

Water Pollution Issue in Midtown Manhattan

Chen Xian 4778456

Abstract

The worldwide crisis in environmental resources, such as deteriorating water resource is intensifying. In Manhattan island, a metropolitan area, the risk is also extremely remarkable. According to the United Nations sustainable development goals, at the current time, more than 2 billion people across the world are living under the crisis of insufficient freshwater resources, due to poor economics or inadequate infrastructures. Likewise, In recent years, the increasing water pollution, mainly due to climate change, aging infrastructures and the regional expansion, have had a significant negative impact on Manhattanites' habitat and health, which are embodied in the growth pollution level of natural waterways, such as East River and Hudson River.

Based on the context, the main objective of this thesis is to research the system of local water systems and the resource crises. Several main questions raised during the study process: What are the causes of the regional resource crisis? What's the ideological expression of the water infrastructures to Manhattanites? How to ease the climate-induced crisis, or even to end up the emergency by architectural interventions? Within these questions in mind, the main research question is formed: How can the architecture, concerning climatic crisis, cultural loss, evoke a more livable and healthier community for NE Midtown's future development? These questions will be answered on the following chapters.

Keywords

water pollution, human health, sustainability, awareness, Midtown Manhattan



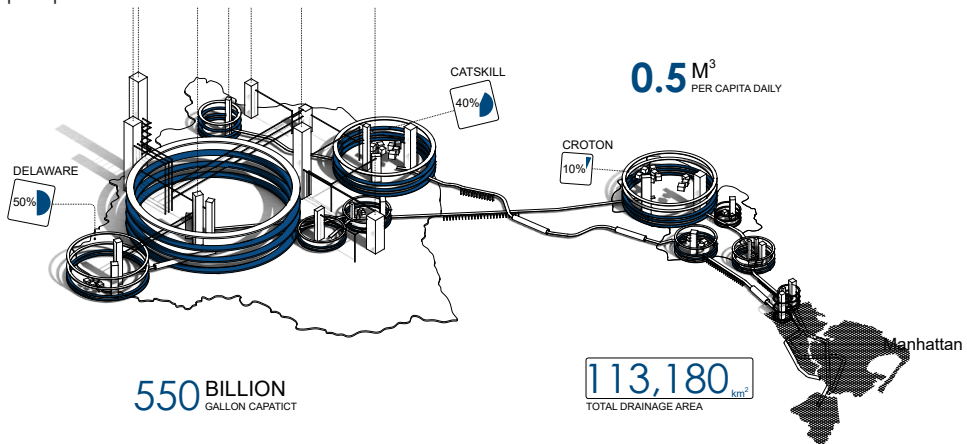
Chapter 1: Two main water infrastructures in New York City

Nowadays, metropolis, including New York City, is maintained by a large, complex network of infrastructures which are beyond the observation of human beings. As the lack of any observable feedback loops, we are blindly heading towards a planetary resource crisis where the global demand for resources will soon exceed supplies. Concerning about the infrastructures is an essential condition for dealing with resource crises.

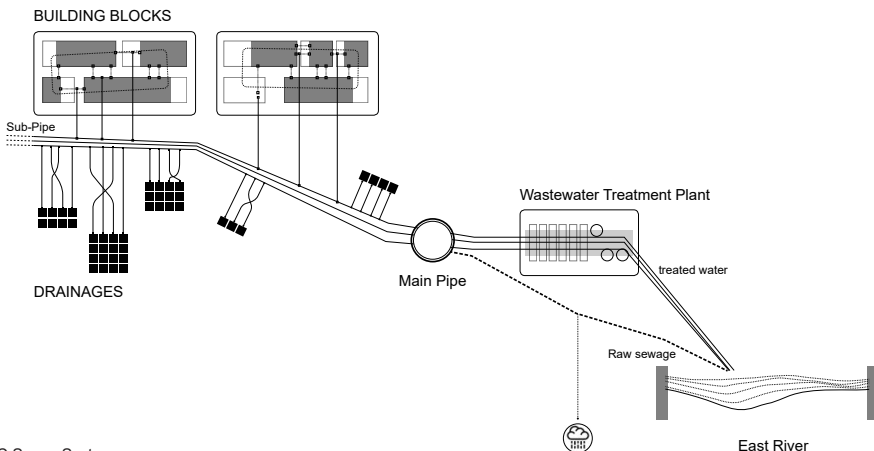
One of the most extraordinary infrastructures in NYC is the water supply system, which is also one of the most extensive municipal water systems in the world. Since the rapid growth of population over the last 200 years, the city has developed its local water source into a network of watersheds many miles out of the urban boundary to meet the need. The network currently is comprised of 19 reservoirs within the state's national parks, which cause a physical disconnection between the rural source and urban citizens. The invisible underground system provides one billion gallons of safe drinking water to the city's 8.5 million residents per day through over 6800 miles of pipeline before reaching the consumers. This largely autonomous mechanism creates a huge socio-physical divide between rural water supplies and the urban consumer. In spite of the enormous scale and physicality of the process, and the capacity of water continually pulsing through the system, the citizens' experience of the network is decreased to some minor elements within the urban context. These elements, from the water tanks furnishing the rooftops to water fountains in the street, diminish the importance of the network, as well as the resource it channels, within the urban perception.

Another important water infrastructure is an elaborate network of sewers. It consists of over 6600 miles of mains and pipes. Some of the pipes still in use were buried as far back as 1853. 70 percent of the city sewers carry storm and rain runoff, as well as sewage from sinks and toilets. These lines are referred to as a CSO (combined sewer systems). The complex system quietly does a job that residences simply can't live without, but tens of millions of gallons flow through the system every hour (1.3 billion gallons per day). The system works well during the dry weather condition, it will deliver the wastewater to a NYC wastewater treatment plant. However, when it comes to the wet condition, like rainstorms that projected to be more frequent, the runoff oversteps the capacity of pipes will be directly dumped into the waterways that surround the city. This leads to the East River and surrounding waterways being too polluted for recreational purposes. As a response to the deteriorating water quality, the government is continuing to invest in maintaining and improving the infrastructure. Although many harmful discharges into the waterbodies have ceased, contributing to the gradual improvement of the water quality, many water quality problems remain, such as the detachment of the East River with east Manhattan island.

