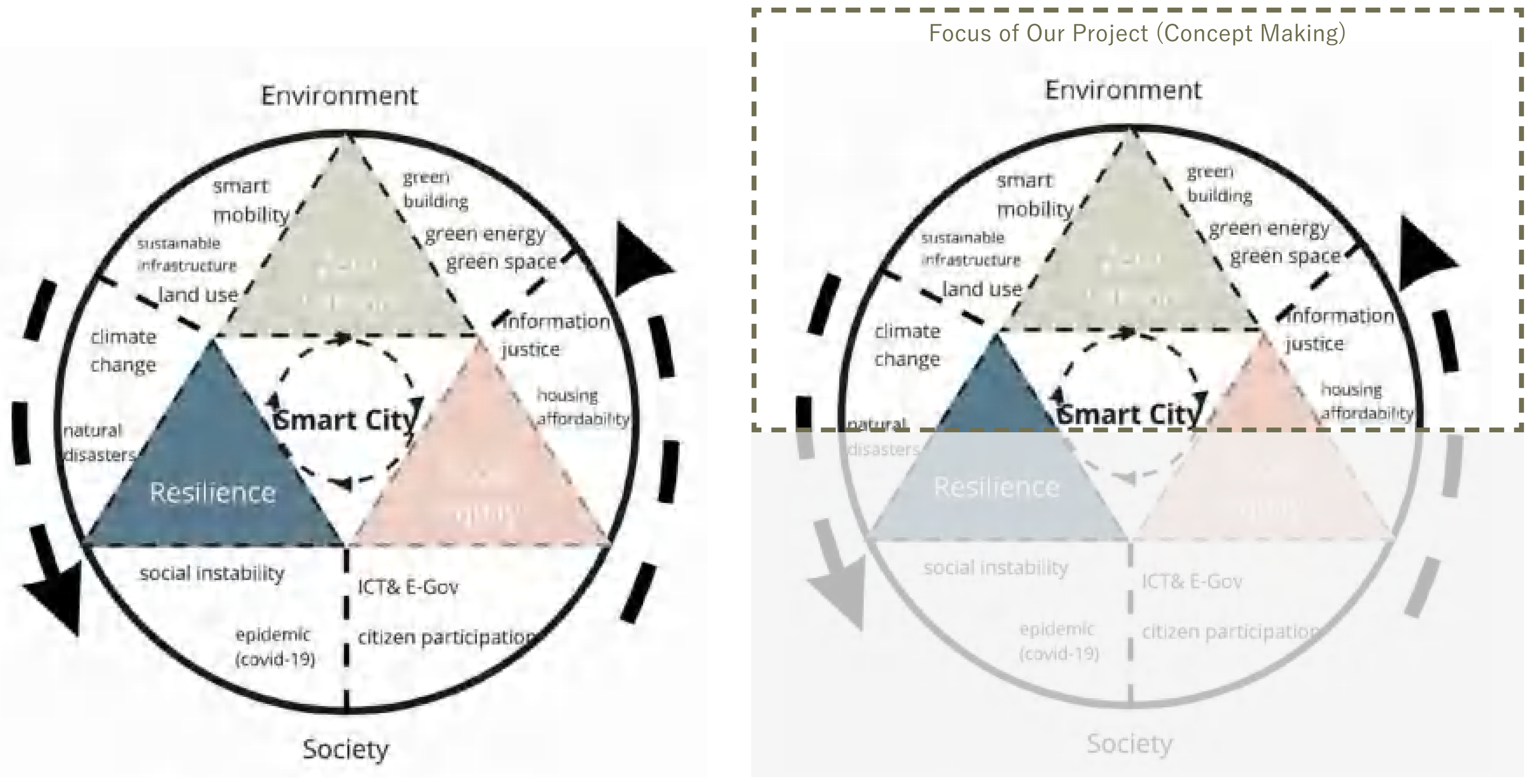
01 Conceptual Framework & Site Analysis

Framework _ Components and Perspectives



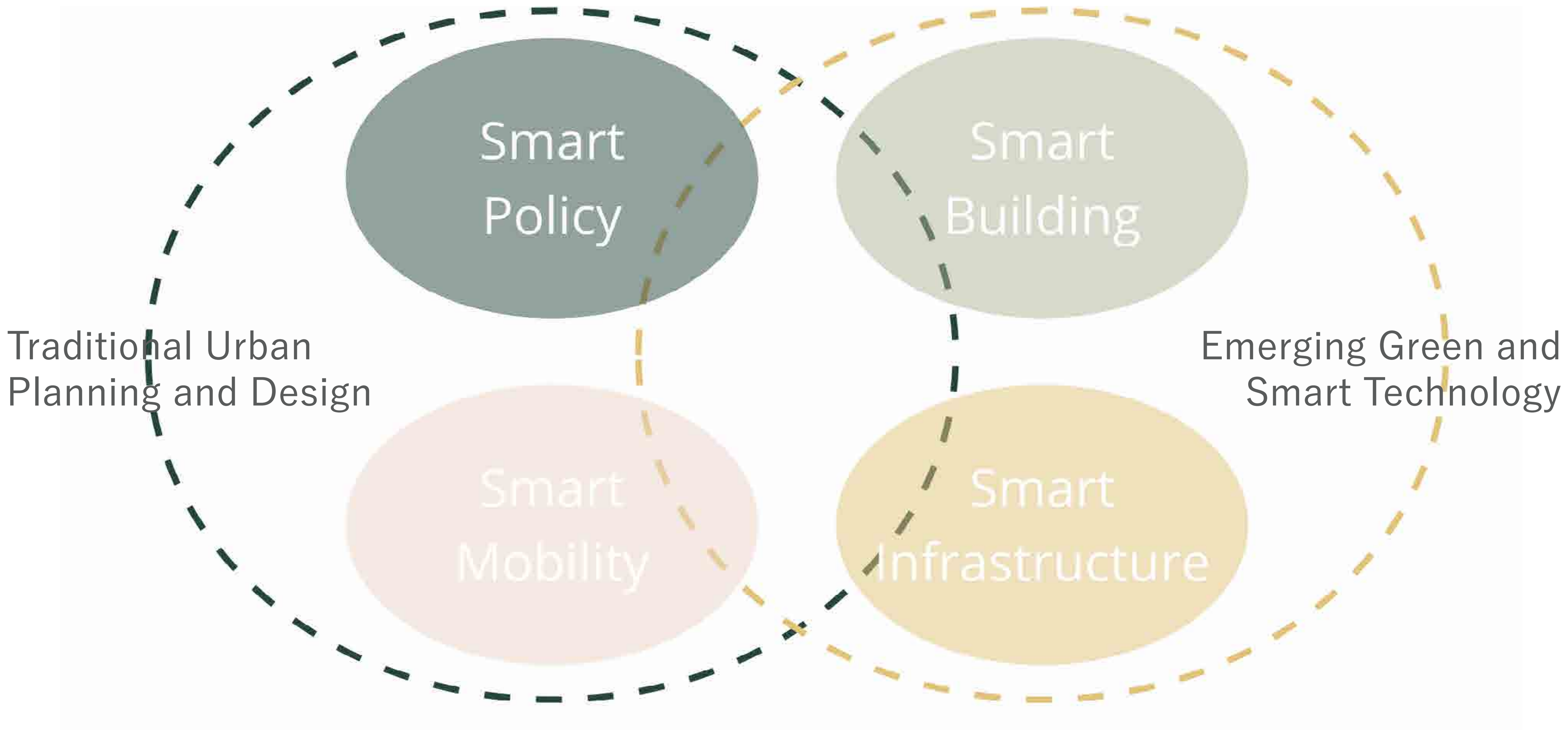
3 Components and 2 perspectives

Defining a Smart City
Considering existing definitions and the focus of this studio, we define smart city as an approach to attain environmental and social goals incorporating smart technology.

Components of this Studio Work
1) Zero Carbon
2) Resilience
3) Social Equity

The Perspectives in Concern
1) Environmental amenity by focusing on carbon emission and resilience.
2) Social development by analyzing and satisfying local need.

Work Structure _ A Urban System Design Approach



1. Land-use and Development 2. Design Guidelines 3. Affordable Housing 4. Digital Platform	1. Building Construction 2. Operation and Maintenance
1. New Mobility System 2. Detailed Street design	1. Green Infrastructure and Urban Form 2. Water Reuse 3. Energy Strategy

Yang, P. P., & Yamagata, Y. (2020). Urban Systems Design Creating Sustainable Smart Cities in the Internet of Things Era. Elsevier.

Site History / Site Analysis

1872

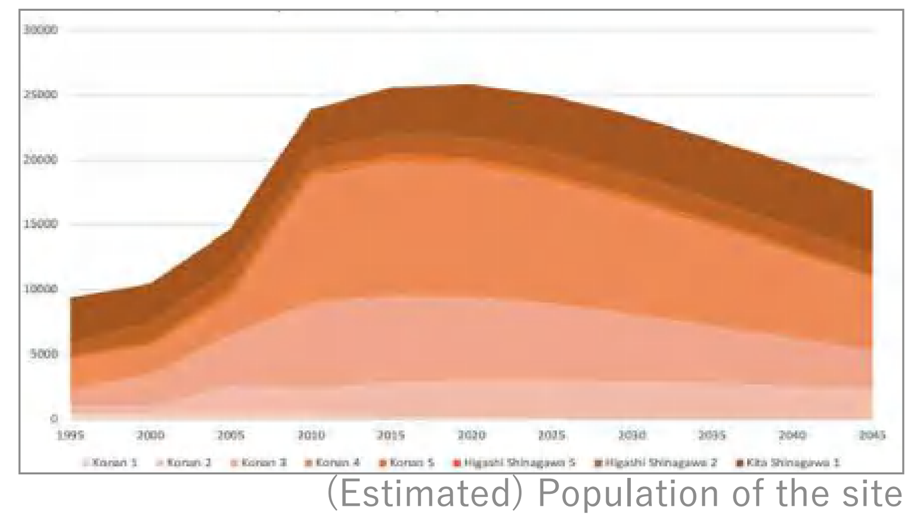
Historically a **shukuba-machi** (hotel town). The first and oldest railroad station in Japan.

Gotenyama hanami Shinagawa zenzu

around 2000

Shinagawa has become an **access hub** to west Japan & transit point for those going abroad due to its connection to Haneda airport through the Keikyu Line and the Tokaido Shinkansen.

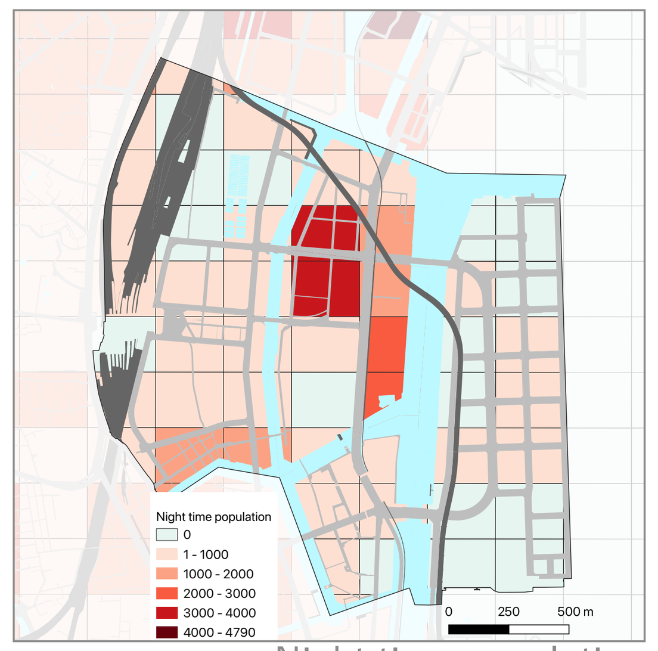
Following these events, many high-rise office buildings and housing were built in the area in the period between 2000 and 2010.



