RUONAN JOAN DU

GSAPP M.Arch
2020-2023
work collection
During my final semester at GSAPP, I enrolled in a class called Metatool, which prompted me to reevaluate the tools and approaches I had adopted throughout my eight-year architectural education journey. This experience helped me understand that architecture transcends mere form and spatial design; it can serve as a bridge connecting diverse social groups, humans and nature, industries and capital, as well as the past and the future. When discussing architecture, we delve into the unique history and context of a specific space and time.

In my studio work, I aimed to create proposals that fostered new modes of interaction, responding to contemporary social, economic, and environmental challenges. In Core II, Core III, and Adv V, I explored potential ways to facilitate coexistence among different social groups. In Core I and Adv IV, I proposed innovative industry and business models. In Adv VI, I envisioned a novel residential pattern that took into account the intricate relationship between humans and nature.
Dairy has long been a crucial part of the American food industry, with milk sales representing 47.1% of New York’s agricultural commodities in 2017, according to the U.S. Department of Agriculture (Dinapoli, 2019). Among all U.S. states, New York ranks third in milk production, with the Hudson Valley region playing a particularly significant role thanks to its abundant farmland resources.

The stranded asset we have chosen to renovate is a remnant of a condensed milk factory once operated by the Borden Dairy Company in Wallkill, Orange County. This building serves as a miniature representation of the region’s rich dairy history.

Our renovation project aims to foster community cohesion and support the continued growth of the dairy industry through the creation of open bridge spaces and other parallel alleys. By revitalizing this memorable building, which has witnessed the rise and decline of the milk industry over the years, we hope to inspire the people working in it and pave the way for a more sustainable industry in the decades to come.
ISSUE: Regional milk industry decreasing

47.1% of NYS agriculture income
Top 3 ranked in United States

First condensed milk manufacturer
Founder of Wallkill Village

Borden's New York Condensed Milk Company

1856 Founding Firm
Gail Borden invented and patented condensed milk, founded the New York Condensed Milk Company.

1881 Setting Wallkill
John G. Borden purchased the 261 acres homestead for $35,000 and 1,700 acres farms and built Wallkill.

1891 Development
Marion Borden continued developing industry while building social institutions and technology for Wallkill.

1950-1990s
Borden Dairy Company filed for bankruptcy.

2020 Bankruptcy
MDS HVAC-R Inc. purchased it.

2021 Possible Rebuilt
Borden's New York Condensed Milk Company, General Slicing Machine Company took over the property.

Pasture/Hay Cultivated Crop
3400 ft 6800 ft 10200 ft 13600 ft 17000 ft 20400 ft 23800 ft 27200 ft 30600 ft 34000 ft 37400 ft 40800 ft 44200 ft 47600 ft 54400 ft 51000 ft 57800 ft 61200 ft
4% of all human-caused emissions

**U.S. Plant-Based Milk Market**

- **2018**: $2.0b
- **2019**: $2.1b
- **2020**: $2.5b

**Environmental Impact of One Glass (200ml) of Different Milks**

- **Dairy Milk**: 406g CO2
- **Rice Milk**: 132g CO2
- **Soy Milk**: 406g CO2
- **Oat Milk**: 132g CO2
- **Almond Milk**: 406g CO2

**Stage 1: Current**

**Conventional Dairy Farming**

**Stage 3: by 2050s**

**Plant-based Farming**

**Timeline**

- **Unsustainable Economy**
- **Sustainable Economy**

**STRATEGY:** Environmental transition

* Taking New York State as example

1 gallon of milk = 17.6 pounds of CO2

15,120,000,000 gallons of milk production per year

15,120,000,000 * 17.6 = 266,112,000,000 pounds of CO2 per year

Carbon reduction = 199,584,000,000 pounds per year

Source: New York State Dairy Statistics, 2019
In 2022, it is estimated that immigrant labor accounts for 51% of all dairy labor, among them 93% are undocumented. Immigrant dairy farmworkers are a hidden population that is difficult to access because of their vulnerable immigration status and schedules.

Nearly half of the interviewed immigrants report having suffered bullying or discrimination. They should be seen and respected.

Working conditions of immigrant farmers are another concern. Now they are working over 12 hours a day with a poor payment just past New York State's minimum wage.

Lack of education resources and opportunities for immigrant laborers also creates pressures towards the immigrant population.

