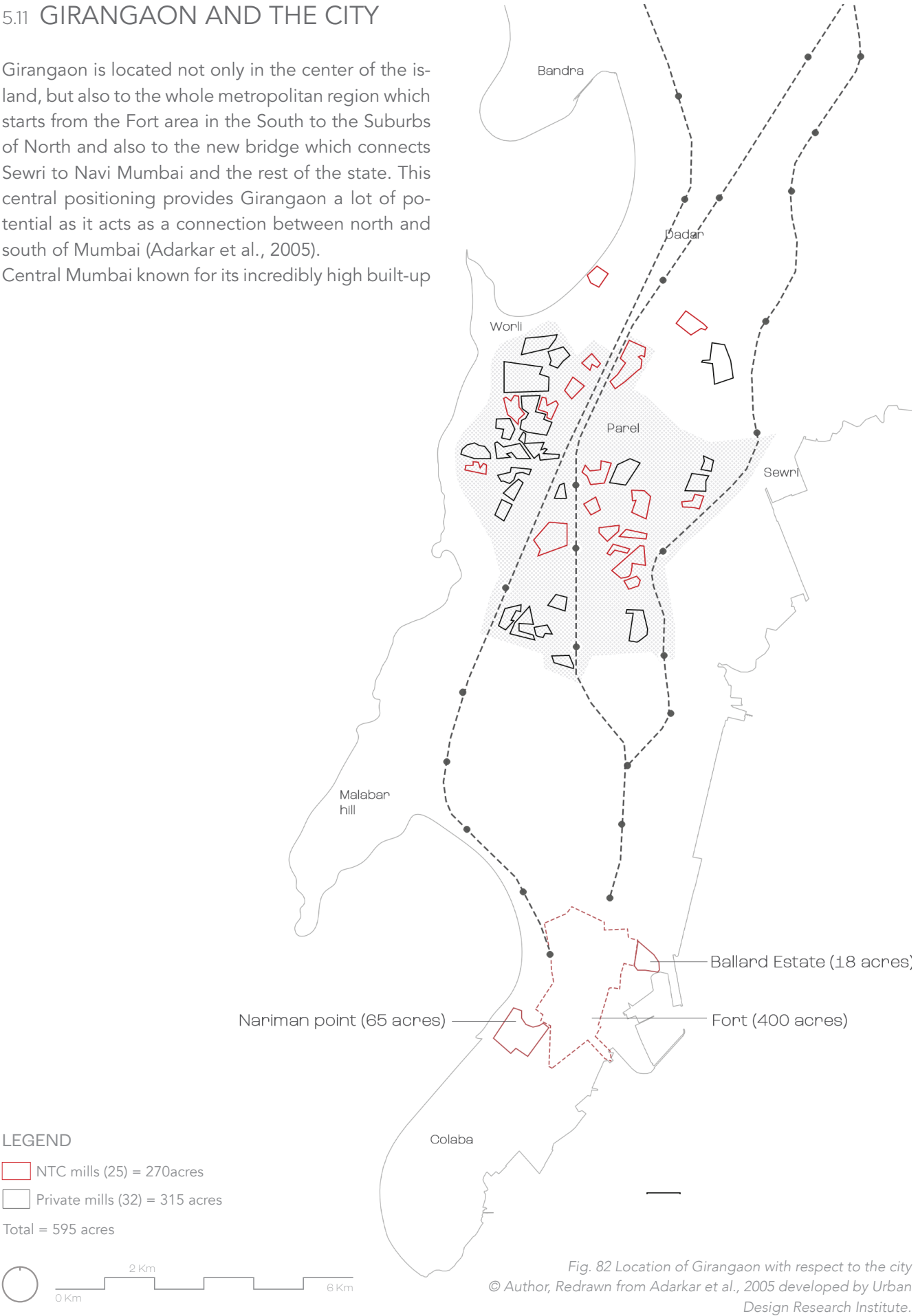
5.12 GIRANGAON FIGURE GROUND PLAN

density has a a lot of people and structures crammed into a small area. Al-
though data suggests a decreasing density in the recent years, it still remains
higher than that of the city's average. Some parts of the Girangaon area have
over 2000 people per hectare which showcases the intensity in built up.
Moreover, th need for housing is currently being met by equally dense built
up, which account for an unequal balance between solids and voids (Atlas of
Urban Expansion 2016).

LEGEND

■ Built
□ Unbuilt

Fig. 83 Figure ground plan of Girangaon
© Author

0 Km   1 Km   3 Km

5.13 GIRANGAON LAND USE PLAN

LEGEND

Central Mumbai is a mix of both commercial establishments and his-
toric structures. The central business district of the area has a lot of
financial and commercial buildings while the eastern side is complete-
ly occupied by the port and its auxillary facilities. Amidst all of this
remains pockets of industrial heritage that stands out of the residential
and commercial context. The area also has educational institutes like
the University of Mumbai which adds on another layer. The area how-
ever lacks open space which poses a threat to the quality of livelihood.

- Residential
- Open spaces
- Commercial
- Industrial
- Transportation
- Social amenities
- Slum / Cluster
- Water
- Natural areas
- Cemetery
- Vacant
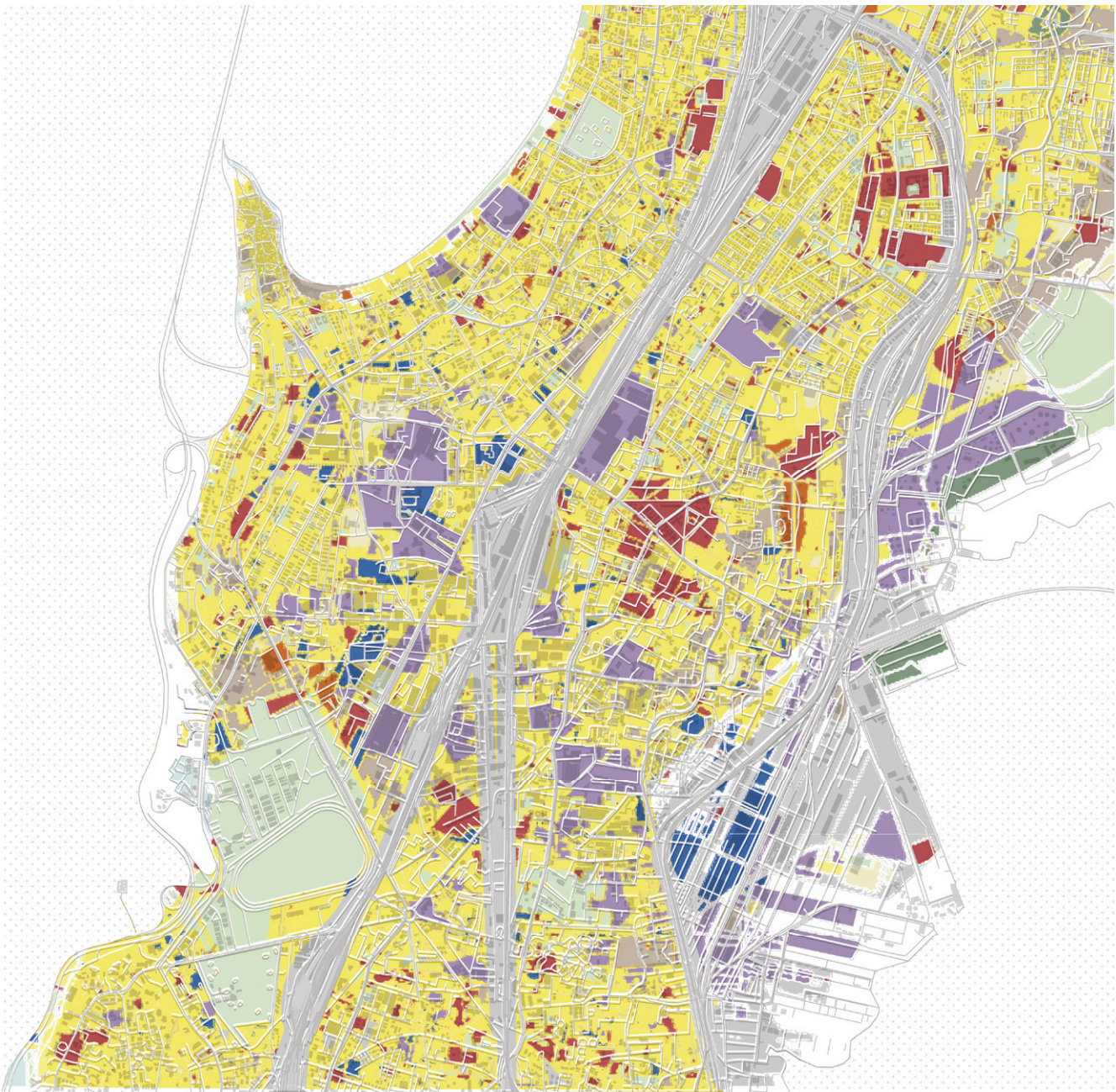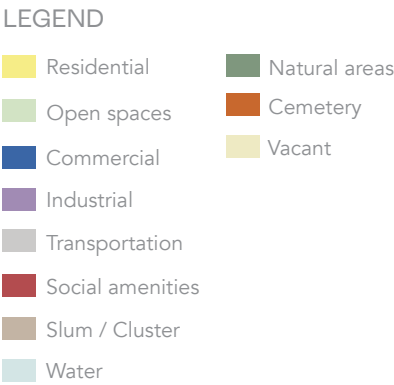
Fig. 84 Land use map of Girangaon
© Author, Reference: loginmumbai.org

0 Km   1 Km   3 Km

5.14 TRANSFORMATION OF MILL LANDS

After the establishment of the first cotton mill in Tardeo, the city has seen a rapid growth in the textile industry. By the end of the 19th century, 80 more mills were part of the city and by 1931, about two third of the adult in Mumbai were working in the textile industry. The mills and the location of the settlements of the mill workers were concentrated on a particular part of Bombay which included areas of Lalbaugh, Parel, Naigum and Sewri. This part was known by the name Girangaon which literally means "the mill village". By 1961, 2.5 lakh people were employed in the mills which covered upto 600 acres of land (Adarkar et al., 2005) (Nallathiga, 2011). After the strike, about 58 mils were found to be existing in the Girangaon area, where about 32 were private and 25 were owned by NTC (Correa, 1996). Currently, among the 25 NTC[35] mills, 9 mills are observed to be demolished and redeveloped, 5 mills are under development, 10 are abandoned without any developments and one mill is found to be completely demolished. Mills transforming into malls without preserving the integrity is observed as a common phenomenon (Frazier, 2019) (Butt, 2019).

The establishment of railways and local rail routes, which further helped in the creation of major nodes around Girangaon, contributed to the development of the city. The Bandra Worli sea link flyover, which was built in 2009 (Bose, 2010) and the Eastern express highway, which passes through the Girangaon area are significant develop-ments in the growth of the city as such (Baug, 2024). The Versova - Dahisar Coastal Road project, which focuses on the development of the western coast and the Marine drive area (Government of Maharashtra, 2011) and the Mumbai Easter water front development, which aims at the development of the eastern dockyards of Mumbai (Dobariya, 2020) are the future proposals that are coming up around Girangaon.

35 National textile corporation

Fig. 85 Land transformation over time
© Author, Redrawn from Khedkar, 2018

5.15 PRESENT DAY STATUS OF MILLS

At present, about 9 mills, that is, Kohinoor Mills no. 3, Elphinstone Mills, Jupiter Mills, Shri Madhusudan Mills, New Hind Textile Mills,   Mumbai Textile Mills, Bharat Mills, Apollo Mills, and Podar Processor are found to be demolished and redeveloped into commercial or residential high rise buildings. One mill, that is, India United dye works no.6 is found to be demolished without any developments. Among the rest of the mills, 5 are under development and 10 are abandoned without any developments.

Fig. 86 Present day condition of mills © Author

LEGEND

☐ Demolished and re-developed mills (9)
☐ Under development (5)
☐ No development (5)
☐ Demolished and re-developing (1)
☐ Private mills (32)

TYPE 1: Demolished and redeveloped mills

1. Kohinoor mills no. 3

Fig. 87. Plan of Kohinoor mills, 1996 © Author, Redrawn from Correa, 1996.

Fig. 88. Kohinoor mills © pastindia.com

Fig. 89 Plan of Kohinoor Square Tower, present © Author

Fig. 90 Kohinoor Square Tower © wikimedia.org

0 0.1km 0.3km 0.5km
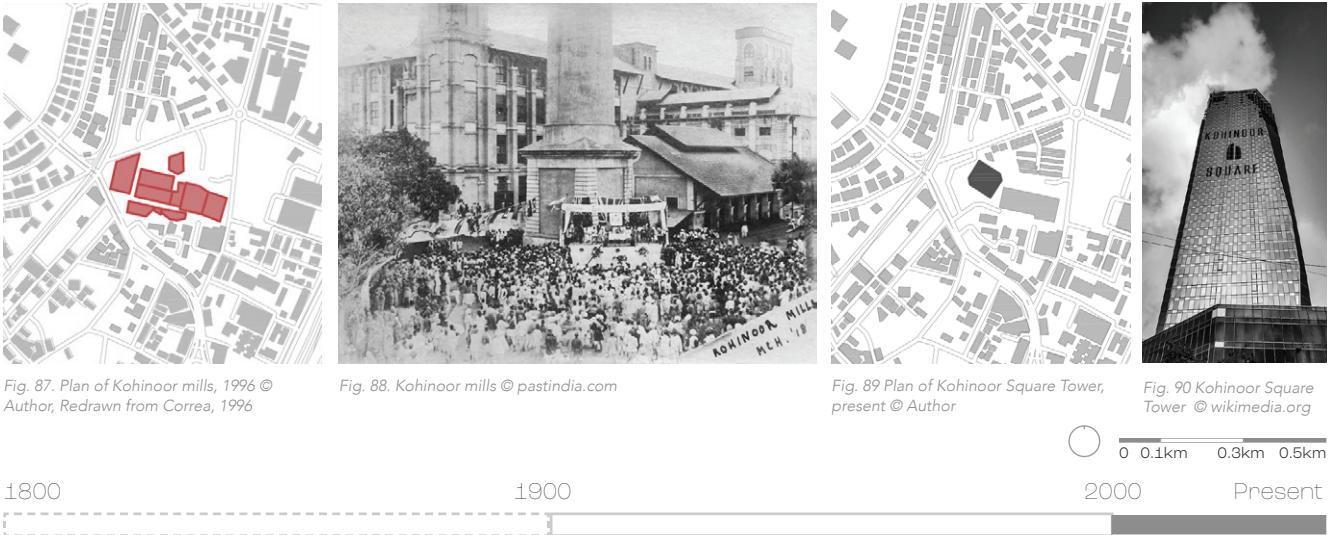
1800   1900   2000   Present

1918
Kohinoor mills
It is a textile mill company which was estab-lished during the cotton boom period of In-dia by the British

2019
Kohinoor Square Tower
Tower with residential, com-mercial, and recreational ac-tivities

Structures and age

13 structures, 50 - 103 years

Mill area

20,492.57 sq.m

Functions of the mill

Location of the mill

Construction technology used in the mill

Distance from nearest railway station

10 km
5 km
3 km
1km
R

0 1Km 3Km 5Km

* refer appendices for iconography list

3. Elphinstone mills

Fig. 91 Plan of Elphinstone mills, 1996 © Author, Redrawn from Correa, 1996

Fig. 92 Elphinstone mills © indiatimes.com

Fig. 93 Plan of Indiabulls Finance Centre and Indiabulls Sky Suites, present © Author

Fig. 94 Indiabulls Finance Centre and Indiabulls Sky Suites © squareyards.com

0 0.1km 0.3km 0.5km

1800   1900   2000   Present

1921
Elphinstone mills
Part of thee mill growth era of Mumbai. Converted raw cotton to fabric

2023
Indiabulls Finance Centre and Indiabulls Sky Suites
High end residential buildings

Structures and age

24 structures, 80 - 103 years

Mill area

34,382.93sq.m

Functions of the mill

Location of the mill

Construction technology used in the mill

Distance from nearest railway station

10 km
5 km
3 km
1km
R

0 1Km 3Km 5Km

4. Jupiter mills

Fig. 95. Plan of Jupiter mills, 1996 © Author, Fig. 96. Jupiter mills © gettyimages.it Redrawn from Correa, 1996

Fig. 97 Plan of Istanbulls Sky, present © Author

Fig. 98 Istanbulls Sky ©sky-scrapercity.com

0 0.1km 0.3km 0.5km

1800   1900   2000   Present

1920s
Jupiter mills
Major producer of cotton textile for the purpose of exporting

2016
Indiabulls Sky
Residential and office spaces

Structures and age

20 structures, above 100 years

Functions of the mill

Mill area

44,164sq.m

Construction technology used in the mill

Location of the mill

Distance from nearest railway station

10 km
5 km
3km
1km
R

0   1Km   3km   5km

5.Shri Madhusudan mills

Fig.99 Plan of Shri Madhusudan mills, 1996 © Author, Redrawn from Correa, 1996

Fig. 100 Shri Madhusudan mills © thewire.in

Fig. 101 Plan of Enpar Lotus Towers, present © Author

Fig. 102 Enpar Lotus Towers ©no-broker.in

0 0.1km 0.3km 0.5km

1800   1900   2000   Present

Cotton textile production mills. Major role in the cotton boom era of Mumbai, which was nick-named as the 'Manchester of East' then

2022
Enpar Lotus Towers
Residential towers in Lower Parel

Structures and age

19 structures, age unknown

Functions of the mill

Mill area

73,248 sq.m

Construction technology used in the mill

Location of the mill

Distance from nearest railway station

10 km
5 km
3km
1km
R

0   1Km   3km   5km

8. New Hind Textile mills

Fig. 103 Plan of New HInd Textile mills, 1996 © Author, Redrawn from Correa, 1996

Fig. 104 New HInd Textile mills © alamy.com

Fig. 105 Plan of MHADA housing development, present © Author

Fig. 105a MHADA housing development ©nobroker.in

0 0.1km 0.3km 0.5km

```
1800              1900                    2000      Present
```

1940s
New Hind Textile mills
One of the cotton textile mills in Girangaon that came up during the British era.

2012
MHADA Housing Development
Government run organisation for the development of affordable housing for low and middle income groups

Structures and age

21 structures, 50-80 years

Functions of the mill

Mill area

33,125sq.m

Construction technology used in the mill

Location of the mill

Distance from nearest railway station

0   1Km   3Km   5Km

---

12. Mumbai textile mills

Fig.106 Plan of Mumbai Textile mills, 1996 © Author, Redrawn from Correa, 1996

Fig. 107 Mumbai Textile mills © thehindubusinessline.com

Fig. 108 Plan of MHADA housing development, present © Author

Fig. 109 MHADA housing development ©mhada.gov.in

0 0.1km   0.3km 0.5km

```
1800              1900                    2000      Present
```
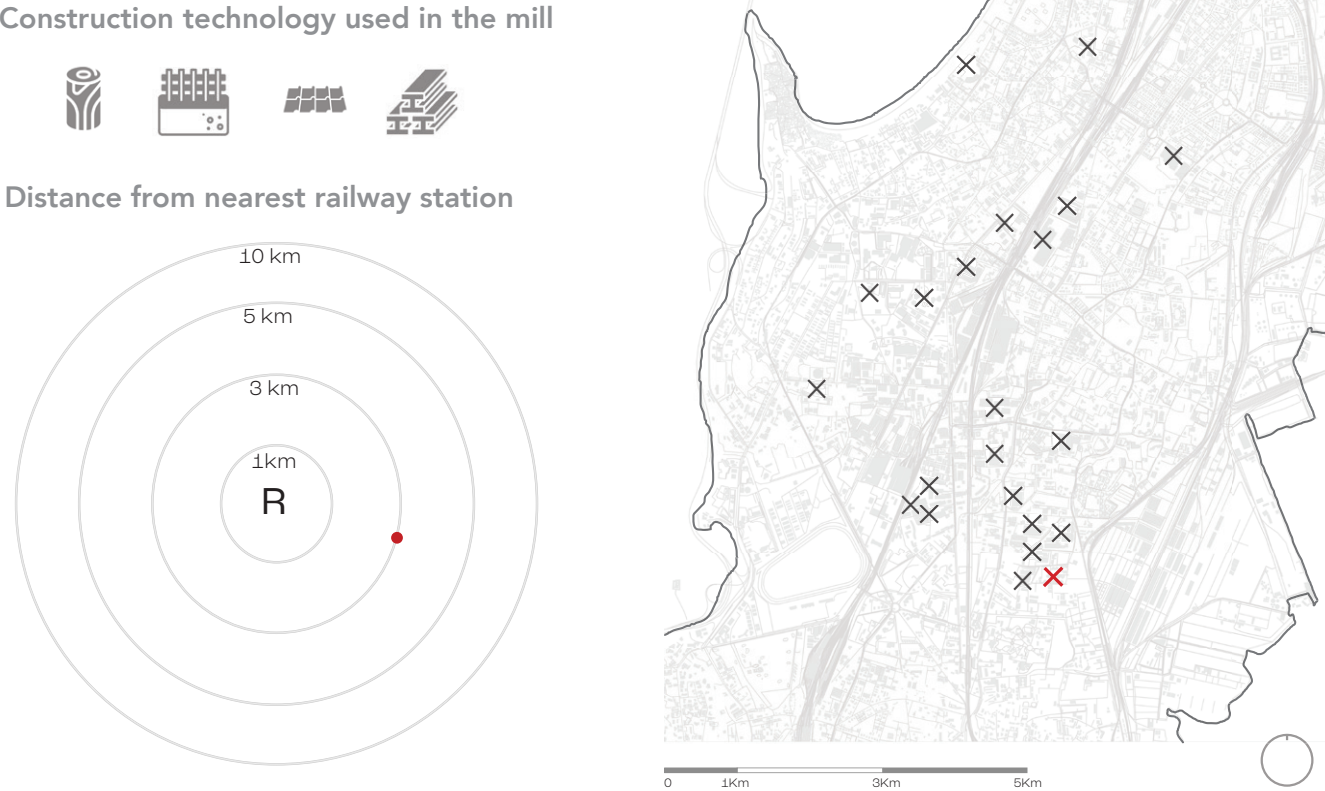
1940s
Mumbai Textile mills
One of the cotton textile mills in Girangaon that came up during the British era.

2010
MHADA Housing Development
Government run organisation for the development of affordable housing for low and middle income groups

Structures and age

16 structures, above 80 years

Functions of the mill

Mill area

67,378sq.m

Construction technology used in the mill

Location of the mill

Distance from nearest railway station

0   1Km   3Km   5Km

13. Bharat mills

Fig. 110 Plan of Bharat mills, 1996 © Author, Redrawn from Correa, 1996

Fig. 111 Bharat mills © mumbaimirror. indiatimes.com

Fig. 112 Plan of Hilla Towers, present © Author

Fig. 113 Hilla Towers ©nobroker.in

0   0.1km   0.3km   0.5km

1800   1900   2000   Present

1920s
Bharat mills
Major producer of cotton textile for the purpose of exporting

2011
Hilla Towers
Residential apartments

Structures and age

16 structures, 80-105 years

Functions of the mill

Mill area

33,882.8sq.m

Construction technology used in the mill

Location of the mill

Distance from nearest railway station

10 km
5 km
3 km
1km
R

0   1Km   3Km   5Km

15. Apollo Mills

Fig. 114 Plan of Apollo mills, 1996 © Author, Redrawn from Correa, 1996

Fig. 115 Apollo mills © citizenmatters.in

Fig. 116 Plan of Lodha Bellissimo/Primero, present © Author

Fig. 117 Lodha Bellissimo/Primero ©sky-scrapercenter.com

0   0.1km   0.3km   0.5km

1800   1900   2000   Present

1910
Apollo mills
It is a textile mill company which was established during the cotton boom period of India by the British

2012
Lodha Bellissimo/Primero
Residential apartment towers

Structures and age

25 structures, 50-110 years

Functions of the mill

Mill area

56,327.36sq.m

Construction technology used in the mill

Location of the mill

Distance from nearest railway station

10 km
5 km
3 km
1km
R

0   1Km   3Km   5Km

21. Podar processor

Fig. 118 Plan of Podar processor, 1996 © Author, Redrawn from Correa, 1996

Fig. 119 Podar processor © mumbaimirror.indiatimes.com

Fig. 120 Indiabulls Blu, present © Author

Fig. 121 Indiabulls Blu ©housing.com

0 0.1km   0.3km   0.5km

1800   1900   2000   Present

1960s
Podar Pocessor
One of the cotton textile mills in Girangaon that came up after independence

2018
Indiabulls Blu
Residential apartments

Structures and age

6 structures, above 50 years

Mill area

9,664sq.m

Construction technology used in the mill

Distance from nearest railway station

Location of the mill

10 km
5 km
3 km
1km
R

0   1Km   3km   5Km
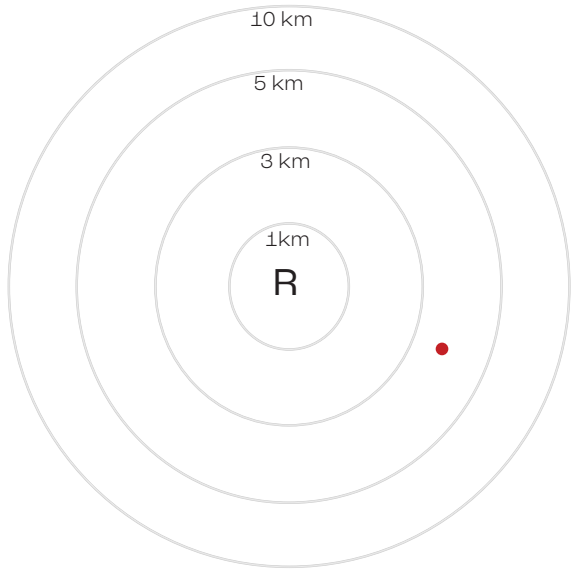
TYPE 2: Demolished and redeveloped mills

2. India United dye works no.6

Fig. 122 Plan of India United dye works no.6, 1996 © Author, Redrawn from Correa, 1996

Fig. 123 India United dye works no.6 © mumbaimirror.indiatimes.com

Fig. 124 Site plan of India United dye works no.6 , present © Author

0 0.1km   0.3km   0.5km

1800   1900   2000   Present

1863
India United dye works no. 6
It is one of the first textile mills in Mumbai which was established during the cotton boom period of India by the British

Demolished
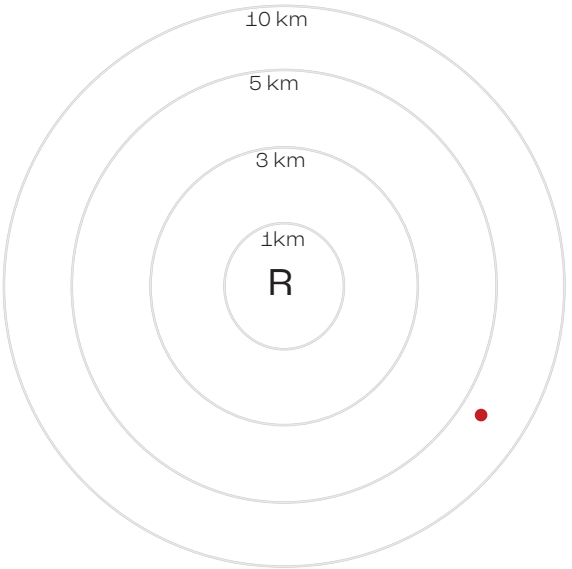
Structures and age

14 structures, 150 years approx.

Functions of the mill

Mill area

48,414 sq.m

Construction technology used in the mill

Location of the mill

Distance from nearest railway station

10 km
5 km
3 km
1km
R

0   1Km   3km   5Km

TYPE 3: Mills under development and with no developments

6. Jam mills

Fig. 125 Plan of Jam mills, 1996 © Author,
Redrawn from Correa, 1996

0   0.1km   0.3km 0.5km

0   1Km   3Km   5Km

| 1800 | 1900 | 2000 | Present |

1907
Jam mills
It is a textile mill company which was es-
tablished during the cotton boom period
of India by the British

2024
Under MHADA Development
Low budget housing

Structures and age

24 structures, 50-117 years

Functions of the mill

Construction technology used in the mill

Mill area

33,517.4 sq.m

Distance from nearest railway station

10 km
5 km
3 km
1km
R
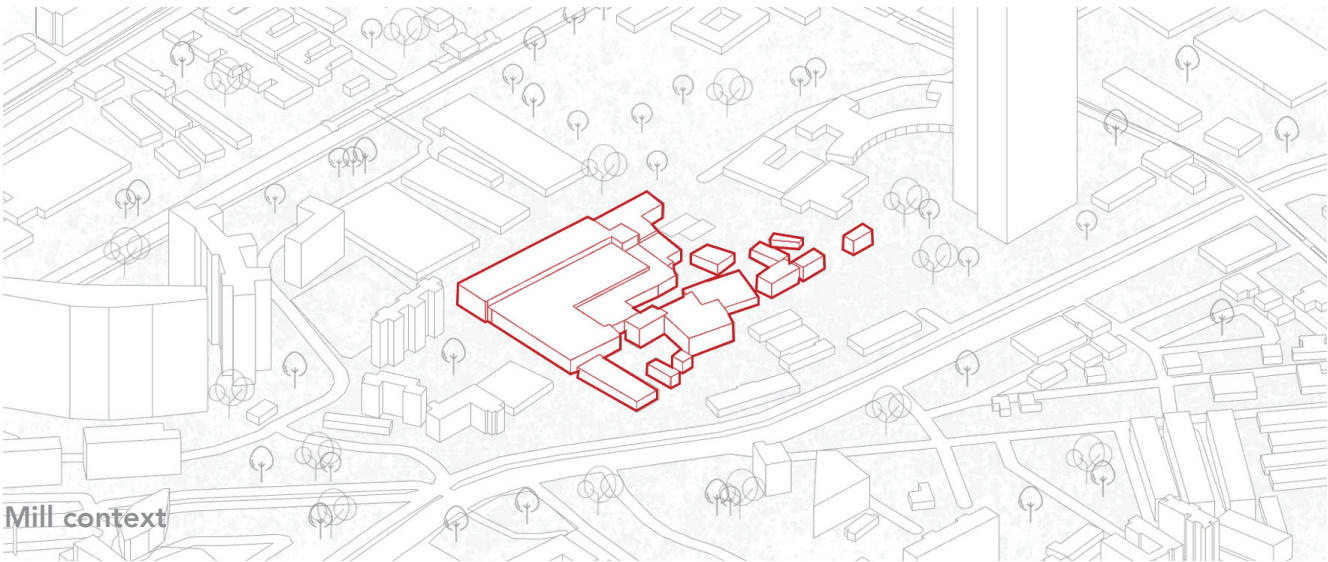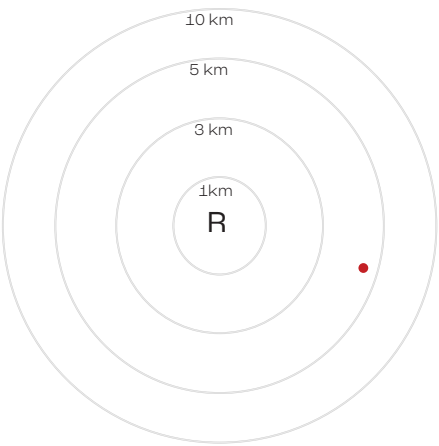
Mill context

---

7. Sitaram mills

Fig. 126 Plan of Sitaram mills, 1996 © Author,   Fig. 127 Sitaram mills © archdiaries.com
Redrawn from Correa, 1996

0   0.1km   0.3km 0.5km

0   1Km   3Km   5Km

| 1800 | 1900 | 2000 | Present |

1920
Sitaram mills
Major producer of cotton
textile for the purpose of
exporting

2024
Under MCGM
Municipal Corporation of
Greater Mumbai

Structures and age

19 structures, 50-107 years

Functions of the mill

Construction technology used in the mill

Mill area

52,408sq.m

Distance from nearest railway station

10 km
5 km
3 km
1km
R
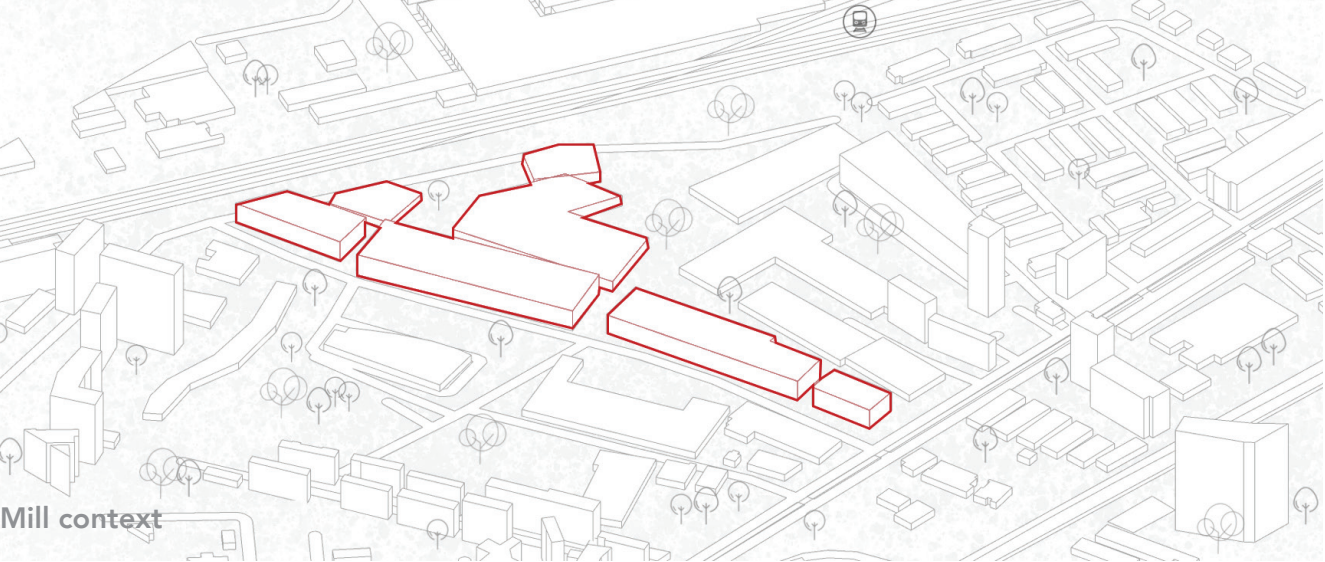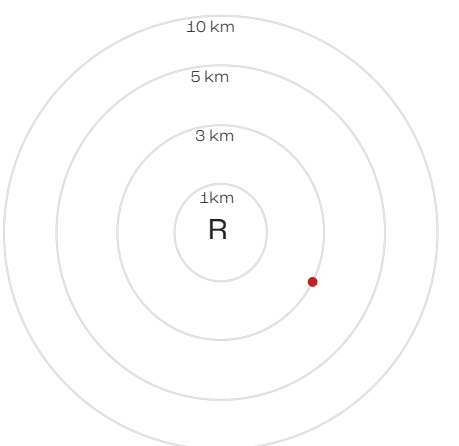
Mill context

9,10. Kohinoor mills No.1 &2

Fig. 128 Plan of Kohinoor mills 1&2, 1996 ©
Author, Redrawn from Correa, 1996

Fig. 129 Kohinoor mills 1&2 © kractivist.wordpress.com

1800   1900   2000   Present

1940s   **2024**

Kohinoor mills 1&2   No Development
One of the cotton textile mills in Girangaon that
came up during the mid 20th century.
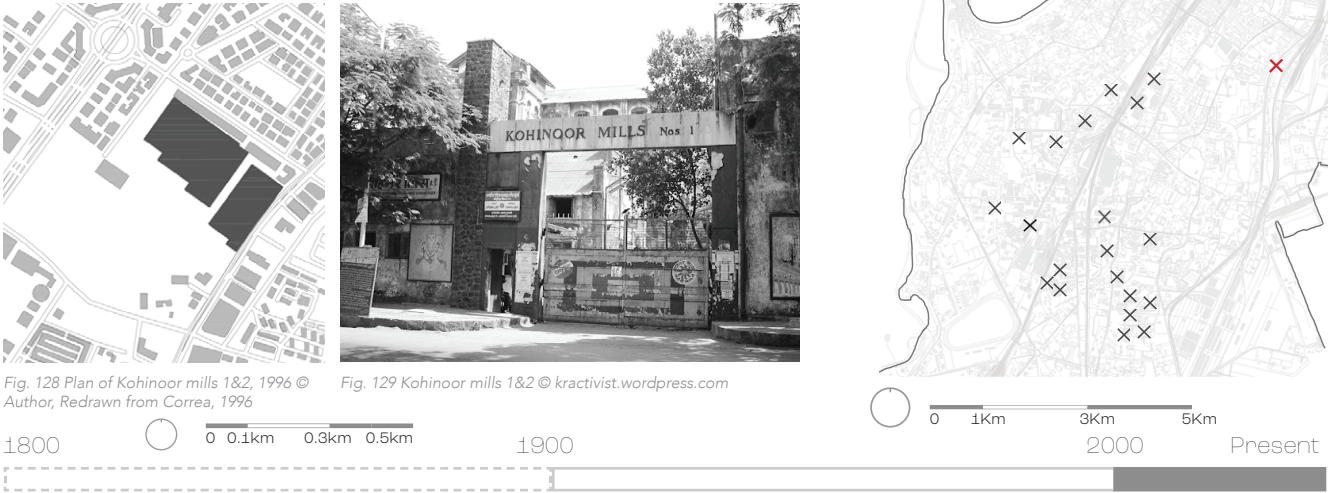
Structures and age

33 structures, 50-80 years

Functions of the mill

Construction technology used in the mill

Mill area

87,932 sq.m
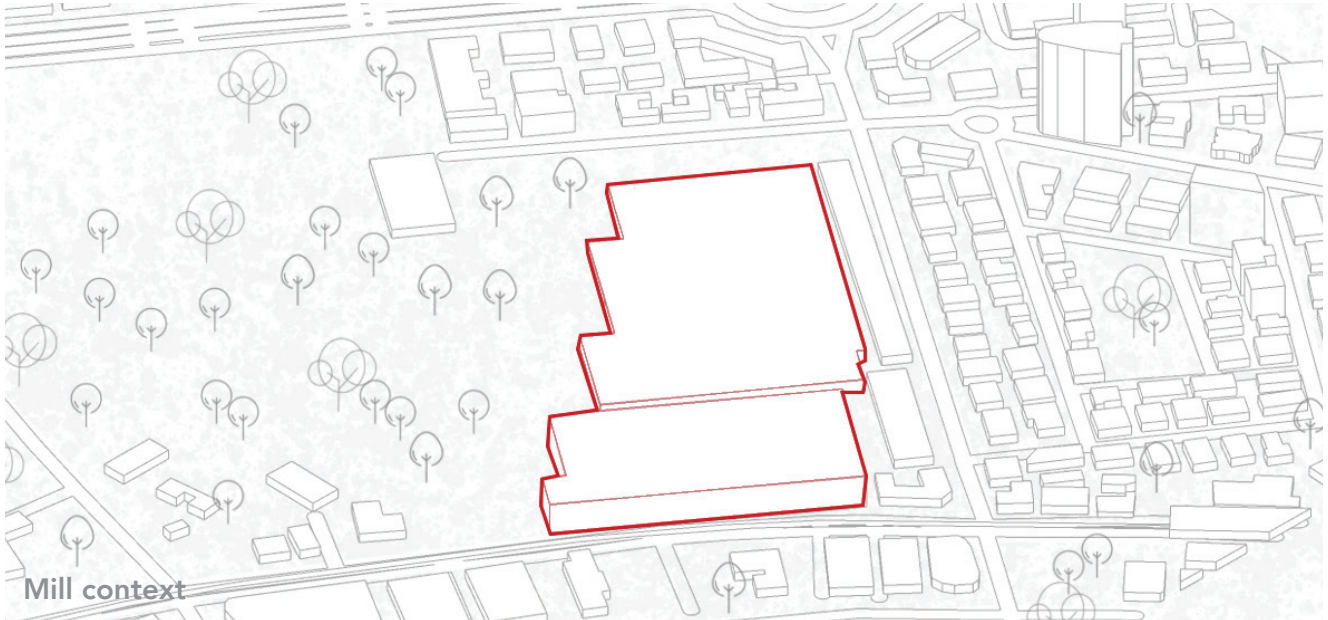
Distance from nearest railway station

10 km
5 km
3 km
1km
R

Mill context

---

11. Tata mills

Fig. 130 Plan of Tata mills, 1996 © Author,
Redrawn from Correa, 1996

1800   1900   2000   Present

2024

Tata mills lie in close proximity with the central
railway station and is an NTC mill.   No Development
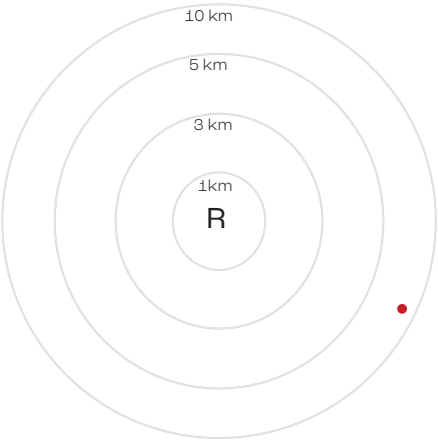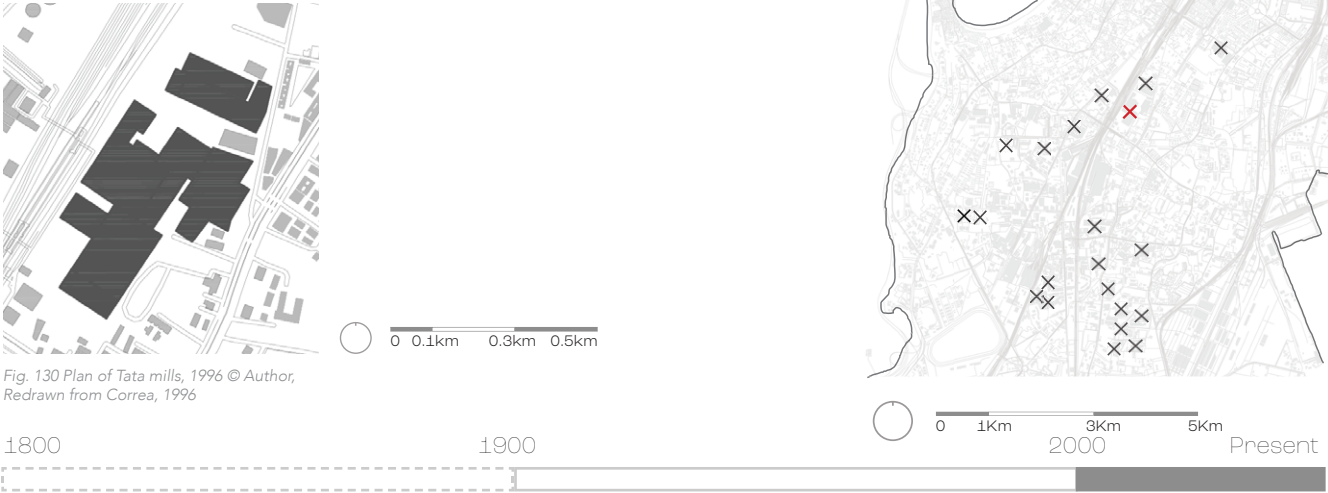
Structures and age

25 structures, age unknown

Functions of the mill

Construction technology used in the mill

Mill area

139,200.5sq.m

Distance from nearest railway station

10 km
5 km
3 km
1km
R

Mill context
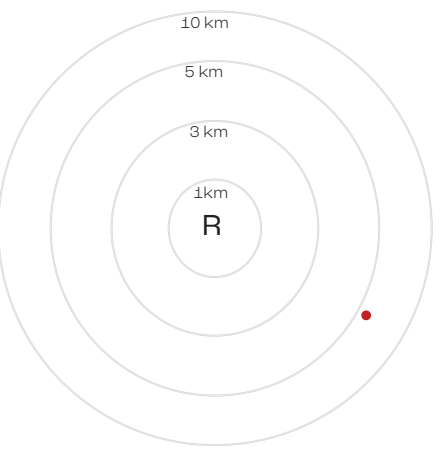
14. Digvijay mill

Fig. 131 Plan of Digvijay mills, 1996 ©
Author, Redrawn from Correa, 1996

Fig. 132 Digvijay mills © flickr.com

0 0.1km   0.3km   0.5km

0   1Km   3Km   5Km

1800 --------- 1900 --------- 2000 ------- Present

1940s   **2024**
Digvijay mills   No development
One of the cotton textile mills in Girangaon that
came up during the mid 20th century.