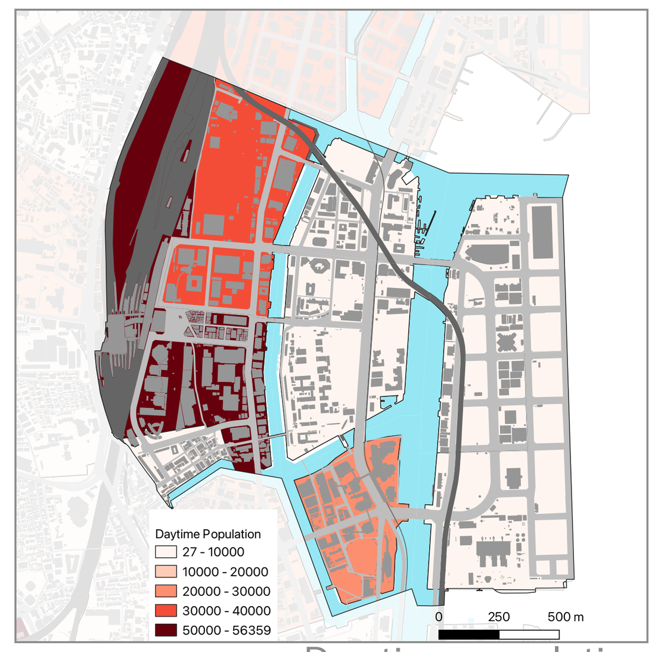
(Estimated) Population of the site

now

Demographic



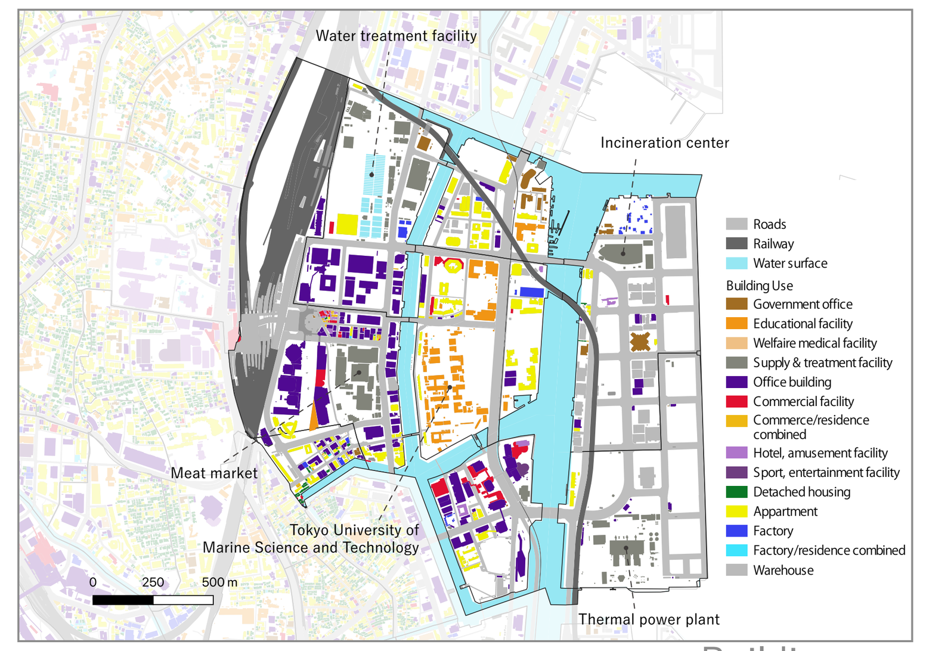
Night time population



Day time population

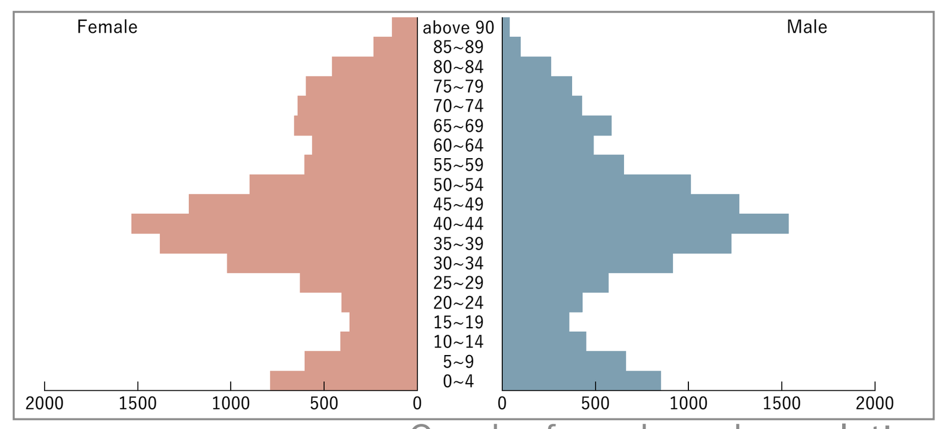
Land Use and Main Infrastucture

Current land use in the site is quite separated between islands
a. The land closest to Shinagawa Sta., is mainly office spaces;
b. The middle island is the main residential area with a Major University
c. The eastern island is a wharf area.
Important Utility Facilities are present in the area, including a water treatment plant, waste incineration plant, and a thermal power generation plant.



Building use

Age Based Population



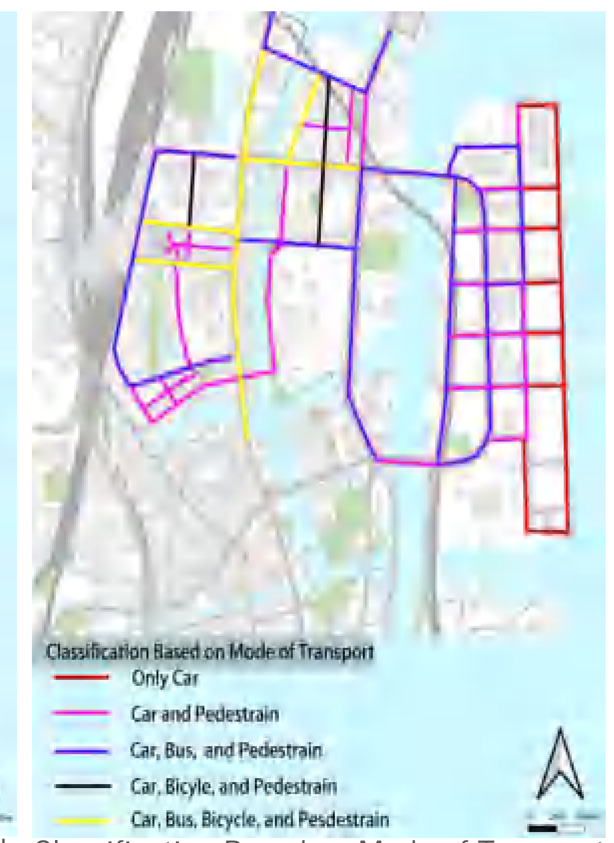
Graph of age based population

The site has experienced significant population growth in the 2000's. People live mostly in the central island, in high rise housing complexes. Meanwhile, the daytime (labor) population is concentrated around the station. Most people living in the area are in the 40-45 yrs old age range and children below 20.

Mobility

- The carriageway is distributed in the entire site according to the vehicular type, speed, and accessibility.
- The minor roads connecting the major roads have specific direction movement restrictions.
- The carriageway is wider near the port area for heavy-duty vehicle movement.
- Roads near the station connecting the site with other parts includes lane for station bound vehicles.
- Roads in the locations with public activities and movement include sidewalks.
- Major roads have the access of the bus connecting main public nodes.
- Bicycle lanes are restricted to only one main axis connecting station.

Classification of Carriageway Width



Classification Based on Mode of Transport

2019~

Open of Takanawa Gateway station and new development around.

Open of new Maglev Shinkansen

2027*

*This was planned to be opened in 2027, but postponement of opening has been decided.

The station of new maglev shinkansen connecting Tokyo and Nagoya (and Osaka in future) will be at Shinagawa. As well, a new train line connecting Haneda airport and central Tokyo is now being prepared for construction.

Open of new Maglev Shinkansen

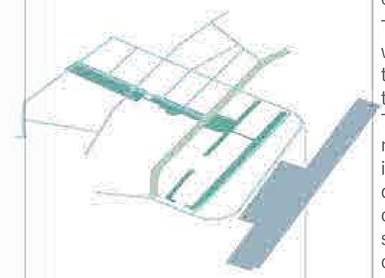
University of Tokyo (Jinyu CHEN, Kanta SAYUDA, Kazuki ISHII, Leonido Zairion DIMAANO, Nabamita Nath, Ryota OKAMOTO, Shuailing CUI, Tomoki HOSAKA, Yudi LIU)

02 Vision & Master Plan

Master Plan S: 1/10000

Smart Buildings

Building life cycle has 2 hot spots of carbon emissions; Construction and Operations. We are proposing a new building system and a demand response system. For the former, 5 strategies are classified by building ages and scales. Every new construction is required to achieve carbon neutral and existing buildings are renovated to improve their energy use. For the latter, we propose different technologies from interior scale to district scale. These measurements make a building management system as whole and reduce overall emissions.



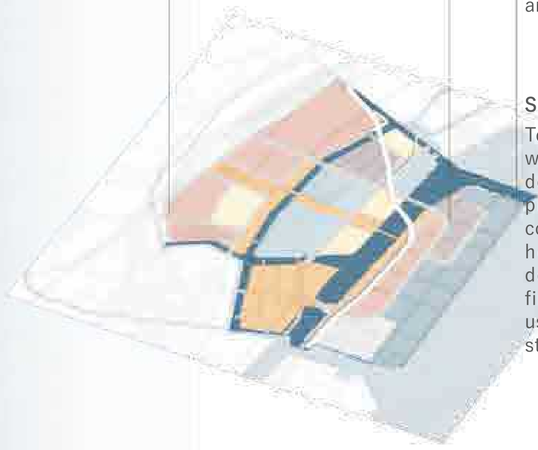
Smart Mobility

Smart Transportation system to manage and mobilize accessibility in the zone that will cater to the future demand in a more sustainable, safe, and energy-efficient pattern.

To achieve smart mobility within the area along with positive impact in the surrounding zones, the existing roads are re-designed to improve the mobility pattern prioritizing Non-Motorized Transport (NMT) movement in the inner core and minor roads while considering safety for the NMT in the major vehicular Roads. To improve the air quality as well as comfort of the pedestrians and bi-cyclists, sufficient plantation along the roads with smart technologies have been incorporated. A green corridor has been proposed connecting the station with port area to improve the walkability of the area.

Smart Infrastructure

Our proposal for Smart infrastructure consists of interventions in both green and gray infrastructure. For the former, we propose a redesign of the open space system that would maximize green space as well as the promotion of urban farming in the redevelopment site. For the latter, we propose a new water reuse system and an independent smart grid for further reduction of carbon emissions. These proposals take into account existing site resources, such as effluent water from the treatment center and energy from the incineration plant.



Smart Policy

To support the smart city urban system design, we proposed four main policies. The land-use and development policy assists in the development process. The design control policy regulates a consistent design in the long-term. The affordable housing policy creates potential for private developers to provide affordable housing. And finally, the citizen participation policy focuses on using emerging digital technology to improve inter-stakeholder communication.

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03 Proposal - Smart Building

03-1 _ Carbon Typology

We divided the strategy for the new building system into 5 categories. To achieve zero-carbon in the site, new buildings must aim to be at least carbon neutral.

Thus, if developers want build high rise buildings, they would be required to pay carbon credits, proportional to the amount of their excess carbon emissions.

	New Building			Existing	
	B1. Low rise	B2. Middle rise	B3. High rise	B4. New existing	B5. Old exiting
	→ Climate Positive	→ Carbon Neutral	→ Carbon Credits	→ Renovation	→ Recycling
Structure	Wooden RC	Wooden RC	RC SRC	(RC) (SRC)	Especially Wood
Elements	PV Panels Wooden Louver Green Facade Wind Catcher ...	PV Panels Louver Low E Glass Green Roof ...	PV Panels Louver PV Window Radient Panel ...	AI Censoring LED lighting Louver Eco Material ...	Construction & Supply Chain Management

New Building System

03-2 _ New Construction

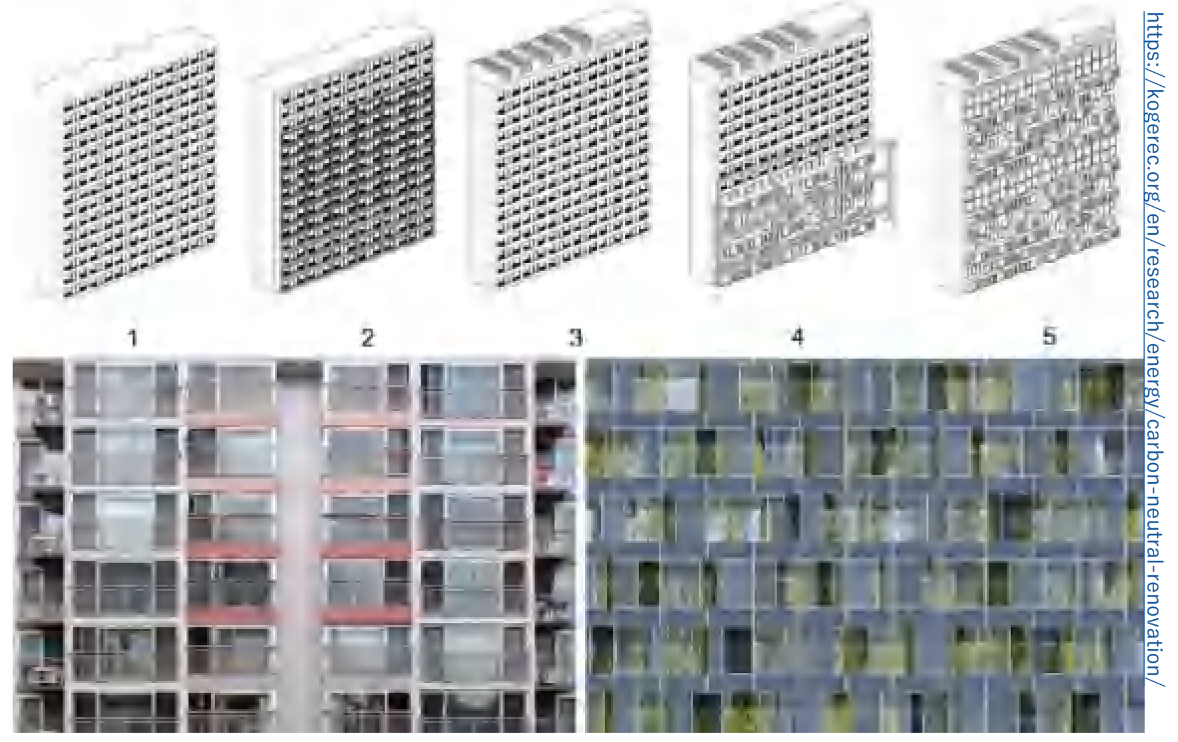
We are also proposing the promotion of wooden materials for new construction. Timber locks approximately 1 ton of CO2 per 1m3 thus doing so would further emission reductions.
The site can easily import wooden materials from Shinkiba, a nearby timber production area. We believe that, in the future, it would be possible for all buildings, whether low-rise or high-rise, can achieve carbon negative status especially through the expansion of wooden building technology.

