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SHARED HERITAGE LAB
SEMARANG 2019/2020

REVITALISING HERITAGE SEMARANG, INDONESIA

RESEARCH BOOKLET
MSC3 GRADUATION STUDIO

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Rijksdienst voor het Cultureel Erfgoed
Ministerie van Onderwijs, Cultuur en Wetenschap

SHARED HERITAGE LAB
SEMARANG

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BPKLL
University Fund TUDelft

CONTENT

SOURCE: Leiden University Library - Digital Collections

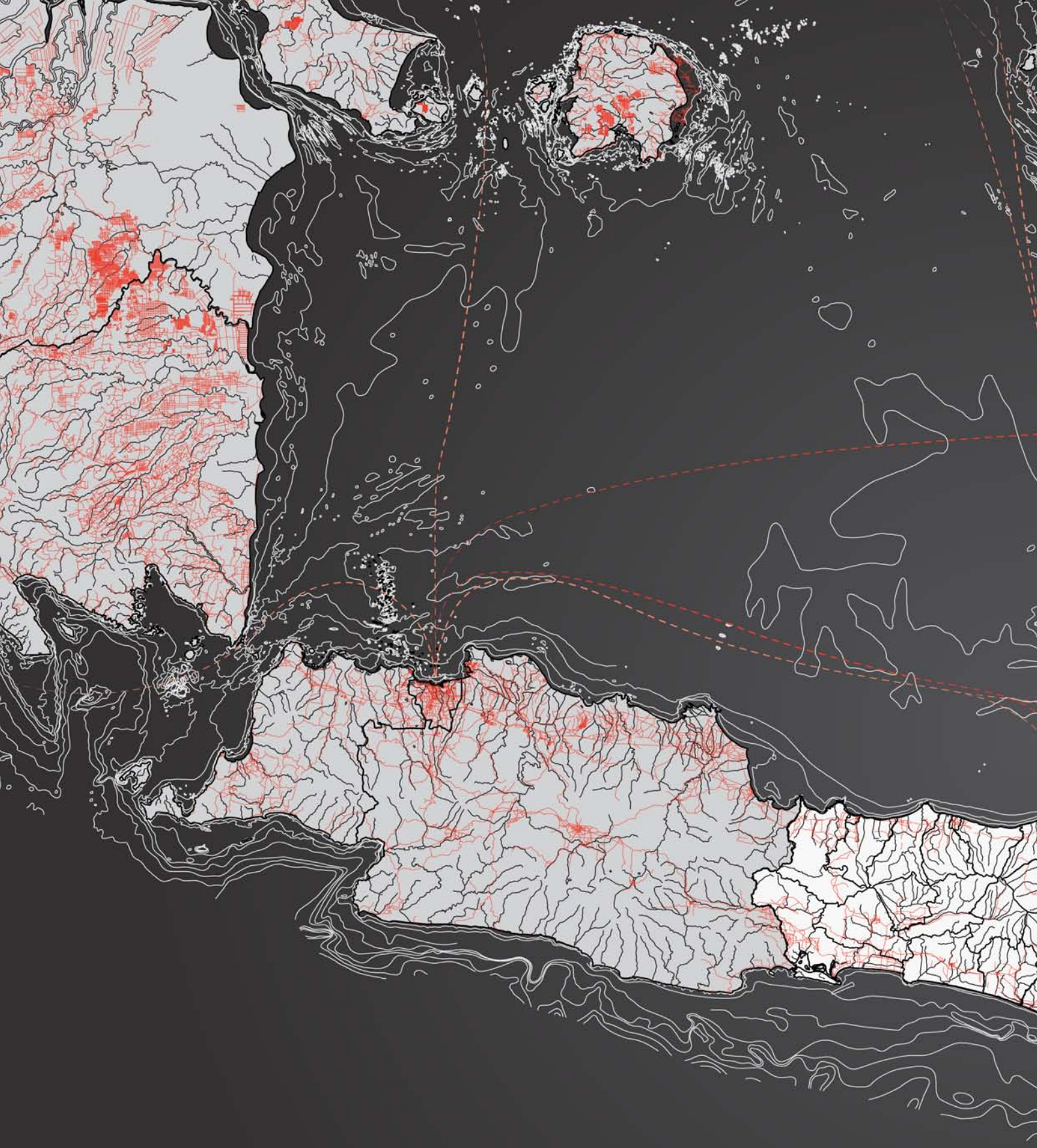
INTRODUCTION

The shared history between Netherlands and Indonesia poses an interesting ground for addressing hertiage and architecture. The colonial past of Indonesia has left many trails across its archipelago. Semarang, of central Java is no exception. With its rich history of colonial activities, the current built fabric is filled with built traces of its past. Social segregation which resulted in three key areas of Semarang - Kota Lama, Pecinan and Kampung Melayu are our main areas of focus for this Shared Heritage Lab studio. At present, Semarang faces many challenges with a high flooding risk, severe land subsidence, poor water and waste management and substantial urban decay (among others). How can we find solutions to these issues across several scales of the built environment?

This booklet is a compilation of our research into Indonesia and Semarang across several domains that inspire us for the final graduation projects of this studio. These domains, namely, politics and socioeconomics, infrastructure, built environment, and waterscape help us to investigate Semarang in different scales in relation to its positioning in the greater archipelago.

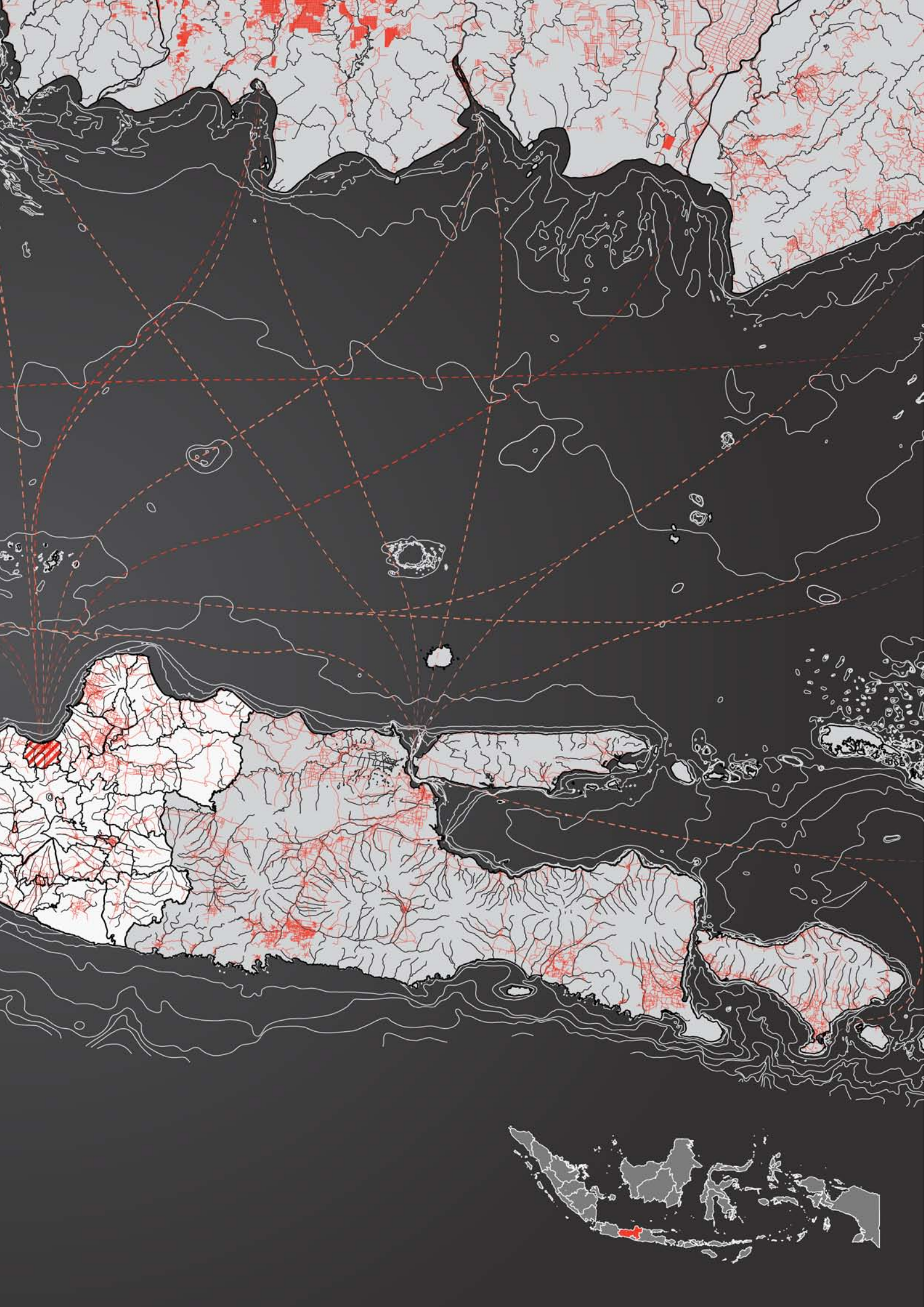
The research was done as a joint effort from four different tracks within the Department of Architecture at TU Delft - Heritage & Architecture, Architectural Engineering, Landscape and Urbanism with the help of our external stakeholders that contributed to our understanding of this city and the problems it face.

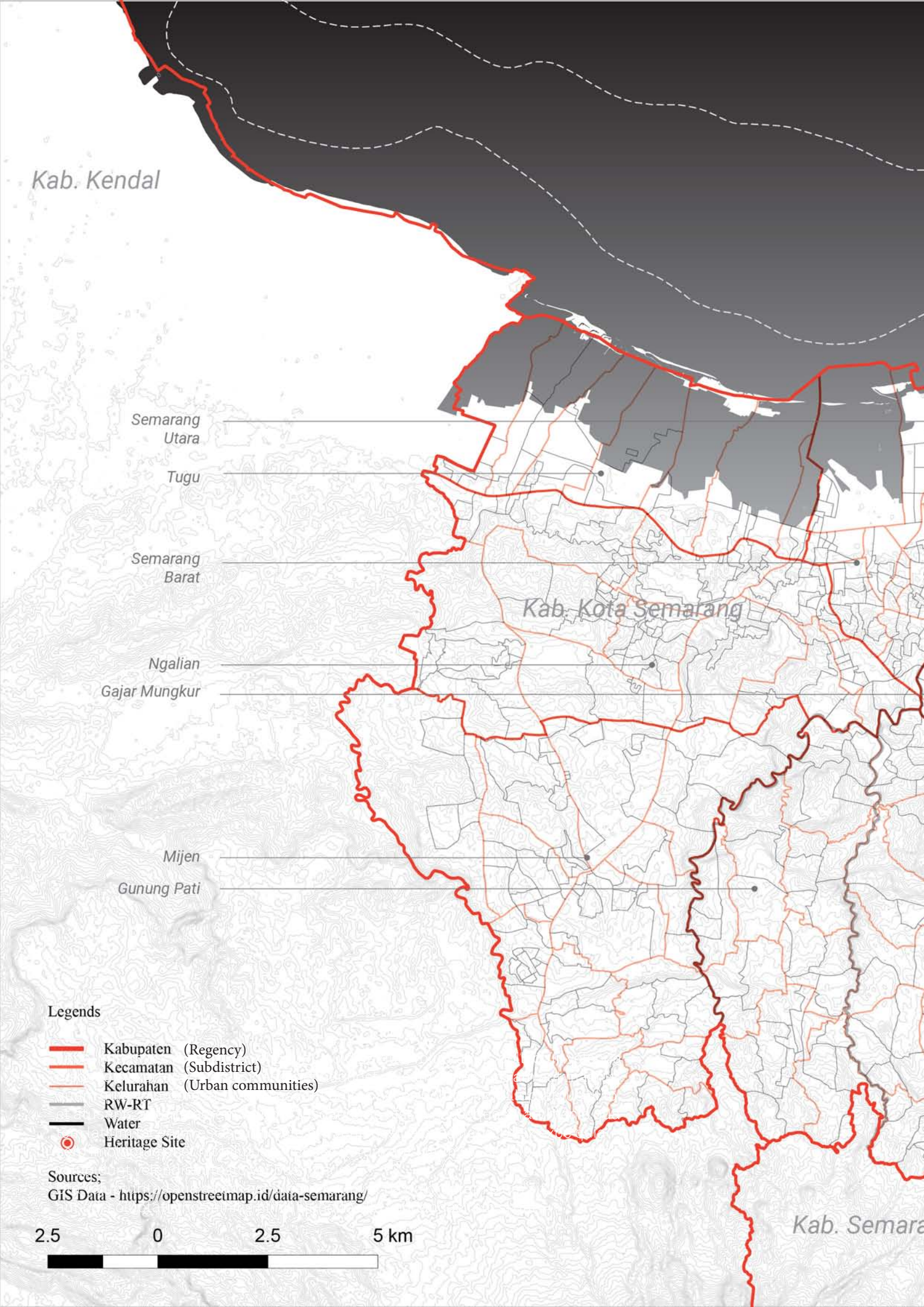
We hope that this research can provide a sound base for our future perspectives for Semarang in the hopes of contributing to alleviating some of the issues that Semarang faces on a daily basis.



POLITICAL DIVISIONS OF JAVA

Semarang is the capital and largest city of Central Java province in Indonesia. Being located on the northern coast of Java, the city serves as a major port during the Dutch colonial era, and still an important regional centre and port today. It is also the main hub connecting Jakarta and Surabaya, as well as cities in the southern part of Java such as Surakarta and Yogyakarta. Decades after the Indonesian Independence in 1945, a number of citizens began to realize the necessity to nourish the remarkable buildings of the Old Town as the aesthetic value of the city became encapsulated by informalities. However, the extreme climate heighten the challenges. Semarang City elevation ranges from 2 meters below sea level up to 340 meters above the sea level. Together with a seasonal moonsoon climate, Semarang also deals with heavy rainfall and therefore prone with flooding.




Kab. Kendal
Semarang Utara
Tugu
Semarang Barat
Kab. Kota Semarang
Ngalian
Gajar Mungkur
Mijen
Gunung Pati
Kab. Semara
Legends
Kabupaten (Regency)
Kecamatan (Subdistrict)
Kelurahan (Urban communities)
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Sources;
GIS Data - https://openstreetmap.id/data-semarang/
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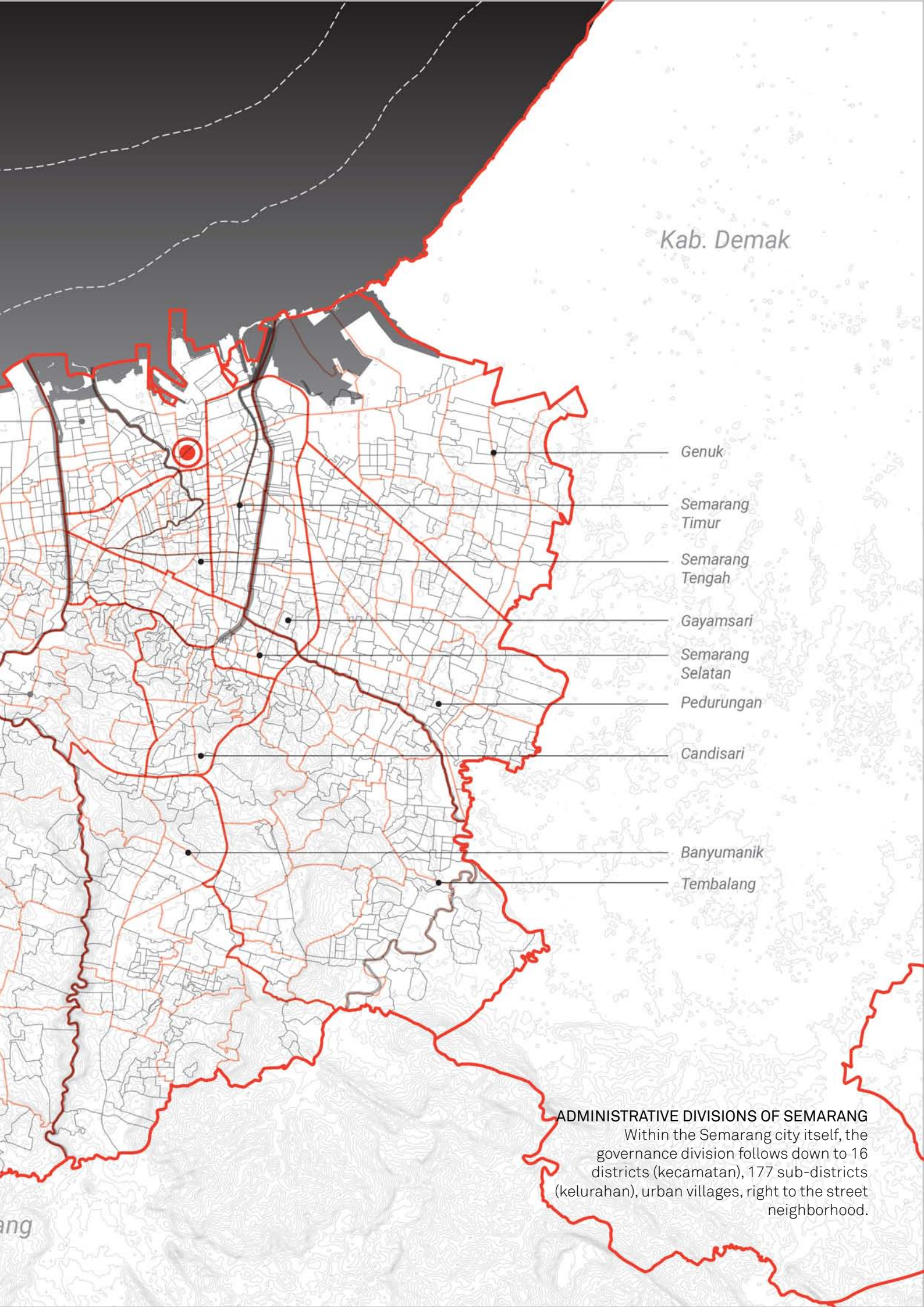


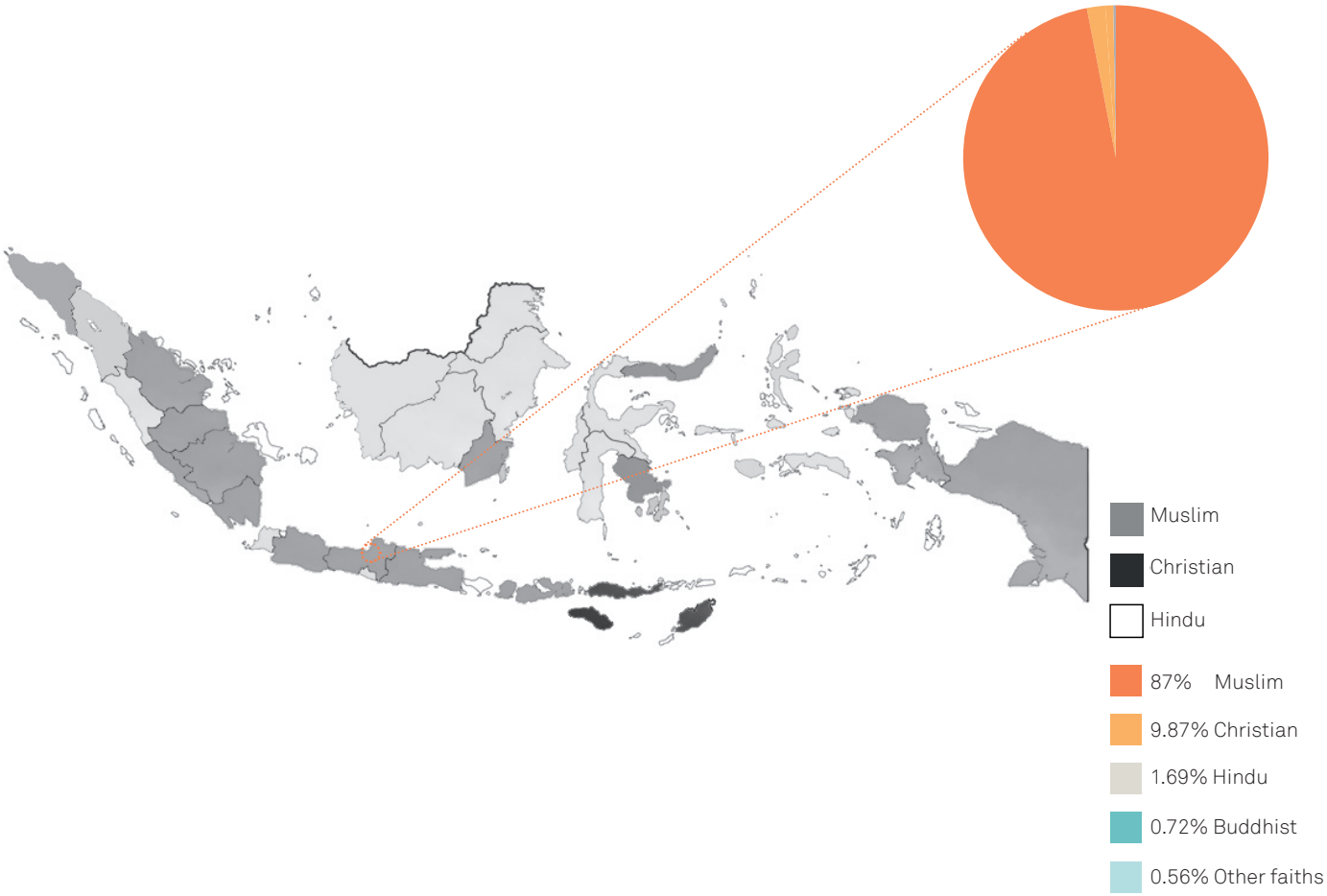
ADMINISTRATIVE DIVISIONS OF SEMARANG

Within the Semarang city itself, the governance division follows down to 16 districts (kecamatan), 177 sub-districts (kelurahan), urban villages, right to the street neighborhood.

RELIGIOUS POSITIONING | overview of religious distribution in Indonesia

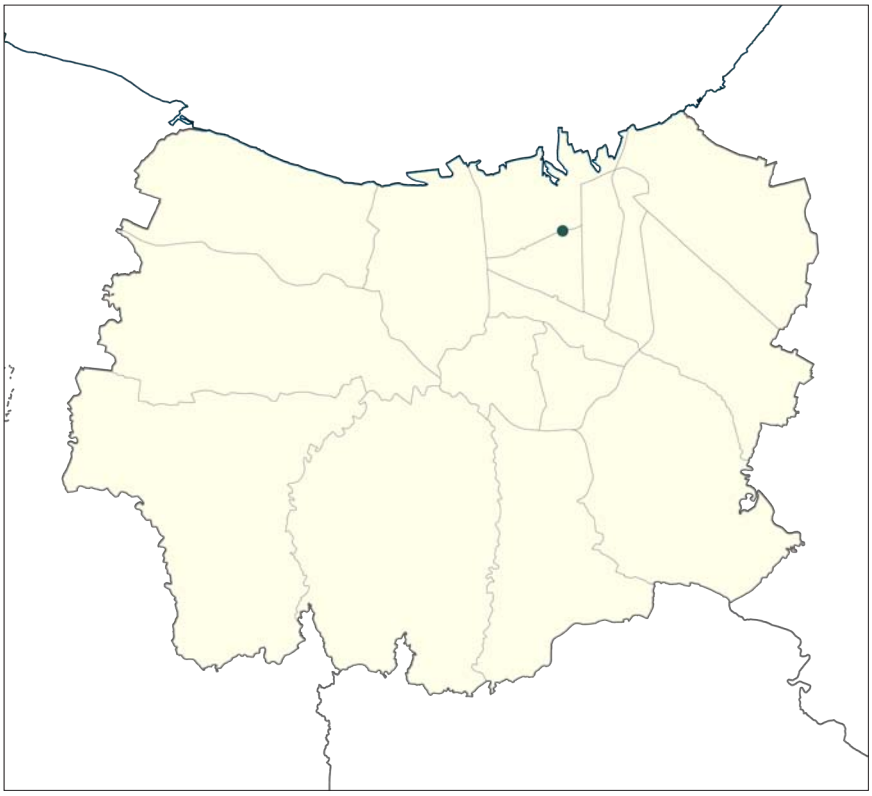
The state of Indonesia is based on the foundation of Pancasila, which means five principles. This principle was declared by the first president, Sukarno in 1945. The idea of the five principles was to build Indonesia as a new independent nation. Next to these principles that are adopted throughout the whole population of Indonesia, the people also have their own religion. In 1965 the government curtailed Indonesians' freedom to choose their religions. The government mentioned only six "official" religions, namely Islam, Protestantism, Catholicism, Hinduism, Buddhism and Confucianism. Therefore, Indonesians have to choose one of these six official religions to appear on their card. Based on this aspect the religions in Indonesia were divided by six main religions. Overall the percentage of Buddhism and Confucianism are so small that it is not shown on the map in the figure above.

RELIGIOUS POSITIONING | religious distribution in Semarang

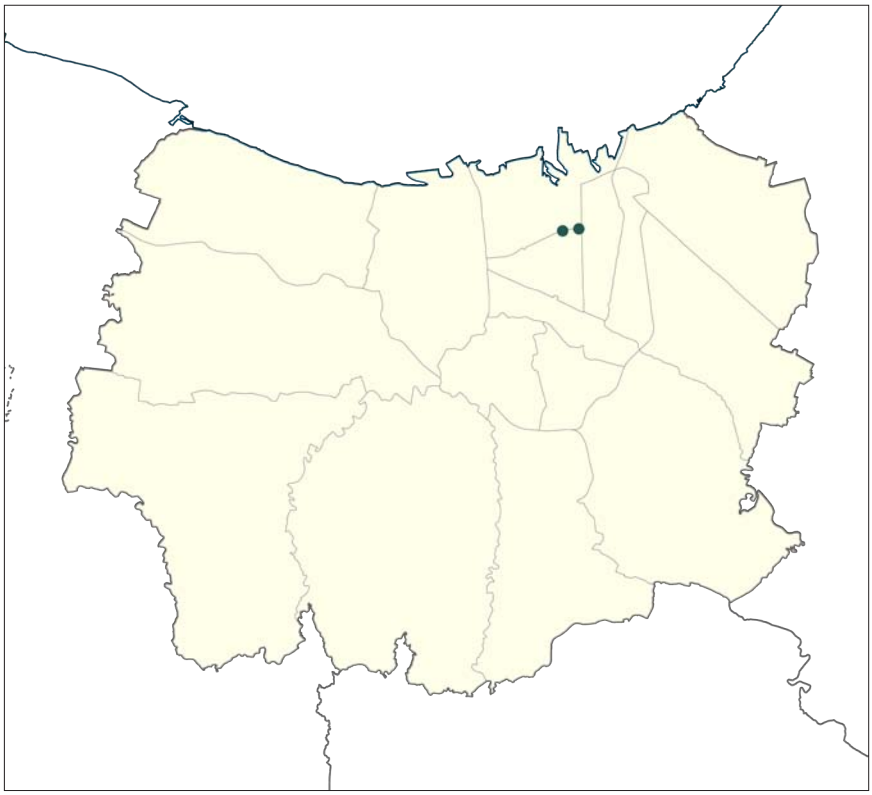


The religious distribution in Semarang is comparable with whole Indonesia. Whereby is seen that the majority is Muslim and the second biggest religion is Christian. There are more religions in Semarang but the percentage is remarkably small that it doesn't show on the graphic. The population of Semarang is mainly Javanese with a significant population of Chinese. Next to that the oldest Chinese temple of Indonesia is located in Semarang. But the Chinese population in Semarang is most likely not registered as Confucianist.

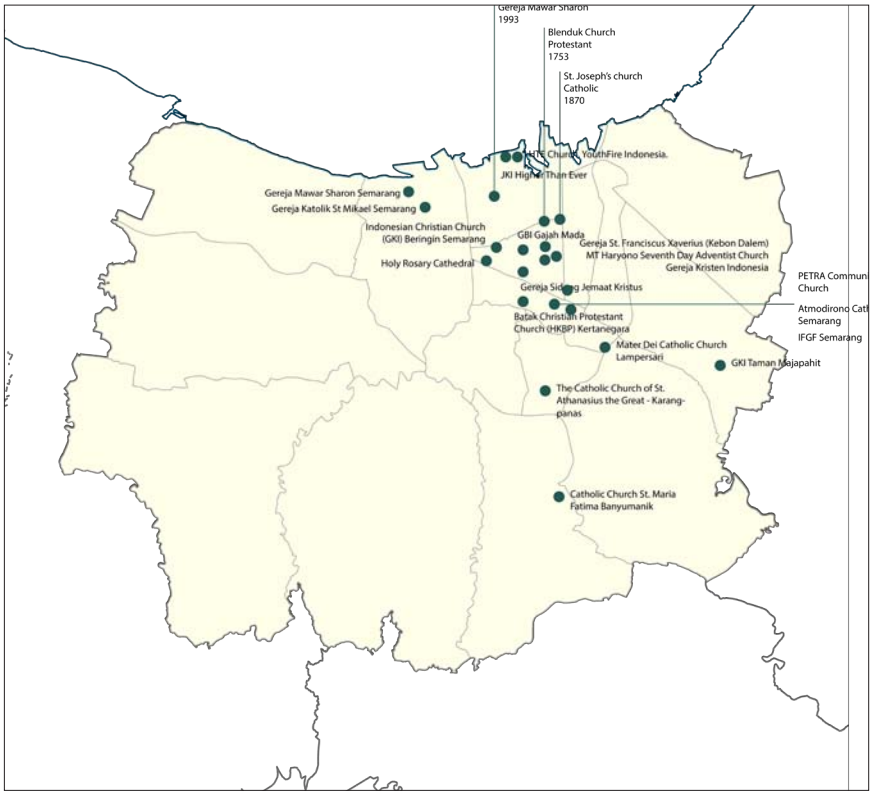
When Soeharto, the second president, came to power in 1967, he continued his predecessor's policy on religion. However, in 1979 his cabinet decided not to recognize Confucianism as an official religion, because Confucianism is closely linked to the ethnic Chinese. Since then in Indonesia, only five official religions were recognized. The Confucians then identified themselves either as Christians or Buddhists.



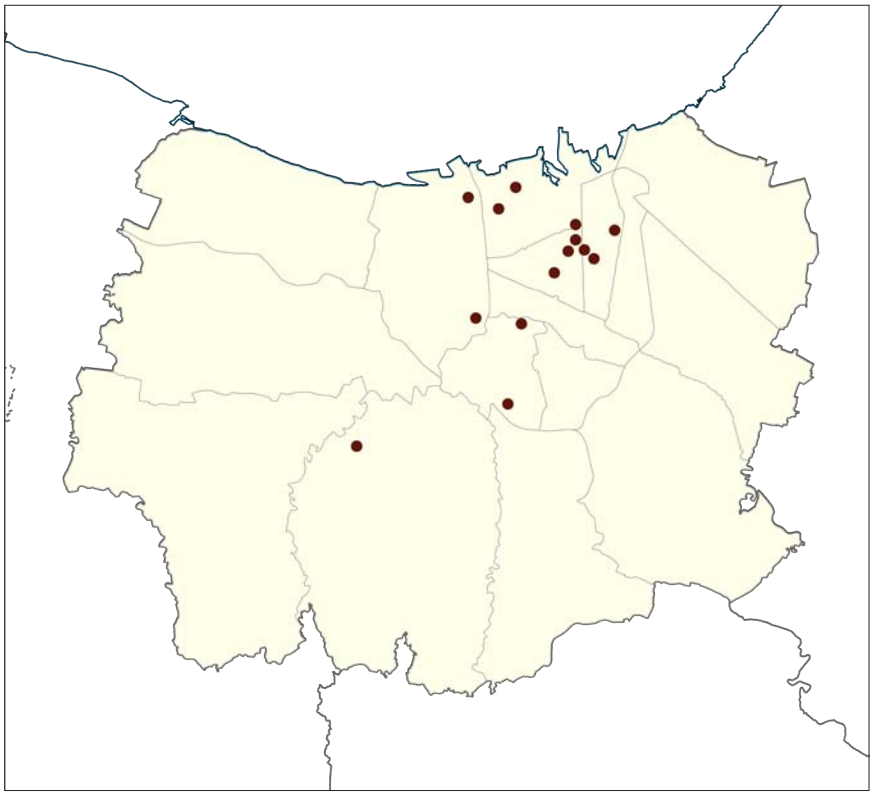
1753: The oldest church registered in Semarang is the Protestant Church in Western Indonesia Immanuel Semarang, or Gereja Blenduk. The church was built in 1753.