Structures and age

16 structures, 50-80 years

Functions of the mill

Distance from nearest railway station
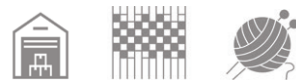
Construction technology used in the mill

Mill area
37,768.5 sq.m
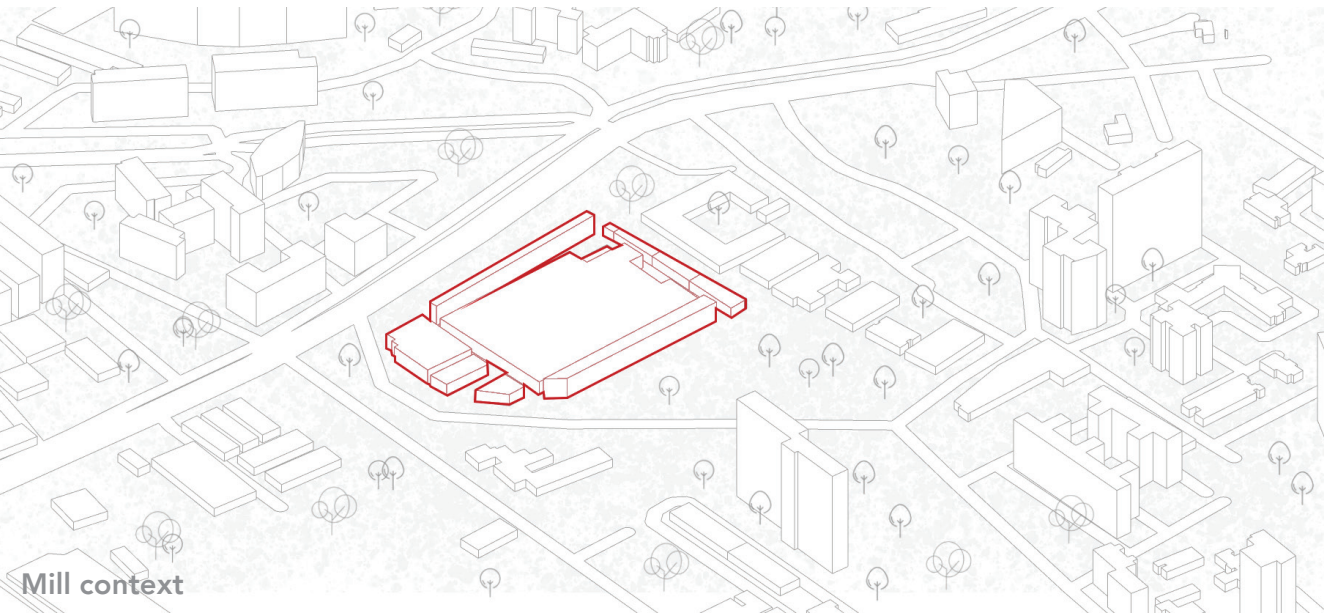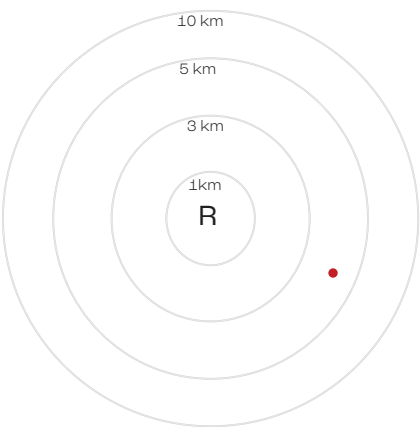
Mill context

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16. India United mills no.4
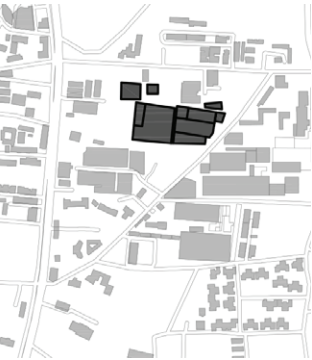
Fig. 133 Plan of India United mills no. 4, 1996
© Author, Redrawn from Correa, 1996

0 0.1km   0.3km   0.5km

0   1Km   3Km   5Km

1800 --------- 1900 --------- 2000 ------- Present

1920s   **2024**
India United mills no.4   Under MHADA Development
Major producer of cotton textile for the   Low budget housing
purpose of exporting

Structures and age

10 structures, above 103 years

Functions of the mill

Distance from nearest railway station

Construction technology used in the mill

Mill area
29,988sq.m
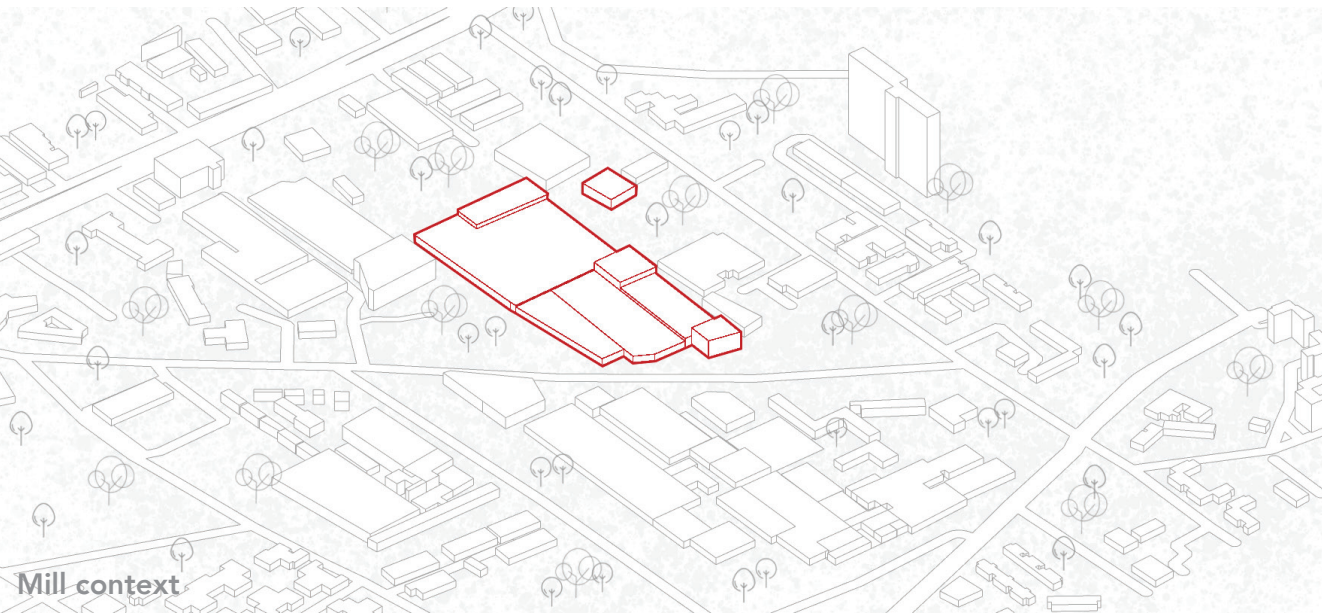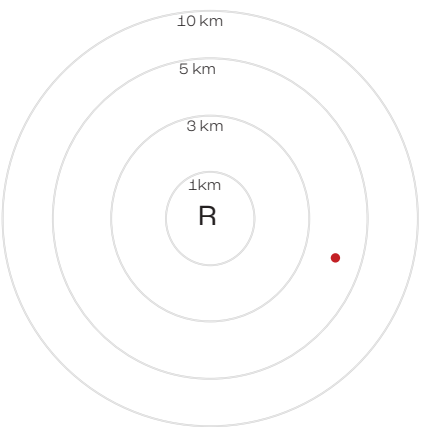
Mill context

17,18.India United mills no.2 & 3

Fig. 134 Plan of India United mills 2 &3, 1996
© Author, Redrawn from Correa, 1996

Fig. 135 India United mills 2 &3 © shekhar.cc

0 0.1km 0.3km 0.5km

0 1Km 3Km 5Km

1800 ———— 1900 ———— 2000 ———— Present

1920s
India United mills no. 2&3
Major producer of cotton textile for the
purpose of exporting

2024
Under MCGM
Municipal Corporation of
Greater Mumbai

Structures and age

23 structures, 50-105 years

Functions of the mill

Construction technology used in the mill

Mill area

64,910 sq.m

Distance from nearest railway station

10 km
5 km
3 km
1km
R
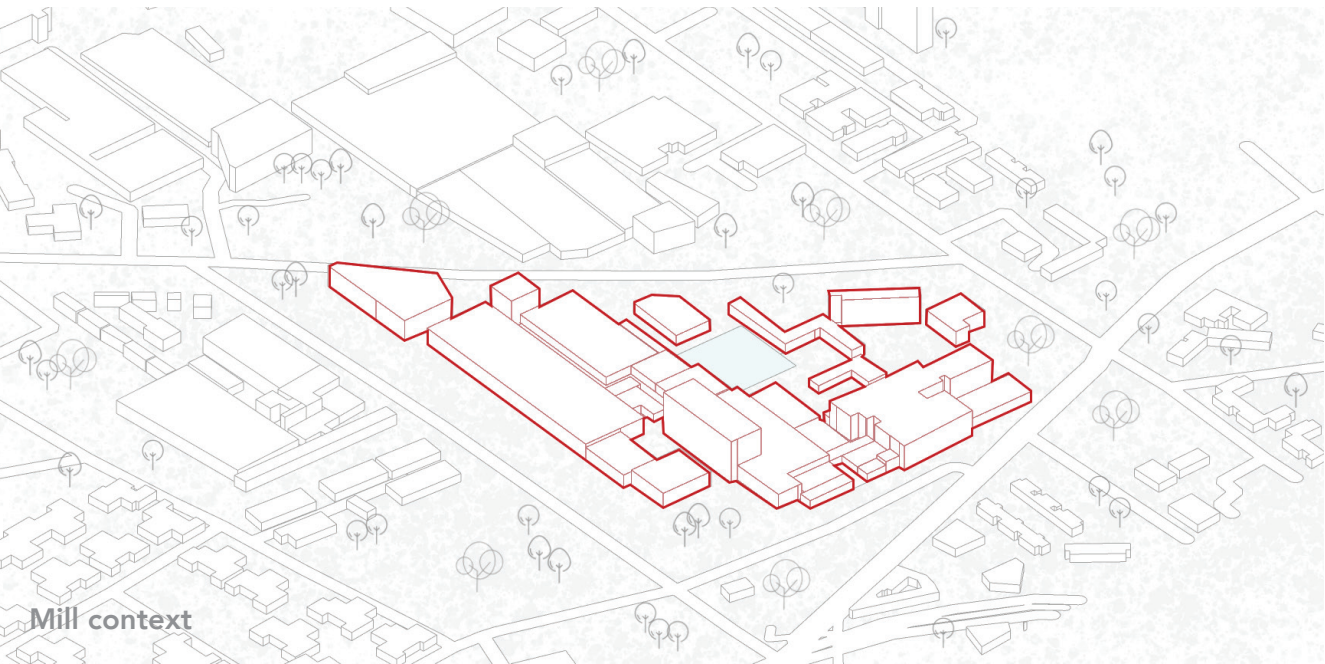
Mill context

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19. India United mills no.5

Fig. 136 Plan of India United mills 5, 1996 ©
Author, Redrawn from Correa, 1996

Fig. 137 India United mills 5 © flickr.com

0 0.1km 0.3km 0.5km

0 1Km 3Km 5Km

1800 ———— 1900 ———— 2000 ———— Present

2024
Functioning mill

Structures and age

15 structures, age unknown

Functions of the mill

Construction technology used in the mill

Mill area

22,538 sq.m

Distance from nearest railway station

10 km
5 km
3 km
1km
R
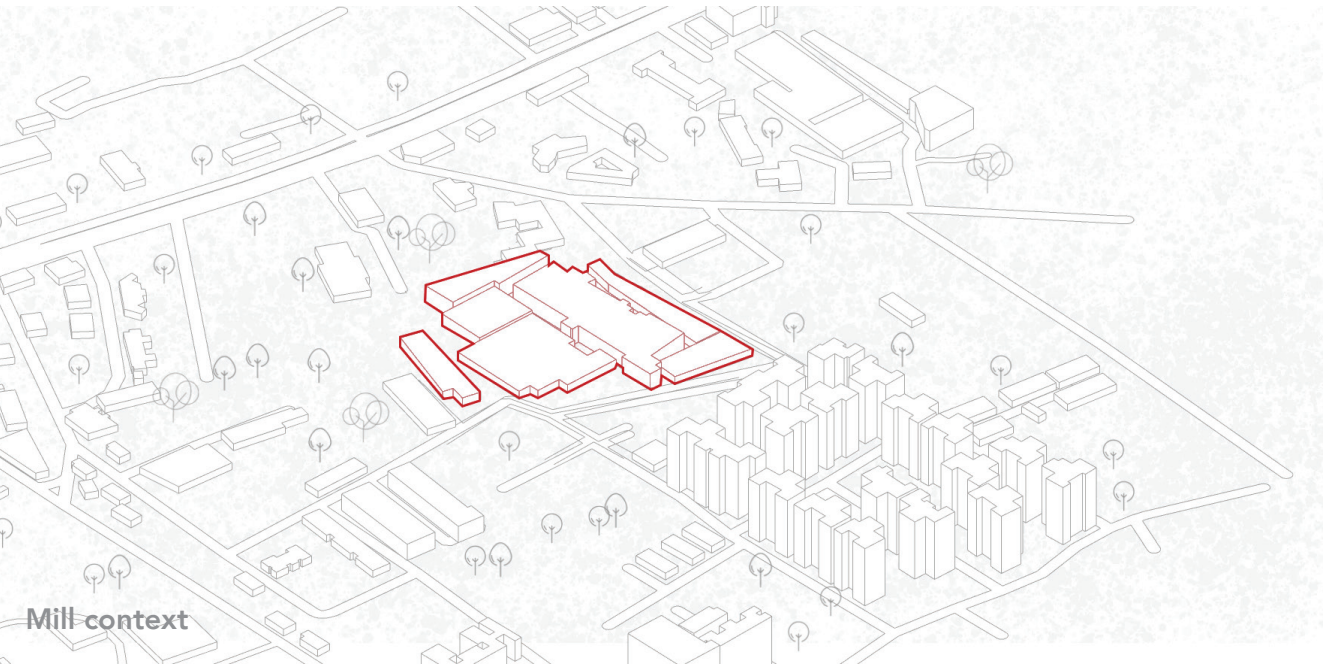
Mill context

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20. Gold Mohur mills

Fig. 138 Plan of Gold Mohur mills, 1996 © Author, Redrawn from Correa, 1996

Fig. 139 Gold Mohur mills © wikimapia.org

0   0.1km   0.3km   0.5km

0   1Km   3Km   5Km

1800   1900   2000   Present

1944   **2024**
Gold Mohur mills   No development
Major producer of cotton textile for the
purpose of exporting

Structures and age

15 structures, 55-80 years

Functions of the mill

Construction technology used in the mill

Mill area

19,325 sq.m

Distance from nearest railway station

10 km
5 km
3 km
1km
R

Mill context

22. India United mills no.1

Fig. 140 Plan of India United mills no.1, 1996 © Author, Redrawn from Correa, 1996

Fig. 141 India United mills no.1 © swarajyamag.com

0   0.1km   0.3km   0.5km

0   1Km   3Km   5Km

1800   1900   2000   Present

1920s   **2024**
India United mills no. 1   Ambedkar statue and
Major producer of cotton textile for the purpose of   public spaces
exporting
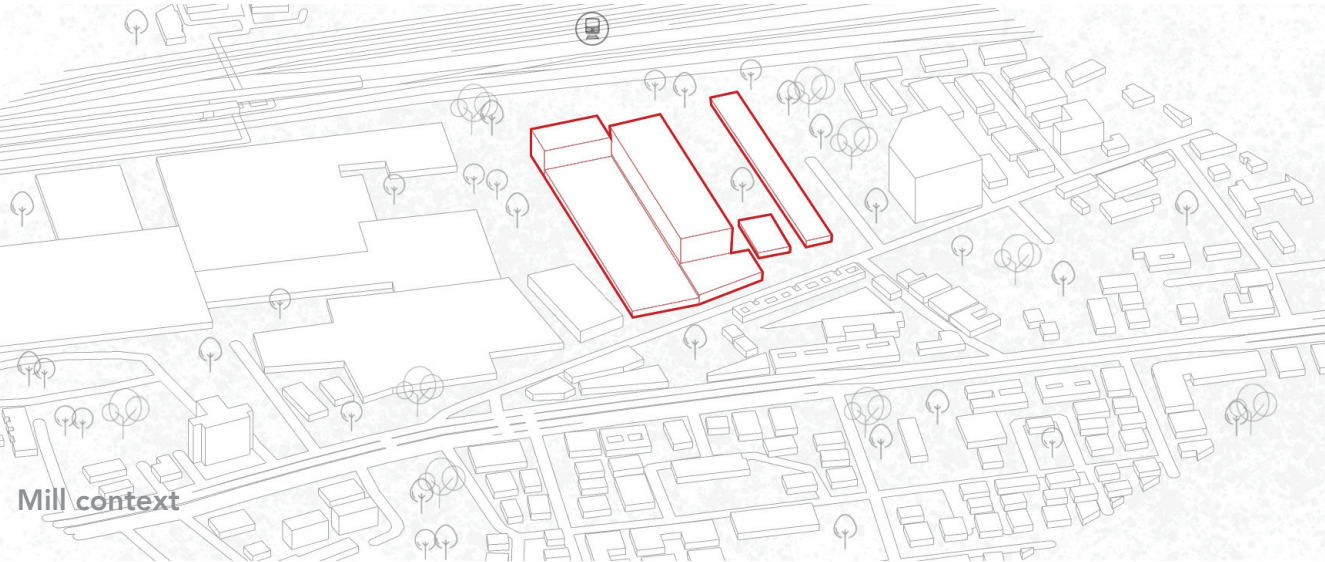
Structures and age

18 structures, 50-105 years

Functions of the mill
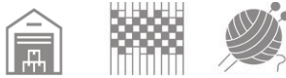
Construction technology used in the mill

Mill area

81,142 sq.m

Distance from nearest railway station

10 km
5 km
3 km
1km
R

Mill context

23. Finlay mills

Fig. 142 Plan of Finlay mills, 1996 © Author, Redrawn from Correa, 1996

Fig. 143 Finlay mills © gettyimages.it

0   0.1km   0.3km 0.5km

0   1Km   3Km   5Km

1800   1900   2000   Present

2024
No development

Finlay cotton mills, situated in the eastern side of the centrail railway line lies in close proximity to the Lalbaugh precint mills.

Structures and age

18 structures, 50-80 years

Functions of the mill

Construction technology used in the mill

Mill area

42,089.76 sq.m

Distance from nearest railway station

10 km
5 km
3 km
1km
R
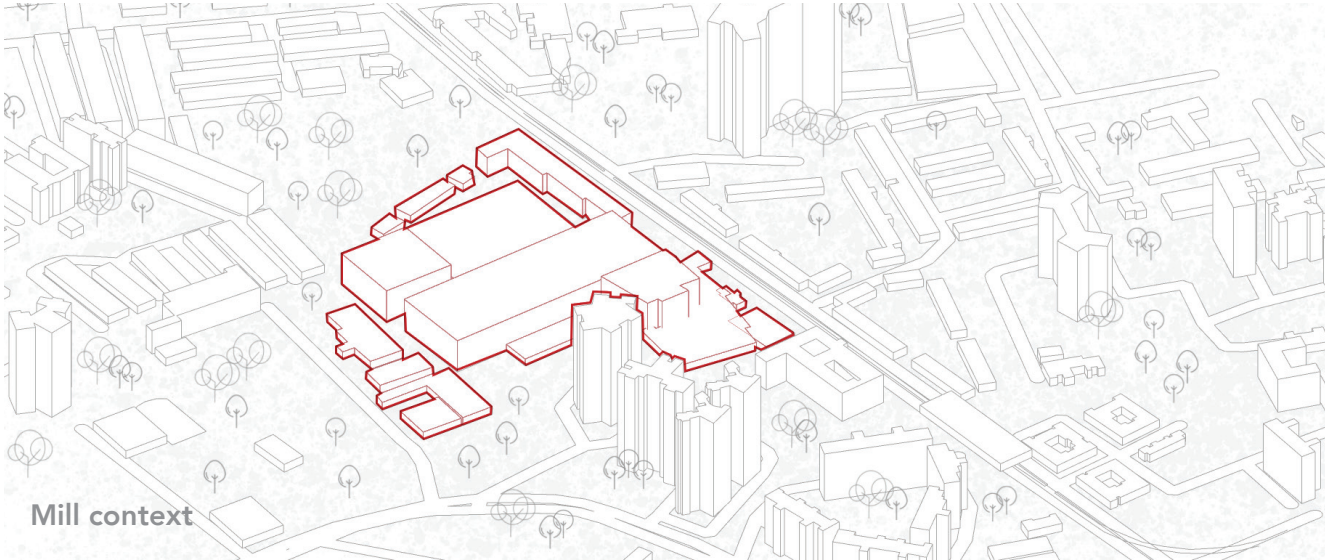
Mill context

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24. Podar mills

Fig. 144 Plan of Podar mills, 1996 © Author, Redrawn from Correa, 1996

Fig. 145 Podar mills © constructionweekonline.in

0   0.1km   0.3km 0.5km

0   1Km   3Km   5Km

1800   1900   2000   Present

1944
Podar mills
One of the cotton textile mills in Girangaon that came up during the mid 20th century.

2024
No development

Structures and age

12 structures, 55-80 years

Functions of the mill

Construction technology used in the mill

Mill area

24,471.16 sq.m

Distance from nearest railway station

10 km
5 km
3 km
1km
R
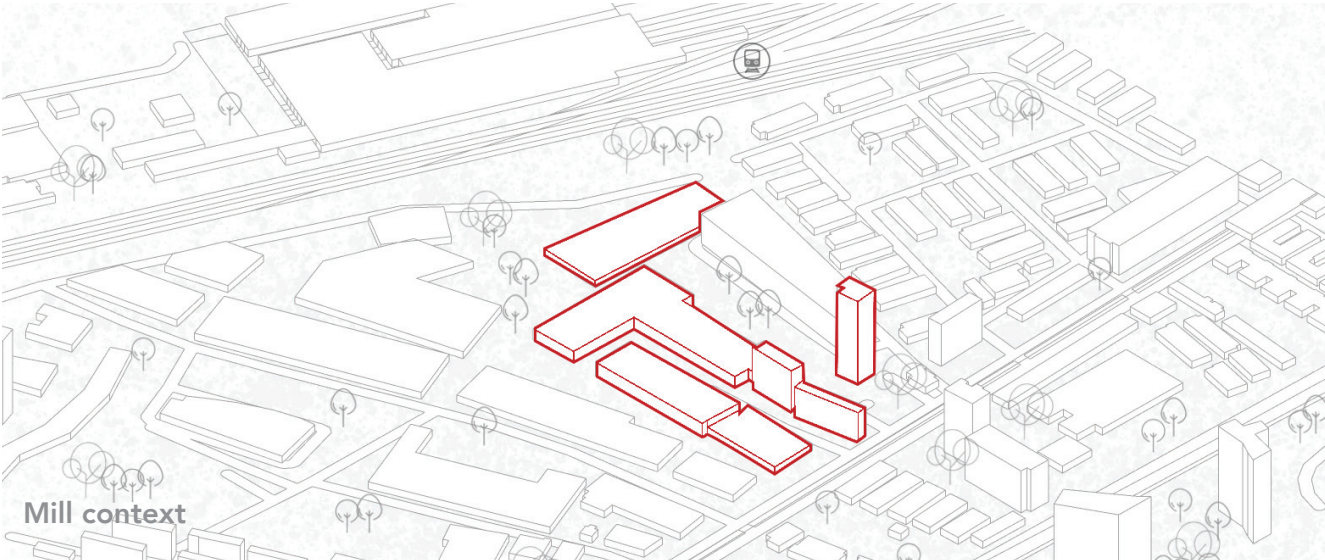
Mill context

25. New city mills of Bombay
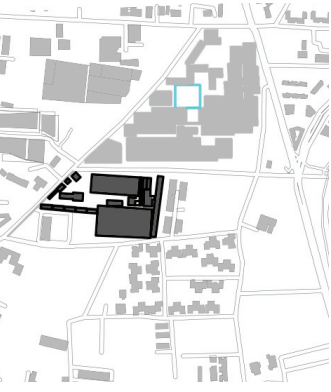
Fig. 146 Plan of New city mills of Bombay, 1996
© Author, Redrawn from Correa, 1996

0   0.1km   0.3km   0.5km

0   1Km   3Km   5Km

1800   1900   2000   Present

2024
No development

Structures and age

21 structures, age unknown

Functions of the mill

Distance from nearest railway station

10 km
5 km
3 km
1km
R

Construction technology used in the mill

Mill area
27,105 sq.m
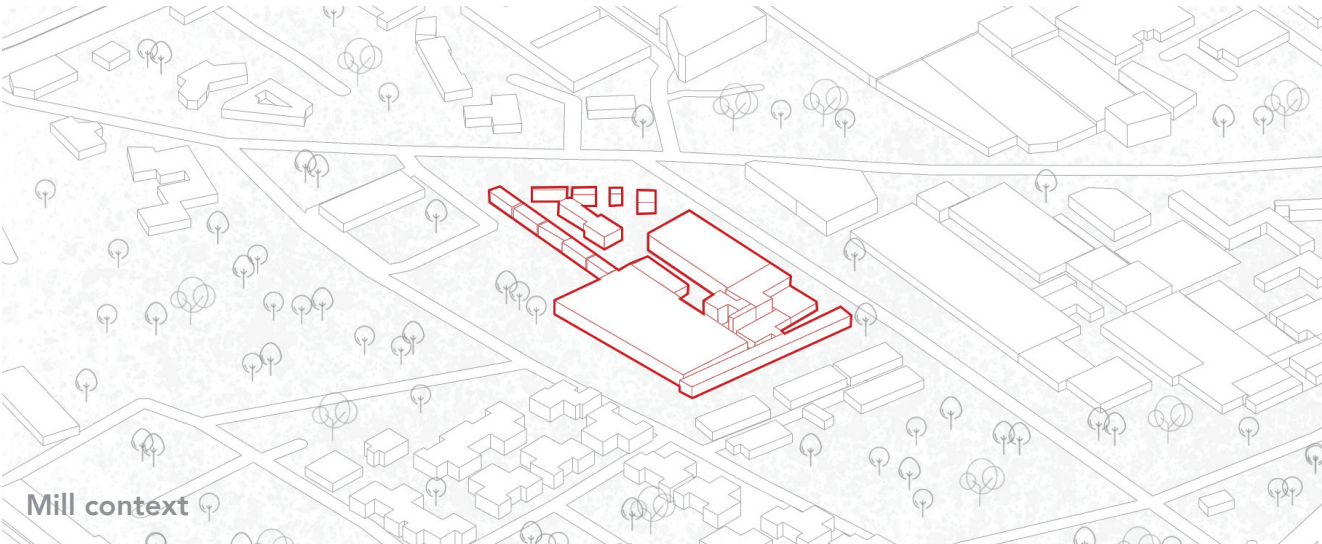
Mill context
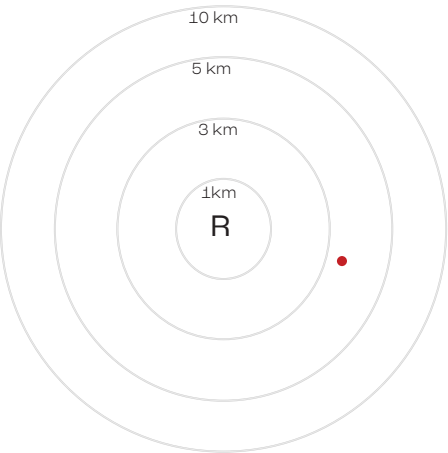
The mumbai mills portray a variety of building blocks catering to different functions within each cotton mill. While most of these building units take up a similar shape, their areas differ with some modification in form.

Type 1   Type 2   Type 3   Type 4   Type 5

Loom shed
InDu 1 mills : 1800 SqM
Digvijay mills : 1465 SqM
Gold Mohur mills : 1591
InDu 4 mills :608 SqM
Sitaram mills : 4566 SqM

Weaving
InDu 1 mills : 15790 SqM
Apollo mills : 4812 SqM
Digvijay mills : 300 SqM
Jam mills : 900 SqM
Finlay mills : 861 SqM

Spinning
Indu 2 &3 mills : 583 SqM
Tata mills : 12075 SqM
Sitaram mills : 4219 SqM
Jam mills : 892 SqM

Godown
Jam mills : 240 SqM
Tata mills : 325 SqM
InDu 2,3 mills : 495 SqM
Gold Mohur mills : 1239 SqM

Store
Tata mills : 312 SqM
InDu No.4 mills : 600 SqM
InDu 2,3 mills : 622 SqM
InDu no.5 mills : 195 SqM

Canteen
Indu no.5 mills : 580 SqM
Jam mills : 268 SqM
InDu 2,3 mills : 540 SqM

Offices
InDu 2,3 mills : 618 SqM
Gold Mohur mills : 450 SqM

Fig. 147 Typology of buildings in the mills © Author

Fig. 148 Strenghts of the site
© Author

LEGEND

▨ Green lands
▤ Port
— Main roads
-- Railways
— Coastline
-- Monorail
+ Activity centres
✛ Nature related activity
✕ Railway station
⬡ Green spaces
⬡ Mill lands
⇈ Connections

0 Km   1 Km   3 Km

STRENGTHS

The major strengths of Girangaon is its efficent transport network that lies in close proximity with the mills. The city has different transport options catering to the travel of citizens between the northern and southern parts of the region. Moreover, the area is filled with activity centres and a linear coastline. Despite the few green spaces and nature reserves, the city does offer some of it within a highly dense zone.
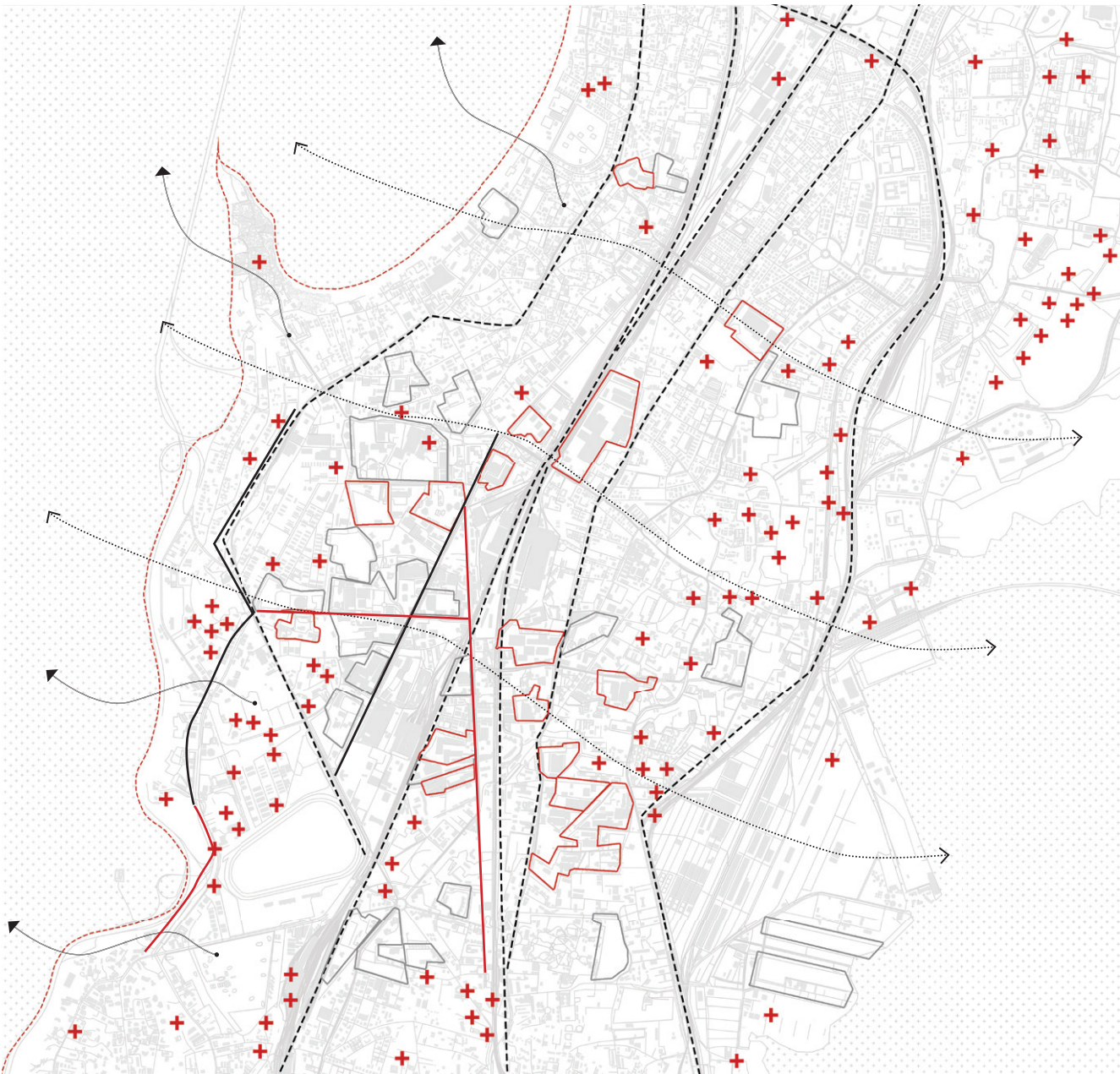
Fig. 149 Weaknesses of the site
© Author

LEGEND

╲ Pedestrian and traffic congestion areas
╲ Traffic congestion areas
↑ Fewer connections
↑ Lack of connection with coastline
+ Slums
○ Underdeveloped mills
○ Mill lands
-- High pollution zones
-- Undeveloped coastline

0 Km   1 Km   3 Km

WEAKNESS

The main weakness of the site would be its lack of connection along the East-west. This creates a hindered flow along the stretch. Moreover the railway lines passing North-South further divides the city into two. The slums and the under-developed mills are also a drawback of the city that has high real estate demands. Despite the boastful coastline, it mostly remain under-developed. The pollution in the region along the main roads and railway lines is also another issue.

Fig. 150 Oppourtunities in the site
© Author
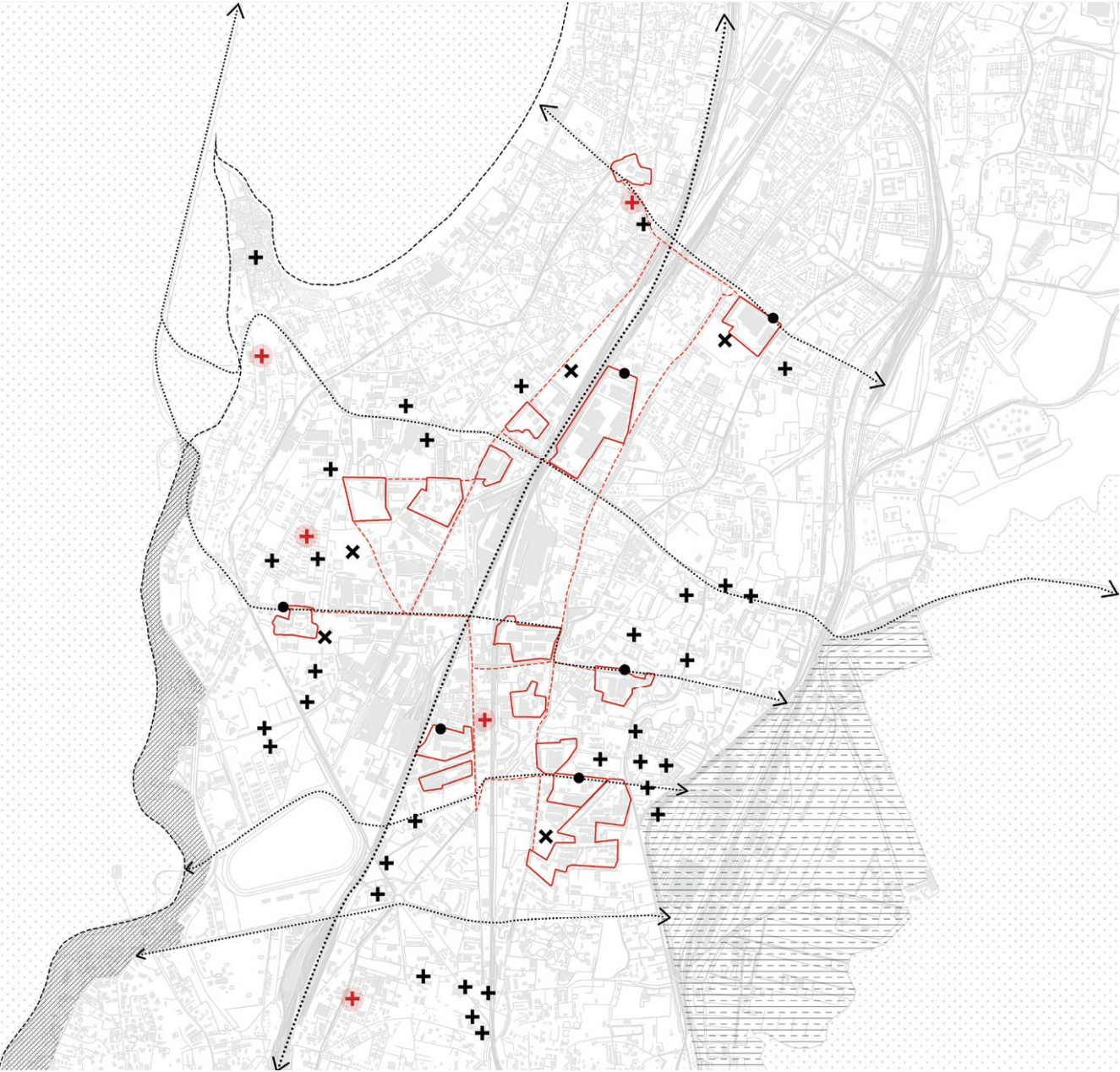
LEGEND

Green area redevelopment

Redevelopment of port

Establishing connections

Connections between mills

Incorporating green spaces

Redeveloping chawls

Redeveloping unused mills

Housing oppourtunities

Redeveloping Slums

OPPOURTUNITIES

The old district of Girangaon, presently comprising of different localities holds a lot of potential due to its strategic location. It has the potential of becoming an important area with improved connections, redeveloped port, redeveloped mill lands, redeveloped slums and housing opportunities. The area can be presented with better green infrastructure and green spaces with ideal planning and thoughtful redevelopment of mills.

Fig. 151 Threats in the site
© Author
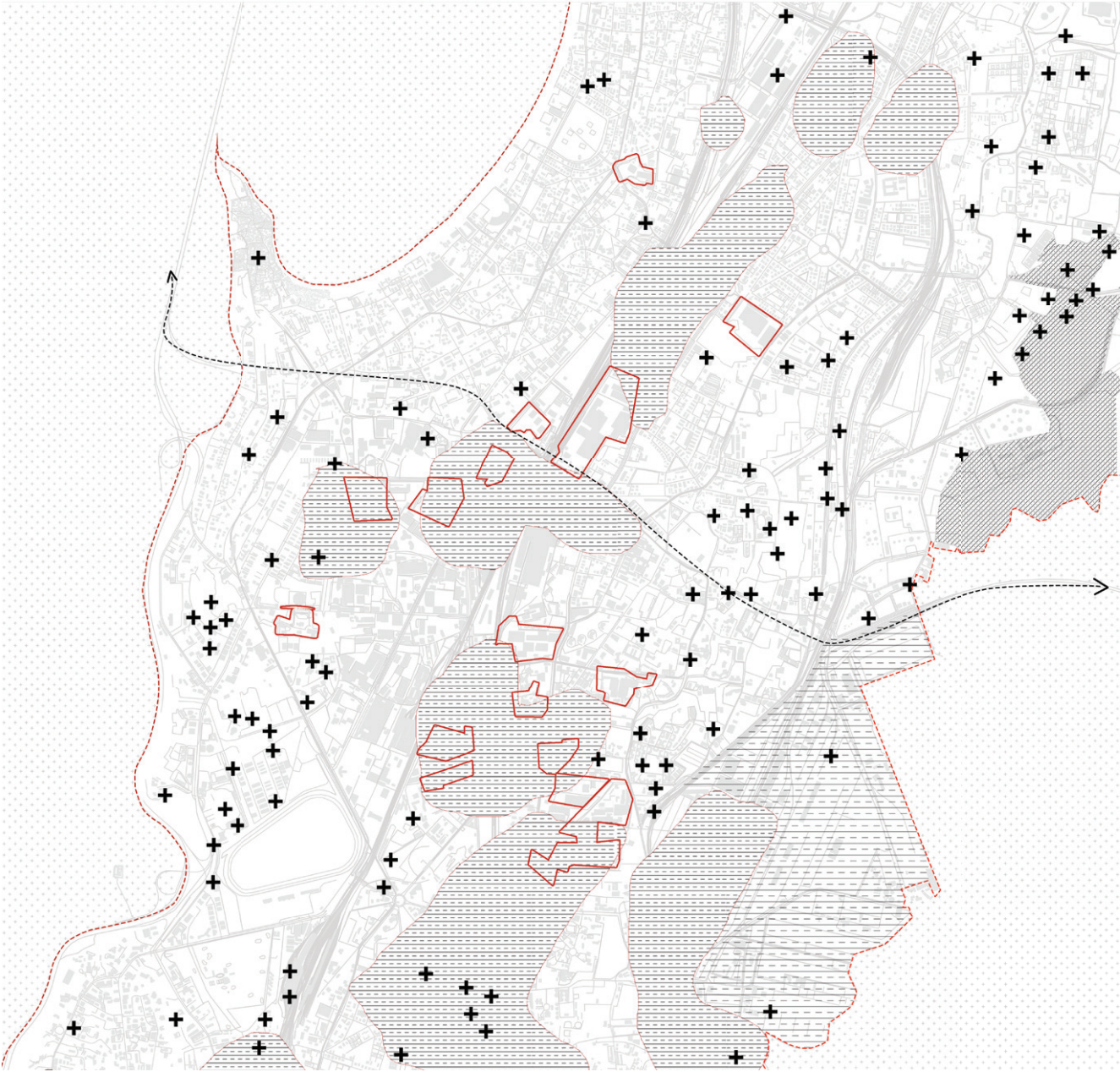
LEGEND

Demoloshing/ ruin of mills

Landslide and floods

Loss of ecological features- Mangroves

Underdevelopment of Port

Expansion of slums

Lack of connection

Rise in sea levels

THREATS

While being a place with high potential, Girangaon also faces a lot of threats if developed improperly. Th lack of connections would lead to traffic issues and separation. Moreover areas of landslide and flood have to be considered so as to not worsen the situations. The threat of slums increasing in number also looms over the region due to the lack of housing facilities and high land prices. Moreover, the rise in sea levels and underdeveloped mills also pose an issue.

5.22 STRUCTURE PLAN GIRANGAON

The Girangaon area is connected with major road networks and railway lines. these transit routes are to be strengthened to improve connectivity while new pedestrian and cycling paths are proposed to enhance the experience of the area. This creates a network that enables people to use different modes of transport to visit the various parts of the old mill precinct. Paths are proposed in a way which connects the whole of Girangaon giving importance to the mill lands. This is envisioned as a heritage trail map for the whole distrcit.

LEGEND

✚   Major railway stations

▨   Proposed green spaces

▦   Township

▒   Proposed services: Cafes, refreshments, Bicycle rentals, taxi stands

▨   Proposed community housing

▢   Waterfront recreation

▭   Industrial remains

▦   Mills with new functions

- - -   Major roads

━━━   Proposed pedestrian path

•••••   Proposed cycling and pedestrian route

═══   Main railway lines

City park

Sports hub

Zoo

0m   500m   2000m

Fig. 152 Proposed structure plan of mill district © Author

Fig. 153 Inter connection between the actors at play © Author

six.

Social dynamics and the city

6.1 THE URBAN MILLSCAPE

Following the fall of the mills, the city saw a lot of transformation. The real estate mafia[36] started to gobble up pieces of land fro development while the city suffered high built density. The city developed at a pace so fast that urbanisation created an urban fabric that has a lot of friction spaces.

This compromised urban integrity was not just the result of the planning but it has an active involvement of various actors who affect the city and its development in various ways. Out of this, the main impact is created by the real estate mafia against whom most environmentalists, heritage conservationists and urban planners have a constant problem with.

_____
36 Mumbai's need for land and lack of spaces has made real estate a market over the years

6.2 ACTORS AT PLAY

Main actors at play are local public, planners and designers, real estate mafia, activists, and historians. The activists, environmentalists and historians mainly aims at the benefit of the local public, social benefits and the preservation of the historic assets. They focuses on the nature and intagible factors in the site. Whereas the Real estate mafia maily aims at their self benefits. The lawyers are found to have equal interest on the social benefits as well as their self benefits (D'monte, 2007).

6.3 SPATIAL RESPONSES: OPPORTUNITIES LOST AND EXISTING

In the year 1991, large number of closed mills were sold and the proposal of providing 1/3rd of the land to MHADA for affordable housing came up. Huge number of mill demolitions and conversion of mills to malls and bowling alleys took place till the year 1996. The mills were converted to commercial places for monatory gains of the owners. In the year 1996, Architect Charles Correa came up with the proposal to redevelop mill lands as clusters and not as piecemeal[37] redeveopment. This would generate larger open spaces in the city. In the year 2000-2001, the rule was altered as the owners need to surrender only 1/3rd of the vacant land to the government. This alteration benefited the owners mostly and the possibilities of open spaces and affordable housing reduced. In the year 2005 legal battle took place where the environment activists filed case stating that the ammendments of 2001 reduced the possibility of having more open spaces in the city. The Bombay High Court gave stay to the case. But the mill owners and real estate mafia filed the case in the Supreme Court, where the bill was passed. Due to this, at present, these abandoned mill lands are a hindrance to the development of the city.

37 Individual development of mill lands was highly opposed due to the scare of gentrification.
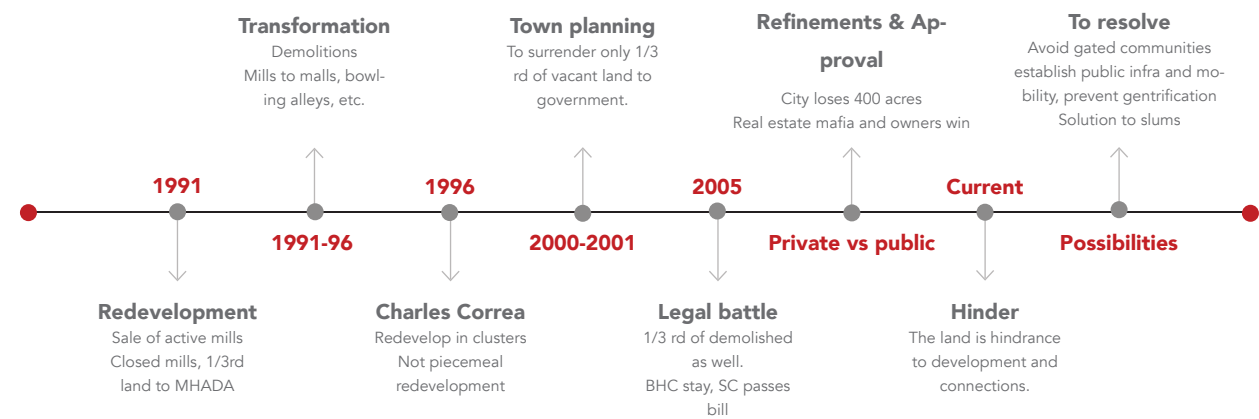
Fig. 154 Inter connection between the actors at play © Author

Fig. 155 India United Mill no. 1 to Ambedkar statue © The Indian Express

Fig. 156 Construction of the Ambedkar statue © Mumbai Buzz

The major possibilities in the future are to avoid gated communities, establish public infrastructure and mobility, prevent gentrification and solution to slums (D'monte, 2007). Currently, after the passing of bill by the Supreme Court, the owners have the benefit of double FSI[38]. The mill district is thus found to have too much amenities and less transportation facilities which connects these amenities. Public infrastructure like the sewage and electricity should also be given primary importance as part of the area development. Slum eradication must also be given primary importance while designing this mill district. Lack of pedestrian paths is another major drawback of the area, which needs to be considered while developing the area. Major problems that can be found in the mill district are improper planning, development of only the crucial zones, disparity between the built and unbuilt, gentrification and loss of land (D'monte, 2007).

38 Increased FSI was a way to make the owners settle for the deal to offer land for public infrastructure.

6.4 PRESENT PROBLEMS IN MUMBAI

The book, MUMBAI READER 22/23, CIVIL SOCIETY AND THE CITY,[39] UDRI, focuses on the problems that are faced by the city of Mumbai and the problems that are addressed by a few organisations, especially NGOs over the years.

There are a number of foundations which were set up to solve and minimise the major issues that the city was facing. Nivara hakk is a programme that focuses on better and affordable housing opportunities for the low income groups in Mumbai. SPARC[40] focuses on improvement in the quality of life of the people living in the slums of Mumbai. NPCCA[41] aims at improving the green spaces and public places in Mumbai, and the Awaaz Foundation engages in creating awareness about the environmental issues of Noise pollution, which is a major problem of the city.

Fig. 157 Nivara Hakk foundation © Mumbai Readers, UDRI

Fig. 158 SPARC © Mumbai Readers, UDRI

Fig. 159 NPCCA © Mumbai Readers, UDRI

Fig. 160 Awaaz Foundation © Mumbai Readers, UDRI

39 The books helps to understand the current situation and the problems that are faced by the people of the city. This would help us in leading to a design solution which could result in a better lifestyle of the people of Mumbai
40 The Society for the Promotion of Area Resource Centers, works for the vulnerable and urban poor.
41 The National Centre for the Performing Arts is a cultural organisation.

6.5 SITE STUDY SURVEY

During the site study, a survey[42] was conducted among the people of Mumbai to understand their concerns and needs. The connection that they have with the mill lands and what would be the best proposals and solutions according to them regarding these abandoned properties were analysed. After the survey, their answers were analysed to understand what would be the best solution for these abandoned mill areas according to the residents of Mumbai.

The first question asked was the memory they have associated with the mills, for which 65% of the people answered to have heard about it. The next question was to understand the major concerns that they have about the redevelopment of these mill sites, to which, most of the people answered about the lack of housing opportunities and the loss of open spaces in the city. The last question focused on the type of redevelopment that they prefer for the mill lands, to which the majority answered that they would like to have public infrastructure and public housing.

_____

42 Around 50 people were surveyed on 3rd September 2024 in Mumbai
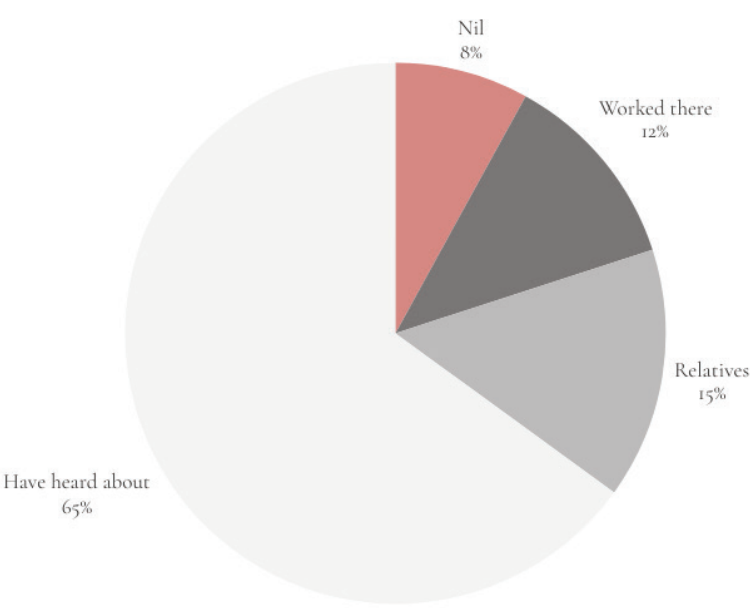
Do you have any memory associated with the mills?
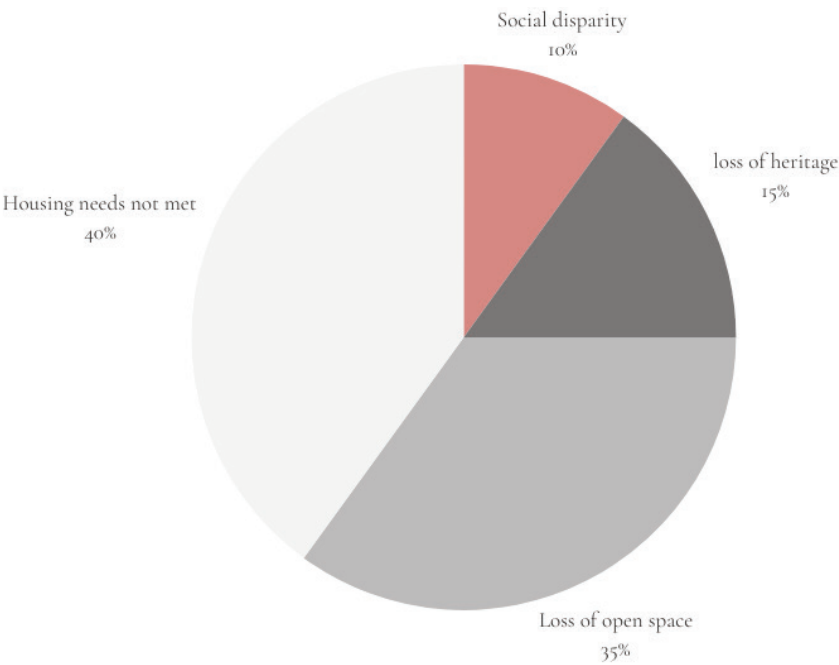
What are your biggest concerns about the redevelopment of the mill sites?
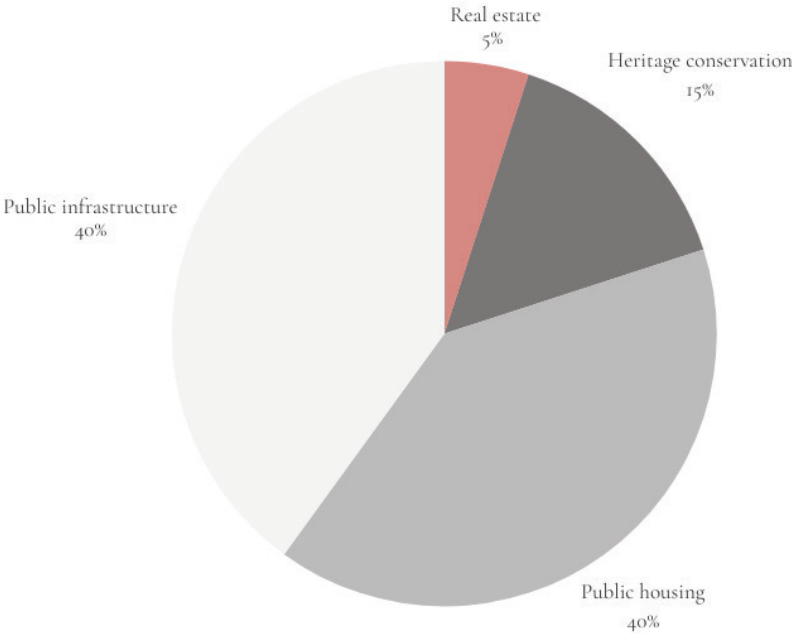
What sort of redevelopment would you prefer for the mill lands?

Fig. 161 Diagram concluding the results of the site survey © Author

seven.

The remnant precinct

7.1 INDUSTRIAL REMNANT

The fate of the mill lands has been a brutal one with barely any of then surviving in its full integrity. While most of the mills have been demolished and transformed, the very few that survive are highly dilapidated and in a state of ruin. The mills have lost their prominence and stand as huge parcels of land that are cut off from the city entirely.

While most of the mill precincts succumbed to development only one remains with most of the mills. The Lal-baugh precinct has 7 mills, each of them in a situation different from the other. While one is entirely in ruins, another is a live fionctioning mill.

7.2 LALBAGH: SITE STUDY

The project focuses on a district with 7 mills adjacent to one another, situated in the heart of Girangaon. Out of 580 acres of mill lands, Lalbagh[43] area occupies up to 60 acres of land. Here, a major cluster of mills that are under development or with no development are found.

43 Out of 13 mills that are under development and not developed, 5 mills are located in this area.

Fig. 162 Map showing the location of Lalbagh © Author

0 Km   1 Km   3 Km

Mills present in the site:
Digvijay mills: 9.31 acres
India United mills no. 4: 7.35 acres
India United Mills no. 2,3: 16.03 acres
India United Mills no. 5: 5.56 acres
New City Mills of Bombay: 6.69 acres
New Hind Textile Mills: MHADA Housing: 8.33 acres

LEGEND

Demolished and redeveloped
Under development
No development
Demolished
Private mills

7.3 FIGURE GROUND

The Lalbagh area is found to have very high built density, just like the rest of Mumbai.

Fig. 163 Figure ground map of Lalbagh area © Author
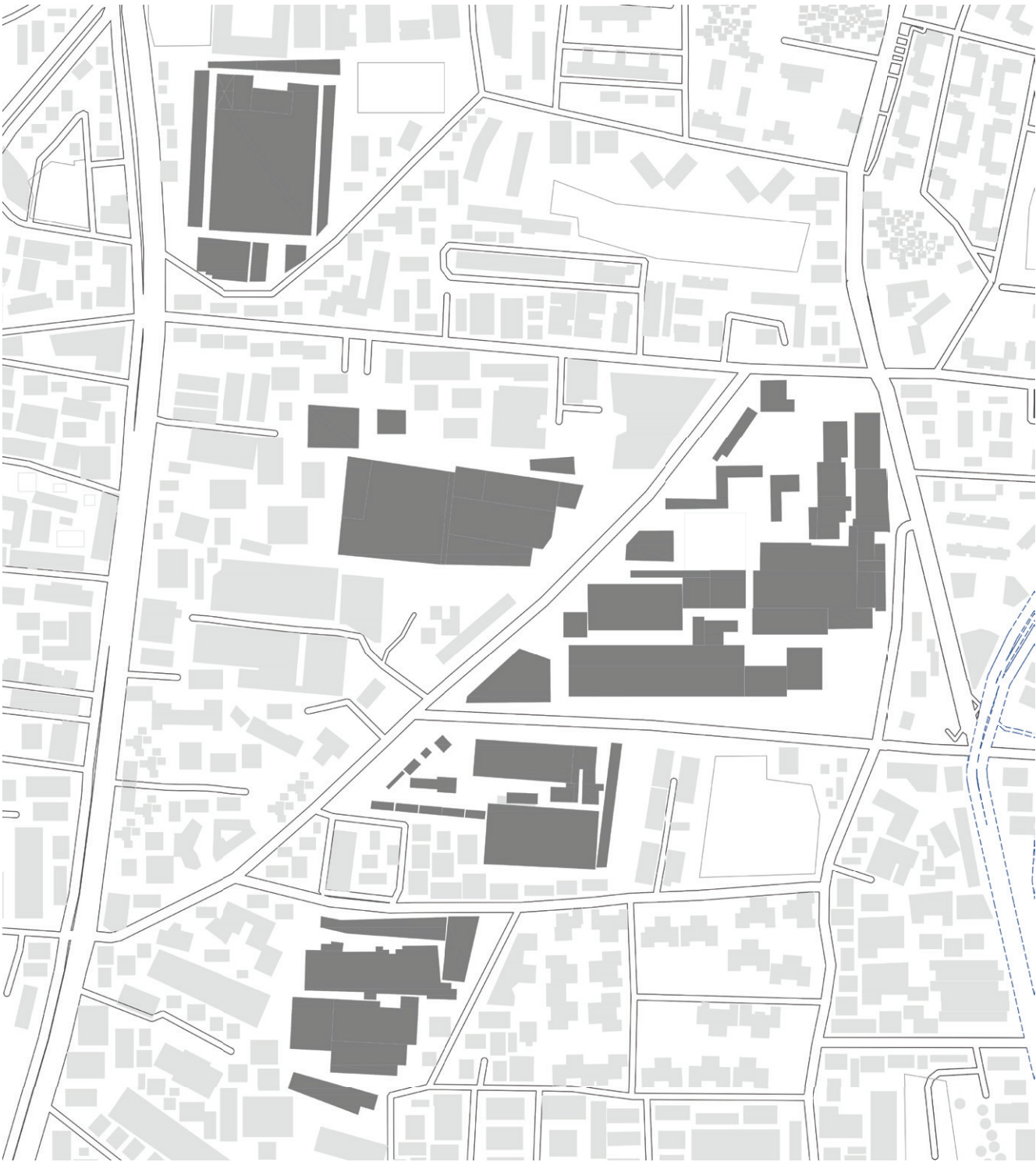
LEGEND

☐ Voids   ☐ Solids   ■ Mills

0   100m   300m

7.4 LANDUSE

The site area is mostly residential with industrial patches. Slum clusters are also seen in the site area. The area lacks open spaces.