Denmark's first climate positive hotel

Concept sketch of wooden skyscraper by Nikken Sekkei

03-3 _ Existing Building

Renovation enables relatively new buildings to improve their energy use without large scale reconstruction.
Some existing buildings don't need to be rebuilt completely. They can reduce emissions by retrofitting their facade and/or adding rooftop PV panels.



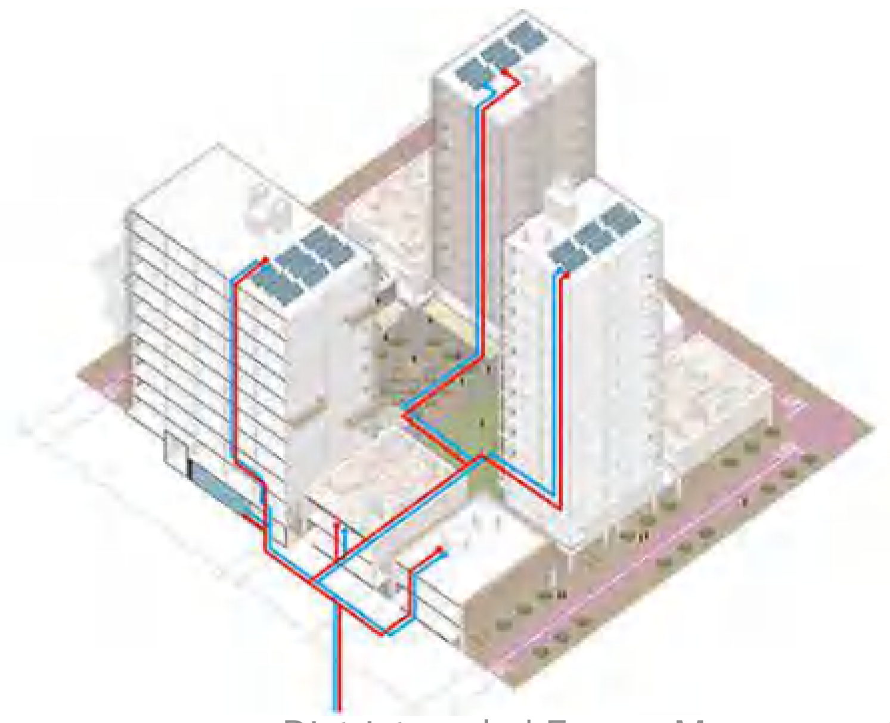
SKKU_Carbon-neutral-renovation

03-4 _ Energy Use Management by The Scale

Building Operations is the second hotspot of carbon emissions in the building life cycle. We propose different technologies from interior to district scale. The interdependency of measurements in each scale makes an efficient operation system as whole.

Smart buildings interact between each other.
A district scale system manages building energy demand, enabling excess energy to be shared between buildings.

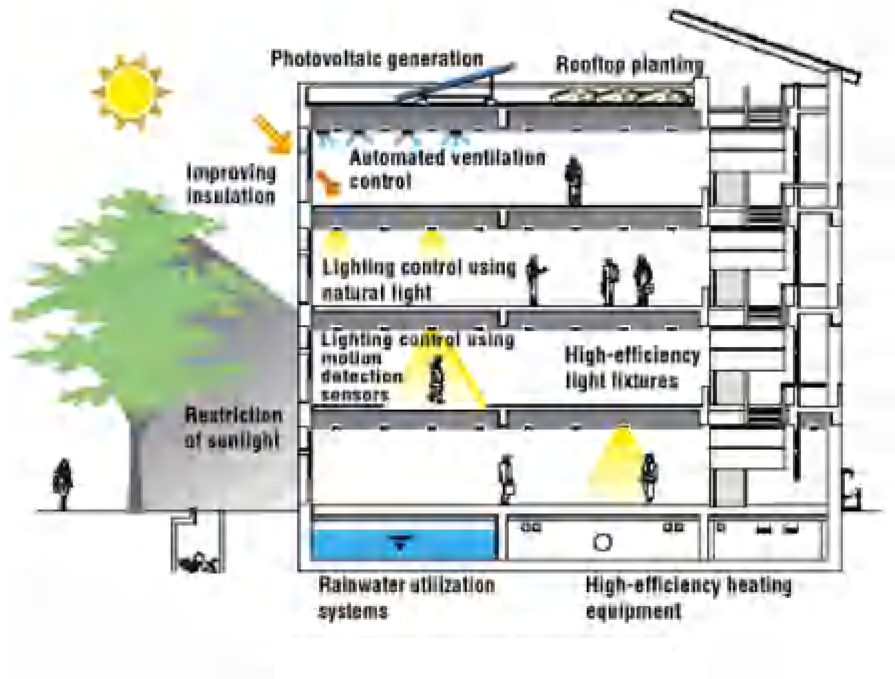
- Identify the quantity of building energy demand
- Utilize the waste heat of the surrounding area
- Supply extra electricity generated by PV panels to other buildings



District-scaled Energy Management

For overall building design, facades and floor plans affects the efficiency of natural ventilation and lighting.
Therefore these should be optimized.

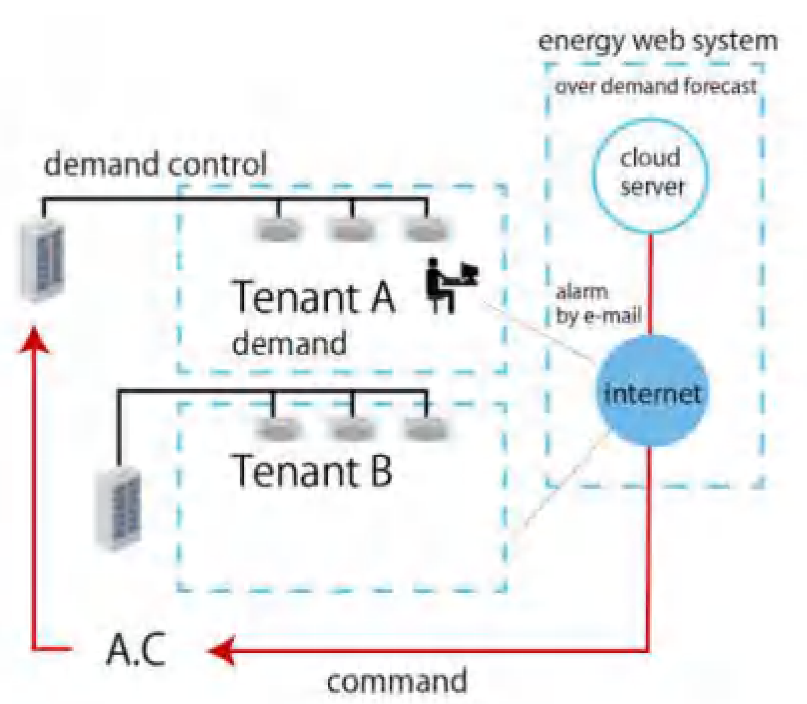
- Generate electricity using PV panels
- Restrict and utilize sunlight with a flexible facade
- Optimize ventilation and reduce air-conditioning use
- Utilize rain water for cooling



Conceptual image of green bldgs

By independently, monitoring the demand of each building tenant it is possible to reduce the peak of energy use in a building through a demand-control system.

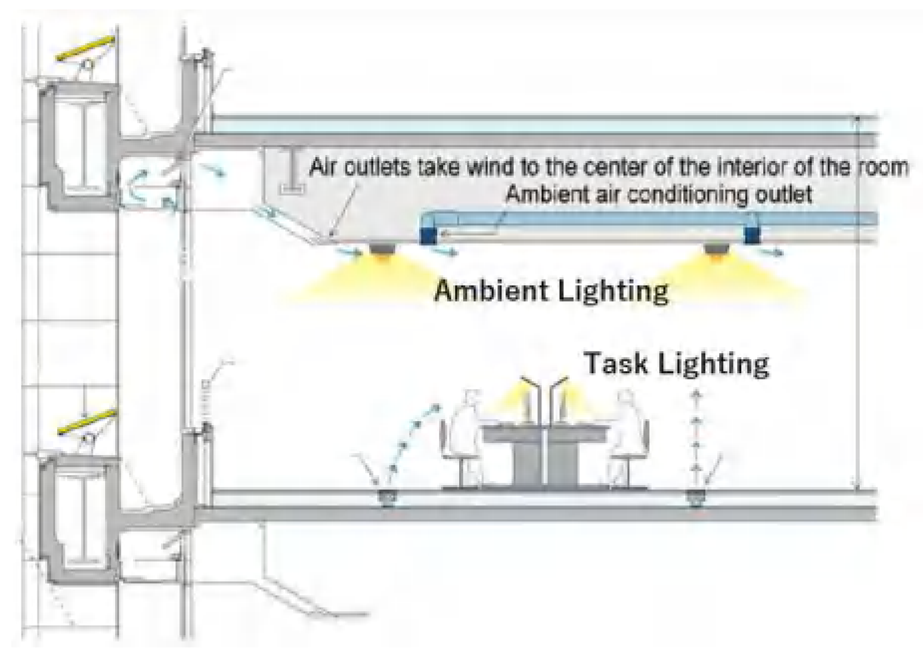
- Identify energy demand of each tenant space
- Ease the peak of energy use
- Give incentives for electricity savings
- Monitor and analyze the energy use



Tenant-Based Demand Response System

A Task-Ambient system can be used for air conditioning and lighting.
This kind of system has been shown to not only reduce energy wastage but also improve comfort and productivity.

- Reduce temperature difference between outside and ambient air conditioning
- Adjust the luminosity automatically
- Sense a person and turn off when it's not in use



Task-Ambient System

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04 Proposal - Smart Mobility

04-1 _ Street Design

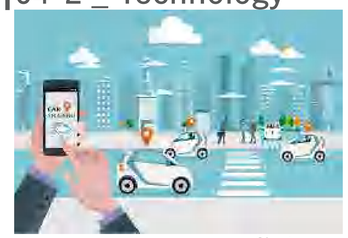
Public Transportation Route

Non-motorized transportation System

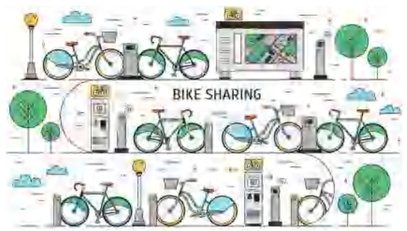
Public transportation coverage increase: With this design, the bus route covers most of the site.
Public transportation use is one of the most effective actions individuals can take to conserve energy. Riding public transportation far exceeds the benefits of other energy-saving household activities, such as using energy-efficient light bulbs, adjusting thermostats, or using energy-efficient appliances.

Non-motorized transport (NMT) Segregation: Segregation of NMT and MT(motorized transportation) make the site safer and more walkable.
Non-Motorized Transportation (NMT) includes all forms of travel that do not rely on an engine or motor for movement. This includes walking and cycling, and using small-wheeled transport and wheelchairs. These modes of transport can provide both recreation and mobility.
To encourage more people to use Non-motorized Transportation and decrease vehicle use, infrastructure for non-motorized transport is provided with safety, comfort, and detours.

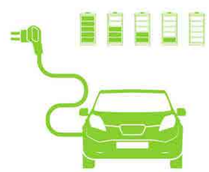
04-2 _ Technology



Sharing cars
https://www.automotive-iq.com/autonomous-drive/articles/how-car-sharing-will-impact-us-economy-and-what-car-makers-can-do-about-it



Sharing bikes
https://www.dreamstime.com/bicycles-available-rent-parked-docking-stations-city-street-payment-terminals-map-stand-trees-concept-public-bike-image107495106



Electric cars
https://www.dreamstime.com/

The shared economy has created a number of opportunities for smart cities in terms of improving asset utilization and effectively reducing transaction costs and waste. Improving the use of assets implies numerous positive consequences, for instance, energy-saving and decongestion of roads.
Sharing Economy will be applied in the site. Autonomous cars, sharing cars, and electric cars will be promoted to realize flexibility.

Smart city with technologies
Silva B N, Khan M, Jung C, et al. Sensors, 2018, 18(9): 2994.