The residents of NYC are at the mercy of its complex water supply infrastructure, however, any disruption, or disastrous failure will not be felt by the public until it is too late to react because of the invisible networks. In other words, the disconnection of the source can lead to the weak awareness. On the other side, the vast combined sewer system is getting overburdened with the heavy precipitations. The backup of sewage channeled by the system finally into the nearby waterways has been a significant issue in the city.



7.1.1 Drawing-NYC Water Supply Network



7.1.2 Drawing-NYC Sewer System

Chapter 2: Water pollution challenges in Manhattan

The regional debate on clean, accessible water never stops for many livings in midtown Manhattan. Currently, the major crucial factors affecting the water quality are global warming, the aging sewer system, the growing immigrant population, and the weakening collective protection awareness. A study of these factors is necessary when conducting a specific research on the local water quality issue.

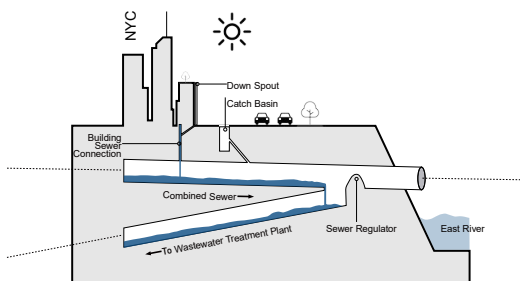
The aging sewer system, in NYC, is the most considerable factor that contributes to the degrading water quality. In reality, more than 70 percent of Manhattan area use a combined sewer system, which is over 100-year-old. It has a fairly small capacity compared to the predicted increasing volume of sewage. When it rains heavily, stormwater drives the sewer system to reach the maximum capacity, releasing the untreated sewage into its waterways. The event is called CSO (Combined Sewer Overflows). There are more than 450 outfalls in the city, including dozens around Manhattan island and 9 at the coastline of NE-Midtown. Averagely, CSO events occur about once per week and the average weekly polluted discharge is about 19000 m³ citywide. The figure is also projected to increase as both water consumption and precipitation grow. The quality of waterways will be further adversely deteriorated.

The global warming is the second most important challenge to the issue. According to the New York City Panel on Climate Change(NPCC) 2019 Report, by the 2050s, the city can expect to witness an increased average temperatures (2.3 to 3.2 C)increased average precipitation (4 to 9 percent). In this instance, the rising temperature resulting in more frequent and intense precipitation will definitely put more burdens on the city sewer system. During the

rainy days, the excessive amount of stormwater and wastewater flow into East River directly without treatment, causing the serious pollution. Beyond precipitation growth, the city is keeping growing in terms of population, which will reach 9 million by 2040, an increase of nearly 8 million people. Such a growth means more sewage produced will strain the city's aging infrastructures and test the reliability of municipal engineering, including the wastewater delivery system. It requires enormous investments to maintain the normal work of the sewer system. As a result of these changes, the livability of environment, the durability of infrastructures and the sustainability of economy is going to decline, eventually the health of public who live and work here will be potentially impacted.

Nevertheless, the majority of the public have a poor perception of water resource crisis. Although they know water is crucial for life, they still trash it anyway and do not care about where is the sewage going and how it would be treated. They lack the accessibilities to gain the knowledge of the water issue. As a response to the fact, Manhattan is working on various ways to promote public sense of water conservation and protection, including several educational campaigns, e.g. +POOL Light art installation floating in East River and Water Tanks Project. The intention of these programs is to create art as social intervention, to encourage awe and joy, to educate, and to alter attitudes and habits among those who engage in the projects, ultimately evoking meaningful and long-lasting change.

To conclude, there are mainly four factors that contribute to water resources deterioration in Manhattan area. The aging sewer system is the most crucial factor which will be influenced by the other essentials. The metropolis needs to find solutions to mitigate the severe challenges in an appropriate way.

