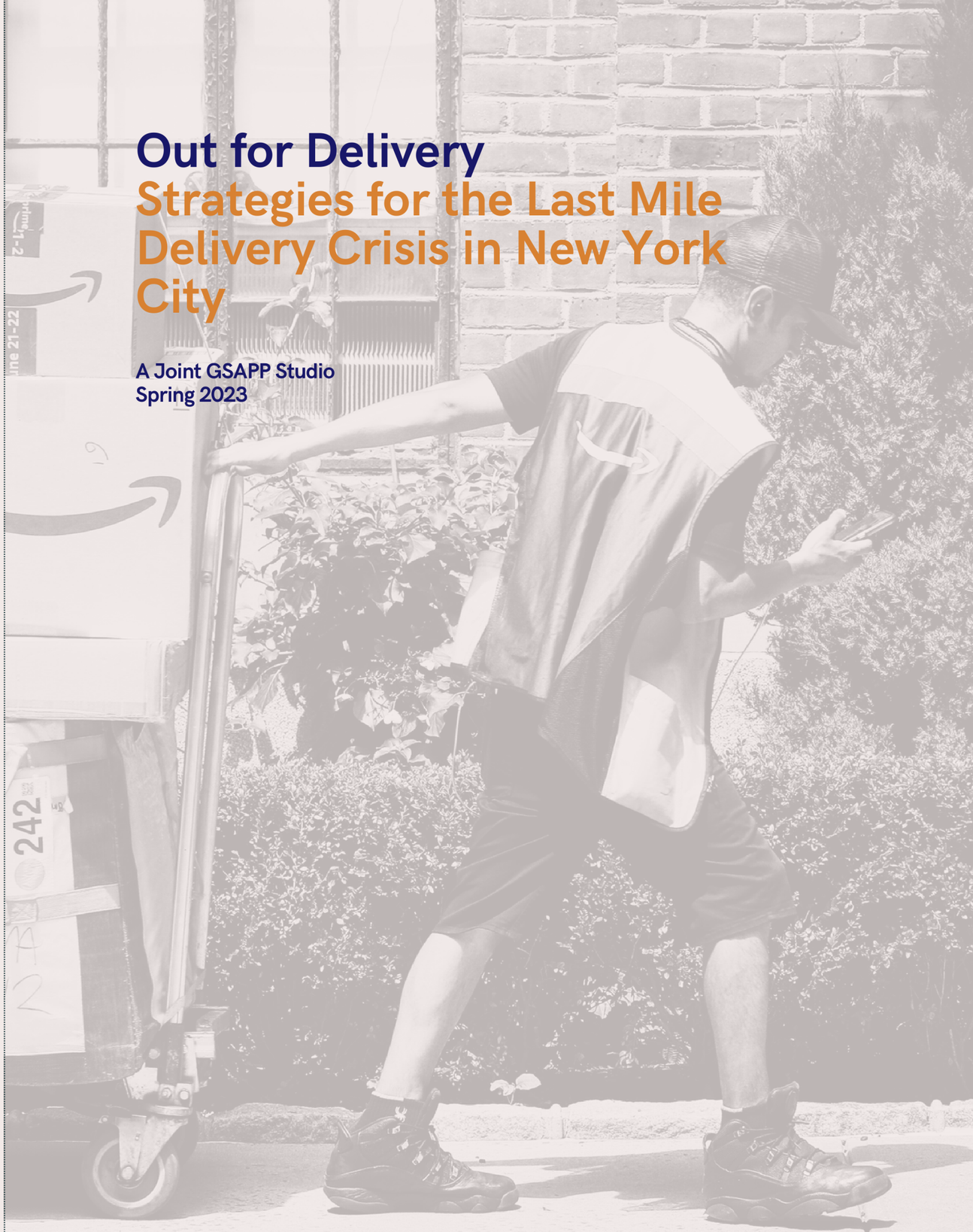
Out for Delivery

Strategies for the Last Mile Delivery Crisis in New York City

A Joint GSAPP Studio
Spring 2023



Acknowledgments

Thank you to our professors, Adam Lubinsky and Melissa Loomis Binda for their guidance in this studio. We are very grateful for their continuous support and insight in tackling this complex issue. We would also like to thank everyone who took the time to provide their expertise and recommendations to guide our work, including our client, the New York City Department of City Planning as well as team members from the Southwest Brooklyn Industrial Development Corporation, Regional Plan Association, Columbia University Climate School, and Snowball Development.

Executive Summary

Online shopping has never been easier. Click a button, and your package arrives in two days- perhaps even one. The rise of e-commerce and the pandemic-induced explosion in online shopping has created a system where consumers and businesses rely on fast and efficient delivery of packages. While package delivery has never been more convenient, the delivery process has created a crisis for New York's urban landscape.