Real-time data
Silva B N, Khan M, Jung C, et al. Sensors, 2018, 18(9): 2994.

Sensor network in cities
https://www.stengg.com/en/newsroom/news-releases/st-engineering-showcases-industry-leading-smart-city-capabilities-for-middle-east-market/

Sensor networks consist of spatially distributed devices communicating through wireless radio and cooperatively sensing physical or environmental conditions. They provide a high degree of visibility into the environmental physical processes. The sensor network uses real-time data to provide users with road conditions, traffic flow, dangerous roadways, and smoother route selection, avoiding traffic jams and traffic accidents, while also saving time and reducing energy consumption.

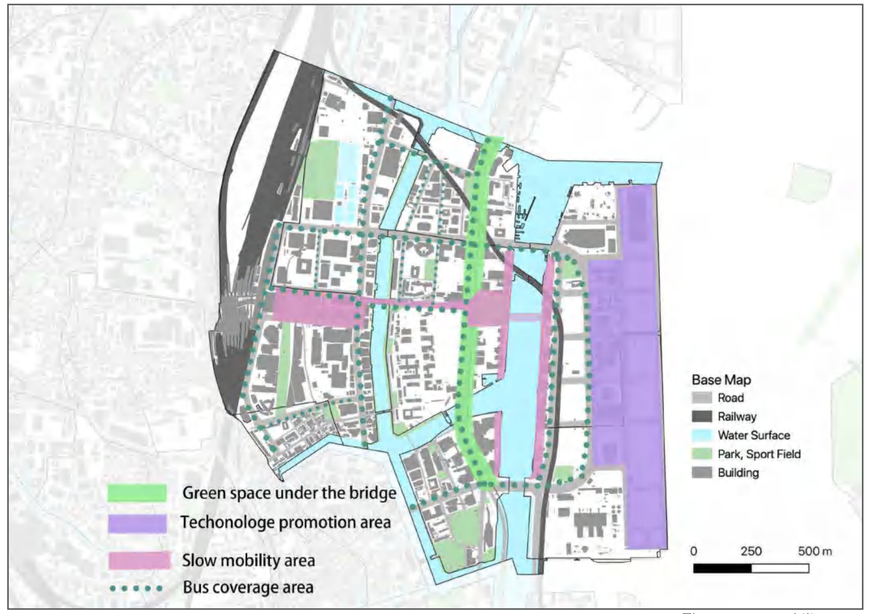
04-3 _ Smart Zone

We propose that there be three special zones for mobility promotion. Depending on its location, surroundings, and main users, each zone is designated a specific design. The Slow mobility area, near the exit of Shinagawa station, would connect the station to the primary waterfront. This area is an optimum site to have walkable commercial spaces. The wide street under the bridge is designed to be a mix-used space to create unique experiences. Lastly, the area along the port is is special since it accommodates cargo shipments. Here, technology will play a big advantage in solving both efficiency and environmental problems.

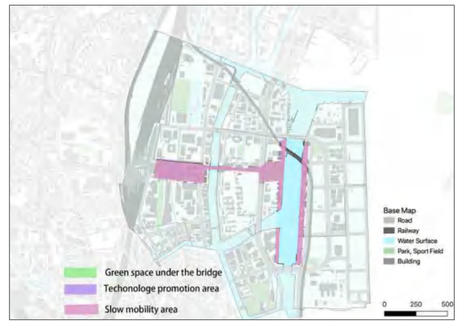
Slow Mobility Area:
- Sidewalks are well design to attract people to walk around.
- Enough interaction between pedestrians and the whole environment can be achieved.

Space under the Bridge:
Space under the bridge can be mix-used as car parking, green space, and activity area.

Technology Promotion Area:
The industrial area is suitable for promoting Electric cars, Hybrid electric and autonomous vehicles.



Three smart mobility zone

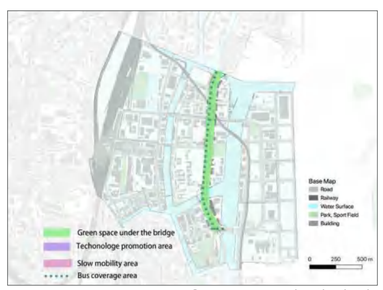


Slow mobility area

Image of pedestrain-friendly street

Bioswalse along the sidewalks

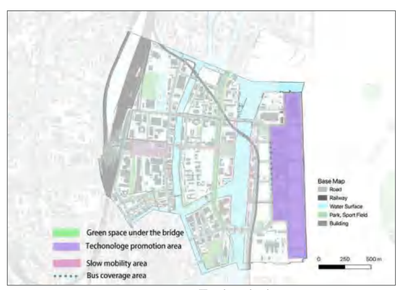
- Slow mobility area is also the green corridor in the site.
- Street green design and bioswales along the street as a soft barrier can also provide a safe and comfortable environment for pedestrians.



Gray space under the bridge

Image of gray space design

- The widest road in the site is also the gray space under the bridge. (viaduct).
- Enough plants are like the screen to absorb the co2 emission from vehicles and keep the air fresh.
- Make full use of such gray space may provide various activity spaces in the site.
- The contemporary activities are possible to be held here to make it an impressive public space.



Technolodgy promotion area

Autonomous cars

Electric trucks of Mitsubishi Fuso

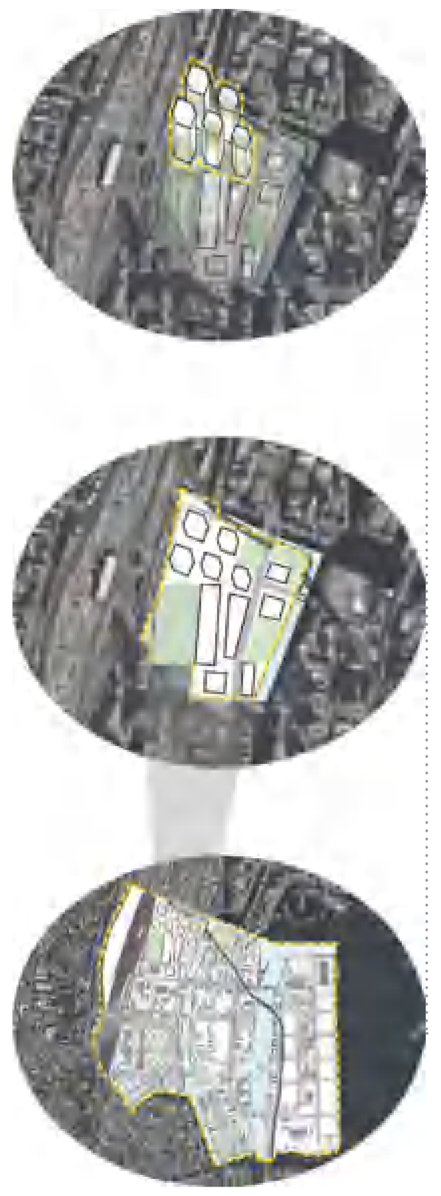
- The current industrial area brings much air pollution and noise to the neighborhood.
- Autonomic trucks can decrease the total number of trucks. With the intelligent system, all of the trucks will work more fluently and be allocated more resonable.
- Electric trucks can reduce the emissions that contribute to climate change and smog, improving public health and reducing ecological damage.

University of Tokyo (Jinyu CHEN, Kanta SAYUDA, Kazuki ISHII, Leonido Zairion DIMAANO, Nabamita Nath, Ryota OKAMOTO, Shuailing CUI, Tomoki HOSAKA, Yudi LIU)

05 Proposal - Smart Infrastructure

05-1 _ Open Space System

Proposal Methods for Open Space Design to achieve the Carbon Neutral: Design an Open Space System(static) connected with Smart Mobility System(dynamic), to achieve the New Lifestyle that is considered to be healthy and environmental friendly with parks and squares, walkable street, vibrant waterfront and community.



Living Level

- Family Gardens: allotment spaces for residents to grow food.
- Create diverse tree canopy.
- Design waterfront space to be more walkable.

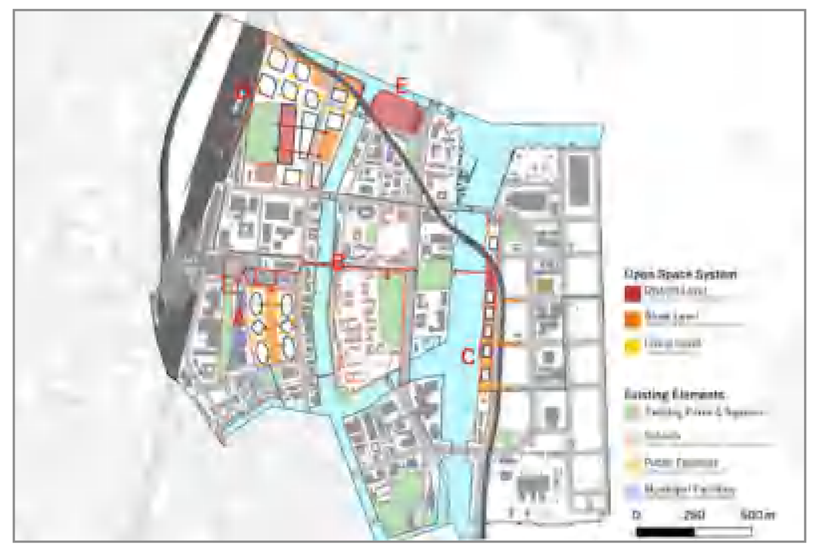
Block Level

- Pocket Parks (open streets) as open spaces for the community.
- Design rainwater gardens connected with the water circulation system.
- Use wind towers to capture upper-level wind to the squares+regulate the wind flow within the streets.

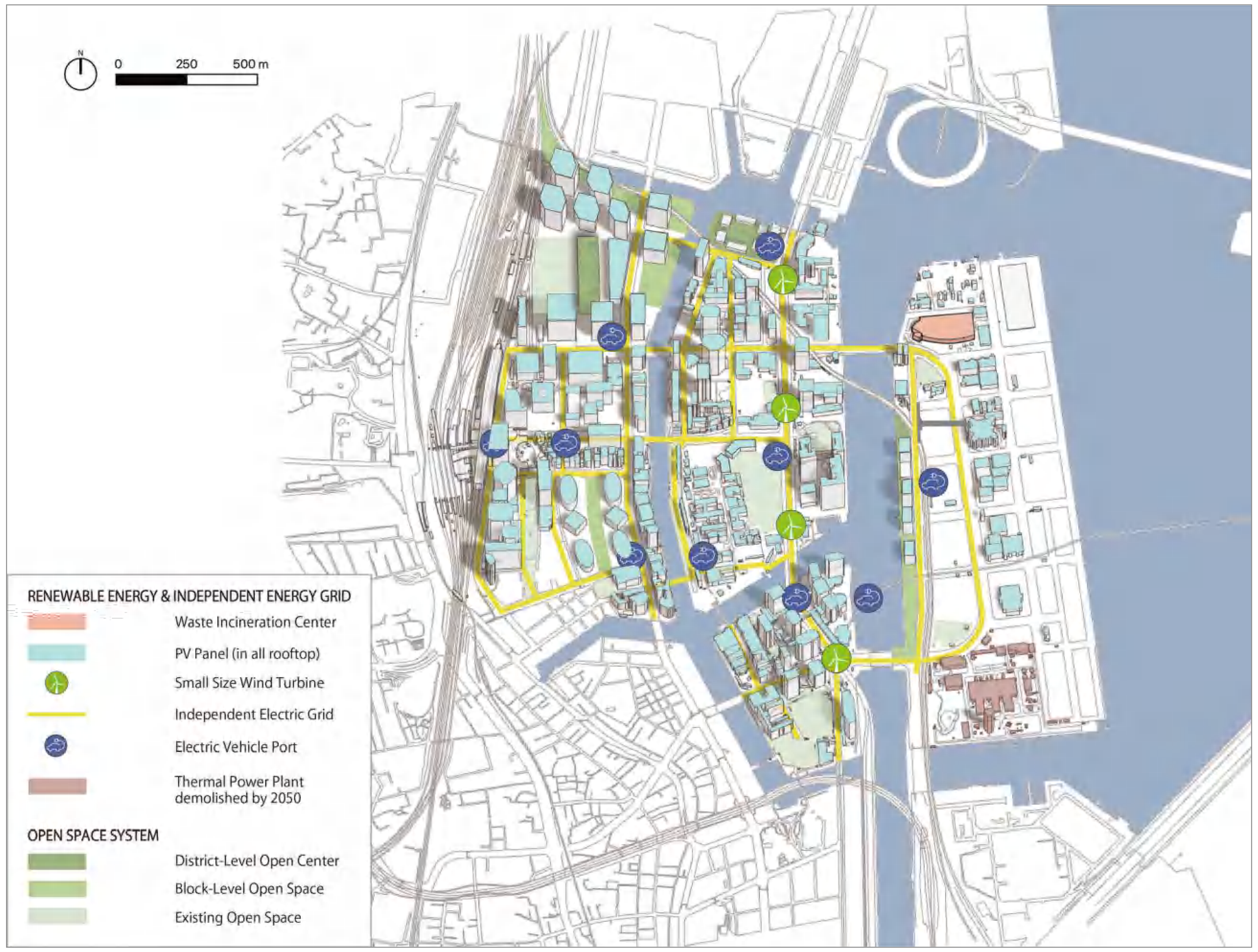
District Level

- Urban central parks and squares.
- Add some sharing bike spots , electric vehicle charging points, and secure bicycle parking spots near the main public spaces.
- Add sanitation for streets and open spaces.