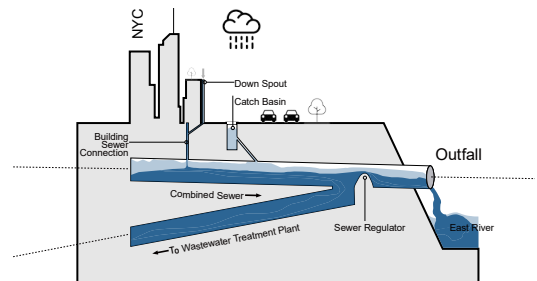


2. Dry weather

storm sewers
sanitary sewers

Dry Weather

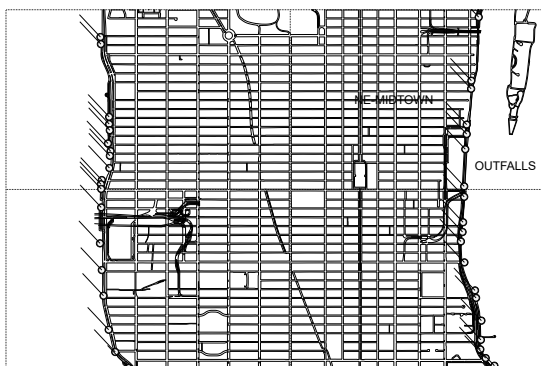
7.1.3 Drawing-Combined Sewer System



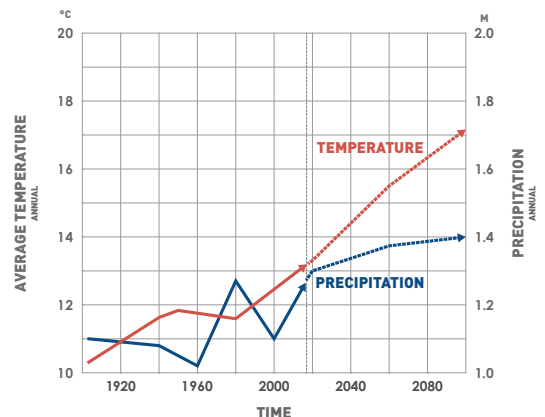
3. Wet weather

storm sewers
sanitary sewers

Wet Weather



7.1.4 Graph-CSO Location Mapping (Mitown)



7.1.5 Graph-Temperature Rising

Chapter 3: Water infrastructures: the materialization of ideology of Manhattan

The city's water supply engineering is one of the most ambitious projects in its history. Manhattanites were proud of their constructions, which evoked power, sophistication and security. Although some of them have been transformed, a few spaces in Manhattan are still recalling the memory of the past romantic landscapes.

The York Hill Receiving reservoir. It was located between 79th and 86th streets and between 6th and 7th Avenues. The reservoir represented a change in design philosophy, where urban infrastructure would be integrated into park landscaping, and enjoyed for scenic views and recreation. Over the years, it was gradually surrounded by the city's central park and was partly filled up and torn down to become the park's Great Lawn. The remaining reservoir has been renamed for Jacqueline Kennedy Onassis, providing a recreational and jogging space for the nearby residents.

The glorious High Bridge. The oldest surviving bridge in Manhattan's uptown area, with its adjoining smaller reservoir and water tower, serving the demands of the higher elevations in the urban area. Although much of it has been altered, for example, the high bridge itself had turned into a monumental attraction, the tower remains one of the defining landmarks of the Croton-era waterworks and the smaller reservoir currently serves as a community swimming pool.

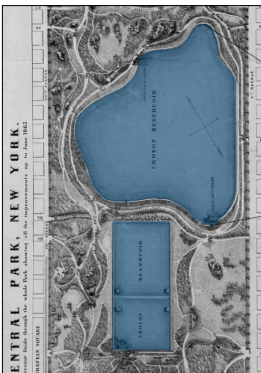
North River Wastewater Treatment Plant. It is on the west side of upper Manhattan, between 137th street and 145th street, extending itself out into the Hudson River. The park has three swimming pools, including one of Olympic dimensions. There is a covered skating rink, for roller skating in the summer and ice skating in the winter. There are several sports fields and basketball courts. It also has an 800-seat theater, an athletic center, and a restaurant with views up the Hudson River valley past the George Washington Bridge. The

surprising thing is that the park is really a 'green roof' on the top of a wastewater treatment plant.

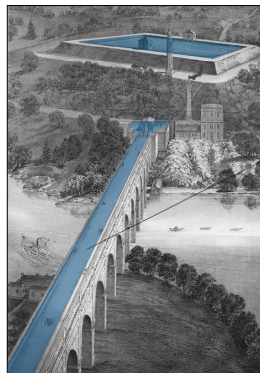
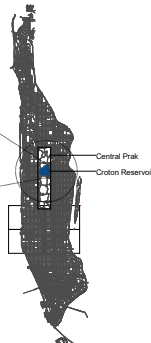
In addition to these spectacular water supply and treatment infrastructures, bathing facilities in the city also has a long history. In the late 1800s, in order to promote the public health, the state legislature introduced a law mandating free bathing facilities for families in overcrowded residential area. At that time, bathhouses, the predecessor of the swimming pool, were initially used for cleaning and therapeutic purposes but years later shifted to more recreational uses. Together with bath houses, 'floating baths' was also popular along both the East and Hudson Rivers. These wooden baths were anchored near the waterfront and applied the river water for bathing. However, growing concerns about river pollution and the limited seasonal availability made these scenic pools short-lived.

In the 1900s, the need of more recreational facilities has been increasing, forcing the agencies to improve the water facilities, like grand bath houses and outdoor pool complexes equipped with advanced cleaning techniques were built. These pools functioned out of season as well, becoming venues for dancing, ice skating and various other activities. But swimming in the East or Hudson rivers hardly ever happened again. Since pollution ended natural bathing, nowadays, swimming in the natural splendor of the rivers has been left to intrepid individuals confronting the wishes of city authorities, and special events.

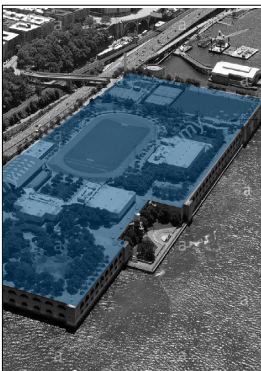
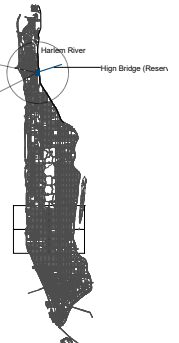
In conclusion, the monumental water infrastructures are telling the greatness of the city's achievements that help to shape its past. Most of them are still controlling and powering the inhabitation of the territory. In addition, New Yorkers' access to the natural waterways has a rich history but becomes less possible these days. Retuning the waterfront and getting access to the rivers are desirable within the public.



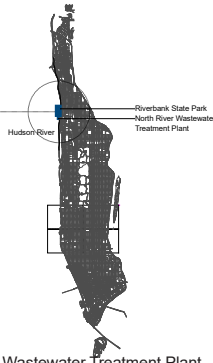
York Hill Receiving Reservoir



High Bridge (Monumental) Reservoir



Wastewater Treatment Plant



7.1.7 Pic-Bathhouses in East River

7.1.6 Graph-Water Infrastructures

Research questions

Based on the context, the main objective of the graduate thesis is to study the system of local water resource issues that influence the health of local community, and proposal of the specific solutions. It forms the main research question:

How can the (infrastructural) architecture address the water quality, through a socio-economical ecological way, to evoke a more livable and healthier community for NE Midtown's future development?