The cultural isolation on rural farms, as well as the experiences of having suffered discrimination, has fostered the need for a community space that is safe and welcoming.

**STRATEGY:**
Community establishment

**STATUS**
- Isolated immigrant workers
- Inclusive immigrant community

**EDUCATION**
- Provide education resources and opportunities to support immigrant laborers and create processes to support the immigrant population.

**LABOR**
- Working conditions of immigrant farmers have been extremely harsh. They work long hours and are subjected to verbal and physical abuse.

**COMMUNITY**
- We need to establish a community center to support the needs of immigrant workers.

**MORE STABLE STATUS**
- Through increased productivity

**REDUCE BURDEN**
- Through cooperation

**SENSE OF COMMUNITY**
- Strengthen and maintain community spaces

**RESPECT & SEEN**
- Through education and awareness
The use of physical models has been a key aspect of the project’s design process.

Given that it involves the renovation of an existing building, transparent and oblique materials were utilized to clearly distinguish the added and original components. These models were particularly useful in experimenting with the design of the new roof from the perspective of the driveway, allowing the team to test and refine the form until it was optimal for the project’s goals.

**PHYSICAL MODEL**
Based on your practical experience, please evaluate the program.

...food safety in production require extensive building renovation to meet the updated standard.

Industrial program may bring annoying noise to community space.

The rural farmers only live between their dorm and farm, nothing for spare time.

STAKEHOLDERS INTERVIEW

Besides data analysis targeting on the general immigrant population and milk industry worker, we value more direct interaction and communication with our targeted users.

We reached out to Mrs. Mary Jo Dudley and Mrs. Maire R. Ulrich, program directors of the Cornell Farmworker Program and Dr. Scott Ferguson, director of Institute for Rural Vitality at SUNY Cobleskill and processed zoom interviews with them to obtain their evaluations on the programs in this dairy-hub.
Section plays an essential role in comprehending this architecture. From the river to pasture, community programs surrounds production ones. Pattern of duplicated enclosed space – alley is manifested and dramatically light structure is shown.
ALLEY SPACE

Allies are key space for its function of connecting isolated spaces for different groups. To attract people step out of each room, a tall space with abundant shadow effect is adopted.
For the purpose of protecting the historical landmark at large, we developed the structure response with a gutter detail, which will sit above the existing masonry wall with a T steel spanning in the long axis. Upon it are the rectangular profiled steels, holding the wood beams that extend freely to upair. To make the least carbon footprint, we combine this structure with a rainwater collection system.
PERMEABLE CITY
REIMAGINING HUMAN-SOIL INTERACTION IN HOUSING

Drawing inspiration from Otto Wagner’s aesthetic and health principles of the early 20th century, which advocated for smoothness and impermeability, Vienna’s urban landscape has been shaped by a detachment of exposed soil from people’s daily lives. This has resulted in a disconnect between residents and the natural environment.

This proposal aims to spark a dialogue on alternative perspectives towards soil, emphasizing that it does not have to be viewed negatively when considering diverse ways of coexisting with it. Rather than isolating residents from soil through fixed programs and rigid spatial designs, the Permeable City project integrates an array of functions within a flexible and permeable landscape.

By embracing a more harmonious relationship with soil, the Permeable City not only reconnects residents with nature but also fosters a sustainable and adaptive urban environment that can better respond to the evolving needs of its inhabitants.

Project Info
GFA 1,000,000 sqm
Location Vienna, Austria
Duration 2/2023-4/2023
Mentor David Gissen
Team Weiwei Wang

ADV VI studio at GSAPP
Critics on Otto Wagner's the Great City (1915)

By measuring the area, only 4% of land is permeable because of the prevention of soil fecundity by Otto Wagner.

If we reverse the amount of hard and soft ground in the city, what becomes possible?
If we reverse the amount of hard and soft ground in the city, what becomes possible?
Challenging the conventional notions of openness and enclosure in urban design, the site comprises approximately 200 distinct yards, surrounded by buildings that create a unique interplay between interior and exterior environments. This innovative design fosters a sense of interconnectedness, both within the community and with the natural world.

The yards offer a diverse range of programs tailored to suit various interests and needs, such as different types of farming, engaging landscapes, and versatile multipurpose fields for recreational and leisure activities.