Fig. 164 Land use map of Lalbagh area © Author
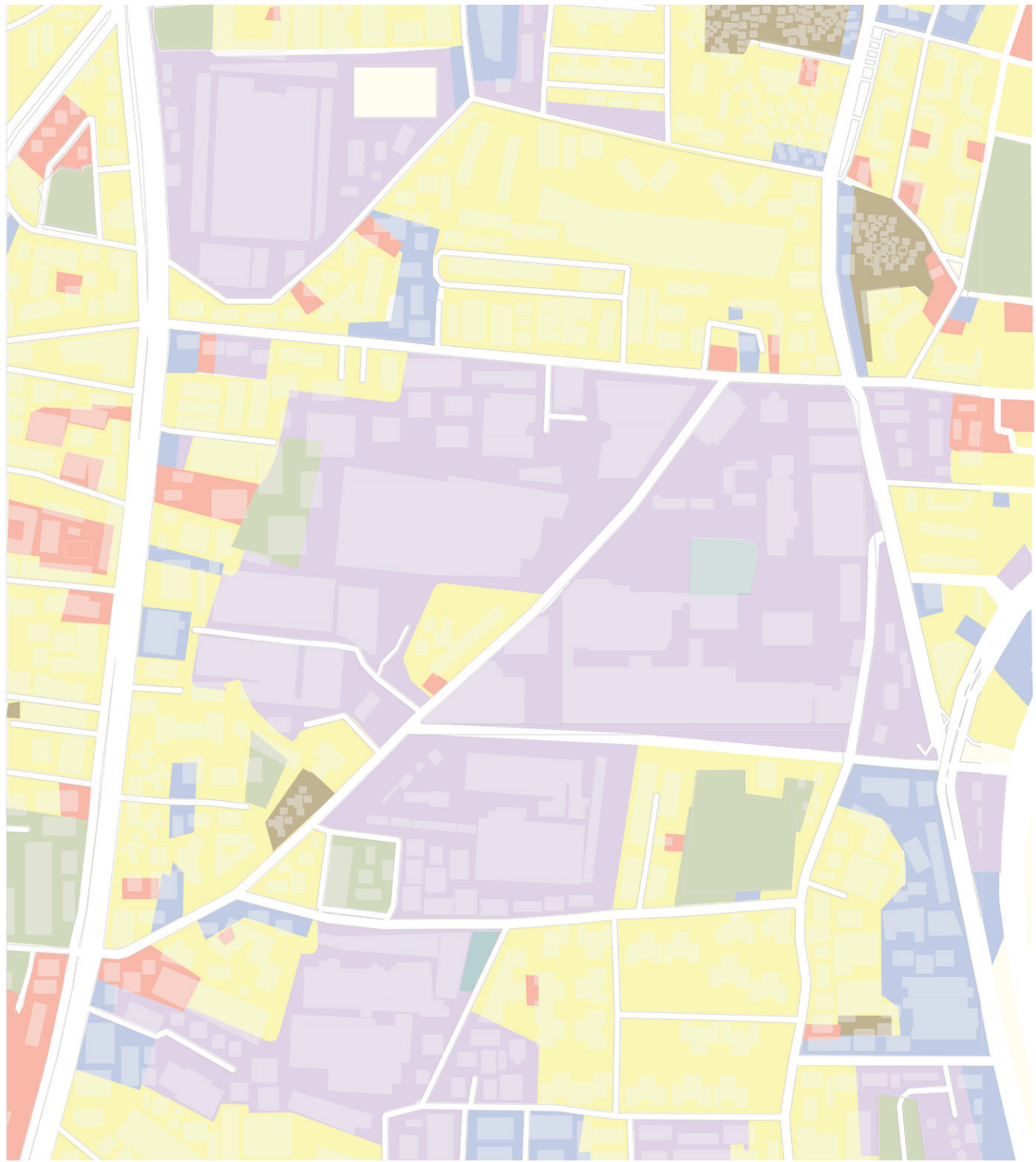
LEGEND

☐ Residential   ☐ Commercial   ☐ Industrial

☐ Water   ☐ Open spaces   ☐ Social amenities   ☐ Slum/Cluster

0   100m   300m

7.5 PERMEABILITY

The Lalbagh area mainly has around equal distribution of paved surfaces which are impermeable and unpaved surfaces which are permeable. Patches of green and vacant spaces are found in the site as well.
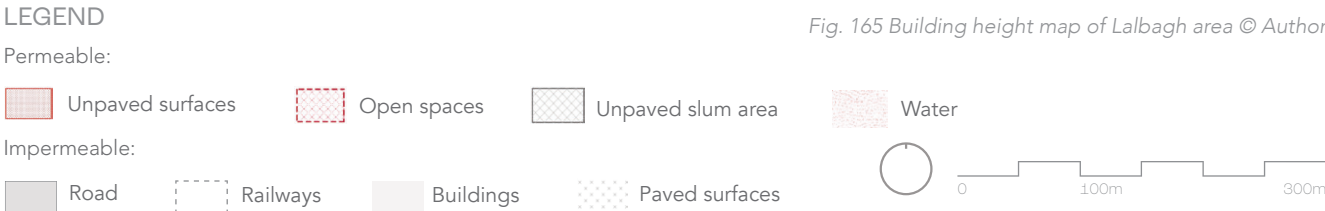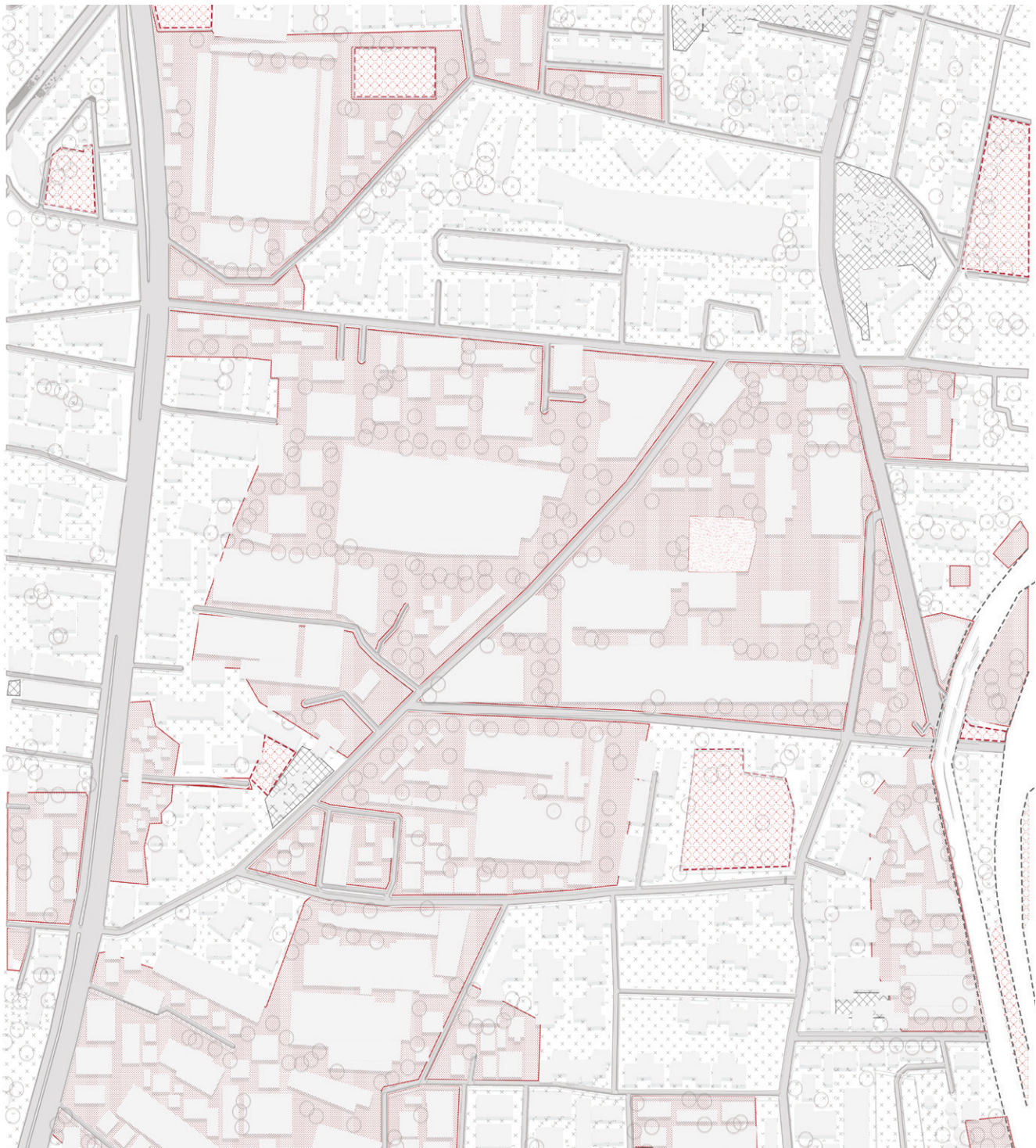
Fig. 165 Building height map of Lalbagh area © Author

LEGEND

Permeable:

- Unpaved surfaces
- Open spaces
- Unpaved slum area
- Water

Impermeable:

- Road
- Railways
- Buildings
- Paved surfaces

0   100m   300m

7.6 BUILDING HEIGHTS

The site area is covered with buildings of height 5-10m and 10-15m. Tallest buildings in the site has above 50m height.
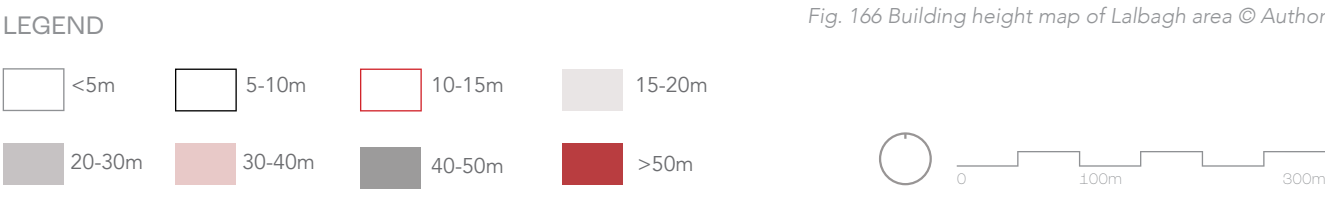
Fig. 166 Building height map of Lalbagh area © Author

LEGEND

- <5m
- 5-10m
- 10-15m
- 15-20m
- 20-30m
- 30-40m
- 40-50m
- >50m

0   100m   300m

Major roads and flyover is seen around the site. Bus stops are found around the site area which makes the site accessible.

Fig. 167 Transportation map of Lalbagh area © Author

LEGEND

- - - - Flyover   - - - - Primary road   - - - - Secondary road   + Bus stops

The bus routes connects different parts of the city with the site. The bus is one the most used means of transit by the local population. Thus its important to have a strong connection with the site.

BUS ROUTES

Relation Bus 44: Shrawan Yeshwante Chowk => Worli Depot

Relation Bus 50: Worli Depot => Ferry Wharf

Relation Bus 50: Ferry Wharf => Worli Depot

Relation Bus 52: Dharavi Depot => Dharavi Depot (Ring Depot)

Relation Bus 67: Antop Hill => Walkeshwar

Relation Bus 67: Walkeshwar => Antop Hill

Relation Bus C-10: Dharavi Depot => Back Bay Depot

Relation Bus 20LTD: Shivaji Nagar Depot => Shyama Prasad Mukherjee Chowk

Relation Bus 20LTD: Shyama Prasad Mukherjee Chowk => Shivaji Nagar Depot

Relation Bus C-10: Back Bay Depot => Dharavi Depot

Relation Bus 45: MMRDA Colony Mahul => Mantralaya

Relation Bus 45: Mantralaya => MMRDA Colony Mahul

Relation Bus 46: Dharavi Depot => Ferry Wharf

Relation Bus 46: Ferry Wharf => Dharavi Depot

Relation Bus 49: MMRDA Colony Mahul => Maharana Pratap Chowk

Relation Bus 49: Maharana Pratap Chowk => MMRDA Colony Mahul

Relation Bus A-45: MMRDA Colony Mahul => Back Bay Depot

Relation Bus A-45: Back Bay Depot => MMRDA Colony Mahul

7.8 SERVICES

Major services are found along the two major roads in the site. Restaurants and religious buildings are found to be more in this area.
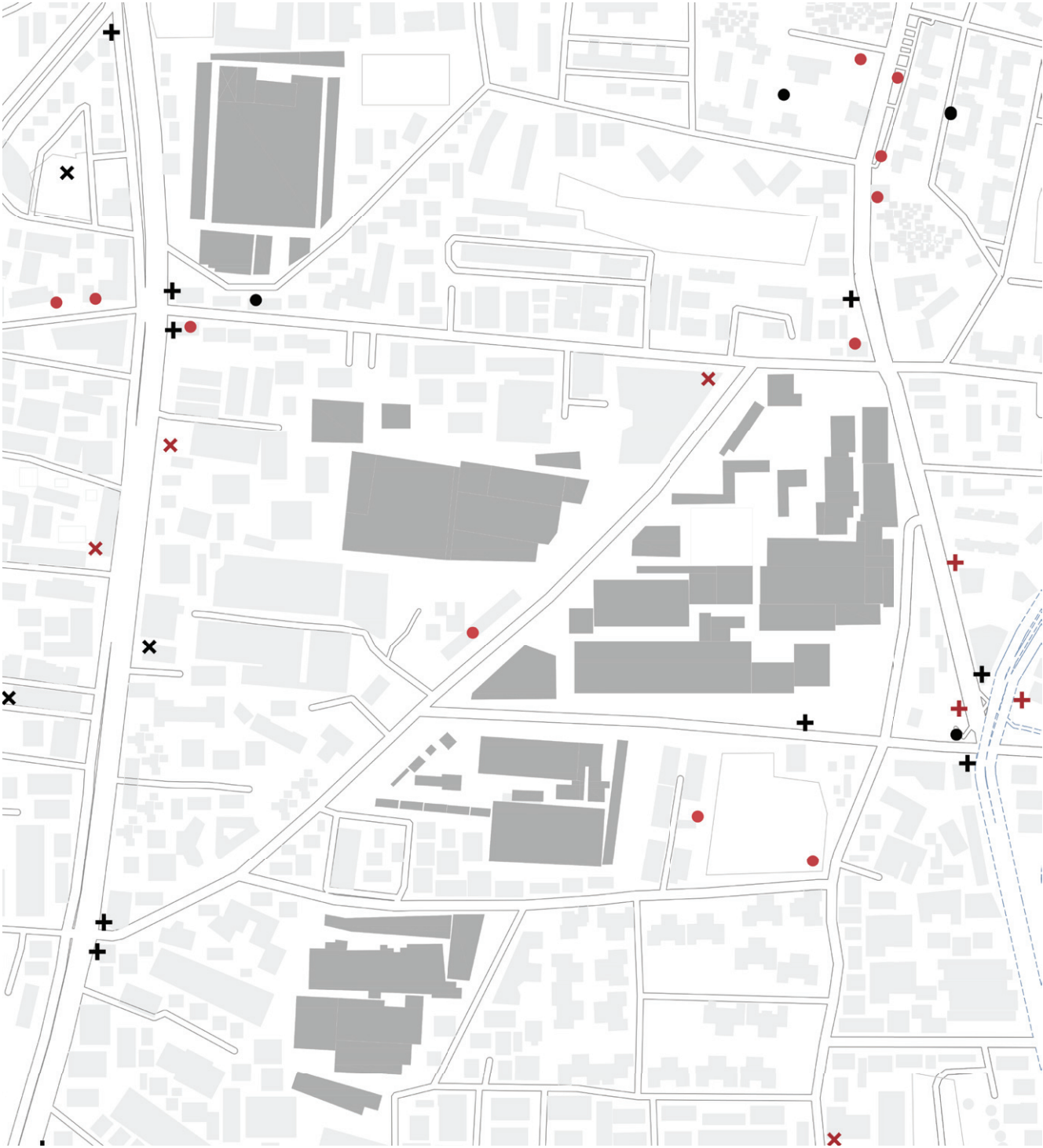
Fig. 168 Services map of Lalbagh area © Author

LEGEND

● Religious   ● Shopping   + Food   + Hotels   ✗ Recreation   ✗ Medical

7.9 CONSERVATION STATUS OF MILLS

In Lalbaugh, as per 1996 Charles Correa Report
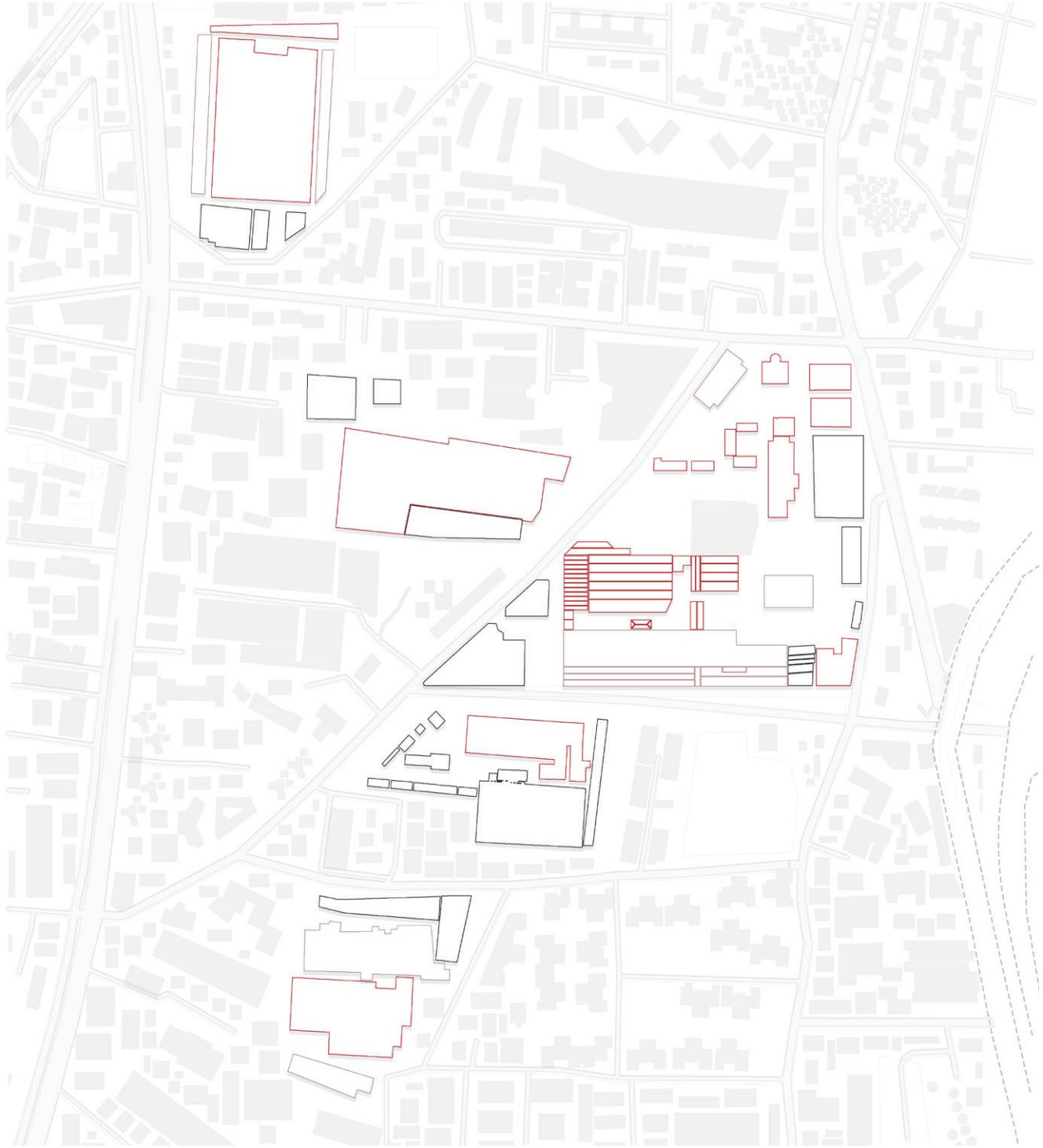
Fig. 169 Conservation status of the mills of Lalbagh area © Author

LEGEND

▢ To be retained   ▢ Could be retained   ▢ Could be demolished

2009

Fig. 170 Mill lands of Lalbagh area in the year 2009 © Author, Reference: Google earth

Most of the mill lands are intact. Roof has not collapsed. Surrounding area has some real estate development construction. High built density, presence of slums and lack of open spaces.

2014
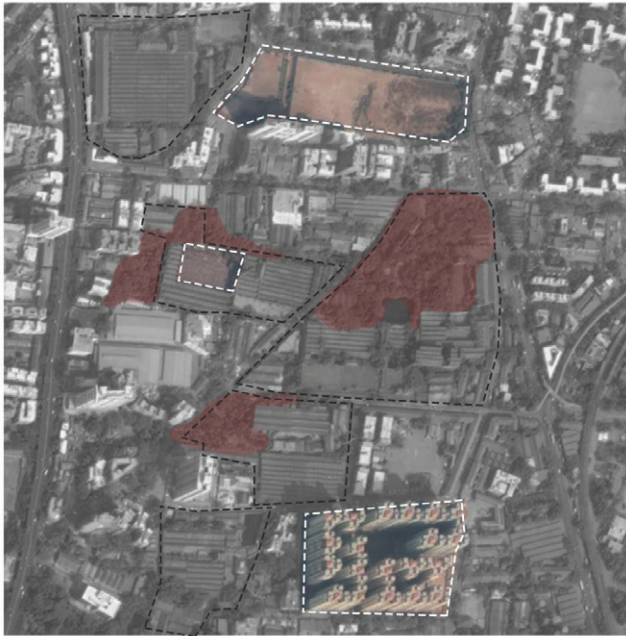
Fig. 171 Mill lands of Lalbagh area in the year 2014© Author, Reference: Google earth

Most of the mill lands are intact. Invasive vegetation increased. A plot in the surrounding is cleared for new comnstruction. One of the abandoned mills is converted to high rise apartment. Mill 4 has some roof loss.

2017

Fig. 172 Mill lands of Lalbagh area in the year 2017 © Author, Reference: Google earth

Top part of the site has been covered in vegetation. Loss of roof for structures on the north. New constructions in site surroundings, Mill no 4 roof has collapsed. Roof of site buildings show damage.

2020
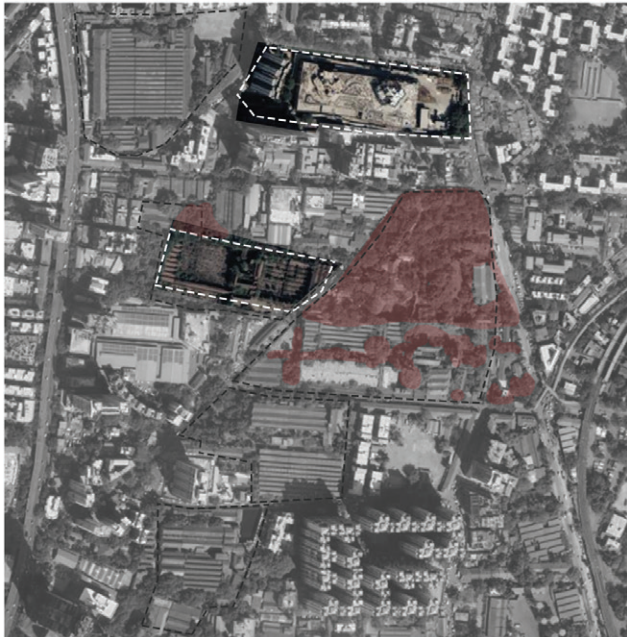
Fig. 173 Mill lands of Lalbagh area in the year 2020© Author, Reference: Google earth

Top part of the site has been covered in vegetation. New constructions in site surroundings, Mill no 4 roof has collapsed. Roof of site buildings show damage. Invasive vegetation throughout the site. Connection to mill 4 is demolished.

2021-22

Fig. 174 Mill lands of Lalbagh area in the year 2021-22 © Author, Reference: Google earth

Loss of roof for structures on the north. Roof of site buildings show damage. Damage of some buildings in the south. Eutrophication of pond.

2024
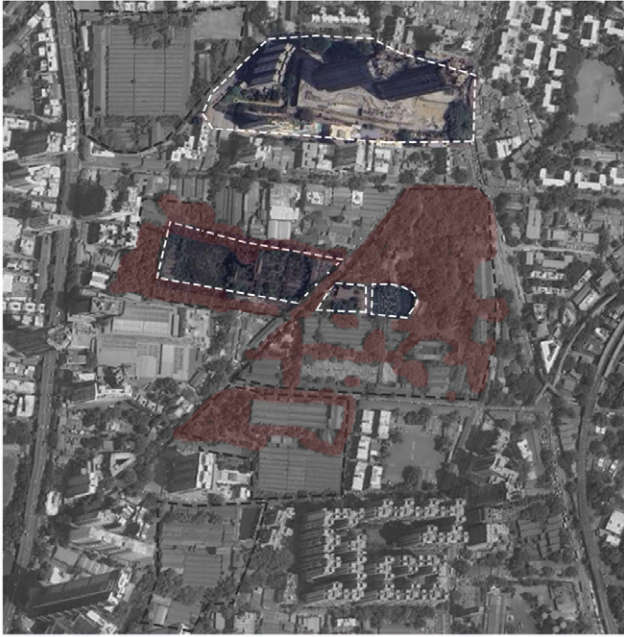
Fig. 175 Mill lands of Lalbagh area in the year 2024 © Author, Reference: Google earth

Signs of new construction, pond is cleared, some new construction, heavy damage and collapse of roof for most buildings. Mill 4 completely dilapidated.

0 m   250 m   500 m
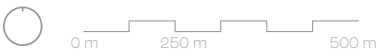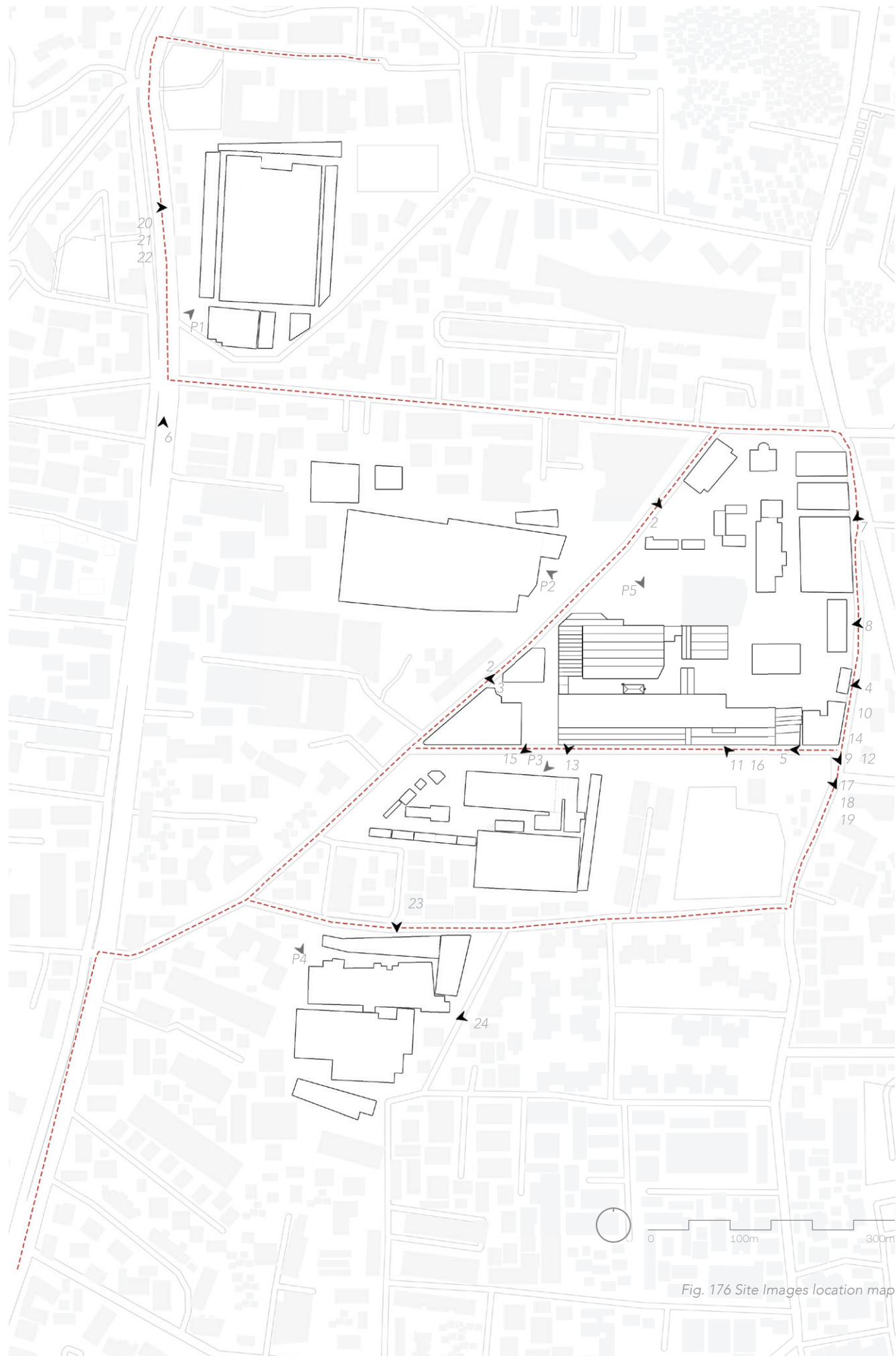
Fig. 176 Site Images location map

7.11 SITE PICTURES

Fig. 177 Site Context Imgaes

© P1-5: Google maps; 1,3- Google street view;2,4-12: Divyesh Parsana; 13-19- Dhaval Modi; 20: Jordi Castellsague; 21: pukarmumbai; 22: mobile geographies; 23: Deepak Dhuri; 24: Himadyuthi V Deshpande

7.12 PRESENT CONDITION OF LALBAGH AREA

Major road networks

Major developments

Slum clusters
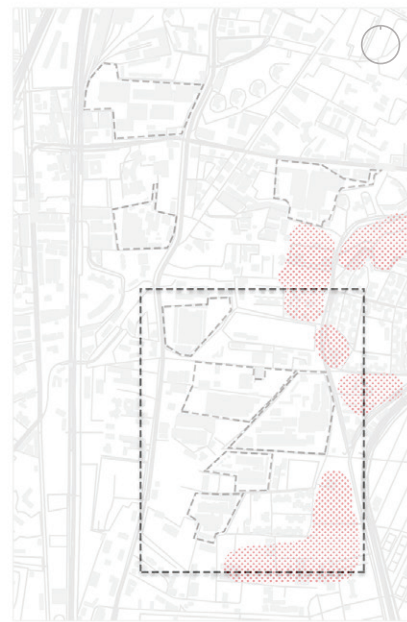
Fig. 178 Diagramatic representation of the current situation of the Lalbagh area © Author

The streets are found to be less active compared to the other streets of Mumbai. The major reason is the large number of abandoned mills in the surroundings. Tall compound walls[44], which are about 5 to 10ft tall are found in this area. This creates visual and physical block around the site area. Railways and flyovers are found around the site. Slum clusters are found mainly along the east part of the mill lands.

_____

44 Most mills have a tall wall running along the periphery of the site.

7.13 POSSIBLE SOLUTIONS

Better transportation

Transparency

Attracts residents

Pedestrian path around the site and better public transportation facilities.

Visual and physical transparency around the site.
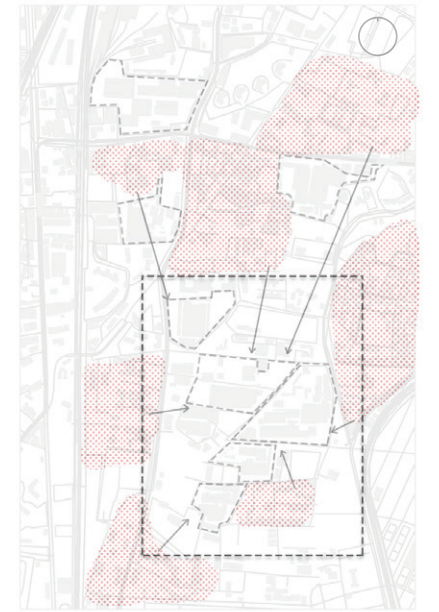
Functions that are useful and attracts the residents living nearby.

Fig. 179 Diagramatic representation of the possible solutions the Lalbagh area, regarding the transportation, transparency and future proposals © Author

Slum eradication

Open areas

Safe neighborhood

Slum eradication and affordable housing for the people.
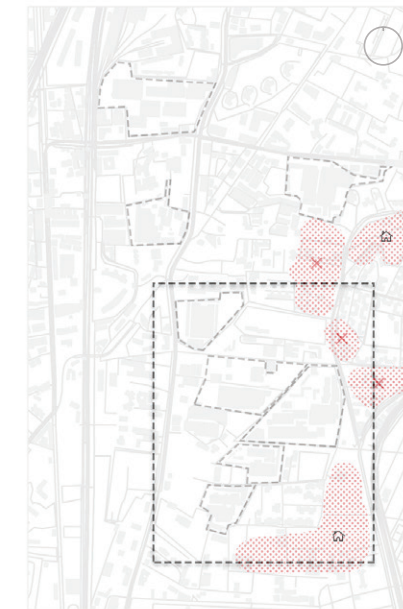
Improved open spaces and green areas.

Safe neighborhood with street lights.

Fig. 180 Diagramatic representation of the possible solutions the Lalbagh area, regarding the slum eradication, open areas and neighborhood safety © Author
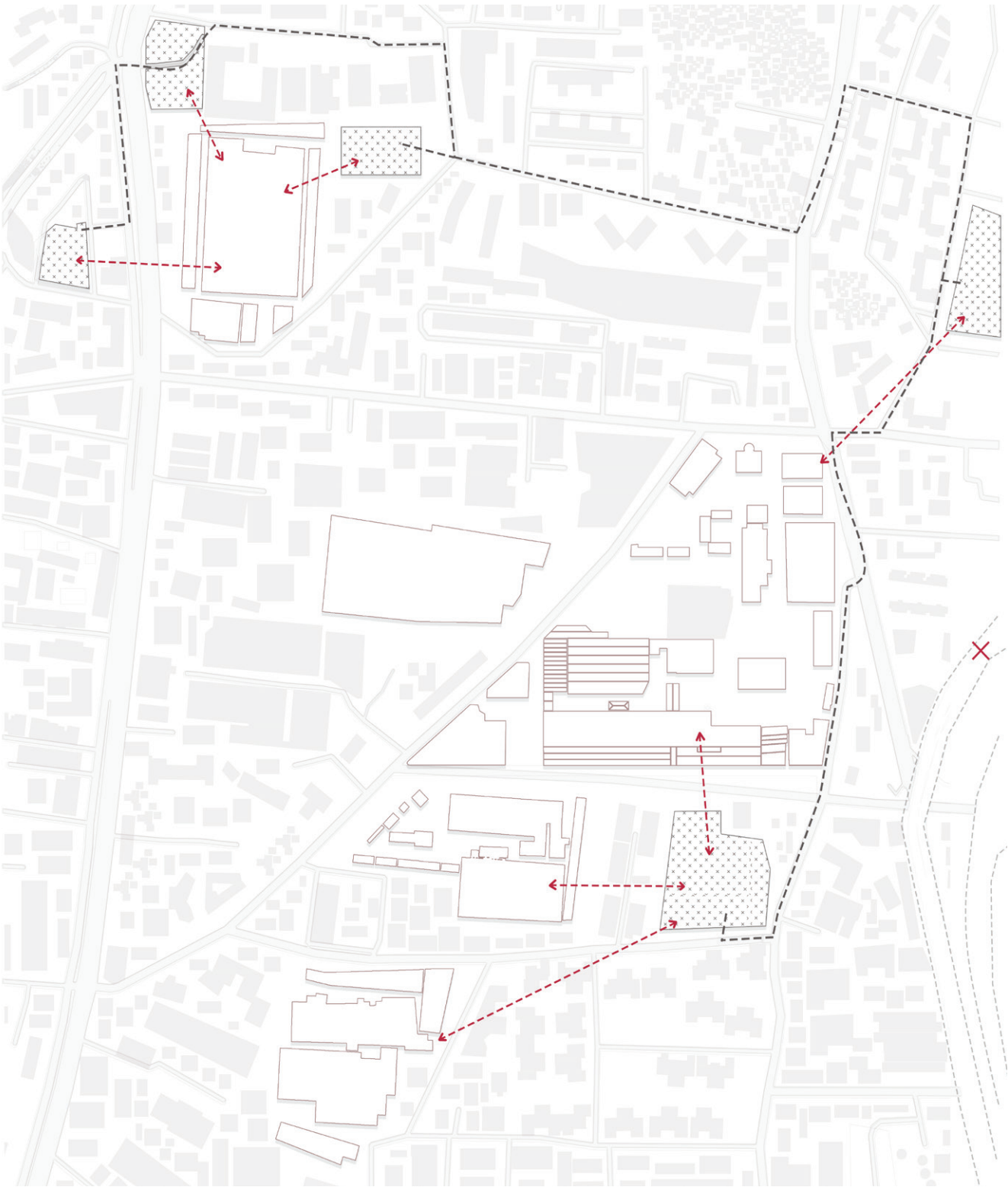
Fig. 181 Map showing the potential green spaces and its connectivity © Author

LEGEND

Green areas   ←--→ Links   ----- Green connection   ✕ Railway station
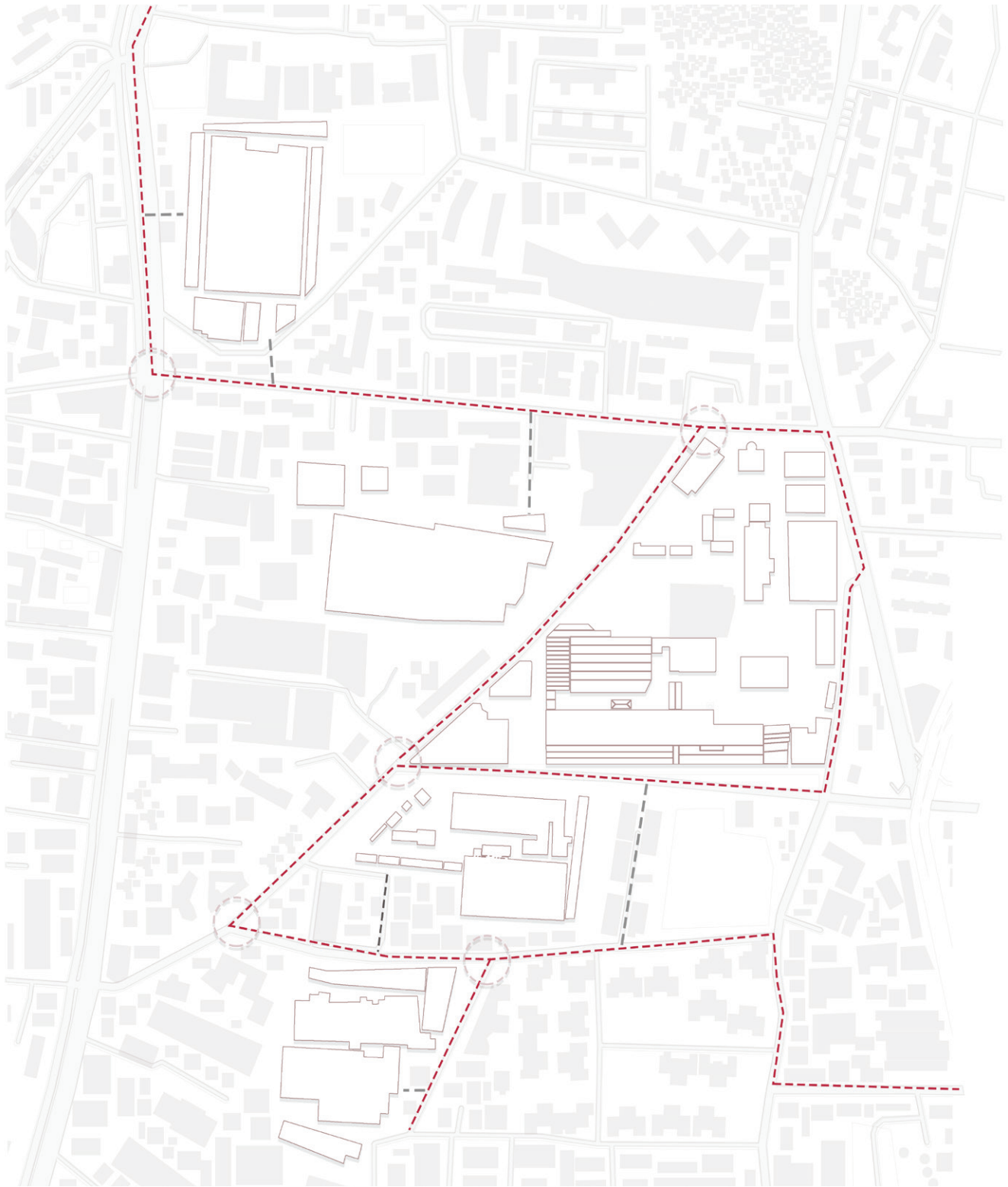
Fig. 182 Map showing the potential paths and links © Author

LEGEND

----- Path   ----- New connections   ◯ Nodes

7.16 PLOT RELATIONS
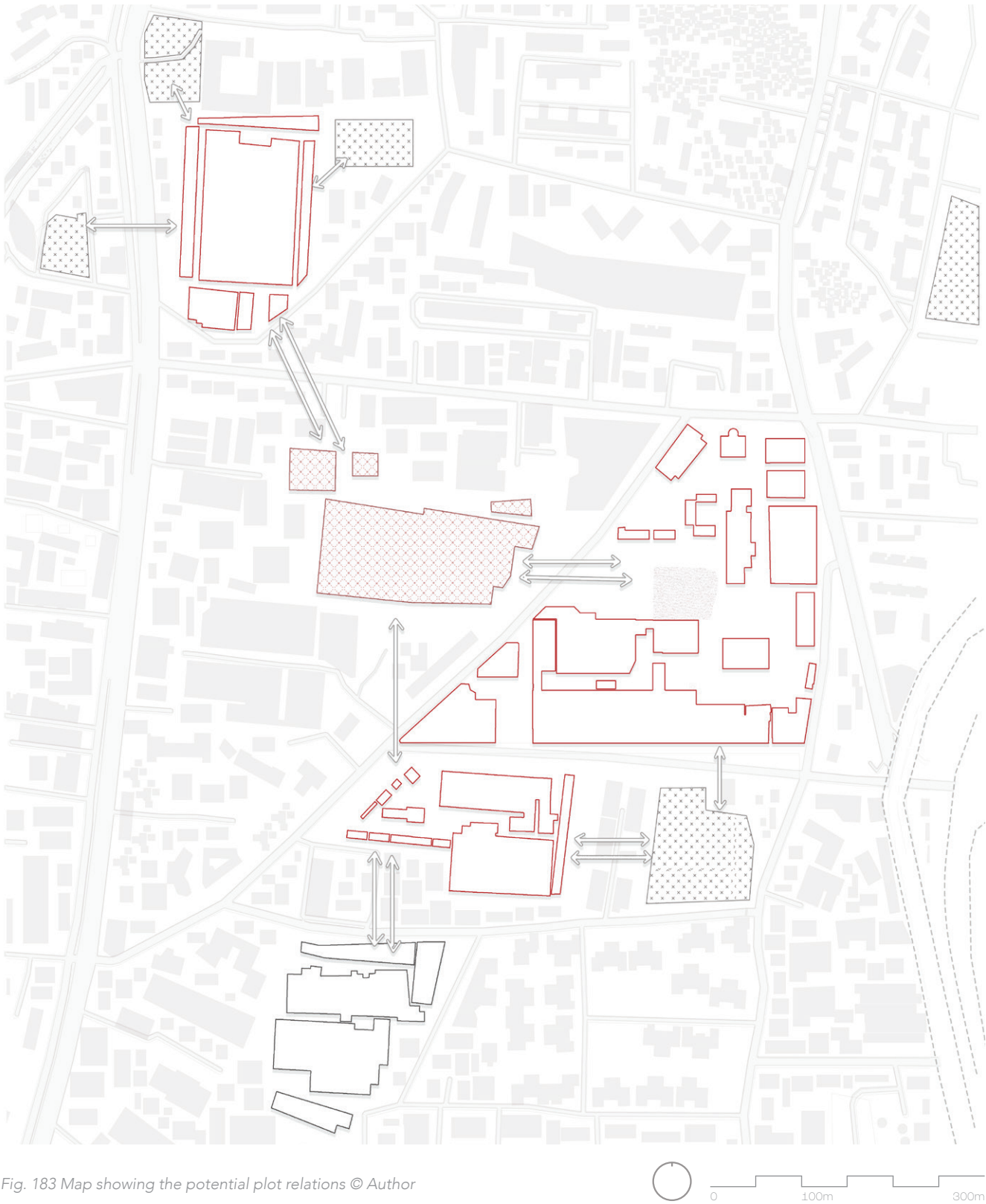
Fig. 183 Map showing the potential plot relations © Author

LEGEND

- Dilapidated mill
- Water
- Potential existing green spaces
- Mills to be redeveloped
- Functioning cotton mill

7.17 STAKEHOLDER ANALYSIS

Stake holders	Level	Type of actor	Resource	Goal/ Agenda	Interest & Power	Type of sta-keholder
	Local	Special interest	Cognitive	Availability of safe and clean residences, job opportunities	Low Power, High Interest	Primary stakeholder
	National	Special interest, Bureaucratic	Cognitive, Economic	Redevelopment of closed mills that would contribute to revenue generation	High Power, High Interest	Key stakeholder
	Local	Special interest	Cognitive	Safe neighborhood, open spaces for leisure activities	Low Power, High Interest	Primary stakeholder
	Local, Regional, National, International	Special interest	Cognitive, Economic	Raise in business opportunities, safety	High Power, Low Interest	Secondary stakeholder
	Local	Political	Cognitive, Legal	Domestic safety, satisfaction of residents' needs	High Power, High Interest	Key stakeholder
	Local	Bureaucratic, Political	Cognitive, Legal	Safety of area, reduction of slums, benefits of the residents	High Pow-er,HighInterEST	Key stakeholder
	Regional, National	Bureaucratic, Political	Cognitive, Legal	Safety of area, reduction of slums, reduction of environ-mental degradation	High Power, Low Interest	Secondary stakeholder
	Local, Regional, National, International	Special interest	Economic	Increase of financial gain	High Power, low Interest	Primary stakeholder
	Local, Regional, National, International	Expert	Cognitive	Creation of a well functioning area which would provide benefits to the stakeholders	High Power, High Interest	Key stakeholder
	Regional, National	Special interest	Cognitive	Better connectivity	Low Power, Low Interest	Secondary stakeholder

Tab 1. Stakeholder analysis of Girangaon © Author

7.18 STAKEHOLDER POWER MATRIX
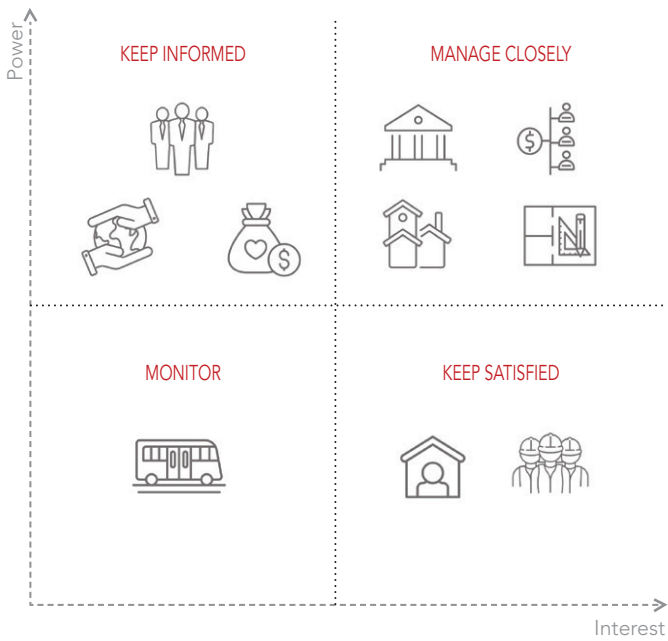
Fig 184.Stakeholder analysis matrix © Author

The powers of the stakeholders and how much the project proposal would be interested in their goals are analysed here. According to that, the actors who have high power and whose interests are prioratised the most are found to be in a segment where they needs to be managed closely. They are known to be the key stakeholders of the project as their interests are considered more and they as well have the power to alter the project proposals. After identifying the level of power and priority of each of the stakeholders, their inter relationships are identified. Here, strong relationships, weak or informal relationships between the actors are identified. Relationships which are marked by tension is also identified, which in this case is the relationship between the mill owners and the workers. Legal alliances like that of the NTC mill owners and the local Government is identified. Relationships where the stakeholder is dominant to the other is also picked out. Here, for example this type of relationship is found between the Local transportation authority and the Local Government.

7.19 STAKEHOLDERS INTER RELATIONSHIPS
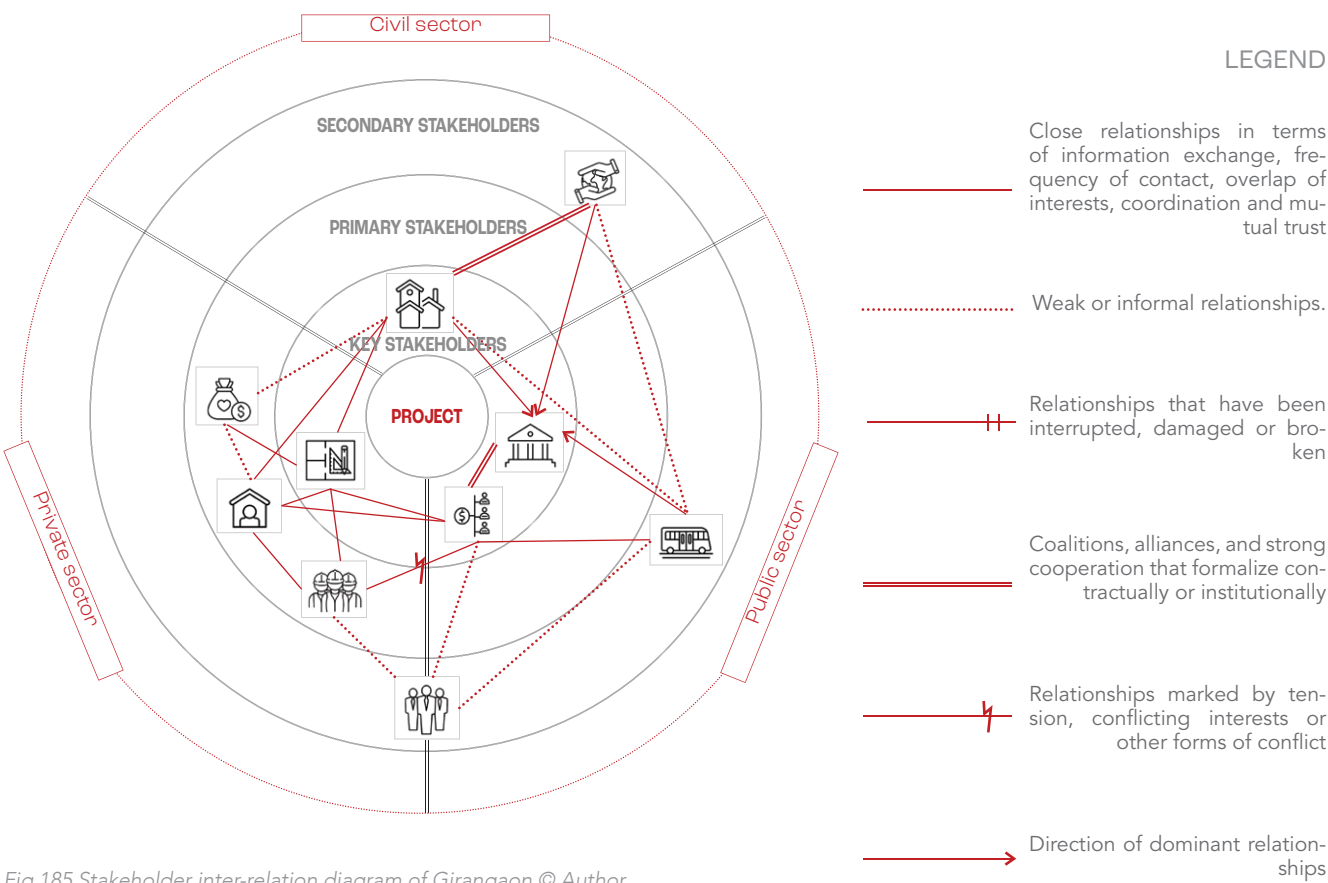
Fig 185.Stakeholder inter-relation diagram of Girangaon © Author

LEGEND

Close relationships in terms of information exchange, frequency of contact, overlap of interests, coordination and mutual trust

Weak or informal relationships.