The main question will be answered through the several sub-questions:

-How to build up a sustainable system that evokes an efficient wastewater treatment building?

-How can the architecture encourage the environmental education and socio-cultural implication of the community?

-How can the architecture contribute to the diversity of open space?

The design proposal

The ambition of the future intervention in the urban area is to improve the community's livability and reconnect the public and waterways. It will involve several strategic themes: 1. An advanced wastewater purification infrastructure that will retreat the swage efficiently; 2. An agency that is responsible for conducting research and system management; 3. Several water-based scenarios that regenerate collective memories and bring the Manhattanites back to waterways. 4. Adjusting the way that people experience the space to encourage the environmental education.

Overall, the new architectural intervention questions the relationship between the public and their understanding of the neighborhood they reside upon. Also, it makes them to think that the natural resource that have shaped the city's past how will shape the future. It's not only a productive infrastructure, but also encourage research, education, communication and recreation.

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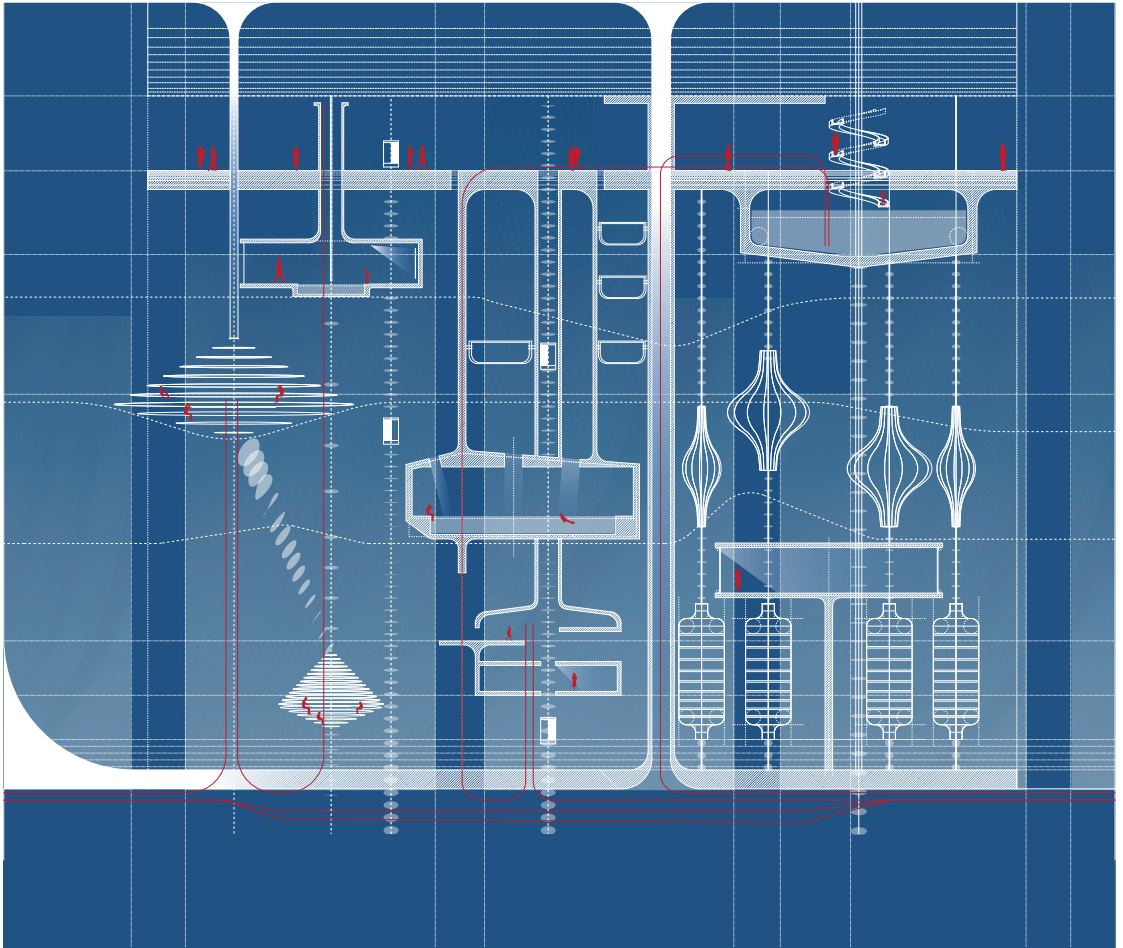
The Zone of Water Purification Design in NE-Midtown

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Introduction

The study site, NE-Midtown, is an extremely dense area fully occupied by the mixed commercial and residential buildings. It's tightly linked to the East River, which is one of the most important natural assets in the region. Over decades of development, the city has expanded radically and is projected to grow significantly. The process leads to the unpleasant fact that the natural waterway is badly polluted by the increasing swage discharge. The water pollution crisis has caused serious consequences, like the destruction of ecosystems, risks of human health and water culture detachment, finally, put threats on economic development. Factors, such as the aging sewer system, temperature rising and population growth, are mainly responsible for the noticeable crisis. These can only intensify the decline of water quality. The area is in desperate need of restoration in this term.

The project seeks to establish a new connection between the traditional wastewater purification infrastructure and public space, to allow a scheme that will not only eliminate the regional water pollution issue but allow a direct interaction between the people and their water resources. By adjusting the way that we experience space we have the potential to greatly increase awareness of the environmental impact, ultimately, as a response, we can begin to make the necessary adjustments to our society, and to the way that we live, in order to mitigate disaster.