Over the course of the 2023 spring semester, graduate students from the M.S. Urban Planning, M.S. Real Estate Development, M.S. Urban Design and New York/Paris Program have worked in an interdisciplinary studio to develop solutions to alleviate the impacts of the last mile delivery system on New York streets and communities. Our solutions are a reflection of our respective fields strengths and our semester long collaborative effort to mitigate negative impacts directly related to the delivery system.

Our work focuses on creating system and site-specific solutions. The delivery system presents significant challenges for New York's transportation system and streetscape. The final steps of the delivery system are embodied by our two sites of study. Our first site is located in Red Hook, Brooklyn, a hotspot for last mile distribution facilities. Our second site, located in Midtown Manhattan, illustrates the challenges of the last fifty feet of the delivery process as a package moves from a delivery truck to its recipients' doorstep.

In crafting our proposed solutions, we imagined a future where the last mile delivery system can exist in harmony with New York's urban environment. An interdisciplinary approach allowed our studio to consider a wide-ranging set of place-based and policy-based solutions to the last mile delivery crisis that we believe can meet the demands and challenges of the delivery system. The demand for e-commerce will continue to grow and New Yorkers will continue to rely on delivery services for fast and convenient deliveries, but the delivery system can change to exist in harmony with the complex demands of New York's landscape.

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About Us


Jessi Li


Chelsea Mullen


Dave Freeman


Alice Jiang


Alyana Acacio


Davis Mullins


Jacqueline JingYi Liu


Jade Wang


Catharina Utami


Zhiyang Chen


Mahalakshmi Sivakumar

Urban Planning

Urban planners are driven to integrate the needs and demands of people and places. In the context of the last mile delivery crisis, our studio's urban planners sought to integrate the demands of the last mile delivery system with the needs of local communities and stakeholders impacted by the last mile delivery system.

Urban *Design and Architecture*

Designers are committed to understanding the interactions and flow of people and place. Through thoughtful consideration of last mile delivery demands, our urban design team worked towards implementing design strategies that promote resiliency and efficiency, reduce congestion, and enhance the urban environment.

Real Estate

Our real estate development students provided important insight into how values influence development. Beyond understanding the financial feasibility of the proposed interventions, our team worked to understand what tools can help align our studio goals of social and environmentally responsibility with policy and stakeholder demands.

Introduction

New York residents and businesses receive 3.7 million packages every day. This constitutes a staggering 88 percent increase from pre-pandemic package deliveries in 2019. New Yorkers are all too familiar with the impacts of this constant stream of deliveries. Oversized trucks exacerbate traffic congestion, delivery vans double parked on narrow city streets, workers sort piles of packages on avenues, and couriers push hand carts down nearly every sidewalk. However, New Yorkers are also familiar with the convenience of ordering items with the click of a button. E-commerce and package delivery services have become an integral part of everyday life and while people's reliance on deliveries shows no signs of changing, the last mile delivery system can evolve to cause significantly less distress to New York's streets and communities.

The last mile delivery process refers to the final leg of the supply chain, where goods are transported from a distribution center or transportation hub to their final destination, which is typically a residential or commercial address. This process is often seen as the most challenging and costly aspect of the delivery process, as it involves navigating complex urban transportation, dealing with traffic congestion and parking limitations, and ensuring timely and secure delivery.

In New York City, the last mile delivery process is particularly challenging due to a variety of factors. One major challenge is the dense urban environment, which can make it difficult for delivery trucks to navigate narrow and congested streets. Additionally, limited parking availability can make it difficult for delivery trucks to park close to their destination and unload packages. This can lead to additional costs and delays, as drivers may need to park farther away and transport the goods on foot or using smaller vehicles. The rise of e-commerce and the growing demand for fast and reliable delivery services has also put added pressure on last mile delivery providers to meet increasingly high expectations for delivery speed and convenience.

In addition to the logistical complexities of the last mile delivery system, there are serious equity issues in regards to the location of last mile distribution facilities. Last mile facilities are often concentrated in low-income communities who are in turn adversely affected by the traffic, noise, and pollution associated with the delivery facilities. In New York City, the Red Hook neighborhood of Brooklyn has seen exponential growth of last mile warehouses in recent years, with distribution giants such as Amazon and UPS opening facilities in the area. Nearly 10 percent of Red Hook's total square footage is either developed for or approved for e-commerce shipping facilities.