The yards in the Permeable City are designed as a series of personal open spaces, originally featuring exposed soil and devoid of physical barriers. This layout encourages intimate public interactions with soil, fostering a sense of connection to the natural environment and promoting a healthier urban lifestyle.

The yard programs and activities are determined by community discussions. This rendering depicts one possible activity - an open weekend market where residents can bring their harvests and exchange goods, fostering a sense of community and connection.
Public programs are thoughtfully embedded within a carefully designed grid system to facilitate community services and foster shared activities among residents. These programs are strategically arranged in harmony with the yard layouts, ensuring a seamless integration of public and private spaces.

To further enhance the residential experience, versatile toolboxes have been designed to supplement the dwellings, providing residents with additional amenities and resources that cater to their needs. Moreover, the bridges connecting various sections of the development have been thoughtfully planned to feature larger, more expansive spaces. These bridge areas serve as integral community hubs, promoting social gatherings and fostering a strong sense of community among residents.

Public programs

Bridge plans
All housing units in the Permeable City are designed along a horizontal axis, ensuring maximum sunlight exposure for each residence. The interior spaces are thoughtfully divided into two sections, allowing for natural airflow and ventilation to pass through. This intentional design consideration makes living in close proximity to soil not only possible but also comfortable, fostering a harmonious and healthy relationship between residents and the environment.
Expand the spectrum of living with soil

Upon selecting their desired neighborhood, residents are presented with an array of housing options, thoughtfully designed to foster a more intimate connection with nature. The guiding principle behind these designs is to broaden the spectrum of living harmoniously with soil, creating a seamless transition between the built environment and natural surroundings. The design process is divided into three interconnected steps: open yard, in-between space, and personal spaces. These components come together to form an integrated and cohesive living environment. In each scheme, various soil coverage levels are highlighted, demonstrating the diverse ways residents can engage with and embrace the natural landscape. Through this innovative approach, the Permeable City empowers residents to explore and adopt varying degrees of soil integration in their daily lives, nurturing a deeper connection with the environment and promoting sustainable urban living.

A - 1
0%

open yard
open yard’s paving and utilization

B - 1
0%

in-between
approaches to home and the degree of encroachment for their personal open space

C - 1
0%

personal space
the level of soil involvement in their living environment
I interpret INTER- in three layers:
- Intergenerational property.
- Intersection as the main form language.
- Interaction between different target groups.

From the demographic research, we found that children and senior groups take up a considerable part in the community. Therefore, the first strategy is to incorporate afterschool programs and senior care center into the community service system. On residential unit level, we believe that community should play as a strong bond between residents. Based on this philosophy, an intimate unit cluster consisting of five units, which plays with different floor heights of spaces is applied.

Project Info

| GFA      | 430000sqft |
| Location | New York, USA |
| Duration | 9/2021-12/2021 |
| Mentor   | Galia Solomonoff |
| Team     | Alison Lam |

Core III studio at GSAPP
UNIT CLUSTER WITH SHARED COURTYARD

To strengthen social bonds between residents through providing more shared space, a unit cluster type has been developed. A unit cluster is made up of five residential units, with a shared indoor courtyard in the center.
UNIT CLUSTER WITH SHARED COURTYARD:
Height difference to distinguish public/private space

To elevate the intimacy in a spatial sense, the unit cluster adopts a method with different floor-to-floor height of public side (12ft) and private side (8ft).
INDOOR QUALITY: NATURAL AIR AND LIGHT

Unit cluster courtyard is a transactonal area from public corridor to private kitchen, where residents are encouraged to bring foods outside homes and share with neighbors. Quiet but not dull is the atmosphere in bedroom. To intake sunlight as dynamic shadows, operable penetrated metal panels are adopted in the bedroom-sided facade.
P.S. 64 has long been at the center of a conflict between business interests and local residents. Closed since the mid-1970s, the building was purchased by Gregg Singer at an auction, with plans to convert it into a college dormitory. However, the neighborhood vehemently opposed this proposal, insisting that P.S. 64 should be designated as a historical site. To this day, many of the original Charas organizers still reside in the area and maintain that the space should serve the community, providing resources for children and the elderly.

Considering this context, the reimagined P.S. 64 aims to fulfill not only its educational purpose but also its role as a community hub. In terms of design, the intention is to transform the existing solid courtyard into a series of interconnected spaces, fostering intentional or serendipitous interactions between community members and school occupants. By creating a welcoming and inclusive environment, P.S. 64 can become a focal point for the neighborhood, promoting unity and collaboration while preserving its historical significance.