Relationships that have been interrupted, damaged or broken

Coalitions, alliances, and strong cooperation that formalize contractually or institutionally

Relationships marked by tension, conflicting interests or other forms of conflict

Direction of dominant relationships

7.20 FEASIBILITY

The feasibility of the Lalbagh area is found using the Analytic Hierarchy Process[45]. This process aims to find what function could be allotted to each of the abandoned mills in the Lalbagh area. For this process, the main Goal, Criteria and alternatives are defined firstly.

Goal: Accurate function for each mill

Criteria: Interest of Stakeholders (Key stakeholders and Primary Stakeholders)

Alternatives: According to the surroundings of each mill

The identified **stakeholders** are:

1. Neighborhood committee (mostly interested in the benefits of the residents)/ Residents

2. Mill owners: NTC

3. Local Government

4. Mill workers

5. Private investors

The identified **alternatives** are:

1. Residential complex

2. Commercial building

3. Cultural spaces (Museum, theatre, etc.)

4. Educational institutions

5. Open space

Summary of land use proposal for mill sites of Lalbagh as deducted from Analytical hierarchy process:

Open space	0.03	0.03	0.64	0.03	0.55	0.0378
Commercial	0.39	0.39	0.15	0.03	0.18	0.4485
Cultural spaces	0.39	0.39	0.15	0.03	0.18	0.2374
Educational	0.09	0.06	0.03	0.05	0.03	0.2656
Residential	0.09	0.13	0.03	0.05	0.06	0.0105

25.20%
30.76%
30.76%
5.11%
8.16%
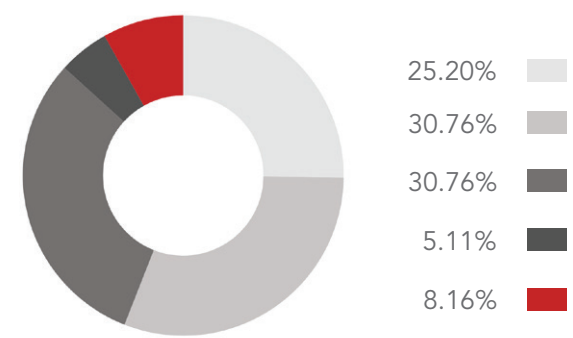
Fig. 186 Summary of land use proposal for mill sites of Lalbagh © Author

Note: The preference of each stakeholder towards each of the proposed functions for the mills is estimated in percentage. This is then compared with the percentage value which shows the power of each stakeholder. The comparison is done after converting the percentage value to decimal, using the matrix method . Microsoft Excel was used to develop and solve the matrix calculations in this Analytical Hierarchy Process.

_____
45 This step is done to understand the future direction the project would be moving. This process aims to find what function could be allotted to each of the abandoned mills without any development and the ones under development. As the first step, the project's goals, criteria, and alternatives are listed. Here, the Goal is to identify the most accurate function for each of the mills. The Criteria are identified according to the interests and benefits of the stakeholders that are identified to be the most important ones. (key stakeholders & primary stakeholders). The next step is to compare each of the stakeholders according to their power and the priority they have in the decision-making of the proposals for the mill redevelopment project. After the comparison, the percentage of importance of each of the stakeholders would be understood.

As the next step, the various proposals that could come up in the mill are identified and then they are compared with each other concerning the interests of the stakeholders, which would vary according to the location of each mill and the strengths, weaknesses, opportunities, and threats of its location.

7.21 STRUCTURE PLAN LALBAUGH

Each of the abandoned mills are assigned with new functions as part of the proposal. This is assigned based on the analysis of city's issues, needs and to restore functions into the mill in a modern context. Digvijay mill is converted to a food culture hub, India United Mill no. 4 is converted to a community space, India United mill no. 2 and 3 are converted to a textile museum, The New City mills of Mumbai is converted to a movie experience center and the functioning mill, India United mill no. 5 is used for live visit where people could observe and experience the process of textile making. The street network starts from the street connecting Digvijay mill to the main road and ends at the node which connects India United mill no.5 to the main road. All the mills are getting connected through this network.

The transformation of the mills includes its restoration, adaptive re-use or transformation as:

1. **Slum rehabitalisation:** Slum converted to vertical housing and community spaces.

2. **Food culture hub:** Mill as a curating space for Mumbai food culture with fine dining restaurant.

3. **Community space:** Mill converted as a community space with industrial ruins.

4. **Textile museum:** Mill converted as a textile museum with experience centers and commercial spaces.

5. **Movie experience center:** Mill converted as a Movie experience space with Bollywood screening, movie theatre, museum and gathering spaces.

6. **Functioning mill:** Live visit of currently functioning mill.
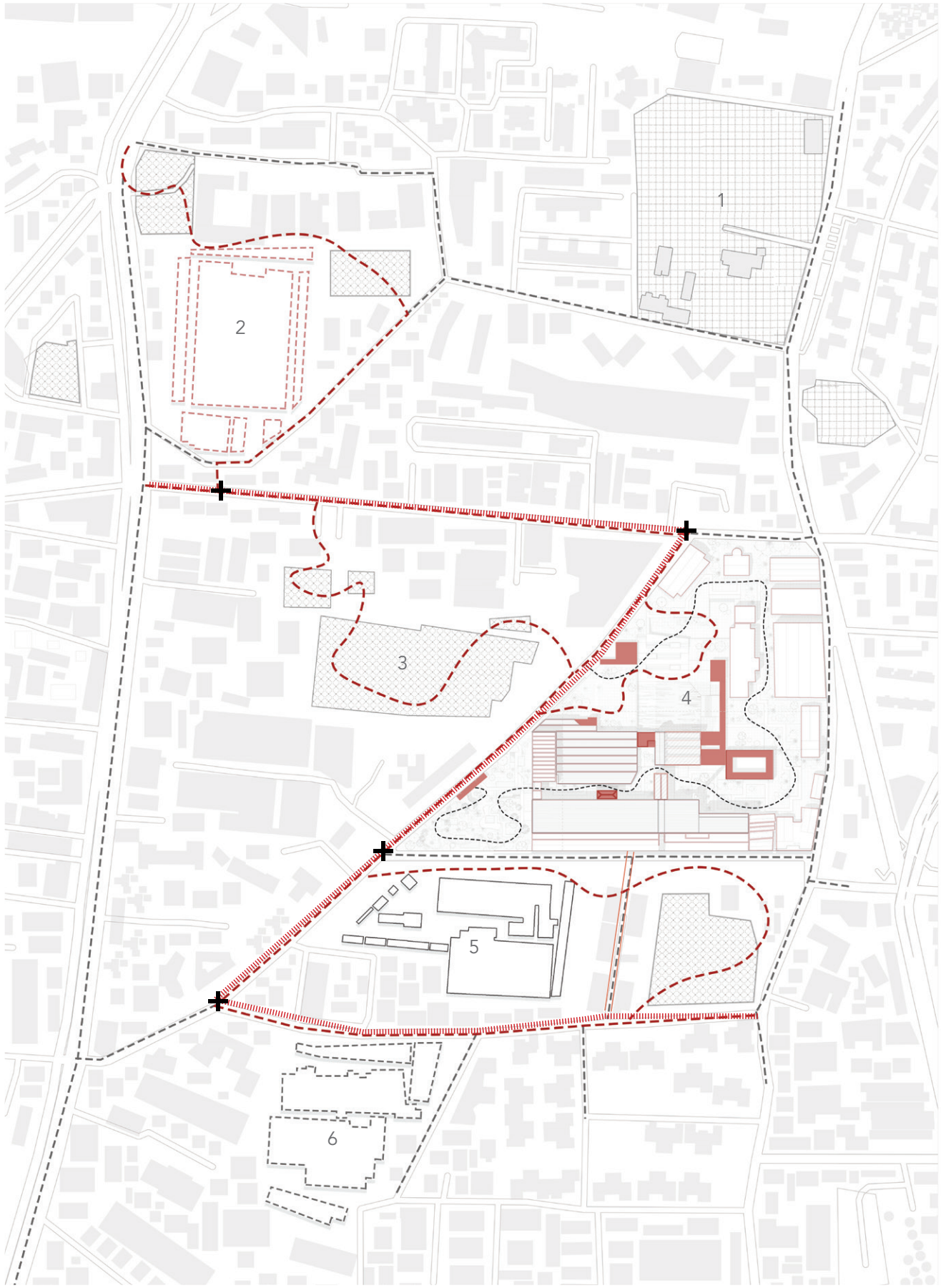
Fig. 187 Structure plan of Lalbaugh precinct © Author

0m   50m   150m

LEGEND

▦ Slum rehabitalisation	--- Major pedestrian route	✛ Nodes	- - - Mills connection
▨ Green spaces	═ Pedestrian path	⦚ Green corridor	pedestrian

Community space

Movie exp. center

Textile museum

Food culture hub

Functioning mill

Fig. 188 Jamsetji Nusserwanji Tata (1839-1904) © Tata Sons

Fig. 189 Elias David Sassoon (1820-1880) © Krishnan, 2018
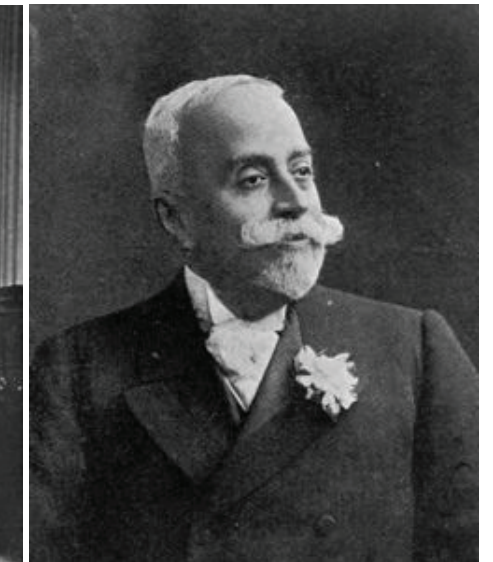
Fig. 190 Sir Jacob Sassoon (1844-1916) © Krishnan, 2018
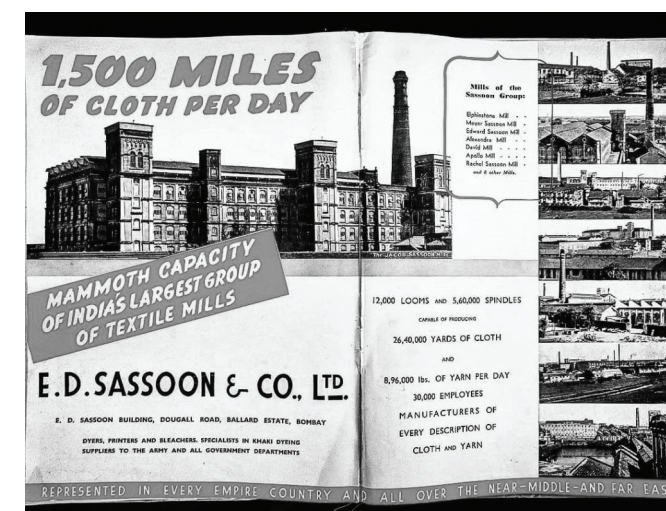
Fig. 191 Advertisement for E.D. Sassoon & Company, Indian Textile Journal, 1940 © Krishnan, 2018
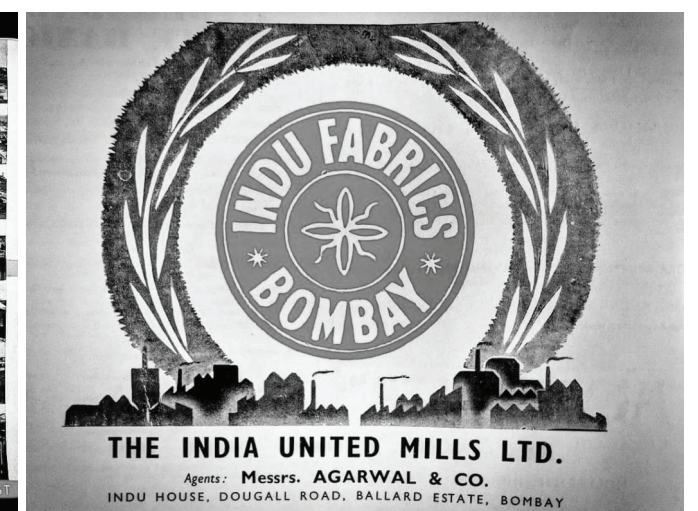
Fig. 192 Advertisement for Indu Fabrics and India United Mills, Indian Textile Journal, 1955© Krishnan, 2018

eight.

A fragment of the past

8.1 INDIA UNITED MILLS NO. 2 & 3

The history of the mill starts from over 150 years when the mill was known as "Chinchpoogly Oil Mills" where vegetable oil was pressed. In the year 1869, the mill was converted as "Alexandra Spinning & Weaving Mills"by Jamsetji Tata. In the year 1875, it was sold to Keshowji Naik and was renamed "Kaiser-i-Hind Mills". After four years, the mill was purchased by Elias David Sassoon and named "Alexandra and E.D. Sassoon Spinning and Weaving Mills."

In the early 1900s, the mill was expanded by Sir Jacob Sassoon, and became India's largest textile group. In the year 1974, the mill was nationalised by the Indian Government and by 2000s the operation of the mill was ceased. In the year 2009, the mill was transferred to the Municipal Corporation for development as a museum. The construction of the textile mill is still carrying on (Krishnan, 2018).

8.2 MILL FUNCTIONING PROCESS

The cotton fabric making process starts from the carding and blow loom department, from where the cotton is shifted to the spinning room. In this spinning process, the raw cotton is converted to thread. After spinning, the thread is shifted to the Semi loom and sizing department and the Heald and reed[46] departments. After these two steps, the finished cotton thread is shifted to the weaving shed, where the cotton thread is converted to cotton fabric (Harpe, 2024). This final fabric is then shifted to the warehouse, where the fabric gets folded. This folded finished fabric is then sold at wholesale. The mill also had a general store, where the finished goods were sold. Staff quarters and canteen are also found within the site. Within the mill area, two offices and four godowns for storing the cotton at various stages are there.

_____
46 A aprt of the cotton manufacturing process
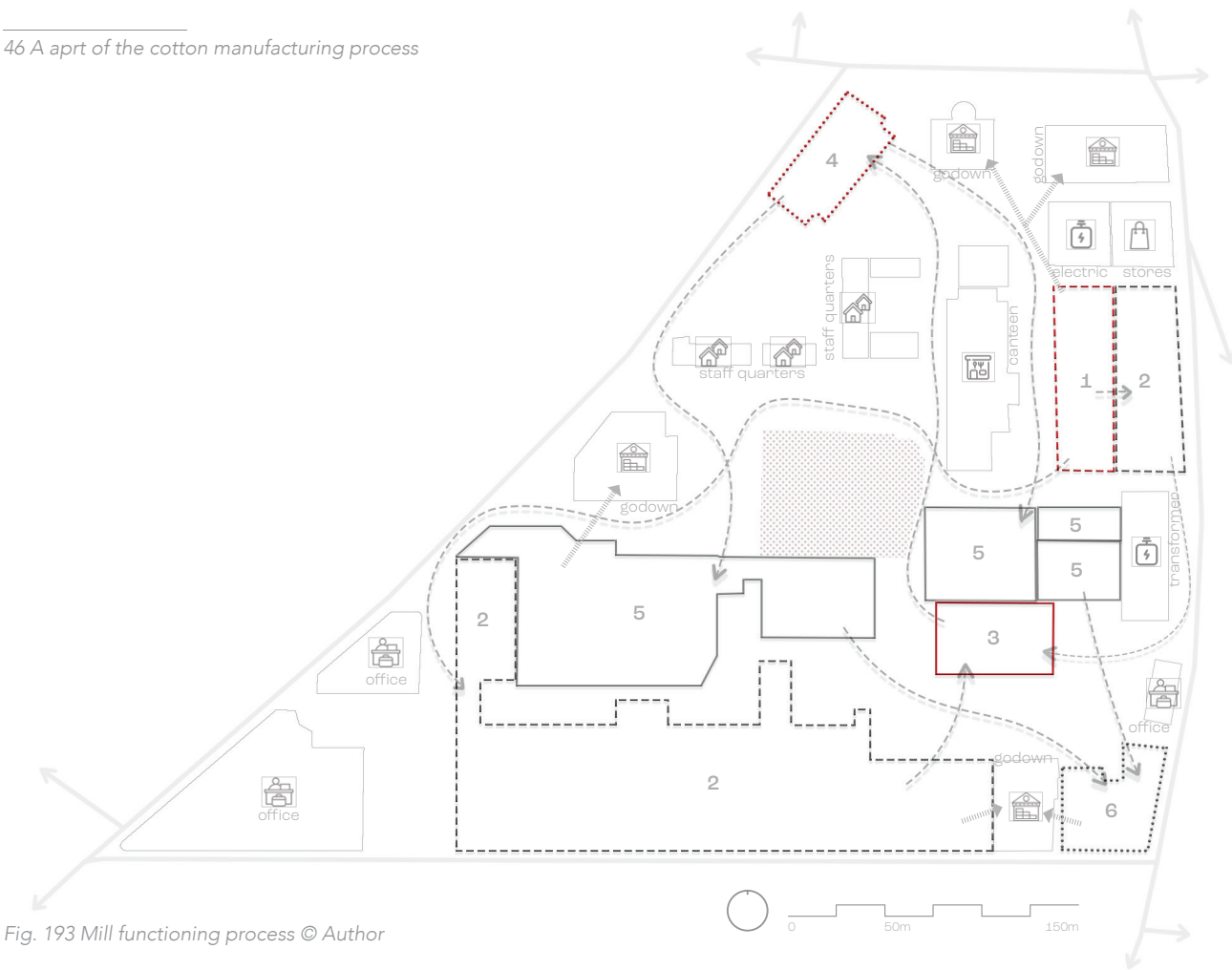
Fig. 193 Mill functioning process © Author

Fig. 194 Mill functioning process images © Author, Image source: need-leandquest.com, karenfinchtextiles.com, www.toyota-industries.com

LEGEND

1. Carding and blow loom

2. Ring and spinning

3. Semi auto loom & sizing dept.

4. Heald & Reed dept.

5. Weaving shed

6. Bailing dept. warehouse calendering and folding

as per (Karwa, 2024)
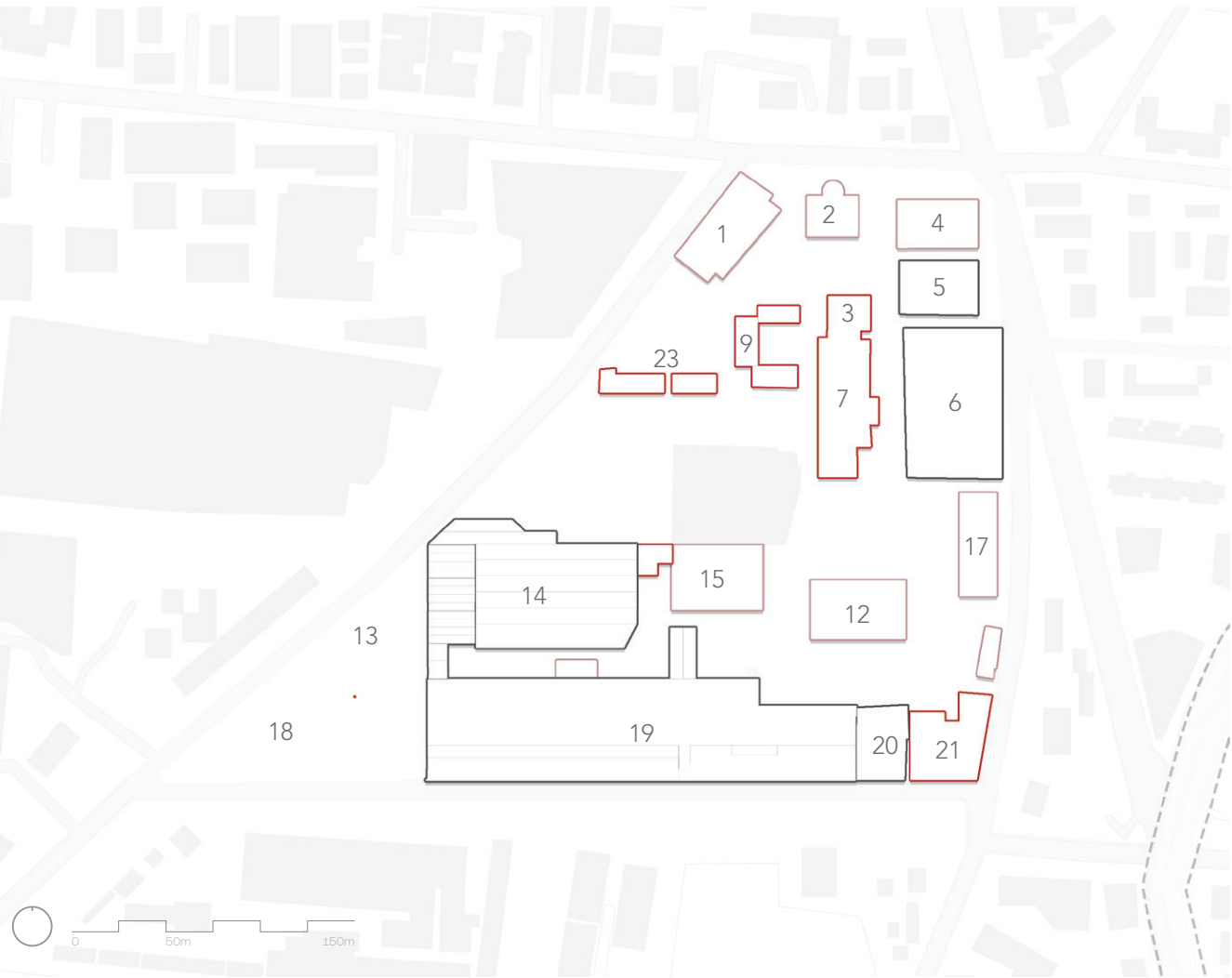
Fig. 195 Conservation status of India United mill no. 2,3 © Author, Reference: Karwa, 2024

☐ Structures that could be demolished   ☐ Could be retained   ☐ To be retained and re-used

Building Element	Material	Building Element	Material
Roof	Mangalore Tiles	Flooring	Cement Sheets + Tiling
Column	Steel Sections (C-Section)	Door	Wooden Frame
Beam	Steel Sections (I-Section)	Window	Wooden Frame
Wall	Brick Walls		

Tab. 2 Conservation status of India United mill no. 2,3 © Author, Reference: Karwa, 2024

Building no.	Function	Age	Structural Status	Building no.	Function	Age	Structural Status
1	Warehouse	75+	Poor	12	Weaving	100+	Moderate
2	Grain Godown	50+	Poor	13	Office	100+	Moderate
3	Electric & Switch Gear	75+	Poor	14	Ring & Spinning	100+	Moderate
4	Godown	75+	Moderate	15	Weaving Shed	100+	Moderate
5	General Stores	100+	Poor	16	Semi-Auto Loom & Sizing Dept.	75+	Moderate
6	Canteen	50+	Moderate	18	Time Keeper's Office	75+	Moderate
7	Carding & Blow Room	100+	Moderate	19	Office	50+	Moderate
8	Ring & Spinning	100+	Moderate	20	Spinning	75+	Moderate
9	Workshop Transformer	75+	Moderate	21	Godown	75+	Poor
10	Weaving	100+	Moderate	22	Waste Godown		Moderate
11	Weaving Shed	75+	Moderate	23	Function		Poor

Tab. 3 Conservation status of India United mill no. 2,3 © Author, Reference: Karwa, 2024

8.4 ROLE OF CIRCULAR ECONOMY IN TRANSFORMING INDUSTRIAL SITES

as per (Foster, 2020)

Reduce: Design for Disassembly; Material Optimization.

Reuse: Adaptive Reuse, material reuse

Recycle: Recycled Content, On-site Waste Management

Rethink: Planning and Design, Mixed-use Development, Walkable Infrastructure, Resource Efficiency, Local Sourcing.

Refurbish: Design for disassembly, use of sustainable and low-impact materials in transforming areas into creative workspaces, community centers, educational institutions, or even mixed-use developments.

Recover: Waste management, on-site resource recovery facilities, and partnerships to create a closed-loop system.

Repair: Health, well-being, society and culture.

End-of-Life: Deconstruction planning, design buildings with a clear plan for their eventual deconstruction and material reuse or recycling. This involves identifying valuable materials and ensuring their easy extraction at the end of their lifespan.

Material passports: Implementing a system of material passports that track the origin, composition, and history of materials used in buildings to facilitate informed decision-making regarding reuse and recycling at the end of their lifespan.

Circular businesses: Establishment of circular economy-focused businesses within the revitalized area. This could include repair cafes, upcycling workshops, businesses specializing in recycled or sustainable products, and waste management companies (Foster, 2020).

Stages of Circular economy in Industrial building adaptive reuse
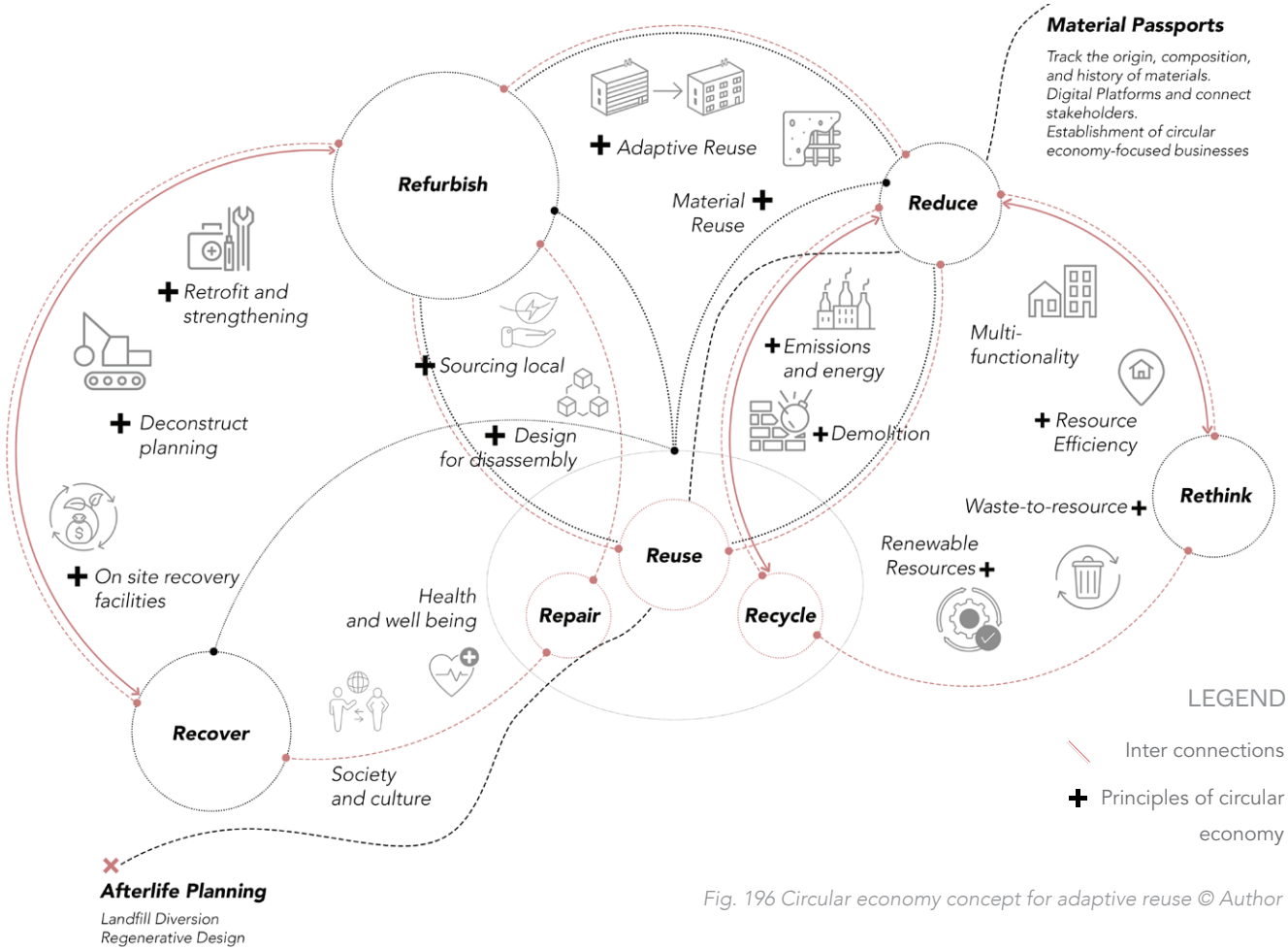
Fig. 196 Circular economy concept for adaptive reuse © Author

8.5 POSSIBLE APPLICATION OF CIRCULAR ECONOMY IN GIRANGAON
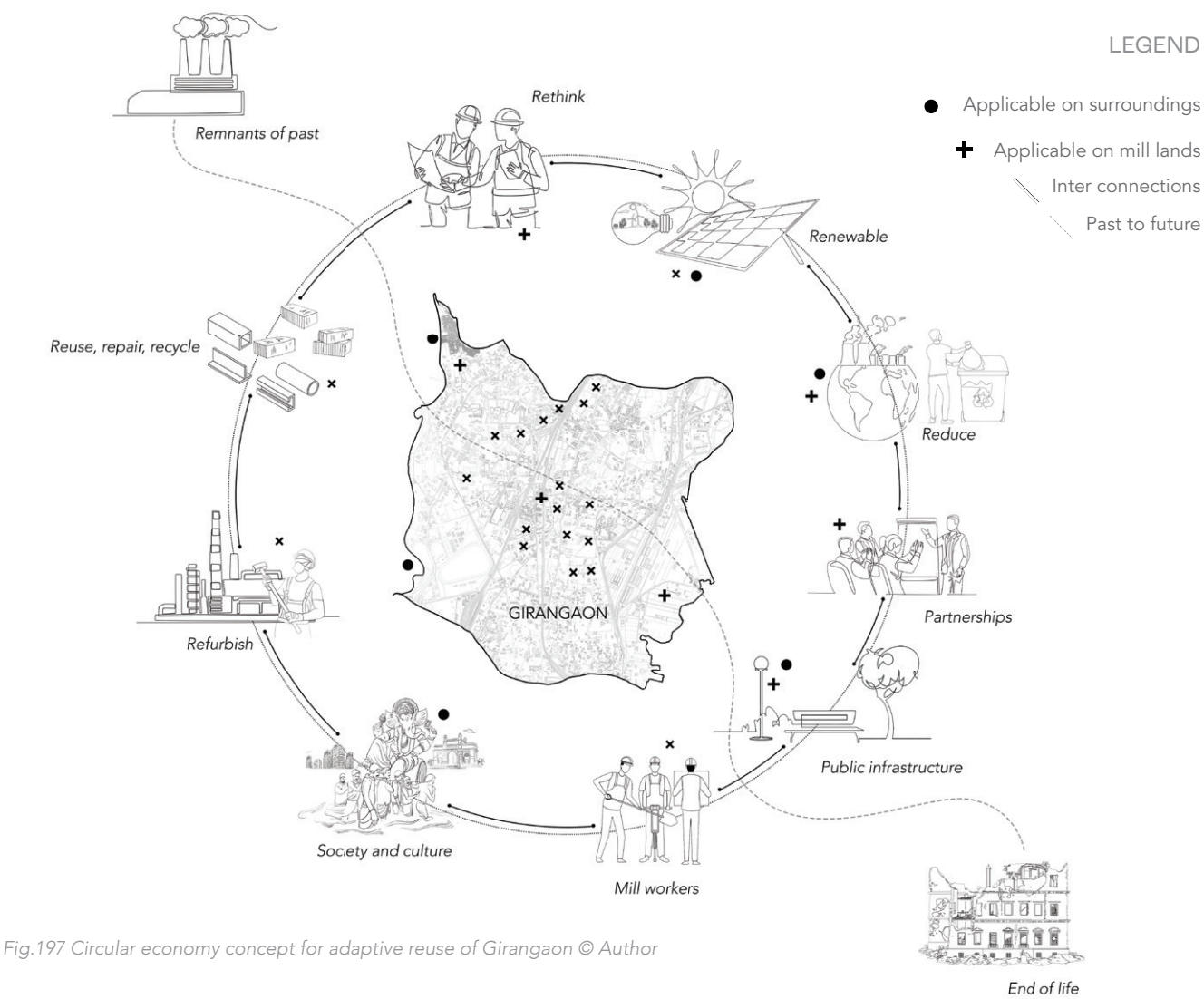
Fig.197 Circular economy concept for adaptive reuse of Girangaon © Author

Application and execution of the concept in Girangaon

Based on (Foster, 2020)

Heritage
Preserve, protect, revitalise, redevelop

Rethink
Effective strategies to revitalise mill lands

Reduce
Waste generation and emissions

Reuse
Material and adaptive reuse

Recycle
Existing materials and mills

Refurbish
Mill lands

Transform
Slums, unused spaces, encroached areas

Recover
Lost potentials, encroached areas

Repair
Health, well-being, society and culture.

End-of-Life
Deconstruction planning, designing buildings with a clear plan for their purpose and afterlife

8.6 SITE PICTURES

The documentation of the site to understand the state of conservation, dilapidations, damages and state of material as well as the buildings through photographs.

Fig. 198 Site Map
© Author
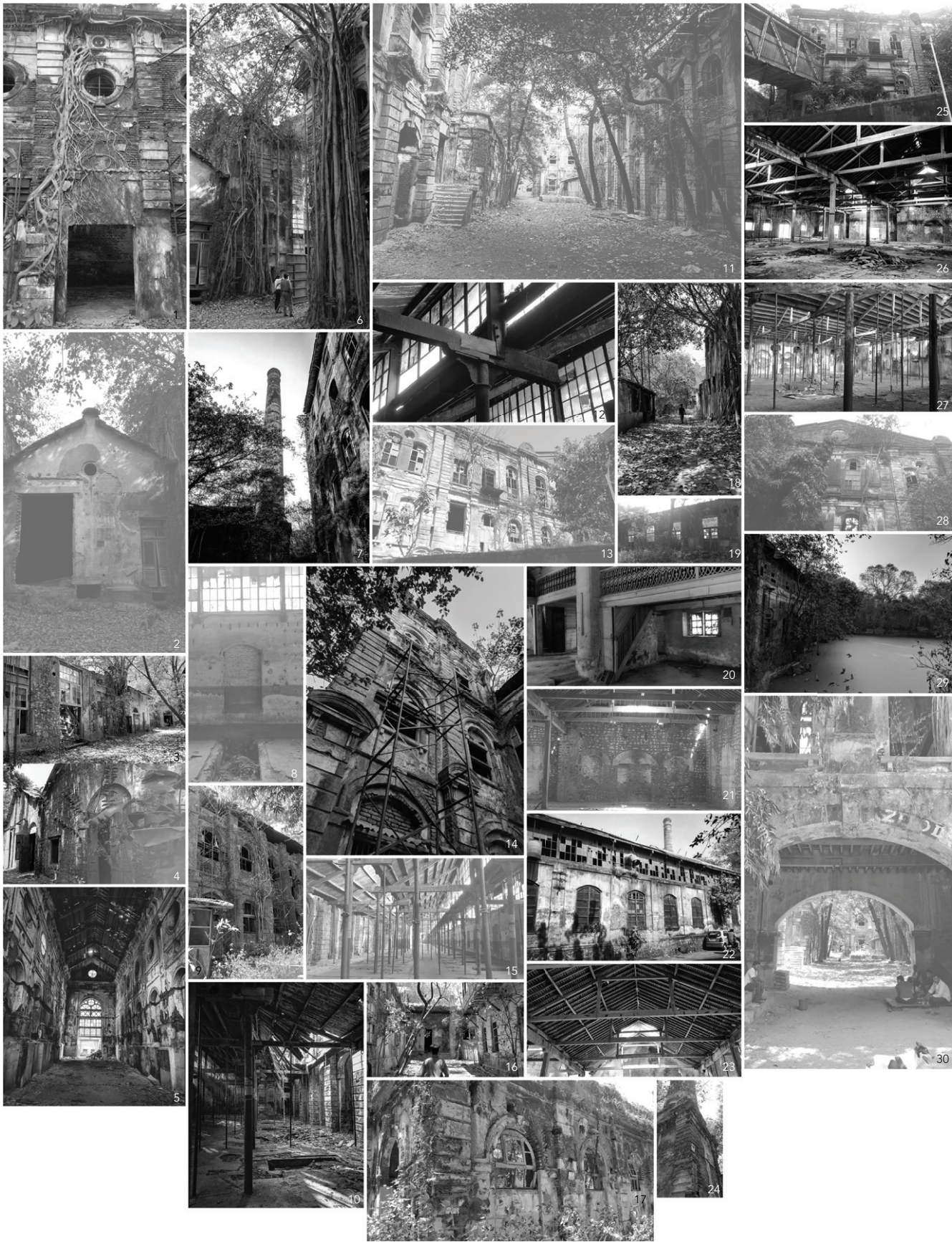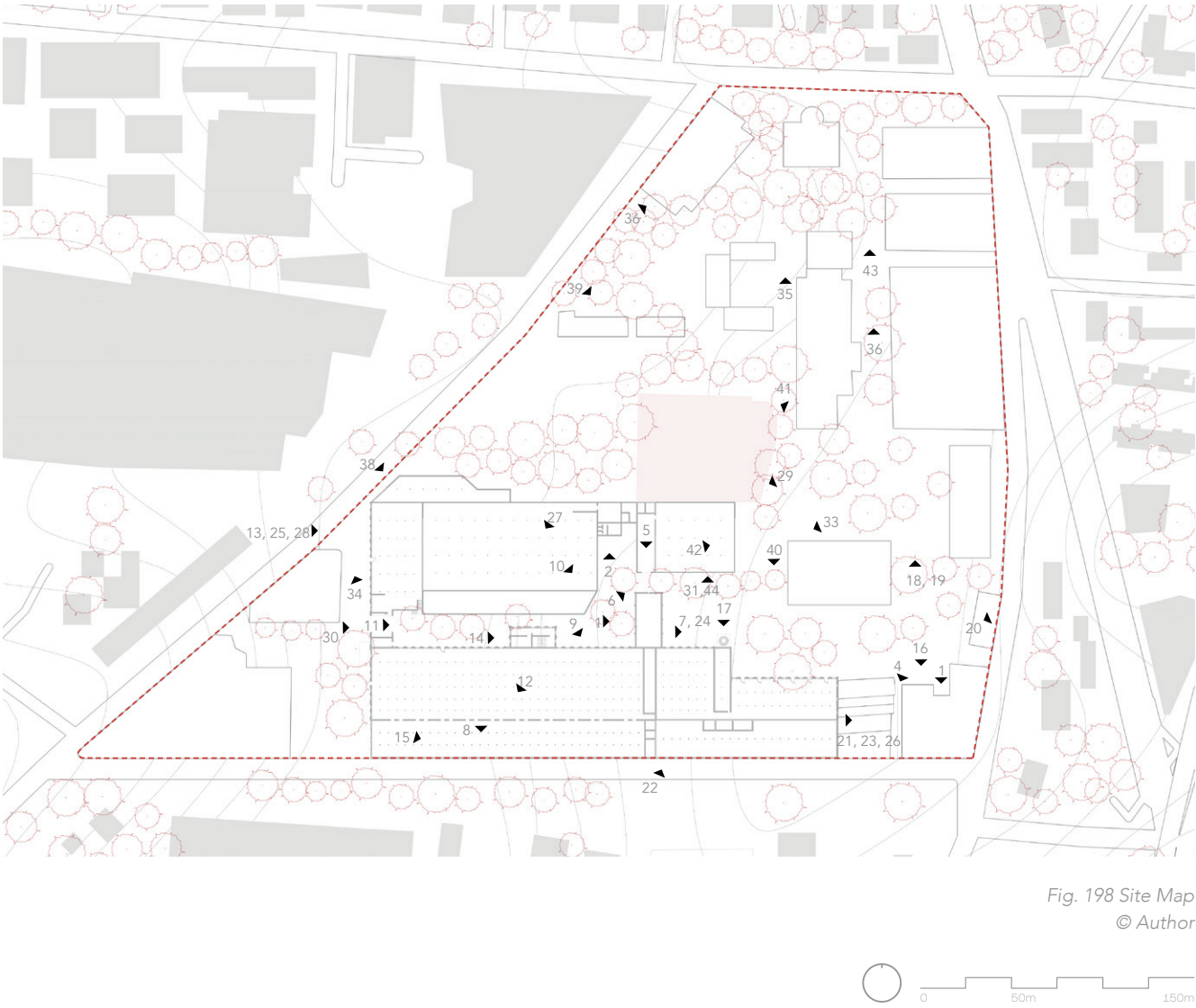
Fig. 199 Site Images
© Divyesh Parsana; Dhaval Modi; 5,7, 10, 11, 22, 26, 29- Shekhar Krishnan

Most of the buildings have some sort of damage and the materials have varying levels of decay in different buildings. Vegetation has taken over the entire area with invasive plants even affecting the stability of some buildings. The pond has undergone eutrophication.

Fig. 200 Site Images
© Dhaval Modi
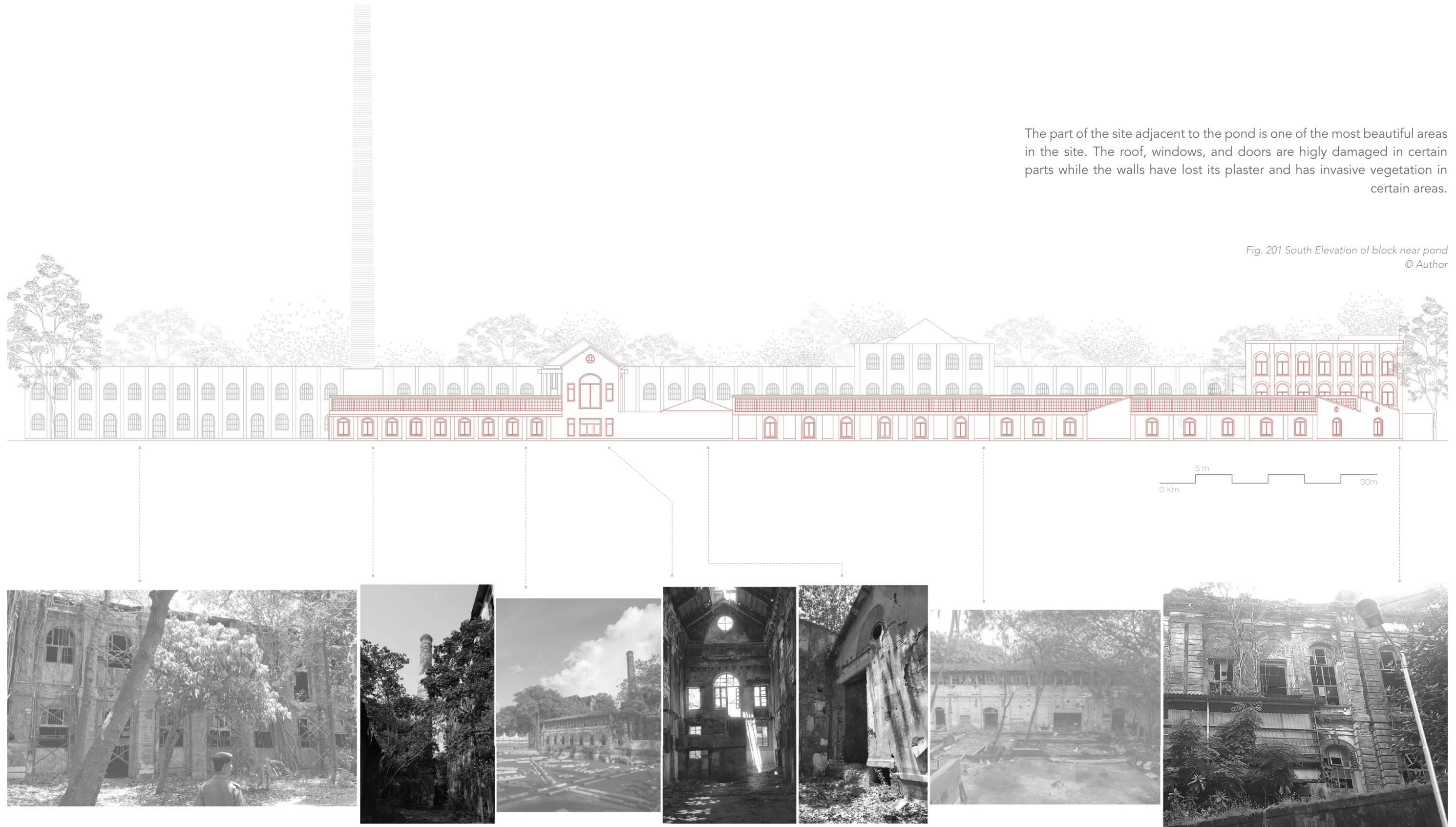
The part of the site adjacent to the pond is one of the most beautiful areas in the site. The roof, windows, and doors are higly damaged in certain parts while the walls have lost its plaster and has invasive vegetation in certain areas.

Fig. 201 South Elevation of block near pond
© Author

Fig. 202 Site Images when viewed from the side of the pond
© 1,4,5- Divyesh Parsana; 2,7- Dhaval Modi; 3,6-Hindustan Times

Fig. 203 North elevation of Buildings adjacent to pond
© Author

Fig. 204 Building Images
© Divyesh Parsana; Dhaval Modi

The facades have damages and decay due to time wheres the roof has collapsed in most of the areas. The opening have damges in the glass or the frame and the plaster has been stripped off in the walls. There is also an active growth of invasive vegetation.

Fig. 205 South Elevation of block adjacent to southern road
© Author

Fig. 206 Ruins of a building in the site © Dhaval Modi

Fig. 207 An old door © Dhaval Modi
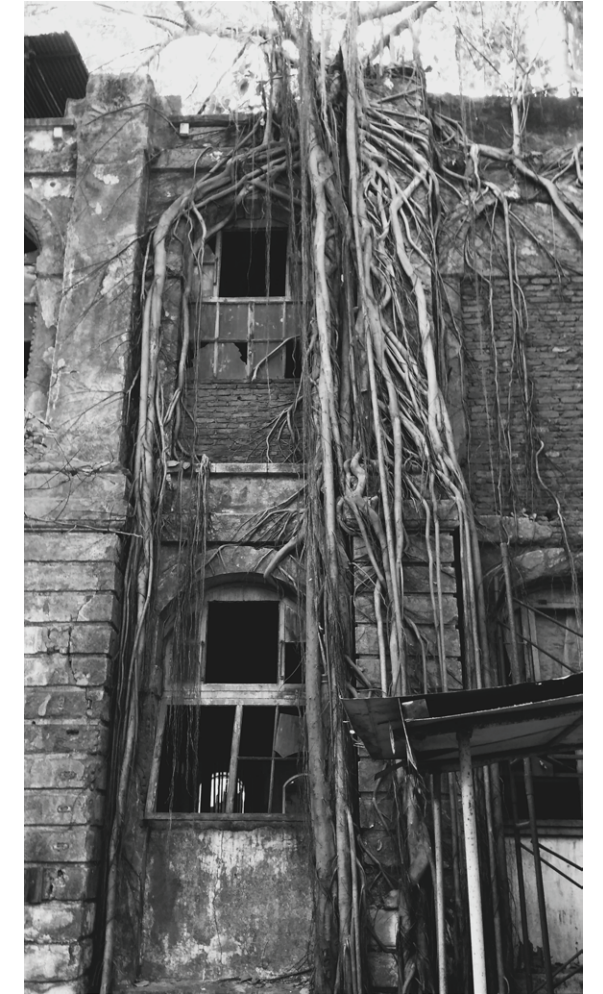
Fig. 208 Invasive vegetation © Dhaval Modi

nine.

Re-thinking realities

9.1 CASE STUDY 1: SESC POMPEIA

SESC São Paulo (Serviço Social do Comércio - Social Service of Commerce) is a non profit organisation that was established in 1946 with a view to create cultural and leisure spaces along with promoting education and social services so as to improve the quality of living in the city. The focus is to improve the well-being and quality of livelihood of the people working in commerce, services, and tourism sectors, and their families (SESC Sao Paolo 2024).

The SESC has a huge network with 43 centres under the, each offering a different experience. Their mission is to improve the cultural and social fabric of Sao Paolo by making cultural experiences accessible and affordable; create cultural landmarks out the adapted buildings and create community hubs for people from different walks of life.

Fig. 209 Location SESC cultural centres © Author, Reference: SESC and the city, ETH-Zurich and Universidade de São Paulo.

LEGEND

+ Major SESC centres in the locality

+ Other SESC centres in the locality

SESC AND ARCHITECTURE

The SESC has re-defined social living for over 78 years byb re-developing old industrial sites that have been abandoned in order to create streets, squares and other public infrastructural facilities along with promoting their food culture. Their centres were revamped by notable architects like Lina Bo Bardi (SESC Pompeia) and Mendes da Rocha (Sesc 24 de Maio). Their adaptation included creative re-use of the old industrial sites with an integration of nature while prioritising functionality and open spaces. The projects are notable for the inclusion of the urban fabric and for the idea of extending the space beyond four walls to create cultural centres, public amenities and infrastructure across the city.

Their interventions of these building are not individual projects but a network of inter-connected cultural and leisure spaces. They have carefully curated these spaces to make it accessible to diverse communities across Sao Paolo. These centres offer unique programmes like art, film, theater, sports, education and social activities. These centres are accessible to all residents fostering a sense of community by becoming a hub for social interaction, learning and cultural interactions. The SESC Pompeia centre is one of the notable projects for its presence as a n urban landmark and vcatalyst for reviving the urban fabric (Avermaete et al., 2019).

CENTRE 1: SESC POMPEIA

Timeline

1900	1950		2000	Present

1911
The Metal barrel factory for engine parts

1970'S
The Matarazzo Factory ceases to function

1977-1982
SESC acquires the factory, renovation takes place and re-opens in 1982

A vibrant cultural hub

2024
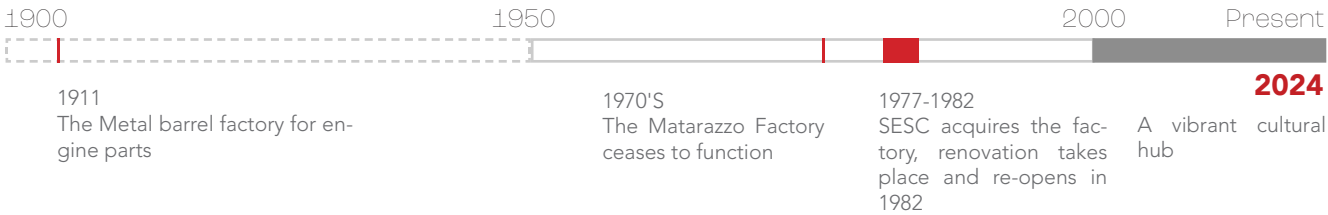
HISTORY AND DESIGN

SESC Pompeia, designed by Lina Bo Bardi and inaugurated in 1982 serves as a cultural centre ofeereing various programmes and activities like art exhibitions, theatre, film screenings, dance performances, educational workshops, sport facilities, gym and library. The building occupied by the cultural centre is a re-purposed industrial comples that used to manufacture engine parts. Bo Bardi's main philosophy was to foster social interaction and inclusion in the urban spere through an open floor plan, accessible spaces and integration of nature (Arquitectura Viva, 2022).