Red Hook is home to a mix of families who have lived there for generations and wealthier newcomers who are drawn to the cultural scene of the neighborhood. As more warehouses are built in the area, new and longtime residents have grown increasingly concerned with the noise, dust, pollution and traffic associated with construction and operation of the facilities. Under the current zoning regulations, warehouses are categorized as a low hazard industry producing very little environmental impacts and a majority of the lots in Red Hook are zoned for as-of-right development of logistic centers. As a result, warehouse facilities are not subject to environmental review or a community engagement process and can be located close to community facilities. When the zoning code was written in the 1960s, this was logical because warehouses were typically less than two stories tall and freight traffic was limited. However, today's warehouses have more than doubled in size and operate 24 hours a day to keep up with delivery demands. Estimates calculate that warehouses can bring 1,000 additional daily truck trips to impacted neighborhoods. While Red Hook is not the only neighborhood negatively impacted by the presence of last mile delivery system, it is a strong representation of what is happening to communities situated near clusters of warehouse facilities.

Solving the last mile delivery crisis requires a multi-disciplinary approach that addresses the complex challenges and develops innovative, holistic solutions. This report provides detailed recommendations that address system and site-specific interventions to reimagine the last mile delivery landscape and create a sustainable, equitable, and reliable delivery system.

Client

A fundamental goal of this studio was to develop strategic recommendations for our client, the New York City Department of City Planning (DCP), to address the last mile delivery crisis.

As New York City's primary land use agency, DCP is interested in implementing solutions to complex challenges created by the urban environment. In regards to the last mile delivery crisis, DCP has the ability to implement land use changes to improve the permitted design of last mile facilities under the NYC zoning ordinance and reimagine how packages are delivered to New York residents and businesses. In crafting our solutions, we considered DCP's commitment to making New York a better place to live through innovative policy and design solutions.

Client **Priorities**

NYC PLANNING

1. ***Integrate the competing demands of public and private entities in the design of a last mile distribution center***
2. ***Alleviate congestion and safety concerns related to package delivery on street spaces***
3. ***Support sustainable solutions to delivery processes that protect and enhance the urban landscape***

Delivery System Stakeholders

In addition to framing our research around DCP's priorities, our studio has considered the demands of the multitude of stakeholders involved in the last mile delivery system. It is a significant challenge to craft sustainable solutions that adequately address stakeholder's wide spectrum of demands, but our studio's multidisciplinary approach makes us well suited to develop holistic solutions that are informed by a diverse range of values and perspectives.

Community

Delivery Services

Last Mile Delivery Stakeholders

City Agencies

Developers/Land Owners

Community

Local communities are impacted by the last mile delivery system every day. Residents living near last mile warehouses are impacted by higher rates of pollution, noise, and traffic generated by the facilities. In addition, consumers and pedestrians are impacted by the system as well. Consumers drive the growth of e-commerce, resulting in congested sidewalks used by pedestrians and delivery workers.

City Agencies

The Department of City Planning is not the only agency with vested interest to improving the last mile landscape in New York. Agencies such as the Department of Transportation and the Department of Building have the power to implement changes for the complex system. Transportation systems and zoning regulations play an important role in creating and mitigating delivery related challenges. Now is the time for city agencies to come together to deliver comprehensive system and neighborhood level solutions.

Delivery Services

Efficiency and profitability are the core of delivery services' interest in improvements and changes to the last mile delivery process. There is increasing pressure on delivery services to integrate sustainable practices into their businesses and provide benefits to local communities impacted by their facilities. These demands must be considered with businesses need to drive efficient package delivery.

Developers/Land Owners

Given the high demand for e-commerce facilities, developers are keenly interested in developing last mile distribution centers. Neighborhoods like Red Hook, where a large proportion of land is accessible for as-of-right warehouse development, present opportunity to attract investments and tenants. In addition, developers and owners must find solutions to address the high commercial vacancy rates in Manhattan. The demand for logistic solutions can be integrated into solutions for addressing the vacancy issue.

Stakeholder Engagement

Over the course of the semester, our studio team had the opportunity to engage with numerous stakeholders from the private and public sectors to understand how their work shapes and is impacted by the last mile delivery system. We gained a wealth of knowledge from the following stakeholders and are very appreciative of their willingness to work with our team.

Department of City Planning
Jack Schmidt, Director, Transportation
Sagi Golan, Deputy Director, Urban Design
Emily Bachman, Senior Borough Planner
Jonah Rogoff, City Planner
Alex Sommer, Director Brooklyn Office
Abraham Abreu, City Map Team Leader
Chan Tran, Urban Designer

Southwest Brooklyn Industrial Development Corporation
Jesse Solomon, Executive Director
Brady Meixell, Government Relations & Business Services Manager

Regional Plan Association
Rob Lane, Senior Fellow for Urban Design

Columbia University Climate School
Anna Rubbo, Senior Researcher, Center for Sustainable Urban Development

Snowball Development
Brian Ker, Founder & President

Justin Ginsburgh
Former Senior Manager, Transportation Sustainability, Amazon

A System-Based and Site-Specific Approach

Research Questions

1

How can we reimagine the last mile delivery system to accommodate the demands of e-commerce in the context of New York's dense landscape?