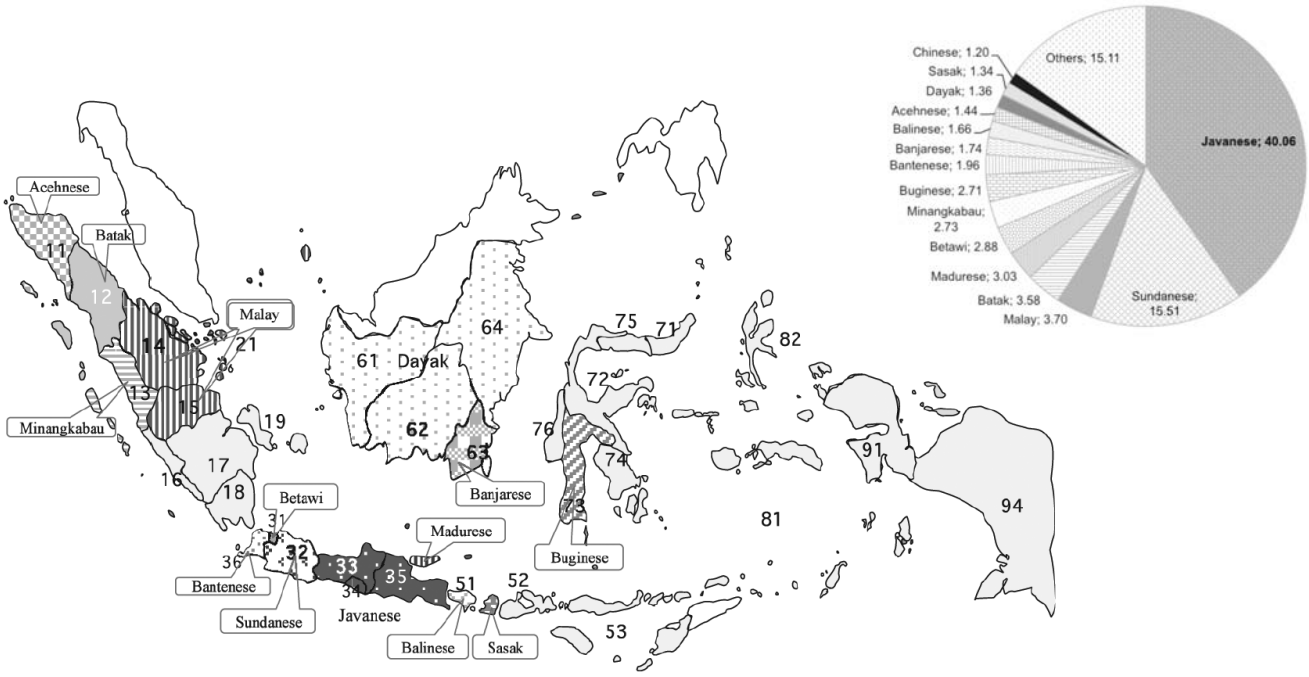
1870: The second oldest church registered in Semarang is the St. Joseph's Church. Constructed in 1870 and was needed because of the growing Catholic population in Semarang.



1900: After 1870 the numbers of churches in Semarang grew rapidly due to the religious freedom.



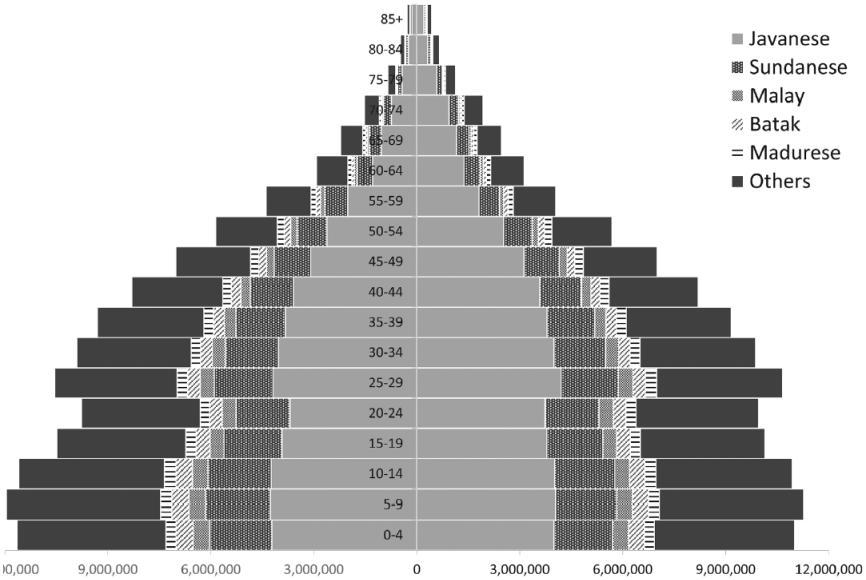
1993: Mosques in Semarang



The figure above is showing the fifteen main ethnic groups in Indonesia. With the Javanese as the largest ethnic group, forming 40.06% the total population of Indonesia. The Javanese are mainly distributed over three provinces: Central Java, Yogyakarta and East Java. Next to that are the Sundanese with a percentage of 15.51% who are mainly distributed over Central Java, Jakarta and Banten.

After that the percentage of ethnic groups are considerably smaller as seen in the figure above. With the Malay as the biggest of them with a percentage of 3.70% and mainly living on the island of Sumatra. The largest ethnic group with foreign origins is the Chinese with 1.20%, who are mainly living on Java, Sumatra and Kalimantan. The Chinese have been living in Indonesia since the 13th century and came to Indonesia intentionally as temporary residents or economic migrants.

ETHNIC GROUPS | age structure



The figure is showing the comparison between the different age groups and sex of the population of Indonesia. As shown in the figure above the Javanese are the largest ethnic group in Indonesia and also the most dominant one in each age group. The Javanese are compared with the four other largest ethnic groups: the Sundanese, Malay, Batak and Madurese. It is remarkable that the Javanese are more prevalent amongst the older age groups and among the youngest age group only one third. As a conclusion there could be stated that the Javanese are having a rising percentage of elderly and a declining percentage of youngsters.

POLITCS AND SOCIOECONOMICS


MIMBAR DEMOKRASI
Boulevard UGM 23 - 25 April '98 KPRP
TURUNKAN HARGA ADILI SOEHARTO
BUBARKAN DPR/MPR HASIL PEMILU '97
TOLAK DIALOG DENGAN ABRI/PEMERINTAH
OLISI
OLISI

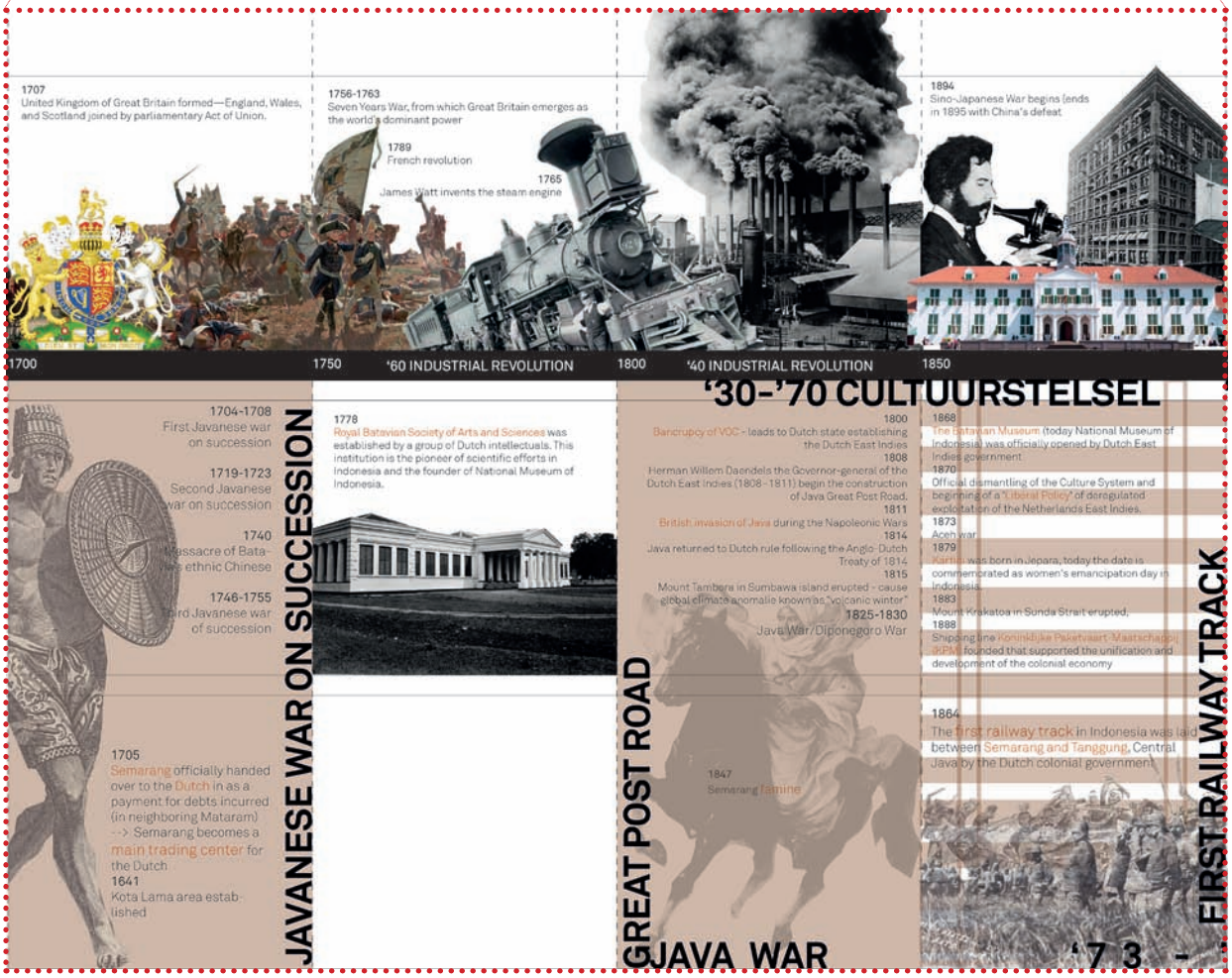
POLITICS AND SOCIOECONOMICS

Politics and socioeconomics play a significant role in the development of Indonesia throughout history, from the pre-colonial period of Kutai Martadipura Kingdom to what Indonesia is at present day, in 2019. European spice trade which eventually lead to the colonisation of the now unified archipelago, still continue to bear traces of the colonial politics and socioeconomics introduced. Additionally, social segregation that was a result of colonisation had a significant impart in the urban sprawl of the city over time. Combined, these had a large impact opn the evolution of the built environment. The question of shared heritage has much to do with politics and diplomacy as it does with nationalism.

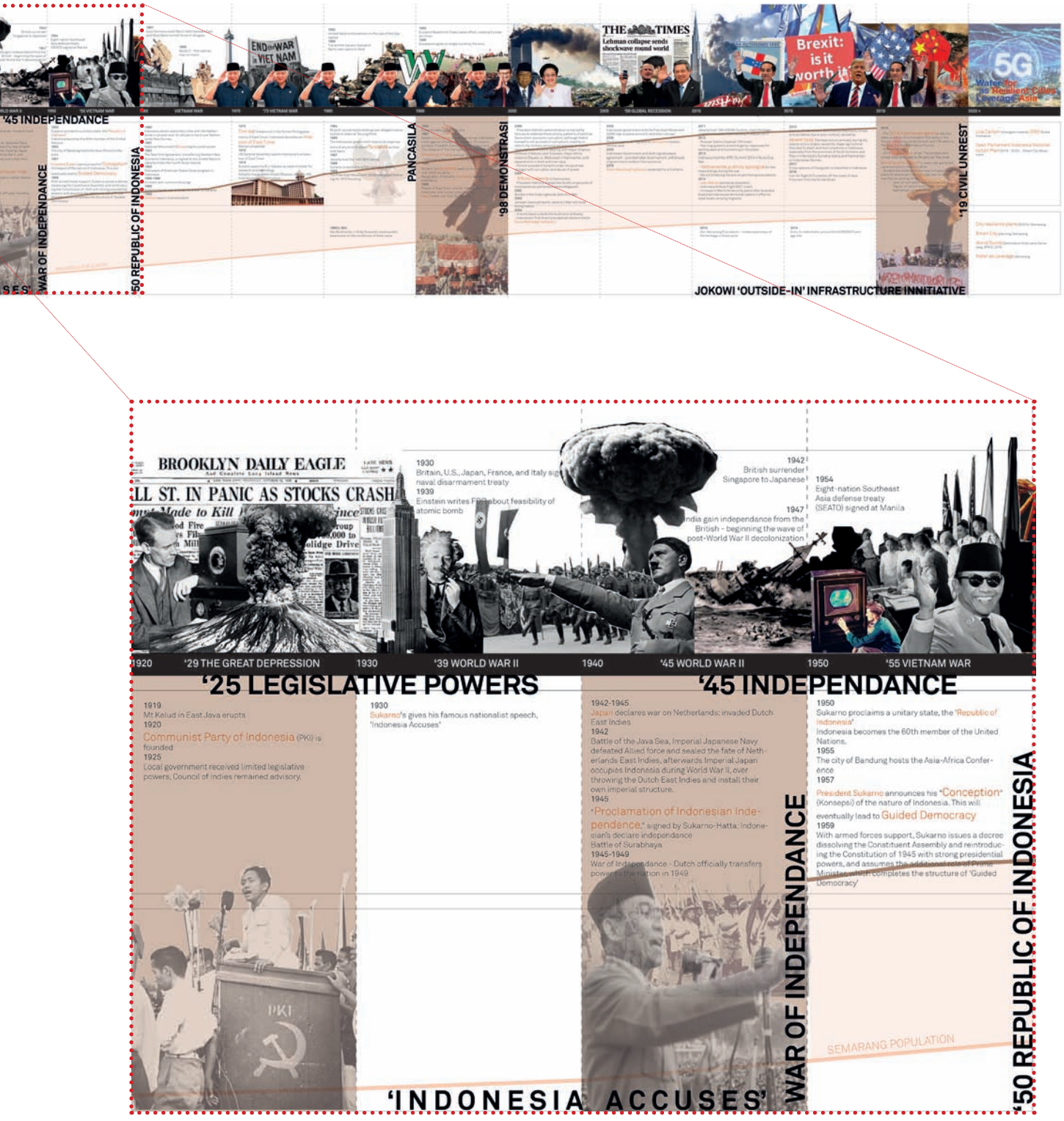
By understanding the history of politics and socioeconomics in Inodonesia from a global, national (Indonesia) and local (Semarang) perspective, we can try to understand the rationale behind the evolution of the built environment of Semarang. This provides a strong base to design for present and future generations, as well as address the tangible heritage left from the colonial era across multiple domains.

Semarang's importance as a port city of Indonesia, still remains today. Its difficult relationship with water stems from a multitude of political and socioeconomical issues. Our aim is to understand its history in order to come up with suitable solutions that address these current issues.

The political and diplomatic relationship between Indonesia and Netherlands has a long history. How then to deal with these different sentiments to shared heritage - not just between the two countries, but within the different generations of Indonesia itself?



VOC set sail to Indonesia for the spice-trade because of the abundance of spices on several of the islands, where Moluccas was significant (1603 VOC setup trading post in Java). The bankruptcy of the VOC lead to the Dutch state taking over in 1800s, which brought about 'true' colonisation of archipelago. In **1830** the cultuurstelsel was established which forced farmers to produce crops for the government in Batavia. This was abandoned in 1870 and the colony entered a phase with private entrepreneurship together with territorial conquests and modernisation. The socioeconomic changes came about with the introduction of the Agrarian Act in **1870**. In **1900**, the Ethical Policy was introduced - which paved the way for the Decentralisation Act in 1903, the Local Councils Ordinance in 1904 and the Government reform act in 1944 that resulted in the spatial planning regulations and changes.



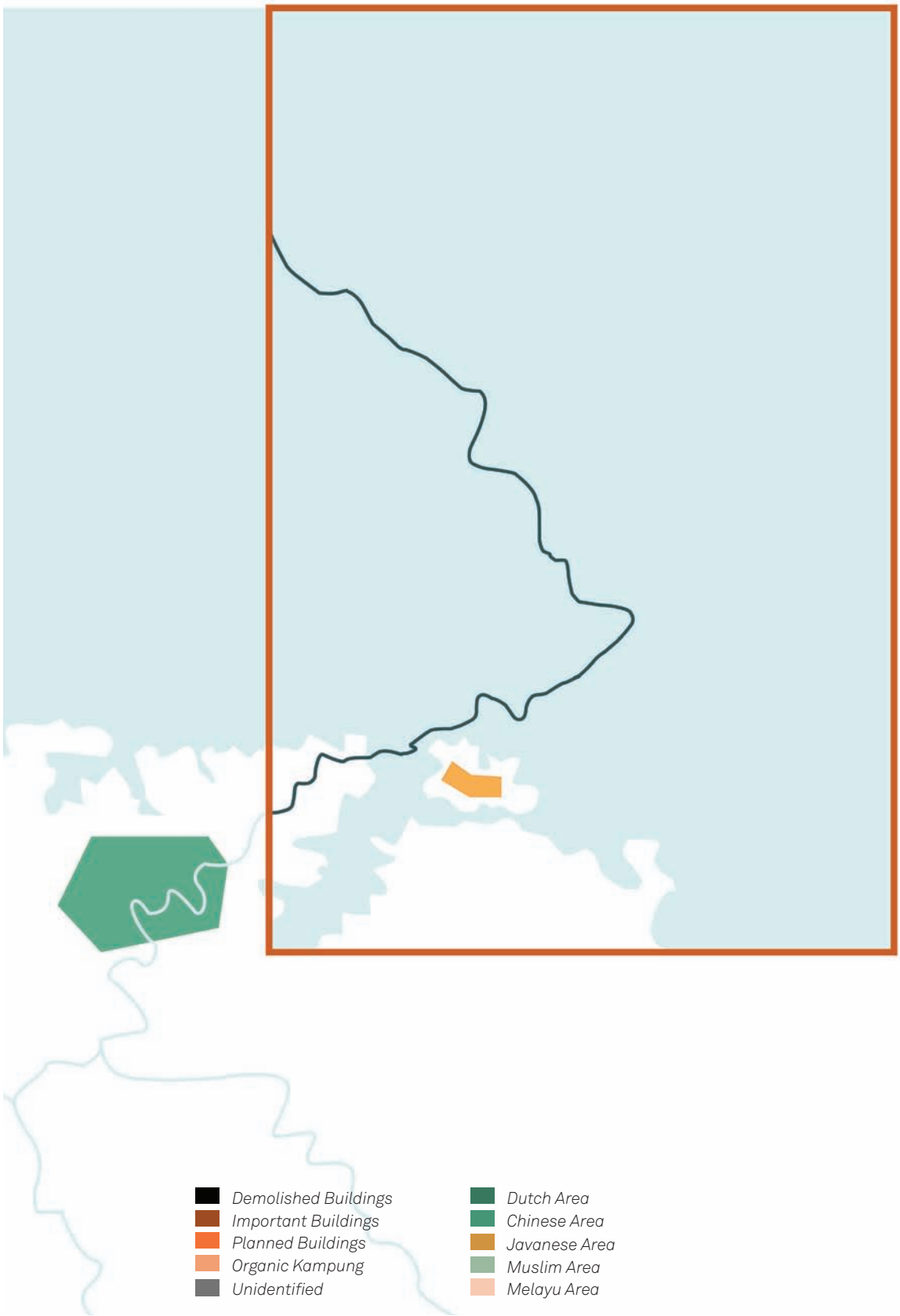
These were still instigated by the colonial powers up until Indonesians declared independence in **1945**, although not officially recognised by the Dutch till 1949. The most notable changes due to the Agrarian Act and the Ethical Policy was the increase of population due to the influx of Europeans, Indonesians from rural areas moving into the city which lead to a housing crisis, specially in 1870, increased number of Wester immigrants created a segregated society. After the official handover by the Dutch, in **1950** Sukarno proclaimed a unitary stated, the Republic of Indonesia. In **1957** he announced his Konsepsi of the nature of Indonesia and eventually lead to a Guided Democracy.

When Suharto came into power in **1968**, his idealism which was different from Sukarno, led Indonesia in a different direction, both in terms of political, socioeconomics and the built environment. Suharto's approach was more enhancing nationalism through vernacular than imported icons like Sukarno. Suharto regarded the colonial period with much disdain. In **1985**, the Indonesian government required all organisations to adopt the pancasila (revised version of Sukarno's)-

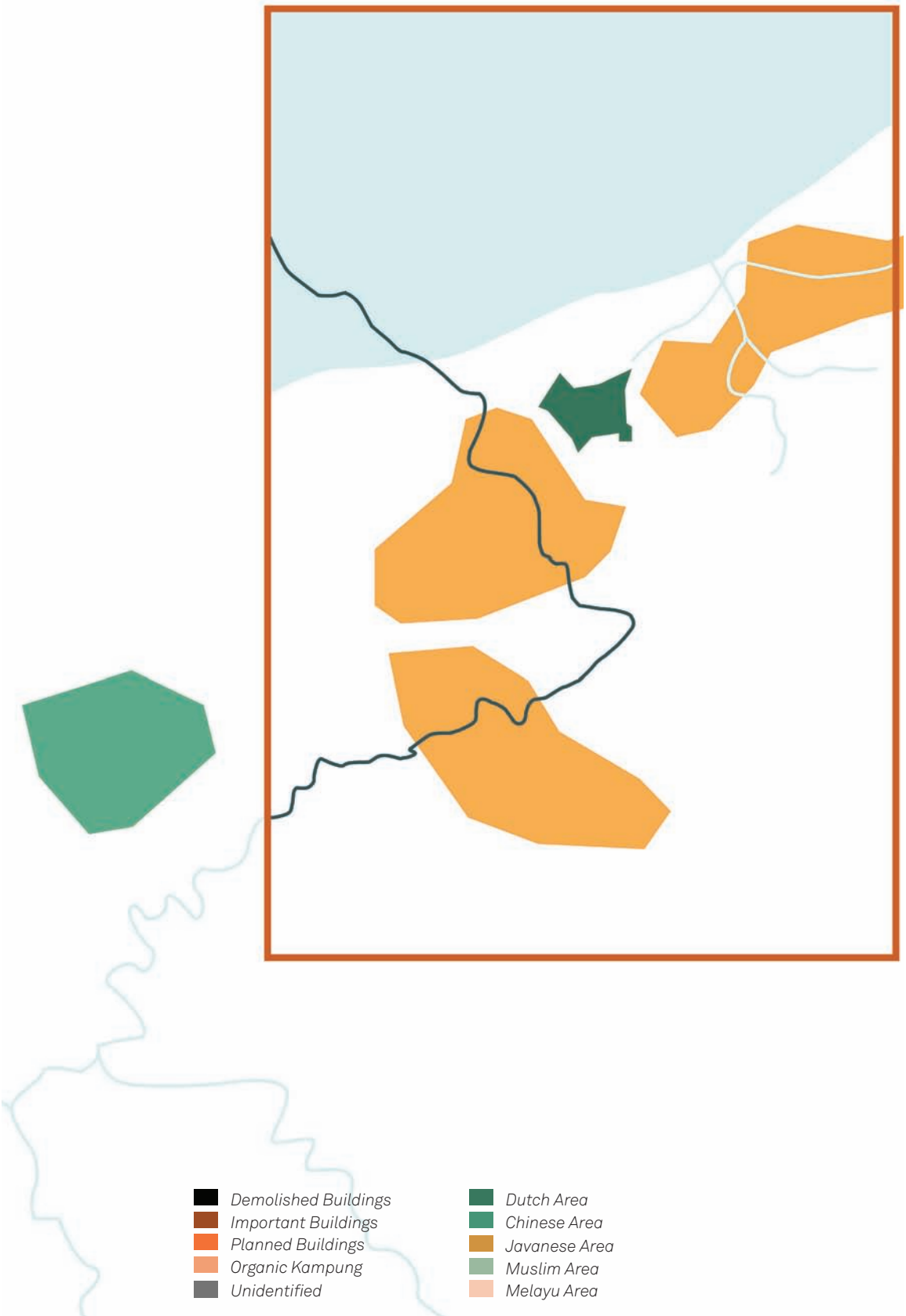
Belief in the Almighty God
A just and civilized humanity
A unified Indonesia
Democracy led by the wisdom in a consensus or representatives
Social justice for all Indonesians

Suharto's reign lasted over 30s years and it ended with the 1998 student led protests which lead to violence, rioting and students being killed. As a result, Suharto resigned and BJ Habibie assumed presidency. BJ Habibie became the most loved president of Indonesia, even though he was only in power for one year. Within that year, he accomplished a great deal of things for Indonesia - in 1993 he unveiled the first Inonesian developed plane.

In **2014** Joko Widodo got elected as president. He won the **2019** election and was sworn in as president on the 20th of October. Joko's primary focus in his first term was the 'outside in' infrastructure initiative - infrastructure like toll roads, train lines, seaports and airports will be connected to production centres, small industrial estates, and special economic zones and tourism zones, which he deemed to be key for Indonesia's future. However for his second term, he claimed to want to prioritise human resource development which he now thinks is the future of Indonesia. Jokow's win sparked an outrage with Prabowo resulting in Prabowo supporters protesting and asking for a recount. 2019 also signifies another national wide protest starting in Papua causing serious civil unrest over racial, ethnic discrimination and papuan independance, as well as in Jakarta and Kalimantan over a multitude of social issues.

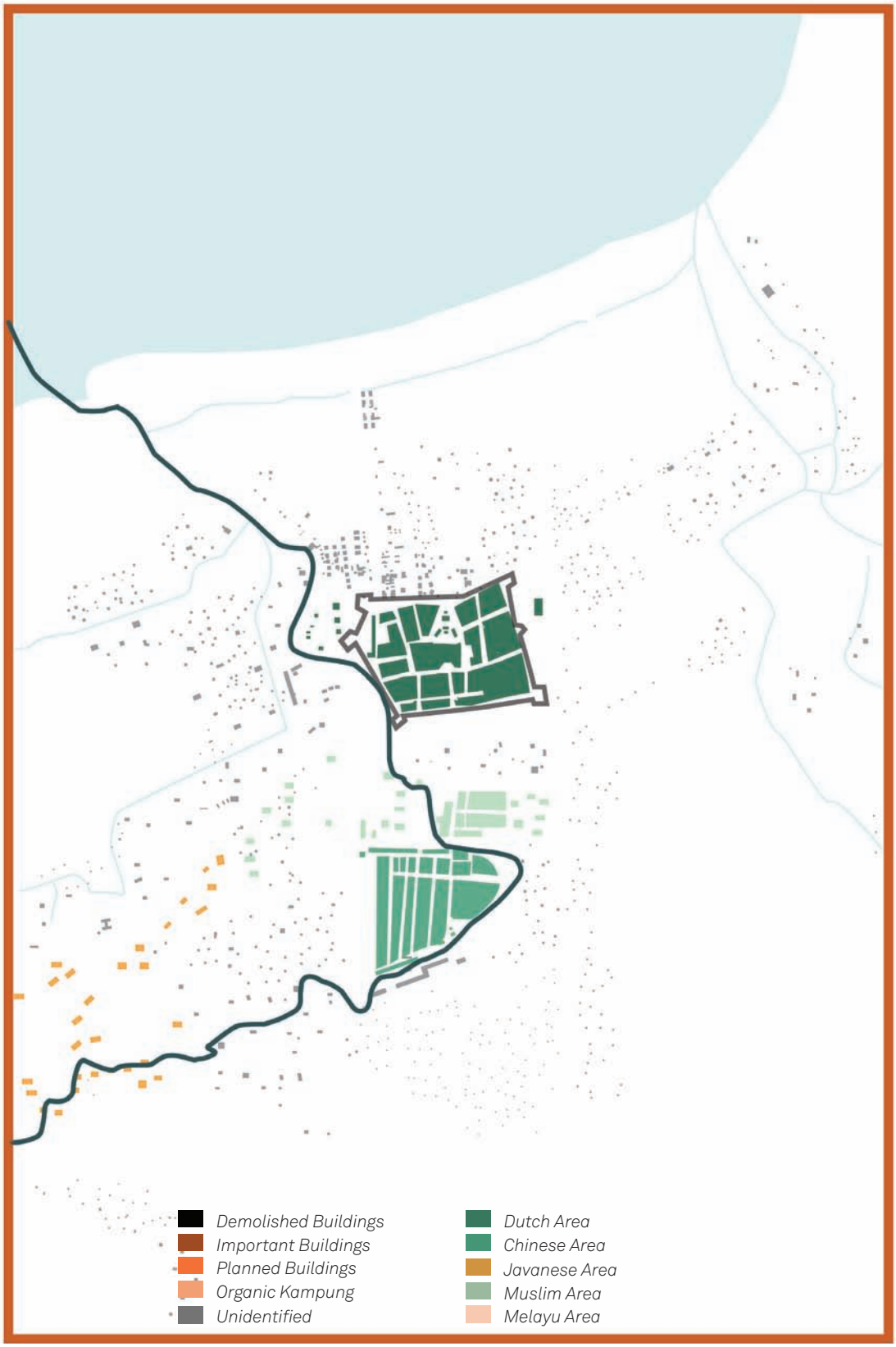


1400: Semarang has been formed since the 6th century. It was initially a part of Mataram Kuno Kingdom in an archipelago coastal area called Bergota. Due to continuous sedimentation that is still occurring until now, the area formed into land. In the 15th century, Chinese traders were first to come and lived in the hilly part of Semarang, while the Dutch (VOC) came in the early 16th century.

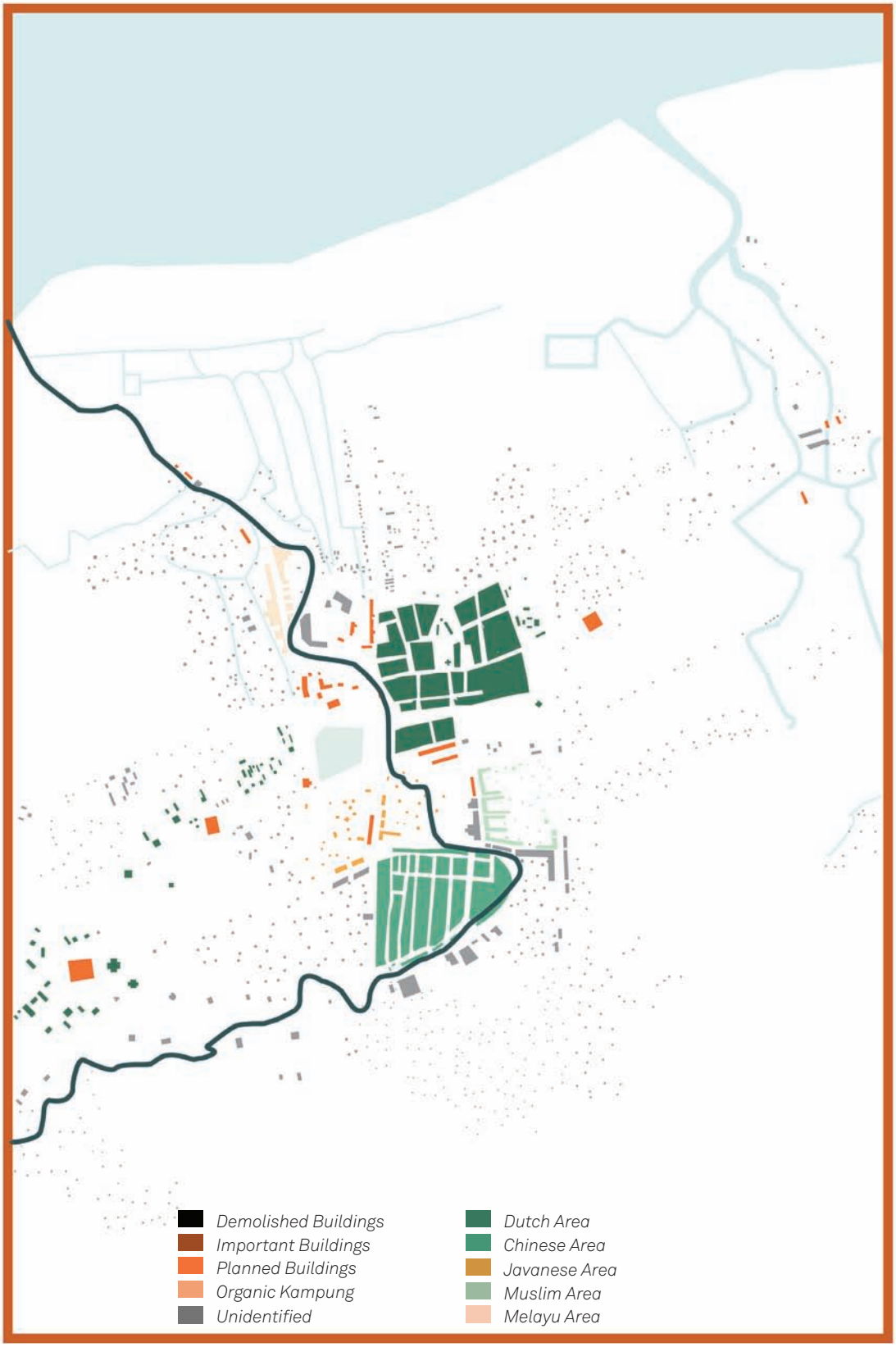


1650: In 1678, Mataram Kingdom gave Semarang to VOC as a reward for their assistance in defeating another Indonesian Kingdom, Trunojoyo. Kota Lama Semarang acted as the VOC center of administration, which led to the emergence of Dutch and European style buildings. VOC's intention was to trade because Semarang is closely positioned to the hinterland that produces spices. These spices were then sold to Western Europe. This contributes to the establishment of Semarang's role as a trade and port city.

1719: During the initial stage of Semarang urban growth, the city was configured around Kali Semarang and along the east to west road, which both also acted as the main transportation routes. In 1695, The Vijfhoek fort was built as surveillance area because Kota Lama started to act as the military center. When VOC fully owned Semarang in 1705, various rebellions occurred.



1787: Pecinan area for full-surveillance on the Chinese activities. Meanwhile, the Dutch settlements grew on the east side of the Vijfhoek fort. This area is now referred to as the embryo of Kota Lama Semarang. Apart from the Dutch turf, this area also holds the Javanese, Melayu, and Chinese settlements that grew along the Kali Semarang's estuary and were segregated based on ethnicity.