ADAPTIVE RE-USE AND SOCIAL SIGNIFICANCE

The re-purposing of the industrial site is also an approach to preserve Sao Paolo's industrial past through sustainable construction. The adaptation retained the industrial elements like exposed brick walls, concrete beams and trusses which were juxtaposed with open areas, gardens and natural light in order to blur the boundaries between the interior and exterior. The large open plazas, courtyards and rooftop terraces become gathering zones for the community which fosters a sense of belonging (Veikos et al., 2014).
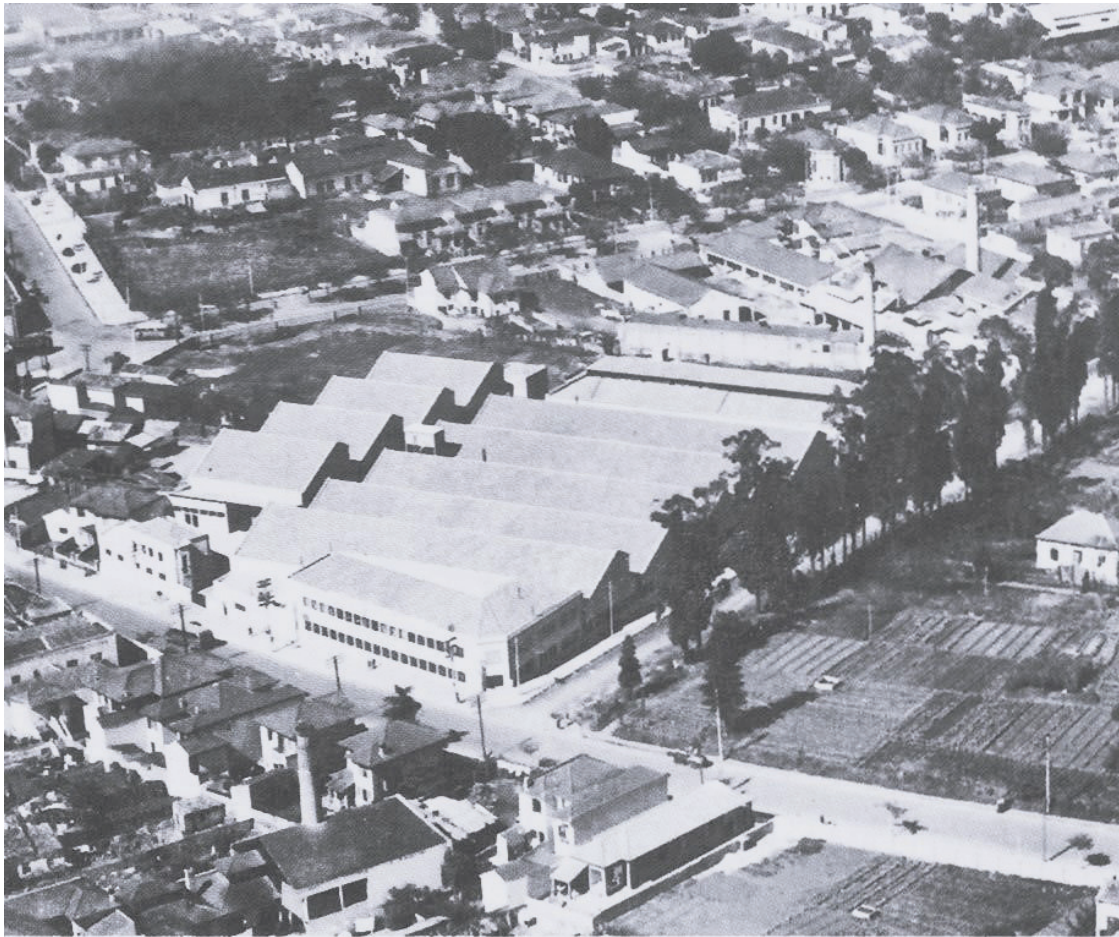
Fig. 210 View of the factory in the forties © Carvalho Ferraz (1994)

Fig. 211 Re-developed Factory into SESC Pompeia © arquitecturaviva.com, Photograpgers: Leonardo Finotti Nelson Kon Markus Lanz / Pk. Odessa Co.

THE SPACES AND FUNCTIONS

Old warehouse ●

Art Galleries
Exhibition Halls
Libraries
Workshops
Recreational Areas

New addition ●

Sports Facilities
Auditorium
Changing Rooms
Workshops
Solarium

4°

2°

térreo

10   40
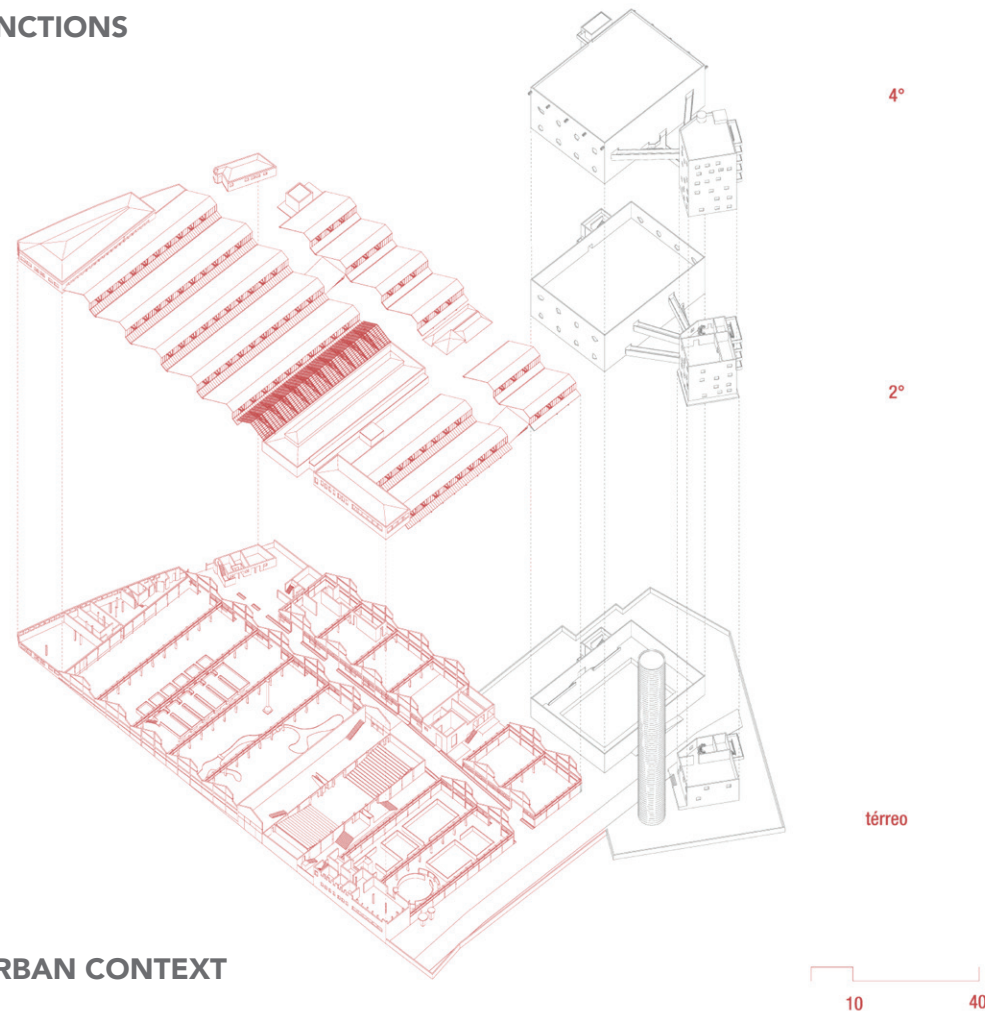
THE SITE AND THE URBAN CONTEXT
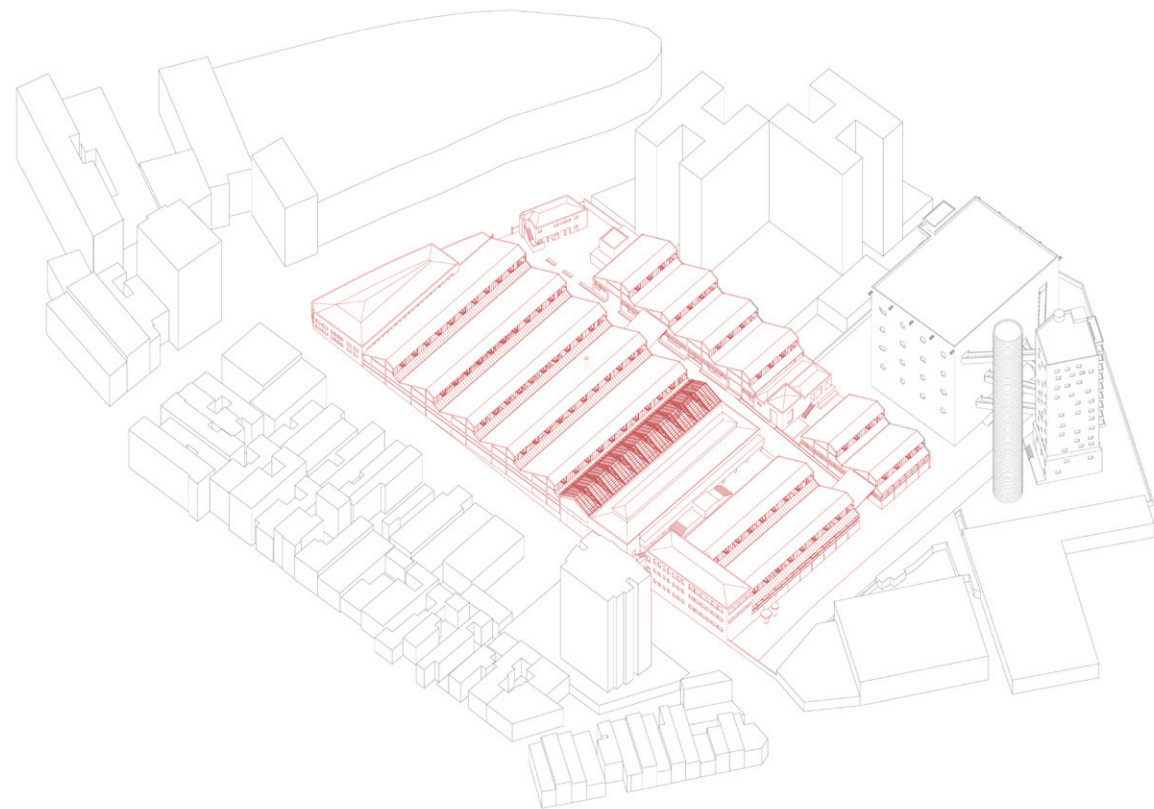
*Fig. 212 The urban context and spaces of the SESC centre © Avermae-
te et al., 2019*

New addition as areas for physical
activity and social gathering.

Old warehouses converted into
cultural and intellectual spaces.
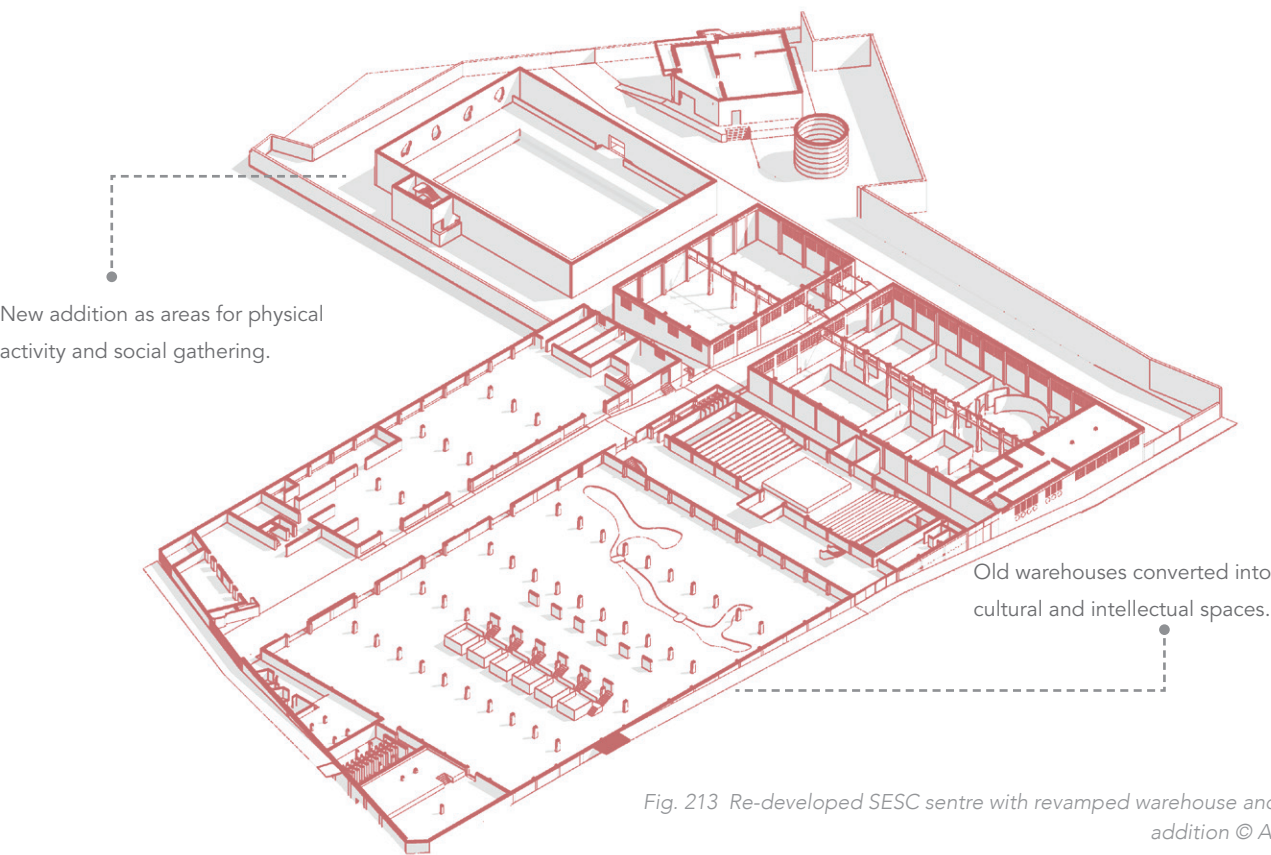
*Fig. 213 Re-developed SESC sentre with revamped warehouse and new
addition © Author*

SYMBOLICISM

Situated in the former working class district of Pompeia, the SESC building has a history that is closely tied to the old workers. The functions in the centre have been curated with the concept of inclusion of this same population so as provide them with facilities that may not be easily accessible to them. Courses, workshops, lectures, gyms as well as legal aid services and limited dental care are provided to these workers and their families (Ferraz, 2008).

The renovation transforms the area into a new space while also making sure to depict the hard labour and the stories of the old factory. The use of small round windows with a perforated frame is inspired by the building's industrial past and is carefully integrated into the building's architecture (Veikos et al., 2014).

Fig. 214 The bridge in the new addition © Leonardo Finotti Nelson Kon Markus Lanz / Pk. Odessa Co.

Fig. 215 Spanish Civil War Hole © Leonardo Finotti Nelson Kon Markus Lanz / Pk. Odessa Co.

Fig. 216 The interior of the cultural centre © Nayara Cespedes

Fig. 217 Revamped warehouse © Pedro Kok

Fig. 218 New addition by Lina Bo Bardi © Pedro Kok

DESIGN FEATURES

Old red brick warehouse: This part of the former factory was transformed into areas for reading, exhibitions and recreational activities while retaining the original brick walls and strutural elements to create the sense of transformation in time of history. The area also accomodates art galleries, libraries and workshops for the local public as well as travellers.

New Concrete Annex: This part is the new addition which includes two towers that are connected by diagonal walkways and it houses sports facilities, auditoriums, swimming pool and a solarium. The use of concrete stands in stark contrast to the old red brick building, offering a modern approach and a clear distinction betwwen old and new. Bothe the old and new structures are well connected through walkways and bridges, thus encouraging movement and interaction between the various spaces.

Construction materials: The old structure's red brick has been retained as a memoir to its industrial history. The modern addition on the other hand has extensively used glass and concrete to complement and contrast while adding aesthetics as well as transparency.

Sustainability considerations: The re-purposing itself reduces environmental impact that would have been otherwise brought about by new construction. The open layout and strategic placement of windows facilitate good lighting and ventilation. Moreover,The vegetation and courtyards regulate the temperature in the interiors (Veikos et al., 2014).

DESIGN FEATURES

The centre is a symbol hof how adaptive re-use of industrial areas within the urban realm can bring about a better environment and improved urban fabric. Moreover, its revival will ensure community engagement and interaction in a space that would have been otherwise rendered as a browfield. The cultural and social aspect of this revival futher improves the quality of livelihood of the citizens and that of the neighbourhood.
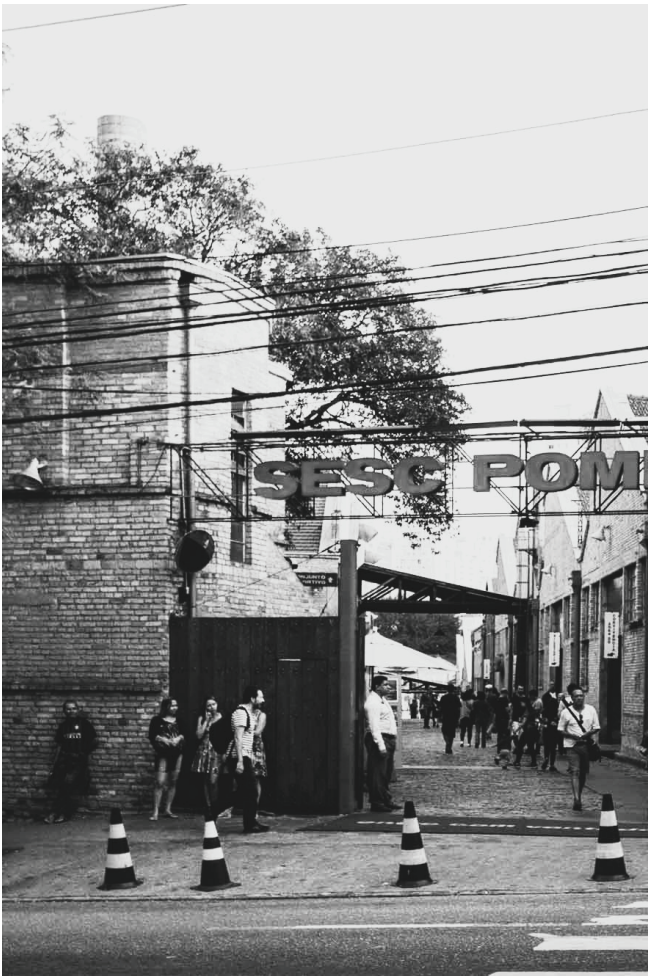
Fig. 219 The entry to the SESC Pompeia centre © Mariana Wilderom

Fig. 220 The view of the centre from outside © Mariana Wilderom

TAKEAWAYS
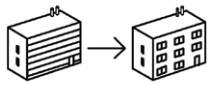
Adaptive Reuse as a Catalyst for Urban Renewal
Preservation of Industrial Heritage

ADAPTIVE REUSE

Integration of Nature
Emphasis on Public Space

BLURRING BOUNDARIES AND FOSTERING COMMUNITY

Open and Welcoming Spaces
Affordable Cultural Programs

SOCIAL INCLUSION THROUGH ARCHITECTURE

Reduced Environmental Impact
Mixed-Use Functionality

MODEL FOR SUSTAINABLE URBAN DEVELOPMENT

CENTRE 2: SESC 24 DE MAIO

Timeline

1900	1950	2000	Present

2024

1912 or earlier
Mesbla departmental store is established

Late 1900's
Bankruptcy and decline

1999-2000's
SESC acquires the factory, renovation takes place and re-opens

A vibrant cultural hub
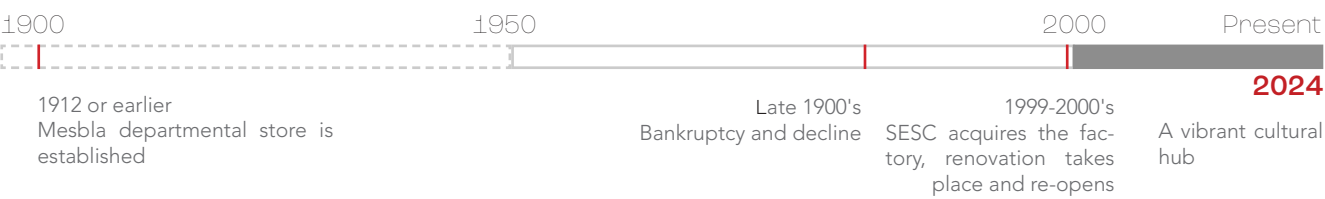
SOCIAL AND CULTURAL SIGNIFICANCE

The center has been adapted into the Mesbla building which used to be a convenience store and has been revamped by architects Paulo Mendes da Rocha and MMBB arquitetos. By re-using the existing structure, they have retained a piece of Sao Paolo's commercial history. The centre now offers a variety of projects for various age groups including: Visual arts, cinema hall, photo library, music space, craft area, sports facilities, play area and workshops (Tapia, 2018).

ARCHITECTURE

The architects have retained the original Brutalist style of the building while adding large windows for an open and inviting feel. The Brutalist style of the mid-20th century emphasises the use of raw materials and bold geometric forms, while the introduction of large windows, removal of interior wall adn preservation of high walls create an open plan with natural light and ventilation. The ramps within the building connects the various spaces while the enclosed plazas and rooftop terrace provide for community interaction.

THE OUTCOME

The architecture of SESC 24 de Maio is a balance between preservation and modernity. The building is not just symbolic to the city's heritage but also becomes a cultural icon for its citizens. It is a centre space for social interaction and needs as it fosters a s sense of community and belonging among the residents.

THE SPACES AND FUNCTIONS

10°
Old warehouse

Dance studio
Services

New addition
5°

Exhibition spaces
Ramp

térreo

Ground floor

Staff offices
Services

13°
New addition

Swimming pool
Ramp
Services

11°
New addition

Cafe
Services
Ramp

| 10 | 40 |
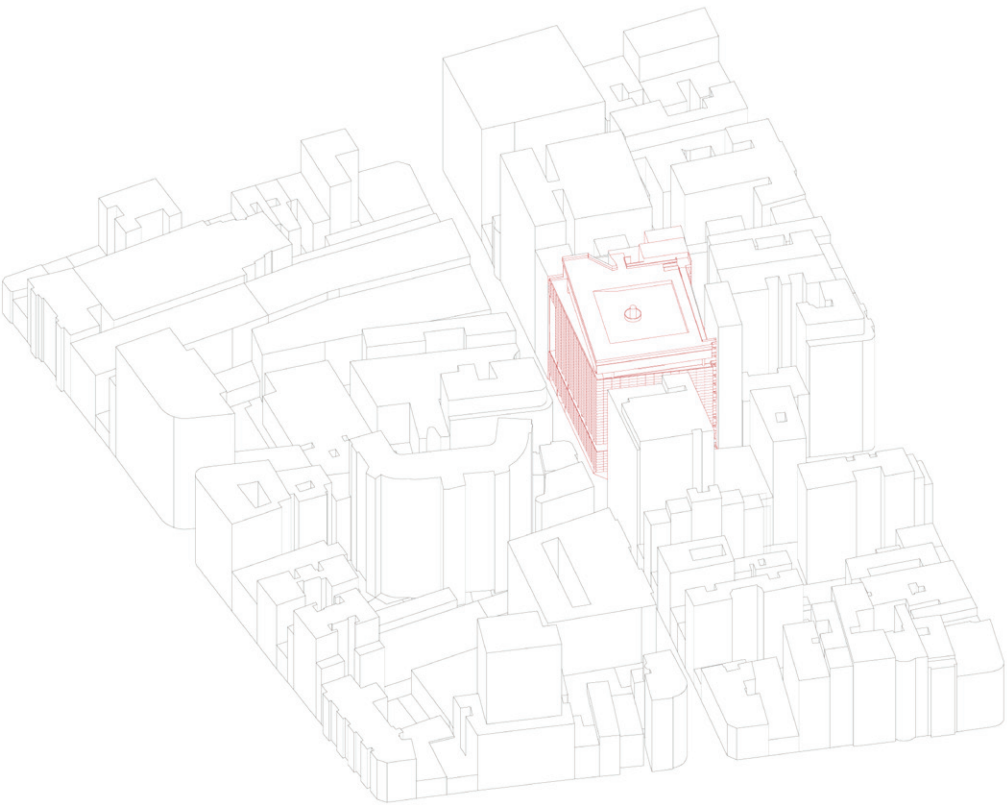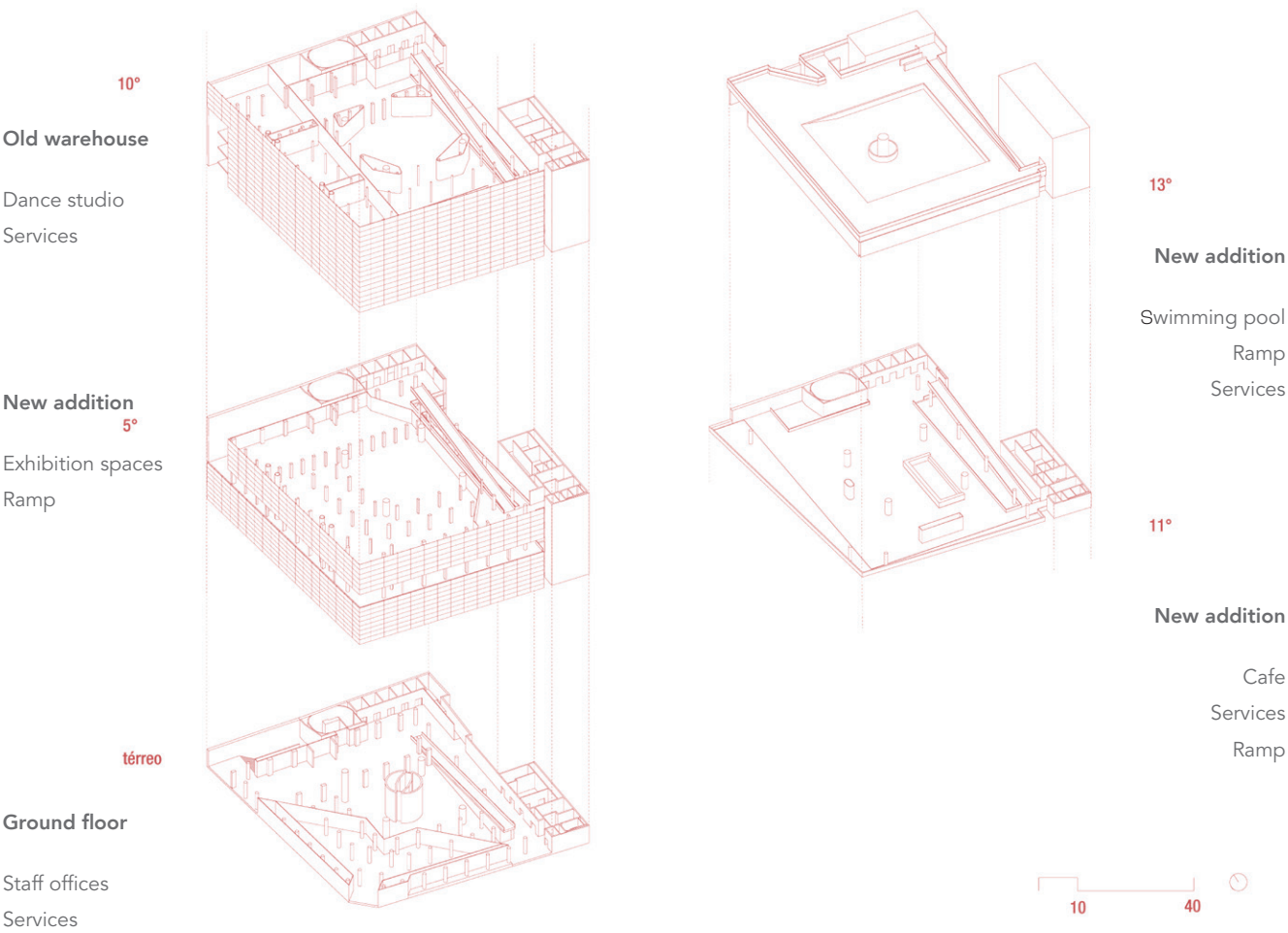
Fig. 221 The urban context and spaces of the SESC 24 Maio © Averma-ete et al., 2019

Fig. 222 The roof terrace at SESC 24 Maio © Claudia Kim, Avermaete et al., 2019

Fig. 223 The Swimming pool at SESC 24 Maio © Claudia Kim, Avermaete et al., 2019

Fig. 224 The view of SESC 24 Maio © Nelson Kon

Fig. 225 Reading space at SESC 24 Maio © Nelson Kon

Fig. 226 The ramp at SESC 24 Maio © Nelson Kon

TAKEAWAYS
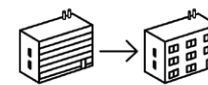
ADAPTIVE REUSE

Urban Renewal and Social Impact

Social Inclusion through Culture
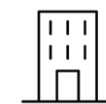
ARCHITECTURE AND PUBLIC SPACE

Integration of Nature

Emphasis on Public Space

CULTURE AND EDUCATION FOR ALL

Diverse Artistic Programs

Lifelong Learning Opportunities

MODEL FOR SUSTAINABLE URBAN DEVELOPMENT

Reduced Environmental Footprint

Accessibility by Public Transport

CENTRE 3: SESC CONSOLACAO

CENTRE 4: SESC IPIRANGA

CENTRE 5: SESC VILA MARIANA

CENTRE 6: SESC AVENIDA PAULISTA
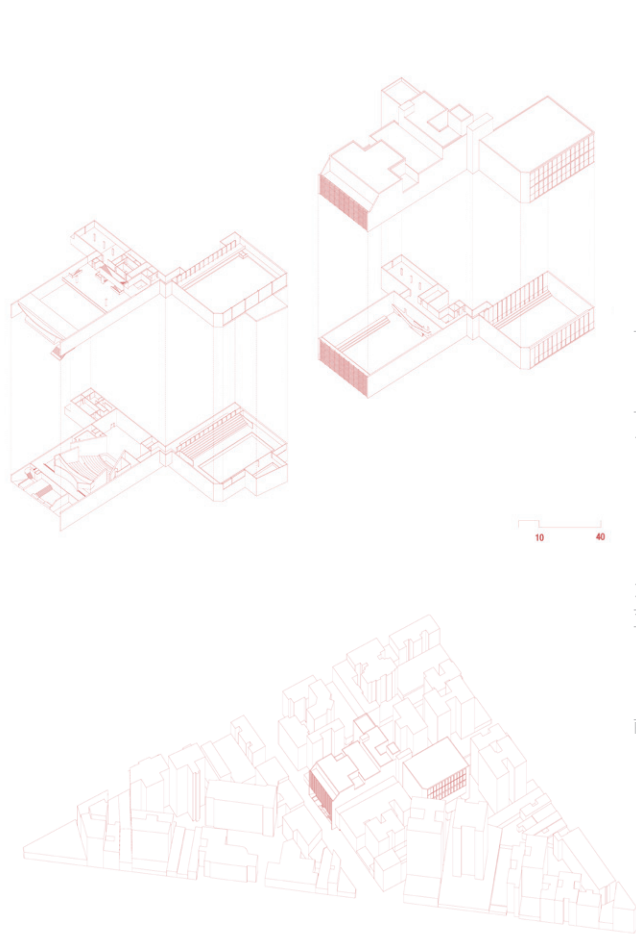
Theater, exhibition, restaurant, indoor pool, sports courts.

Theater, gymnasium, café, indoor pool, garden.
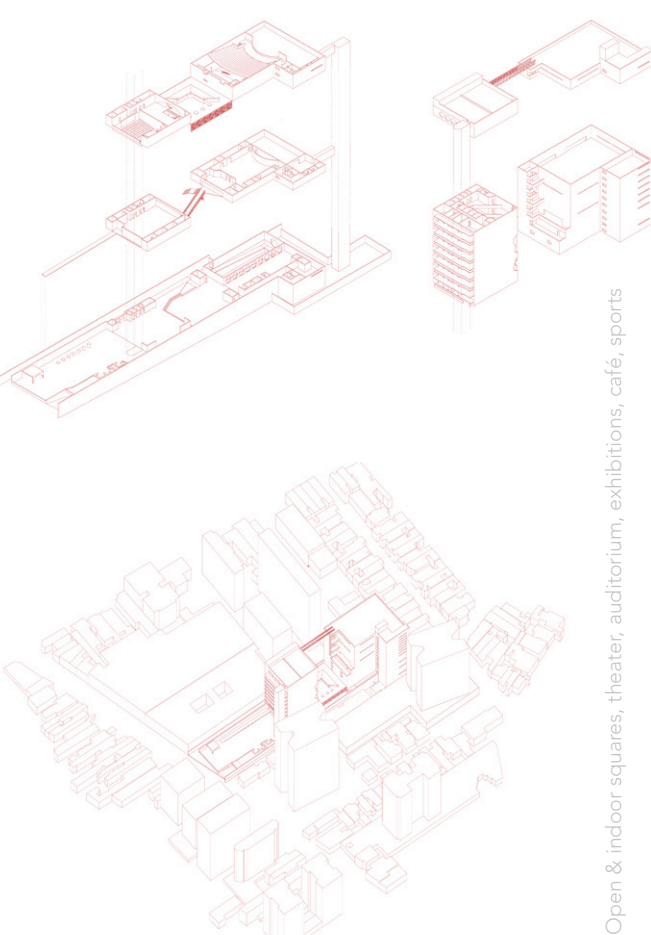
Open & indoor squares, theater, auditorium, exhibitions, café, sports
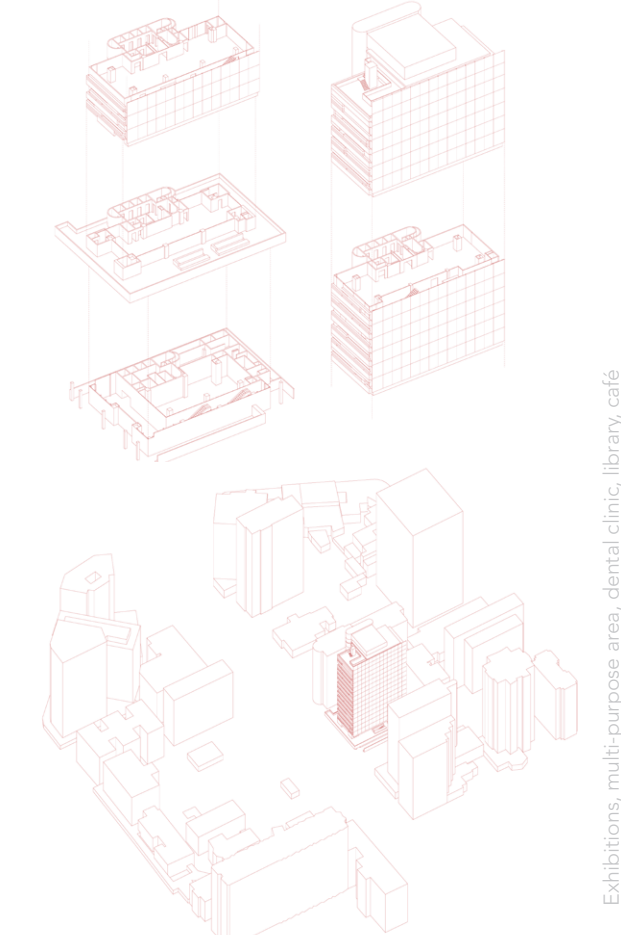
Exhibitions, multi-purpose area, dental clinic, library, café

Fig. 227 SESC Conolacao © Avermaete et al., 2019-Drawings, Mariana Wilderon-Photograph

Fig. 228 SESC Ipiranga © Avermaete et al., 2019-Drawings, Mariana Wilderon-Photograph

Fig. 229 SESC Vila Mariana © Avermaete et al., 2019-Drawings, Mariana Wilderon-Photograph

Fig. 230 SESC Avenida Paulista © Avermaete et al., 2019-Drawings, Pedro Vannucchi-Photograph

9.2 IF.BE ICE FACTORY BALLARD ESTATE, MUMBAI, INDIA

1800   1900   2000   Present

1878
Establishment of the ice factory. Initially named Bombay Ice Man-ufacturing Co. Later renamed to Ambico Ice Factory

Operation got ceased.

2022
Restoration of the building by Malik Architecture
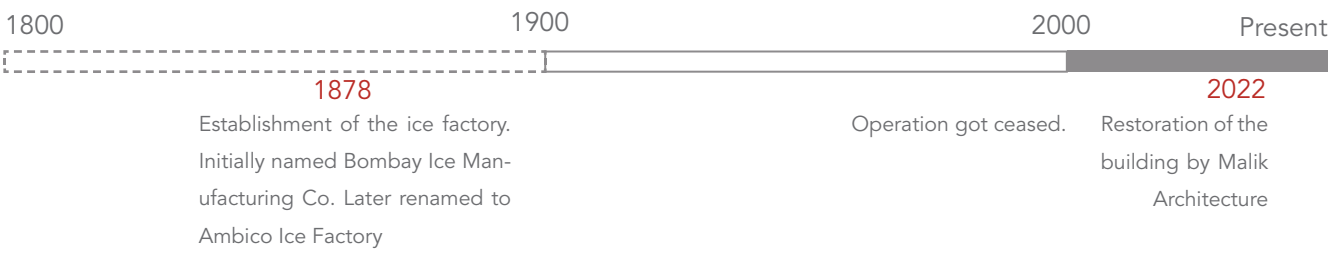
DETAILS

Architect: Malik Architecture
Area: 10870 sqft.
Year: 2022
Reuse: A multi-disciplinary space for art, exhibitions and events

Ambico Ice Factory, which was established in 1878, is situated in a heritage neighbourhood within the city of Mumbai. This 140 year old building was exposed to years of neglect and decay. In the year 2019 Ar-chitect Kamal Malik took up this project of convert-ing this abandoned factory to a space for workshops, events and exhibitions. The name IF.BE stands for "Ice Factory Ballard Estate", which also indicates the words "if" and "be", which represents possibilities (Dsouza, 2024).

Fig. 231 Entrance of IF.BE ice factory © Archdaily.com

Fig. 232 Site plan of Ballard estate © Archdaily.com
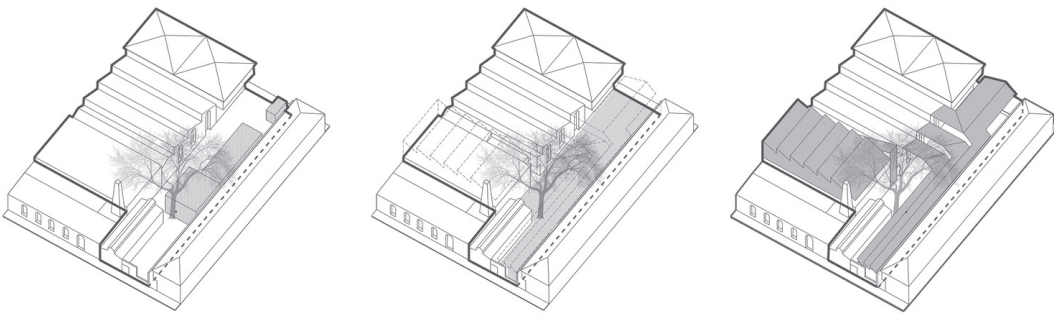
Fig. 233 Design development stages of IF.BE ice factory © Archdaily.com

KEY STRATEGIES

The key strategy is to create a unique and engaging space which is different from the usual gallery and perfor-mace venues. The idea was to create a relationship between the users and the space. The main aim was to create a model for adaptive reuse of abandoned industrial buildings. The architects wanted to promote the idea of the importance of preserving the built heritage (Sharma, 2023).

PROJECT

The project, which took three years to complete, was led by Malik Architecture, was funded by Malik Architecture and two other partners. The main focus was to give a new life to the abandoned and neglected heritage building in the city (Koshta, 2023).

1. Existing Substation (retrofitted)
2. Cafe ,Courtyard
3. Existing Ice Factory
4. Cathedral
5. Bar
6. Existing Chawl Housing
7. Existing Wooden North Lights of the Heritage Ice Factory
8. Proposed North lit roof turning into east lit Galvalum insulated roof
9. Kitchen
10. Black Box (Phase 2 Expansion)

Exploded Axonometric (after retrofitting)

Fig. 234 Exploded axonometry after retrofiting of IF.BE ice factory © dezeen.com

1. Main Entry
2. Sub Station
3. Wash room
4. Cafe
5. Courtyard
6. Cathedral
7. Ice Factory
8. Bar
9. Kitchen
10. Chawl

Space Extension
Existing Roof Members
Roof Extension
Point of Extension

Ground Floor Plan

Fig. 235 Ground floor and first floor plans of IF.BE ice factory © dezeen.com

1. Native Restaurant
2. Private Dining
3. Native Kitchen
4. Outdoor Dining
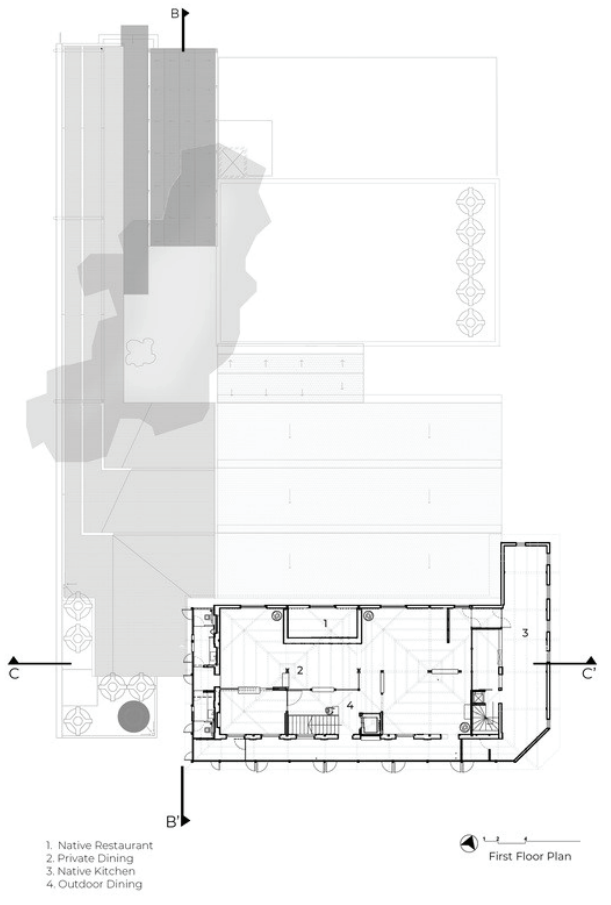
First Floor Plan

Fig. 236 Ground floor and first floor plans of IF.BE ice factory © dezeen.com

TRANSFORMATION

The major aim was to preserve the existing structure of the factory and its history. The restoration work included the removal of plaster to expose the original brickwork, repair of the damaged roofs, trusses and walls. Main focus was given to restore the vintage woodwork with Burma teakwood. The industrial artifacts were reused in a very innovative way b the architects. Old cooling coils wee used into the floor and gantry which was part of the facrory was used for art installations (Shah, 2023).
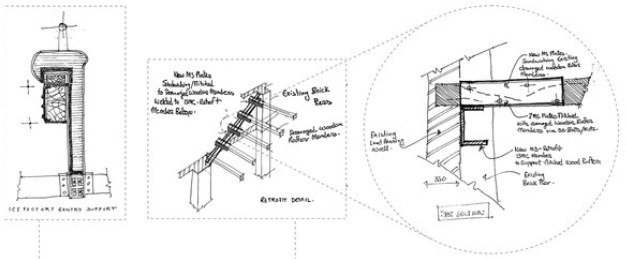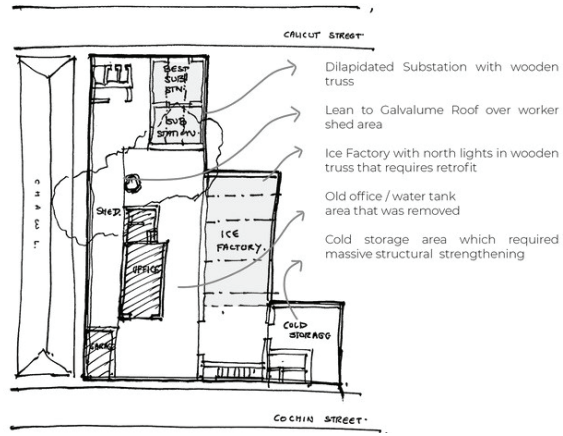
Fig. 237 Restoration and renovation stages of IF.BE ice factory © Archdaily.com

Fig. 240 Section BB' of IF.BE ice factory © Archdaily.com
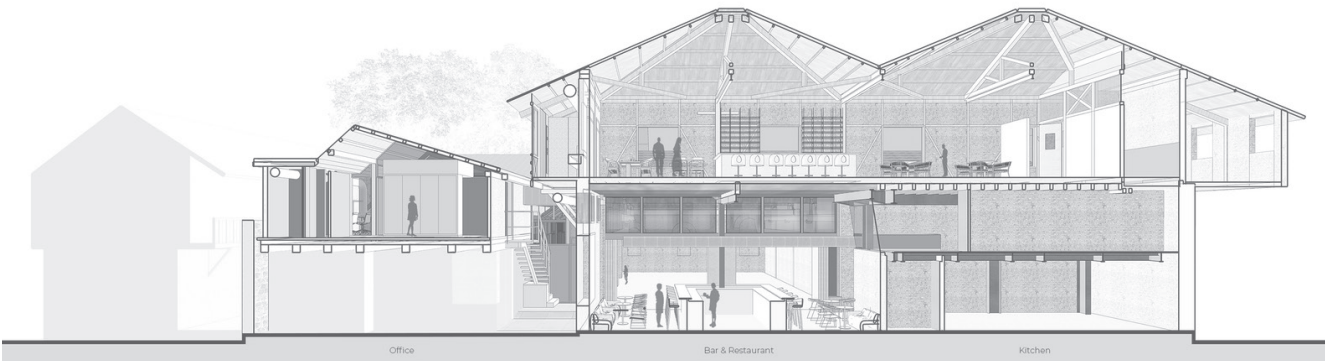
Fig. 241 Section CC' of IF.BE ice factory © Archdaily.com

Fig. 238 Spaces surrounding the banyan tree inside IF.BE ice factory © Malikarchitecture.com

Fig. 239 Courtyard area of IF.BE ice factory © Malikarchitecture. com

Fig. 242 View towards the courtyard of IF.BE ice factory © Malikarchitecture.com

Fig. 243 Images showing from top left) the roof details © Archdaily.com, restaurant view © Malikarchitecture.com, bar counter view dezeen.com, north light view, © Malikarchitecture.com water element view © Archdaily.com

TAKEAWAYS

ADAPTIVE REUSE

Adaptive reuse as a method of conserving industrial heritage

RESTORATION

Materials and methods used for restoring the building
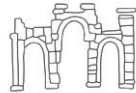
PRESERVATION

The preservation of the built heritage and materials

FOSTERING COMMUNITY

Importance to public spaces and events

INTEGRATION OF NATURE

Importance to nature in the design

9.3 THE FIRST PARLIAMENT PROJECT, TORONTO, CANADA

1800		1900		2000	Present
	1824	**1879**			
Construction of the First & Second Parliament Buildings.	Second Parliament Buildings destroyed by fire.	Consumers' Gas acquires the property.	The site becomes a hub for gas manufacturing and railway operations.	Redevelopment of the former railway yards into office spaces and studios.	The site is occupied by the Canadian Opera Company and Toronto City Hall, standing as a significant historical landmark.

KEY STRATEGIES

The key strategies in the design of the project are the involvement of local people and the general public throughout the project. Thorough historic research and creation of an engaging and accessibe historic stories throughout the site is another major aim of the project. Long term sustainability and environmental impact on the project are considered important. Accessibility of the site to people of all ages and abilities are also given primary importance (City of Toronto, 2021).

Fig. 244 Present day aerial view of the first parliament site© toronto.ca

MASTER PLAN

The heritage values are given primary importance in the planning. The accessibility and the needs of the people are considered during the planning phase. Emphasis on the public and the stakeholders are a major key in the planning throughout. (DTAH, 2021)
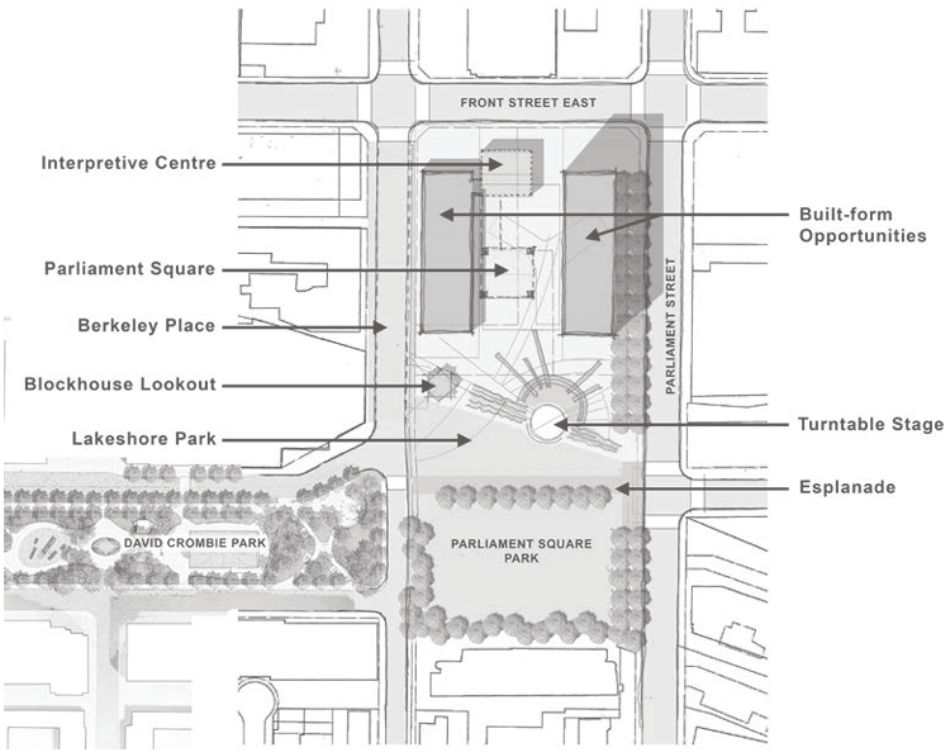
Fig. 244a Proposed masterplan of the first parliament site© toronto.ca

SITE BACKGROUND

The First Parliament is a significant site in Toronto. The site holds an important history in the development of Upper Canada, as well as in the life of the indigeneous people there. The site is also found to have a major role in the industrial, commercial, cultural and the governmental growth of the city (DTAH, 2021).