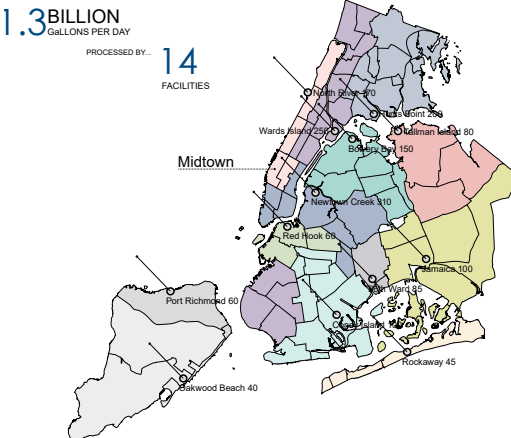
Conceptual Drawing of Design Proposal

1. Building Typology and Proposed Program

Based on the research of the issues raised in the previous stage, the proposed program will focus on the concept of rethinking the design of water infrastructure. Through architectural interventions, the design will explore the solutions that alleviate the water pollution of East River, and activate the waterfront public space, strengthen the connection between water and the public, and promote the healthy development of the community. The building type of new project defined as **Public Infrastructure**. It is comprised of three main functional requirements. Wastewater purification infrastructure, Bathing facilities, and Soft Management Agency.

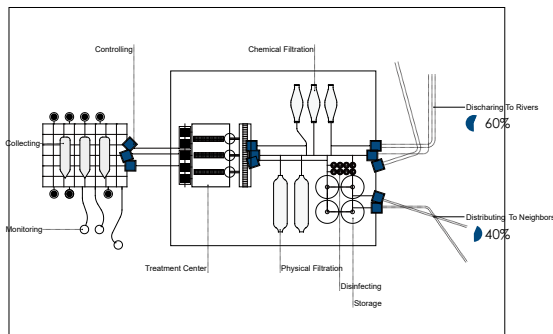
1.1 Wastewater Purification Infrastructure

NE-Midtown is facing crucial water pollution challenges. The major causes of this issue are the aging sewage system, climate change, and population expansion. As these factors are expected to continue to increase in the future, the regional drainage system will be subject to more serious pressure, and the amount of sewage discharged to the surrounding waterways through this system will also increase, further deteriorating the water quality. There are currently fourteen wastewater treatment plants in New York that are responsible for the daily collection of urban sewage¹, but due to the rapid rise in sewage volume, Manhattan needs to supplement more advanced water pollution treatment facilities to deal with the problem.²



capacity in millions of gallons per day

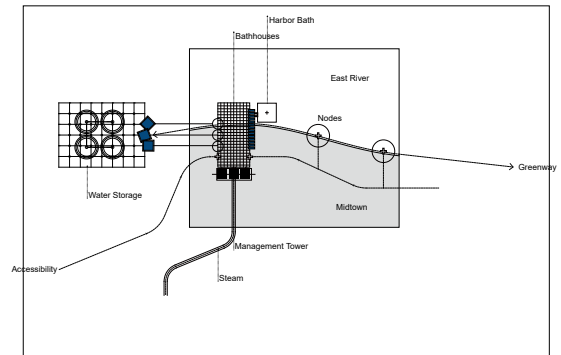
8.1.1 Own Drawing-NYC Wastewater Treatment Plants



8.1.2 Own Drawing- Wastewater Plant Work Scheme

1.2 Bathing Facilities

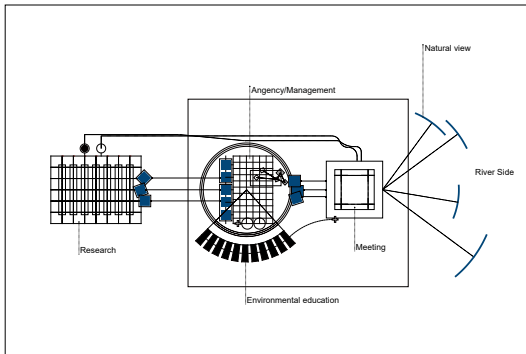
The water facilities, like bathhouses, once flourished in the East River and Hudson River. The rising level of water pollution gradually disconnects people from the waterways, preventing a dialogue with water which only enhances the culture of resource detachment. Recreational activities near the natural water sources are disappearing as a consequence of the closure of beaches. Although harbor bathing has a long history in the area, the citizens nowadays can only enjoy the recreations in some indoor facilities. In addition, in NE-Midtown, access to the waterfront is pretty limited, which directly cuts off the intimate connection between land and water. Therefore, the Department of Environmental Protection in NYC plans to create a continuous loop of open space around the perimeter of Manhattan. Closing one of the biggest gaps in the East River Greenway is the final step. The proposed esplanade involving three nodes is envisioned for biking, walking, seating, and planting, while the nodes each had a programmatic focus, such as environmental education, art exhibitions, gatherings, and active uses. Regarding this, the bathing facility³ is an ideal proposal. By reusing purified water sources and street thermal sources, providing indoor bathhouse and outdoor harbor bath, integrating the historic and public composition of the area.



8.1.3 Own Drawing- Waterfront Accessibility Scheme

1.3 Soft Management Agency

The NYC Department of Environment Protection (DEP) is an organization that responsible for protecting public health, critical quality of life issues, and the environment by supplying clean drinking water, collecting and treating wastewater and making water policy as well. Today, more and more community working groups are encouraged to engage in the decision-making process. It is proved by practices that strengthening the collaboration between the organization and the public can evoke public enthusiasm. Consequently, more projects can be accepted and appreciated by the public to a greater extent after completion. In order to improve a sustainable management⁴ of water resource, functional spaces, like meeting rooms, research centers, educational spaces are beneficial for promoting communication and cooperation between environmental organizations and community groups. Interactive educational spaces are efficient mediums to disseminate environmental protection knowledge to the public.