1824: In 1756, VOC demolished the Vijfhoek fortress and built fortress around Kota Lama area to protect their turf. However, VOC went bankrupt in 1824 and the Dutch state took over Semarang. Then, the fort was demolished because it became a constraint to grow. Due to the lack of agricultural assets, the Dutch state implemented cultuurstelsel.

1906: In 1893, sugar factory played a significant role in economy and railways were used to transport the sugar. Later on, the river transportation was replaced by road and railways transportation network. Under Dutch colonial authority, Semarang administrative boundary has been expanded three times, by the year of 1886, year of 1894 and year of 1902. Semarang had extended to the south and the sub-centers started to move towards south. Internal structure of the city was changed radically.

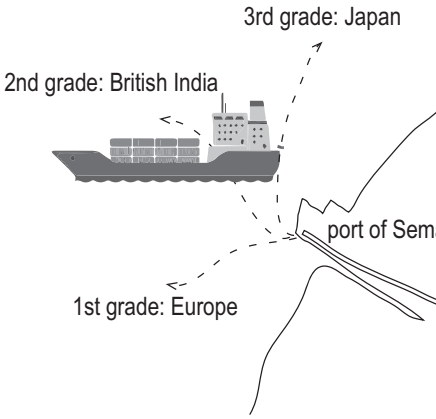
1935: Karsten was in charge as the advisor of Semarang city planning. He divided the zone based on the economic classes rather than the ethnic group. However, the three ethnic groups were also divided into three economic classes. As a result the concept of zoning division only changed land use and spatial function, but still held the segregation.

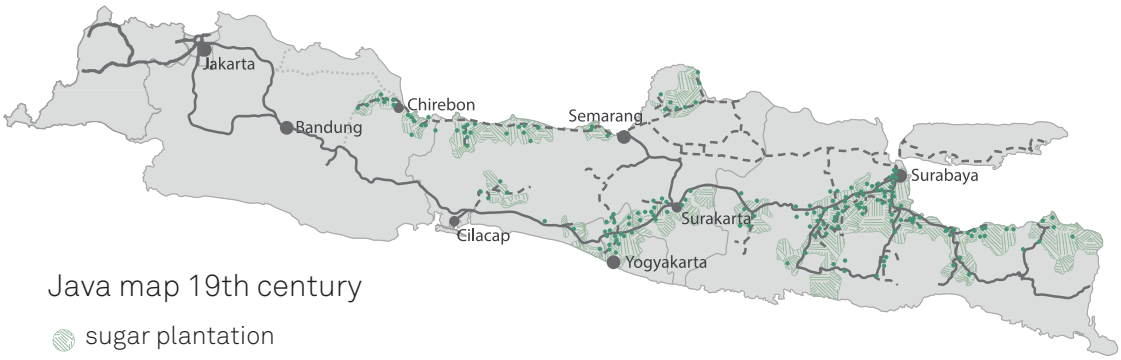
1946: Indonesia declared independence and urban population grew very fast. Semarang becomes the capital of the Central Java Province due to its strategic location on the main national transportation corridor between Jakarta and Surabaya. Modern urban infrastructure was established, such as airport, regional road and other transportation facilities. During 1950 - 1960 Indonesian government nationalised most Dutch's buildings in Semarang, while the rest went to individuals and private institutions.

2006: Due to the limited budget of the authority, the privatisation, and lack of trading and economic development in the Kota Lama area, the people started to leave most of the buildings have become vacant. Instead, the settlements grew towards the fringe areas and the trading and industry moved towards Simpang Lima area (the center of Semarang). The city structure changed, which was the early phase of the gentrification and Kota Lama area lost its centrality.

2019: Currently, Semarang city stands as one of the biggest city in Indonesia with a poly-centric character that holds multi-cultural heritage and assets but faces urgent problems, such as floodings, land subsidience, and abandoned heritage built.

Agro-plantation has been an important industry for the development of Semarang. Many infrastructural development of the city has direct relation to agroindustry especially in the 18th-19th century. Indonesia has once been the second largest exporter of sugar, and Semarang was the major port to export sugar products on the north coast of Java. Road and railway networks were developed to foster the connection to the port.





Java map 19th century

- sugar plantation
- sugar mill
- railway

1843: Big bridg
post road Jogja
and Magelang-

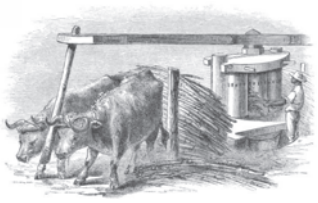
1842: Jogjakarta-
road extended to
wa-Semarang
1842: Magelang-
as a big entry roa

1833: Jogjakarta-Mage-
lang road extended up to
Pringsurat

1743: The first port
named Groot Boom
built for transporting
trade commodities

1836: Vacuum apparat
replaced open cauldro
water mills replaced ar
power

1828: First iron
cylinders



1677: Formation of
the VOC area of
Java's Northeast
coast

1678: Handover to
Semarang to Dutch
East Indies

424: Earliest
record of sugar
in Java found by
the Chinese
travellers

Beginning of a
large-scale
manufacturing of
sugar by Chinese
immigrants

1705: Semarang
officially became a
VOC city

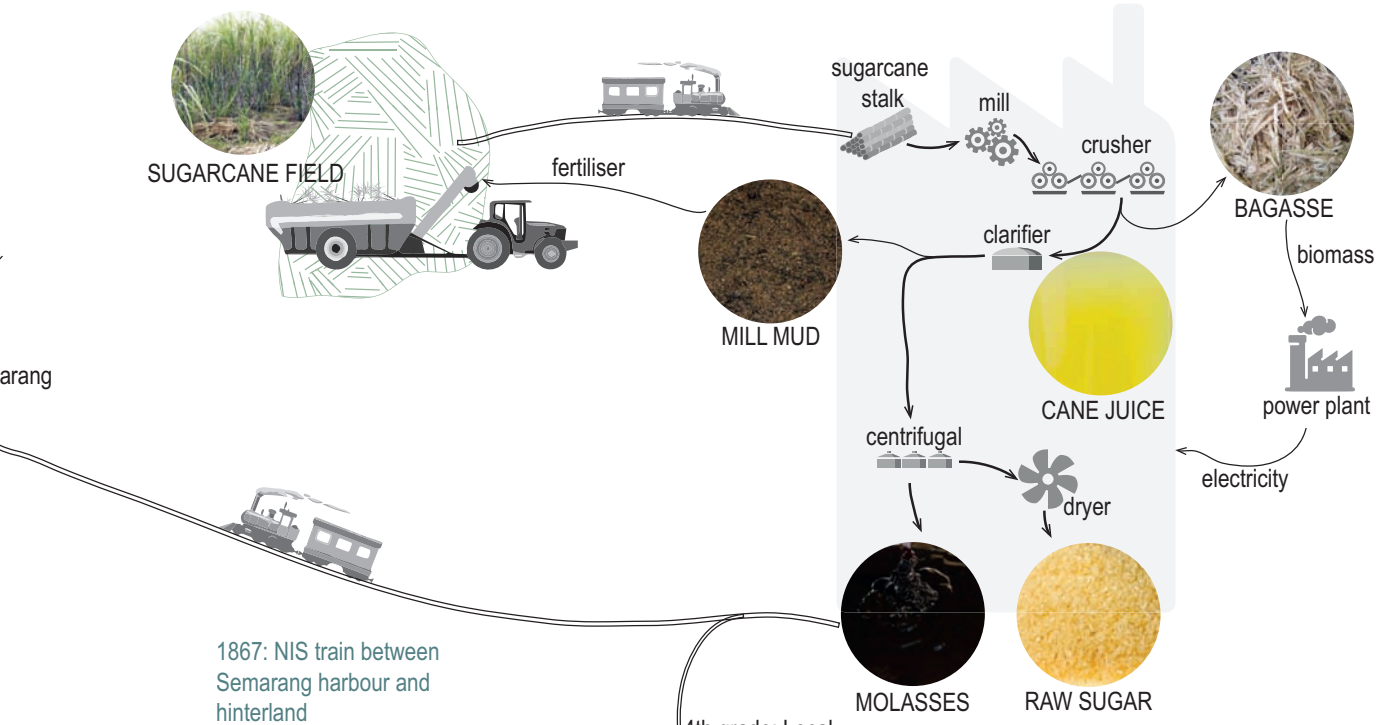
Susuhunan Pakubuwono I made a deal to
give extensive trade rights to the VOC in
exchange of wiping out Mataram's debt

Dutch East Indies
government setting
up plantations

1798: Sugar
produced by
Chinese settlers
with primitive ways;
raw refined sugar
exported by VOC

Mataram Sultanate
VOC
VOC monopolized sugar trade
Cultuurstelsel

400s
1400s
1700s
1750
1800



Sugar process cycle

1867: NIS train between Semarang harbour and hinterland

4th grade: Local

retail market (Pasar)

1870: Semarang-Surakarta railroad opened

1873: Surakarta-Jogjakarta line completed

1884: Surakarta-Surabaya line through Madiun opened

1851: Major posts road of Salaman-Purworejo was built

1873: Second port Klein Boom was built which served as ship dock loading

1860: Major highway on northern coast: Postweg Groote

1887: Jogja-Cilacap line completed

1887: SJS between Semarang and Blora; SCS between Chirebon to Semarang

Kaliwoengoe 1910

1853: 1st Java centrifugal plant for efficient separation of sugar and syrup

1910: The third Port of Tanjung Emas was built

1877: Pans were introduced for improved purification of cane juice

1873: 1st "double action evaporation/ reduction equipment"

1849: Awareness of peasantry was raised

Max Havelaar (1860)

1847: 1st severe famine

1849: 2nd and more widespread famine

1881: Sugar cane disease "Sereh"

1930s: Great Depression

1945: World War II

1980: Asosiasi Gula Indonesia (Indonesia Sugar Association) formed

1870 De Suikerwet

1850 1900 1930 1980

CONCLUSION

The tumultuous history of Indonesia's political and socioeconomic systems have embded layers of social, environmental and economic issues, among others, upto this day. The laws and regulations that were imposed, not to mention the built environment that resulted from years of colonisation, infrom the built fabric that we see in Indonesia, and especially Semarang, today. Understanding these layers throughout time have given us clues on how to approach hertiage and architecture, through a thorough evaluation of values of each aspect that informs the building fabric in Semarang.

The future of Indonesia is resting on a step back to more stricter laws on freedom of speech, women's rights and limiting the powers of the anti corruption division while the city infrastructure and city planning tries to step forward into a 'smart' city movement.

The presence of social segregation during the colonial times is seen in the ubran morphology of the city. Traces of these are seen in individual building spatial planning as well. These are important factors to consider the current status of the city and its remnants of the past.

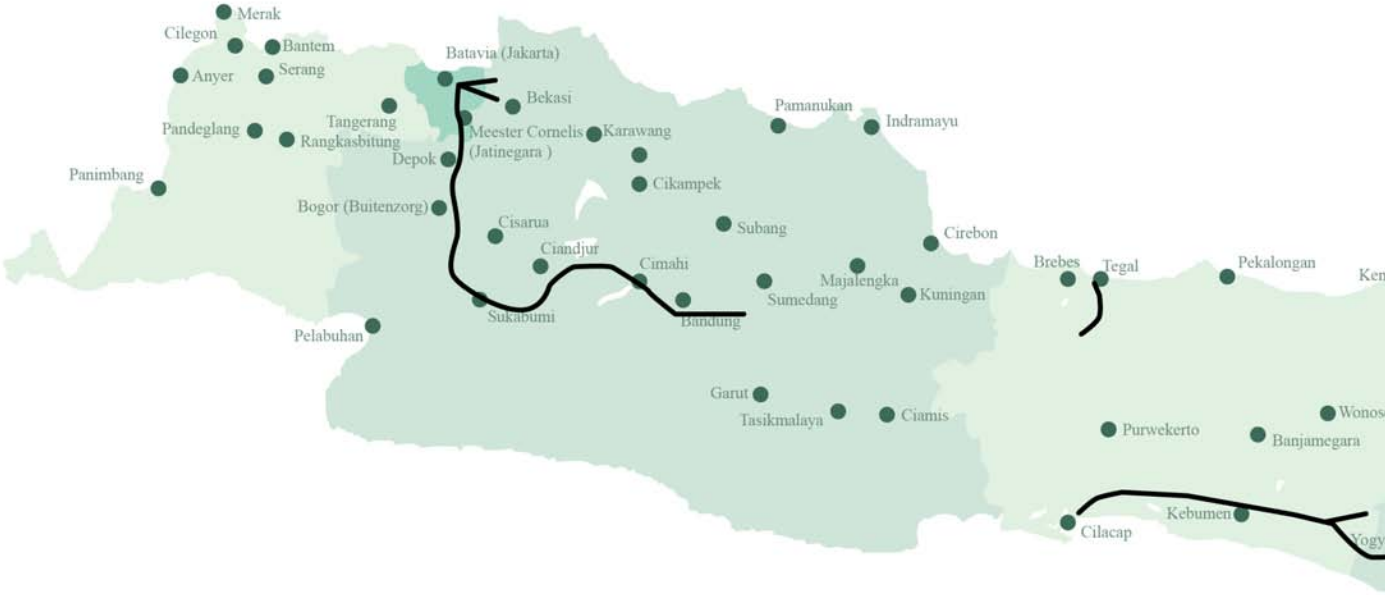
With these mind, we can look at built heritage from a multitude of perspectives, and what it means for the society as well the future of adaptive heritage architecture.

INFRASTRUCTURE

Map of the railroad from Samarang
SOURCE: Leiden University Library - Digital Collections

INFRASTRUCTURE

Semarang was the first city in Indonesia to have railway systems, and also is home to the oldest railway station in Indonesia. From this, we can see that railways play a crucial role in the identity and character of Semarang. The vibrant harbor city Semarang couldn't have been able to flourish without the support of a strong structured railway. The purpose of this study was to understand how the railways developed on Java Island, and also how the railways were integrated with the overall development of Semarang.


Merak
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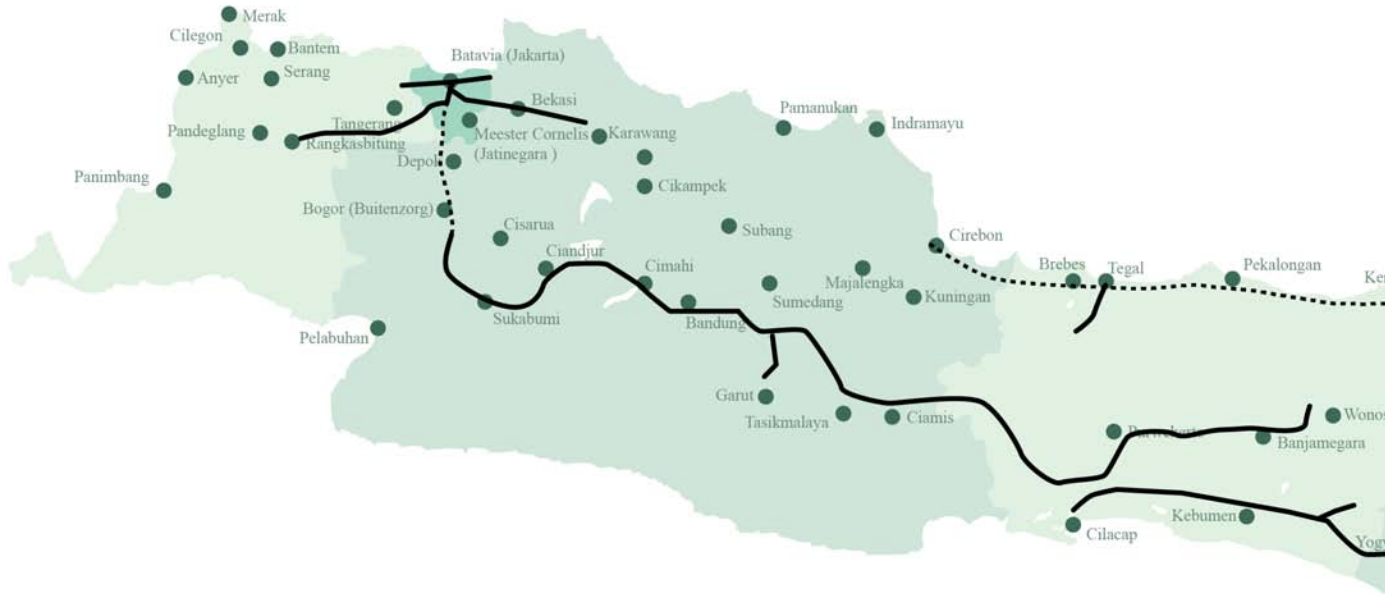
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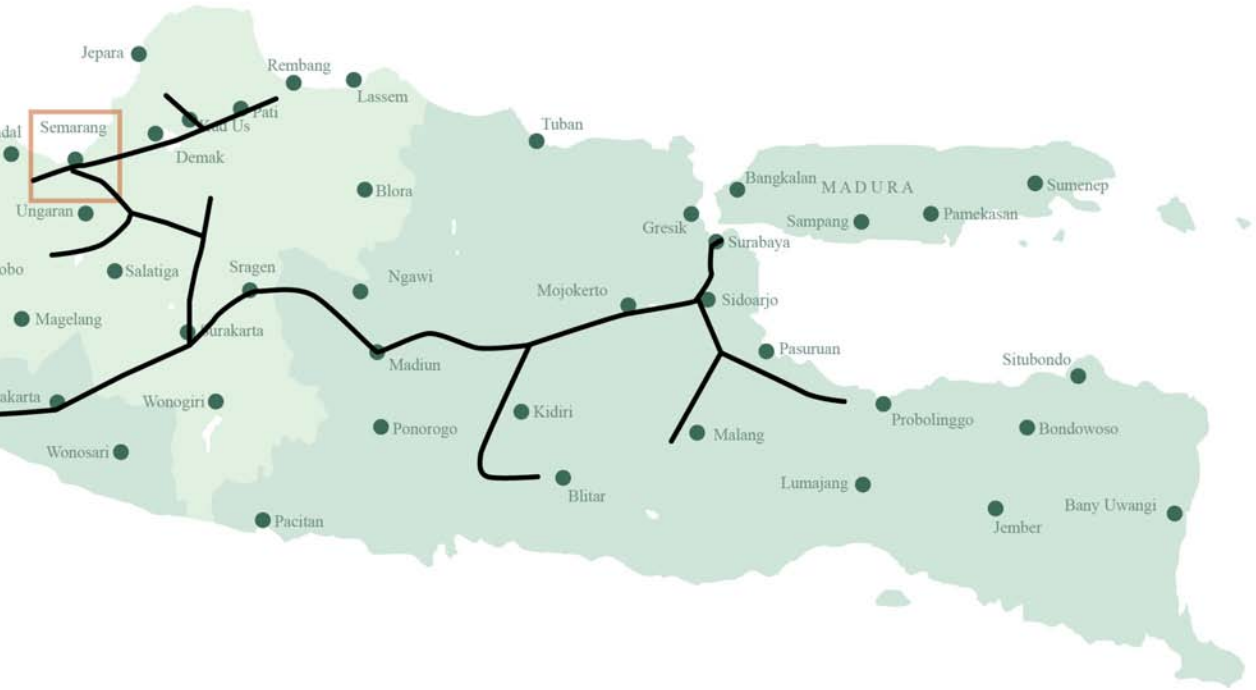
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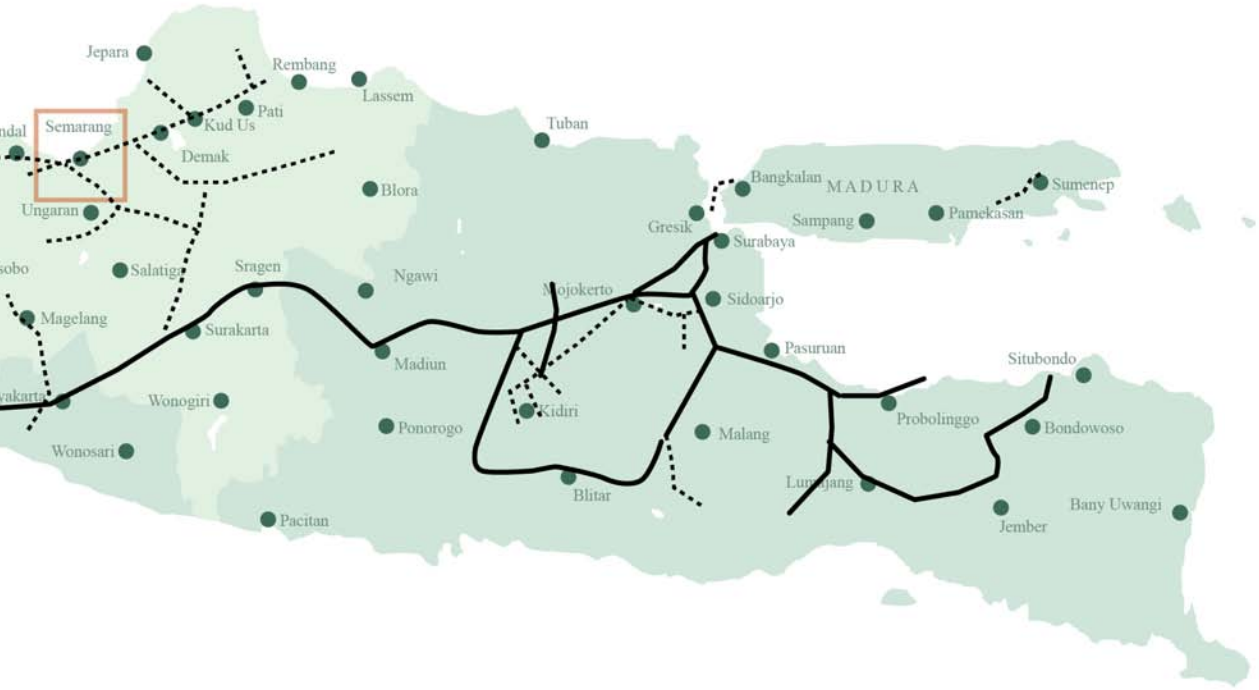
1888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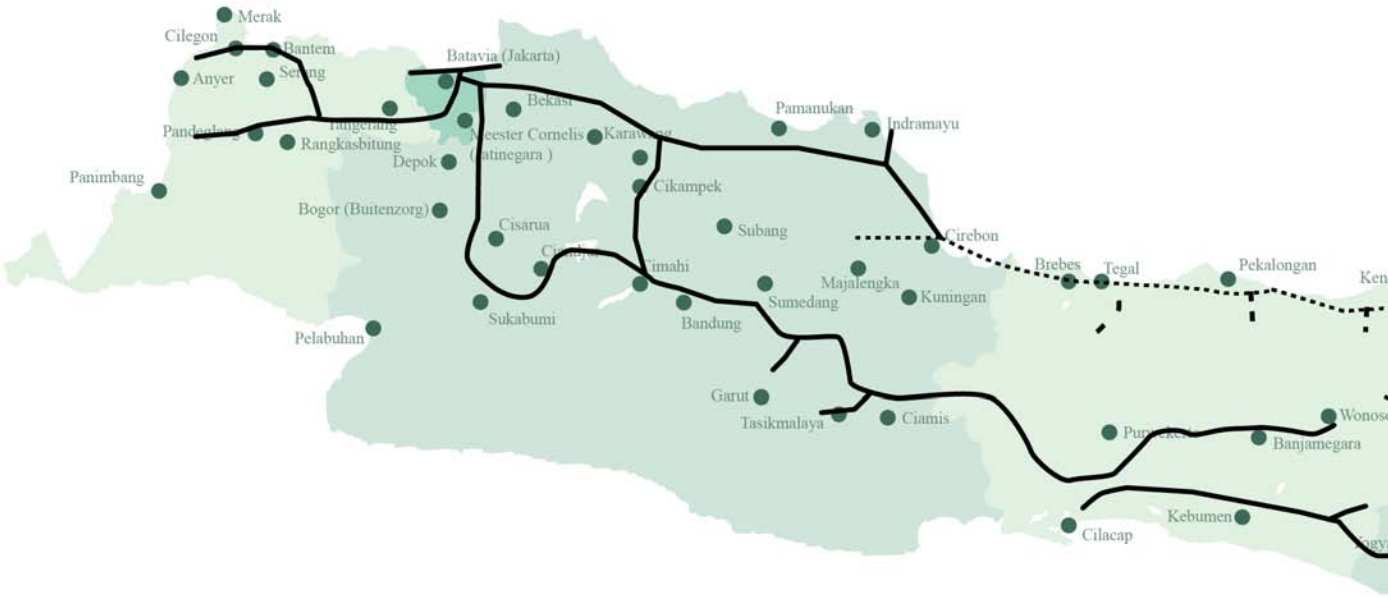
1899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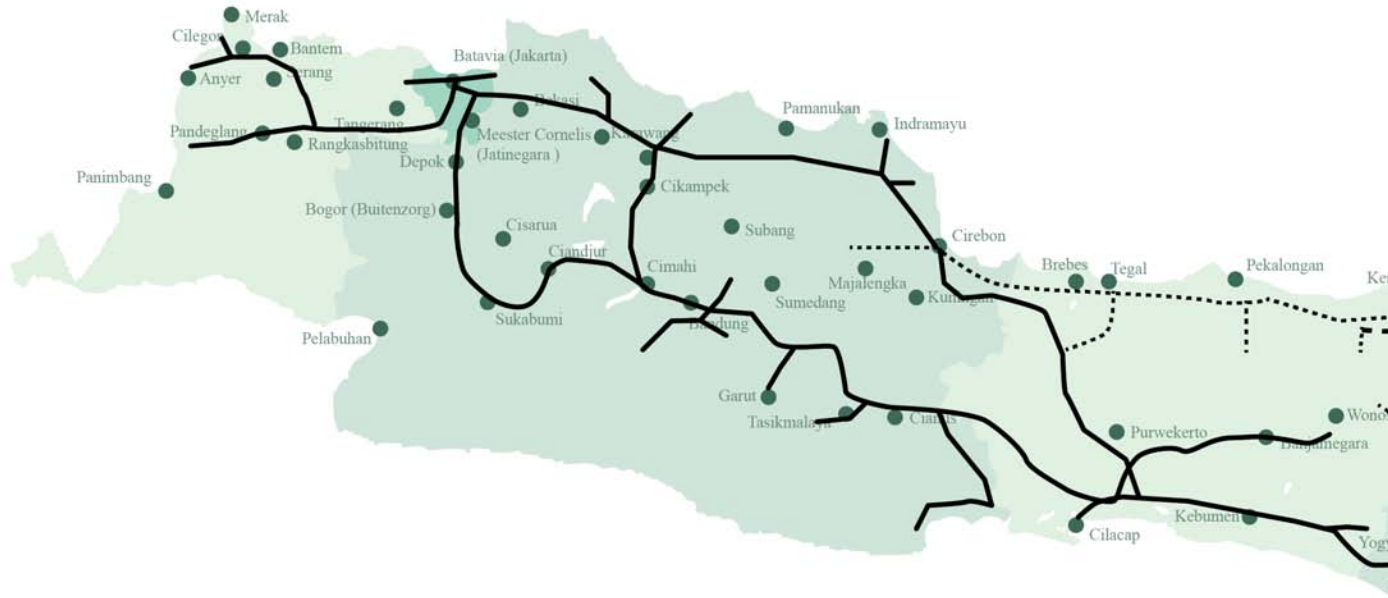
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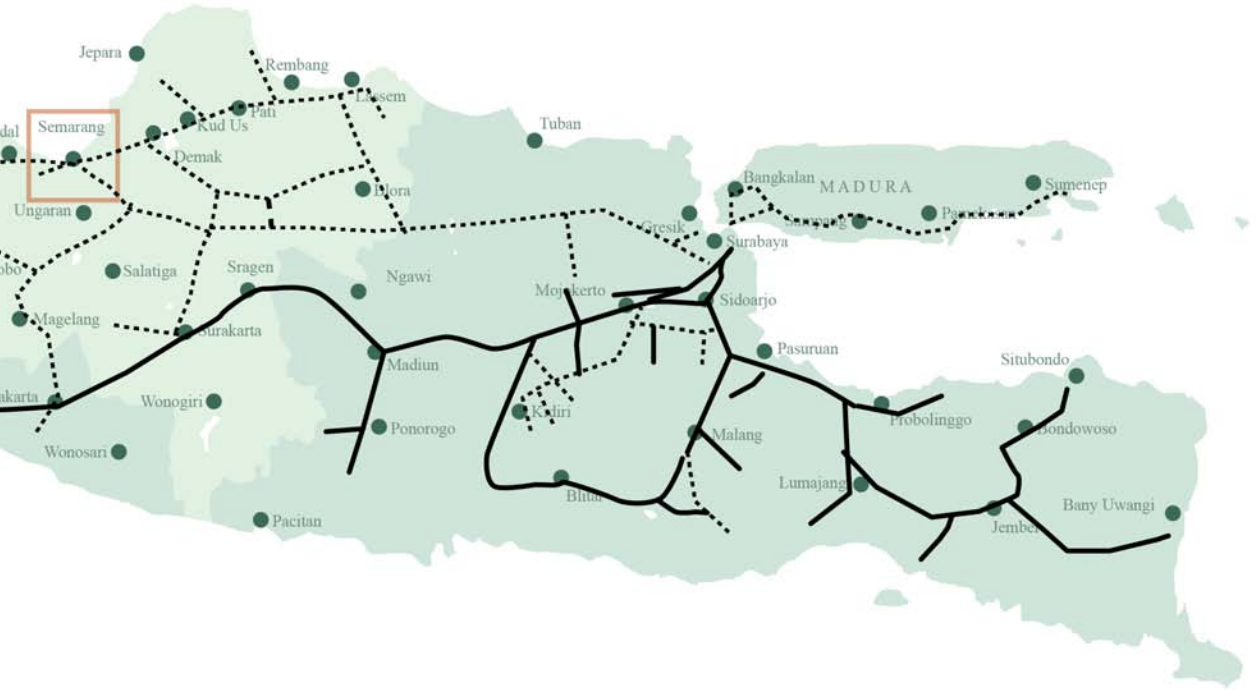
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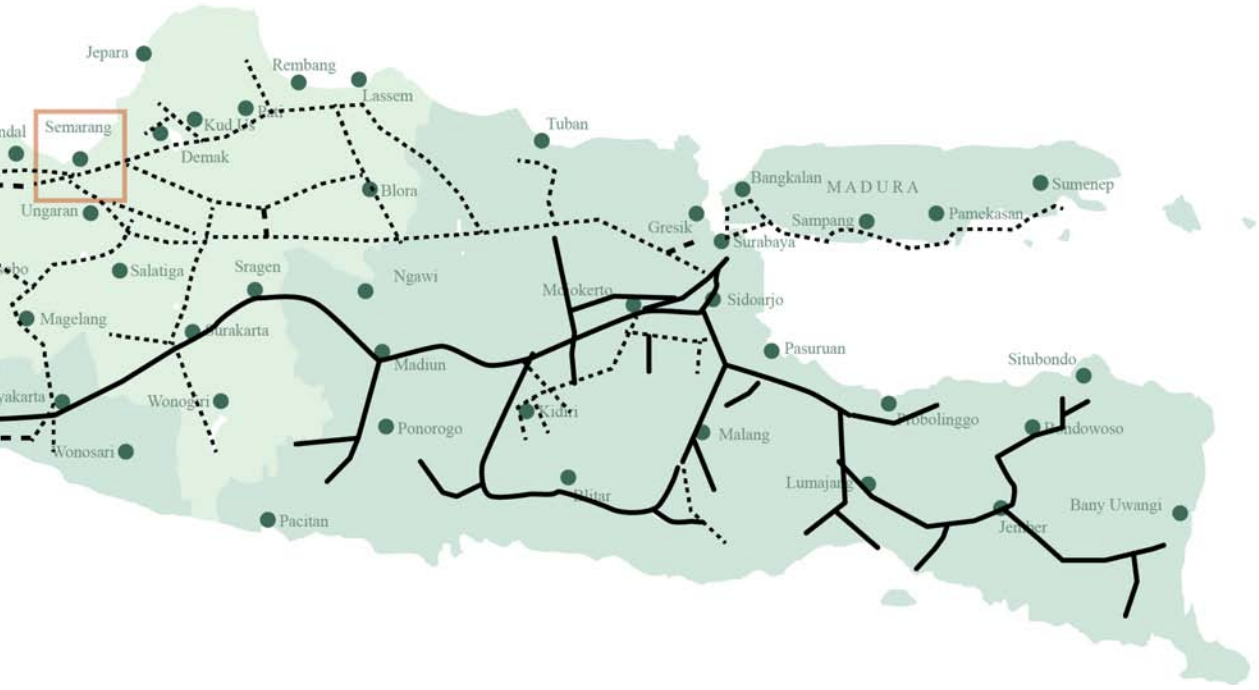
1913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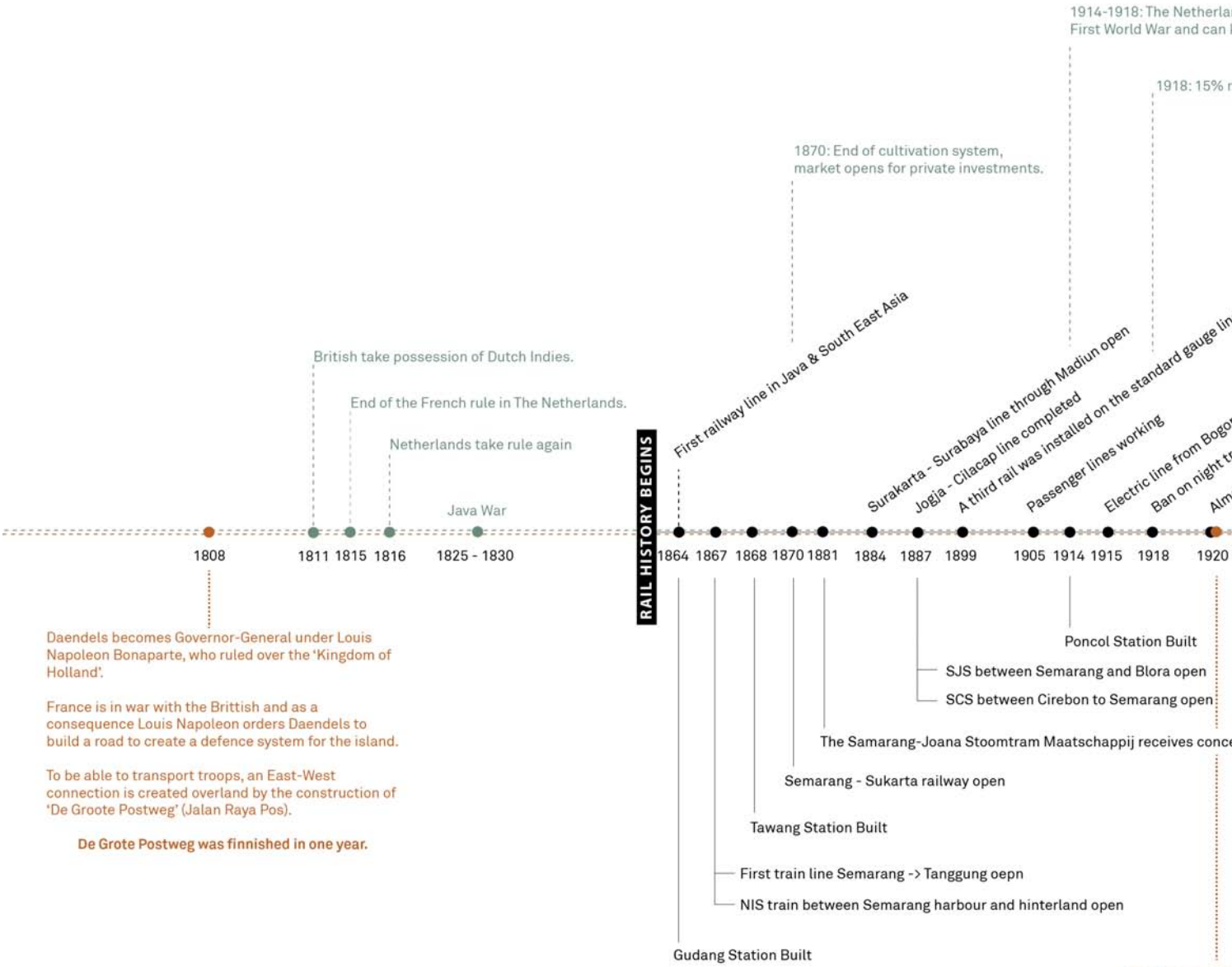
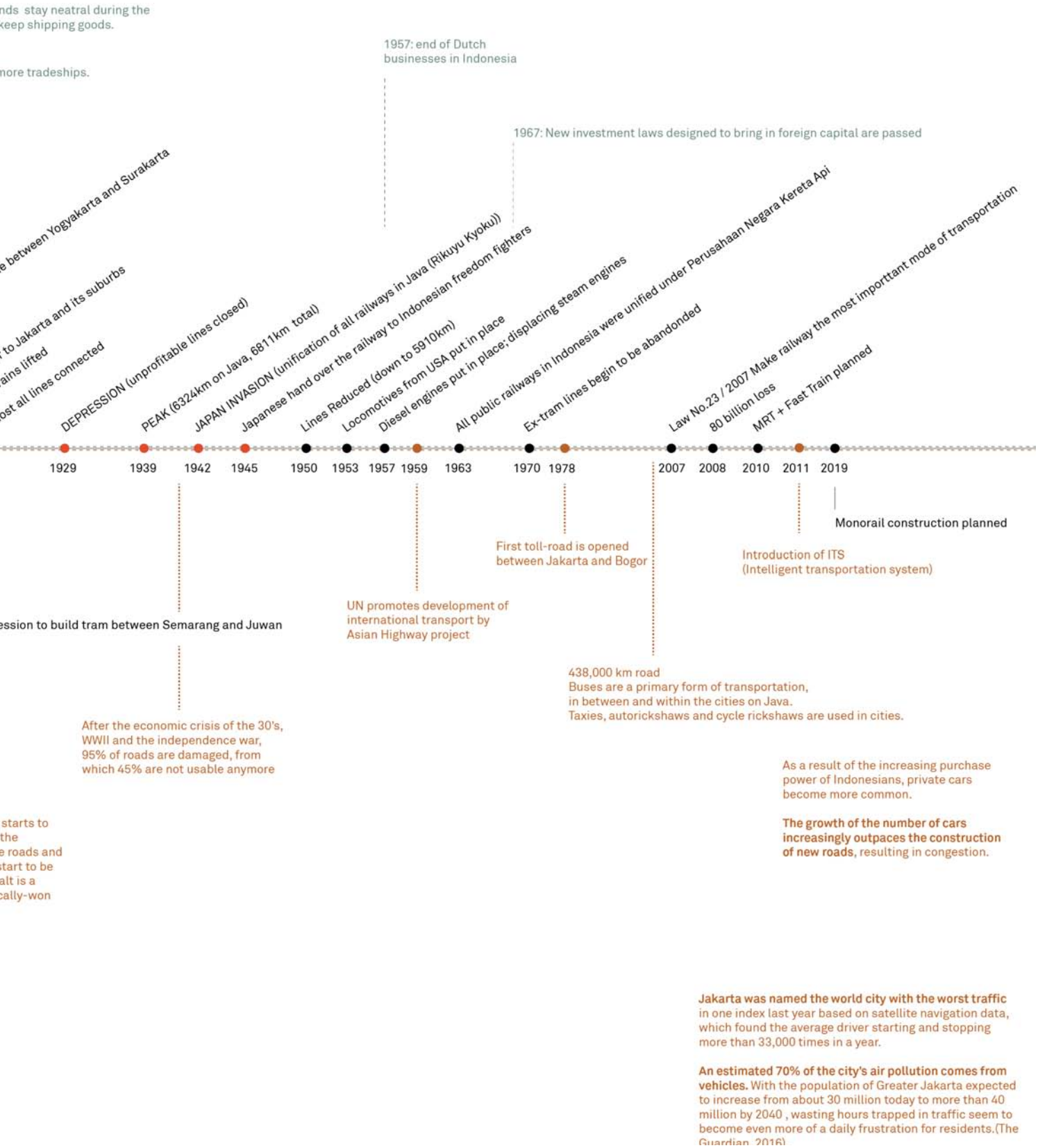
1925