Traces of History: Natural History and Pre-Settlement
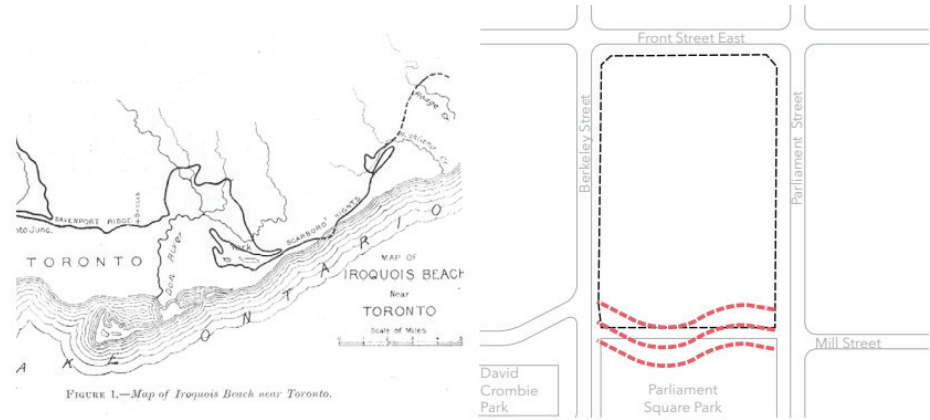
Fig. 245 Infleunce of natural history in the planning of the first parliament site© DTAH,2021

Traces of History: First Parliament (1794 to 1820)
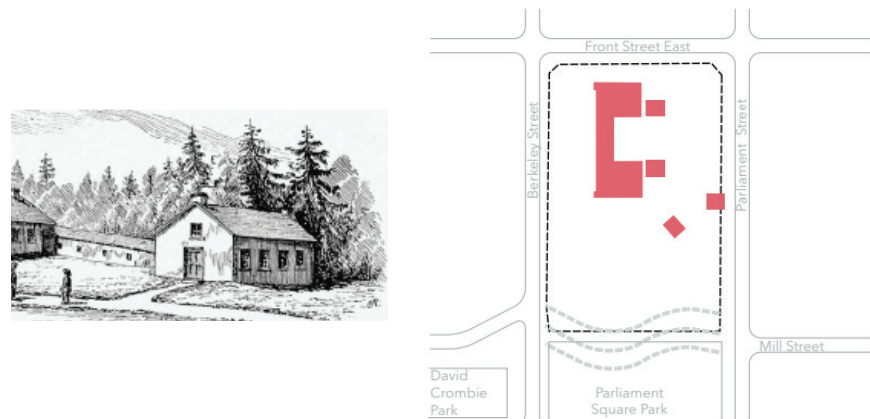
Fig. 246 Infleunce of the location of first parliament in the planning of the first parliament site© DTAH,2021

Traces of History: The Town Block House
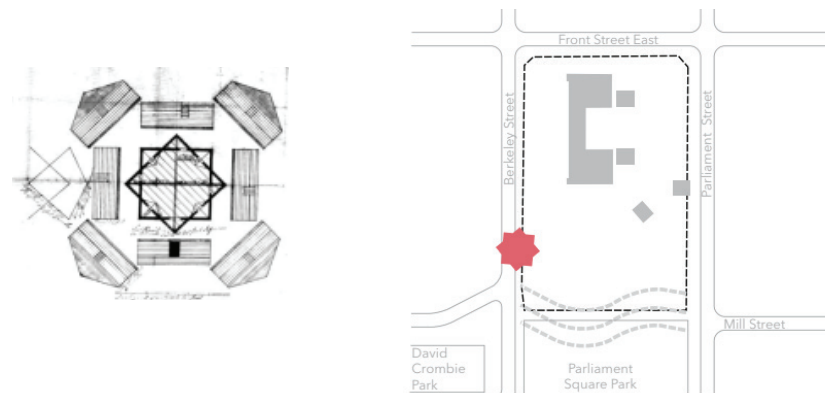
Fig. 247 Infleunce of the location of Town block house in the planning of the first parliament site© DTAH,2021

HERITAGE INTERPRETATION

The historical stories of the site are uncovered and developed. The project focuses on how the people would interact with the site. Best tools for the story telling of the important heritage of the site is developed while planning (DTAH, 2021).

Traces of History: Industrial Era (1879 to 1955)
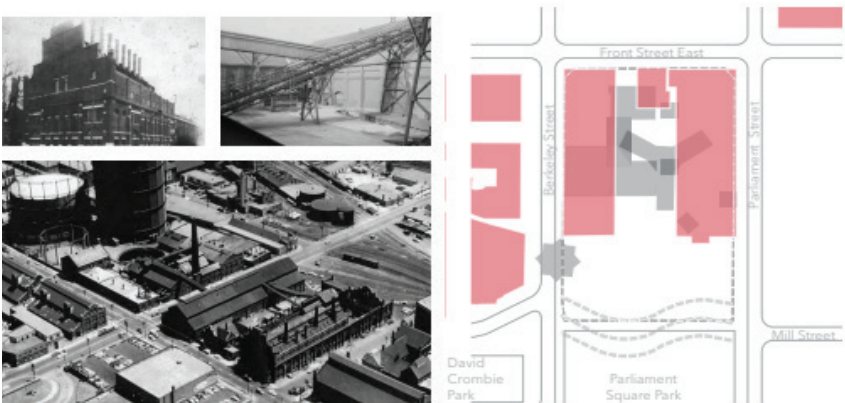
Fig. 248 Infleunce of the industrial era in the planning of the first parliament site© DTAH,2021

Traces of History: Railways
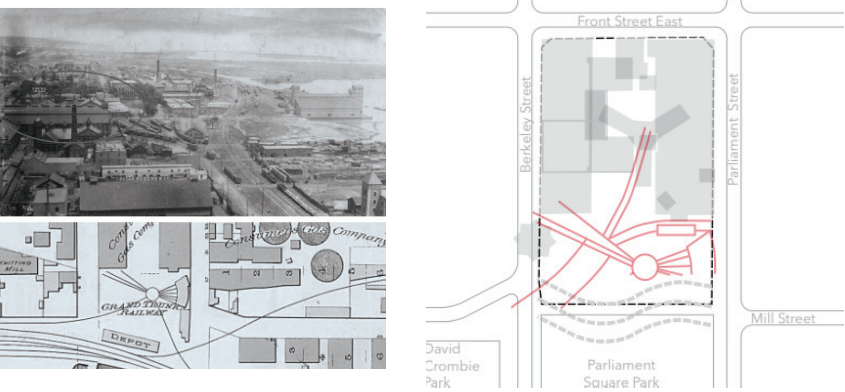
Fig. 249 Infleunce of the location of railways in the planning of the first parliament site© DTAH,2021

Zone of Archaeological Potential
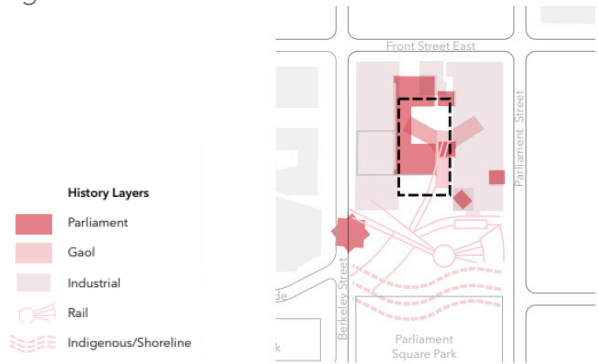
Fig. 250 Identification of the zones of archeological potentialin the planning of the first parliament site© DTAH,2021

PUBLIC PARTICIPATION

The local people and the community groups are given primary importance in the project development phases. Their interests and needs are considered while developing the design strategies of the project (City of Toronto, 2021).
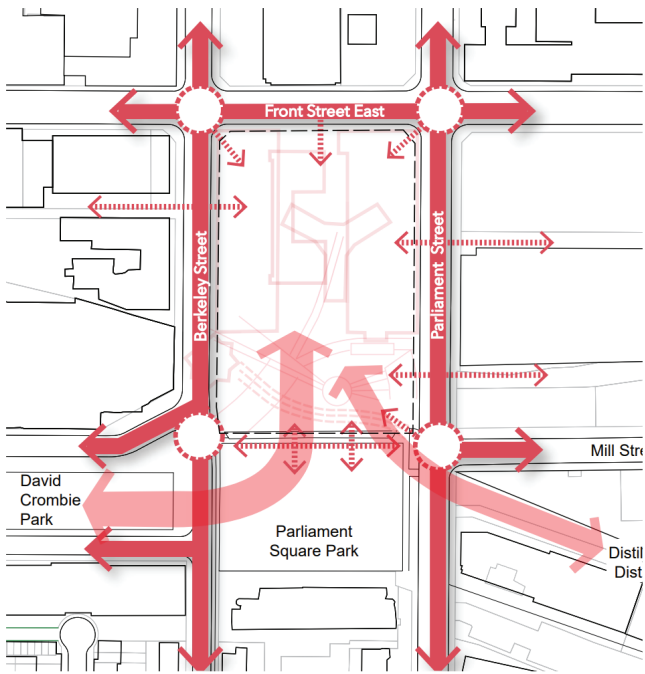
Fig. 251 Accessibility and movement system in the planning of the first parliament site© DTAH,2021

TAKE AWAYS

PUBLIC PARTICIPATION
Importance to public needs

HERITAGE INTERPRETATION
Heritage and history of the site is preserved

SUSTAINABILITY
Long term sustainability and energy efficiency

FOSTERING COMMUNITY
Importance to public spaces and events

ACCESSIBILITY
Accessible to people of all ages, abilities and backgrounds

9.4 SHAUL PARK, RAMAT GAN, ISRAEL

THE CONCEPT

The Shaul garden designed as parte of the masterplan for the city in 1922 was designed by architect Richard Kauffman and has recently undergone a redevelopment in 2023 by BO landscape Architecture. The renovation ensured the protection of the historic features of the park such as the layout, hardscape and indigenous vegetation. The architects incorporated sensory elements, water conservation, natural contour and vegetation to bring about an engaging experience for the users (Landezine, 2023).

Fig. 254 Masterplan © Yoav Peled

Fig. 252 Natural landscape and retained stonework © Yoav Peled

Fig. 253 Retained natural contour © Yoav Peled

Fig. 255 Use of indigenous vegetation © Yoav Peled

9.5 THE PARADISE LOST IN TIME, TAIPEI, TAIWAN

THE CONCEPT

The project preserves the parts of an old paper industry as its ruin itself while adding a temporay installation within it so as to create the idea of preserving the ruin. The architects, Interbreeding Field, have tried to retain the ruin in order to showcase the space as a paradise that has been lost over time. The project is an inter-section of the past and the present as it houses art, sculptures and community with a ruin that was a building in the past (Rosenberg, 2011).

Fig. 258 Acddition of installation © Interbreeding Field

Fig. 256 Nature and the ruin © Interbreeding Field

Fig. 257 Retaining the ruin and natire © Interbreeding Field

Fig. 259 A space to gather © Interbreeding Field

HERLEV HOSPITAL, DENMARK

The landscape project at the Herlev Hospital in Denmark focuses on the creation of a greenscape that aids in speedy recovery of its in-patients. This concept is rather interesting due to the creation of a lush and vibrant green system that is indigenous as well as holds medicinal properties.The biodiversity created helps in reducing stress and calming the users (SLA, 2024).

Fig. 260 Building around the existing © SLA

ANCHOR PARK, SWEDEN

The concept of using tactile materials vernacular to the context and the creation of microclimates with existing resources is what makes the the Anchor project park in sweden an outstanding one. The sesnory experience that arises out of the natural diversity and material usage is one that will stay with the user post experience (SLA, 2020).

Fig. 261 Designing for senses © SLA

GELLERUP NEW NATURE PARK

Green spaces as an extension of living is a concept that is imbibed in thsi project as it involves the revitalisation of a park with bad reputation into one that can be used by the nearby residents. The transformation of the area into a vibrant and attractive neighbourhood retaining all its existing resources while adding new elements in accordance with the presence of existing is noteworthy (SLA, 2024).

ORDENER-POISSONNIERS

The project involves the tranformation of an old railway station into a greenscape that preserves the areas industrial character while creating a micro-climate through its carbon neutral architecture. The project aims to re-use the existing materials of the railways such as tracks, trolleys, signals etc to retain the industrial character while also putting forward a sustainable approach (SLA, 2024).

Fig. 262 An extension of living © SLA

Fig. 263 Reusing resources © SLA

ten.

The prototye

10.1 STATE OF CONSERVATION

The conservation status of mill in general depicts its need for conservation. However, within the site there are some structures that have suffered more dilapidation due to factors like rain, invasive vegetation and lack of maintenance. Among the various buildings most of the buildings towards the north are in a severe need for conservation whereas the building in the south are generally more intact and are in need of repairs and replacements.

The site also has some buildings that have completely disappeared whereas some others have barely standing walls. The most damaged part of most buildings are the roofs. the pond had also suffered decay and need to be revived as it suffers algae growth and eutrophication. The buildings in the south mainly the spinning and weaving blocks are the most intact of all. Invasive vegetation is mostly present in the northern part of the site.

Fig. 264 State of conservation © Interbreeding Field
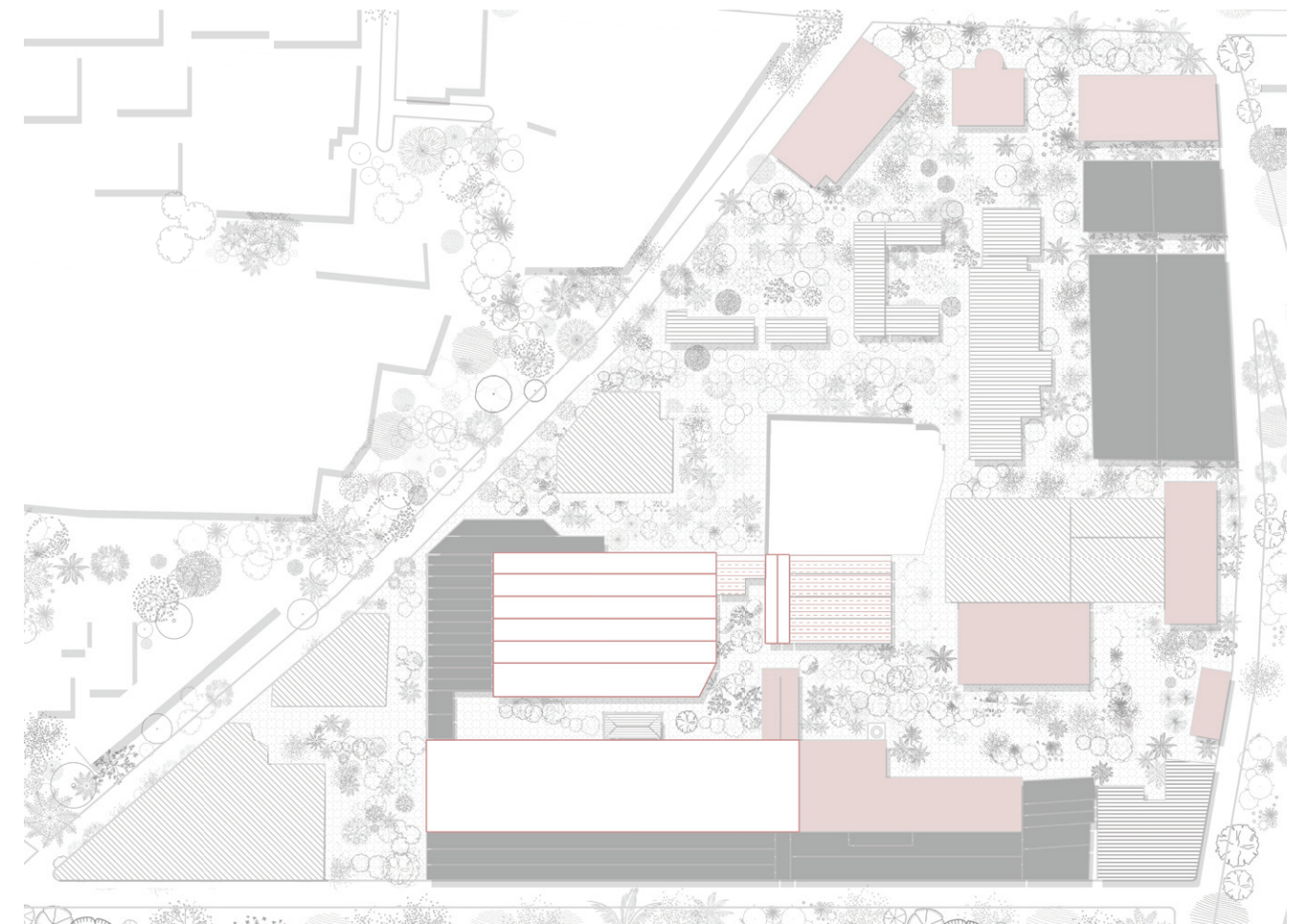
LEGEND

- Good state of conservation - damages
- Need for conservation - Slight repairs needed
- Need for conservation - Moderate damages
- Severe need for conservation / Major damages
- Ruins / Mostly dilapidated
- Already demolished

0   50m   150m

10.2 DEMOLITIONS AND REPLACEMENTS

LEGEND

▨ Presently inexistent buildings

▩ Buildings to be demolished completely

▤ Buildings with partial demolition/ replacements/ additions

▨ Buildings in need of repairs

Area of demolition: 161.5 SQM
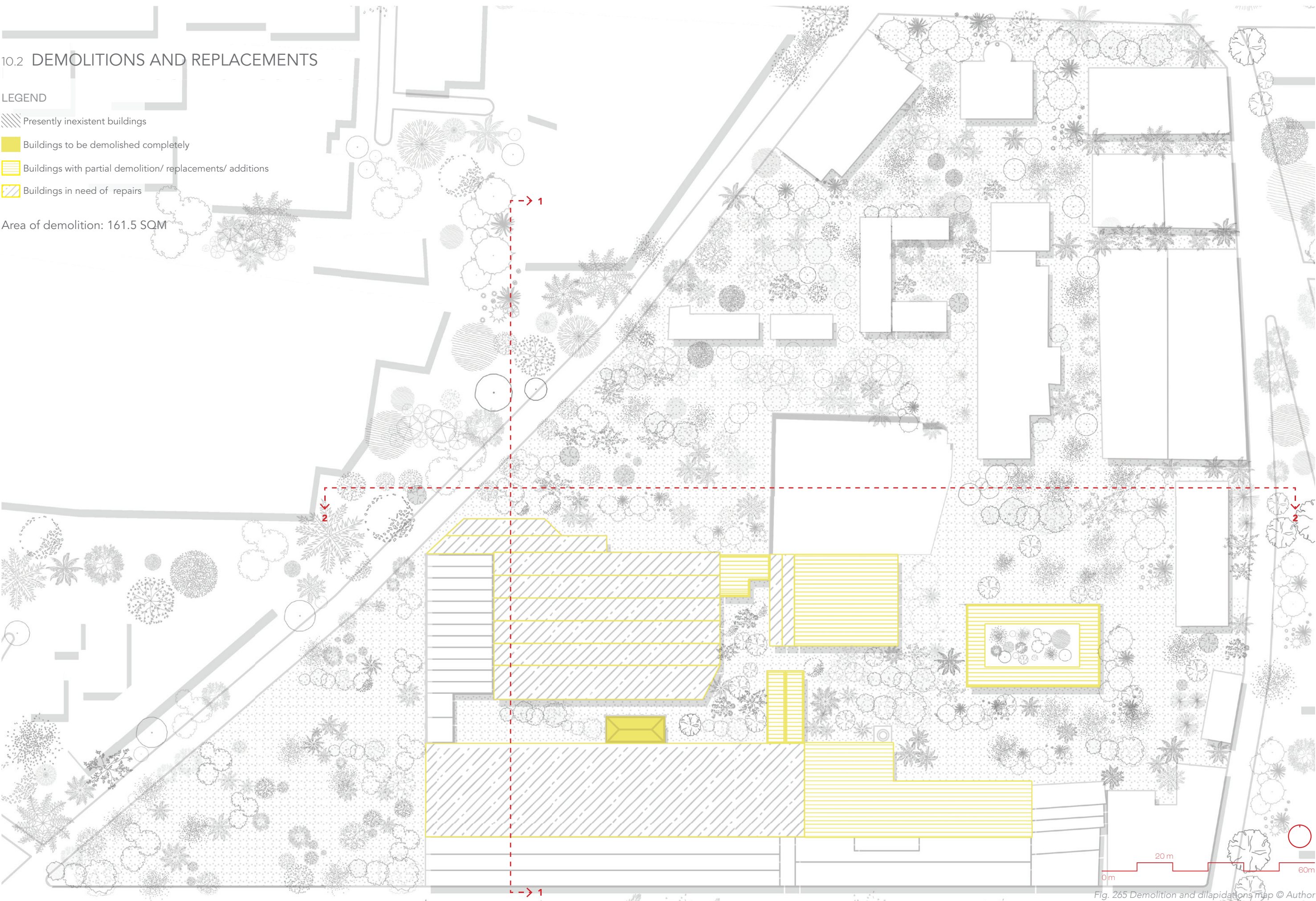
Fig. 265 Demolition and dilapidations map © Author
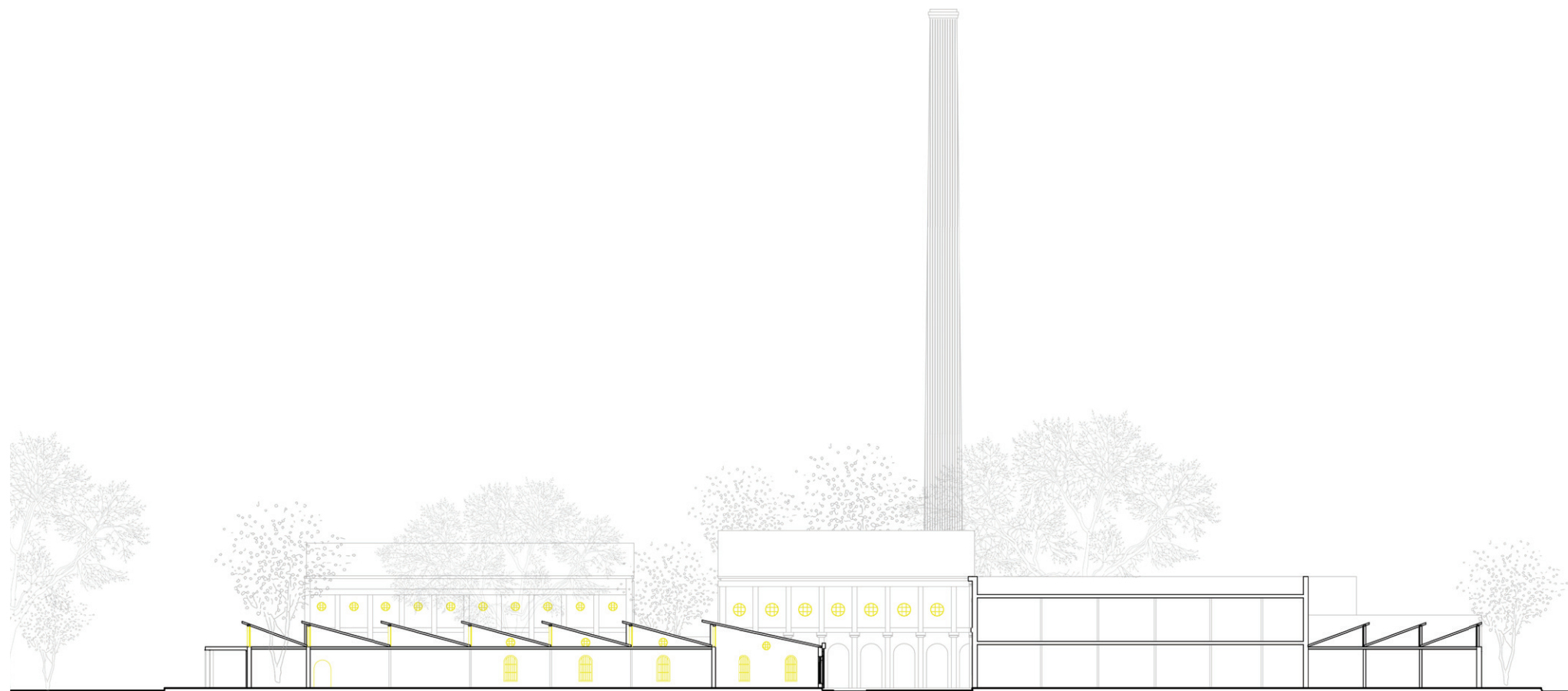
Fig. 266 Demolition and dilapidations section 1 © Author

The old spinning and weaving blocks are currently the only blocks with sufficient stability and integrity. These buildings still hold its original character to some extent except for dilapidations and damages in parts of roofs, openings and materials.

LEGEND

☐ Replacement needed due to dilapidations

🟨 To be demolished completely

Fig. 267 Demolition and dilapidations section 2 © Author

LEGEND

Structures with repairs

Structure with replacements

New addition

Area of addition: 2140.79 SQM

20 m

60m

0 m
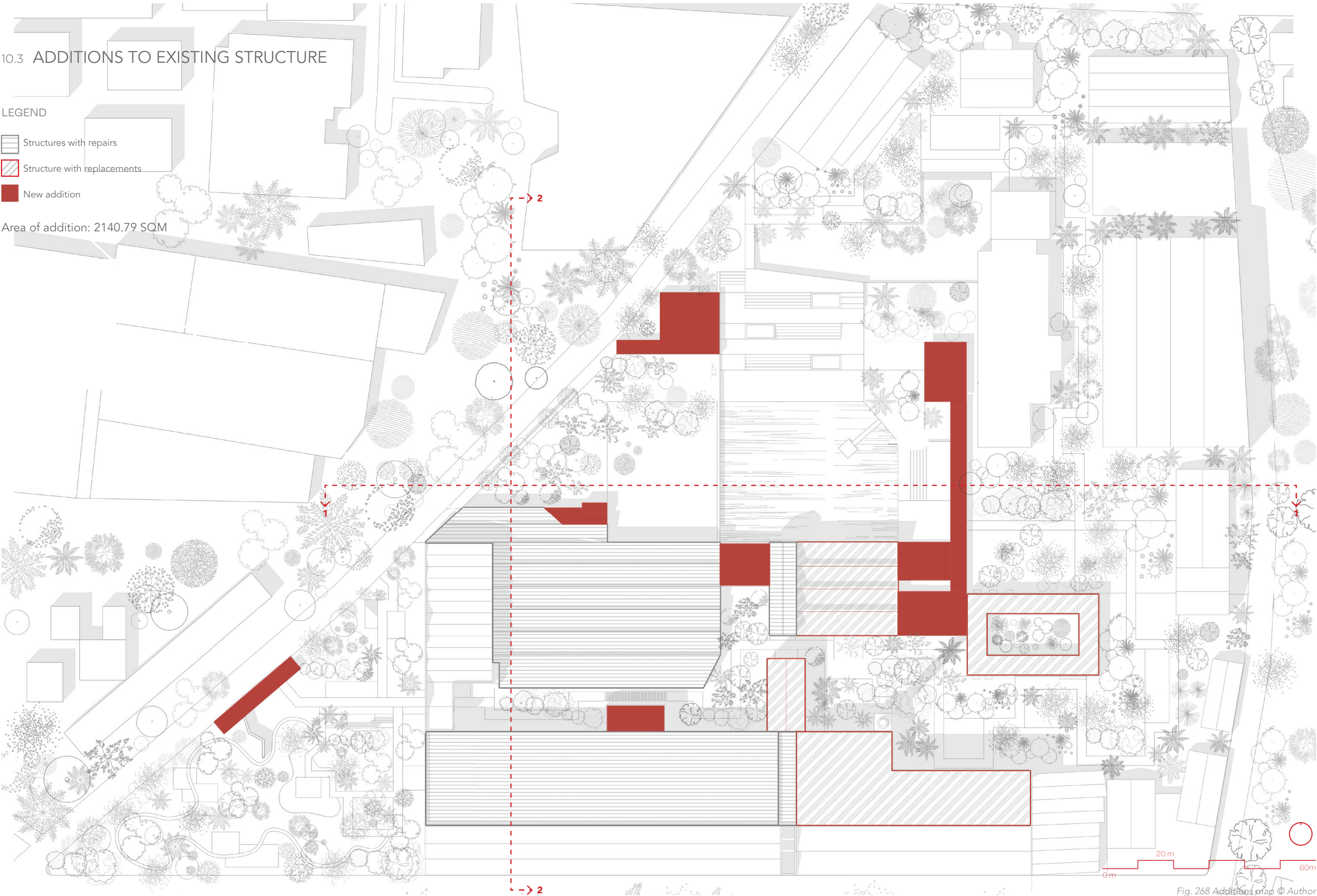
Fig. 268 Additions map © Author

The addition of new blocks a has been done with a view to replace old dilapidated elements and to define the spaces in the masterplan. the new blocks are entirely constructed in modern materials so as to offer a stark distinction between the old and the new.

LEGEND

☐ New addition

Fig. 269 Additions section 1 © Author
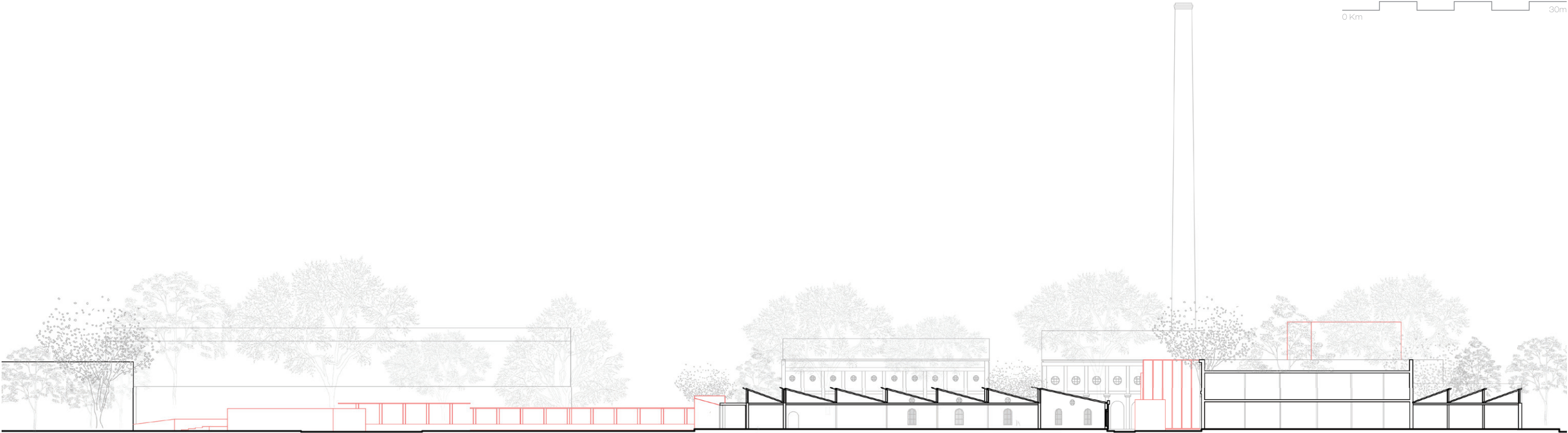
Fig. 270 Additions section 2 © Author

10.4 MATERIAL AND DECAY ANALYSIS

This part of the project involves three major steps. Step one involves identifying the building materials and the construction mode. The next step involves identifying the decays on these materials, analyzing them, determining the reasons for the formation of these decays, and determining the ways of removing these decays from the building facade. The final steps indicate the interventions that are made on these facades to remove the decay and how the facade of the building was transformed after the interventions.

Step 1: Materials

For the first step, the materials on the north and south facades of the area in focus are identified. Clay tiles, locally known as Mangalore tiles are used for the roofing, which is done on timber trusses. The walls are made of bricks. The walls, which were plastered with lime were found to have detached from the brick in many areas. The pilaster and the walls around the iron frame entrance is found to have detailing done in lime mortar over the bricks. The window frames are constructed using two different types of materials. Iron decorative casting is done for the huge entrance space. Wooden frames are used for the normal windows. All the windows are made of glass. The building is found to be standing on a rubble plinth. These materials, which were used for the construction of the mill, are found to be locally available in India.

Step 2: Decays

The second step involves the decay analysis. Since the building was neglected over many years, the chances of decay are very high. Initially, the decays are identified, the reasons behind each of the decays are studied and then the removal techniques are analysed. The major decays which were identified on the facades are biological patina, efflorescence, detachment of plaster, hairline cracks, stains, biological colonisation, deformation, spalling, and differential degradation.

Step 3: Interventions

The intervention stage explains how each of these decays is removed from the body of the structure and how this industrial heritage building is conserved. All decays except for the detachment of plaster and cracks are removed from the building. The process and how each of the decays is dealt with are explained in this chapter.
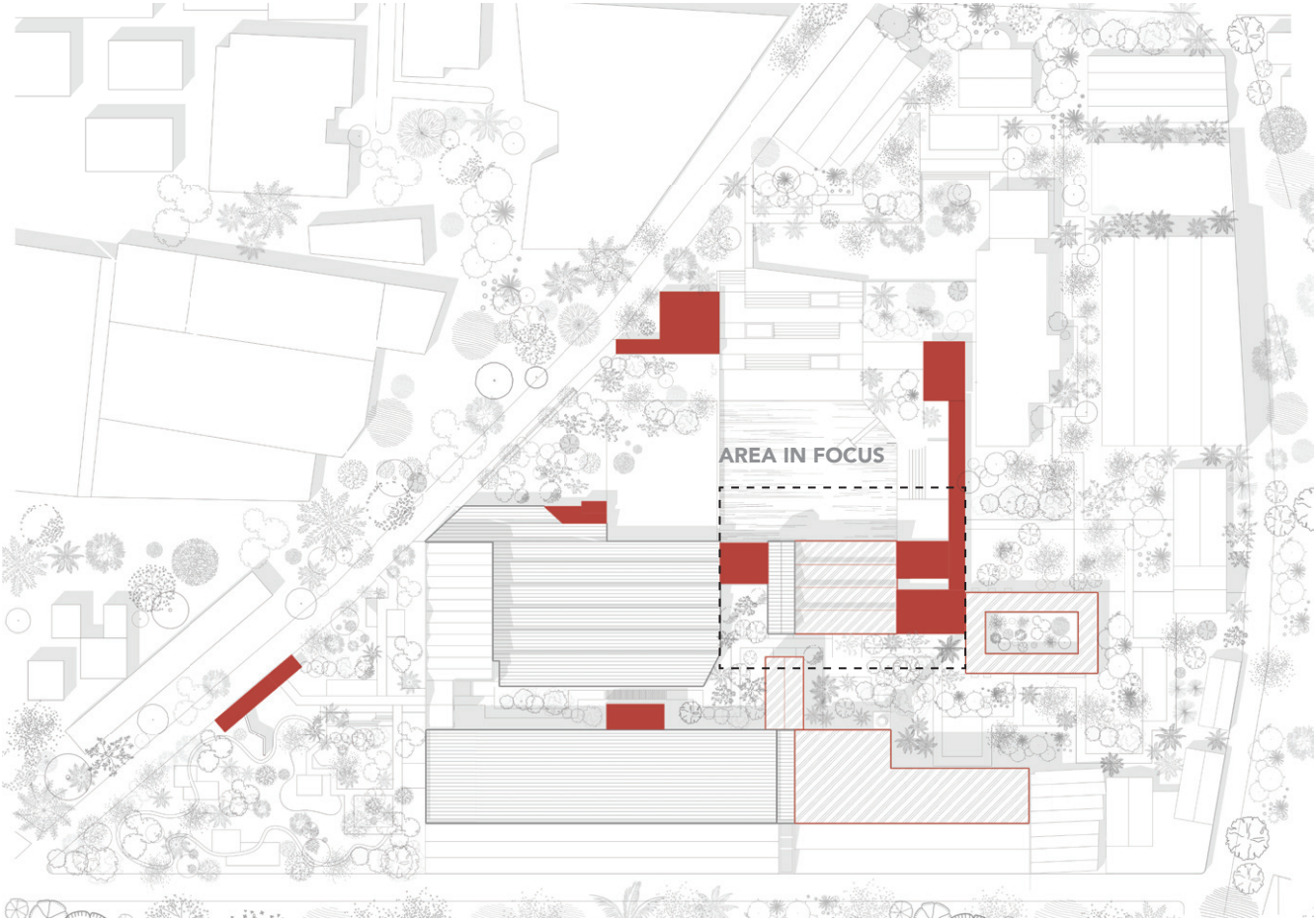
AREA IN FOCUS

Fig. 271 Area to be detailed © Author

0   50m   150m

Fig. 272 Current situation of the buildings in the area © Dhaval Modi

Fig. 273 Current situation of the buildings in the area © Dhaval Modi

MATERIALS
Area in focus, South elevation

Roofing is done using clay tiles, which are popularly called Mangalore tiles in India. They are supported over timber trusswork. Timber is also used for the window frames. Walls and pilasters are made of brick and is plastered with lime. Iron frames are also used for the windows on a particular part of the building. Glass wiindows are found throughout.

LEGEND

1. Clay tile roof over timber truss
2. Iron decorative casting for window
3. Glass
4. Wooden window frame
5. Rubble plinth
6. Brick wall with lime plaster
7. Brick pilaster with lime plaster
8. Detailing in lime mortar over brick

Fig. 274 Images of the building materials (from left): Clay tile roof over timber truss, Iron decorative casting for window, . Glass, . Wooden window frame, Stone plinth, Brick wall with lime plaster, Brick pilaster with lime plaster, Detailing in lime mortar over brick © Divyesh Parsana, Dhaval Modi, Getty images

Fig. 275 Building materials in the South elevation of the area in focus © Author

2 m

0 m   12 m

Scale: 1:200

DECAY
Area in focus, South elevation

Since this facade is facing the waterbody, the presence of biological colonisation, efflorescence, staining, biological patina and vegetation are very high. Plaster is found to be detached on many parts of the building, where the bricks are visible

LEGEND

▨ 9. Biological Patina

▨ 10. Efflorescence and Sub-efflorescence

▨ 11. Detachment (of plaster)

▨ 12. Deformation

⌐ 13. Hairline cracks

▨ 14. Stain

✽ 15. Biological colonisation

▨ 16. Spalling

▨ 17. Differential Degradation[1]

1   As per UNI standards

Fig. 276 Images of the decays on the facade (from left): Biological colonisation, Efflorescence and Sub-efflorescence, Spalling, Detachment (of plaster), Deformation, Presence of Vegetation, Cracking , Stain , Biological Patina, Differential Degradation © Divyesh Parsana, Dhaval Modi, Getty images
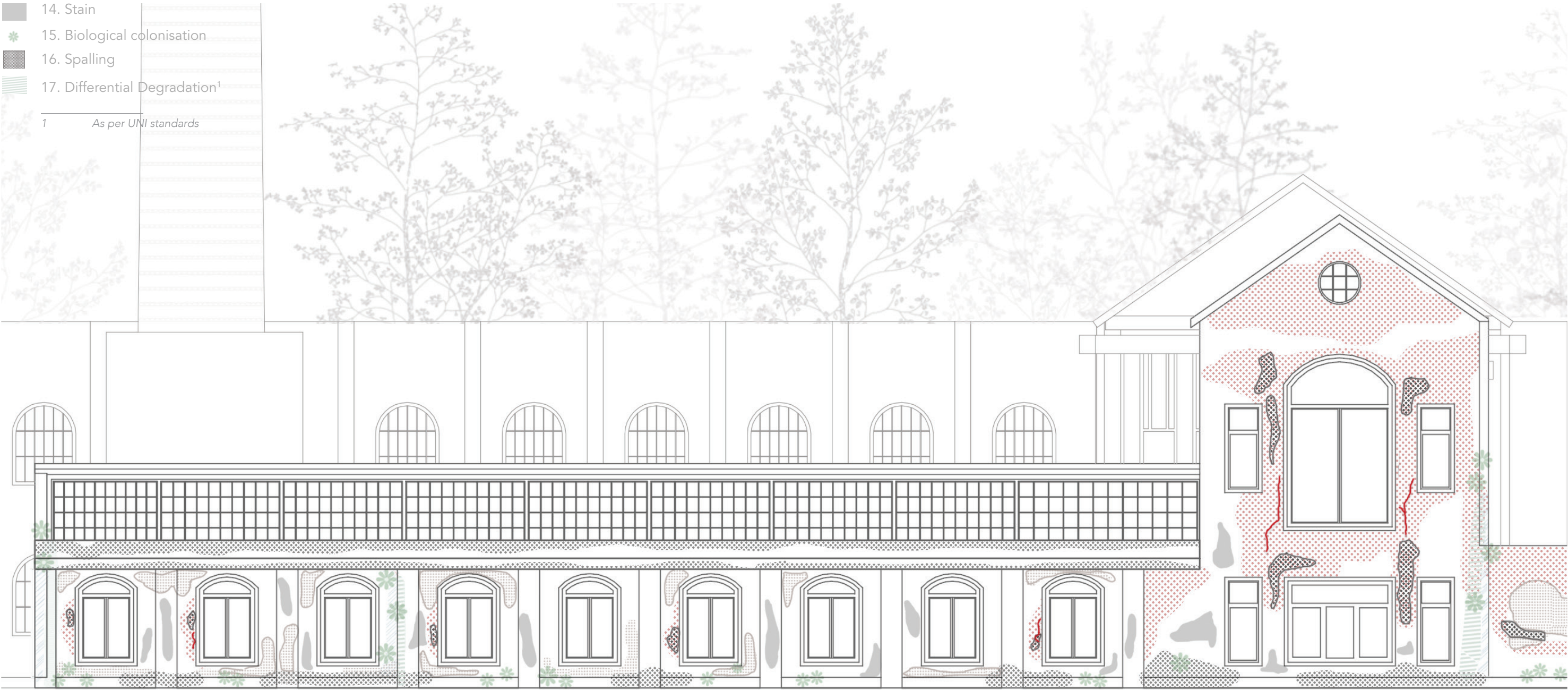
Fig. 277 Decays on the South elevation of the area in focus © Author

0 m   2 m   6 m

Scale: 1:100

MATERIALS
Area in focus, North elevation

Roofing is done using clay tiles, which are popularly called Mangalore tiles in India. They are supported over timber trusswork. Timber is also used for the window frames. Walls and pilasters are made of brick and is plastered with lime. Iron frames are also used for the windows on a particular part of the building. Glass wiindows are found throughout.

Fig. 278 Images of the building materials (from left): Clay tile roof over timber truss, Iron decorative casting for window, . Glass, . Wooden window frame, Stone plinth, Brick wall with lime plaster, Detailing in lime mortar over brick , Brick pilaster with lime plaster © Divyesh Parsana, Dhaval Modi

LEGEND

1. Clay tile roof over timber truss

2. Iron decorative casting for window

3. Glass

4. Wooden window frame

5. Stone plinth

6. Brick wall with lime plaster

7. Brick pilaster with lime plaster

8. Detailing in lime mortar over brick

Fig. 279 Building materials in the North elevation of the area in focus © Author

Scale: 1:200

DECAY
Area in focus, North elevation

The facade is found to have vegetation growing on it in vast. The plaster is found to have dettached from the brick walls on many parts of the building and these bricks are also found to be affected by efflorescence. Small cracks are visible between the bricks at many parts.

LEGEND

9. Biological Patina

10. Efflorescence and Sub-efflorescence

11. Detachment (of plaster)

12. Deformation

13. Hairline cracks

14. Stain

15. Biological colonisation

16. Spalling

17. Differential Degradation[1]

_____
1 As per UNI standards

Fig. 280 Images of the decays on the facade (from left): Biological colonisation, Efflorescence and Sub-efflorescence, Cracking, Detachment (of plaster), Spalling, Deformation, Presence of Vegetation, , Stain , Biological Patina, Differential Degradation © Divyesh Parsana, Dhaval Modi
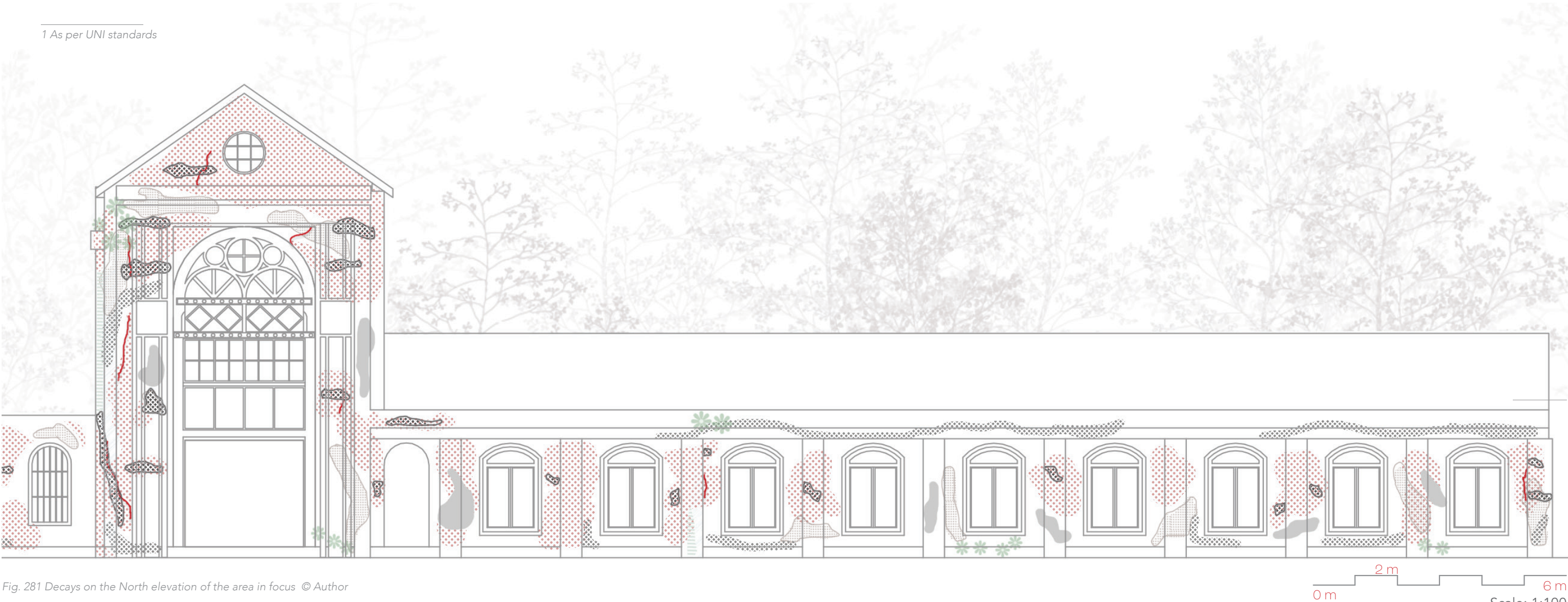
Fig. 281 Decays on the North elevation of the area in focus © Author

2 m

0 m

6 m

Scale: 1:100

DECAY AND INTERVENTIONS

Biological patina:

The presence of lichens, algae, mosses, and moulds indicates biological patina. Lichens are found to be a mix of fungi and algae, which are found in emerald green, yellow and grey colours. Mosses are green growth found on the building materials which have soft and velvety textures. It is found to grow more in damp shades, which grows with the monsoon rains of the city. The biological patina is mainly found towards the lower part of both the elevations and also on the parts just below the roof line. The high humidity, air pollution, and the rains of Bombay increase the growth of this type of decay. Lack of maintenance of the building is also another major reason for the development of biological patina on both the facades (Antonelli et al., 2020).

Stains:

Stains of different colours, especially grey and black are found on the surfaces of the building. These could be water stains from rainwater or pipe leakage. It could also be the result of efflorescence and biological patina. Stains are also found on the building facade due to bird droppings. High humidity is also a reason for the appearance of stains (Aldis, 2023).

Spalling:

Breaking off of small pieces of bricks are found on the bricks that are exposed on the facades. This could be due to continuous exposure to sun, rain, and wind over several years. It can also be a result of exposure to air pollutants and other chemicals that are present in the air of the bus city of Mumbai. The presence of vegetation also could lead to the development of physical pressure on the brickwork, which could lead to the breakage of small pieces of bricks and spalling (Qureshi, 2021).

Efflorescence:

The presence of white powdery deposits on the walls indicates efflorescence. These are salt deposits that are present in the material or the surrounding soil. When water seeps into the bricks, it dissolves the soil. When the water evaporates, the salts remain, leading to the formation of efflorescence. Water infiltration into the building materials and the presence of salt in the materials are the major reasons for the development of efflorescence. Lack of maintenance is also a major reason for this decay. Efflorescence is found vastly on both the north and south elevations of the area in focus (Team, 2025).

Intervention: Mechanical removal methods like soft brushing and low pressure water blasting techniques could be used for the removal of biological patina. Biocides could also be used to remove lichens and algae from the surface of the buildings (Antonelli et al., 2020).

Intervention: It could be removed by the water washing method. Stains can be cleaned with the use of stain removers and detergents as well (Aldis, 2023).

Intervention: Removal of damaged bricks and replacing them with new bricks could be done for spalling. (Qureshi, 2021)

Intervention: Water washing techniques and efflorescence removers (chemical method) could be used to remove efflorescence from the surfaces (Team, 2025).

Biological colonisation:

The presence of vines, weeds and other vegetation growing on the walls indicates biological colonisation. The growth of vegetation is found more on the south elevation when compared to the north. High humidity, due to the presence of a water body could be a reason behind this. The lack of human activities in front of the south elevation, due to the presence of a pond, could also be a reason for the thriving growth of vegetation without any hindrance. The part in front of the north facade is a major route inside the site, where the human activities are more, in comparison with the area in front of the southern elevation. Huge trees are part of both elevations. The lack of sunlight and the presence of sunlight promote the growth of different plant types on both facades (Rajkowska et al., 2013).

Intervention: Small vines could be removed manually from the roots. Thick vegetation could be removed by cutting. Biocides and herbicides could also be used for the removal of vegetation. Very thick vegetation is not touched and kept as such (Rajkowska et al., 2013).

Deformation: A wall on the south elevation of the area in focus is known to have been deformed (from the site study). A huge tree, which had grown on the surface of this wall was removed in the past, as it affected the structural stability of the wall, which got deformed. Deformations are known to affect the stability of the building and need to be taken care of.

Intervention: A wall that was identified to be deformed is removed and a new wall is added as part of the design.

Detachment of plaster: The plaster is found to have detached from various parts of the building. While considering the area in focus, it is found excessively on the north facade when compared to the south facade. The reason behind this could be the penetration of moisture into the building materials. Direct exposure to rainwater could accelerate the peeling and flaking of plaster from the brick surfaces. Poor plaster application could also be a reason for the peeling. Thermal expansion and contraction happening due to temperature fluctuations could lead to minor movements of the bricks, which could lead to detachment of plaster from its surfaces. The biological growth of patina and weeds also contributes to the detachment of plaster. The age of the building and lack of maintenance are also very major reasons behind the flaking and peeling off of plaster from the brick surfaces.

Hairline cracks: Thin cracks are observed on the exposed brick surfaces at a few points. These cracks are found to occur due to uneven settlements due to groundwater movements or soil erosion. Another reason behind cracks could be the thermal expansion and contraction which occurs due to temperature changes. This could lead to slight movement of the bricks, which could lead to the development of cracks. The presence of vegetation is found to be high in the area in focus. The roots of trees could penetrate the building materials and lead to movements, which could develop into the formation of cracks. Hairline cracks are also found to be an indicator of the natural aging process of a building.

THE INTERVENTION CONCEPT:

The concept of intervention is to preserve the building as such, without giving alterations to the main characteristics of the building. The main idea is to preserve the historic character of the building. For this, the layers of the building, which indicates the time it had stood are not altered. Hence, the detachment of plaster and hairline cracks on the structure are kept as such, without any alterations. The interventions are done in a way that prioritises minimal alterations to the building. The exposure of brick layers under the plaster, which got uncovered over time speaks of the decades the building has stood. Huge trees which are part of the elevations are also kept as such as it has now become part of the building over the years. These exposed bricks, cracks, and trees could tell stories of the years they have stood and witnessed the life of the building from being a busy textile mill to being abandoned and neglected over the years to being converted into a textile museum.