Project Info

GFA: 4500sqm
Location: New York
Duration: 2/2021-4/2021
Mentor: Amina Blacksher
Individual work
Core II studio at GSAPP
P.S 64 is a discussion upon the BOUNDARY between community and school.
Teachers are more like close observers of students. Meanwhile, the tower can be utilized as sunlight access for classrooms and a lounge for faculties.

7th And 8th Grade Classroom Type

Teachers’ supervision would be looser but the interaction between classrooms is stronger. Hence, change on the floor level can create more communication between classrooms also to improve lighting conditions.

Kindergarten To 2nd Grade Classroom Type

Structure and materials intensify the contrast between vertical tower and horizontal path. Five truss towers strengthen the ability of resisting wind load while a concrete post and beam system support the horizontal paths. Towers are covered with bright metal mesh while the paths are in light grey concrete.
This program starts with the concern about jobs. I want to figure out what pandemic does to people’s jobs. There are mainly two issues around this topic. For people with lower education, they are more likely to be fired during the pandemic. And for people with high education, they are more likely to work remotely.

Communal-office proposal is to insert modules in interstitial space of community. Residents can turn a part of his house into a public workplace or even café and recreation rooms. He could use it himself, when it is available, he rent it for money.

This system of module could also be developed into a joint space in the void inside a block. The form of mesh gives an integrality to this system. Also, it protects the privacy of residence.

Project Info
GFA 211sqft
Location New York, USA
Duration 9/2020-12/2020
Mentor Alessandro Orsini
Individual work Core I studio at GSAPP
The concept of interstitial space is a common phenomenon in Manhattan, largely due to the typical layout and planar arrangement of tenement houses. These buildings are situated along the block’s perimeter, resulting in a void at the center that frequently remains unused. Regrettably, these spaces are often neglected, left unclean, and exposed to the elements. Consequently, they represent missed opportunities for valuable public space that could enhance the urban landscape and foster community interaction. By recognizing and addressing this issue, urban planners and architects can transform these underutilized interstitial spaces into vibrant, functional areas that enrich the city’s fabric and contribute to a more connected and sustainable urban environment.

Walking along Broadway, passengers could feel the strong rhythm brought by the repetition and symmetry of elevations and pay more attention to the interstitial space within a block.

Typically, there is an awkward problem that residents could clearly look through each others’ windows and the scenes are dull. So I think there should be something to utilize this void and bring more vigour here.
A NEW TYPOLOGY: OFFICE MODULE IN RESIDENTIAL INTERSTITIAL SPACE

This program addresses the impact of the pandemic on employment. Specifically, two key issues have emerged. Firstly, individuals with lower levels of education are more vulnerable to job loss during the pandemic. Secondly, unemployment is a pressing concern in District Nine. Conversely, individuals with higher levels of education, such as office workers or sales professionals, are more likely to work remotely.

To address these challenges, this proposal suggests the installation of modular workspaces and community areas in interstitial spaces within the neighborhood. Residents can rent out a portion of their homes for use as public workspaces, cafes, or recreational areas. The space can also be utilized by the residents themselves. When not in use, it can be rented out for additional income.

Harlem’s unemployment rate stands at 18-20%, a stark contrast to the southern district’s rate. Since the 1940s, the black population in the area has surpassed the white population.

In Harlem, the average commute time is between 30 to 45 minutes. Due to the concentration of jobs in other districts of Manhattan or the Bronx, most residents commute outside of their neighborhood for work.
The community cafe is cantilevered from the existing masonry building, creating shade for the outdoor dining area.

At night, the community cafe transforms into a beacon, serving as a focal point for the outdoor screening events that take place in the area.

The mesh material of the enclosure offers a semi-transparent visual effect. When dining in the space, individuals can observe the shadows and movements outside without causing too much distraction.