1914-1918: The Netherla
First World War and can
1918: 15%
1870: End of cultivation system,
market opens for private investments.
British take possession of Dutch Indies.
End of the French rule in The Netherlands.
Netherlands take rule again
Java War
First railway line in Java & South East Asia
Surakarta - Surabaya line through Madiun open
Jogja - Cilacap line completed
A third rail was installed on the standard gauge lin
Passenger lines working
Electric line from Bogo
Ban on night t
Alm
RAIL HISTORY BEGINS
1808
1811 1815 1816
1825 - 1830
1864 1867 1868 1870 1881 1884 1887 1899 1905 1914 1915 1918 1920
Daendels becomes Governor-General under Louis Napoleon Bonaparte, who ruled over the 'Kingdom of Holland'.
France is in war with the Brittish and as a consequence Louis Napoleon orders Daendels to build a road to create a defence system for the island.
To be able to transport troops, an East-West connection is created overland by the construction of 'De Groote Postweg' (Jalan Raya Pos).
De Grote Postweg was finnished in one year.
Poncol Station Built
SJS between Semarang and Blora open
SCS between Cirebon to Semarang open
The Samarang-Joana Stoomtram Maatschappij receives conce
Semarang - Sukarta railway open
Tawang Station Built
First train line Semarang -> Tanggung oepn
NIS train between Semarang harbour and hinterland open
Gudang Station Built
The government
pay attention to
foundation of th
counntry roads s
asphalted. Asph
by-prodyct of loc
oil.



Jakarta was named the world city with the worst traffic in one index last year based on satellite navigation data, which found the average driver starting and stopping more than 33,000 times in a year.

An estimated 70% of the city's air pollution comes from vehicles. With the population of Greater Jakarta expected to increase from about 30 million today to more than 40 million by 2040 , wasting hours trapped in traffic seem to become even more of a daily frustration for residents.(The Guardian, 2016)

ROAD NETWORK | daendels system

1808: Daendels becomes Governor-General of the Dutch-Indies, under king Louis Napoleon Bonaparte, who ruled over the 'Kingdom Holland'. France, where present day Netherlands was part of during this time, was in war with the British and as a consequence Louis Napoleon would order Daendels to build a new road on Java, in order to create a defence system against a possible British attack. The 'Grote Postweg' (Jalan Raya Pos) as this mayor road was called, would be necessary to transport troops. The enormous road is built on ancient routes used by local people, and was finished within one year (1808-1809).

1830: The Cultivation System is implemented by Governor-General Van den Bosch. The Grote Postweg is used more intensely for the transport of goods. Besides carriages, animals like donkeys, camels and elephants are used for transportation. Later, the railway (from 1864) would provide a larger capacity. Farmers themselves could not use the road, they still had to move their cattle and products on paths alongside the Grote Postweg. These farmers were also not allowed to use bridges and other infrastructural elements.

1903: The Decentralisation Law was implemented, causing the establishment of city and regional councils. These councils are responsible for building and maintaining infrastructure.

1920s: The colonial government start to pay attention to the foundation of roads and country roads are being asphalted. The asphalt is a by-product of locally-won oil and so relatively easy to apply. In the Netherlands there is a lot of experimentation with asphalt. In the Indies roads are asphalted in a basic way.

Post 1930s: After the economic crisis of the 1930's, World War II, and the Independence War, 95% of roads in Indonesia are damaged from which 45% are not usable anymore.

1959: Tthe UN start to promote the development of international transport by creating the Asian Highway project. Denpasar is via Java connected to Malaysia, Thailand, Burma, Bangladesh, India, Nepal, Pakistan, Afghanistan, Iran and Turkey by Asian Highway 2 (not yet all parts of this highway are finished).

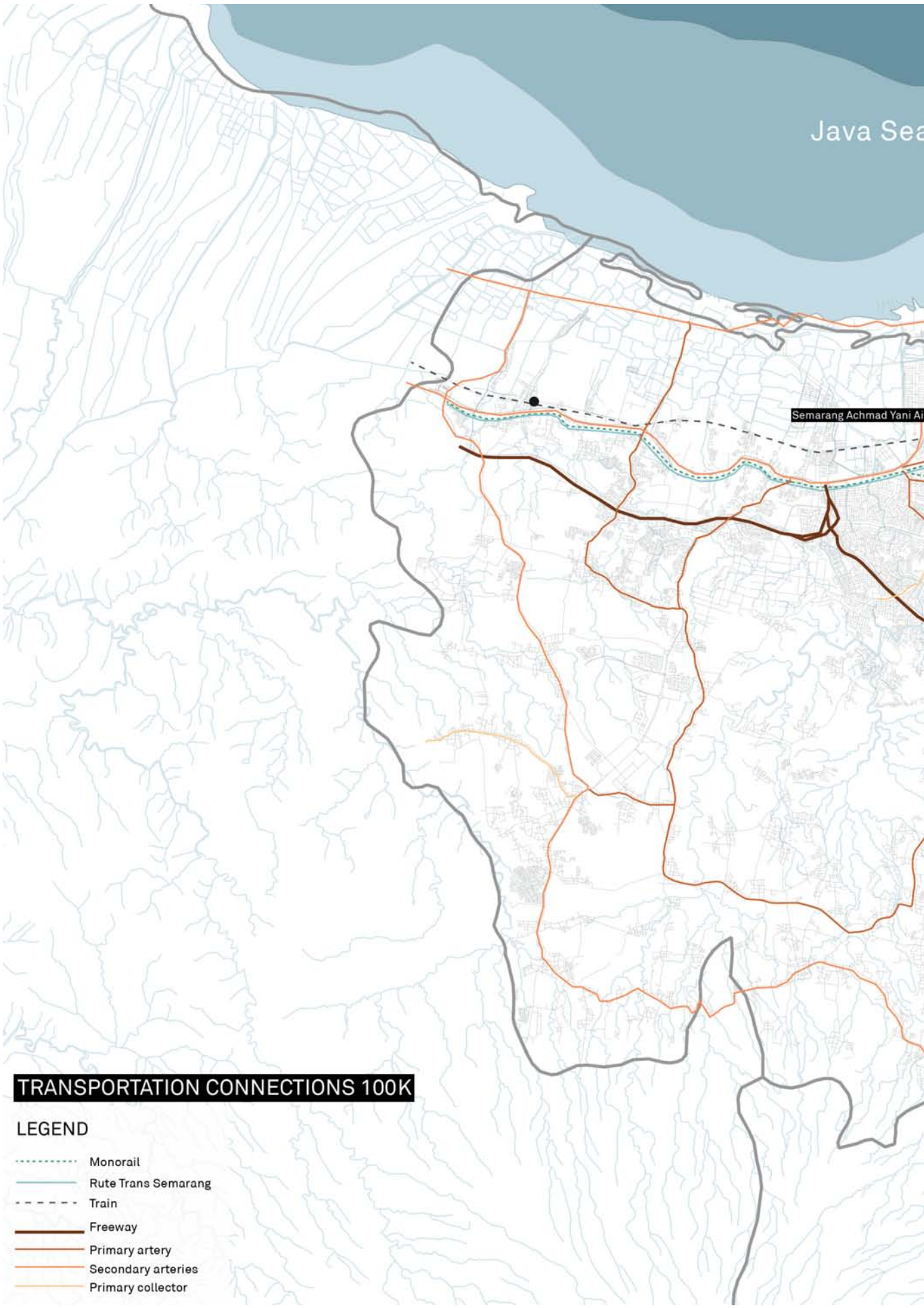
1978: The first toll road on Java is opened between Jakarta and Bogor. As a result of the increasing power of Indonesians, private cars become more common. The growth of the number of cars increasingly outpaces the construction of new roads, resulting in congestion.

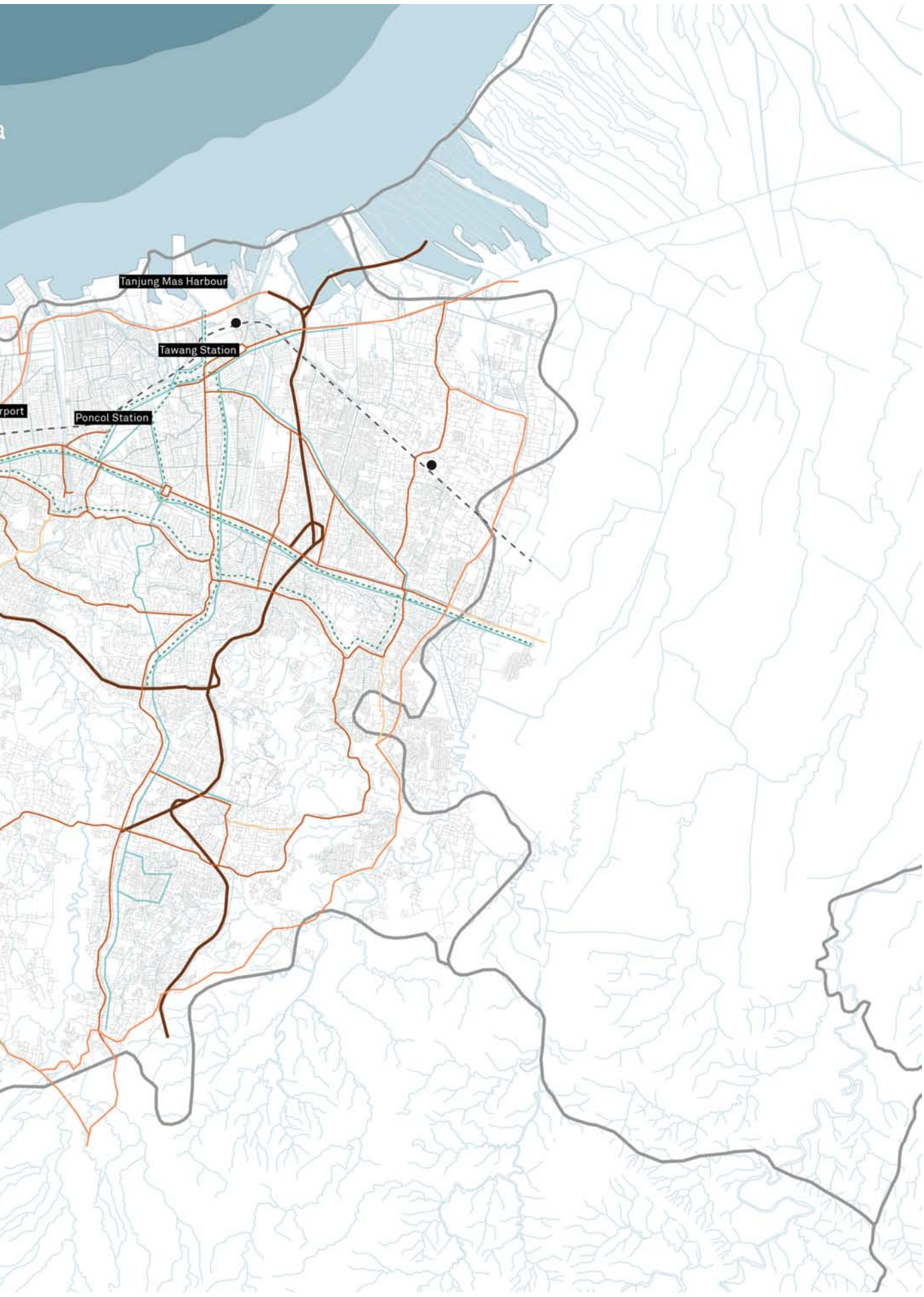
ROAD NETWORK | present day

Besides cars, buses are a primary form of transportation, in between and within the Javanese cities Bus Rapid Transit, BRT). Within cities taxies and autorickshaw are very common as well.

In 2011 the ITS is introduced in Indonesia: Intelligent Transportation system: the government tries to overcome congestion problems in metropolitan areas.

2019: Jakarta was named the wold city with the worst traffic based on satellite navigation data. An estimated 70% of Jakarta's air pollution comes from traffic. With the population of greater Jakarta expected to grow form about 30 million today to 40 million by 2040, waiting hours trapped in traffic will become more of a daily frustration for residents.


Java Sea
Semarang Achmad Yani Ai
TRANSPORTATION CONNECTIONS 100K
LEGEND
Monorail
Rute Trans Semarang
Train
Freeway
Primary artery
Secondary arteries
Primary collector


Tanjung Mas Harbour
Tawang Station
rport
Poncol Station

CONCLUSION

The transportation systems have developed over time, and is still in the process of changing according to the people, economy or society's needs. The railways were heavily related with the transportation of goods in colonial times, and is mainly used for the transportation of goods and also people in recent days. The roads also function as carriers of people and goods, and is a big part of daily transportation for the people of Java island.

One can never look at the transportation and mobility system individually; it always grows and decreases in accordance to the external factors it is situated in. Economic recession or development also heavily impacts transportation infrastructure, for big investments are crucial for infrastructure development.

BUILT ENVIRONMENT

Photo of the new kali with adjoining offices in Semarang in 1890
SOURCE: Leiden University Libraries, KITLV Collection

BUILT ENVIRONMENT

A thorough look at several domains of the built environment - geomorphology, urban morphology, and the architectural fabric of the city was key in order to visualise future for the city in our projects. Understanding how the city if formed, the influences it had gives us insight into how a city might progress in the future


SOURCE: Google Earth

The biophysical environment of Semarang is being analysised in three different aspects.

Firstly from the **macro scale**, the geological condition of Indonesia is very much a consequence of the tectonic plate movements. Java Island is located at the boundary of Eurasian Plate and Indo-Australian Plate, as well as the ring of fire. The subduction plate movement as been causing the active volcanic movement on the Sunda arc. Mount Ungaran is a dead volcano located at the back of Semarang, while further to the south there is Mount Merapi, one of the most active volcanoes in Indonesia.

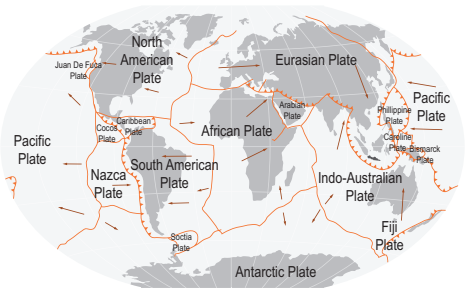
The second part of the analysis focuses on the **current biophysical condition** of Semarang. Semarang is basically formed by a mountain, the hinterland and the coast. Thanks to the volcanic eruption, the soil on Java Island is very fertile for agriculture and plantation. The mapping of elevation, soil and plantation will be analysed in the section.

Last but not least, **agro-plantation** has been an important industry for the development of Semarang. Many infrastructural development of the city has direct relation to agroindustry especially in the 18th-19th century. Indonesia has once been the second largest exporter of sugar, thus sugar industry is highlighted in the section. Timeline, maps and images related to the evolution of the industry will be discussed.

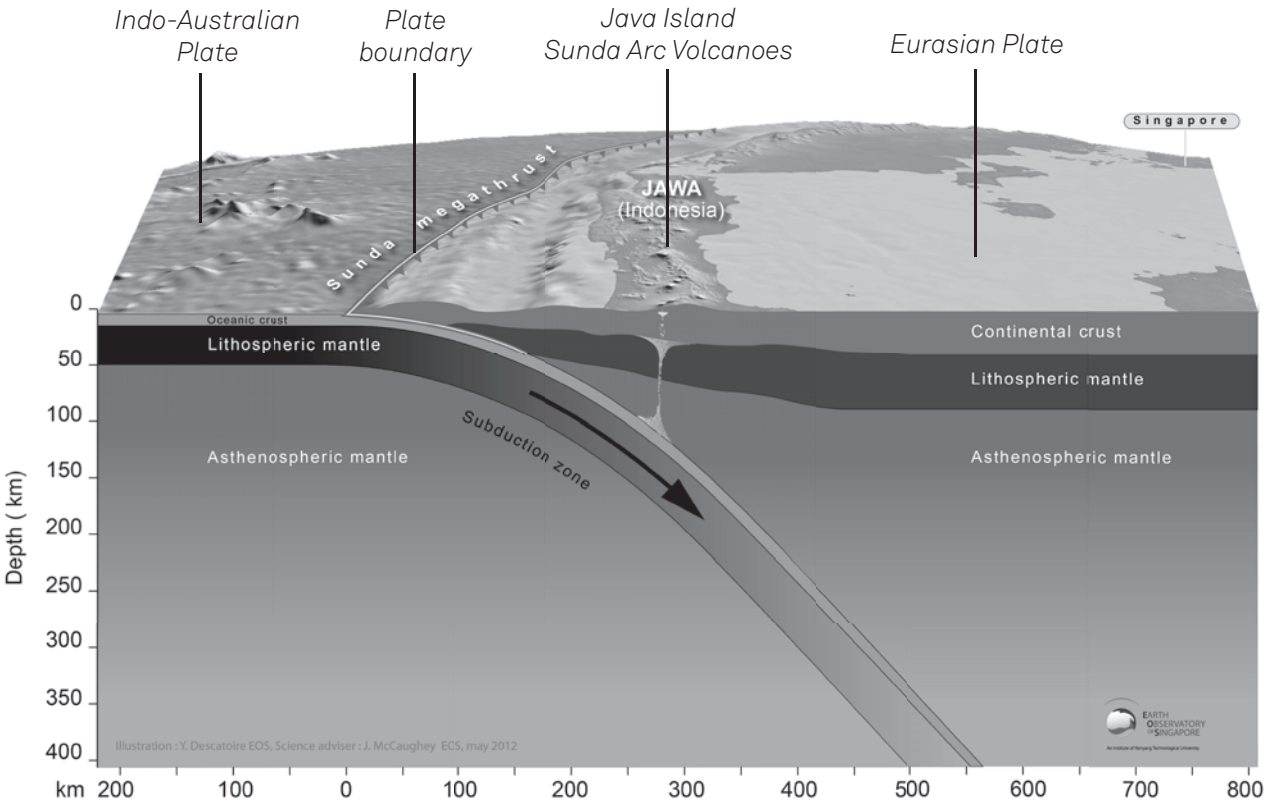
Transport of lorries with sugar cane by caravans at the Kaliwoengoe sugar factory west of Semarang1910
SOURCE: Leiden University Libraries, KITLV Collection

63M BP
Cenozoic era

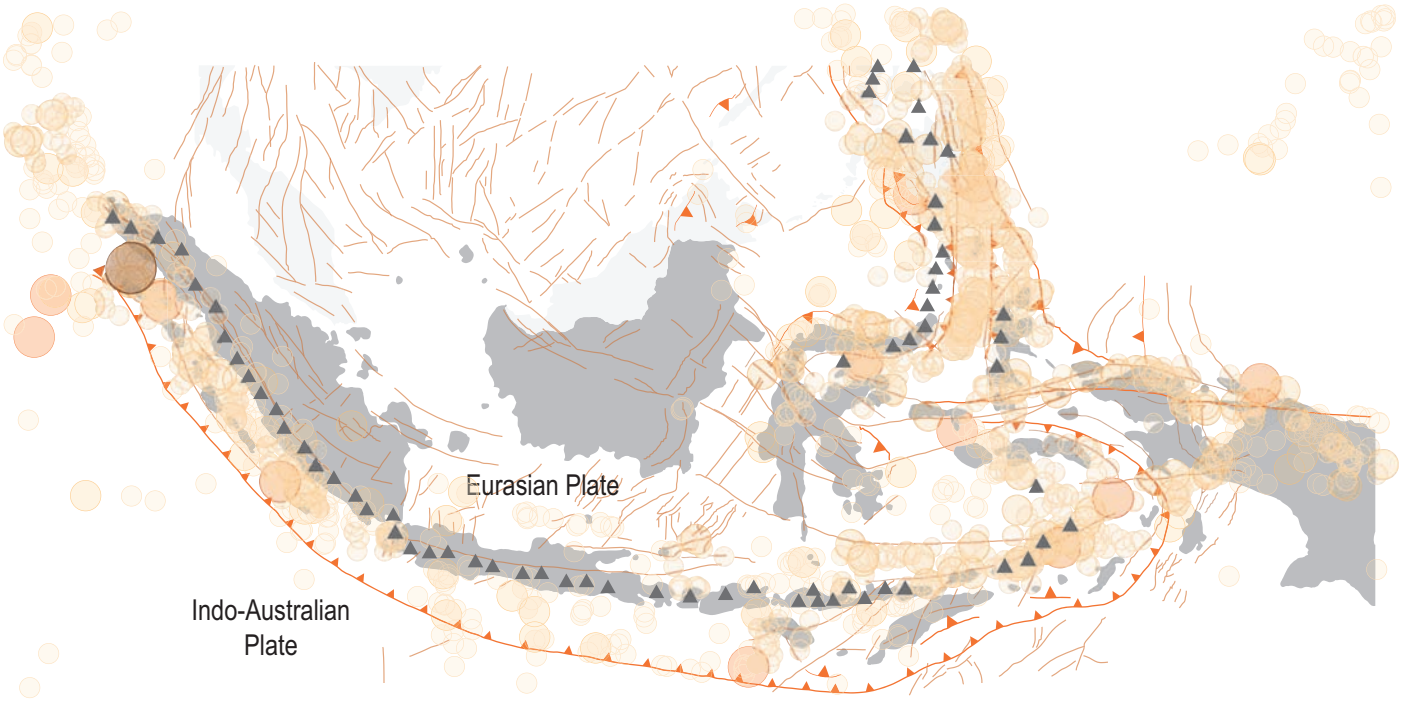
2M BP
Pleistocene era



20000 - 10000 BP
Last Ice Age

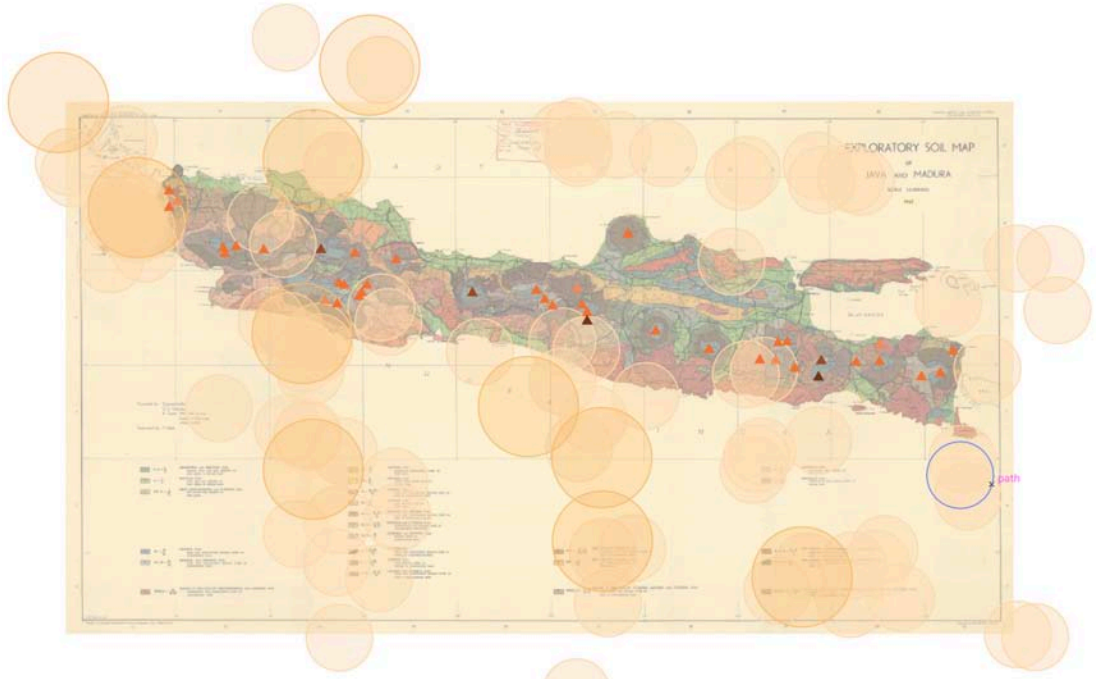


The geological condition of Indonesia is very much a consequence of the tectonic plate movements. Java Island is located at the boundary of Eurasian Plate and Indo-Australian Plate, as well as the ring of fire. The subduction plate movement as been causing the active volcanic movement on the Sunda arc. There are constant earthquakes and volcanic eruption on Java Island. Mount Merapi located in between Semarang and Jogjakarta is one of the most active volcanoes in Indonesia, with frequent eruptions recorded.

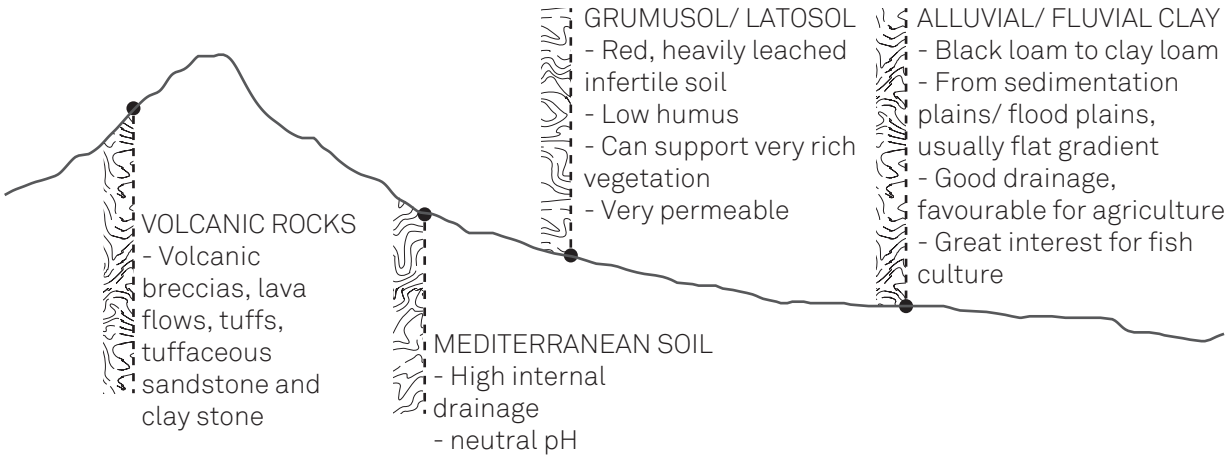


Geological condition of Indonesia

- 6.0-6.9 earthquake
- 7.0-7.9 earthquake
- 8.0-8.9 earthquake
- 9.0-9.9 earthquake
- probably extinct volcano
- normal or dormant volcano
- restless volcano
- erupting volcano
- major trust faults and trenches
- fault lines



Map of earthquakes and volcanoes in on Java Island



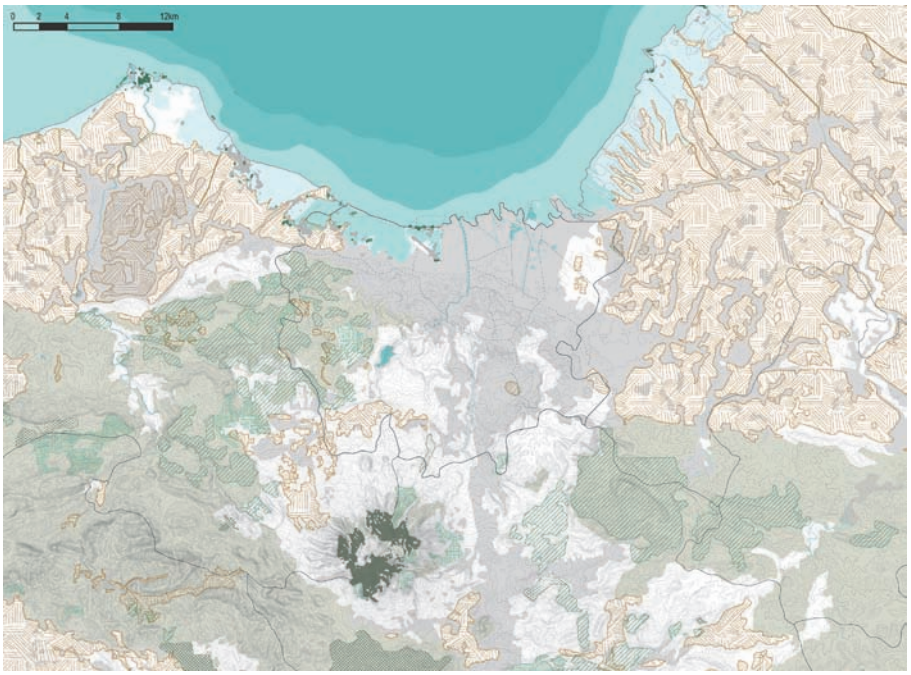
Elevation Map >15% slope 5-15% slope 0-5% slope

Semarang is essentially formed by a mountain, hinterland and coast. Due to volcanic eruption, the soil on Java Island is very fertile for agriculture and plantation. The major soil types of Semarnag are;

alluvial and fluvial clay around the coast and flood plains,
mediterranean soil in central Semarang,
and volcanic rocks and tuff towards the mountains.