10.5 THE MODEL FOR FUTURE
DEVELOPING THE MASTERPLAN

Identifying existing vegetation

The site has a varity of indigenous vegetation such as Ficus/ Banyan, Amla, Ashoka, Mango, Coconut palms, Neem, Ficus, Butea and Cassia among others.
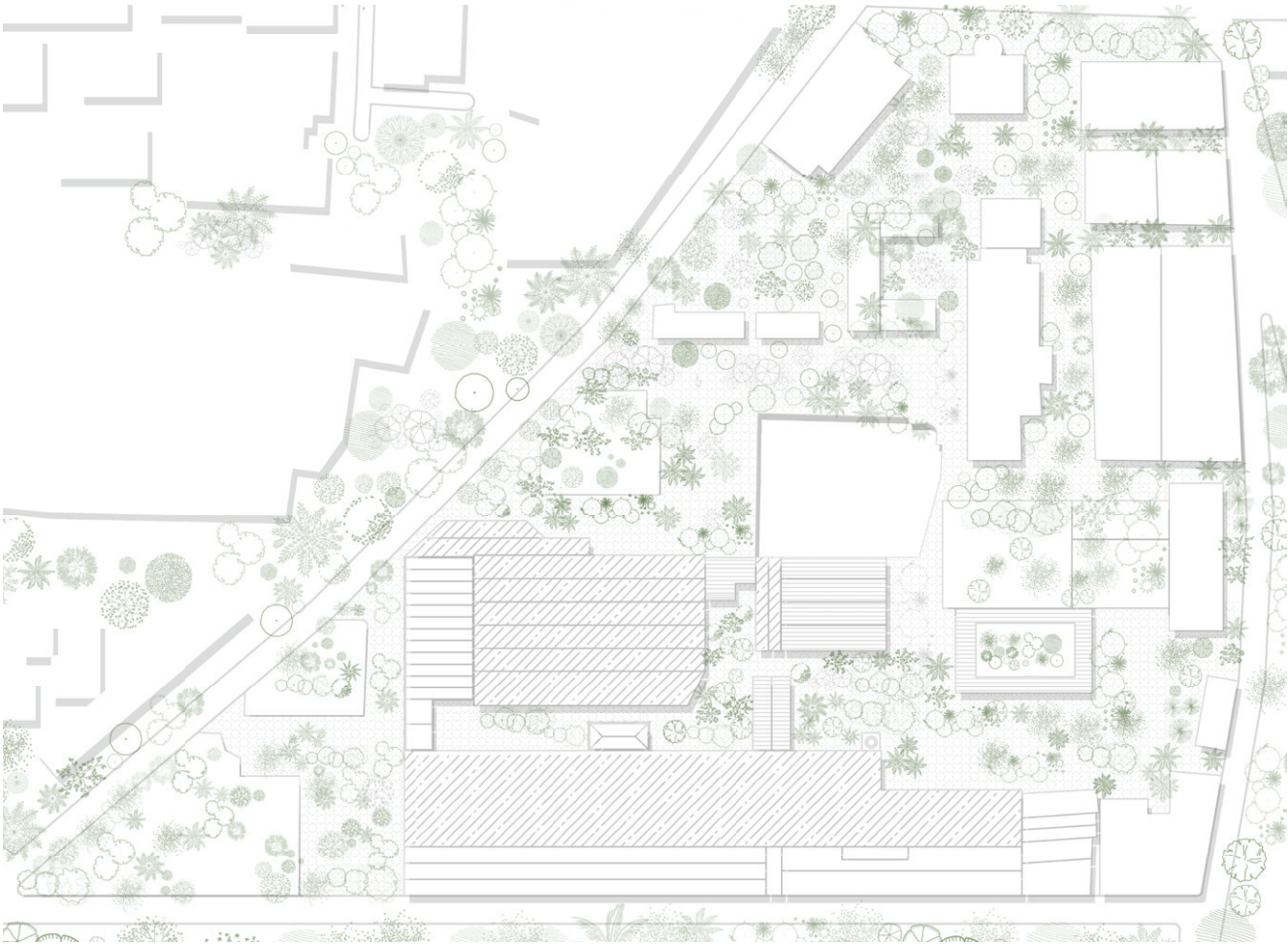
Creation of paths

Path is created as per the position of ruins and the position of the trees. In order to to make a natural look with lesser site intervention.
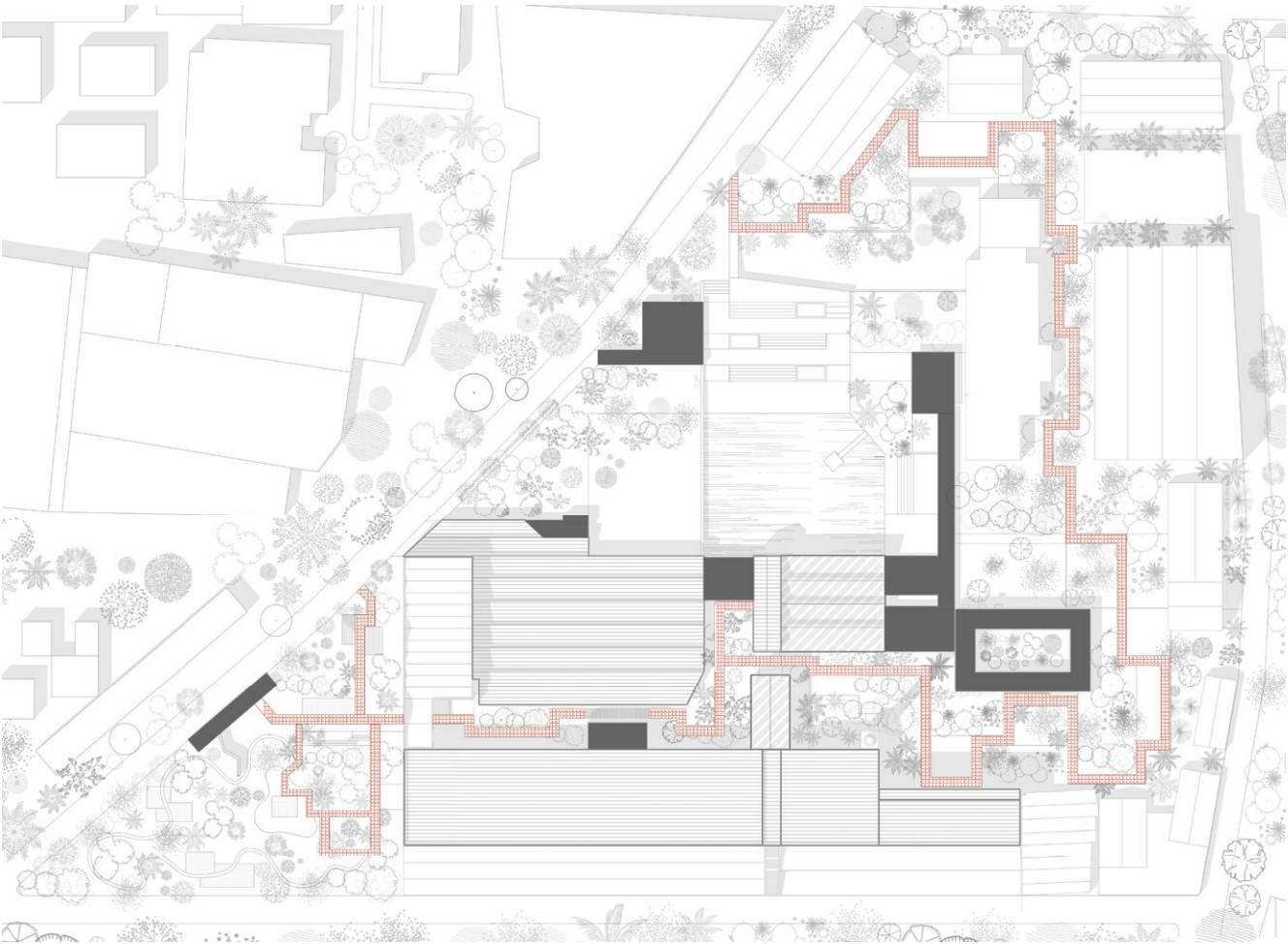

Fig. 282 Existing vegetation on site © Author

Fig. 283 Creating pathways along the trees © Author

Identifying ruins and emphasising it

The site has ruins of old buildings in various parts which has been emphasised through its urban footprint. The outline of the building shape is highlighted using pavements and trees. The addition of trees in the new open areas.
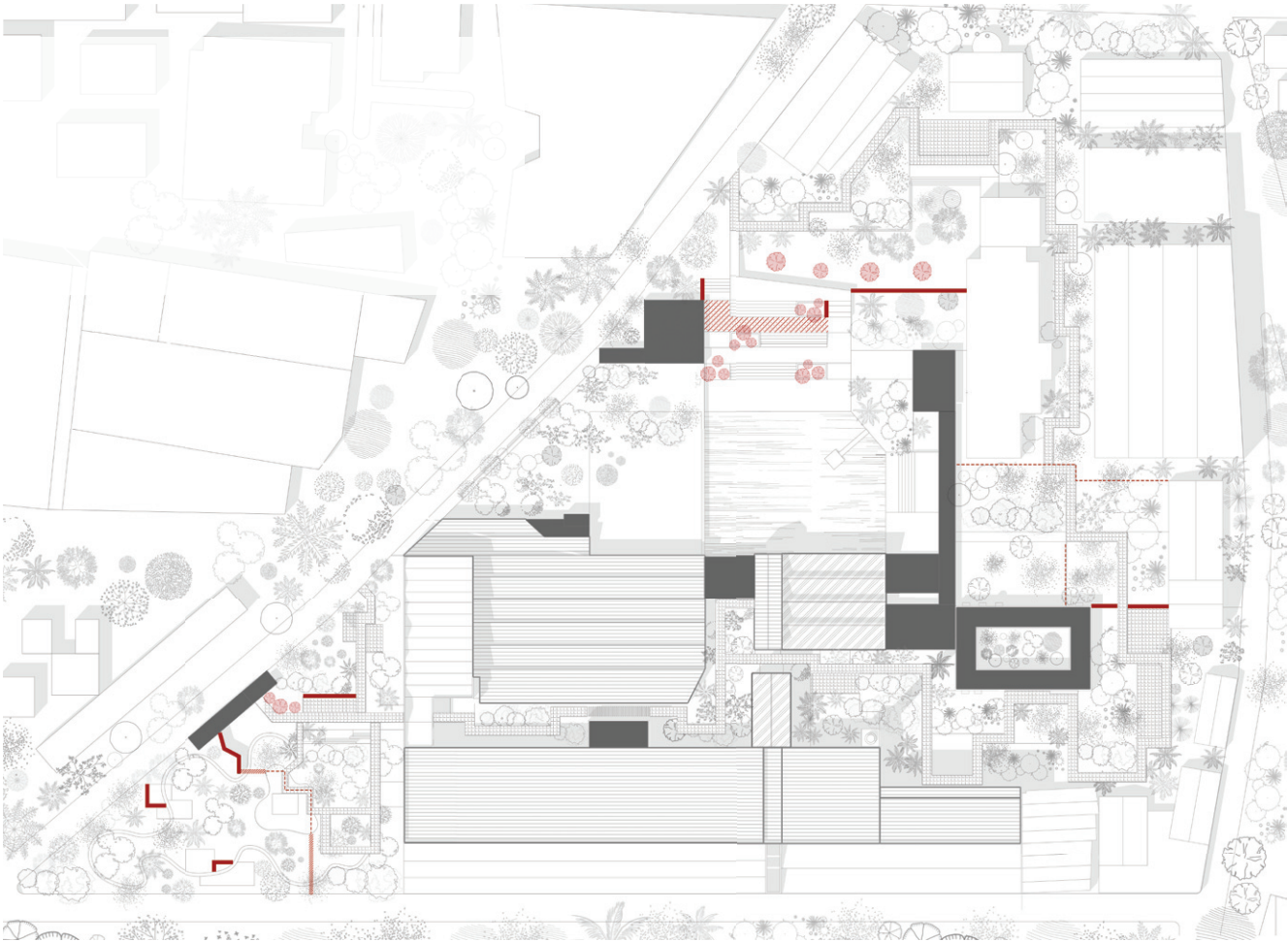
Fig. 284 Retaining and emphasising the ruins © Author

Creation of open spaces and water bodies

The open spaces are created along the natural spaces where vegetation is scarce and also central to the site. Water bosies are introduced at the lowest contour as well as a subtank to the central pond.
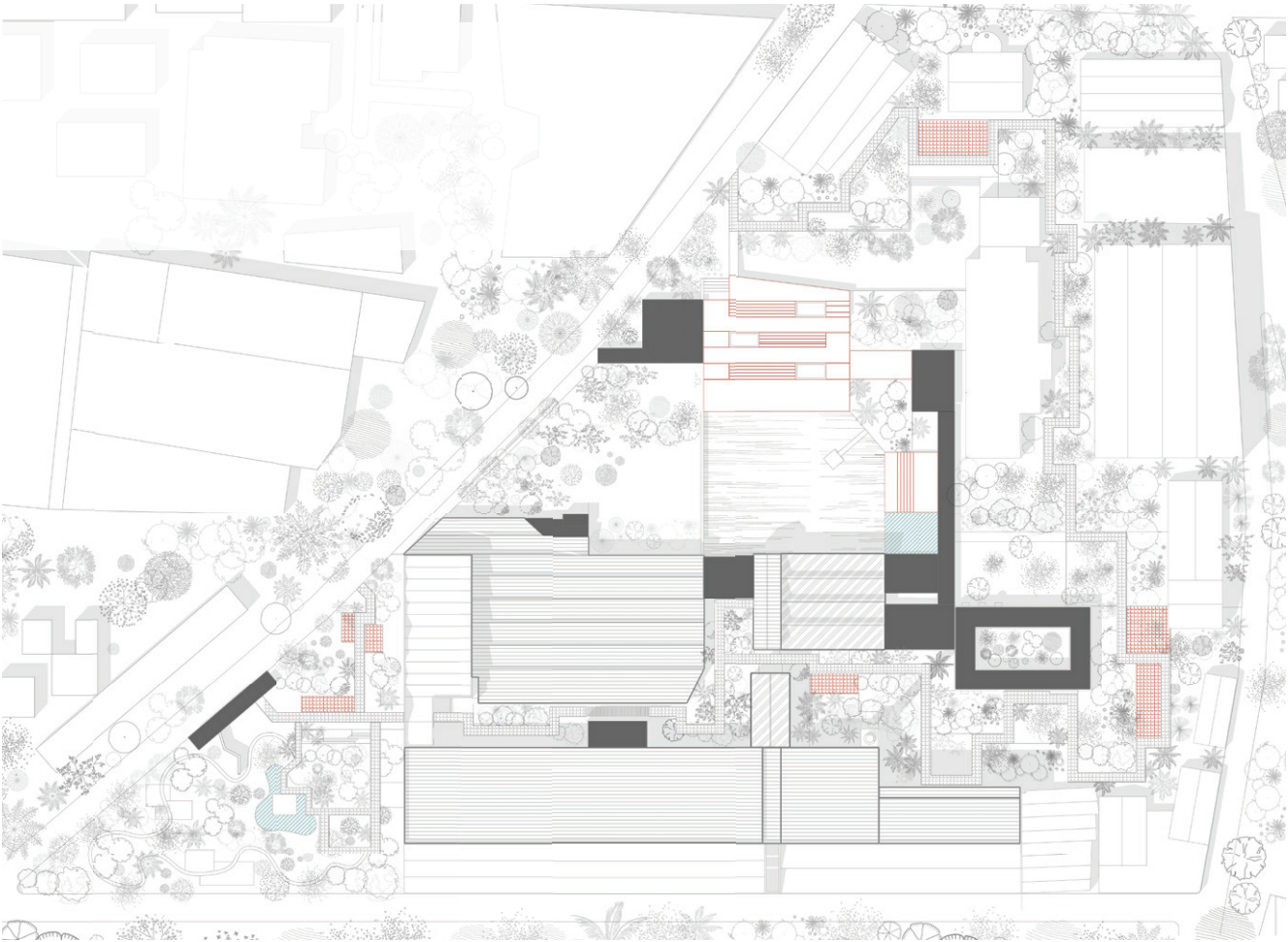
Fig. 285 Creating open spaces and new water bodies © Author

THE MASTERPLAN

LEGEND

➕ Inscriptions and installations

── Ruins remains

── Recycled additions

▨ Roof at different levels

▤ Major plazas

▤ Small plazas

▦ Pond

▦ Greenscape

☐ Amphitheatre

▦ Green heritage industrial park

☐ Buildings

Fig. 286 Masterplan © Author

Fig. 287 Additions section 1 © Author

5 m

0 Km   30m

Fig. 288 Additions section 2 © Author

5 m

0 Km   30m

Fig. 289 Additions section 3 © Author

5 m

0 Km   30m
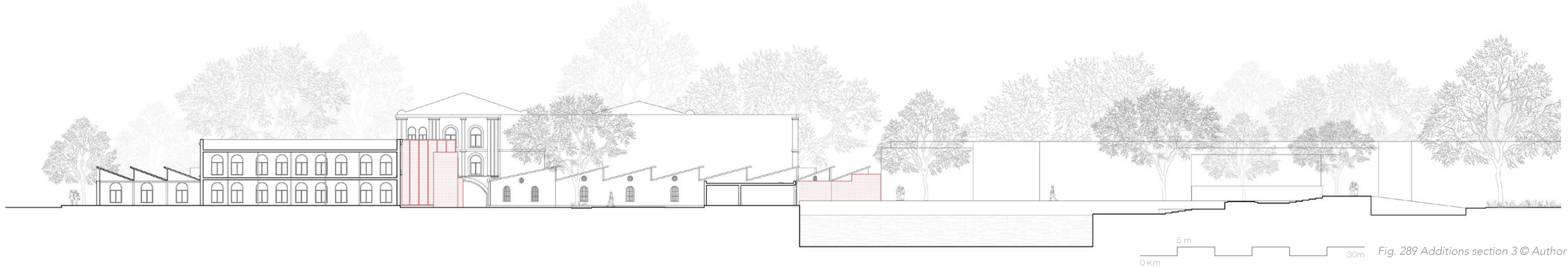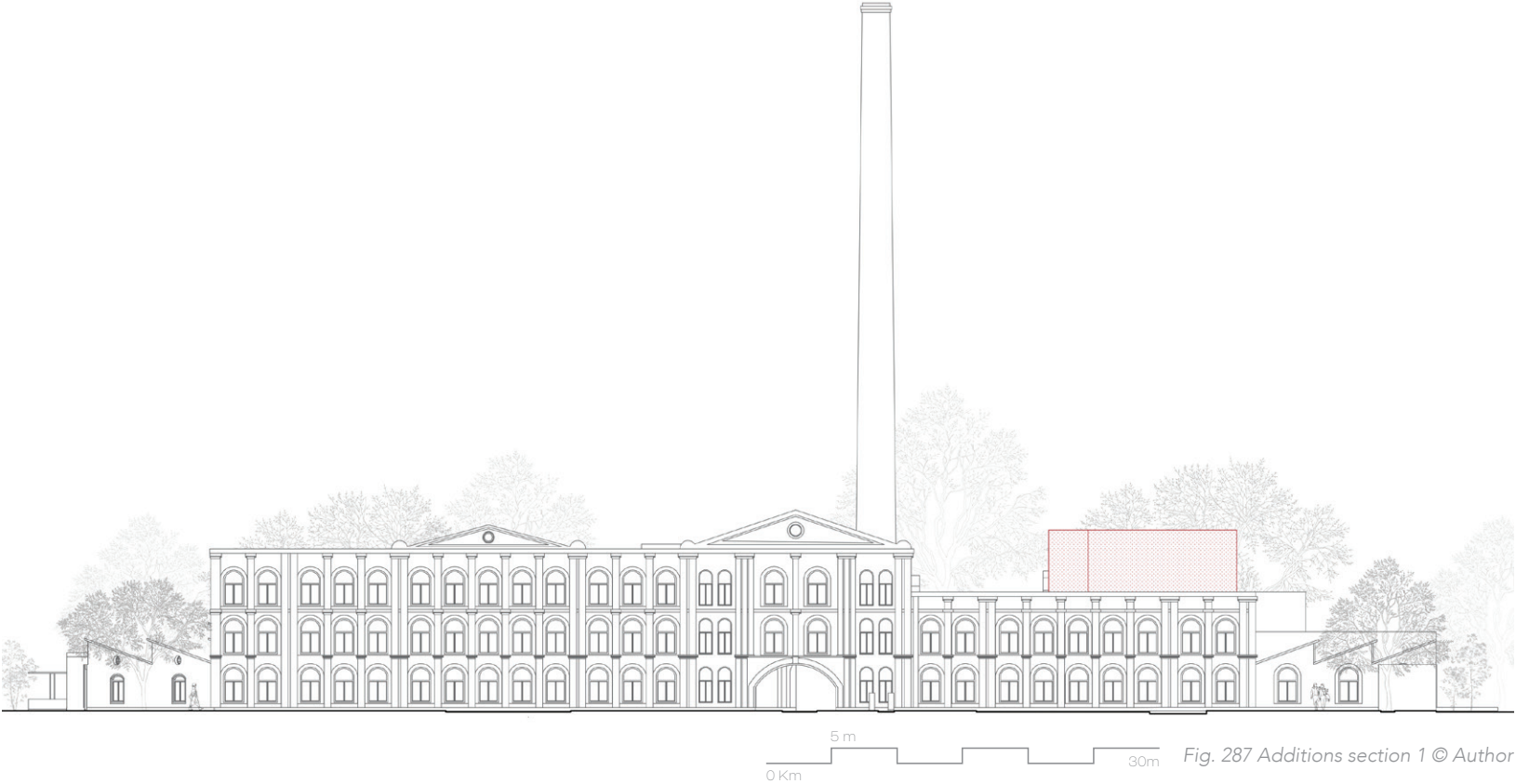
10.7 LANDSCAPE DETAILS

DETAILING THE LANDSCAPE

The site has ruins of old buildings in various parts which has been emphasised through its urban footprint. The outline of the building shape is highlighted using pavements and trees. The addition of trees in the new open areas
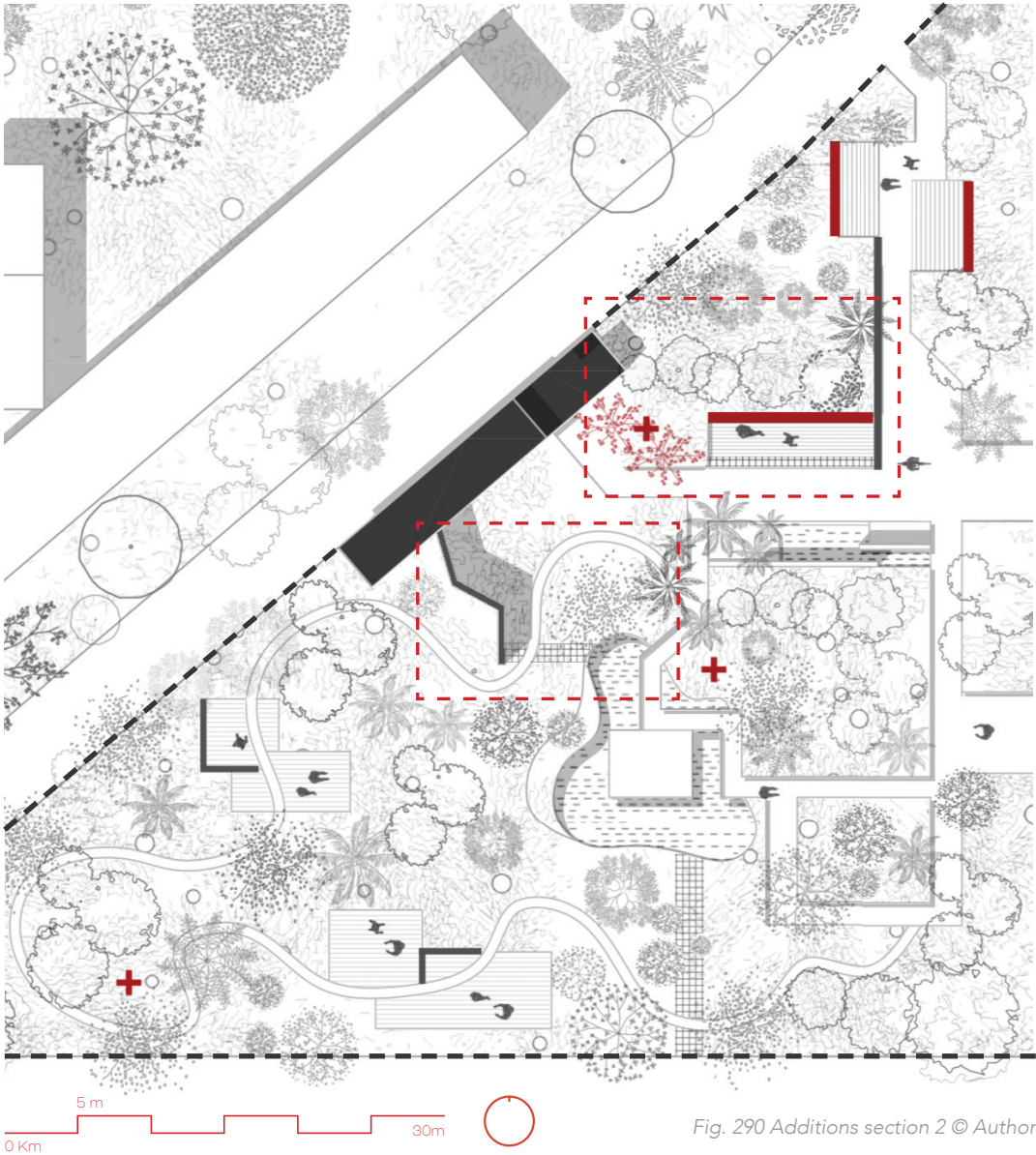

Fig. 290 Additions section 2 © Author
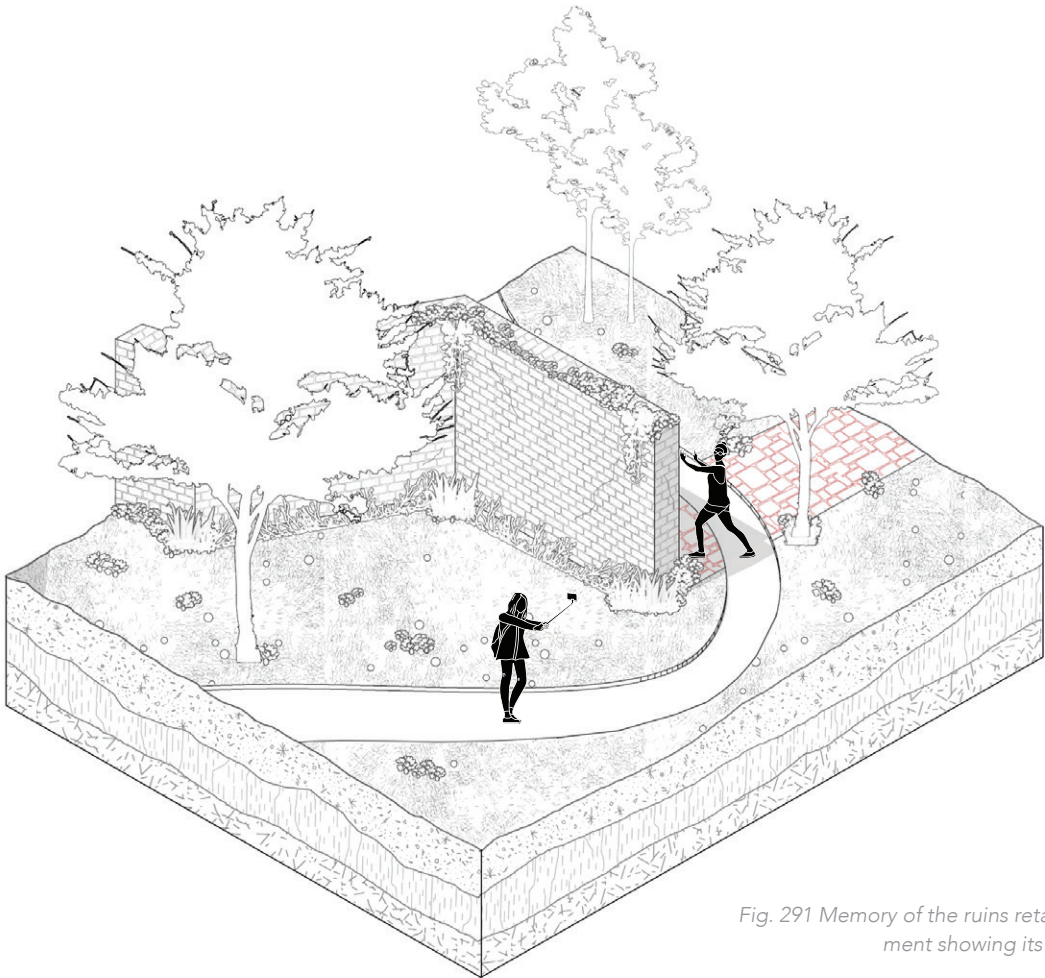
Fig. 291 Memory of the ruins retained via pavement showing its plan © Author
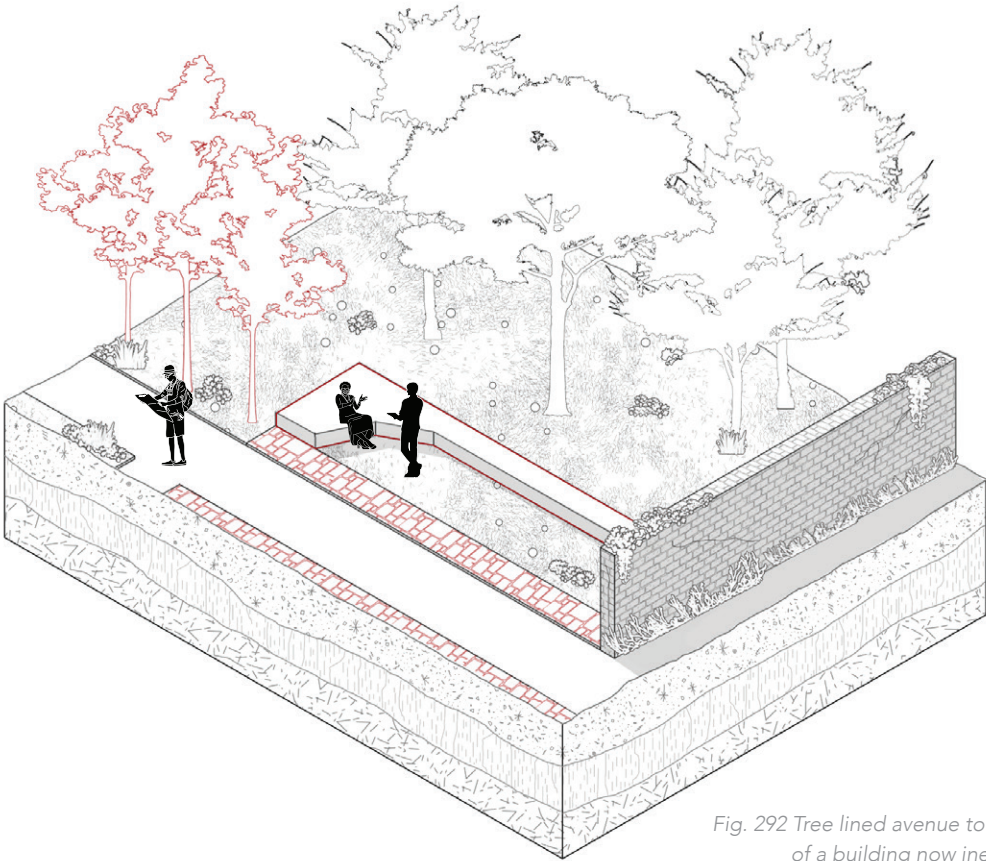
Fig. 292 Tree lined avenue to depict existence of a building now inexistent © Author

LANDSCAPE DETAILS

The site has ruins of old buildings in various parts which has been emphasised through its urban footprint. The outline of the building shape is highlighted using pavements and trees. The addition of trees in the new open areas
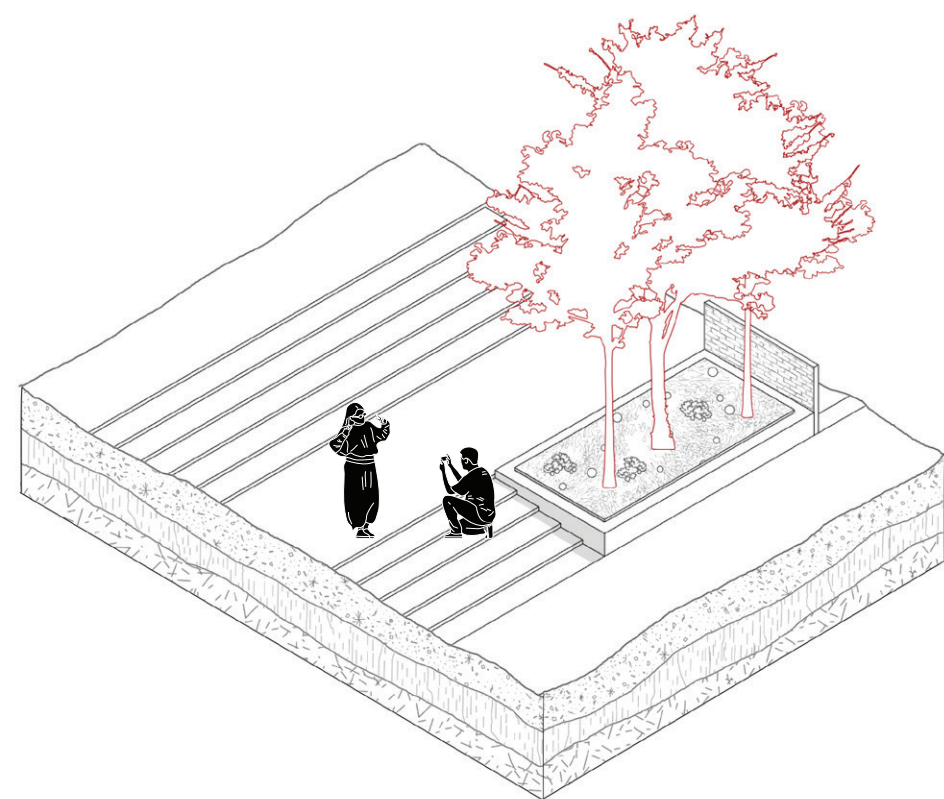
Fig. 293 Stepped seating-utilisng contours © Author
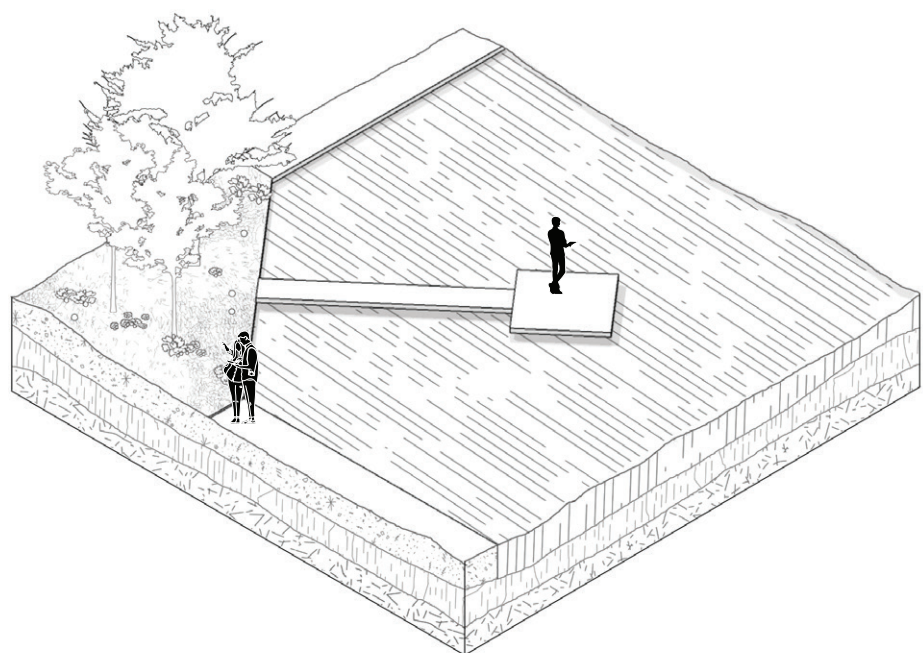
Fig. 294 Boarding area to boat © Author
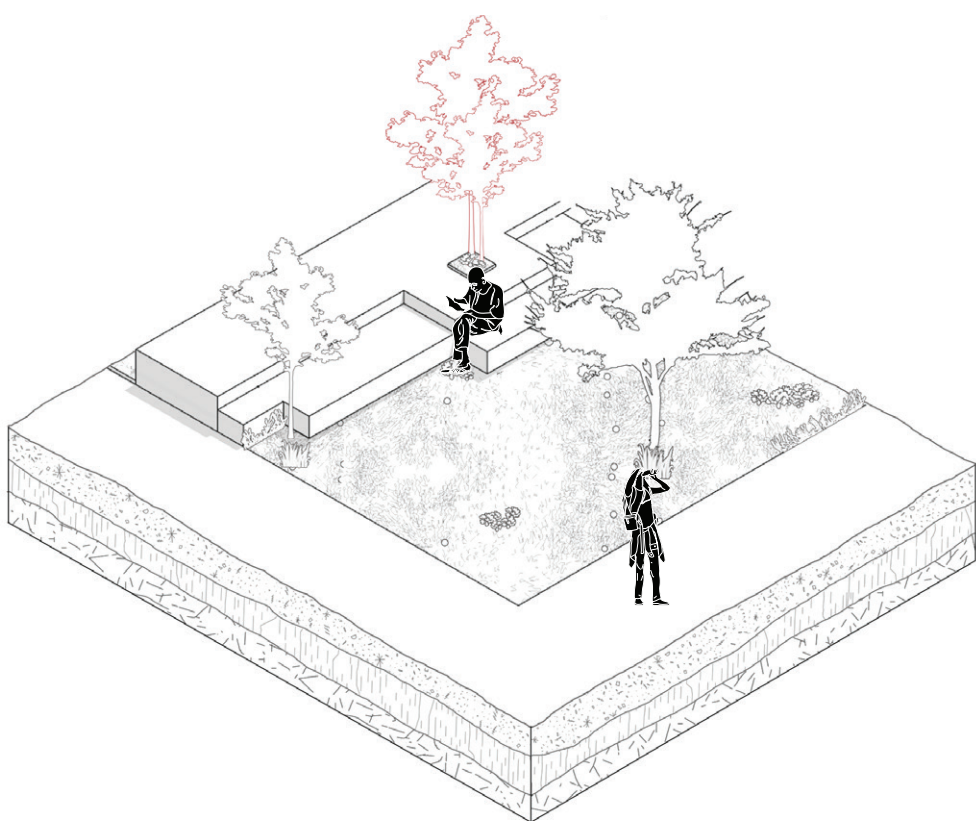
Fig. 295 Seating in plazas © Author
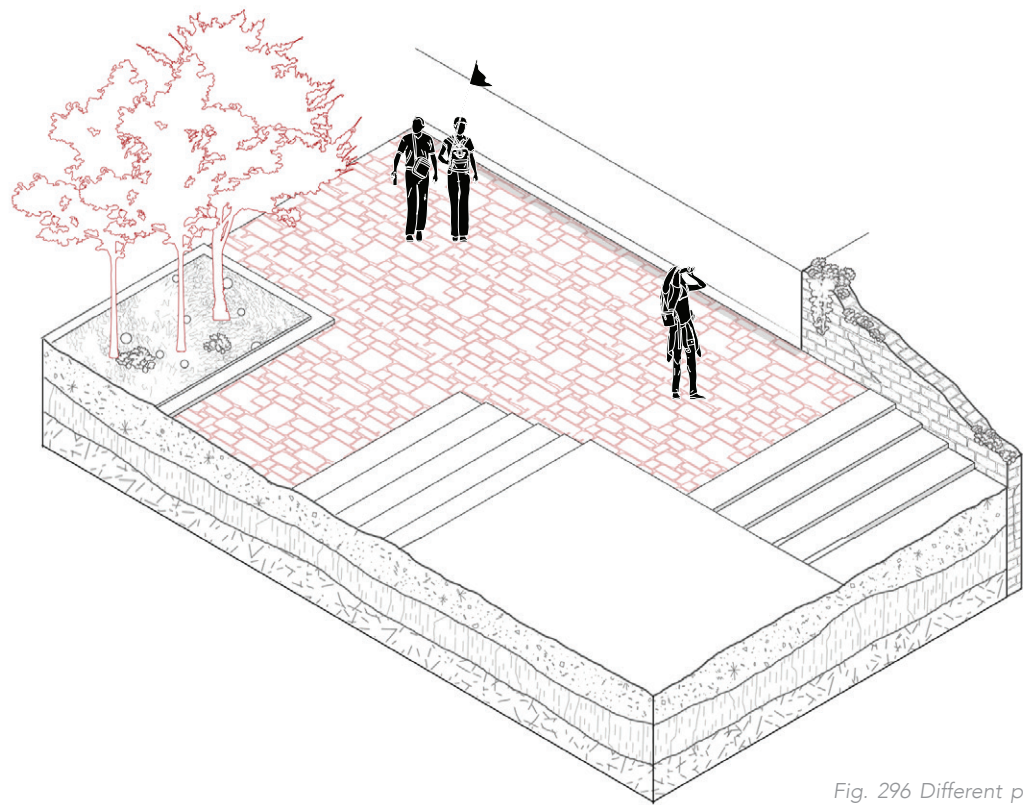
Fig. 296 Different pavement shwoing pre-
sence of an old building © Author
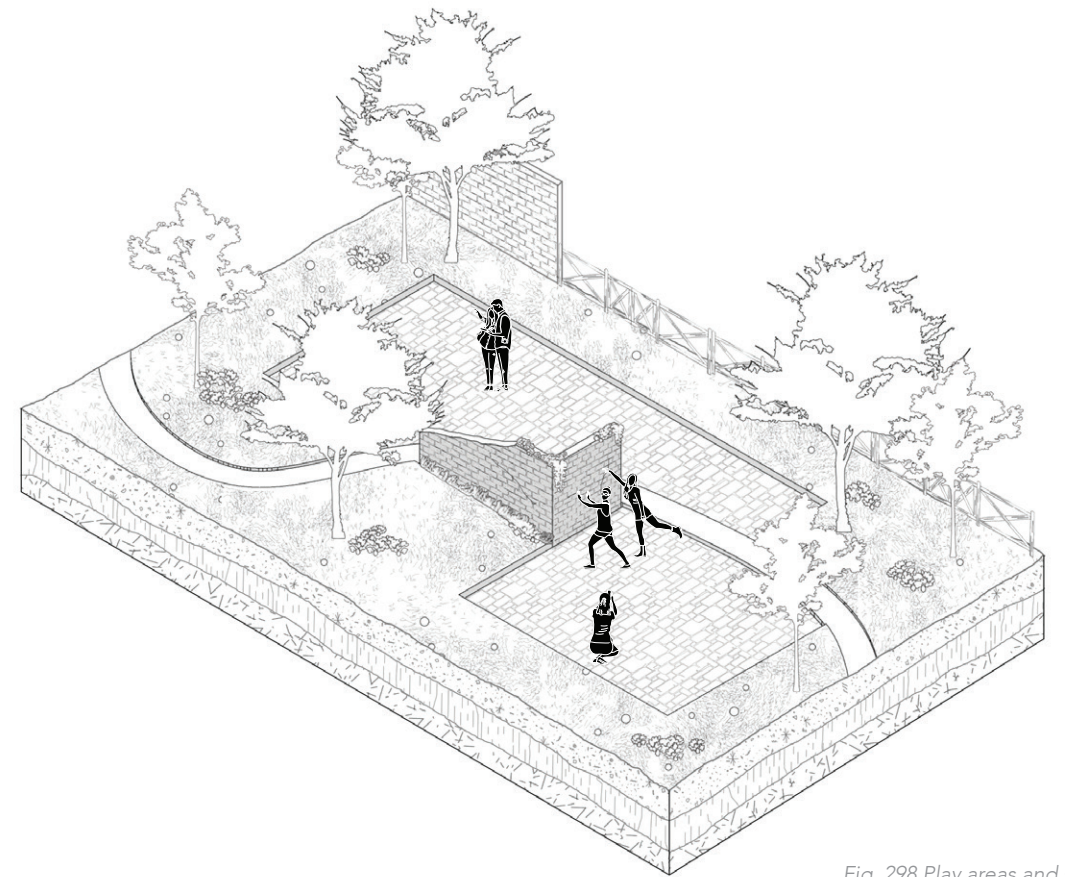
Fig. 298 Play areas and site boundary
© Author
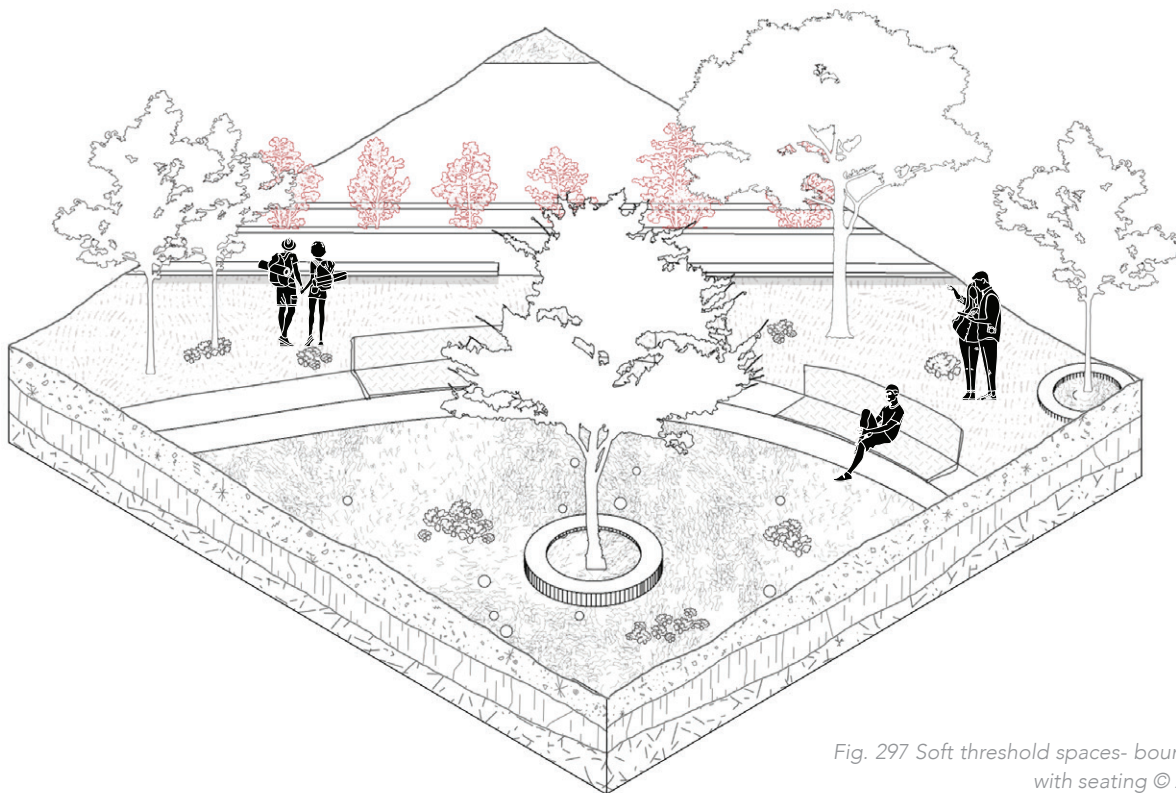
Fig. 297 Soft threshold spaces- boundaries
with seating © Author
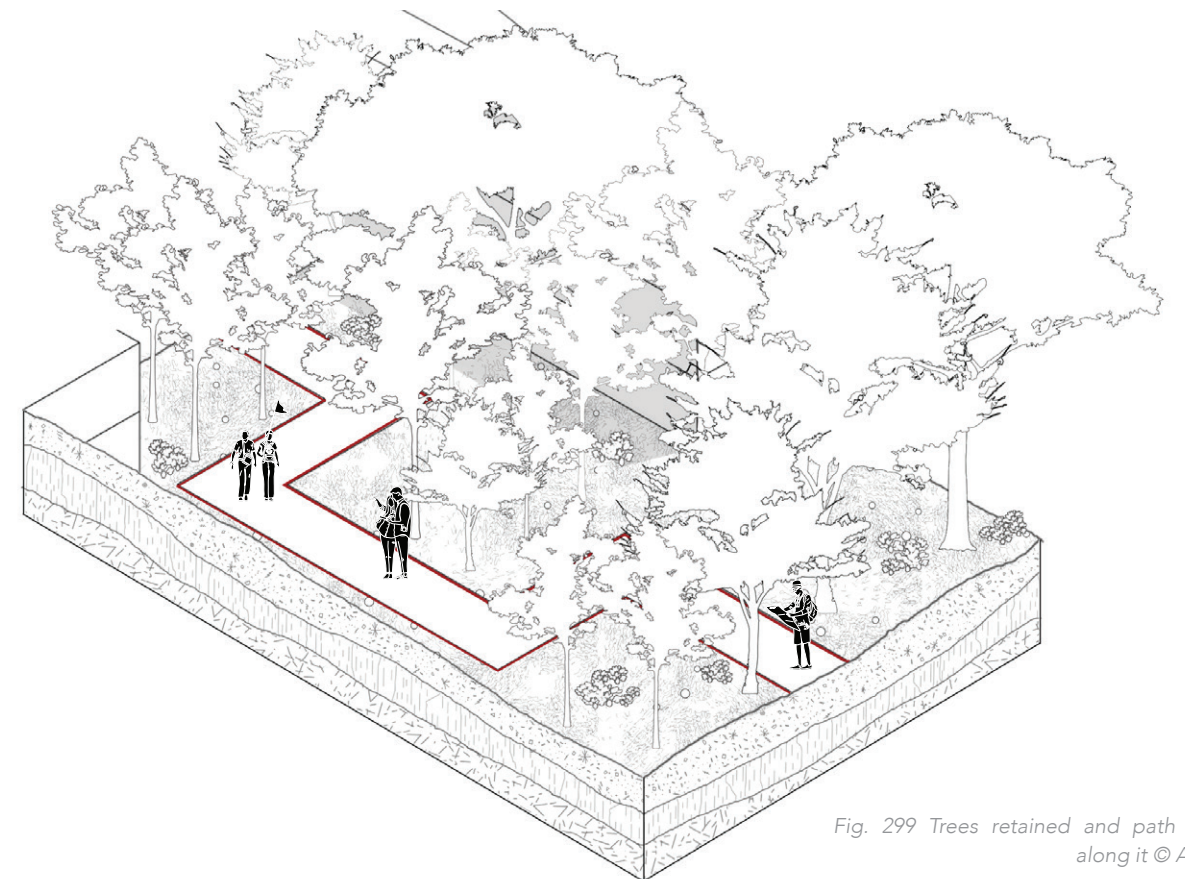
Fig. 299 Trees retained and path taken
along it © Author

10.8 SITE AXONOMETRY

LEGEND

- ■ Museum zone
- □ Craft and cultural zone
- ■ Ruins and remains
- ⌐ ⌐ Zone detailed for design

Textile centre

Lost Heritage

Curio shop

Museum
Machines exhibit
Art gallery
Travelling exhibition
Archives
Library

Boutiques

Entrance and
visitor's centre
Heritage park

Craft stores

NTC Offices

Restaurant

Open space and plaza

Amenities

Workshop

Craft stores

Open air space

Fig. 300 Axonometry and details © Author

Restaurant, pavilion, amenities and exhibits

Heritage park and water harvesting pond

Open air space and services

Museum, Archives and art gallery

Textiles of India centre

DEVELOPMENT PROCESS

The site has ruins of old buildings in various parts which has been emphasised through its urban footprint. The outline of the building shape is highlighted using pavements and trees. The addition of trees in the new open areas

Area in focus: Structures to be demolished
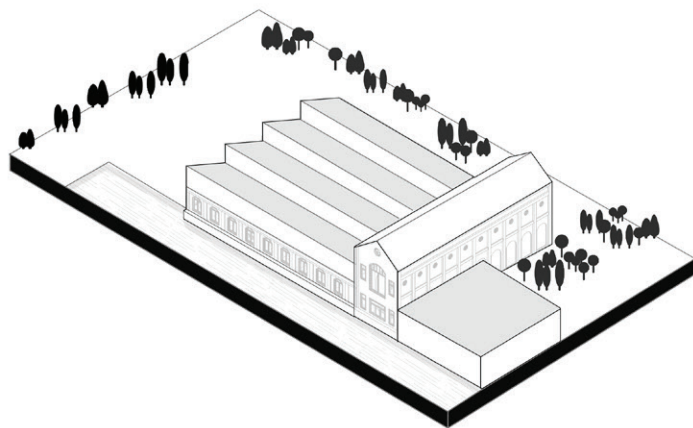
Area in focus: Structures to be added/replaced
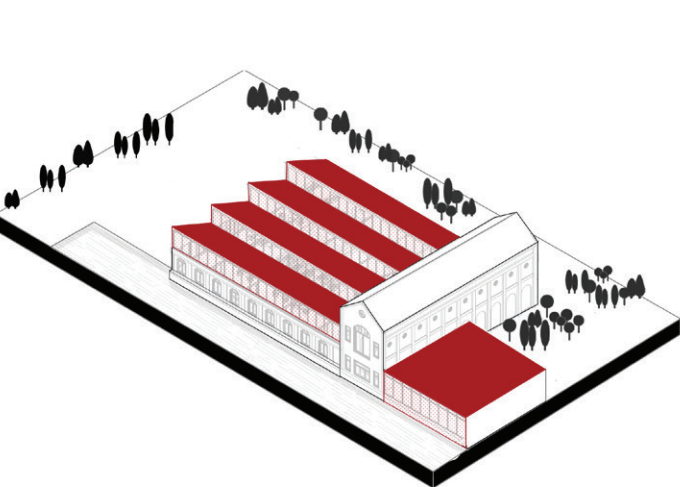
Area in focus: Defining the context
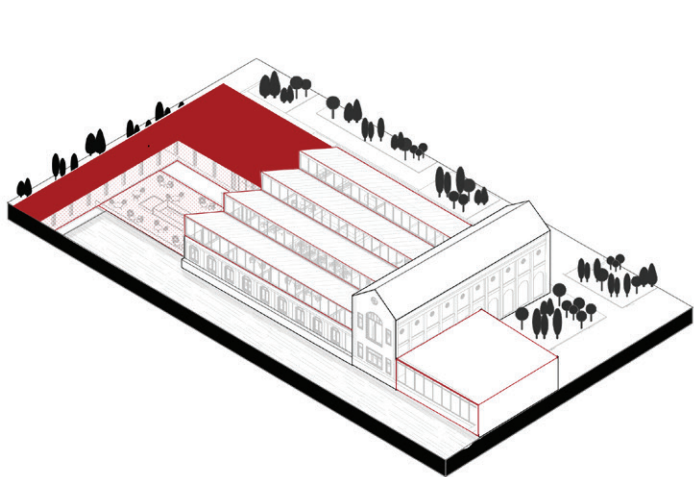
Removing dilapidated roof structure
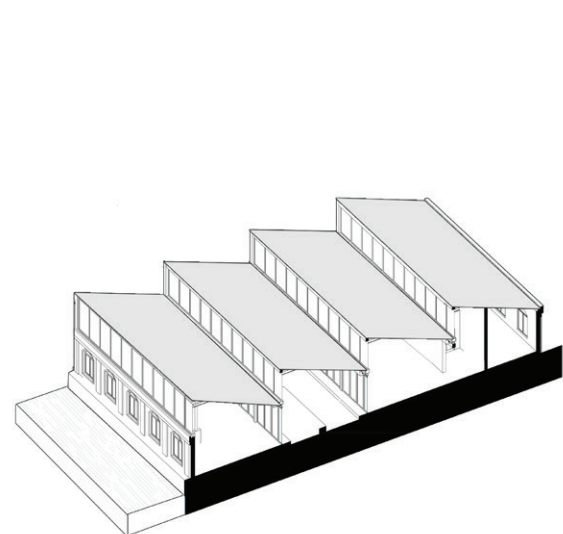
Adding new roof strcuture and replacing windows
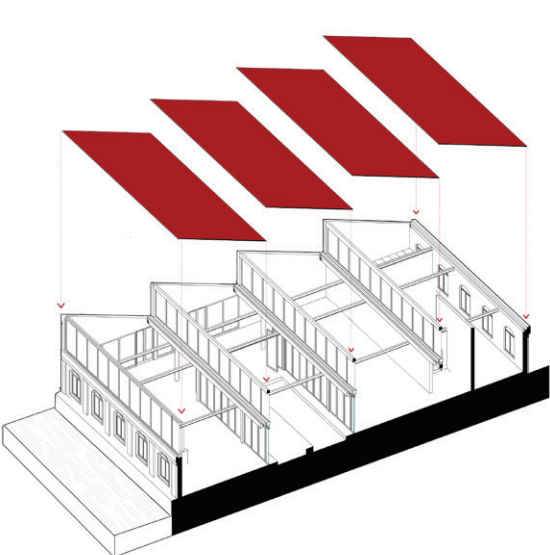
Wall structure to support new roof
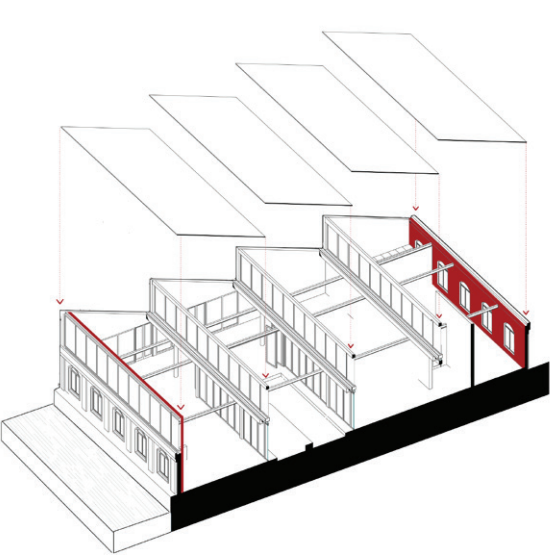
Creating spaces within the existing
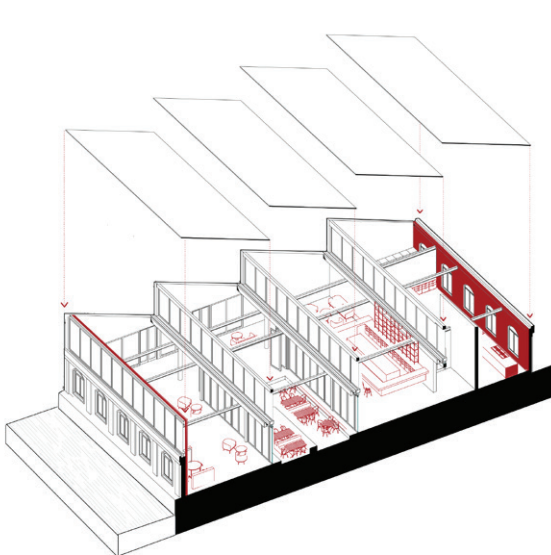
Fig. 301 Development process of the block
© Author

THE DESIGN

The design encompasses a complete revitalisation of the old textile mills to accomodate a museum for the showcasing of the history of the prior mill district. It has spaces for art galleries, permanent exhibitions, craft workshops, travelling exhibitions, archives, library, NTC offices, crafts stores, boutiques, restaurant, amenities, visitor's centre, textile centre and heritage gardens with plaza spaces and pond. The main idea of the design was to retain the existing integrity of the building while replacing the dilapidated with contrasting elements. The indigenous vegetation has been retained and the paths have been created along it. The ruins are emphasised and the gardens provide for open spaces which is otherwise lacking in this part of Mumbai. The main part which is detailed is the restaurant, pavillion, art gallery and amenities part of the entire site in order to depict how the prototype of a heritage revitalisation would work in the indian context. The pavillion is a new addition to the existing structured so as to provide more definition and access within the site whereas the restaurant is a retained existing block with a replaced roof. The art gallery on the other hand is retained in its entirity with only small repairs and the amenities is partially re-developed structure.