There will be some central or urban parks at the District Level, which connect to the existing open spaces and pedestrian road system.
As for the Block Level, the new waterfront parks will also be connected to the upper level.



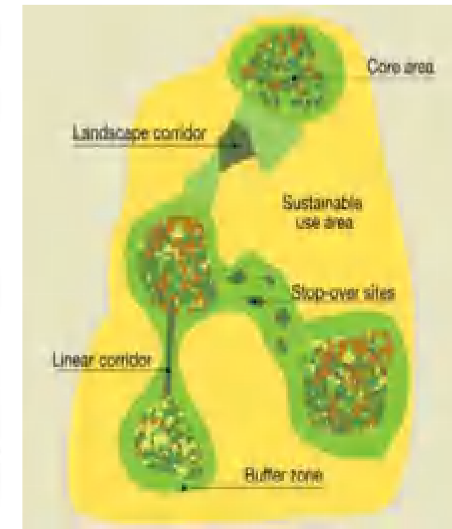
Open Space System design



Renewable Energy & Independent Energy Grid and Open Space System

05-3 _ Environmental Innovation

Bioswales: Brankovic, Mitković, Protic (2019)



Ecological Network
https://www.grida.no/resources/7644

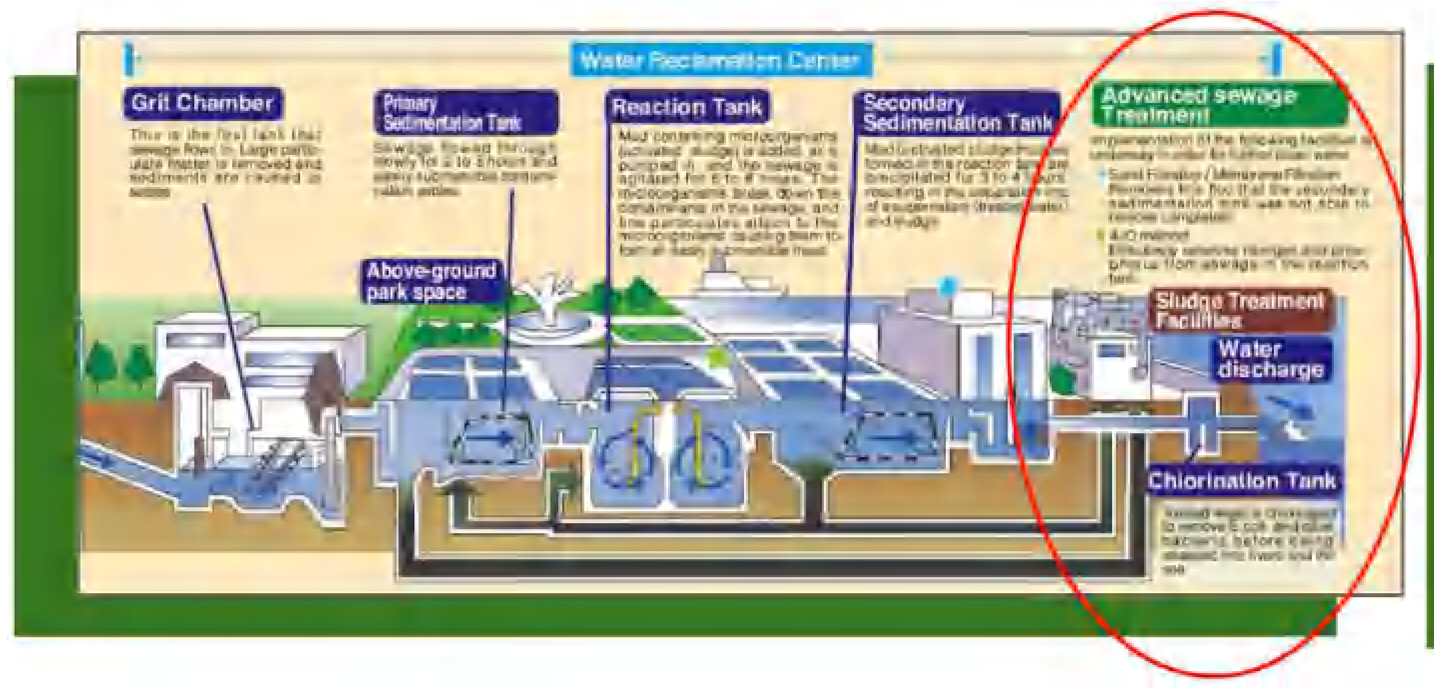
Wall Greening
https://www.architectureanddesign.com.au/suppliers/tensile/do-green-walls-automatically-make-your-building-gr

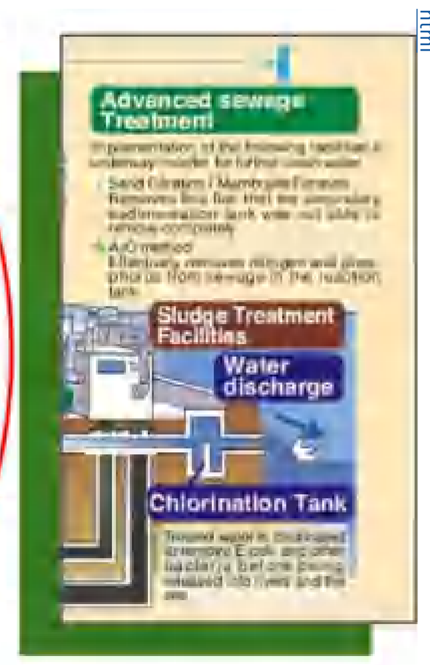
Rain Water Garden
https://www.weforum.org/agenda/2018/09/bangkok-has-created-a-sponge-park-to-combat-future-flooding/

Other existing environmental innovations can easily be integrated in the area to mitigate the environmental impacts of future development. We propose to form an **ecological network** using green pathways and green walls. This can prevent biodiversity loss and reduce the heat island effect. Furthermore, we are proposing to build **rain gardens** and **bioswales**, as these can prevent not just flooding but also the overflow of untreated wastewater in Tokyo bay from the treatment facility during rainy season which severely affects water quality in the area.

05-2 _ Water Reuse Plan

One major stakeholder that operates in the area is the **Shibaura Water Reclamation Center.** This site processes wastewater for a significant part of central Tokyo (app.6,440 ha). The treated water is discharged to Tokyo Bay while a part of the treated water is cleaned through sand filtration and then used inside the Center for cleaning facilities, cooling machines, and flushing toilets. A very small volume of water is further cleaned through ozonization and is supplied to the neighboring buildings as water for flushing toilets. We are proposing that they **expand water recycling** to more buildings for flushing and heating and promote other uses such as for Urban Farming. Furthermore, we believe that they should explore the possibility of **sewage sludge recycling** as fertilizers instead of incinerating it.





Water Treatment Facility Operations

05-4 _ Urban Farm

Large Scale Urban Farm Concept, Paris

Bldg-integrated Farming, Otemachi

Thammasat University

Urban farming is gaining popularity as an activity, not just for its environmental advantages but also its social benefits. There are many forms of urban farming such as building-integrated farms (indoor farm and rooftop farm) and allotment farms (community gardens) that can be built in the site to capture effluent water from the treatment plant, provide areas of recreation and improve food access.
The last point is especially desirable as it does not only reduce emissions but also lead to social justice in terms of food justice. nsequat.

05-5 _ Renewable energy & Independent Energy Grid

Energy consumption is the fundamental cause of carbon emission. In view of Japanese situation, that natural gas are mainly used for heating and cooking, and that 77% of electricity is now provided by fossil fuels, the district should be equipped with the **independent energy grid**, and provides **renewable energies**.

Two steps needs to be considered in the creation of the independent energy grid:

Highway lighs with winds

Generation

The most part of the electricity consumed in this area will be provided by renewable energy sources, which are:
- **Rooftop PV panels** installed in all buildings
- Generation of waste heat from the **incineration center**
- **Wind turbine** installed along the highway

These energy production covers 75% of demand in housing sectors. (See p.8 & p.10) Missing electricity will be provided from grid power.

Electric storage

Electricity storage is a necessary equipment for independent grid in order to control the demand. **Mix land use** of the area helps flattening the time fluctuation of energy demand, as well as the **V2G** (vehicle to grid) system with electric vehicle will be installed.

05-6 _ Removal of Thermal Power Plant

Thermal power plants are obsolete structures for the future decarbonized society. Although the Government have set the temporary goal to get 50%-60% electricity by renewable energy, these infrastructures should be removed for a total zero-carbon district.

The existing thermal power plant, locating in the eastern island, now provides electricity of Tokyo metropolitan area. Alternative land use and energy provision system need to be considered in future work.

University of Tokyo (Jinyu CHEN, Kanta SAYUDA, Kazuki ISHII, Leonido Zairion DIMAANO, Nabamita Nath, Ryota OKAMOTO, Shuailing CUI, Tomoki HOSAKA, Yudi LIU)

06 Proposal - Smart Policy

06-1 _ Land-use and Development

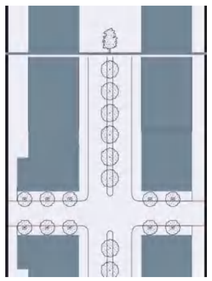
Principle
Flexibly apply Japanese land use and development regulations.
Commercial Zone / Balanced Development
(1. Zoning unchanged
(2. New district plan (地区計画)
(3. Small scale specified block (指定街区) when needed
Semi-industrial Zone / Intense Development
(1. Change to commercial zone
(2. Might apply urban renaissance special district (都市再生特別地区)

	Category I Residential Zone / Innovative Promotion
(1. Zoning unchanged	
(2. Using development promotion to encourage campus-wide innovation	
	Multiple Zoning Types / Landscape Axis
(1. Further imposing landscape district (景観地区) upon the current landscape axis (景観軸) plan	
(2. For Site B, interacting with the design guidelines (introducing in the next slide) to create an integral landscape consist of built environment and waterfront ameanity	

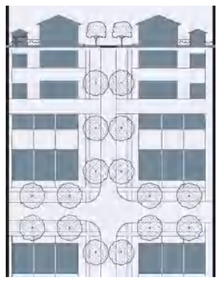
06-2 _ Design Control

Form-Based Codes (FBC) Built environment codes based on urban morphology instead of use	
Origin	Invented in the U.S as a strategy in contrast of the single-use Euclidean zoning in the country. It emphasized in mixed-use, quality design, and friendly environment related to LEED (Garde et al., 2015)
Time	1980s – *. Quite novel and not common even in the U.S yet
Innovator	Andres Duany *.American Architect and one of the founders of the Congress of New Urbanism (CNU)
Uniqueness	(1. The idea concerns sustainable goals
	(2. Form control everywhere. Like a citywide district plan
	(3. Could be tailored to fit actual design practice
Implementation	(1. No need to propose completely new policies, existing institutions like district plan and design guideline system
	(2. Working with designers for local context and need
	(3. Tailoring to the site-wide design (not yet done here)

Urban Zone



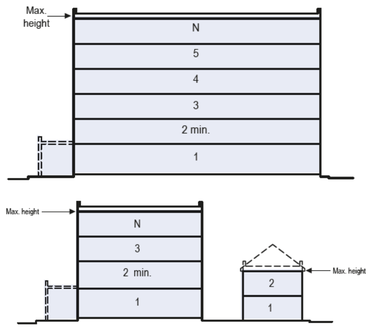
Campus Zone



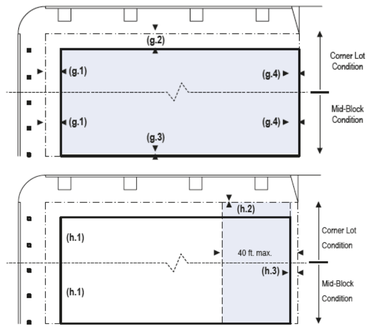
Content (*. only a part)

	Urban Zone	Campus Zone
Highway	not permitted	not permitted
Boulevard	permitted	permitted
Avenue	permitted	permitted
Commercial Street	permitted	permitted
Drive	permitted	permitted
Street	permitted	permitted
Road	permitted	not permitted
Rear Lane	permitted	permitted
Rear Alley	required	required
Path	permitted	permitted
Passage	Permitted	permitted
Bicycle Trail	not permitted	permitted
Bicycle Lane	permitted	permitted
Bicycle Route	permitted	permitted
CIVIC SPACES	* permitted with Open Spaces	
Park	by Warrant	by Warrant
Green	permitted	permitted
Square	permitted	permitted
Plaza	permitted	not permitted
Playground	permitted	permitted
BUILDING DISPOSITION		
Edgeyard	permitted	permitted
Sideyard	permitted	permitted
Rearyard	permitted	permitted
Courtyard	permitted	not permitted
BUILDING FUNCTION		
Residential	open use	limited use
Lodging	open use	limited use
Office	open use	limited use
Retail	open use	limited use