The geology condition has favoured the production of crops and agroindustry, including paddy rice and rubber.

Soil Map

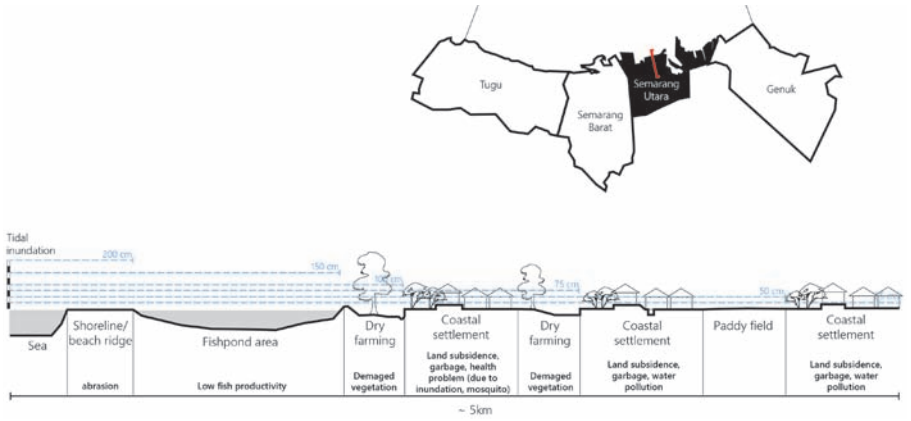


Plantation Map

LEGEND

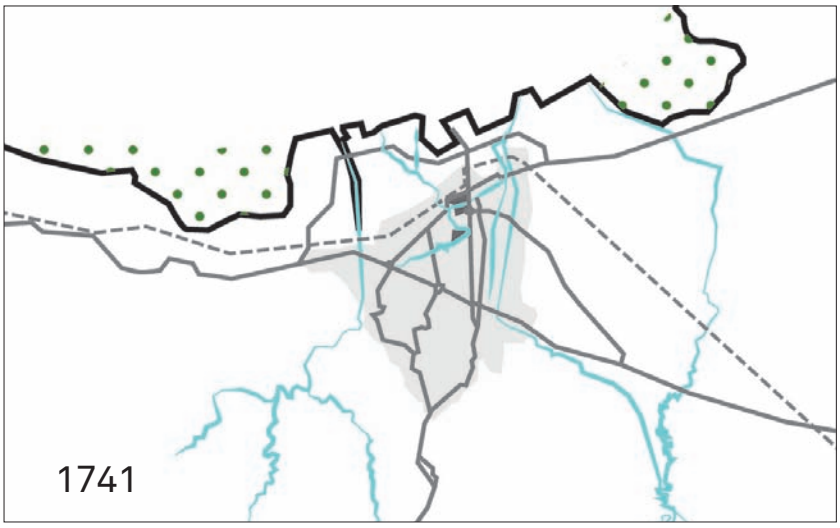
volcanic rocks
Mediterranean
grumusol
latosol
alluvial
production forests
primary forest
rice fields
wood & fibre
rubber
oil palm
fruit
others
mangroves

SOURCE: http://tugurejo.semarangkota.go.id/bidangpariwisata/ekowisata-hutan-mangrove-tapak-tugu-kota-semarang-jawa-tengah

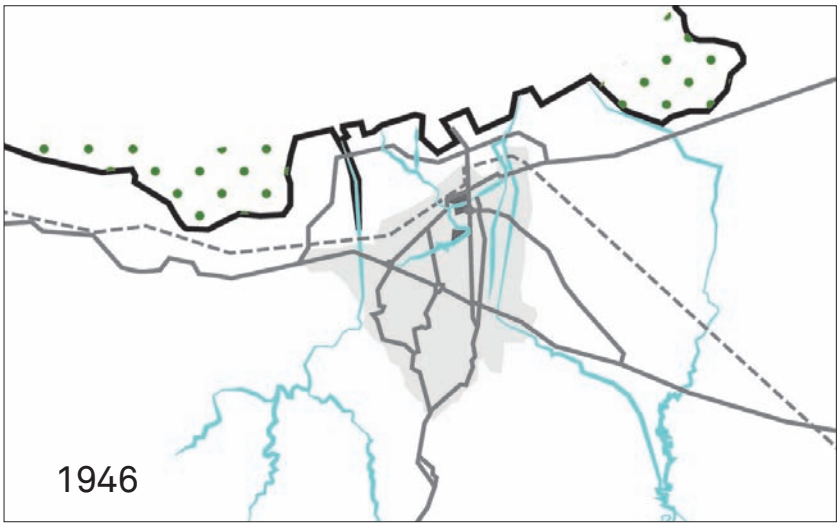


The coast of Semarang before 1741 was occupied by a massive mangrove forest. In the 1900s, the urban area spread from Kota Lama, and further towards the Java sea. The mangroves were cut to give space for rapid urban development and widening fish ponds in the coastal area.

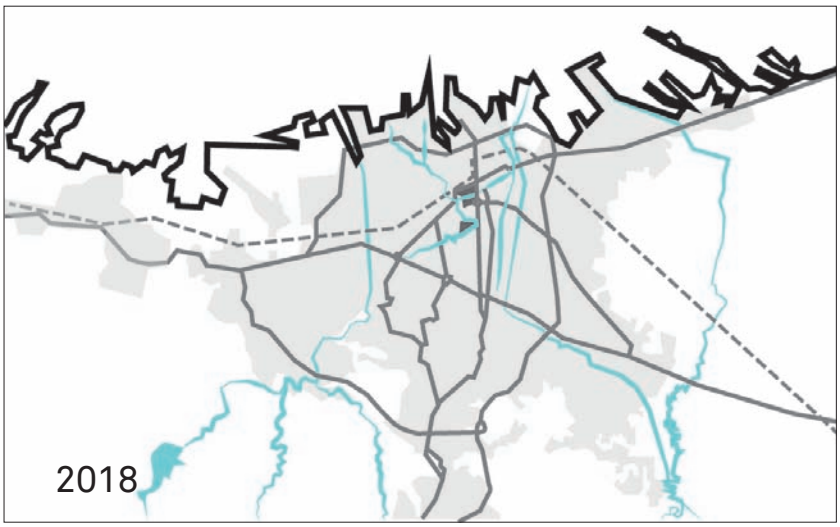
Today, the coverage area of mangroves has been significantly reduced. Wisata Mangrove Tapak, which is next to Jenderal Ahmad Yani International Airport, becomes the major mangrove area in Semarang. Local communities organize mangrove reforestation activities regularly to protect the coastline from further abrasion. Despite of the great effort of the local communities, the city, especially the low land and coastal area, are still suffering from coastal abrasion and inundation due to its low elevation together with the rising sea level.




Kota lama built behind the mangroves



Large part of mangroves was replaced by the expansion of Semarang's coastal urban areas.




The expansion of the urban areas shifts towarrds the hilly areas.

900-1600: Early development

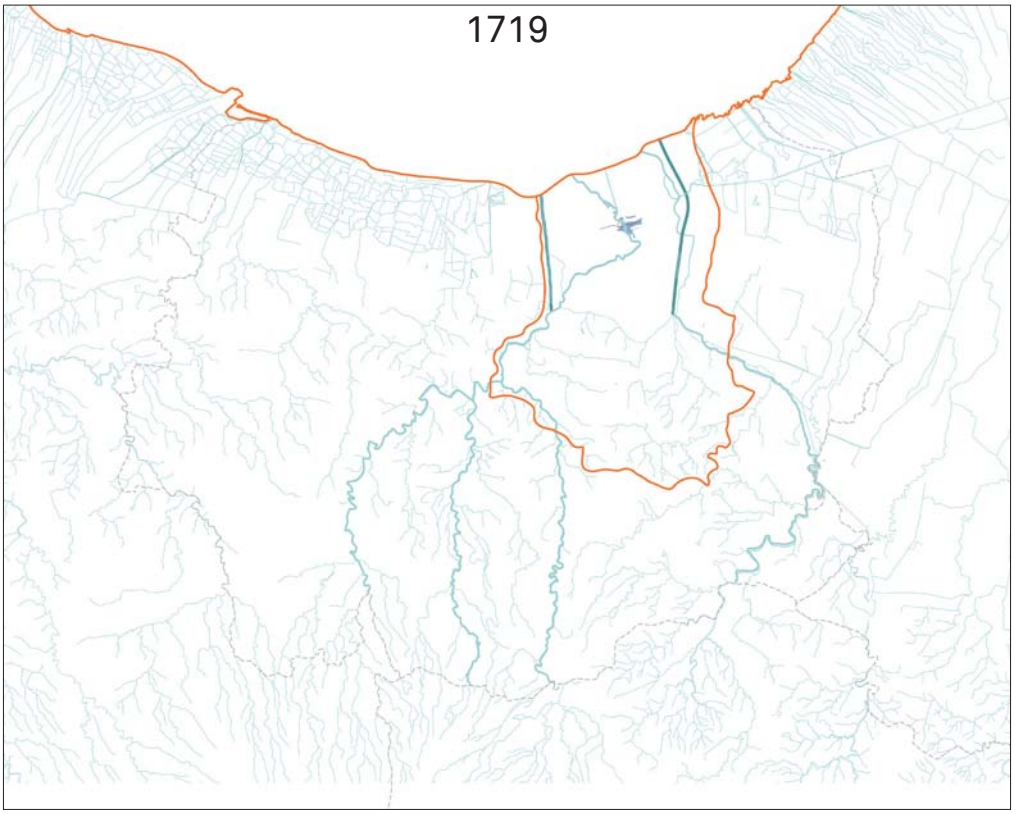
The early settlements of Medang Kawulan Kingdom (fusion of Bhumi Mataram and Cailendra kingdom). Sedimentation formed by the estuary of Kali Kreo, Kali Kripik, and Kali Garang which also used as the main transportation network. The earliest settlements in the area nowadays occupied by the city of Semarang Due to silting up here, in the course of a few thousand years of coastline, they have been moved 4 to 6 km north. Bergota, now a hill in the urban area on the border between the lower and upper town, was an island until the 10th century. The first Javanese settlements of traders and fishermen were probably created there and on the high coastal wall of Palau Tirang in the 8th century. The function of the Semarang area at that time was as the commercial district of Demak and the centre of Islamic religion in the region. At that time, Semarang was still in the form of a moor with several native houses and was very unhealthy because it was located next to marshes and sewage. Many Chinese people who wander to Semarang. They chose to occupy Gedong Batu. The first wall houses erected in Semarang were at Pecinan Lor and Pecinan Wetan or now better known as Gang Pinggir.

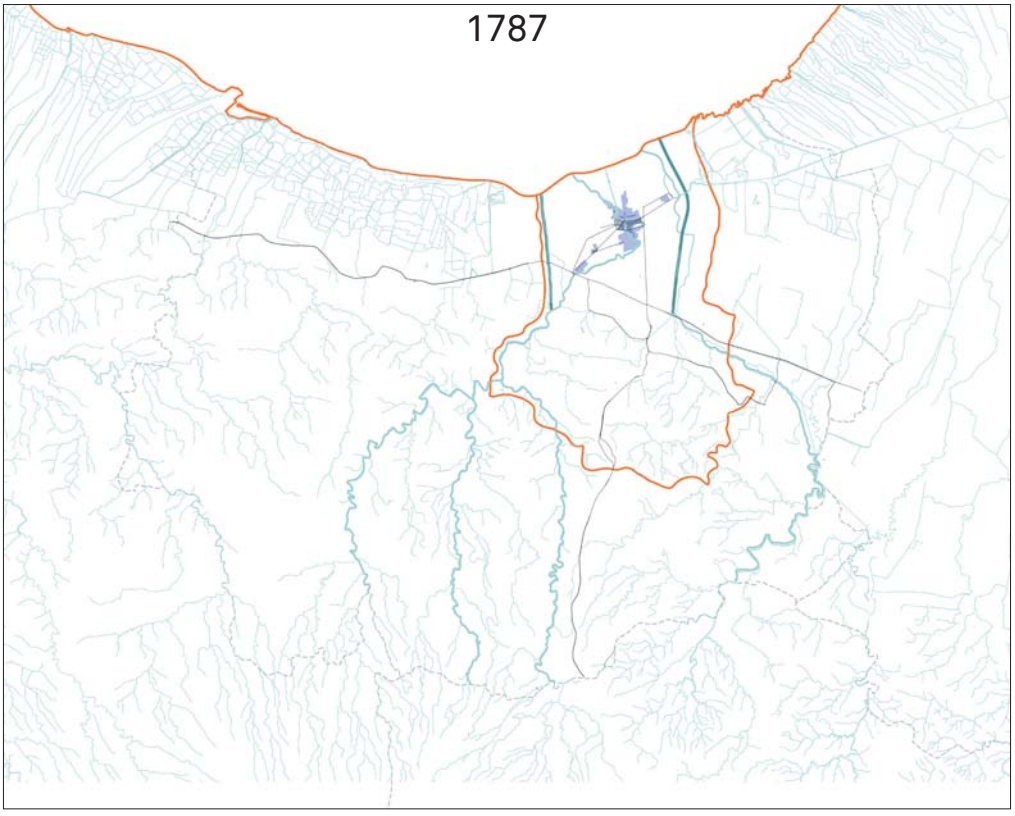
1700-1800s:

During this era, the Dutch settlements dominate the urban fabric as it also attracts many ethnicities to settle nearby due to the trading activity. The shift from water transportation to road transportation happened during this era, the reason was that the sedimentation that occurred in the coastal area made it hard to keep using water transportation network. This also eased the transport of goods from hinterland to the port.

1811-1813:

To tackle the flooding issue in the city area, the Dutch government built West Canal and East Canal that changed the morphology of the city. In the 1808, the Daendels Road (De Grote Postweg) was built and this also changed the morphology of the city. The city grew rapidly because of this development. This road mainly used to transport goods but also mail delivery, however, this road was mainly used by the traders and not by the citizens. During this year, a connection to southern Java was also made.


1719


1787

1847:

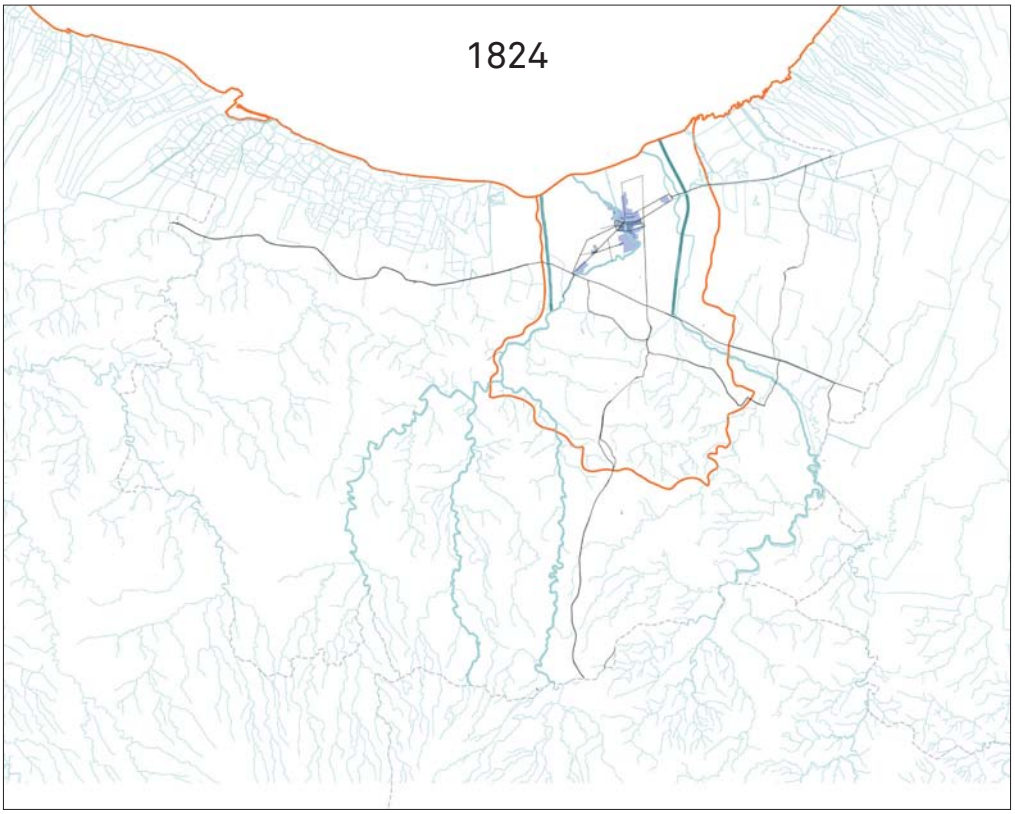
The sedimentation in the fort area (Kota Lama) results in the spread of activity to the coastal area that happened on Ronggowarsito street. The quick sedimentation results in disruption of sea transportation towards Kota Lama, thus the municipality moved the fort to the north area.

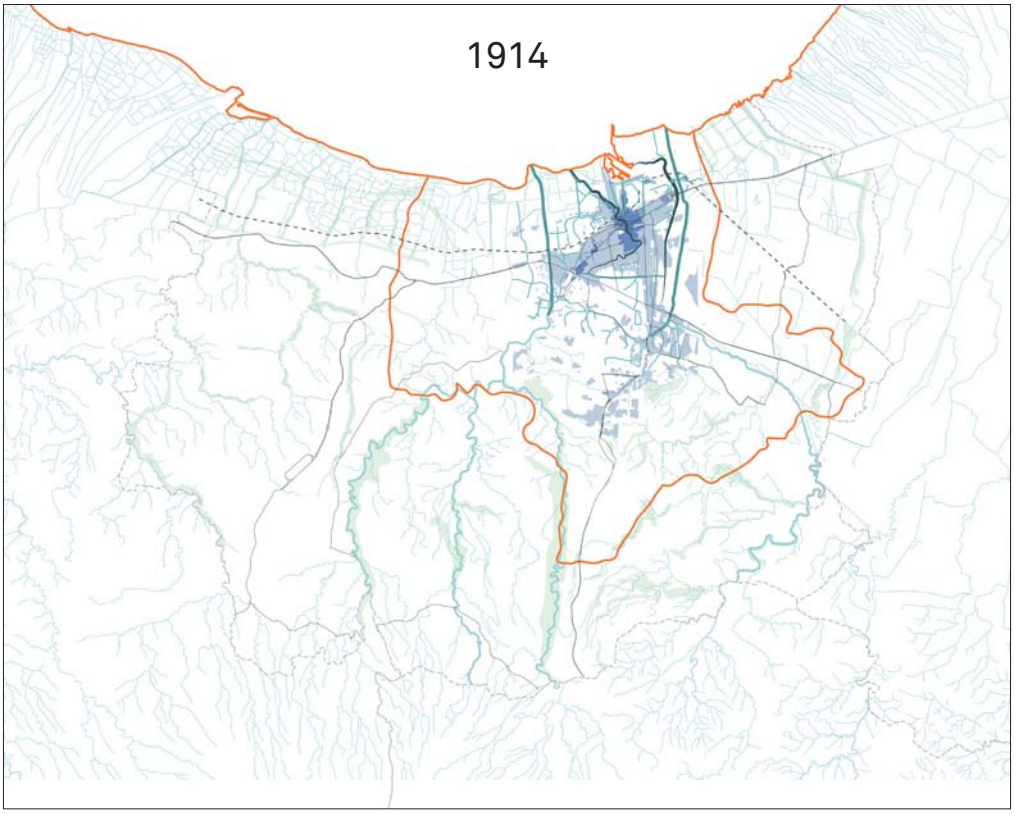
1864:

On June 16, 1864, the first railroad was built in Indonesia. Starting from Semarang to the cities of Solo and Kedungjati, Surabaya and to Magelang and Yogyakarta, two train stations are still in existence, namely Tawang and Poncol. In the XIV century, the Netherlands also established the Tanjung Emas Port. The Port of Tanjung Emas is said to have a strategic function as a centre for national and international trade (The World Market 1870-1900). Furthermore, other developments also emerged in succession such as in 1857 telegram services between Batavia - Semarang - Ambarawa - Surabaya began to be opened, in 1884 Semarang began to make long-distance telephone connections (Semarang-Jakarta and Semarang-Surabaya), the opening of the first post office in Semarang in 1862.
It is important to notice that the development of the infrastructure in Semarang from early years until this era, was triggered by economic interest. The development of the infrastructure grew rapidly and triggered the growth of settlements close to the transportation system even though these infrastructures were initially meant to transport goods from hinterland to the port.

1906-1917:

During these years, flooding issues was still vital in Semarang that caused many killing disease such as cholera. The Dutch government initiate the drainage improvement in the city and also proposing for New Tjandi Planning in the hinterland area. This projects aimed to provide the citizens better and healthier housing. This expansion triggers wider development of the city towards the south area of Semarang or the hinterland area.
Starting from this year, health consideration was important in Semarang's city planning. Many city improvements including water development, was done regarding this issue.


1824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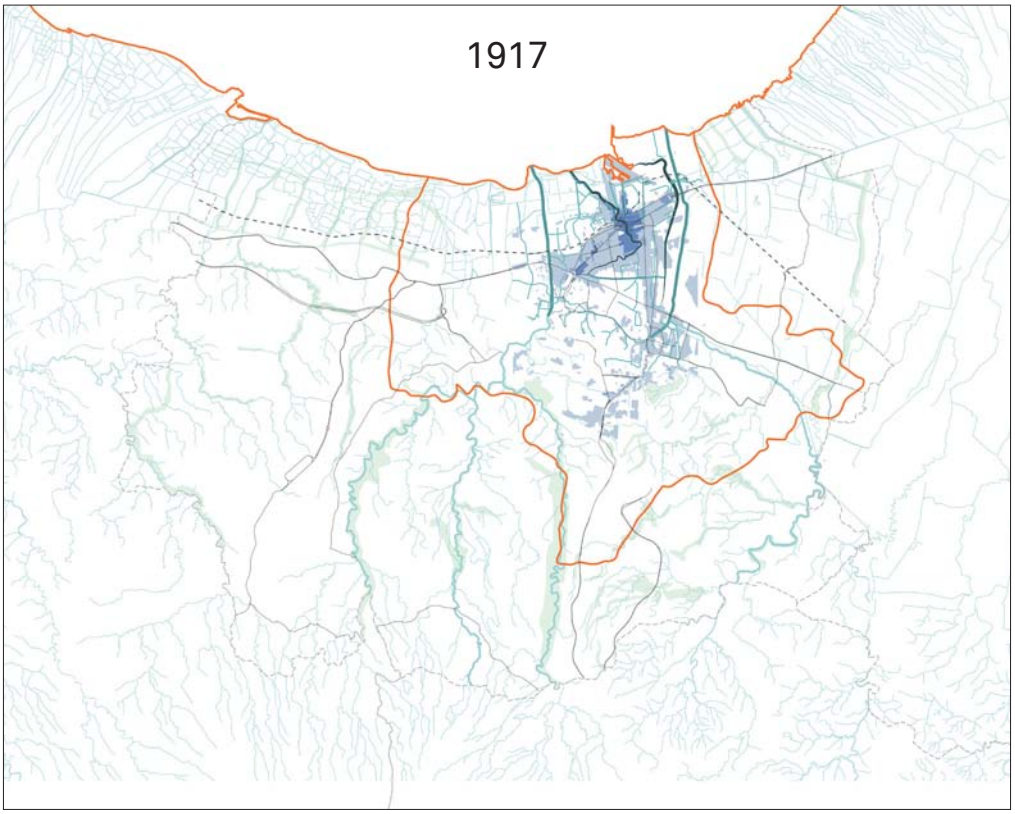
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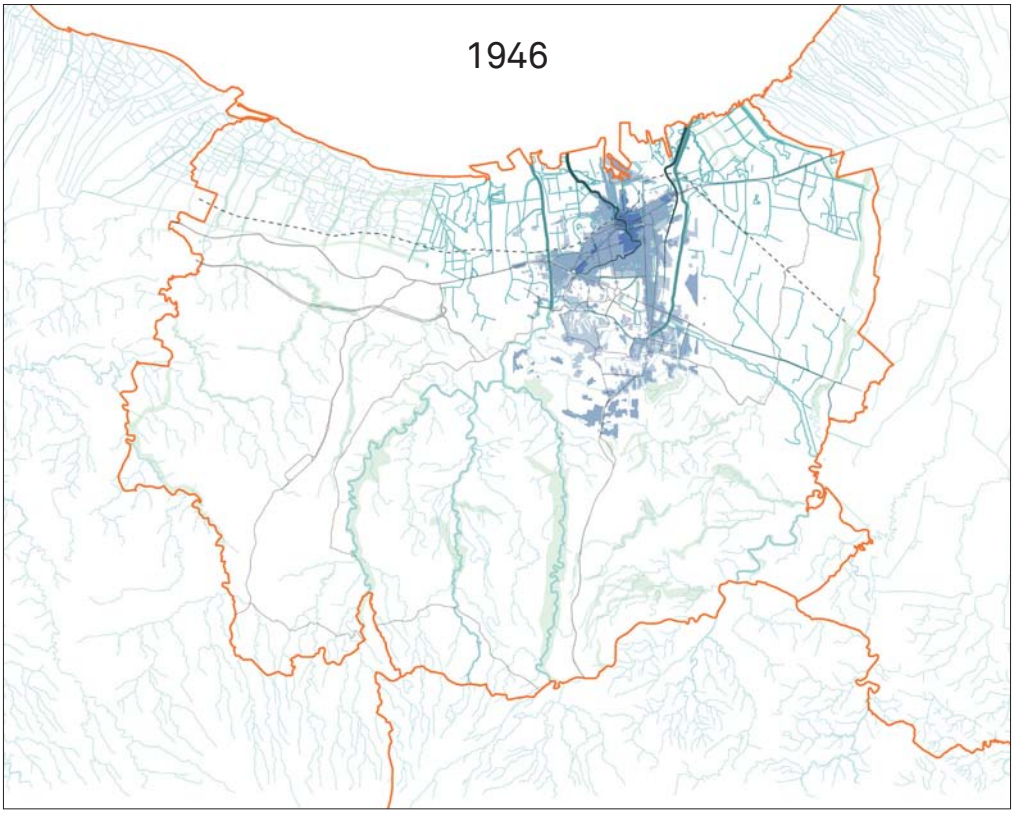
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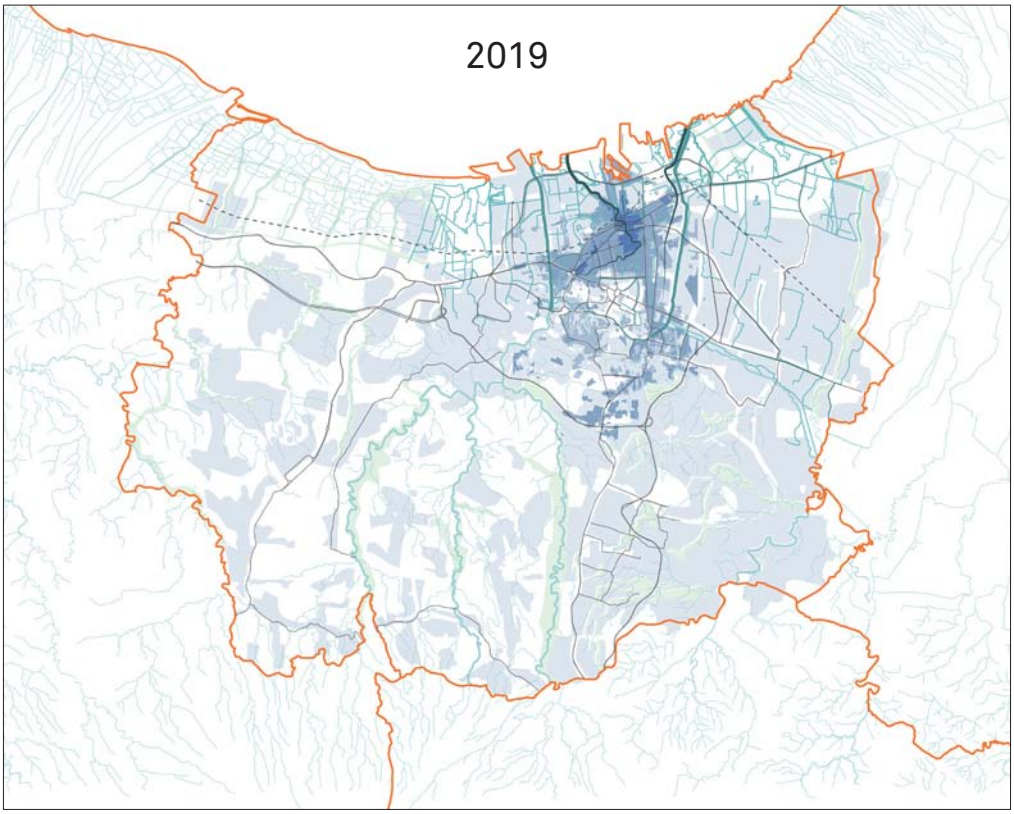
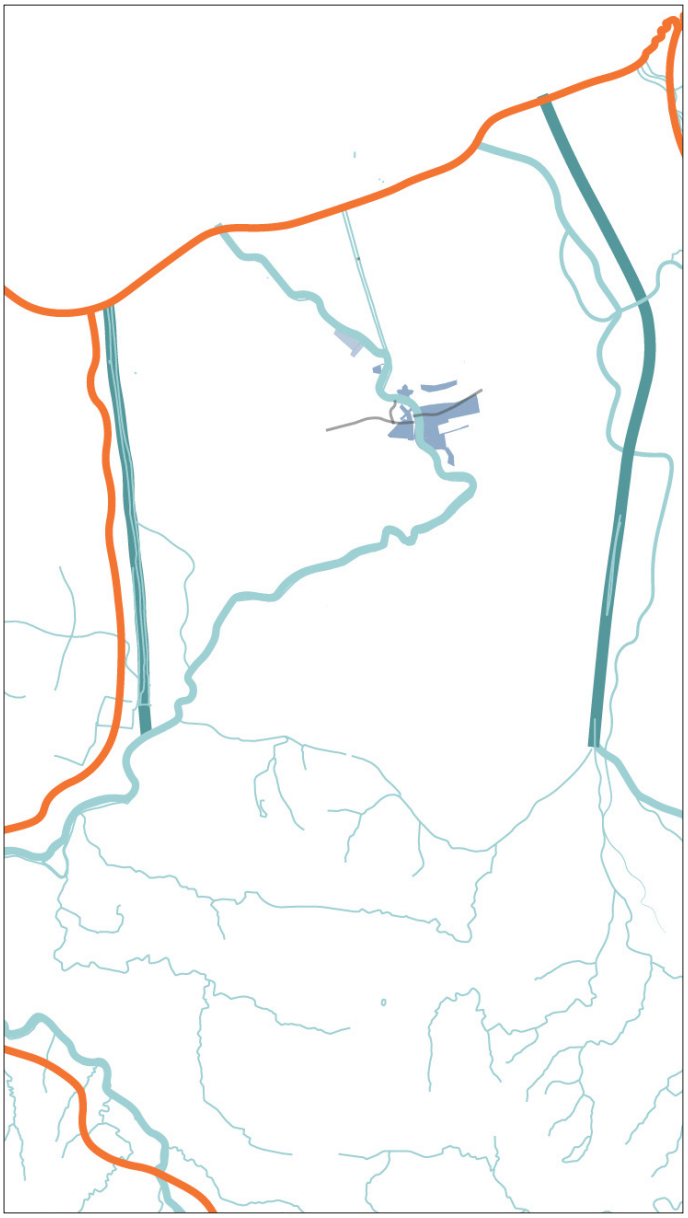


1946: Post-independence

After independence, the documentation of the city planning stopped due to war and transition of Old Order government. This continued until the end of the order in 1998, and after this year data began to be collected. However, the city continued to grow to spread accordingly to the previous structure in 1946.
In 1976 with the issuance of Government Regulation (PP) No. 16 of 1976 the Semarang region experienced a division into Mijen, Gunungpati and Tembalang in the South, Genuk in the East and Tugu in the West. The entire area of Semarang covers 273.7 Km2. From the beginning 5 Subdistricts became 9 Subdistricts. The development and expansion of this region, the growth of the region is considered. The centres of industry, trade, education, housing, defence and security began to be arranged in precise and strategic locations. The next development that stands out is industry and settlement. Industries were developed in the Kaligawe-Terboyo, Bugangan (Genuk) and Tugu regions, while many settlements were developed in the South.