Fig. 302 Monometric view of site from the North © Author

PLAN OF AREA IN FOCUS

LEGEND

- Greenscape
- Walkway
- Pond
- Glass door with metal frame
- Addition load bearing structures
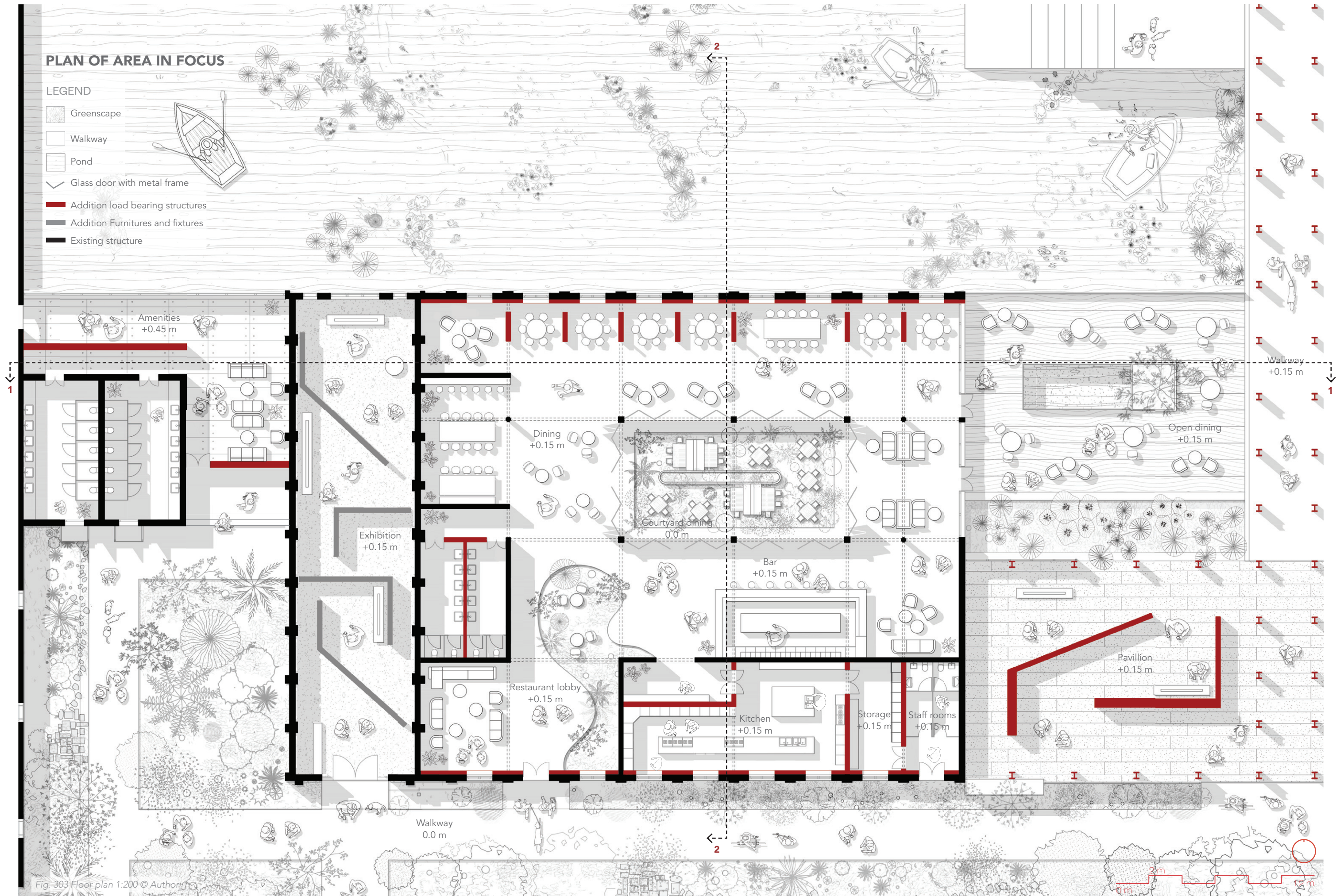- Addition Furnitures and fixtures
- Existing structure

Amenities
+0.45 m

Walkway
+0.15 m

Dining
+0.15 m

Open dining
+0.15 m

Courtyard dining
0.0 m

Exhibition
+0.15 m

Bar
+0.15 m

Restaurant lobby
+0.15 m

Pavillion
+0.15 m

Kitchen
+0.15 m

Storage
+0.15 m

Staff rooms
+0.15 m

Walkway
0.0 m

Fig. 303 Floor plan 1:200 © Authors

SECTION 1-1

2 m

0 m

12 m

Fig. 305 Perspective section across the restaurant © Author
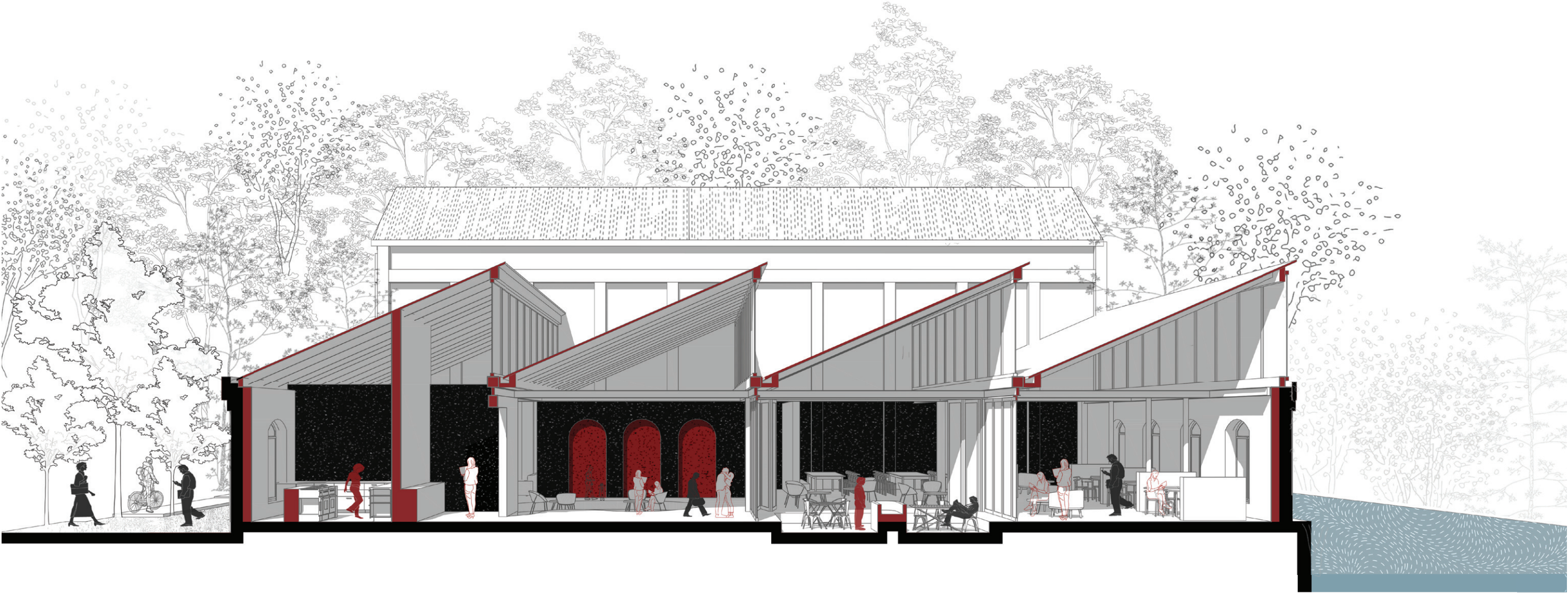
2 m

0 m   6 m

AXONOMETRY AND DETAILS

The axonometry shows the zoomed in view of the restaurant, pavilion, amenities and exhibition space. Further, the part of the restaurant is zoomed in and an isometric section is shown to show the interior layout and roof structure. The details of diffrent joints are also shown as a detailed exploded axonometry.
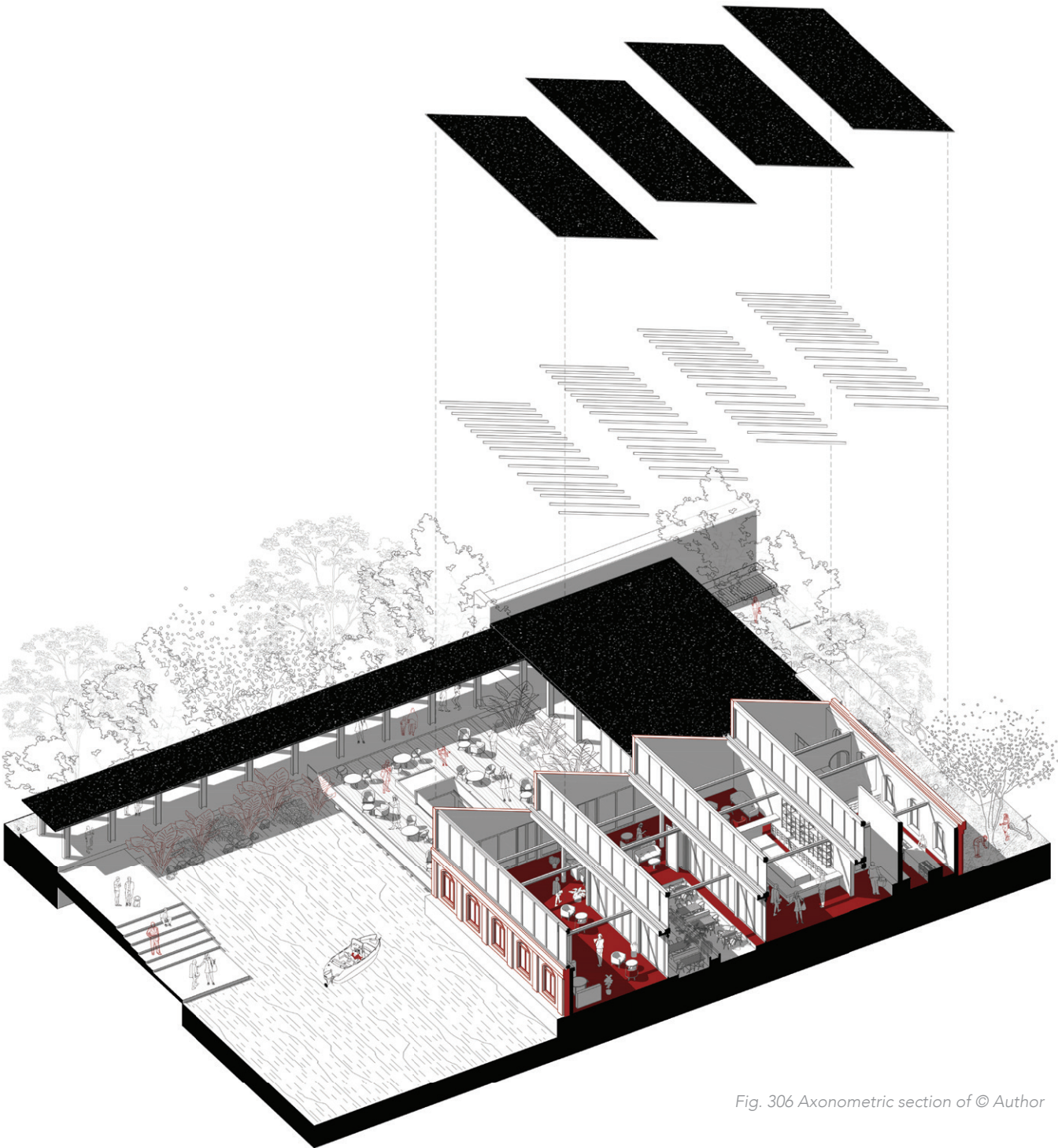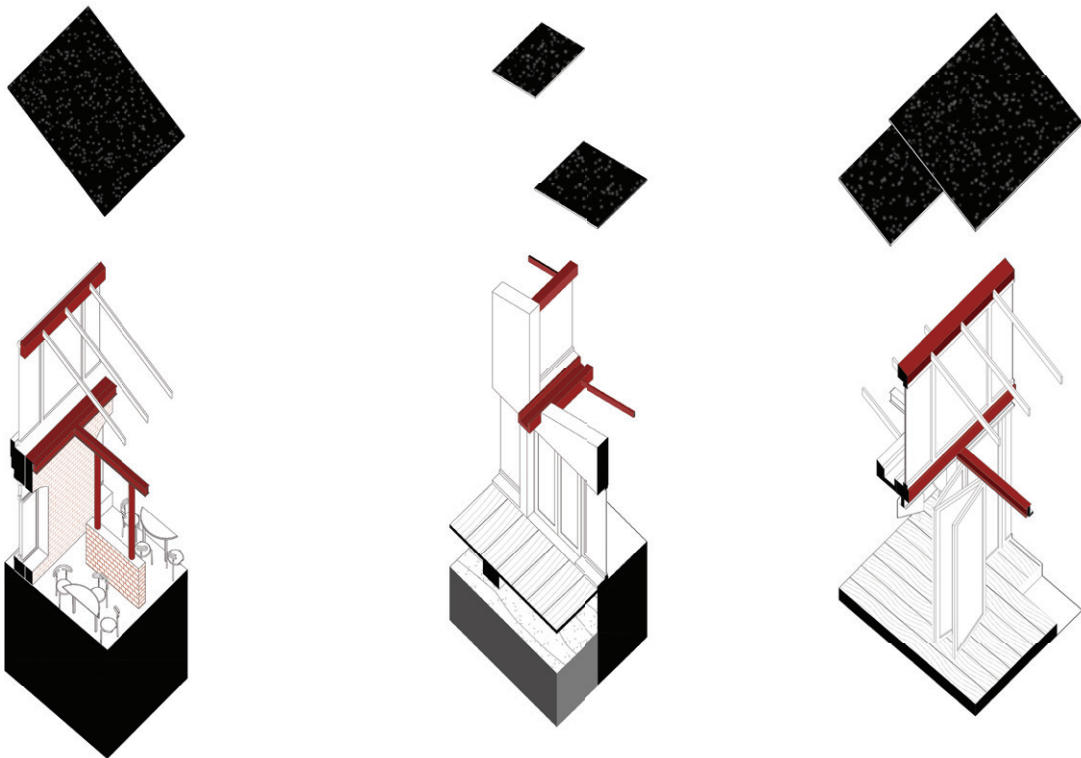

DETAIL 1: Connection to wall   DETAIL 2: Door and roof   DETAIL 3: Roof and window

Fig. 307 Details of joints © Author

Fig. 306 Axonometric section of © Author

Fig. 308 Axonometry © Author

AXONOMETRY AND DETAILS

The axonometry shows the zoomed in view of the restaurant, pavilion, amenities and exhibition space. Further, the part of the restaurant is zoomed in and an isometric section is shown to show the interior layout and roof structure. The details of diffrent joints are also shown as a detailed exploded axonometry.

DETAIL 1: Connection to wall   DETAIL 2: Door and roof   DETAIL 3: Roof and window

Fig. 307 Details of joints © Author

Fig. 306 Axonometric section of © Author

Fig. 308 Axonometry © Author

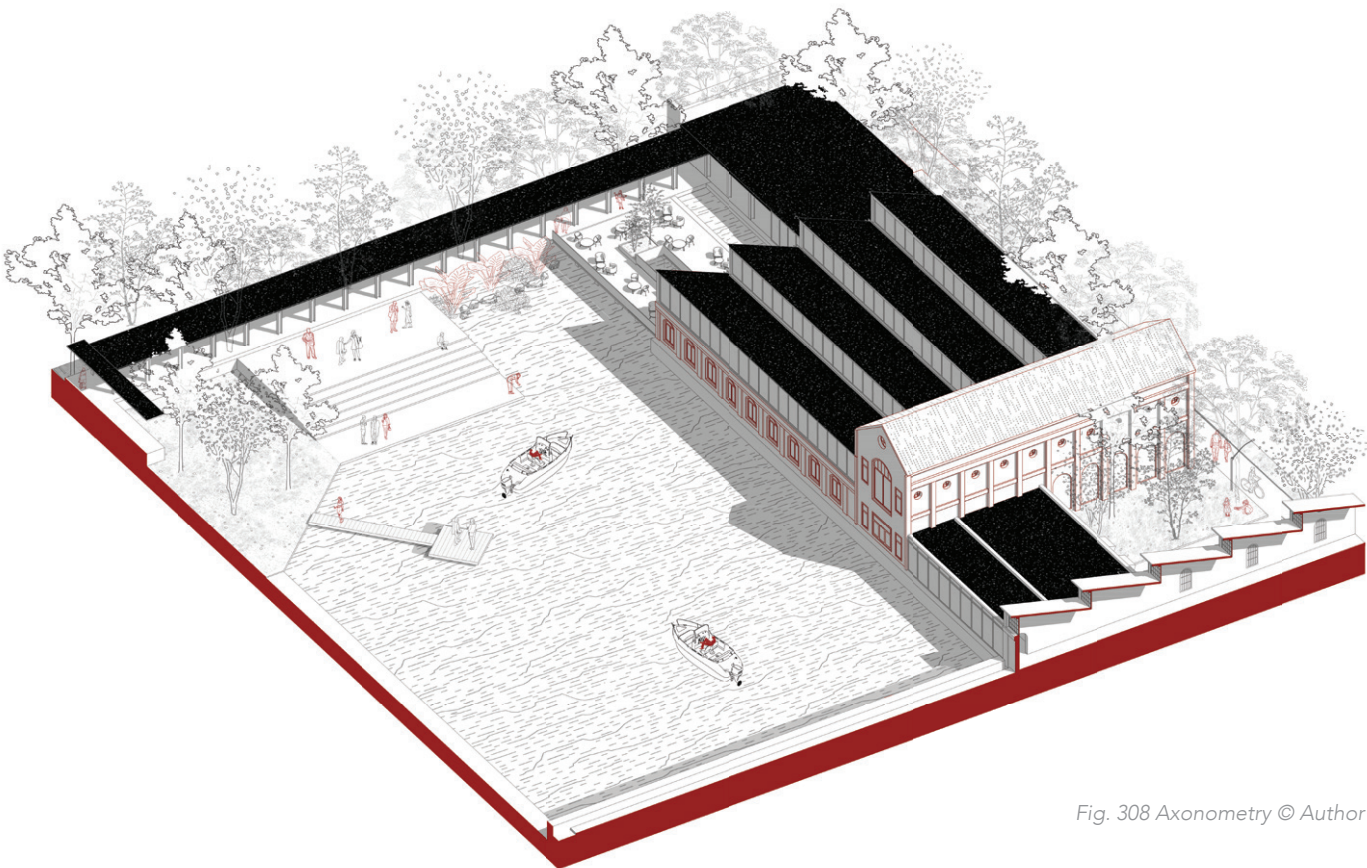# ADDITIONS TO EXISTING STRUCTURE

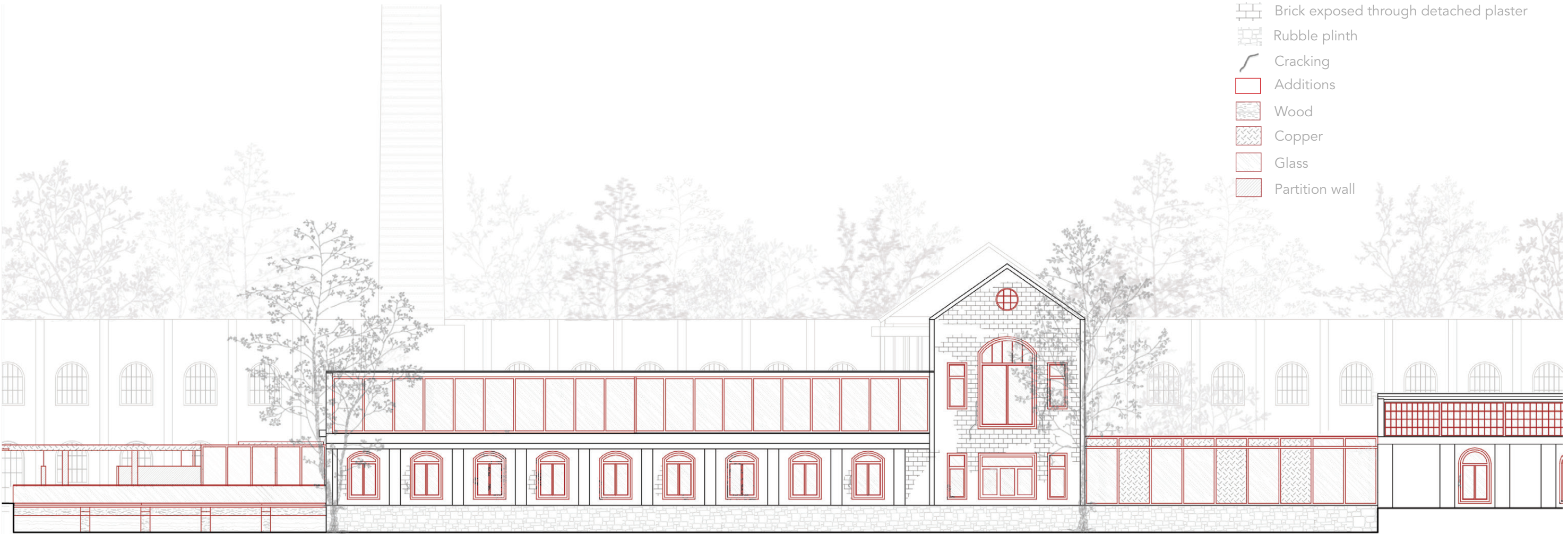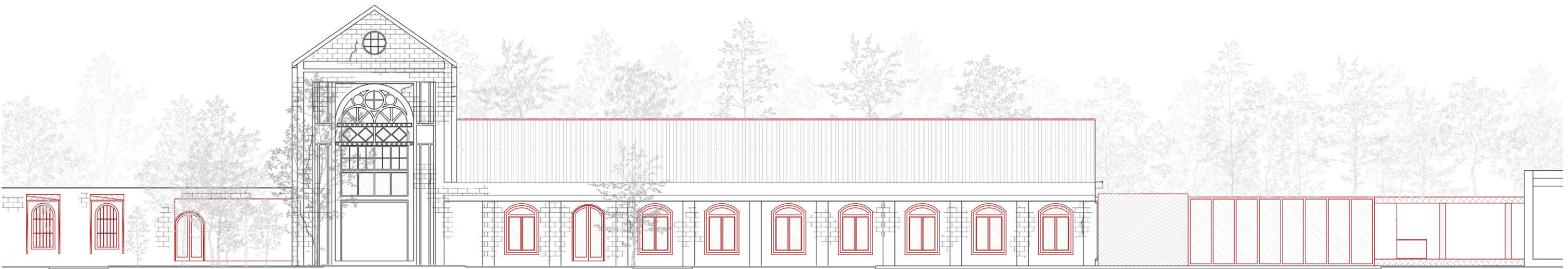*Fig. 309 Additions on South facade © Author*

2 m

0 m   12 m

Fig. 310 Additions on North facade © Author

2 m

0 m   12 m

10.10 TRANSFORMATION

EXISTING
Area in focus, South elevation

Fig. 311 Decays on the South elevation of the area in focus © Author

Stain

Biological Patina

Hairline cracks

Spalling

Detachment

Biological colonisation
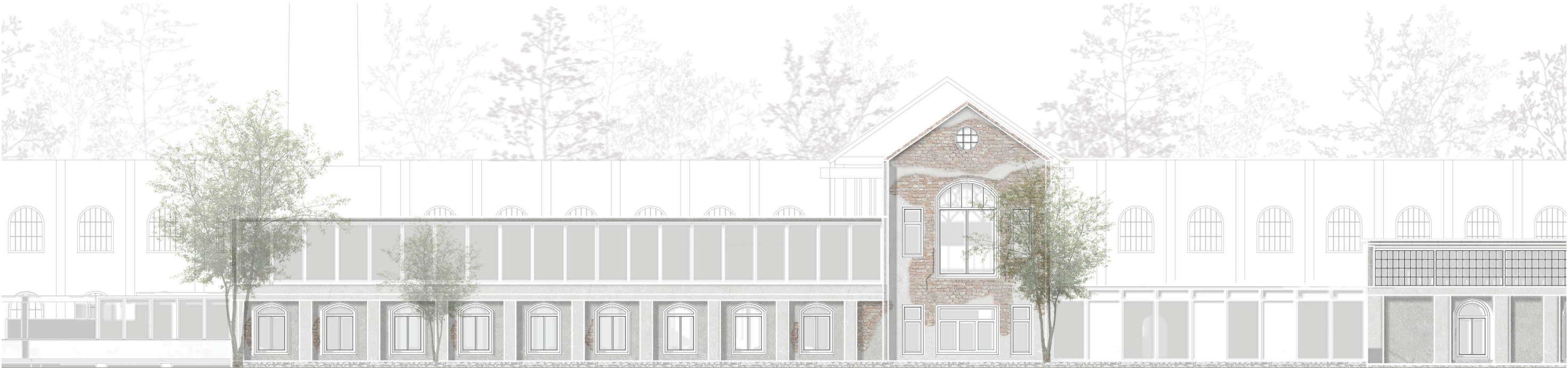
Efflorescence

AFTER INTERVENTION
Area in focus, South elevation

*Fig. 312 Transformations on the South elevation of the area in focus © Author*

EXISTING
Area in focus, North elevation

Fig. 313 Decays on the North elevation of the area in focus © Author

Stain

Detachment

Hairline cracks

Spalling

Efflorescence

Biological colonisation

Biological Patina

AFTER INTERVENTION
Area in focus, North elevation

Fig. 314 Transformations on the North elevation of the area in focus © Author

2 m

0 m

12 m
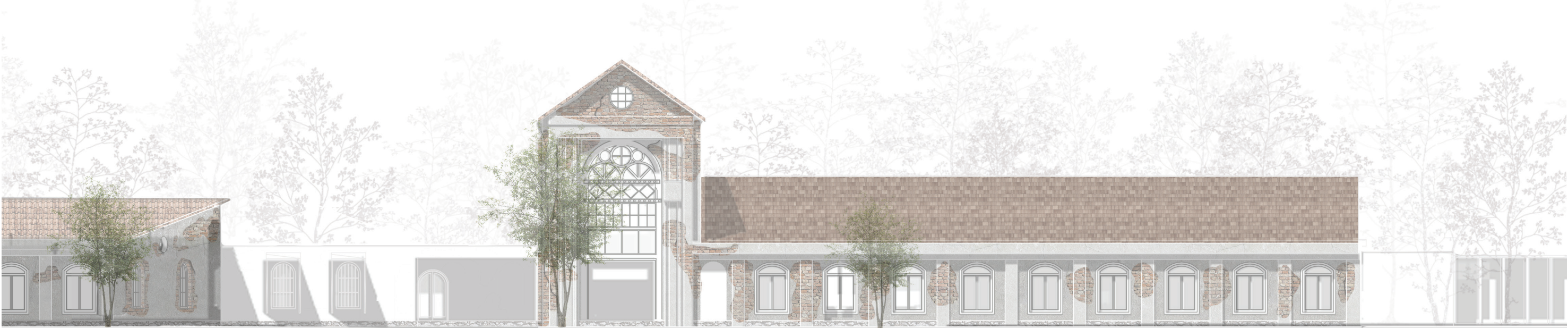
10.11 RENDERS

Fig. 315-317 (left ro right) Renders of interventions and ruins © Author

Fig. 318-320 (left ro right) Renders of interventions and ruins © Author

Fig. 321 Landscape render © Author

Fig. 322 Landscape render © Author

Fig. 323 Landscape render © Author

Fig. 324 Landscape render © Author

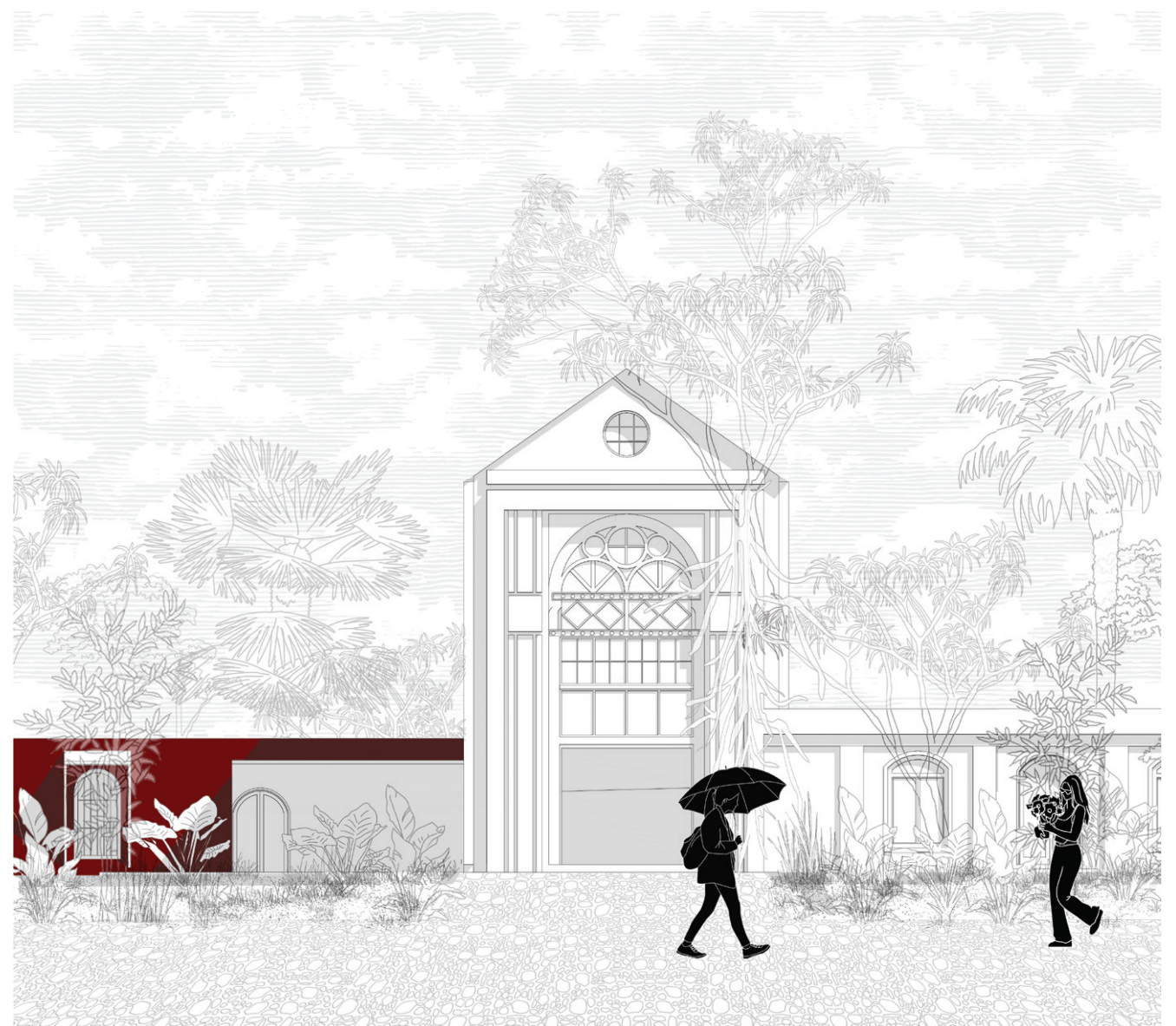Fig. 325 Pathway from pavillion © Author
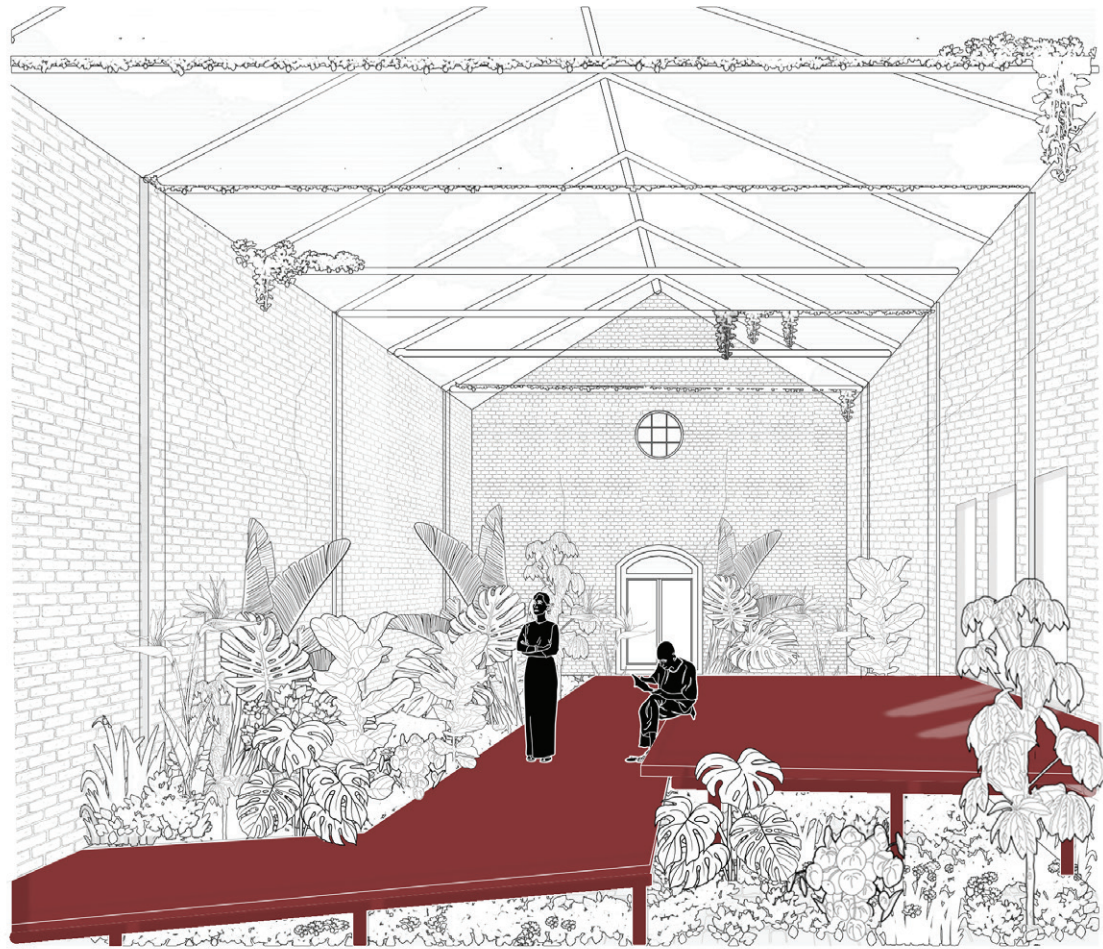

Fig. 326 Amenties and gallery © Author
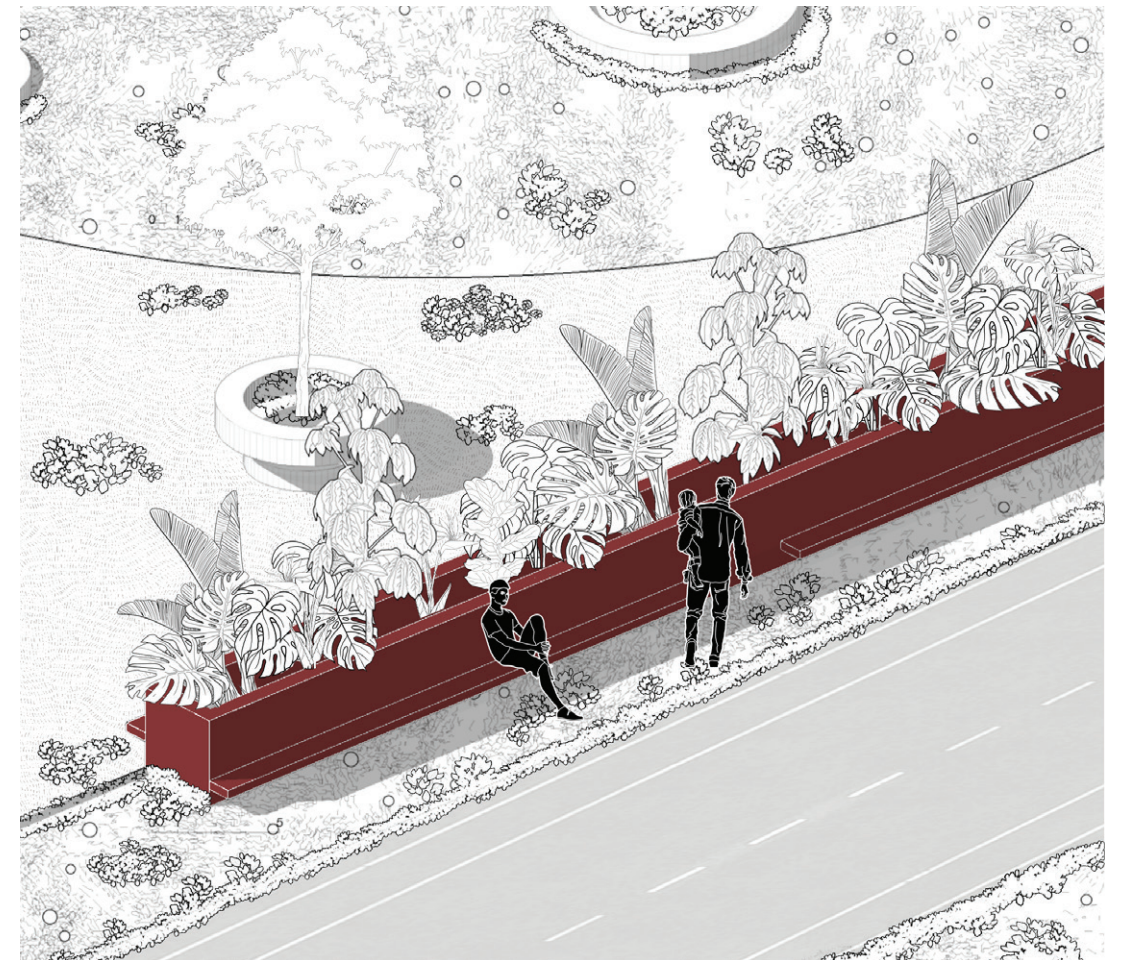
Fig. 327 The idea of a ruin as lost heritage © Author

Fig. 328 Pathway from pavillion © Author

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APPENDICES

UDRI reports on Mumbai mills

An independent organisation that provides extensive research resources on Mumbai mills. The website offers a set of comprehensive reports, studies, publication and maps that aids in the study of Mumbai mill lands.

https://www.udri.org/

KRVIA design cell: 1996 Charles Correa Report

The design Cell of Kamla Raheja Vidyanidhi Institute for Architecture provides information on Mumbai mills and offers a report of the 1996 Charles Correa study group that has a comprehensive detailed report of Mumbai mills.

https://krviadesigncell.wordpress.com/

Login Mumbai

A mapbook by UDRI, that provides different maps of Mumbai which makes the study of the mill lands and the context easier.

http://www.loginmumbai.org/

Ancient maps

Websites that provide ancient maps that enable us to study and understand the city of the past and how it transformed over time.

https://timemaps.com/history/south-asia-3500bc/
https://www.mapsofindia.com/history/ancient-india.htm
https://www.past-india.com/
https://commons.wikimedia.org/wiki/Category:Maps_of_trade_routes_of_India

In The Name of Housing

A study conducted by SPARE Mumbai under the guidance of architect Sameep Padora that illustrates the study of 11 affordable housing (chawls) in Mumbai. The website provides illustrations and graphics of Chawl housing by the author Niharika Kannan.

https://cargocollective.com/niharikakannan/In-The-Name-of-Housing

Chroniques ouvrières de Mumbai

A study by Perinne Philippe that provides details, illustrations and graphics on the Mumbai chawls.

https://issuu.com/perrinefcmx/docs/270816_apaj_libe

Mill Mumbai Repository

A website that provides various documentations, collection of journals and reports on the Mumbai mills.

https://millmumbai.tiss.edu/

600 Acres

A report that provides the history, location, and statistical data of the mills of Mumbai.

http://millmumbai.tiss.edu/wp-content/uploads/2015/04/600-ACRES-01.pdf

Photos and videos

Websites providing documented evidence.

https://toweringgoals.com/before-and-after-7-mumbai-mills-that-made-way-for-skyscrapers/
https://youtu.be/pdoT9ugaJqM?si=f-kOi_YN0SaI8WOx
https://youtu.be/UQDBm9pjKwQ?si=QgZh1KU6HoQpB-ViA
https://youtu.be/mbhkEUugeU0?feature=shared
https://oldbombay.in/
https://garystockbridge617.getarchive.net/topics/historical+images+of+mumbai

ICONOGRAPHY LIST

Office | Printing | Godown | Folding | Bleaching

Spinning | Weaving | Dyeing | Lab | GI or AC sheet

Steel | Wood | Cast iron | Mangalore tiles | RCC | Stone cladding

ANALYTIC HIERARCHY PROCESS

Summary of land use proposal for mill sites as deducted from analytical hierarchy process

14. Digvijay mills

Residential	0.61	0.37	0.54	0.22	0.58	0.0378	38.18%
Commercial	0.17	0.08	0.09	0.32	0.19	0.4485	15.17%
Cultural spaces	0.08	0.08	0.09	0.32	0.19	0.2374	14.83%
Educational	0.12	0.44	0.26	0.11	0.00	0.2656	29.04%
Open space	0.02	0.02	0.03	0.04	0.03	0.0105	2.79%

16.India United mills no.4   17,18.India United mills no.2 & 3

19.India United mills no.5   25.New city mills of Bombay

 Residential neighborhood

The mill is surrounded by residential buildings and on the east side are the docks and godowns.

Residents/ Neighborhood committee	Residence	Commercial	Cultural	Educational	Open space
Residence	1	0.33	0.33	0.33	0.33
Commercial	3	1	1	3	3
Cultural	3	1	1	3	3
Educational	3	0.33	0.33	1	1
Open space	3	0.33	0.33	1	1

Local government	Residence	Commercial	Cultural	Educational	Open space
Residence	1	0.33	0.33	0.33	0.33
Commercial	3	1	1	3	3
Cultural	3	1	1	3	3
Educational	3	0.33	0.33	1	0.33
Open space	3	0.33	0.33	3	1
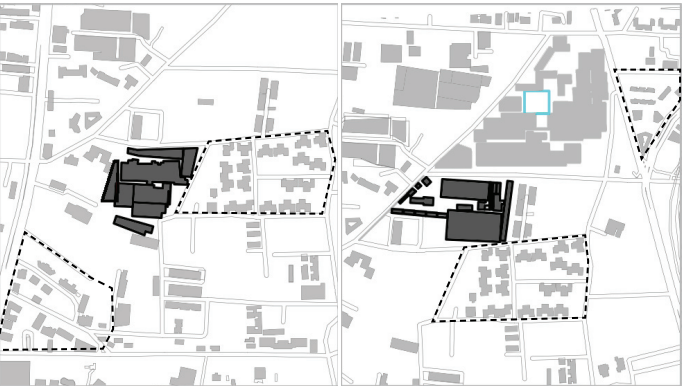
Mill workers	Residence	Commercial	Cultural	Educational	Open space
Residence	1	3	3	5	5
Commercial	0.33	1	1	3	3
Cultural	0.33	1	1	3	3
Educational	0.2	0.33	0.33	1	1
Open space	0.2	0.33	0.33	1	1

Mill owners: NTC	Residence	Commercial	Cultural	Educational	Open space
Residence	1	1	1	3	3
Commercial	1	1	1	3	3
Cultural	1	1	1	3	3
Educational	0.33	0.33	0.33	1	1
Open space	0.33	0.33	0.33	1	1

Private investors	Residence	Commercial	Cultural	Educational	Open space
Residence	1	3	3	3	3
Commercial	0.33	1	1	3	3
Cultural	0.33	1	1	3	3
Educational	0.33	0.33	0.33	1	0.33
Open space	0.33	0.33	0.33	3	1

Residents/ neighborhood committee
Residential =3.00%
Commercial =39.45%
Cultural spaces =39.45%
Educational =9.06%
Open space =9.06%

Local Government
Residential =2.96%
Commercial =38.97%
Cultural spaces =38.97%
Educational =6.18%
Open space =12.90%

Mill workers
Residential =63.92%
Commercial =15.11%
Cultural spaces =15.11%
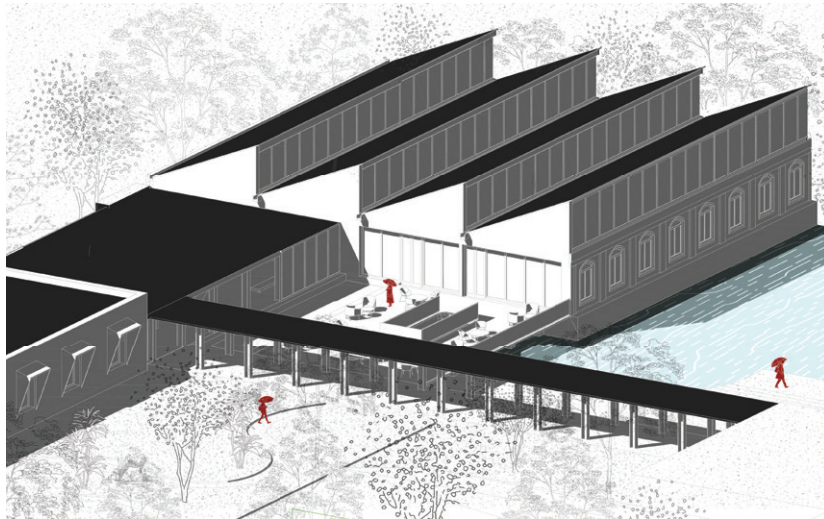Educational =2.93%
Open space =2.93%

Mill owners
Residential =30.15%
Commercial =30.15%
Cultural spaces =30.15%
Educational =4.78%
Open space =4.78%

Private investors
Residential =54.73%
Commercial =18.18%
Cultural spaces =18.18%
Educational =2.88%
Open space =6.02%

Re-Weaving Mumbai

Re-discovering Industrial heritage in the Indian Sub-continent

Devika Shyna Rajesh | Malavika Shyam