Sample Building Rules



Sample Setback Rules



*. Sample illustrations are derived from from SmartCode 9.2 (Duany et al., 2013)

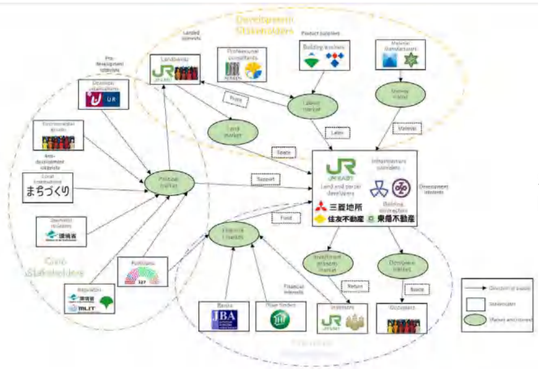
06-3 _ Affordable Housing

Condition		
	General	(1. Inequality is expanding and homeless population are sensible (MHLW, 2019)
		(2. Japan has been focusing on homeownership instead of affordable rent
		(3. Japan Housing Finance Agency (JHF) supports private developers (Kobayashi, 2016)
On site	**Proposal**	
(1. Minato Ward faces challenges from the most expensive land price in Tokyo (MLIT, 2020)	Tansferrance of Mandatory Affordable/Inclusionary Housing (MAH/MIH) Background A private sector-led policy for citywide affordability. Commonly applied in large U.S cities like New York, Seattle, Washington D.C, and San Francisco Reason (1. Flexible affordable unit provision compared with public housing (2. Confronting spatial exclusion that public housing often triggers (3. Tokyo also relies on a private sector-led housing market Method Affordable unit provision exchanges development right Criteria (1. Income criterion (2. Household size (3. Environmental standard Contextualization to Tokyo (1. Side-wide instead of citywide (2. Only apply to demanded places	
(2. Redevelopment brings risks for further polarization (Fainstein and Fainstein, 1986)		
(3. There is a diverse population distribution on the site, instead of being mostly accommodated by wealthy population (SBJ, 2015)		

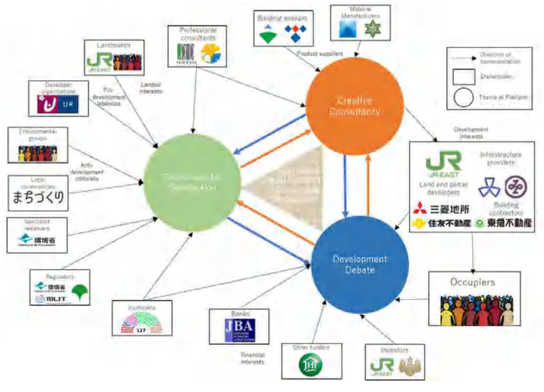
06-4 _ Citizen Participation

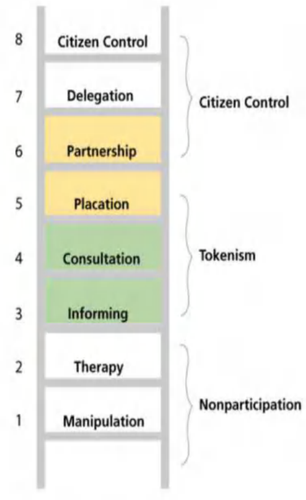
Digital Platform for Citizen Participation	
Idea	Using smart technology to establish a real time network for stakeholders to participate in and communicate with the process of smart city creation
Focus	Advancement in Environment, creativity and development
Technology	Smart phone app and online forum
Dissemination	Encouraged and promoted by local advertisement (Like Cocoa for Covid-alert and prevention)

Stakeholder Network



Digital Platform





Arnstein's Ladder (1969)
Degrees of Citizen Participation

An opportunity to climb up the ladder of citizen participation.

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07 Simulation and Redevelopment Plan

07-1 _ Sites to Be Redeveloped

Taken the need of the entire area into account, we identified five sites with a green corridor as focused of redevelopment practice. The five sites are as below:

A: Meat market zone: Buildings are in high density but decaying physically. Redevelopment is in demand now.
B: Marine University zone: A rather low-density site with a campus inside. Innovative improvement is key.
C: Warehouse & factories zone: A lineal site with typical facilities to undergo redevelopment.
D: Water treatment facility zone: The facility and some green spaces are inside. A balanced strategy is needed.
E: Vacant zone: A small but valuable vacant site for proposing some relatively freer redevelopment.

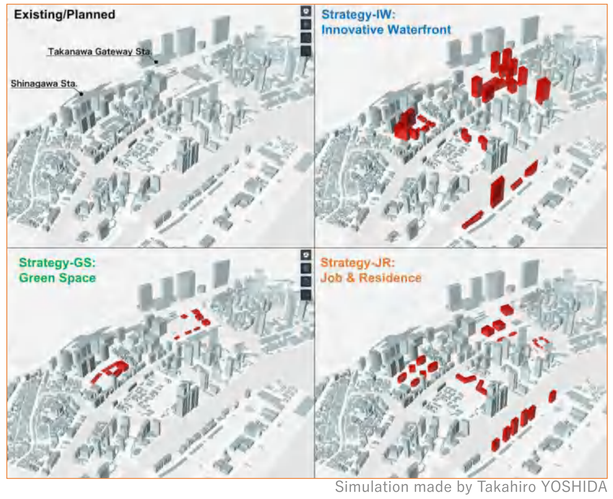
07-2 _ Strategies Options

As shown on the right, in the early stage of our studio work, our members brainstormed and came out with three characteristic strategies:

(1. Innovative Waterfront
A strategy focused on providing intense and tall office space in Shinagawa. The economic effect was rather prioritized.

(2. Green Space
An almost contrary strategy that aimed to provide maximum green spaces. Few office and commercial spaces were proposed near the transport access taking account of the economic aspect.

(3. Job& Residence
A balanced strategy that visioned mixed land use with mid-rise buildings in considerations of our multiple aims.



Simulation made by Takahiro YOSHIDA

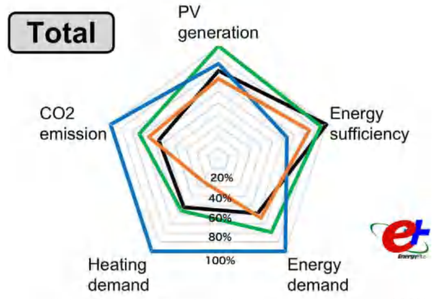
07-3 _ Energy Simulation Method & Result

To make a proposal, we were supported by Dr. Takahiro Yoshida at the National Institute for Environmental Studies (NIES), Japan, to run an energy simulation for measuring the environmental performance of these options. The procedure was:

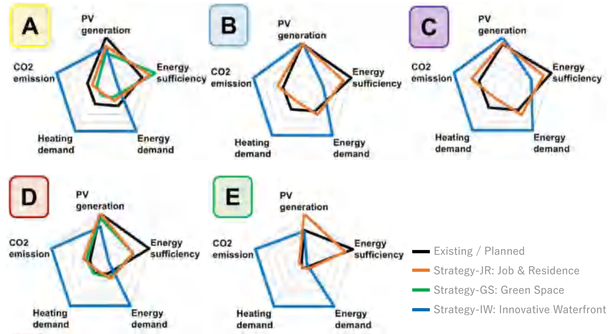
(1. Inputting data of building shapes, building uses per floor, and materials
(2. Outputting results of energy consumption (electricity and heating) from building sectors, generation of PV panels installed in all rooftops, as well as CO2 emission from the same sectors
(3. The Results were assembled in not only the entire area, but also each development site.

Afterward, Dr. Yoshida further helped us by commenting on the general performances of each strategy. As he indicated

(1.Strategy-GS with low-wide buildings appeared to be an eco-effective option.
(2. Strategy-IW with high-rise office buildings needed to spend 10-20% more demands than others.
(3. Strategy-JR with mid-rise buildings in mixed-use is quite similar as the existing/planned scenario.

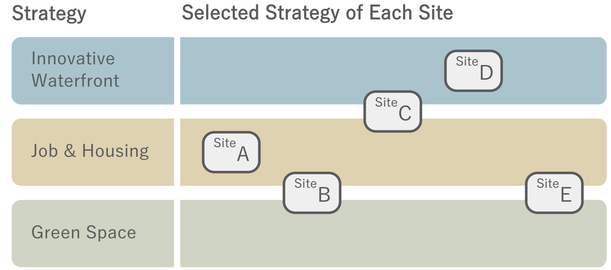


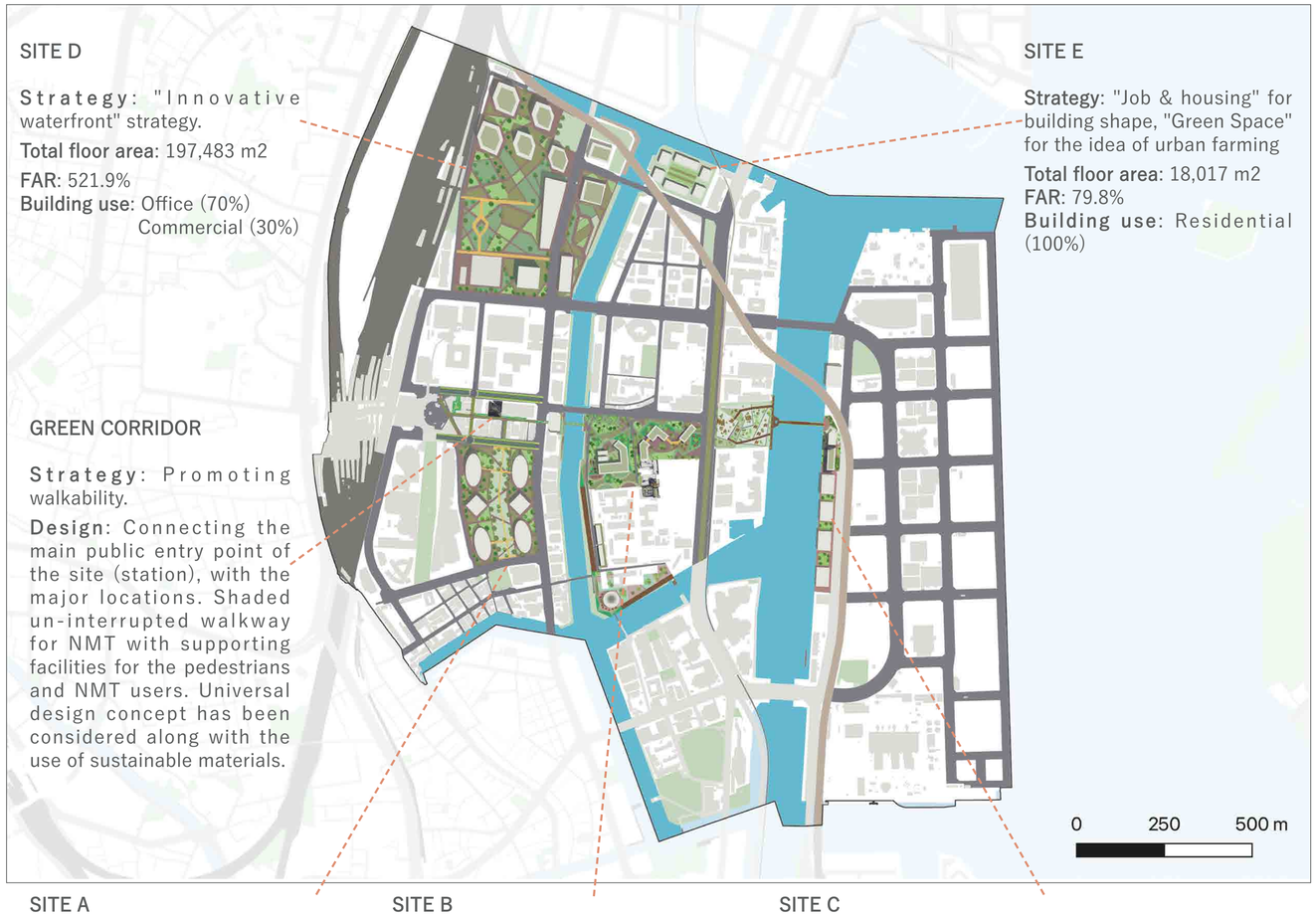
Note: The highest value of each cateory is set at 100%.
Simulation made by Takahiro YOSHIDA



07-4 _ Selected Urban Form

Considering the simulation result(quantitative), the final urban form plan was proposed by mixing the three strategies with additional concerns in economy, social equity, and resilience (qualitative).
The areawide plan map is presented below. Some building forms designed in the three strategies were modified. From the next page, we will explain our (re)development proposal in detail.
The results from the simulations of each site, considering the five components, were compared and analyzed to evaluate the better overall impact of the forms from different strategies. The suitable result for each of the site was selected for the development of future proposal in each site.