Recent development:

The recent condition of Semarang, has shown that most of the lands were occupied and densely built on the coastal areas even though the development is now starting to grow on the hinterland areas. The complex rapid development on the coastal area has resulted in land subsidence, thus the people started to move to the hinterland area where it tends to be safer from flooding issues. The hinterland area is now mostly occupied by settlements (privately and publicly owned) and is reducing the absorption area for water that caused in the increased risk of landslide and flash flood to the low land area.



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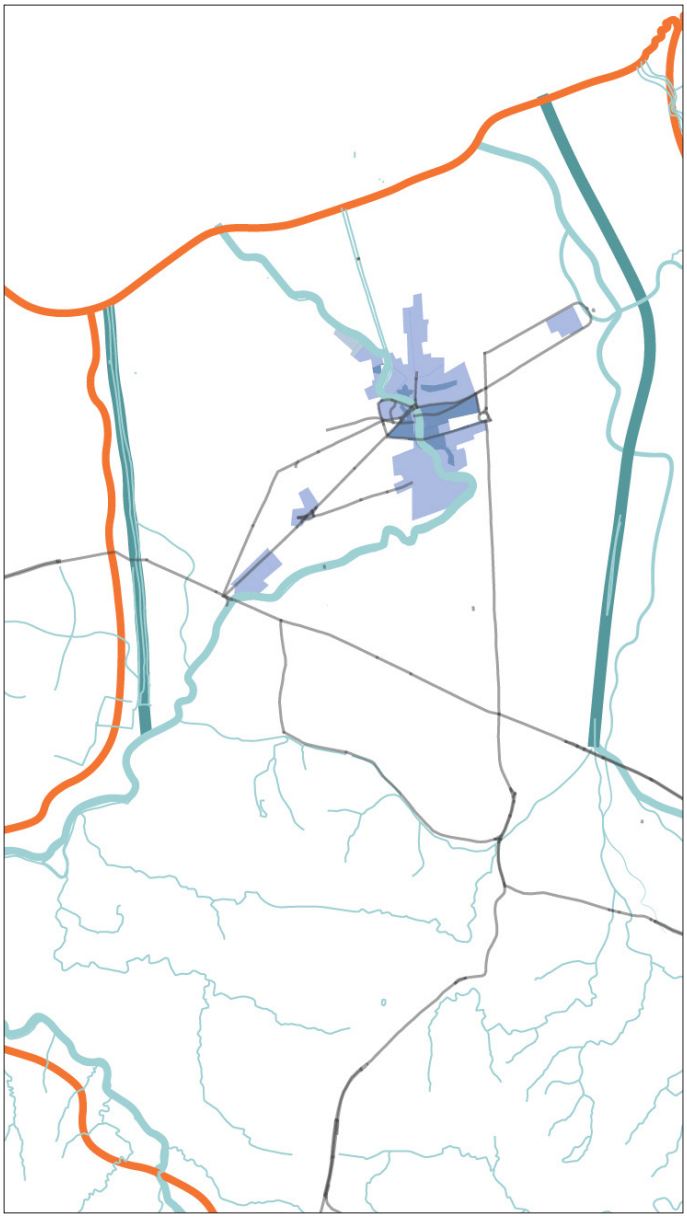

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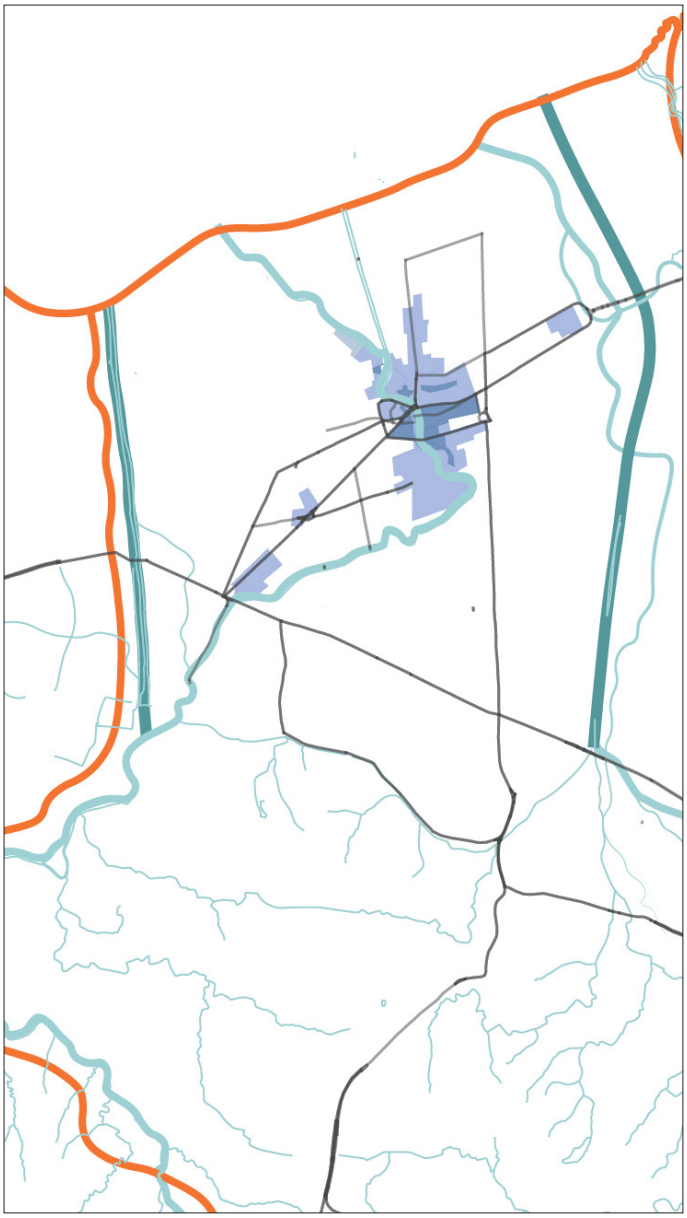

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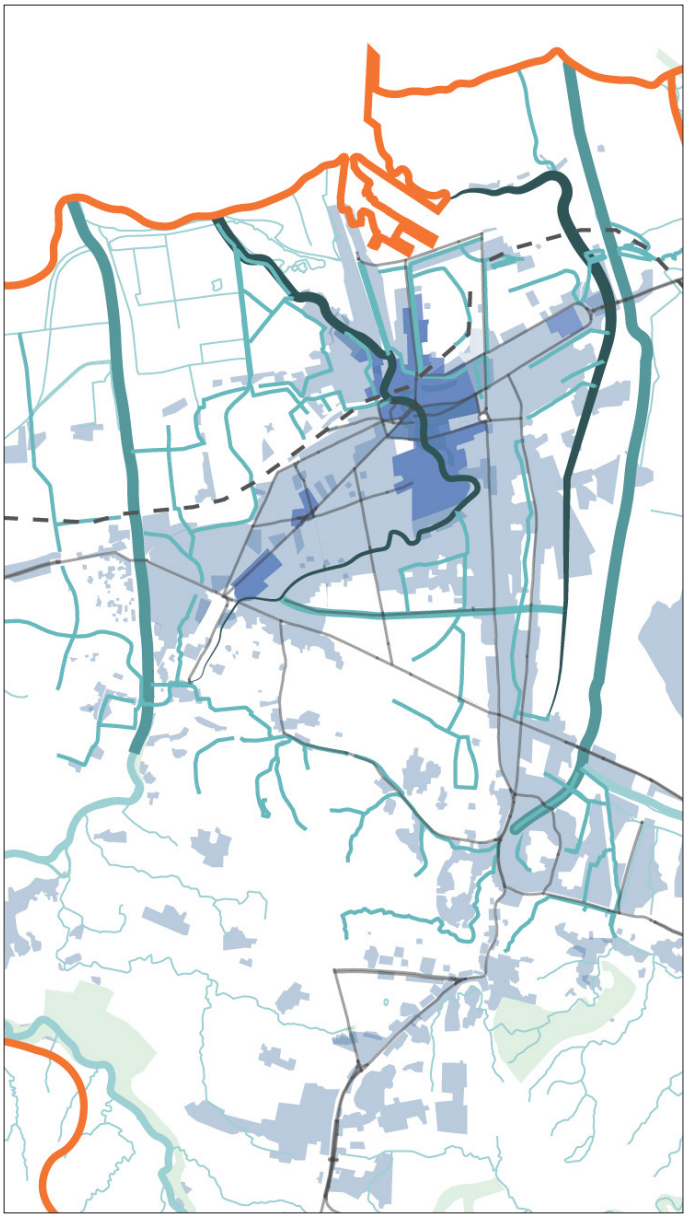

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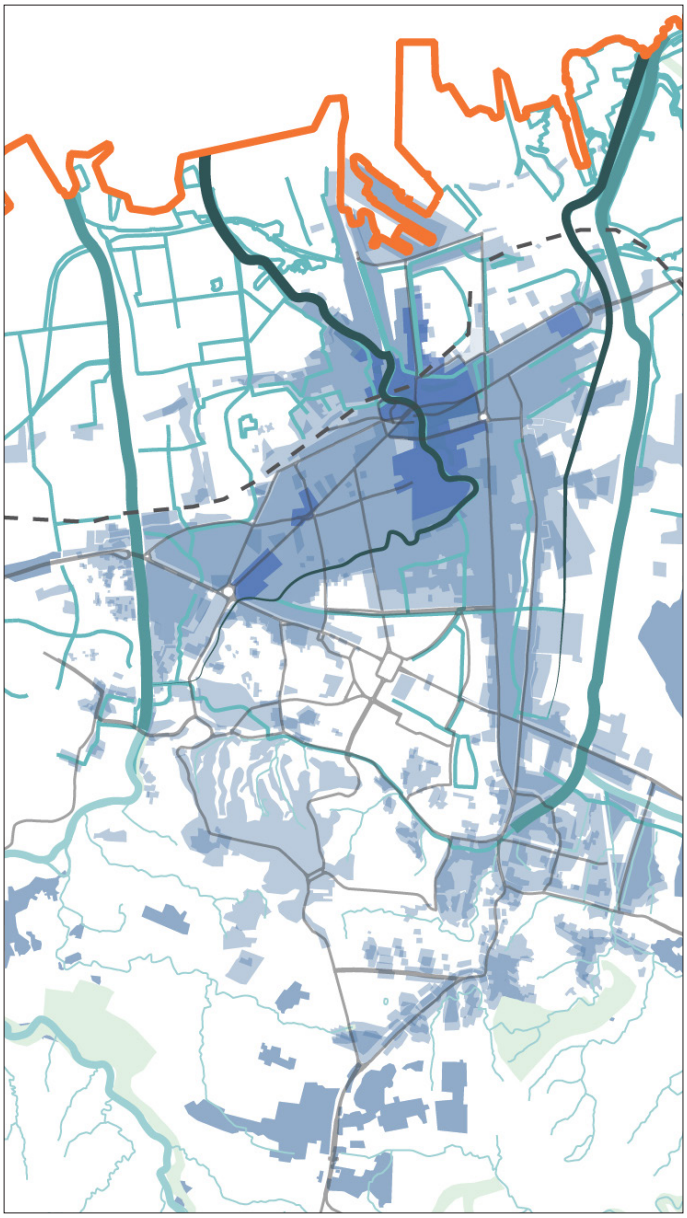


1946

2019

The changes of the Semarang's urban fabric was caused mainly by the economic activity in the city area. This activity of the city, clearly, affects the changes on the city structure mainly the water and the network structures. The improvement and adjustment that the government made to the city, was initially to solve the issue such as flooding. Since the building of the sea dikes and closing of river mouths, the risks of the flooding is reduced. Now, the government seeks for another initiatives to solve the land subsidence that has been caused by the overextraction of the groundwater.

Batak Toba
North Sumatra

Rumoh Aceh,
Aceh

Pagaruyu
West

Omo Sebua
Nias

Bangkinang Malay house,
Riau

Sundanese Kampung house,
West Java

Rumah Bubungan Tinggi,
South Kalimantan

Balinese
Ba

ung Palace,
Sumatra

Rumah Gadang,
West Sumatra

Rumah Torajan,
South Sulawesi

RUMAH ADAT
VERNACULAR TRIBE ARCHITECTURE

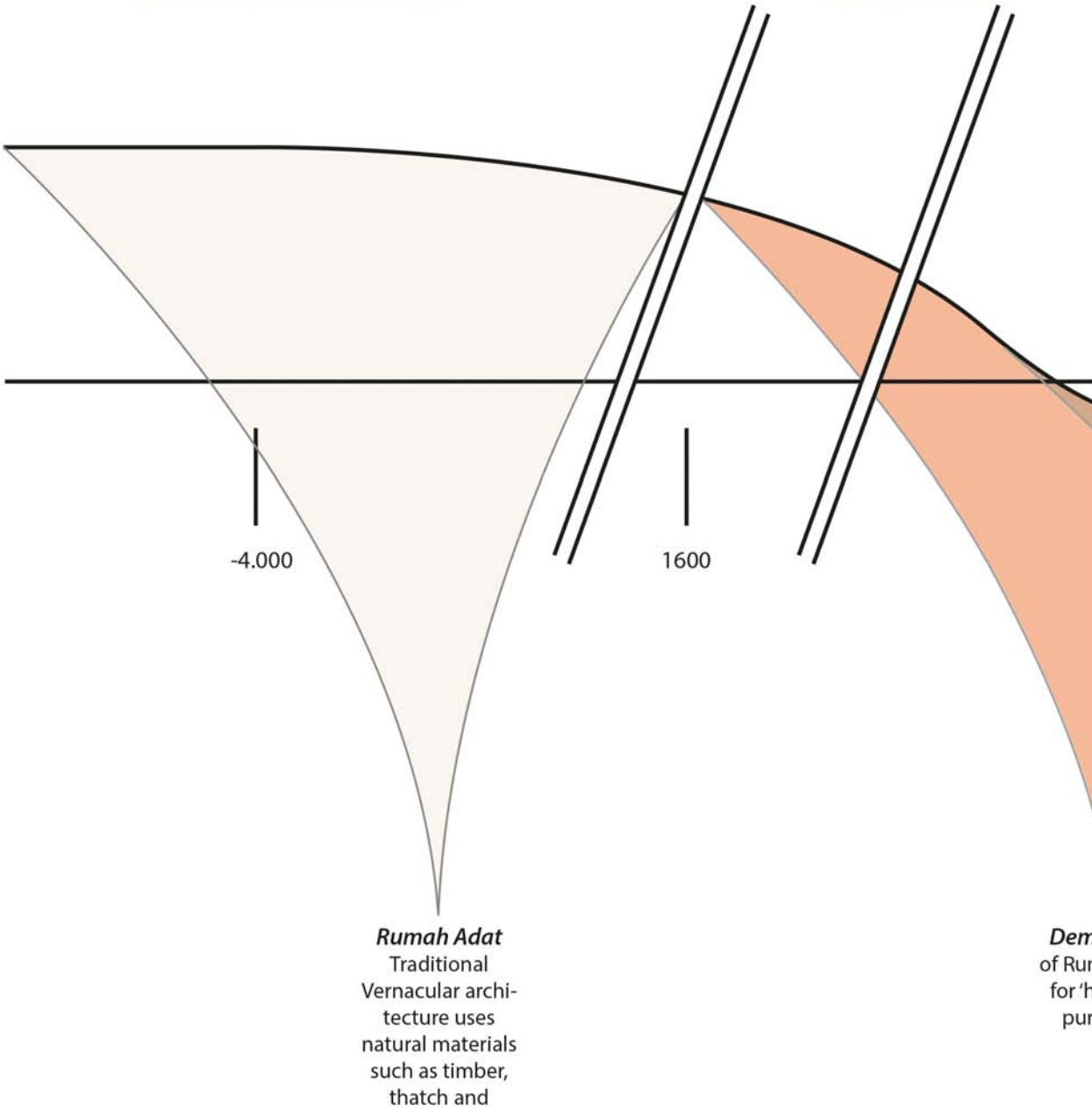
Indonesia can pride itself on a broad history of vernacular architecture. Before the 17,508 islands of the Indonesian archipelago were united under the flag of the Dutch East Indies Trading company, it consisted of many different autonomous islands and tribes, with different ethnicities mainly stemming from Austronesian and Melayan ancestors. These tribes developed different cultures, languages and building traditions. The style in which the vernacular houses were built by these tribes is called Rumah Adat. Architectural historians have organized the most dominant Rumah Adats and concluded that despite their aesthetical difference, the buildings share some strong common elements.

This can be explained through the fact that these nearly isolated ethnic groups still had to combat very similar climatic challenge and were limited to similar building materials.

Pavilion
ali

Sumba house,
East Nusa Tenggara

Toraja rice barns,
South Sulawesi



Rumah Adat
Traditional Vernacular architecture uses natural materials such as timber, thatch and

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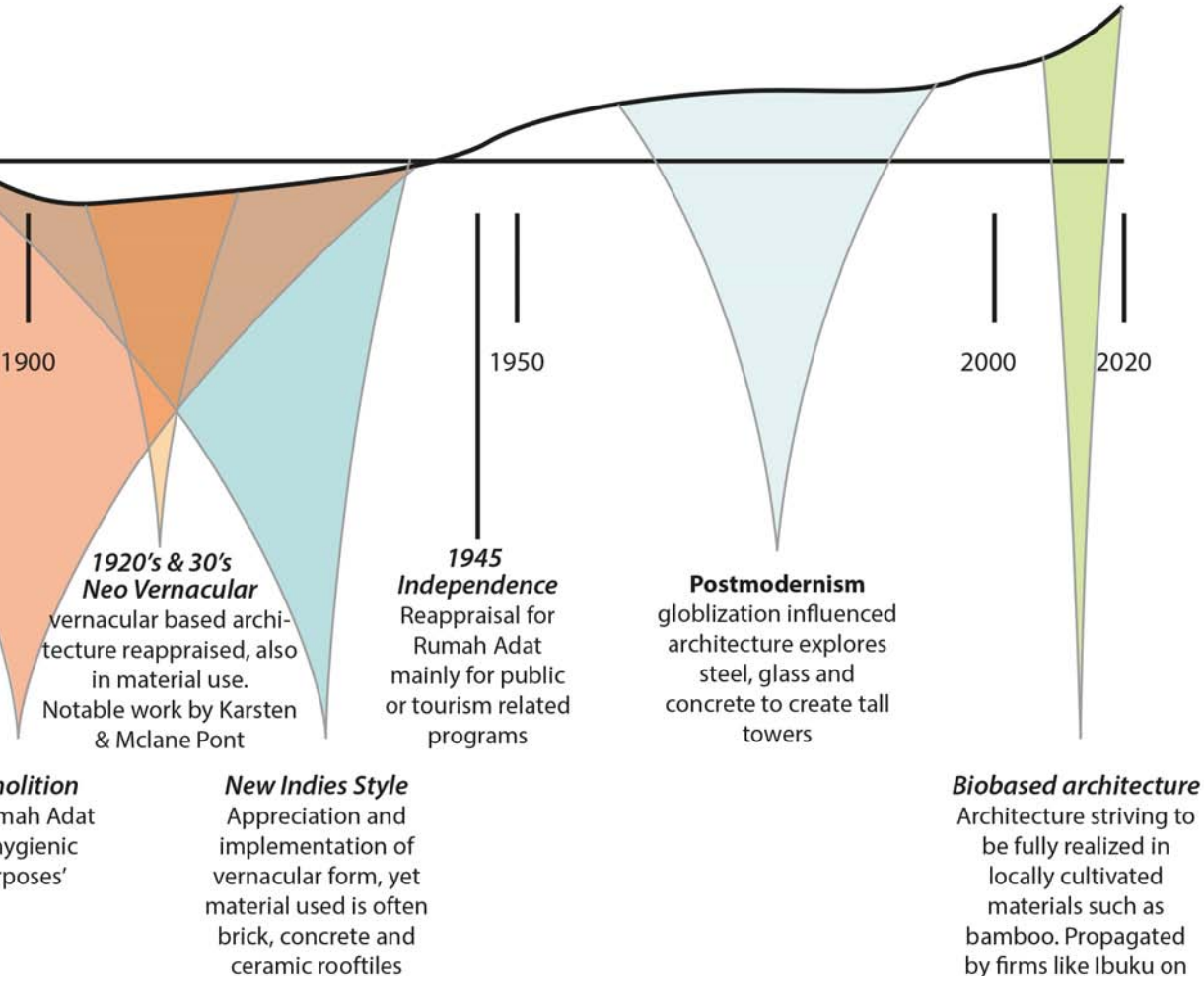
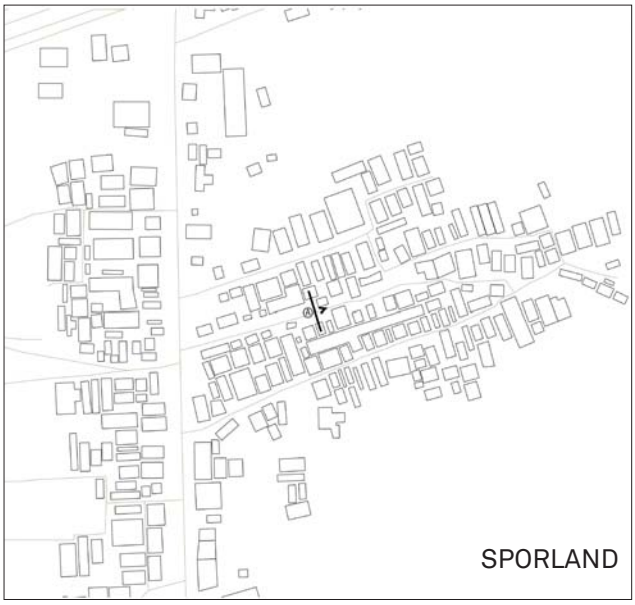
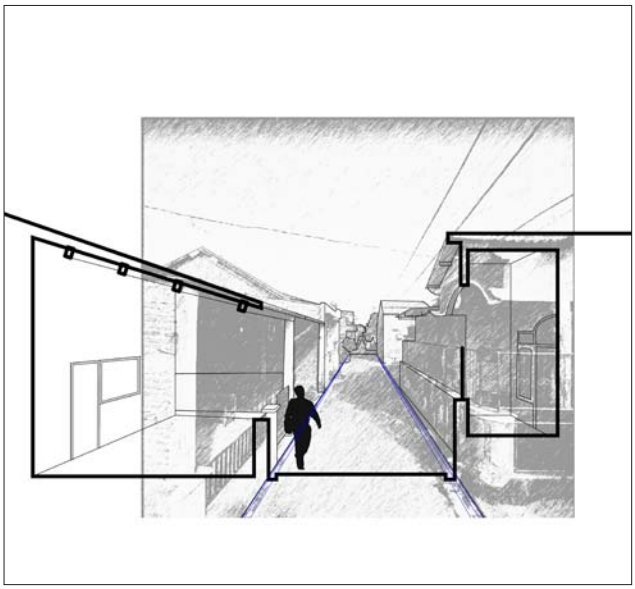


The essential features are as follows:

The main structural components consist of a **timber post and beam** framework, supporting a **pitched roof** which is swept up at either end to create a saddle-back profile.

The **elevated living floor**, which is raised on sturdy stilt foundations with a voluminous well-ventilated roof cavity above, provides an excellent solution to the environmental problems posed by a hot, humid, tropical climate, with seasonal monsoon rains.





Regarding the present day architecture and urban tissue we can conclude that not a lot of the vernacular climatic principles transferred to the present day. Materials are mostly replaced by solid mancrafted ones, such as brick, concrete, and steel. This allows for less ventilation then the natural materials which let air pass through the gaps, creating a more ventilated, breathing skin. Kota Lama is marked by large colonial public buildings rendered in the New Indies style. The Bank Mandiri, formally Nederlandsche HandelsMaatschappij for example uses a colonnade and gallery to serve as a double skin and to extend the roofline, this essentially creates overhanging much as in the vernacular rooflines.

We can see the roof taking on similar shading functions in the Kampung. Often there is a verandah like space added in front of the houses to shield the 'exposed' and 'open' facades from direct sunlight. We can also see that most of the other exposed façade parts are closed, meaning they have no windows or openings to let in unnecessary solar gain.

Contemporary structures could learn from the vernacular in the following ways:

- Materials, the thatch roofs of the vernacular architecture were a lot more heat resistant then the thin sheets of corrugated sheet metal we see on most roofs now.
- Stilt foundation, many buildings in Semarang flood during monsoon season, a stilt foundation could help to prevent this
- Pitched roofs, the pitch roofs helped to not only shade but also catch winds for cross ventilation in the houses, essential for heat and humidity management.

Overview

House in concrete frame and brick infill

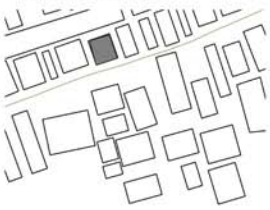
Material

reinforce concrete structure, with brick infull; ceramic rooftiles

Spactial Sequence

A veranda with a fench creates a bufer between public and private realms. The 'bridge' over the streetside gutter acts as another filter between these domains.

Near Context (detail plan + water)



The house is wedged inbetween the other informal settlements. It appaers to have some kind of alley or brandgang at the rear of the building.

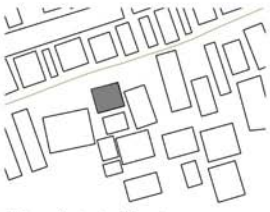
Climate

The veranda prevents direct sunlight from heating up the building and acts as a bufferspace to allow for ventilation. The lack off windows in the blind brick walls prevent extra solar gain.

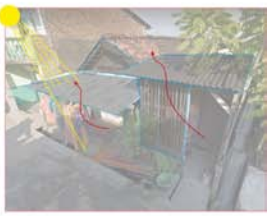
2. Small residential unit(s)

Brick base, plastered with wooden handcarved corbels supporting the corrugated iron roof

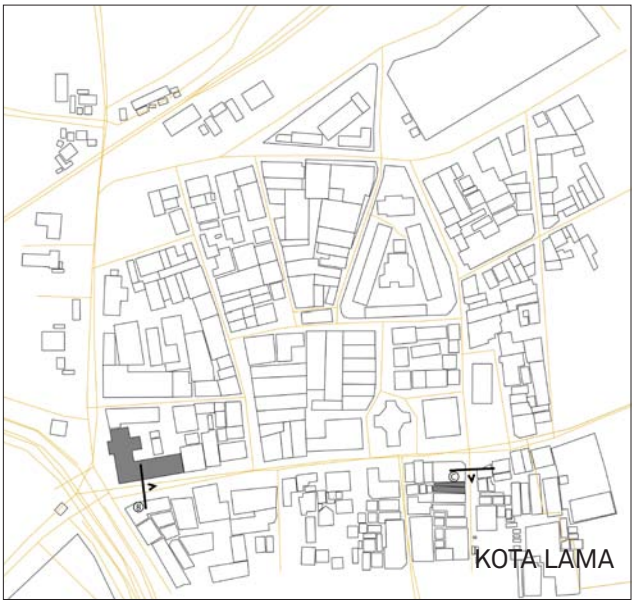
Two veranda's, plus an informal 'front yard' containg plants and pots seperate the dwellings from the street. Just as in the adjacent dwelling, the small 'bridges' over the gutter act as tresholds.



Inbetween the street and the water



The verandaroofs shelter the main facades from direct sunlight. The bamboo slat on the rightermost entrance strengthen the shading capacity of the verandah. The gable for the main volume has no windows or openings to keep solar gain out.



Overview

1.Bank mandiri semarang tantular (previously Kantoor Nederlandse Handels-Maatschappij NHM)

Material

reinforce concrete structure, with brick infull; ceramic rooftiles

Spactial Sequence

Entrance Lobby, which leads to a arcade which visually connects to the public domain via a square. Arcades and loggia act as buffers.

Near Context (detail plan + water)

The bank is on a cornerplot, strongly dictating the urban tissue of the neighbourhood, being prominently placed adjacent to the bridge.

Climate

Typical of New Indies Style, the bank incorporates some climatic motifs from vernacular indonesian architecture, such as the corridor which provides shading, essentialy acting as a large roof eave.

2. informal residential addition

Brick base, plastered with wooden handcarved corbels supporting the corrugated iron roof

shopfront provides a lobby like space, protruding from the original building line. Acting as a buffer between the public and private space

The shopfront is placed on one of the more narrow residential streets of Kota Lama.

Except for the roof overhang it is difficult to distill clear climate principles from this structure. The zinc roofing seems to be a suboptimal material choice for this warm climate.

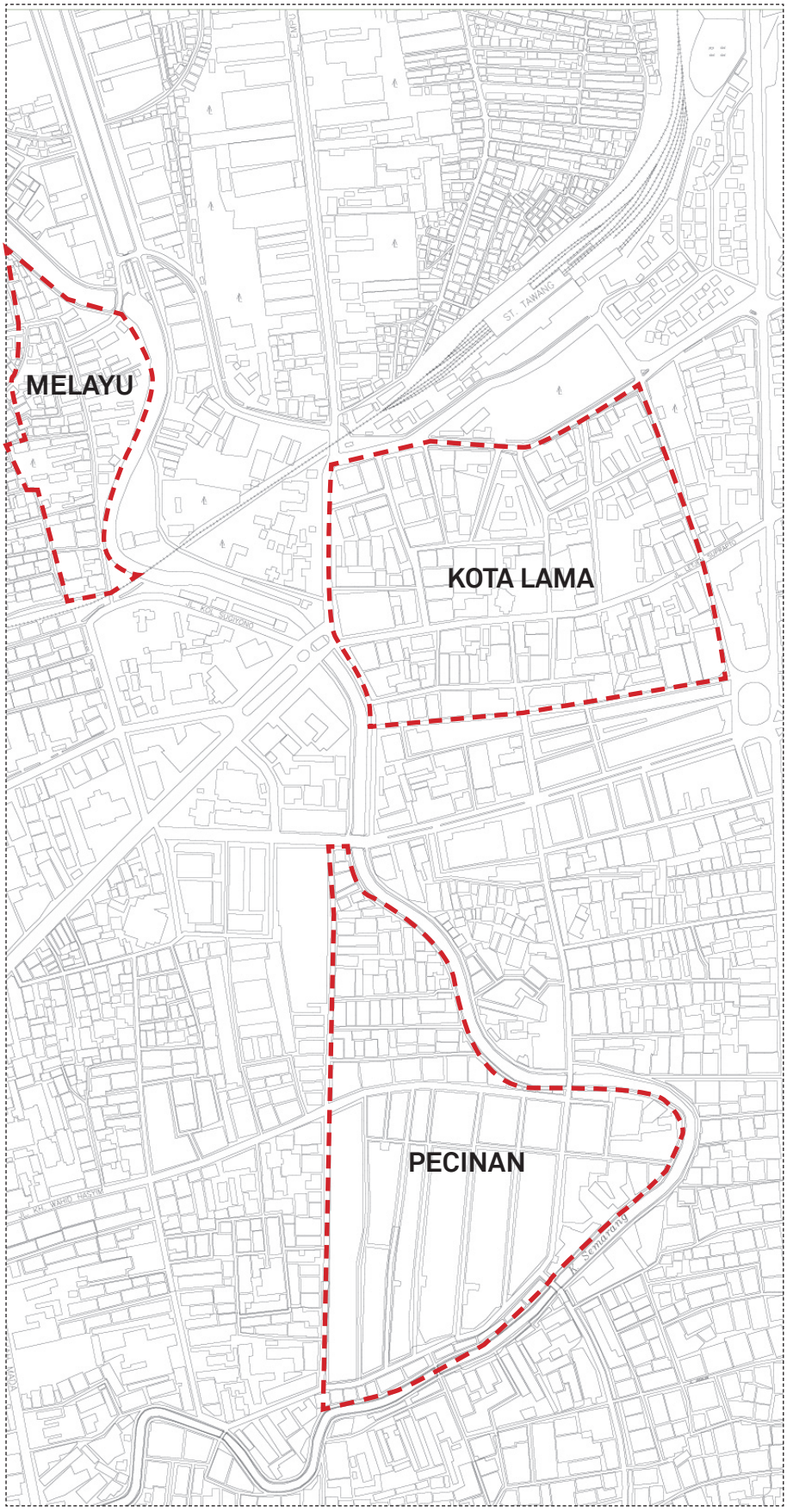
BUILT FABRIC | intervention areas

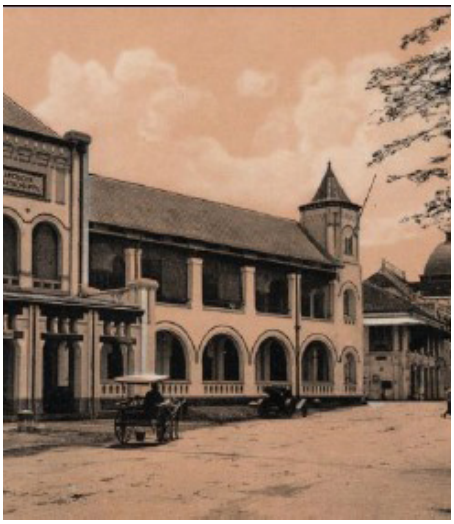
The built fabric can reflect a various aspects of district development, in terms of its urban planning, social environment, economic condition, natural environment and people's behaviour. Consequently, it is important to analyse built environment (e.g. street & buildings) and represent their embodied characters of the place.