**SPACE: PUBLIC LIVING ROOM**

Instead of merely connecting the functional modules, this system is designed to serve as a public living room for the entire community and its visitors. As such, residents and visitors can enjoy the services as a cohesive whole. To achieve this goal, the ground floor has been reimagined to provide greater accessibility to the modules and apartment buildings. The semi-transparent mesh that divides the interior and exterior spaces further enhances the experience. It allows individuals to perceive activities happening behind it, encouraging them to explore and engage with the space. Additionally, the mesh material, along with its radioactive supporting members, creates a plentiful shadow effect throughout the space.
Mesh as a soft media between inside and outside
Homelessness has been an lingering issue for NYC. The homeless population has been constantly increasing since 1983. Among them, children take up 35%, adults with families 39%, youth from age 18-24 11%, and single adults above 24, 15%. The hispanic and black population takes up the largest ethnicity group, which is about 85%.

To the society, the homelesses are people that need to be avoided. Since they give the impression of unhygienic conditions and disturb the public area.

However, from the homeless's perspective, they feel rejected from society. Due to constantly increasing rent in NYC, they struggle to find affordable housing, which brings more dilemmas.

**Project Info**

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<thead>
<tr>
<th>GFA</th>
<th>5000 sqft</th>
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<tbody>
<tr>
<td>Location</td>
<td>Brooklyn, NY</td>
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<tr>
<td>Duration</td>
<td>9/2020-12/2020</td>
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<tr>
<td>Mentor</td>
<td>Laura González Fierro</td>
</tr>
<tr>
<td>Team</td>
<td>Younjae Choi</td>
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<tr>
<td>ADVV studio in GSAPP</td>
<td></td>
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</tbody>
</table>
Our primary focus is on unaccompanied youth aged 18-24, including parenting youth, who comprise an estimated total of 260-360 homeless individuals in East New York.

Homeless youth in this age group are at a critical stage in their lives. Often, they have experienced childhoods marked by poverty and domestic violence, which can have detrimental effects on their academic achievement and personal development. Although homeless youth represent only 11% of the total homeless population, we believe it is essential to break this vicious cycle by providing a new type of shelter specifically designed to address their unique needs.
As an initial step in implementing the proposed system, we have identified five lots situated around the intersection of Glenmore Avenue and Vermont Street. The network has been divided into five distinct sections based on the specific needs of the area: a residential section, a drop-in center, an adjoining community garden, a training section, and a food section located across the street.

Each of these sections serves a unique purpose and caters to different community requirements. The residential section features isolated hygiene areas, laundry facilities, showers, a gym for well-being, and a daycare center for single parents and their children. Meanwhile, the training center offers workshops, mental health clinics, and a job information center, providing valuable resources to support community members in their personal and professional development.

Accessibility to sunlight and ventilation

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Each of these sections serves a unique purpose and caters to different community requirements. The residential section features isolated hygiene areas, laundry facilities, showers, a gym for well-being, and a daycare center for single parents and their children. Meanwhile, the training center offers workshops, mental health clinics, and a job information center, providing valuable resources to support community members in their personal and professional development.
In order to create a supportive and nurturing environment, it is crucial to combine accessibility to hygiene and safety while breaking down the barriers between these spaces and more visible areas, all without compromising privacy. Taking the laundry as an example, we strive to utilize this space as a bridge between the indoor corridor and the outdoor garden, both visually and functionally.
A series of open, column-free spaces are connected in a looped, sectional manner, transforming the central portion of P.S. 64 into a public education hub. The community is invited to use the cafe, gym, library, auditorium, and other amenities provided in the space.

This looped design is not only architecturally significant but also sustainable, requiring careful attention to structural design. Our team of five collaborated on this project as part of the Architectural Technology IV course at GSAPP. Together, we worked to develop a feasible solution that addressed various aspects of the project, including architecture, structural design, MEP, and construction.

Project Info
GFA: 111532sqft
Location: New York, USA
Duration: 9/2021-12/2021
Team:
- Jiageng Guo
- Yuli Wang
- Karen Wang
- Alison Lam

TECH CLASSWORK in GSAPP
The school adopted steel columns and trusses for efficiency in structural and use of space. Exposed CLT Floor Slab is a sustainable material to provide warmth and acoustic barrier.

The whole building can be dismantled and repurposed to adapt to the constant need for the schools. All Materials are honestly exposed in our building reducing the need for any finishes. Off-cuts have been repurposed for making the furniture in the shared space.
We chose the VAV system for its cost effectiveness and lower maintenance requirement. There are 7 air handling units. Each of them can be turned on and down separately so that functions in the middle of the building, including cafe, gym, auditorium and winter garden can be used independently when semester is over and classrooms are closed.