8.1.4 Own Drawing- Soft Management Scheme



8.1.6 Own Drawing- Collecting Outflows

2. Site Location Choice

Location Choice: The intersection of FDR Drive and E53rd St, NE-Midtown Waterfront (Pic)



8.1.5 Pic- The Proposed Site

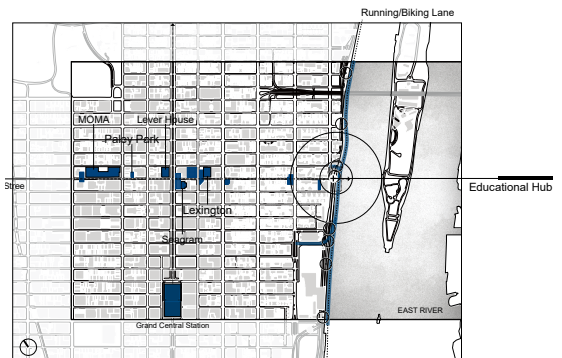


8.1.7 Own Drawing- Waterfront Greenway

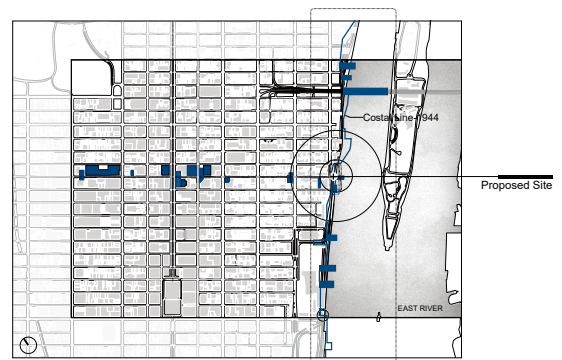
2.1 Site Choice Argumentations

The proposed site is located on the shoreline of NE-Midtown, where the main CSO outfalls are distributed. Therefore, the swage discharge can be efficiently collected by the new infrastructure which is connected to the outfalls. After the treatment of the water, it can be delivered to the surrounding communities for use, which encourages the ecological significance of sustainable use of water resources. Also, the site is one of the nodes of the Waterfront Greenway Program. It will create open space for the public, providing residents in some densely populated neighborhoods with enhanced access to the waterfront.

The coming project as one of the strategies for group vision has an important role to play. 53rd Street could become a preferred crosstown route for pedestrians, linking its extraordinary assets with innovative street design that puts people first. It is lined with cultural treasures, such as MOMA, Paley Park, and six existing open squares. The proposed project is set at the end of the street, becoming a new vital engine will enhance the experience of walking across the area and add prominence to these cultural and architectural jewels. Furthermore, the coastline of East River was once dominated by several industrial wharves for production and transportation purposes. Despite the piers have been gradually removed over the last decades as the focus of the industry shifts to Hudson Yard. The proposed site looks to the historic composition of the area, the intimate connection between land and water will be facilitated by a web of structures that bridge the two environments.



8.1.8 Own Drawing- Group Vision

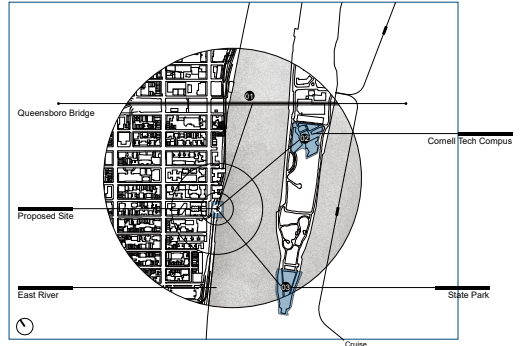


8.1.9 Own Drawing- Industrial Composition

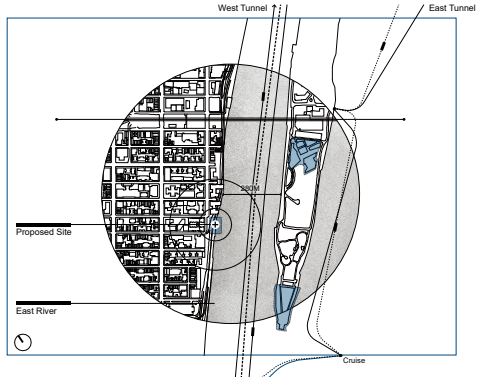
2.2 Site Conditions and Constraints

Firstly, the proposed site is very eye-catching. It establishes visual links with Roosevelt Island Park, Cornell Tech Campus, and Queensboro Bridge. Thus, the new construction will draw the attention of passersby and appreciated because of the unobstructed view. Secondly, about the cruise condition on East River, the main industrial transportation is concentrated in the East Tunnel, while the West Tunnel only has one cruise route that transports passengers between 34th and 90th street. In addition, the underground heat factory near the site can provide thermal resources for the bath function of the new building.

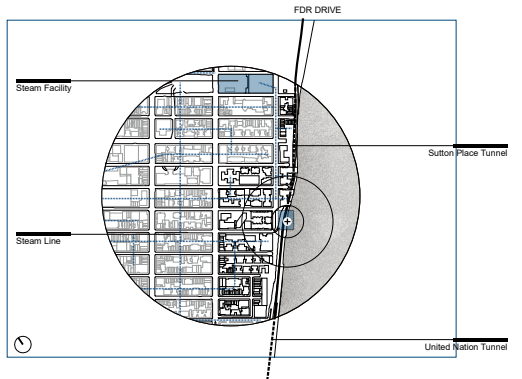
Despite the advantages the proposed site holds, FDR Drive becomes one big constraint on the site. The continuous expressway creates a physical barrier between the area and the East River and brings the noise to the surrounding environment. Solving obstacle restriction and site noise issues will challenge the architecture design. Besides, because the surroundings mainly consist of residential buildings, the newly designed sewage treatment facility should also avoid affecting the daily life of nearby residents as much as possible, and scientifically organize the programs.