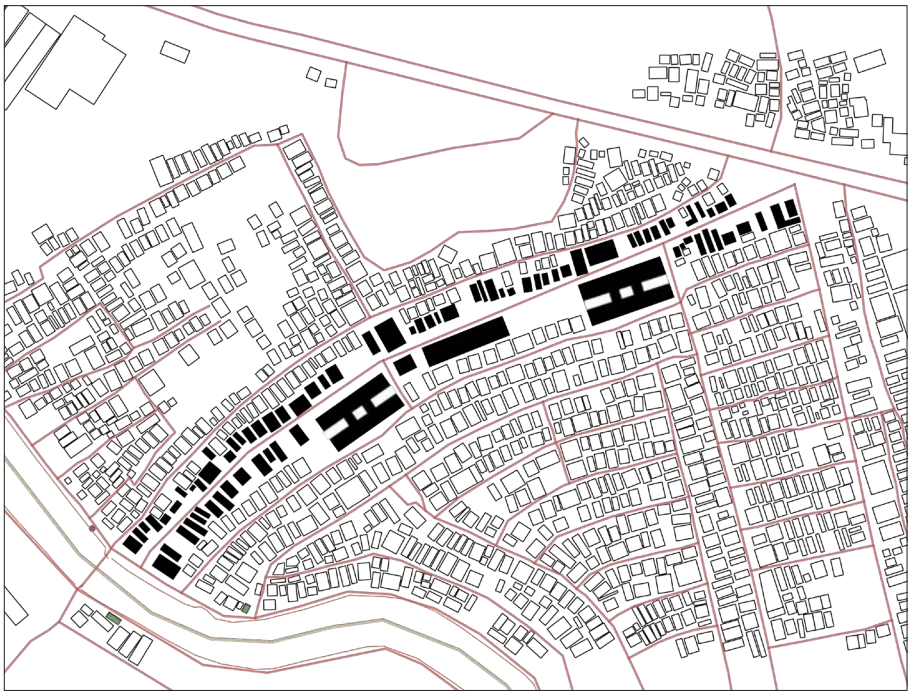
Semarang is rich in multi-culture, resulting in long-history different ethnic settlements. In the three targeted ethnic groups, Kota Lama (Dutch colonial district), Kauman (Kampung) and Pecinan (Chinese settlement), we expected there are considerable differences in the following aspects:

-Urban fabric: street morphology, building mess to understand
-Spatial quality: building and street relationship in section
-Building sequence: people behaviour & street relationship
-Neat context: water, private & public space
-Material: building technology, occupants behaviour, economic condition

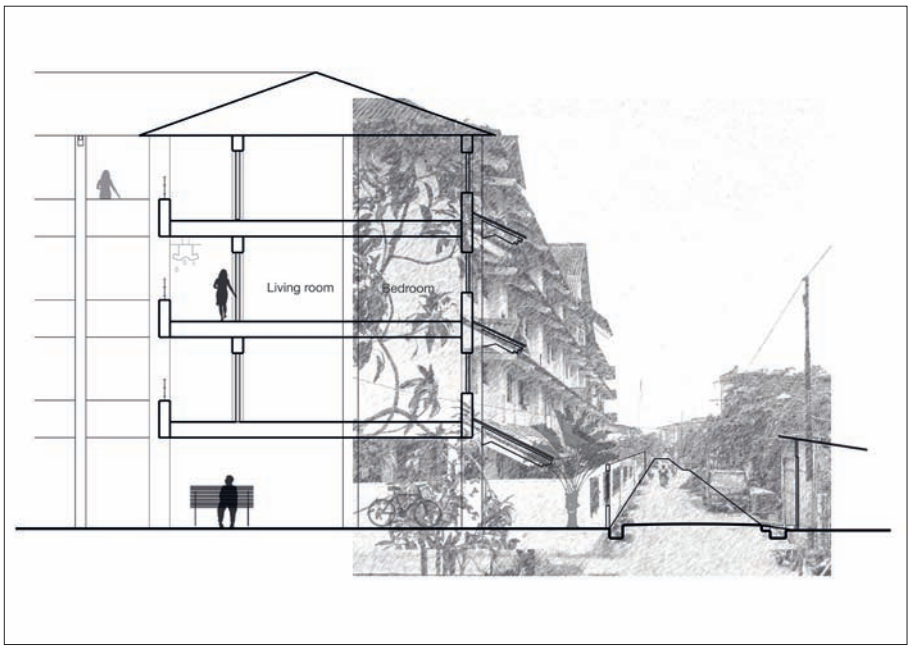
BUILT FABRIC | intervention areas



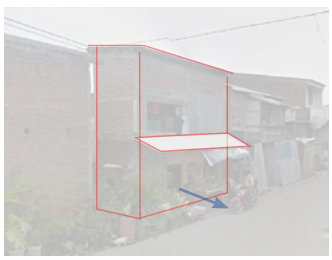
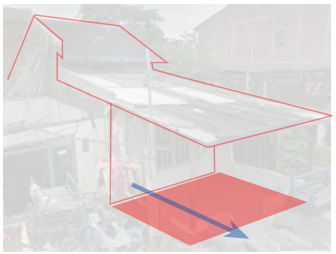
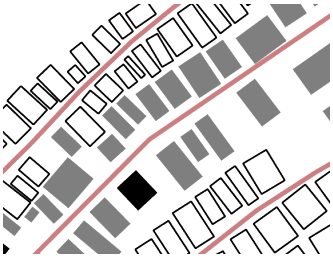
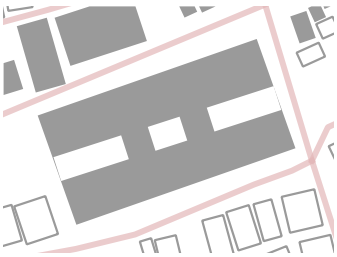
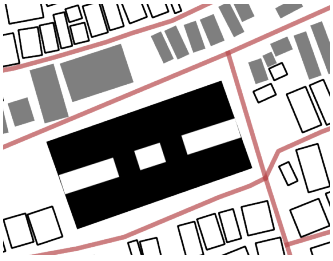
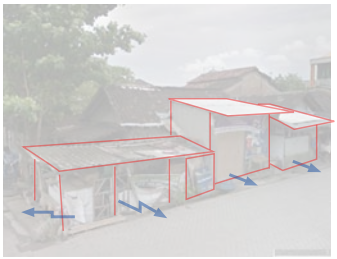
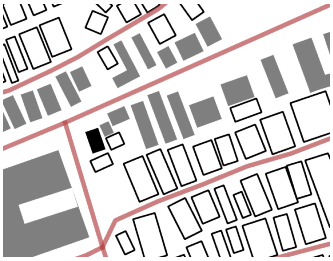


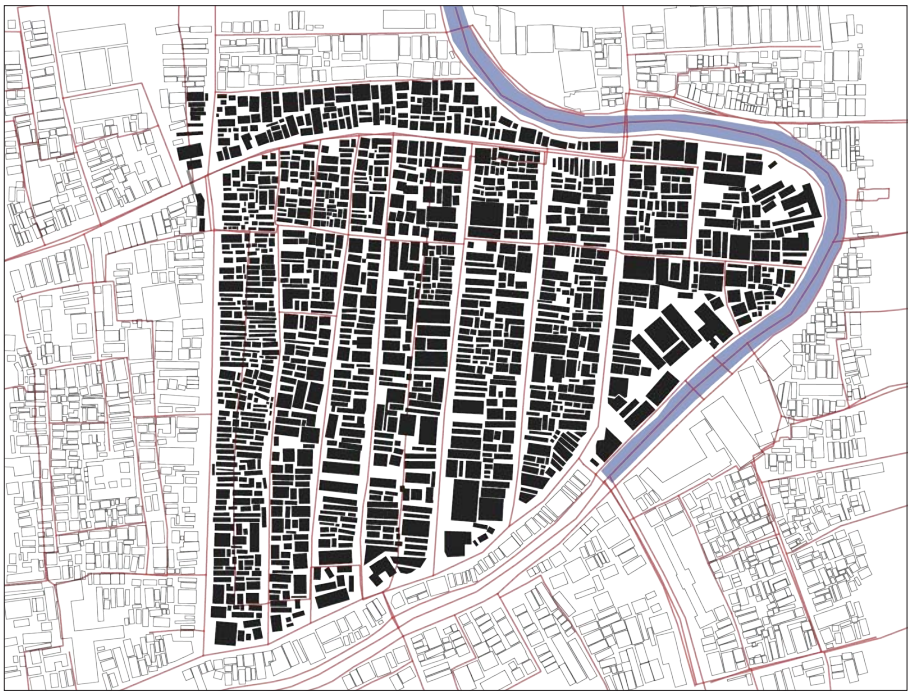


Western Harbor Indonesian Settlement:
Dense with loose settlements
Irregular and flexible



Western Harbor Indonesian Settlement_Street Section:
Kampung modern units(left) VS lowquality selfbuilt house (right)
Land management difficulties + Living environment improvement.

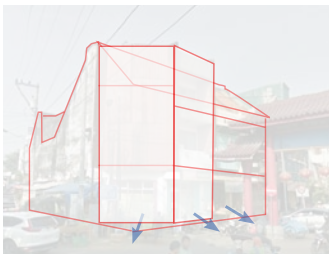
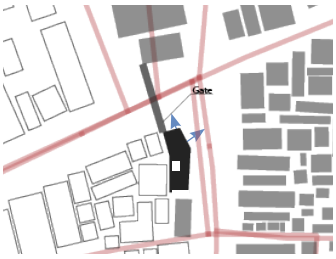
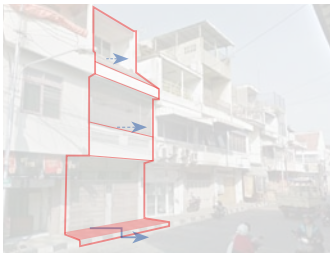
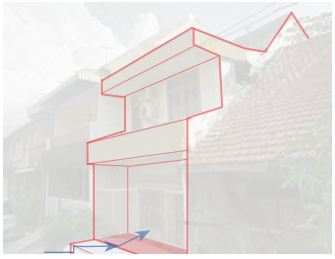
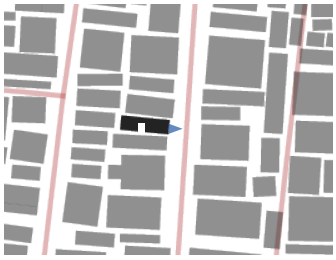
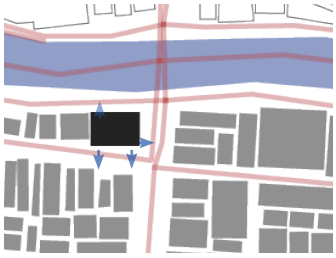
PHOTO	MATERIAL	SPATIAL SEQUENCE	PLANS
			
1 shopfront+resident	Reinforce concrete structure, with brick infull; single corrugated aluminm sheet roof	Shop front in ground floor, directly link to street; residential use in upper level, always has large opening facing the street.	
			
1 shopfront+resident	Concrete basement; partionly wooden support	Empty courtyard connects entrance with mainstreet. The yard as throshould with varies activities. First floor set behind the street.	
			
	Reinforced concrete structure; brick infull	Entrance in the middle; corridor and balacony hidden behind. Considered with privacy, but this only happens in few new buildings.	
			
4. Roughest organic settlement	Banboom, steel, plastic		



The uniqueness and specification of Semarang Chinatown can be seen in its architectural characters which are different from other Chinatowns. Semarang Chinatown has physical characteristics of regional architecture as a result of acculturation between the characters of Chinese architecture and local architecture. The visibl acculturation in the building typology that form row house both as house and house store where the roof shape is in Chinese architecture but the facade details use local architecture.

Section-Pecinan Business Street

Modern concrete terrace, while building height and plot keep historical hint.

PHOTO	MATERIAL	SPATIAL SEQUENCE	PLANS
			
1 shopfront+resident The isolated building near the gate	Stone fundation;brick structure; maybe wooden support; thick plaster finishment	Traditional shop+ historical footprint+adapting economic-orienated .	
			
2. shopfront+resident Row houses along the main street	Stone fundation;brick structure; maybe wooden support; thick plaster finishment	The order of terrace aline and building density are the same in all business-oriented streets in Pecinan.	
			
3. Resident Houses in the secoundary street	Stone fundation;brick structure; maybe wooden support; thick plaster finishment	In residential-oriented streets, building profiles are wider. And threshold courtyards are more essential.	
			
3. Shop+Resident Water next to the water front in Pecinan's bounder.	Stone fundation;brick structure; maybe wooden support; thick plaster finishment	The major house in Pecinan regard water side as a rear side, with close wall or small rear doors.	

CONCLUSION

The investigation on the built fabric of Semarang departed from a broader typological research into the original vernacular architecture of the Indonesian archipelago. Though different in approach, the buildings of that time used exclusively natural materials and incorporated passive principles to deal with the tropical climate such as passive stack ventilation and stilt-elevated dwellings to allow heat and humidity to be removed from the building. Under foreign rule and settlement, a lot of this material and climatic knowledge and tradition was disregarded in favor of Dutch, Chinese or Arabic building systems and materials. As for the Dutch building tradition in Kota Lama, we can observe a gradual adaptation to the local climate and see how the vernacular architecture and climatic principles were reappraised. This reappraisal didn't involve a return to vernacular natural building materials.

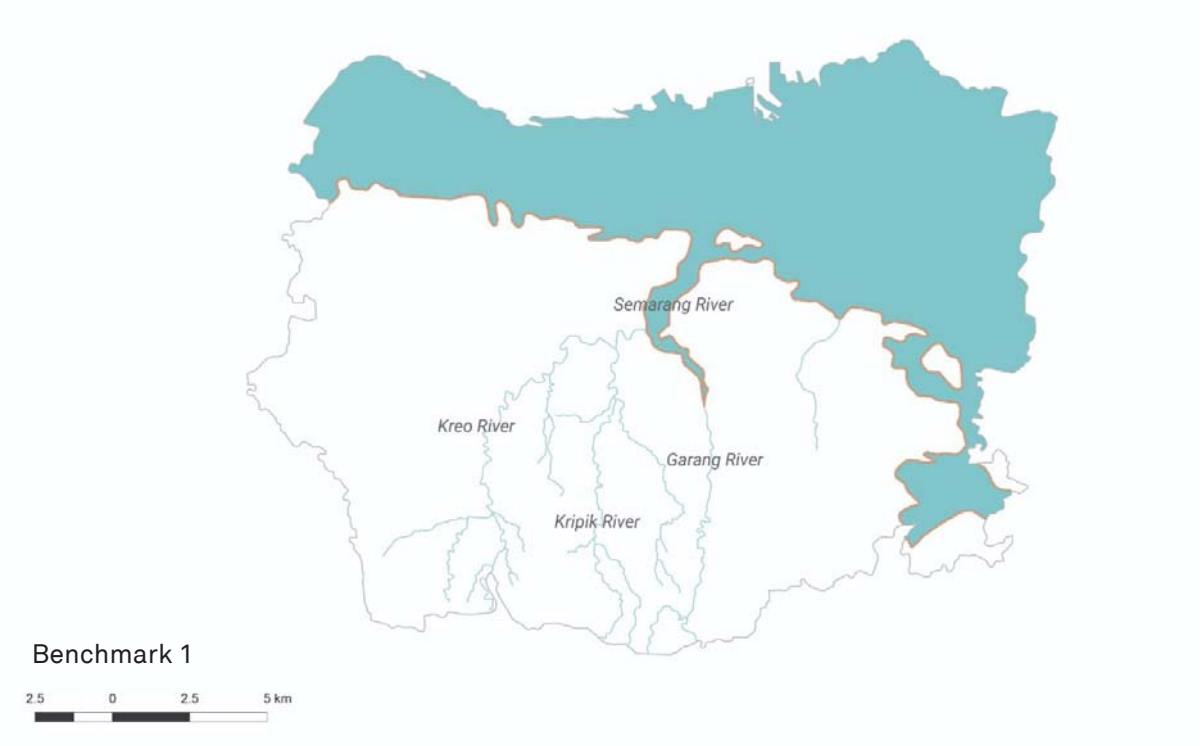
WATERSCAPE

Photo of back of houses, presumably on the Semarang Kali at Gang Waroeng in Semarang
SOURCE: Leiden University Libraries, KITLV Collection

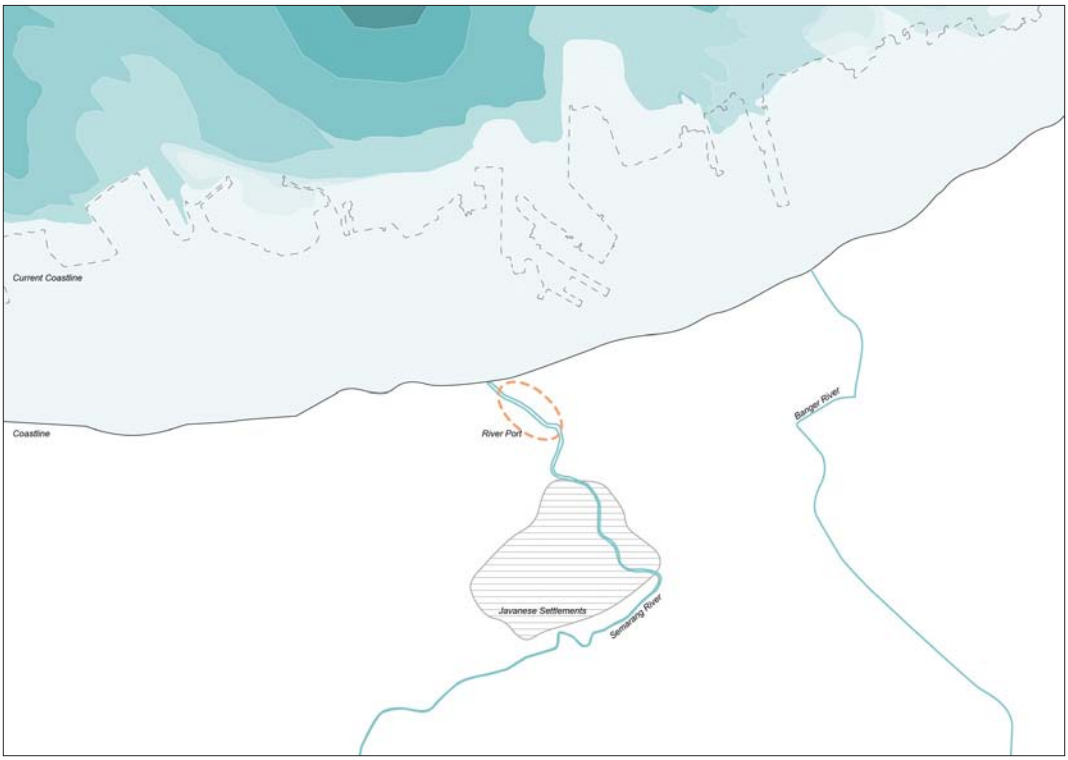
WATERSCAPE

The water bodies of Semarang—if not taken care properly—might follow the footsteps of the capital city, Jakarta. Moments after independence, the shared-heritage dwellings of the Dutch Old Town area were neglected for the time being. Uncontrolled informal settlements had therefore grown within its perimeter. Unfortunately, most of these settlements were built with the back of the houses facing the river. Hence, it induced a psychological effect where waterscapes are most of the time neglected. Semarang faces intricate water sanitary issues as people and factories dump their waste to the river. The polluted river and the rising sea level up to 0.5m/year also speeds up Semarang's water-related problems such as pluvial, fluvial, and coastline flooding. This challenge is further amplified and uncontrolled ground-water extraction which led to land subsidence and greater flooding risks.

In order to tackle these problems, we looked at the history on the relationship of the settlements to the water bodies, measures people have had been executing, as well as the sediment formation on the shoreline throughout time. The outcome of this analysis hopes to set a foundation for water-related design which would allow the people to embrace the notion of living with water for future resilience. This could eventually give themselves a chance of a better quality of life within this developing country. Especially in Semarang, where the decaying beauty of the Old Town are sought to be nominated as listed World Heritage. Hence, the water bodies would play an important role on the everlasting image of the city.



10th century: Semarang coastline prior to the millenium sedimentation.



1406: The first river port in Semarang. *Port and daily activites happen along the river.*

LEGEND

River Lines
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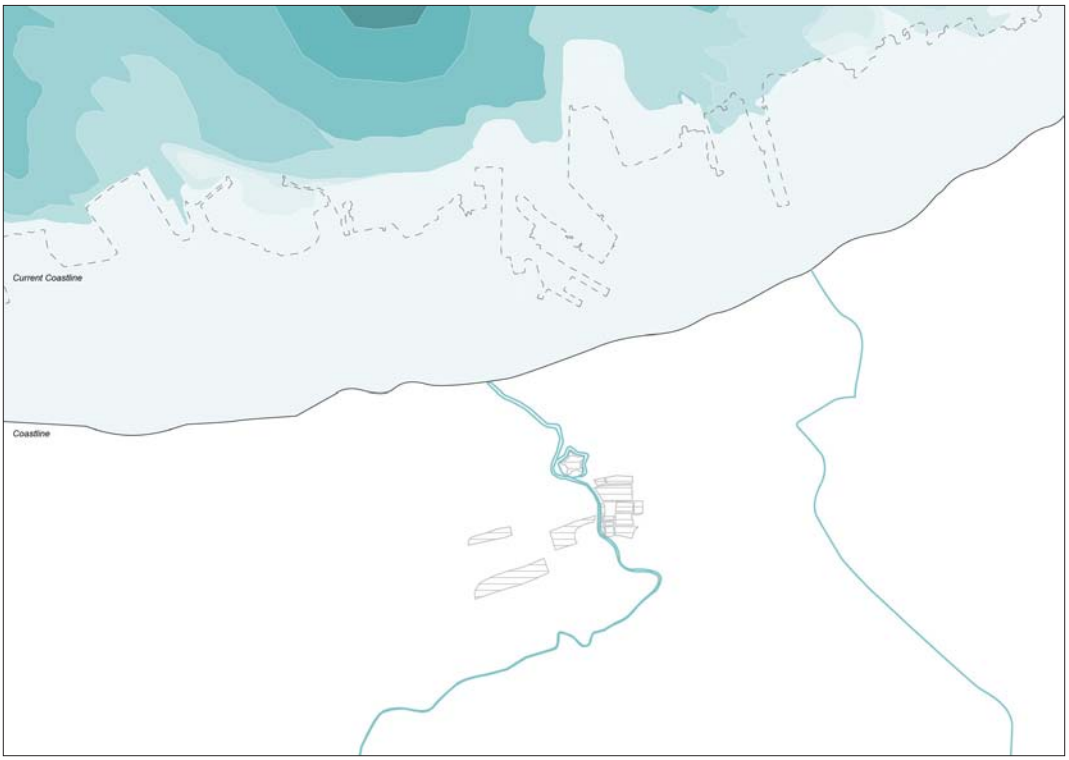
1600: Semarang major waterways prior to human intervention. *Only local settlements can be found at that time.*



1650: Settlements develop along the river. *Different ethnic settlements located along the river which shape the initial urban morphology.*

LEGEND

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1850: Build West Floodway. *The West Floodway was built to channel the water from the hills and Garang river. After the establishment of the floodway, Semarang river lost its role as a port. Moreover, sedimentation phenomenon started to get worse because of smaller water volume, meanwhile the river got polluted from daily use.*

1854: Build new canal port to have easy access to bigger boats. *With the development of infrastructure, trading becomes more easier and important. To meet the higher demand of trading goods, a bigger port is in need.*

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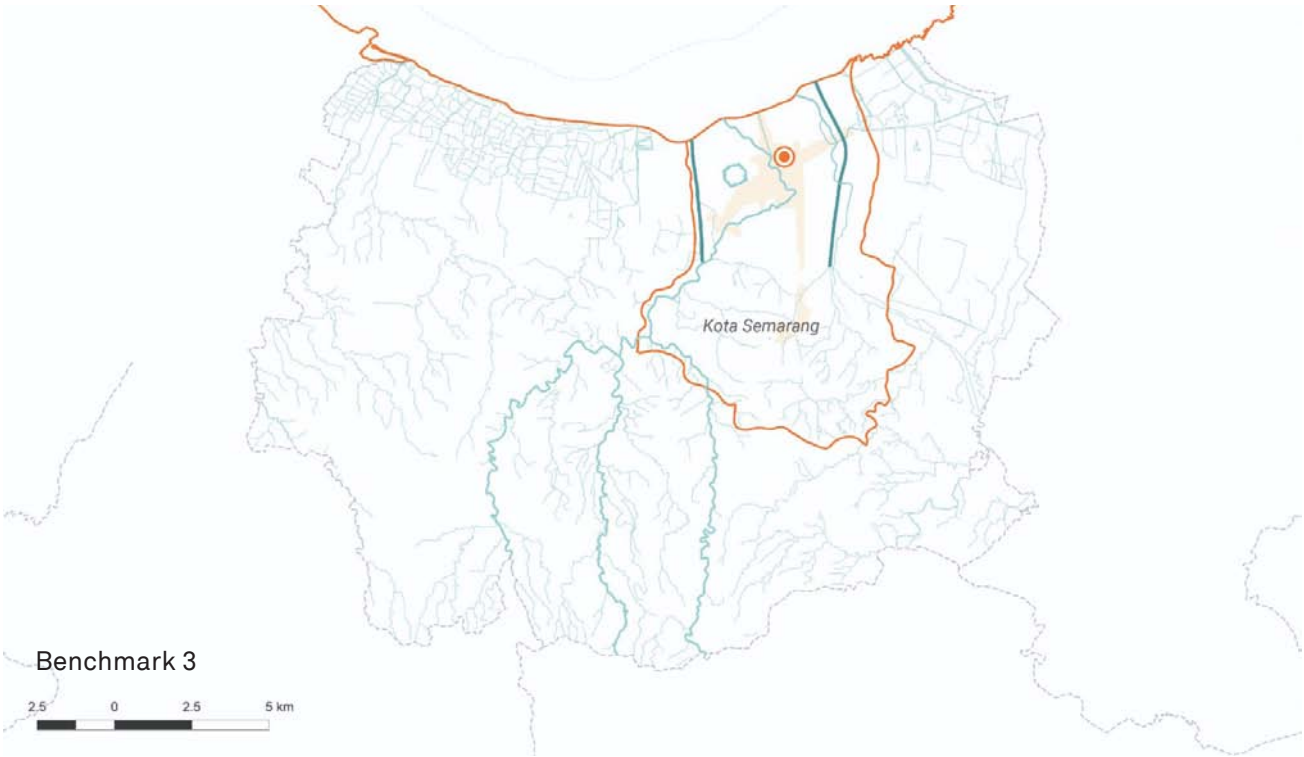
1894: Build East Floodway. The East Floodway was built to channel the water from Penggaron river and solve the flood risk from hilly area.



1900: Two main floodways shape the DNA of the city. *With the establishment of the two floodways, the city morphology was transformed and extended horizontally. It also change the activities along Semarang river from port activities to daily use.*

LEGEND

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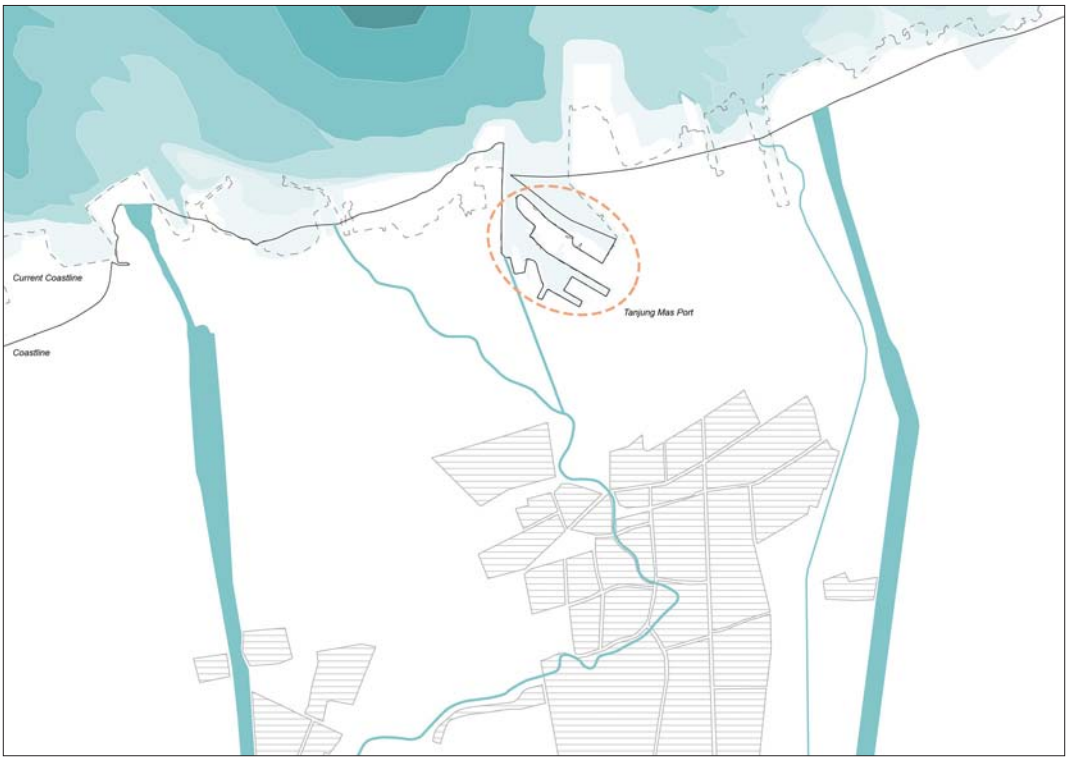
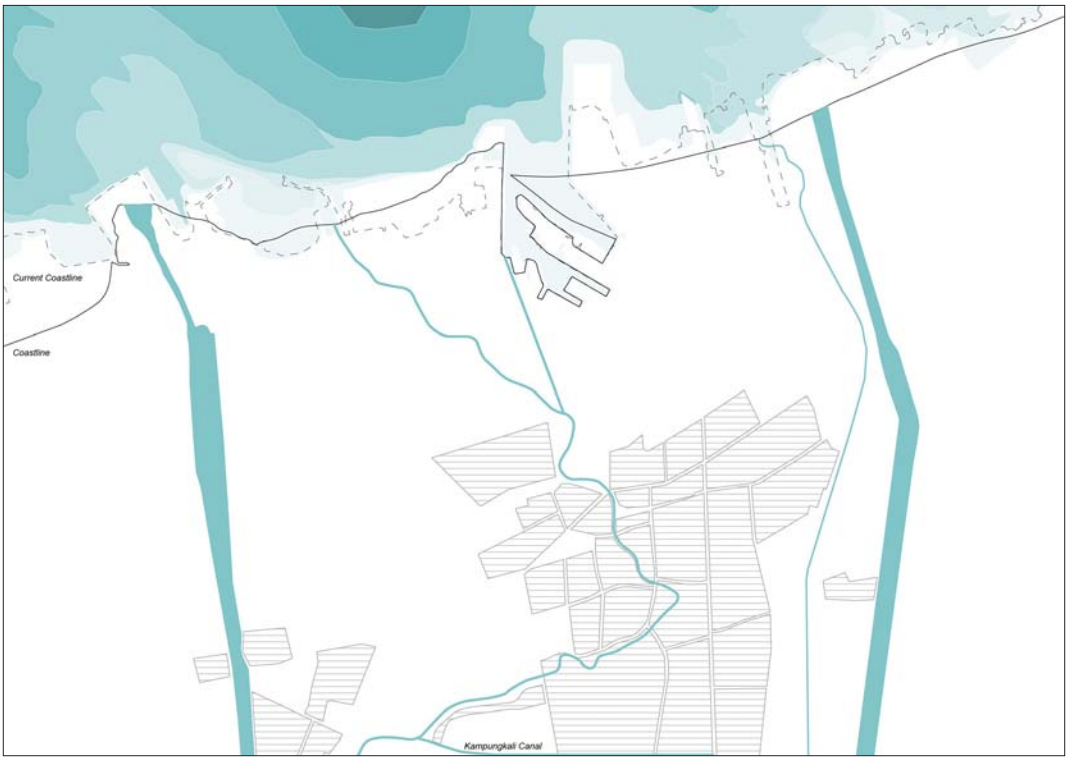


1924: Build Tanjung Mas Port. *Rapid urbanization lead to higher demand of trading and business, the new port was built to meet the urbanization process.*



1936: Build several canals in central part. *The flood risk in the central part stay severe so several canals were built to direct the water from the hills.*