When weather is not that harsh, energy provided for common space can be saved by operating the double facade system.

In summer, windows on the inner facade are opened, pressure difference between the top and bottom induce the horizontal ventilation throughout the building. In winter, windows are closed so that air between two layers is heated by the radiator slab. The double facade plays the role as a thickened isolation for indoor space.
VERTICAL TRANSPORTATION
ELEVATOR CONSTRUCTION CHUNK MODEL

Project Info
Team: Priscilla Auyeung, Isaac Khouzam, Zida Liu

Divider beams + guide rail connections

AT V work at GSAPP
DIARY OF TALKS
Data visualization work

09
REPRESENTATION WORK
DRAWINGS, MAPPING & OTHER MEDIA
During the remote class period caused by pandemic, teamworks are extremely hard for us because of time zones. Hence, this drawing is depicting our cooperation model, in which drawing itself is a form of communication.

In this drawing, a library/dictionary of annotations and icons are utilized to communicate by conveying what our daily schedules/school lives looked like over the past semester.
The COVID-19 pandemic pushed every city dweller to realize the importance of outdoor space. New Yorkers, as those who are living in one of the most populated cities in the world, are more concerned about it than anybody else. Therefore, the importance of sidewalk width has been put in focus unprecedentedly.

In 2020, STREETBLOG NYC called for wider sidewalks by pointing out most sidewalks in NYC are less than 13-foot-wide, which is a minimum requirement of a 6-foot social distance rule. Unveiled in late April, 2020, the Open Street Initiative opened 7.6 miles of streets in the Bronx, Brooklyn, Manhattan and Queens. During the waves of pandemic, it was redeemed as a health necessity more than an aesthetic one. It widened the space for outdoor activity and provided more room to keep social distance.

As the pandemic was normalized, the economic and cultural value of Open Street Program was discovered. Therefore, it was made permanent in 2021. According to the report, Streets for Recovery, released by the city’s Department of Transportation, the Open Street program gave a vital boost to eateries by pushing some bars and restaurants’ sales above pre-pandemic levels. Street Lab, which is an organization aiming at creating programs for publics, has created pop-up chalk murals and reading rooms, giving more vitality and creativity to the city.
In 2022, does the Open Streets Program effectively elevate the spatial equity in accessibility to low-risk walkable streets under the circumstance of Covid-19?

**Research Questions**

1. What is the width of sidewalk spatial distribution in New York City?
2. Where are the Open Streets identified by DOT in 2022?
3. How many percent of New Yorkers are living within the walkable distance to Open Streets?
4. Are Open Streets in 2022 located in areas with narrow side-walls?
5. How is the equity in accessibility to low-risk walkable streets distributed related to median household income?
6. How is the equity in accessibility to low-risk walkable streets distributed related to race?

**Methodology**

**Race**

The open streets in Black and Latino communities were much more likely to lack useful barriers to prevent vehicles.

**Household Income**

Household income varies within walking distance and without. Households within walking distance of high-rated Open Streets were more than twice likely to earn over $100,000.

**Coverage**

Only 20 percent New Yorkers live within the walkable distance of open street.

**Spatial equity, an essential issue**

With all the benefits, the selection of streets is a crucial issue as some critics point out the lack of equity of Open Street program.

According to a survey conducted in 2021 by Transportation Alternatives, Open Street Program lack of spatial equity with three main reasons.
Assumptions

Open Streets in 2022 is generally effective in elevating the spatial equity in accessibility to low-risk walkable streets under the circumstance of Covid-19.

1. Compared to 2021, more New Yorkers are living within walking distance to Open Streets in 2022.
2. Open Streets in 2022 are mostly located in the areas with narrow sidewalks.
3. Where neighborhoods have higher median household income, there are wider sidewalks and fewer Open Streets in 2022.
4. Compared to Asian and Black dominated neighborhoods, White dominated ones have wider sidewalks and fewer Open Streets in 2022.

Limitations

1. The reasonability of defining low-risk walkable street as a street more than 13 ft wide.

As Leila Hawa pointed out, a 13 ft-wide sidewalk is just enough for pedestrians to practice social distancing of 6 ft to form a reasonable conversation with for the project area. However, we should not neglect the vagueness of number selection in terms of safe distancing for pedestrians. Other than sidewalk width, there are additional physical conditions that have a huge impact on people’s normal social distance. For example, how the street furniture is located, whether there is a pedestrian tree or not, whether it is a commercial street or not, how the parking condition is next to the sidewalk.