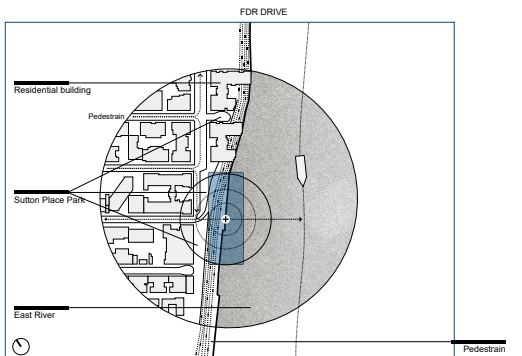
8.1.10 Own Drawing- Visual Connection



8.1.11 Own Drawing- Cruise Route



8.1.12 Own Drawing- Termal Resources



8.1.13 Own Drawing- FDR Drive

3. Organizational Study of Program

After the analysis of functional requirements and proposed site conditions, the next stage is to quantitatively analyze each specific functional requirement and organize the spatial schemes to materialize the project. This process will be conducted through precedents study and managed to compare the conventional, new, and potential architectural functionalities and styles, and explore the potential development of future water purification infrastructures.

3.1 Precedents Study

3.1.1 Wastewater Purification Plant

- Conventional Case: Newtown Creek Wastewater Purification Plant (Brooklyn, New York)

The largest of the 14 wastewater treatment plants in New York City, Newtown Creek underwent a major expansion and upgrade in February 2009. It exemplifies the enlightened collaboration of a public agency, architects and engineers to achieve both community acceptance and design excellence for a utilitarian project type. It serves about one million people and covers an area of about 15,000 acres. The plant has a capacity to treat 310mgd (18% of the city's wastewater) during dry weather. The project involved the construction of a series of new grit, aeration and sedimentation tanks, together with the remodeling of the existing aeration and sedimentation facilities. New control and administration buildings are also built along with piers to support air main and odor control piping. Modifications have been made to pre-existing elements and extensive integration of old and new plant components undertaken.



8.1.14 Newtown Creek Wastewater Plant

-New Case: Solrødgård Water Treatment Plant (Hillerød, Denmark)

The Solrødgård Water Treatment Plant hidden almost entirely under the landscape park, embedding the public facility within an accessible earthen framework. Here, a recycling center, wastewater treatment plant and administrative facility stand alongside walking trails, a bird-watching tower, and a roosting hotel for local bats. By weaving recreational space into public utilities, the park creates a unique space where visitors can gain a natural, firsthand exposure to the cycle of natural resources within the community. The design extends a critical conversation on resource scarcity, which disproportionately affects developing communities.



8.1.15 Solrødgård Water Treatment Plant

-Potential Case: Water filtration skyscraper (2018 Evolo Competition, US)

FILTRATION essentially is a highly modularized prefabricated waste-management and waste-to-energy power plant megastructure that contains several Material Recovery Facilities (MRF) and Water Treatment Plants (WTP) to recycle the floating garbage continent and clean the seawater in all levels from the different ocean across the world. The innovation not only for self-sustaining but also helping resolve the world energy crisis for this coming century.



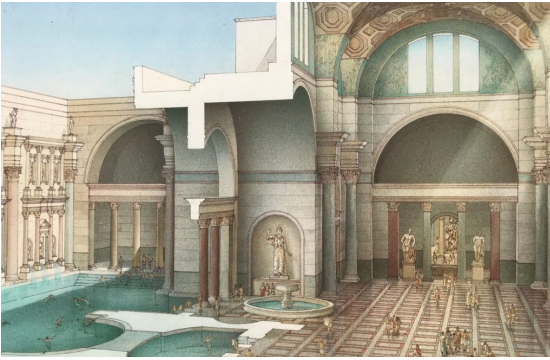
8.1.16 Water filtration skyscraper

To conclude, in terms of architectural functions, public space like exhibition which visualizes the process of sewage purification and treatment added to enhance educational significance. Another noticeable change is the architectural style has tried to transit from a collection of pieces to a centralized building, which improves the efficiency of production and saves more construction land. Furthermore, the landscape is highly taken into consideration while constructing an industrial building.

3.1.2 Bathing facility

-Convention Case: Baths of Caracalla (Rome, Italy)

The bath complex covered approximately 25 ha (62 acres). The complex is of rectangular shape, measuring 337 by 328 meters. The baths followed the "great Imperial baths" blueprint for Roman baths. They were more a leisure center than just a series of baths. Besides being used for bathing, the complex also offered facilities for taking walks, reading/studying, exercise and body care. The main building stood in the center with no connections to the surrounding walls, which housed the cisterns, two symmetrical libraries (south), two large exedras (east and west) and shops to the north. The surviving library measures 38 by 22 meters. Between the outer wall and the central complex were gardens.



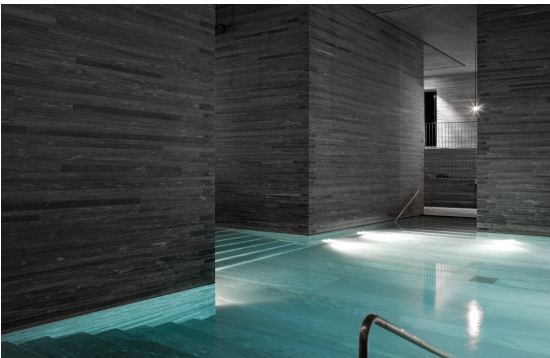
8.1.17 Baths of Caracalla

To conclude, in terms of architectural functions, public space like exhibition which visualizes the process of sewage purification and treatment added to enhance educational significance. Another noticeable change is the architectural style has tried to transit from a collection of pieces to a centralized building, which improves the efficiency of production and saves more construction land. Furthermore, the landscape is highly taken into consideration while constructing an industrial building.

3.1.2 Bathing facility

-New Case: Vals thermal bath (Vals, Switzerland)

Peter Zumthor designed the spa/baths which opened in 1996 to predate the existing hotel complex. The idea was to create a form of cave or quarry like structure. Working with the natural surroundings the bathrooms lay below a grass roof structure half buried into the hillside. The Thermal Vals is built from layer upon layer of locally quarried stone slabs. This stone became the driving inspiration for the design and is used with great dignity and respect.