SITE A
Strategy: "Job & Residence" strategy.
Total floor area: 197,483 m2
FAR: 303.2%
Building use: Office (47%)
Commercial (17%)
Residential (36%)

SITE B
Strategy: "Job & Residence" strategy.
Total floor area: 78,784 m2
FAR: 58.7%
Building use: educational use (100%), including marine museum and its attached facilities

SITE C
Strategy: "Job & Residence" strategy on the base, lowering the building hight ("Green Space" strategy) and changing building use to be more office/commercial oriented.
Total floor area: 146,883 m2
FAR: 473.1%
Building use: Office (55%)
Commercial (27%)
Residential (14%)

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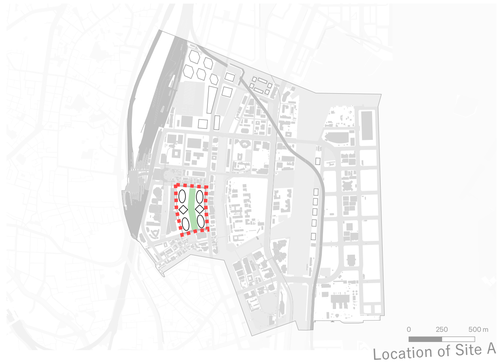
08 Details of Each Redevelopment Plan-1

Site A _ Job and Housing Proximity

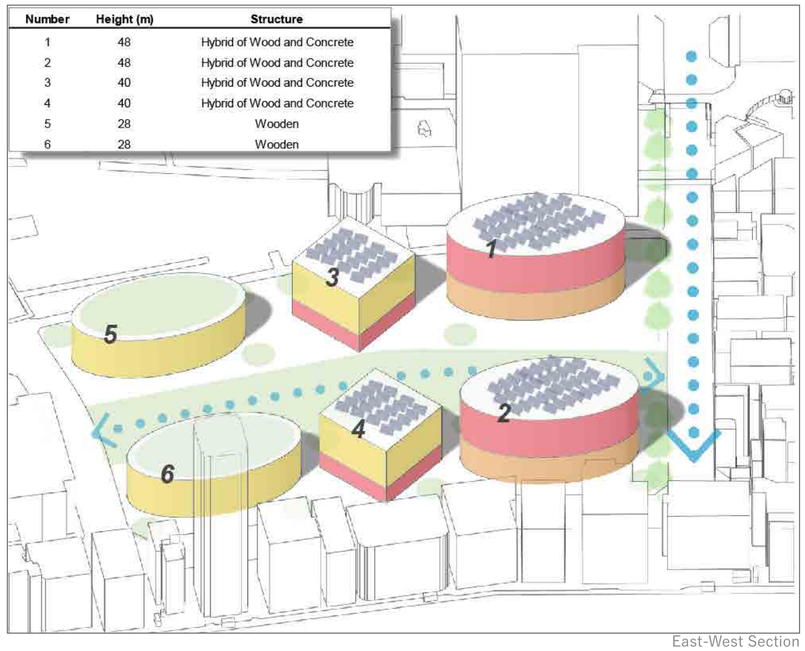


Location of Site A

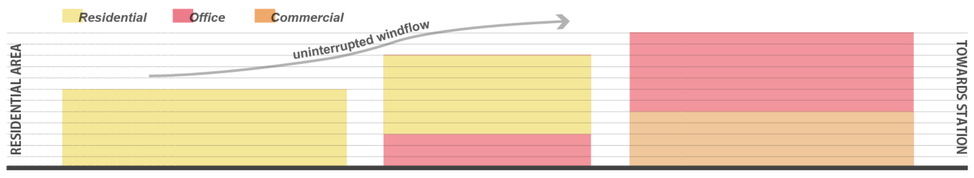
Concept

The site are at right angles to a green corridor. It supplies calm open spaces in contrast with the vibrant axes.
The Heights of the buildings get lower to the South for uninterrupted windflow in the overall site. Green mobilities get through the space between buildings and coexist with pedestrians. Also rich open spaces are mix-used by people from office, shop and residence.

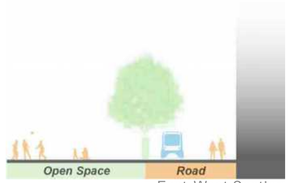
Number	Height (m)	Structure
1	48	Hybrid of Wood and Concrete
2	48	Hybrid of Wood and Concrete
3	40	Hybrid of Wood and Concrete
4	40	Hybrid of Wood and Concrete
5	28	Wooden
6	28	Wooden



East-West Section

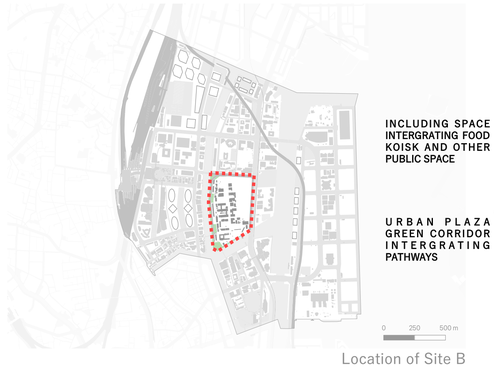


North-South Section



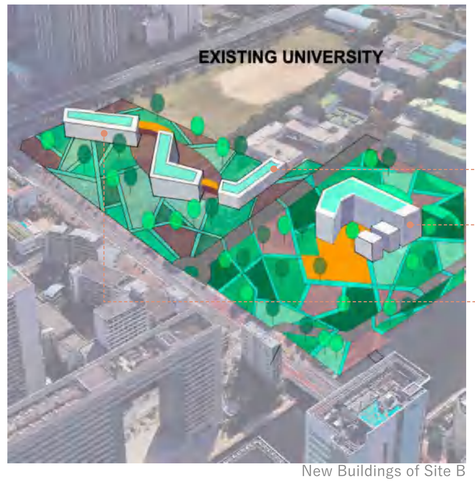
East-West Section

Site B _ University Area



Location of Site B

Master Plan of Site B

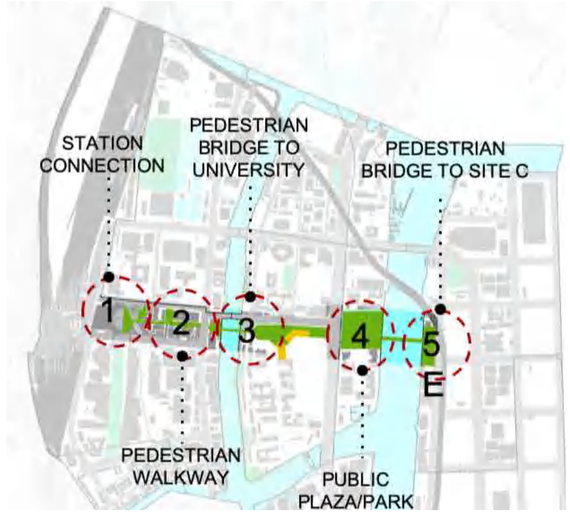


New Buildings of Site B

Stategy: To incorporate green corridor enhancing the significance of the site, while minimum interference in the core area of the University.

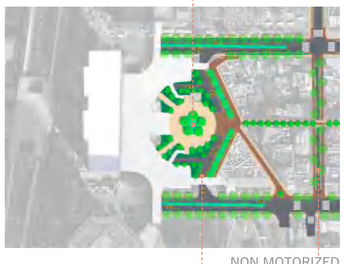
SITE B, the existing University which includes Museum building with waterfront in two peripheral edge. The area has been utilized to improve the surrounding functionality, with minimum intervention within the site area to avoid major alterations in the University core zone. The public interference has been restricted to the peripheral waterfront zone and the entrance area limiting the entry till the Museum. Public amenities has been provided to cater the requirements for Public zone creation.

Site _ Green Corridor



Section 1

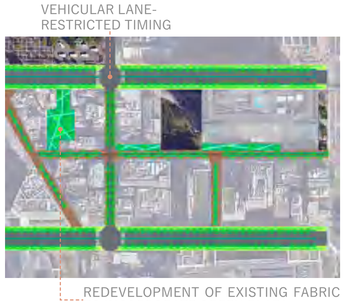
UNINTERRUPTED PEDESTRIAN WALKWAY CONNECTING STATION



- Connecting the upper level exit plaza with the ground floor pedestrian plaza.
- Separate entry exit for parking.

Section 2

CREATING URBAN SPACE ALONG THE CORRIDOR TO INCORPORATE INFORMAL PUBLIC SPACE



- Inclusion of green space.
- Dedicated continuous cycle track.
- Separate pedestrian walkway.

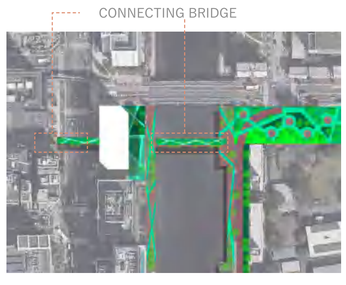
Section 3

(Connecting station with waterfront)
Universal Design strategy with shaded walkway and sustainable materials.


UNINTERRUPTED CONNECTING PEDESTRIAN FOOT-OVER BRIDGE

Section 3

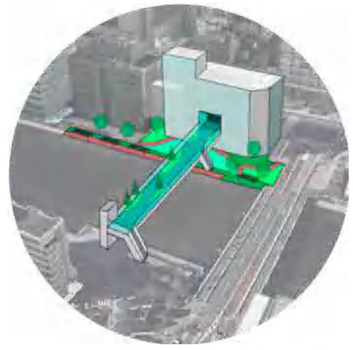
INCLUDING GREEN OPEN SPACE AND CORRIDOR IN EXISTING UNIVERSITY SITE



Redesigning building to incorporate pedestrian bridge connecting green corridor with University.

Section 3

(Connecting University)
Pedestrian bridge connecting the university site integrating green corridor


UNINTERRUPTED CONNECTING PEDESTRIAN FOOT-OVER BRIDGE

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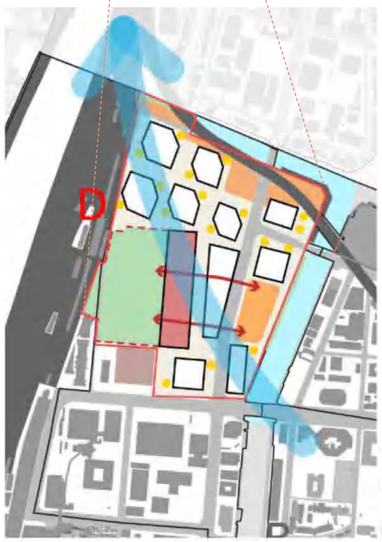
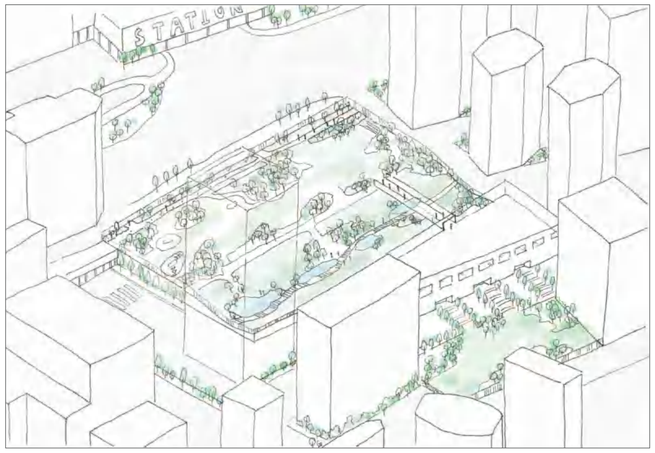
09 Details of Each Redevelopment Plan-2

Site D

Location of Site D





Strategy-IW: which develops high-rise office buildings needs to spend 10-20% more demands than others.
Site D is considered to be a compact and business oriented area of redevelopment, which mainly develops high-rise buildings of office (70%) and commercial (30%) with the method of innovative waterfront since it is near the new station and surrounded by a river.

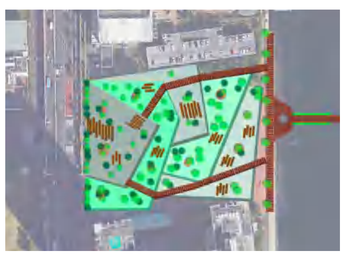
Building ID	N of floors	Floor Area(㎡)	Height	Material
1	30	147,970	117	Hybrid of Wood and Concrete
2	25	82,628	93.9	Hybrid of Wood and Concrete
3	30	146,000	120	Hybrid of Wood and Concrete
4	20	734.00	70	Hybrid of Wood and Concrete
5	28	99,684	95	Hybrid of Wood and Concrete
6	30	156,200	120	Hybrid of Wood and Concrete
7	2	20,172	6	Cement Bonded Wood
8	10	9,450	35	Cement Bonded Wood
9	30	92,628	120	Hybrid of Wood and Concrete
10	20	755.00	70	Hybrid of Wood and Concrete
11	25	110,909	80	Hybrid of Wood and Concrete

Site _ Green Corridor

Section 4

REDEVELOPMENT OF EXISTING PARK INTO A SHADED URBAN OPEN SPACE

STEPPED ENTRY PLAZA SHADED RAMP



- Redesigning existing public park into an urban plaza with steps leading to the waterfront.
- Provision of ramp to encourage universal design.