LEGEND

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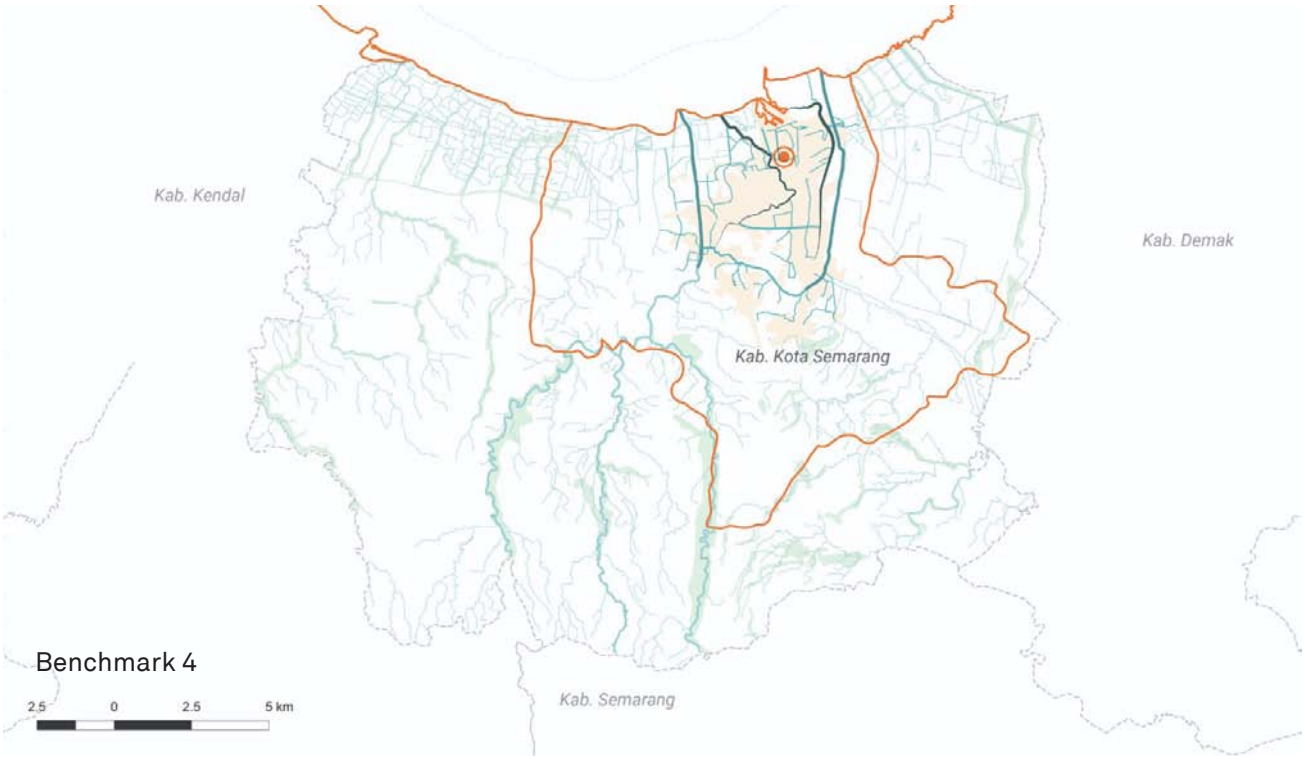

1940: Construction of minor canals within the Semarang City Centre. *With the development of minal canals, Semarang has its first integrated urban drainage system, but meanwhile, it 'kills' the natural waterways of the city.*

1975: Normalize Banger river. *The Banger river was normalized to mitigate the flood problem.*

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2010: Normalized West Floodway, Garang River, Semarang River. *These waterways got silted because of sedimentation, the action of normalization tried to keep them function normally and mitigate the flood.*

SOURCE: https://0859233.wixsite.com/wetworksevo/project-delta-semarang

LEGEND

- River Lines
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- Heritage City
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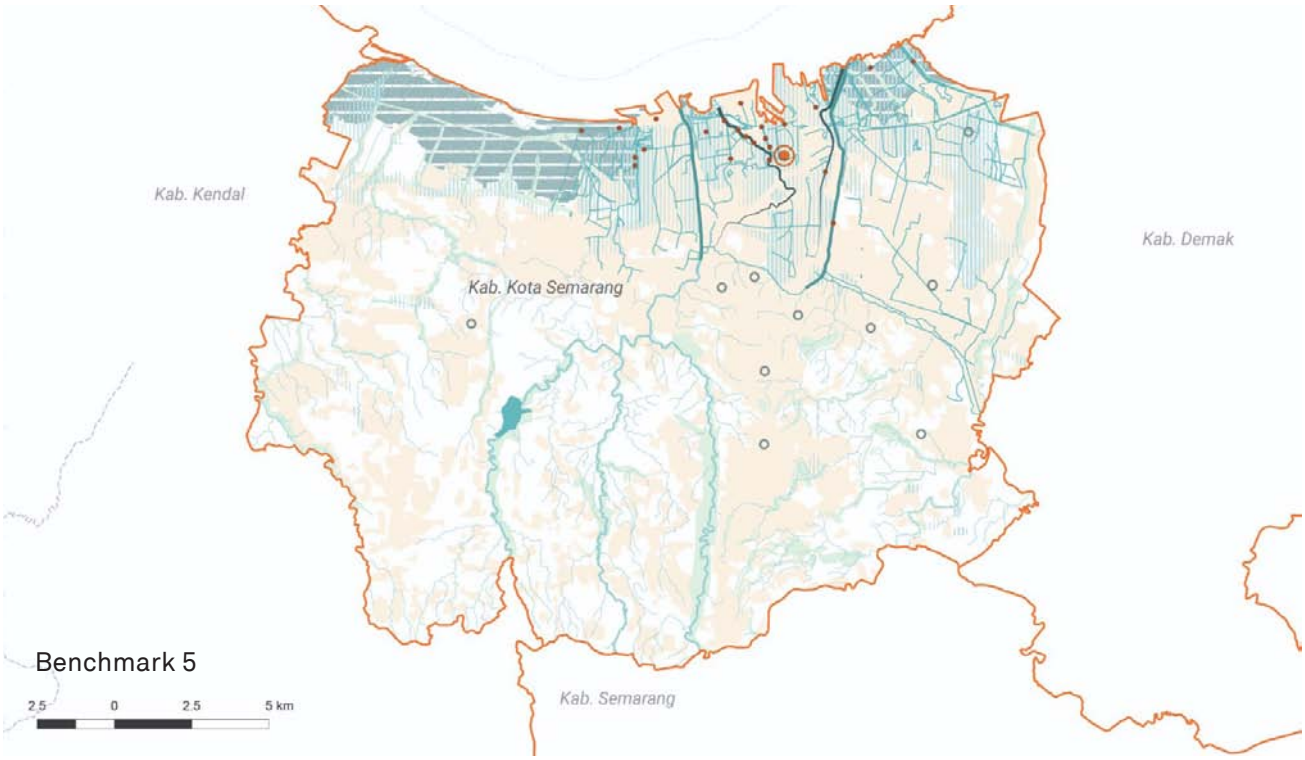
- Pump Stations
- Reservoirs
- Flood Risk



2019: Current flood risk management and measures within Semarang City. *The current water related infrastructures were mapped out to show the general water system now in Semarang. And also the flooding and inundation areas were also mapped out.*

LEGEND

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Schematic section of mangrove forest

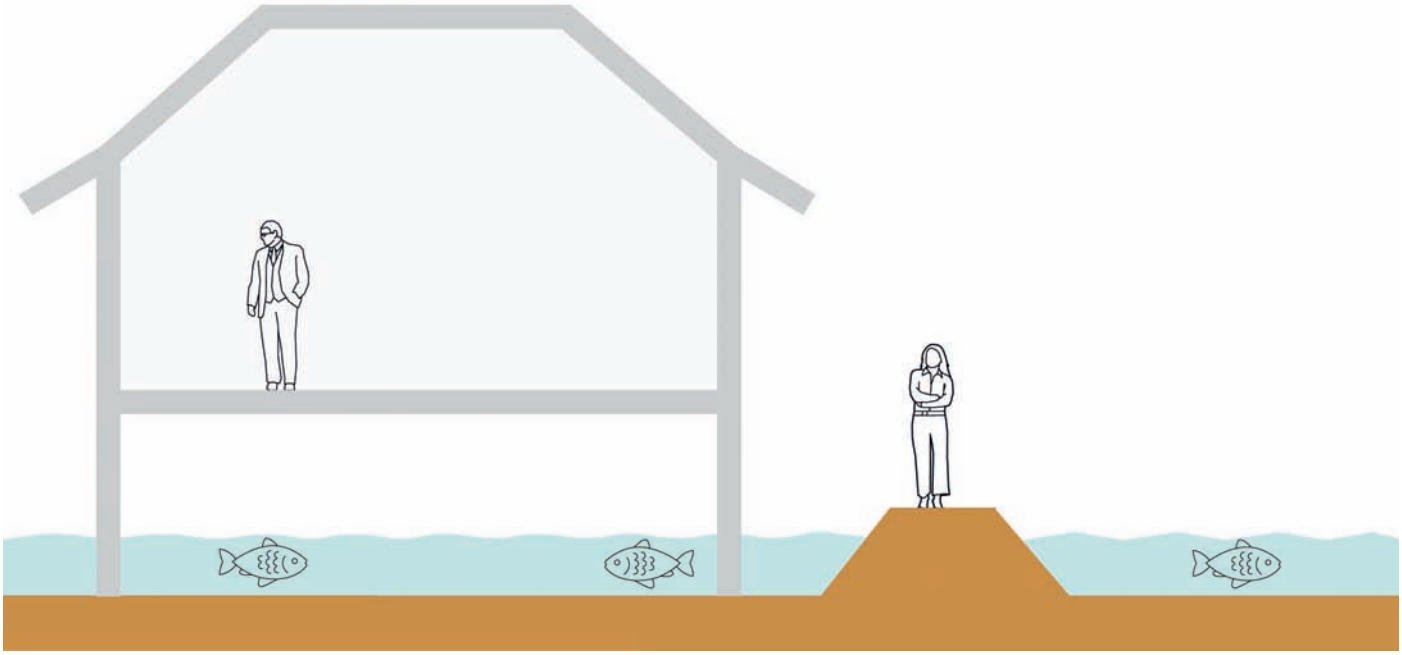
Mangrove forest in Colombia

Replanting mangroves

Before people started living in the coastal areas, the lad area was covered in mangrove forests. The mangrove fores was important to protect the coast from erosion and floods. It also played a part in providing protection from storms.

Since the 1920's, they have been gradually removed but it is reported, now, that new mangrove forests are being replanted to help with coastal flood protection.

LAND SUBSIDENCE | fish farms 1920's - 1980's



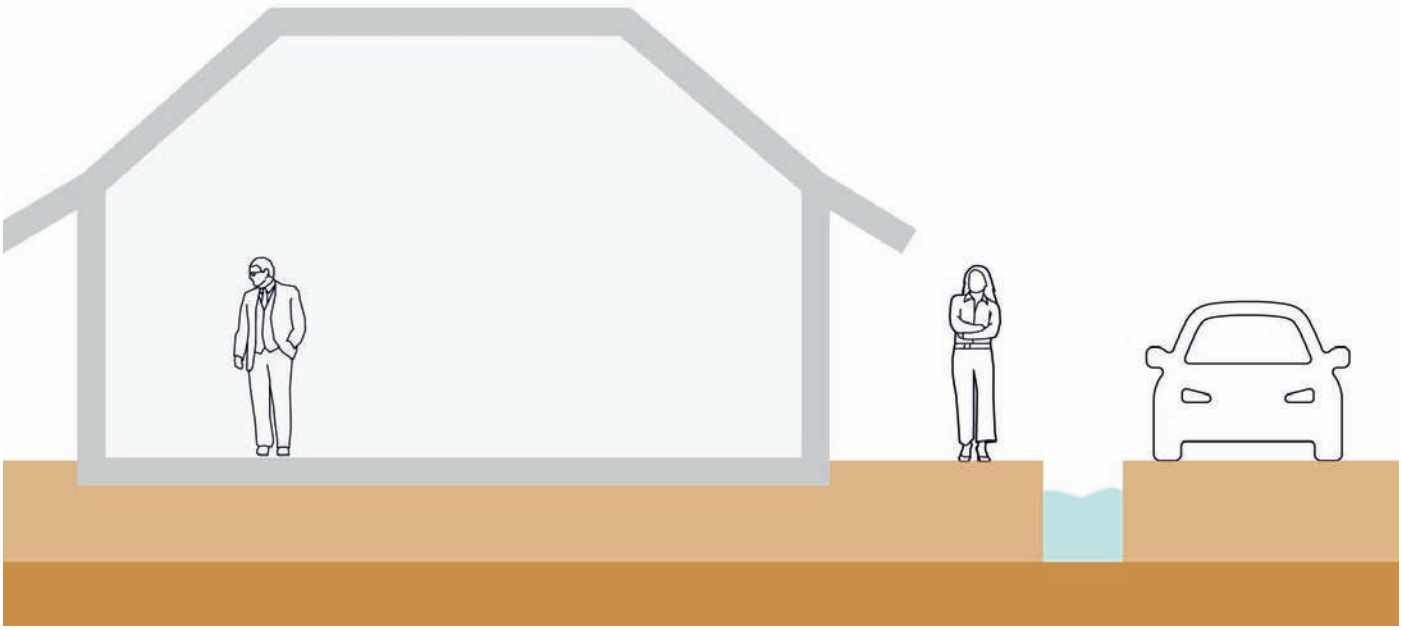
Schematic section of first form of living in the area

Fish farms in Indonesia

House on stilts in coastal area in Semarang

In the 1920's and 1930's people started settling on the coastal area and build fish farms. The people built their houses on stilts to protect themselves from high tides and flooding.

The area consisted mainly of seewater with small dikes in between which would serve as roads and as a means to divide the fish ponds.



Schematic section of first form of urbanisation

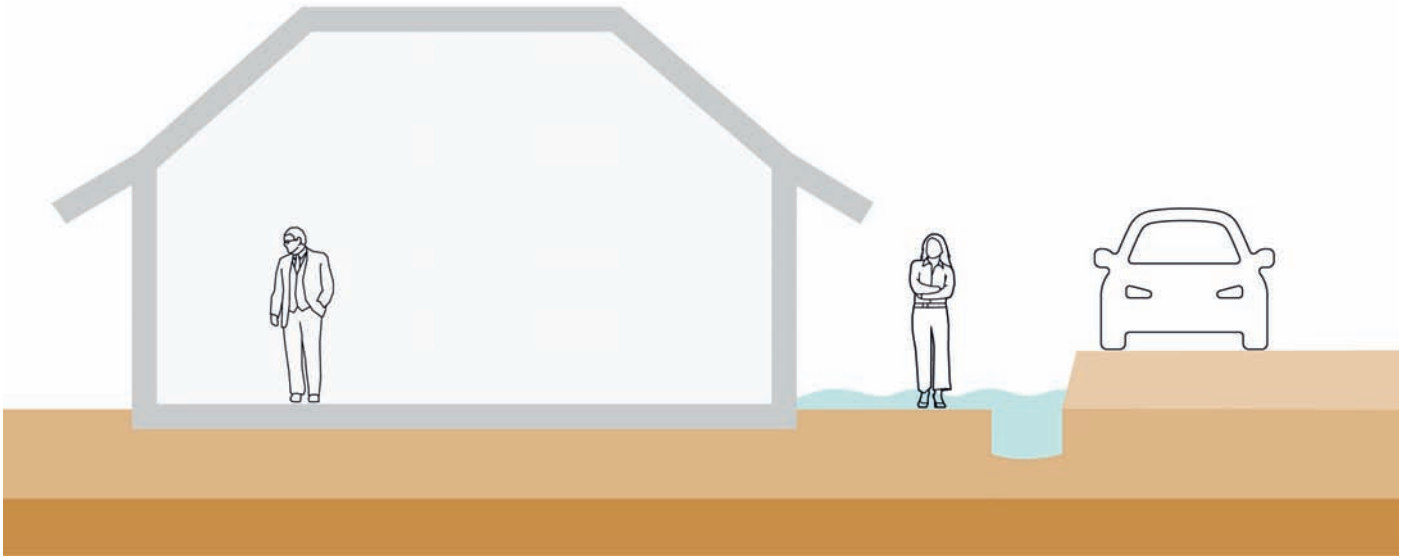
Urbanised coastal area

Road in coastal area

In the 1980's more people moved to the city. Coastal swampy areas were converted into housing areas without a building permit from the municipality.

The area was urbanized by raising the ground level and building the houses and roads directly on it. These community's maintained their drainage and roads by working together as a kampung.

LAND SUBSIDENCE | road raising post 1980's



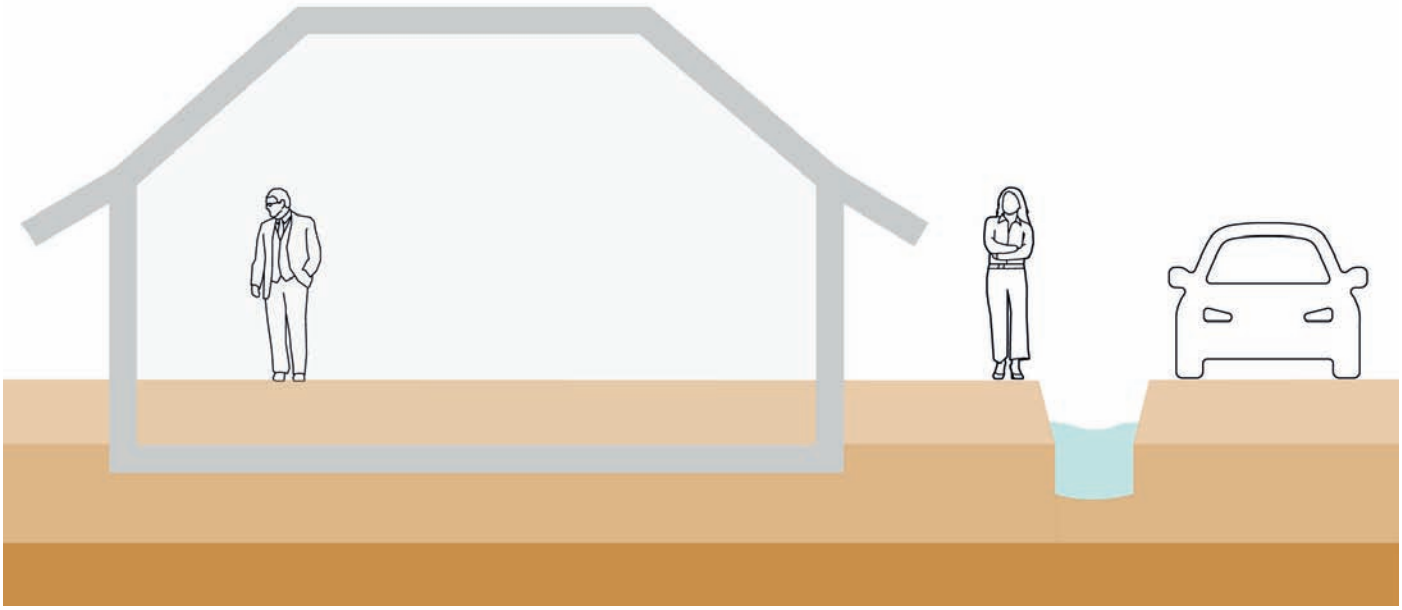
Schematic section of raising of the road resulting in water problems

Street raised in Semarang

House lower than the street in Semarang

When the land started to subside, people needed to react. As a kampung, once every few years, people work together to raise the local infrastructure and dredge the drainage. However, houses are not raised together. This means that there are houses lower than the streets, causing the houses to be incredibly fulnerable for high tides and flooding. These houses often belong to the poorer people in the area.

LAND SUBSIDENCE| floor raising post 1980's



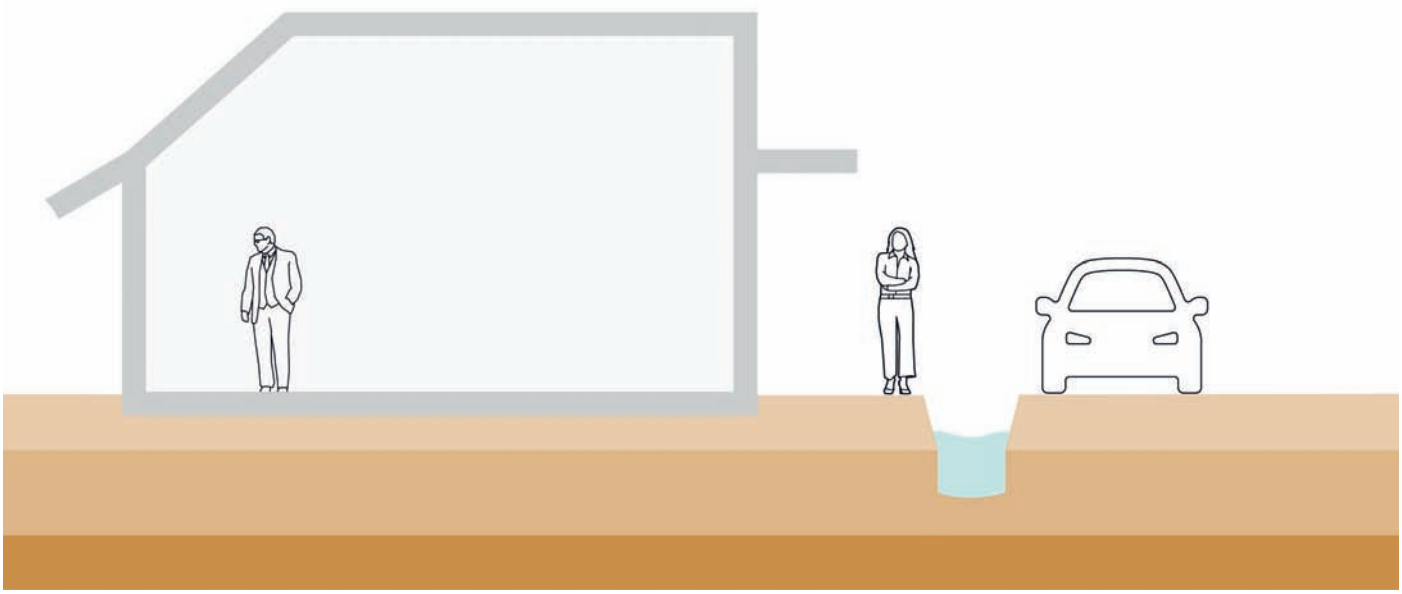
Schematic section of raising the floor in the houses

House subsiding, but with floor raised

House subsiding, but with floor raised

The cheapest solution to prevent your house from flooding is raising its floor, while keeping everything else intact. This is a short term solution which works for a few years untill you reach your roof. This solution is used by the poorer people in the area, since you only need earth.

LAND SUBSIDENCE | complete rebuild post 1980's



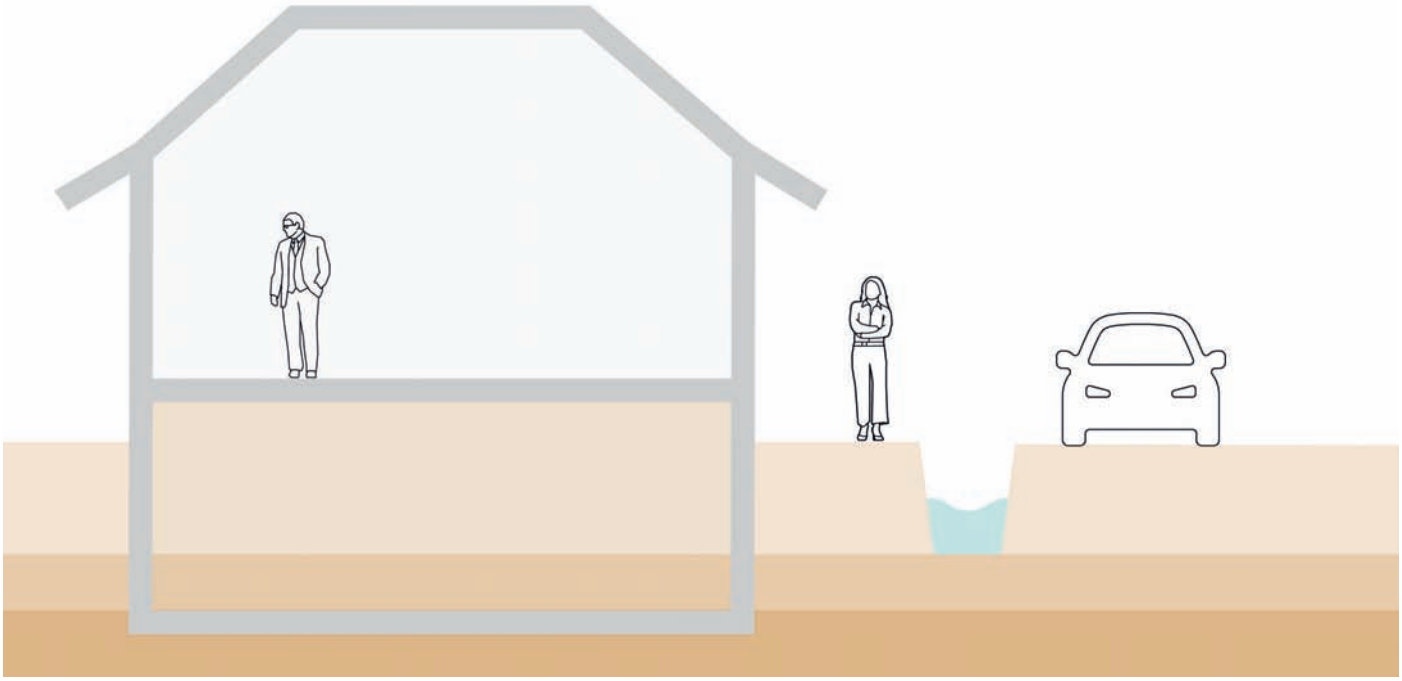
Schematic section of house completely rebuilt

Rebuilding house on old structure

Rebuilding house on old structure

Another solution is to demolish your house, raise the ground and rebuilt your house again. This can be done by demolishing it complete- ly or letting some of the structure intact to use. This is a solution used by the relatively richer part of the kampung. This is also a short time solution, since you'll have to do this every couple of years.

LAND SUBSIDENCE | adding floor post 1980's



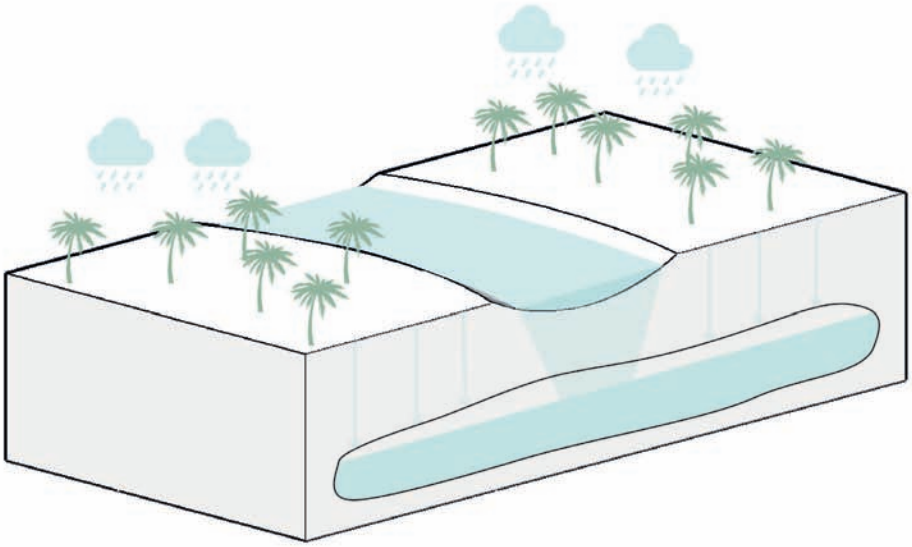
Schematic section of adding an extra floor to help against flooding

First floor being used as ground floor

House built on old house

The final and most extreme solution is adding an extra floor to your house and letting your ground floor subside. This is done when no other option is left. This is a midterm solution. The new house will be above street level and can be used for a relatively longer time, but after a while the same problems will occur.

Photo of flooding in Semarang
SOURCE: Flickr

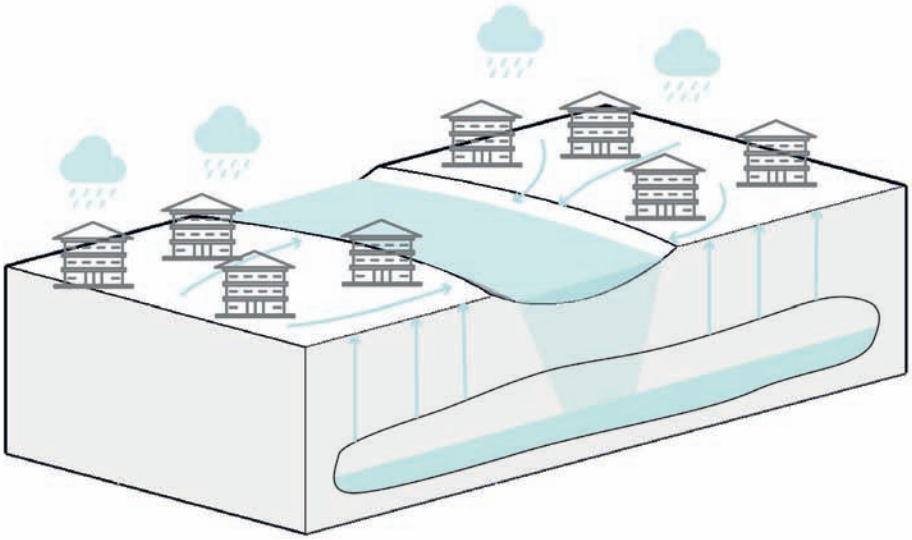


Schematic drawing of original water system before human intervention

Top view of a river in a tropical environment

River in a jungle environment

Before human settlements were constructed, the river flows freely through the landscape of jungle. The river could fill the aquifer as well as the vegetation.



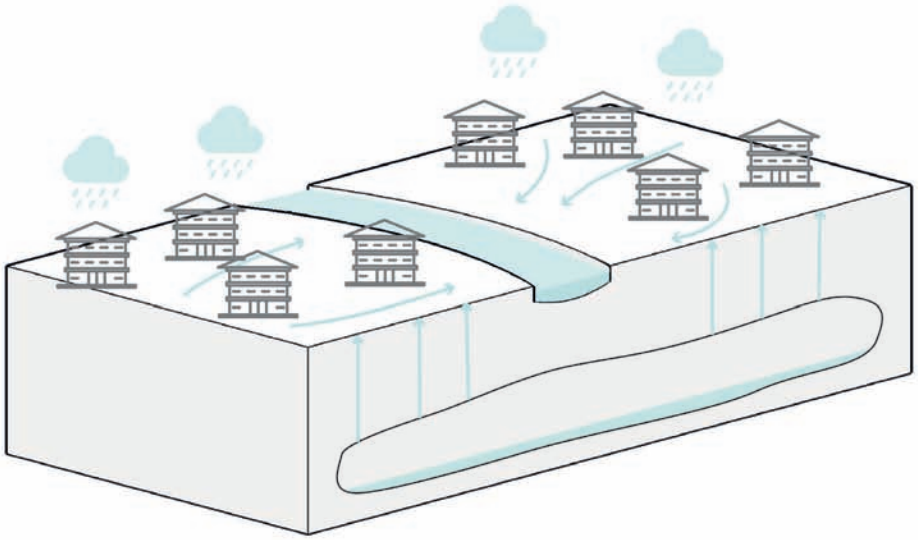
Schematic drawing of urbanization around the river

Flooding in Kota Lama

Flooding in Semarang

Urbanisation around the rivers caused two things:

- The ground was oftened hardened and therefore less capable of taking up rainwater, partly necessary to refill the aquifer. This causes the water to stay on the surface and flow to the river. During rainseasons this can cause floods.
- The people living in the city pump up ground water, causing the aquifer slowly to depleed.



Schematic drawing of normalisation of the river

River seen from Kota Lama

Kali Semarang

To tackle the problem of floods, rivers were normalized to increase the waterflow. This way the water could leave the city quicker.

This causes a new problem. The aquifer isn't being refilled anymore. The water flows away without being partly absorbed by the ground. The river itself is prone to siltation and filled with trash, increasing the problem even more.

Photo of dam being built in Semarang River around Pelangi Village, Jalan Dr Sutomo, precisely behind Kalisari Flower Market
SOURCE: SM / Dini Failasufa

CONCLUSION

Along the line, we found out that Semarang had only relied on the West and East Canal that was built during the colony era to channel the flow of water from the upstream, rainfall, or the sea overflow. The downside of these centralized main water infrastructure is that it happened to 'kill' the Semarang River—the city's meandering backbone which flows from Mt. Ungaran upstream down to the main port. These canals are causing the river to be inactive although it is where the original settlements first set foot on. It is also discovered that most of the urbanized area today lies above the latest millennium delta sedimentation which makes them vulnerable to coastal flooding.

What can be taken from the urbanization process in the coastal areas is that the type of construction from the past few decades is not a future-proof way of building. Houses continue to subside and if nothing changes, the people have to keep adjusting their houses. On a more positive note, in this continuing struggle against the water you can see a great willingness of the people to cope with the issues. The people desperately want to keep living in those areas and this might mean that projects to cope with flooding and land subsidence can be easily implemented.

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TUDelft + ITB at Monod Diephuis, Semarang 2019
SOURCE: Juliansyah Ari Awan

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The wonderful **community** of Semarang for showing us a glimpse into their daily lives,

and,

All our **tutors** from **TUDelft** for everything!

SHARED HERITAGE LAB
SEMARANG - 2019