2. Other factors affecting the location selection of Open Street.

The location selection of Open Street is not merely determined by the sidewalk width. According to the report conducted by DOT, the Open Street Program is not only for health purposes, but also for economical, cultural and community purposes. Therefore, it is fair that other factors such as whether it is inside a residential zone, whether there are schools and restaurants nearby will affect the selection of Open Streets.
2. Comparing the location of Open Streets and the spatial distribution of sidewalk width

By overlapping the narrow streets and the Open Streets in 2022, we discover that the Open Streets are mostly located in areas with narrow sidewalks.

3. Mapping the Open Streets in NYC, 2022

Generally speaking, Open Streets in Manhattan are unevenly distributed.

- Lower Manhattan > Midtown > Washington Heights

Walkable distance = 1/4 mile

In the U.S., over the past two decades, 400 meters (0.25 miles or a 5-minute walk) has sometimes been assumed to be the distance that "the average American will walk rather than drive", and has been used as the value of acceptable walking distance in studies. Hence, we selected 1/4 mile as the distance to create the buffer.
To better estimate the population covered within the walkable distance of Open Streets, it is assumed that the population is evenly distributed within each unit. Hence, we switched to total population by census tract (2021 by 5 years).

50.6% of residents in Manhattan is within the walkable distance to Open Street in 2022, compared to 20% in 2021.

In 2022,

\[
50.6\% = \frac{845,160}{1,669,127} \times 100\% 
\]

845,160 people live within the walkable distance, 1,669,127 people live in the census tracts (partially) covering Manhattan.

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A. The area which includes Harlem, Washington Heights, and Washington Heights South which has the lowest median household income in Manhattan and has a large African American community only has six of the 113 open streets in Manhattan and a very uneven coverage by the 1/4 mile walking distance from the open streets.

B. Marked on average has one of the lowest median household incomes in all of Manhattan and a large African American Community only has six of the 113 open streets in Manhattan and a very uneven coverage by the 1/4 mile walking distance from the open streets.

C. The area which includes Lenox Hill, Upper East Side, East Midtown, Murray Hill which is dominated by a large white community and has one of the highest median household incomes in all of Manhattan has no open streets and very poor coverage by the 1/4 mile walking distance from open streets.

D. Midtown Manhattan, which has a large Asian and White community, is almost entirely covered by the 1/4 mile walking distance from the open streets with only parts of Chelsea and Midtown not being covered.

E. Lower Manhattan, which has a large Asian and White community and has some of the highest household incomes in all Manhattan with the exception being Chinatown which has one of the lowest household incomes, is almost entirely covered by 1/4 mile walking distance from the open streets with only areas near the waterfront not being covered.

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### Median Household Income ($)
- 32,555 - 58,435
- 58,435 - 101,409
- 101,409 - 136,060
- 136,060 - 152,335
- 152,335 - 250,001

### Black Population Proportion
- 0% - 4.4%
- 4.4% - 8.9%
- 8.9% - 17.8%
- 17.8% - 40.4%
- 40.4% - 68.9%

### Asian Population Proportion
- 2.3% - 5.9%
- 5.9% - 10.7%
- 10.7% - 15.5%
- 15.5% - 23.0%
- 23.0% - 39.4%
in 2022, the Open streets program effectively offers people more walking space that will allow them to social distance.

Conclusion

The spatial distribution of Open Streets is not even. 82 of the 113 Open Streets are located below Central Park. The accessibility to Open Streets has been elevated in 2022 compared to 2021, with 55.6% of the Manhattan residents living within the 1/4 mile walking distance to Open Streets. Midtown Manhattan and Lower Manhattan have the highest accessibility.

In demographic analysis, the pattern of Open Street distribution is uneven between the areas divided by Central Park. Majority of the Open Streets are located within Lower Manhattan, Midtown Manhattan and Upper Manhattan, where neighborhoods with the highest household income in Manhattan are located. Those areas also have a large white and Asian community. The area above Central Park only has 11 of the 113 open streets in Manhattan and an uneven coverage by the walkable distance to open streets. These areas include Harlem and Washington Heights, where neighborhoods with the lowest household income in Manhattan are located and the community is majorly composed of African-Americans.

References


Appendix: Methodology