Section 5

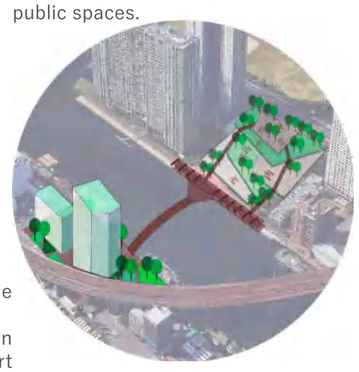
RE-DEVELOPMENT OF SITE TO ENHANCE THE SURROUNDING

CONNECTING WOODEN PEDESTRIAN BRIDGE

- Including commercial, MLCP and office space as a part of mixed use building.
- Creating urban space to generate green barrier from noise reduction of the port area as well as inclusion of public space.

Section 4 (Park Details)

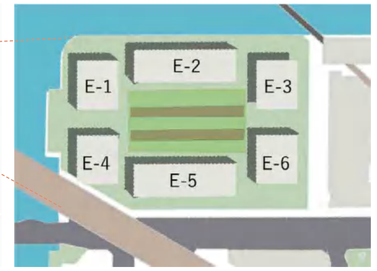
- Use of wood for shading the area along with natural vegetation.
- Porous paving material for the hardscaping
- Including space integrating food kiosk and other public spaces.



- Urban plaza green corridor integrating pathways.

Site E

Location of Site E



Site E			building stories by use		
ID	area per floor	building stories	Office	Residence	Commercial
E-1	1000.96	3	0	3	0
E-2	1000.96	3	0	3	0
E-3	1000.96	3	0	3	0
E-4	1000.96	3	0	3	0
E-5	1000.96	3	0	3	0
E-6	1000.96	3	0	3	0

Detail Information

Design Concept

The site, located in the residential island, will be dedicated for residence of low rise buildings with the urban farm, taking into consideration the lack of green space in the island.


Urban Agriculture in the Furrows

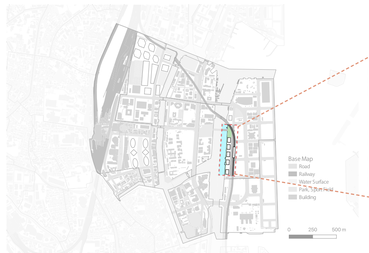
Affordable Housing

The housing provided here include certain amount of affordable housings. They will be mixed with the housings of normal fees, not to foster the social devide.

Urban Farming

The site will be the pilot area of urban farming. The treated water from the center is brought to the site and used for watering. The food produced here by neighborhood residents will be consumed locally, which will contribute to the improvement of social equity. Also, farming has a health-promoting effect.

Site C



Location of Site C

Site C			building stories by use			
ID	area per floor	building stories	Office	Residence	Commercial	Parking
C-1	1335.30053	15	10	0	5	
C-2	1335.30053	20	0	0	20	
C-3	1335.30053	15	5	0	5	5
C-4	1335.30053	25	25	0	0	
C-5	1335.30053	20	20	0	0	
C-6	1335.30053	15	0	15	0	

Detail Information

Slow Mobility Street

The site, as an endpoint of Green Corridor, also promotes the segregation of non-motorised and motorised transportation (NMT & MT).

First, the pedestrian bridge will be created on the extension of the Green Corridor and will improve the accessibility of the entire east island, which is now a car oriented area. Connecting to this bridge, the site will have a waterfront pathway deserved for NMT, which makes the site more walkable and attractive.

Creation of A New Train Station

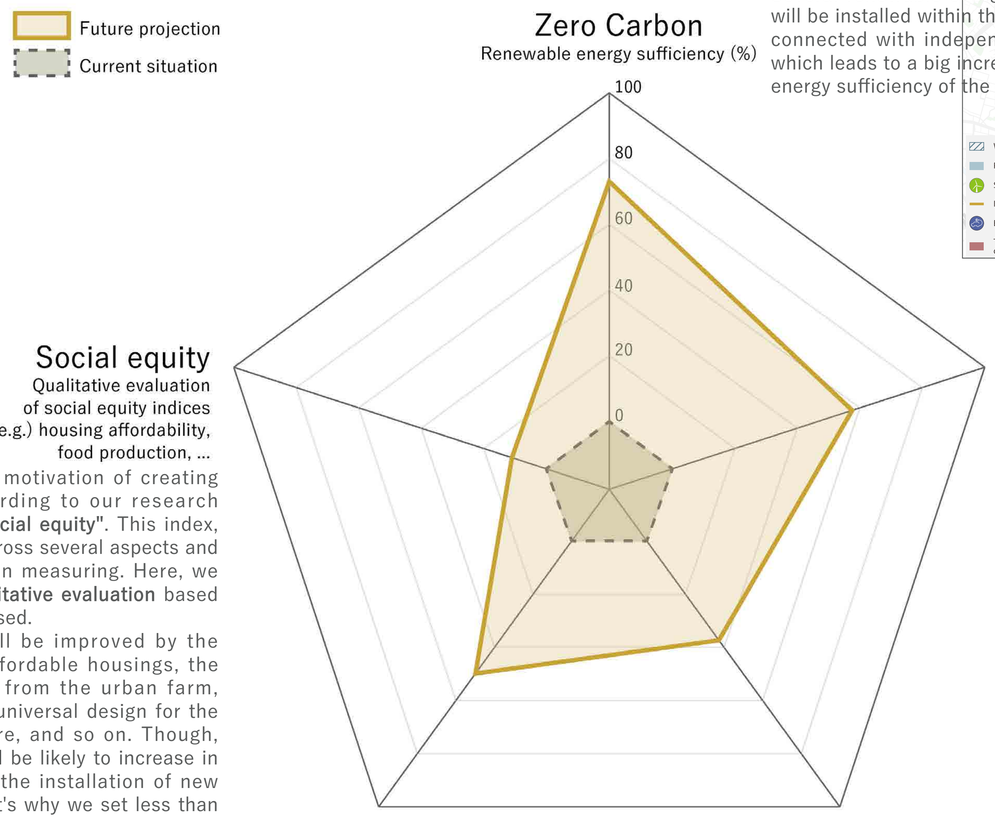
A new train line connecting central Tokyo to Haneda airport is now being prepared for construction. Using this opportunity that the line will pass through the site (the brown land shown in left map), this site will get a new means of public transportation. This accessibility improvement will be one of the big driver for the site to be redeveloped as an area of mixed land use, allowing residents of the site to have a benefit from the proximity of offices and housings.

University of Tokyo (Jinyu CHEN, Kanta SAYUDA, Kazuki ISHII, Leonido Zairion DIMAANO, Nabamita Nath, Ryota OKAMOTO, Shuailing CUI, Tomoki HOSAKA, Yudi LIU)

10 Impact evaluation & Limitation, Conclusion

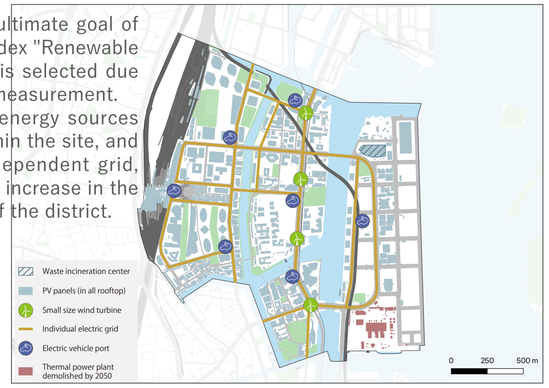
10-1 _ Impact Evaluation

In order to evaluate the effect of our proposal, we conducted an evaluation based on the five indices below, which represent our initial framework of development.



Zero Carbon

Zero carbon is the ultimate goal of our proposal. The index "Renewable energy sufficiency" is selected due to the simplicity in measurement. Several renewable energy sources will be installed within the site, and connected with independent grid, which leads to a big increase in the energy sufficiency of the district.



Social equity

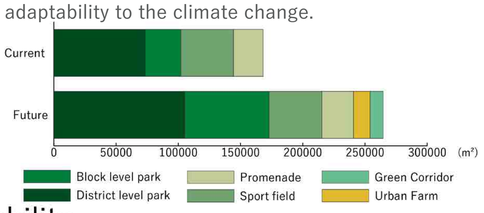
Qualitative evaluation of social equity indices
e.g.) housing affordability, food production, ...

One of the main motivation of creating smart city, according to our research review, is the **"Social equity"**. This index, however, come across several aspects and have difficulties in measuring. Here, we conducted a **qualitative evaluation** based on what we proposed.
Social equity will be improved by the installation of affordable housings, the food production from the urban farm, consideration of universal design for the new infrastructure, and so on. Though, the land value will be likely to increase in total because of the installation of new technologies. That's why we set less than 20% of improvement.

Resilience

Green space installation and its quality improvement (% Gain of green area)

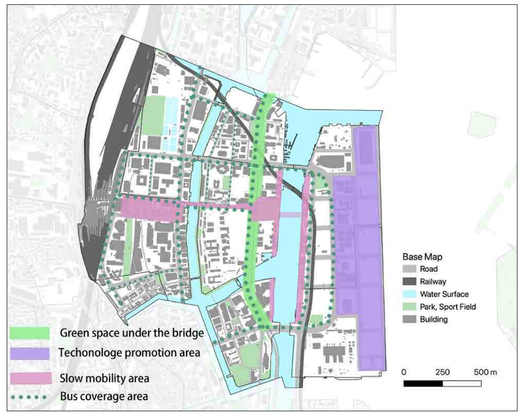
One another main theme of smart city is the **"Resilience"**. Here, we used the gain of green space area as a quantitative index, as well as its quality improvement by qualitative evaluation.
The green space will increase by **1.5 times**, and its function will become **diverse**. Moreover, green infrastructure such as **bioswales** will reinforce the adaptability to the climate change.



Mobility

Accessibility to public transport, pedestrian comfortability (Qualitative evaluation)

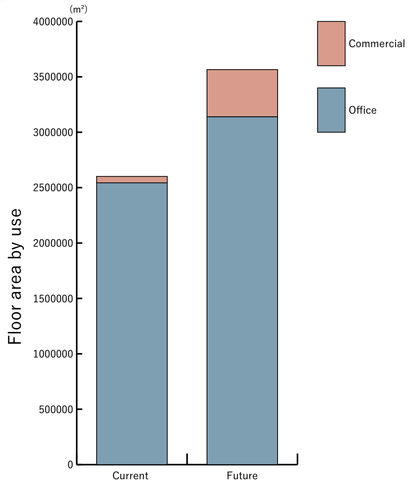
"Mobility" index, in general, refers to several targets - social equity, zero carbon, quality of life, ...-. In this studio, we focus on two aspects, public transport and pedestrian comfortability, based on our proposal.
Accessibility to the public transport and its regularity will be improved by the utilization of autonomous vehicles connected with sensors and the redesign of road compositions. Moreover, the district will become more pedestrian/ cyclist-friendly thanks to the creation of "slow mobility area" including Green corridors.
These new infrastructures will make a big improvement regarding the index.



Economic Sustainability

Office & commercial floor area
(% Gain from present condition)

Outside the smart city framework, **"economic sustainability"** is one of the fundamental goal for a city. Here, we apply the office & commercial floor area gained by the development as an index.
Thanks to the 5 redevelopment sites, especially the **station front site**, the office floor increased by almost 600,000 m2, and commercial floor by over 300,000 m2.
These developments will support the future growth of Shinagawa, which is enhanced by the open of new maglev Shinkansen.



10-2 _ Limitation

Focus	Limitations	Recommendations
Smart Infrastructure	- Actual impact of green spaces to **carbon absorption** and **heat island effect** was not calculated	- Add in the Simulation - Compare cost benefit of Green Roofs vs PV Roofs
Smart Mobility	- Energy Requirements and Carbon Emissions of Proposed New Mobility System is not yet calculated	- Add in the Simulation
Smart Buildings	- Energy Projections for High Rise Buildings are not Carbon Neutral - development potential might be limited	- Study Cost-Benefits Further
Smart Policy	- A specific Green Building Rating System cannot be proposed - A balance between 3E in sustainability is difficult	- Comparative study on different GBRS (CASBEE and LEED) - Integration of policies in Japanese planning system - Offsets and credits, off-site projects
Redevelopment		- The redevelopment potential of the thermal plant
Evaluation	- Quantitatively evaluating social equity is difficult	

10-3 _ Conclusion

We believe that Shinagawa East will be an important focus area of development in Tokyo. Shinagawa East is full potential given site's context but the direction of development must be carefully planned to maintain sustainability.

In this research, we have presented various strategies and technologies that can be used to achieve this goal. This covers the different layers of Urban Systems Design namely: Buildings, Mobility, Infrastructure, and Policy. Ultimately, we presented a masterplan that can give direction for the development of the area by 2040.

With these, we believe that Shinagawa East can truly become more than just a New Gateway for Tokyo's future transit lines. Shinagawa East can be frontier for resilient, zero carbon, and socially equitable innovations that would represent the future of Urban Development in Japan.

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