8.1.18 Vals Thermal Bath

- Faaborg Harbor Bath (Faaborg, Denmark)

The harbor bath is designed to tie a closer link between the city and the sea. Three thematic piers give room for everyone: toddlers, children, and young people can go wild while others enjoy the view of Faaborg Fjord. The new development invites to take a bath, go on a kayak-tour, go for a walk or just sit in the sun or simply enjoy an exciting and active public space. It also invites for swimming and on-water activity. It offers changing rooms and facilities for rowers, a diving platform, a water-playground and a sauna for the winter-bathers. The architects' intention was not to over-program the project in advance, but to create a frame for an unknown content, a place for public life to unfold, the unexpected to happen, in other words a place that people can adopt in their own ways.



8.1.19 Faaborg Harbor Bath

In summary, the bath space provides a moment of respite for the chaos of urban life, to reflect on the importance of its water source, and recognizes the complexity and fragility of the network, providing a vital resource for the city. This kind of reflection can be inspired by the meditative ritual of bathing, which is enhanced through the qualities of space provided by an architecture that emphasizes the movement of water. The outdoor harbor bath has the potential to provide open recreational space for the public and connect the land and water intimately.

3.1.3 Soft management - Agency Headquarter

-Case: UN City (Copenhagen, Denmark)

Bringing together the various agencies and functions of the United Nations offices in Copenhagen, the new main office building is located at the northern harbor of Copenhagen. The main office building has more than 90 meeting rooms including a few flexible rooms on each floor that staff can use for various purposes. It is expected to become one of Denmark's most energy efficient buildings with an annual energy consumption of fewer than 50 KWh per m2. The building was designed to involve several greening measures in the perspectives of Air quality, solar panels, seawater cooling, and water efficiency.



8.1.20 UN City

3.1.4 Soft management - Research Center

-Case: Salk Institute for Biological Studies (California, US)

Kahn's scheme for the Institute is spatially orchestrated in a similar way to a monastery: a secluded intellectual community. Three zones were to stand apart, all facing the ocean to the west: the Meeting House, the Village, and the laboratories. The Meeting House was to be a large community and conference venue, while the Village was to have provided living quarters; each part of the complex would then have been separated from its parallel neighbors by a water garden. Ultimately, the Meeting House and Village were cut from the project, and only the laboratories were built.



8.1.21 Salk Institute for Biological Studies

To summarize, the soft management functions can guarantee the building operate efficiently. Through scientific management, directing production research, and providing citizens with communication space can fill up the gap between the organization and the masses. Make policies and resolutions more transparent and reasonable.

Based on the cases and the site analysis of the previous part, the floor area of each function can be preliminarily concluded.

Functional Floor Area (m²)

| | |
|--------------------------------|---------------------|
| Total | 36100m ² |
| Plot area | 4500m ² |
| FAR | 8 |
| Water Purification Plant (40%) | 14400m ² |
| Bathing Facility (10%) | 3600m ² |
| Agency HQ (22%) | 8000m ² |
| Research Center (18%) | 6500m ² |
| Shared Program (10%) | 3600m ² |

3.5 Program Organization

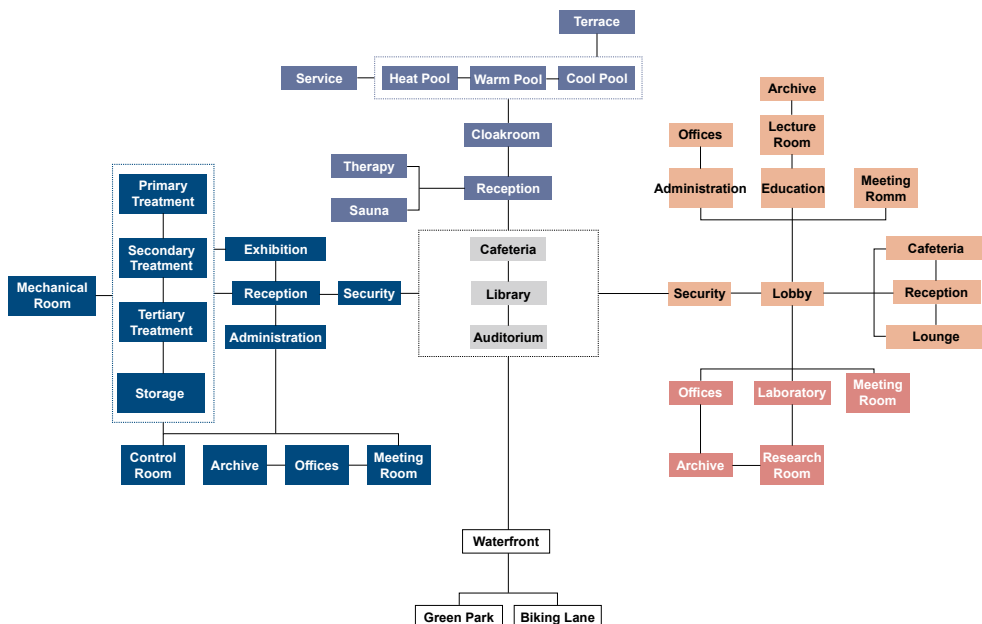
A reasonable functional organization can improve the efficiency of the building operation, and also reduce the interference to the surrounding environment.

4. Design Ambition

The ambition of the future intervention in the urban area is to improve the community's livability and reconnect the public and waterways. By adjusting the way that we experience space we have the potential to greatly increase awareness of the environmental impact of various means of production and, ultimately, as a response, we can begin to make the necessary adjustments to our society, and to the way that we live, in order to mitigate disaster.

Whilst the project is solely conceptual, the research that informs my approach explores the relationship between people and place. By recognizing the potential of the built environment to re-define our perspective on the natural world, I hope to develop an architectural process that could ultimately be used to address the impacts that global consumer cultures are having on our climate.

Technically, there are still some problems should be solved in the further design process. How to coordinate the building and FDR Drive? How to hand public event spaces and water purification facilities? As the fact that it not only produces clean water. In addition, the involved population capacity of the building remained to be figured out.



8.1.22 Programmatic Scheme