2

How can we promote equitable and sustainable solutions that benefit stakeholders with diverse and diverging demands?

A Global Network

A container ship arrives at a port in Florida

The last-mile leg begins at a last-mile facility such as the Red Hook warehouse

Fulfillment and Sort Center
During the pandemic, Amazon bought more than 4,100 acres of land for new warehouse development

Have you ever wondered what happens after you hit the checkout button? The journey of your package begins before you click buy. A lot of our orders come from international manufacturing hubs such as China and Indonesia, where your package begins its journey by air or by sea to domestic ports in the US.

The delivery industry has become a global phenomenon. To facilitate this global exchange of goods, logistics networks have become increasingly sophisticated and interconnected. While this has led to more customer choice, it has also created complexities within the logistics system.

After arriving at domestic ports, it makes its way to fulfillment and sorting centers. The growth of the industry has led to an increase in real estate space occupied by warehouse centers. The sorted packages then makes its way to last-mile facilities which is the most expensive part of the logistics process.

This last mile segment poses several challenges and complexities such as traffic congestion and pollution. These challenges impact efficiency, profitability, customer satisfaction, and sustainability.

The Approach

The approach consists of tackling the last-mile delivery landscapes from two perspectives: system and site. By integrating both the overarching road networks and specific sites into potential opportunities and intervention points, the approach aims to present a more comprehensive and holistic proposal.

system-based

The interwoven nature of the last mile delivery system required us at transportation systems and logistics optimization.

site-specific

The New York context creates specific conditions that involve site based solutions and opportunities.

Evaluation

The proposal utilizes the Sustainable Development Goals to assess and measure the impacts of the interventions outlined.

The Issue: Last Mile Ecosystem

How we're living, and how we're shopping is changing. The last-mile delivery landscape is undergoing massive and swift evolutions requiring a closer look at the elements interwoven in its ecosystem: people, package, planet and profit.

Just last year, there were 268 million shoppers online in the US alone and this market is set to grow by 78% in the next 10 years. Inner cities are struggling with traffic congestion and air pollution due to the increasing number of delivery vehicles, their emissions and second-lane parking. The last mile industry also impacts profit and the industry is projected to be worth $121 billion by 2030.

people

Last mile facilities are disproportionately located in low-income communities

package

The Last-mile segment is the most expensive part of the entire logistics system

planet

Emissions from delivery traffic is only set to increase and the growth of e-commerce will require more delivery vehicles

profit

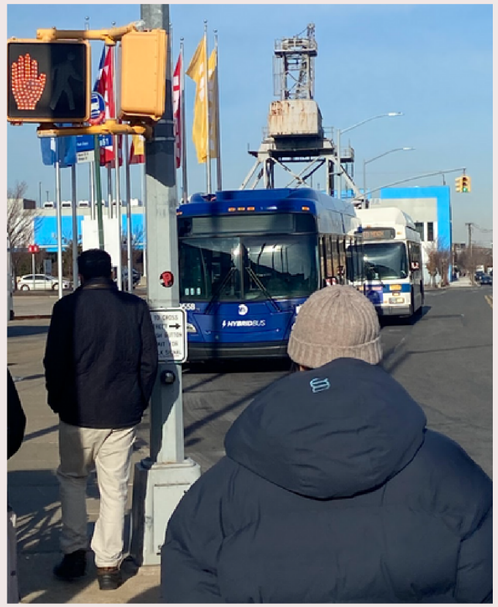
Reduced profits can come from lost packages and logistics disruptions

The Existing System

Urban consumers today demand for quick delivery times for their products. As such, the current system is inundated by delivery trucks and vehicles that are disruptive to the urban environment. Retailers are required to offer options for expedited or same-day deliveries, which creates tremendous challenges for last-mile delivery systems. In a survey by Euromonitor International (2018), consumers highlighted two key considerations for their online shopping choice: "best price" and "time savings".

The Truck Route Affects A Range of Communities

The complexity of the last mile delivery system stems from its far-reaching impact on all stakeholders involved. The intricate web of interactions that occurs when a truck passes through different neighborhoods encompasses various participants, from manufacturers and distributors to retailers and the customers. The last mile delivery system weaves together the diverse needs, preferences, and expectations of these stakeholders which contributes to the challenge of synthesizing comprehensive solutions.



The growth of e-commerce will only continue to place burdens in road networks and its adjacent communities. As online shopping becomes the preferred method for procuring goods, the demand for efficient last mile deliveries escalates, thereby exacerbating existing challenges and introducing new burdens on transportation infrastructure.

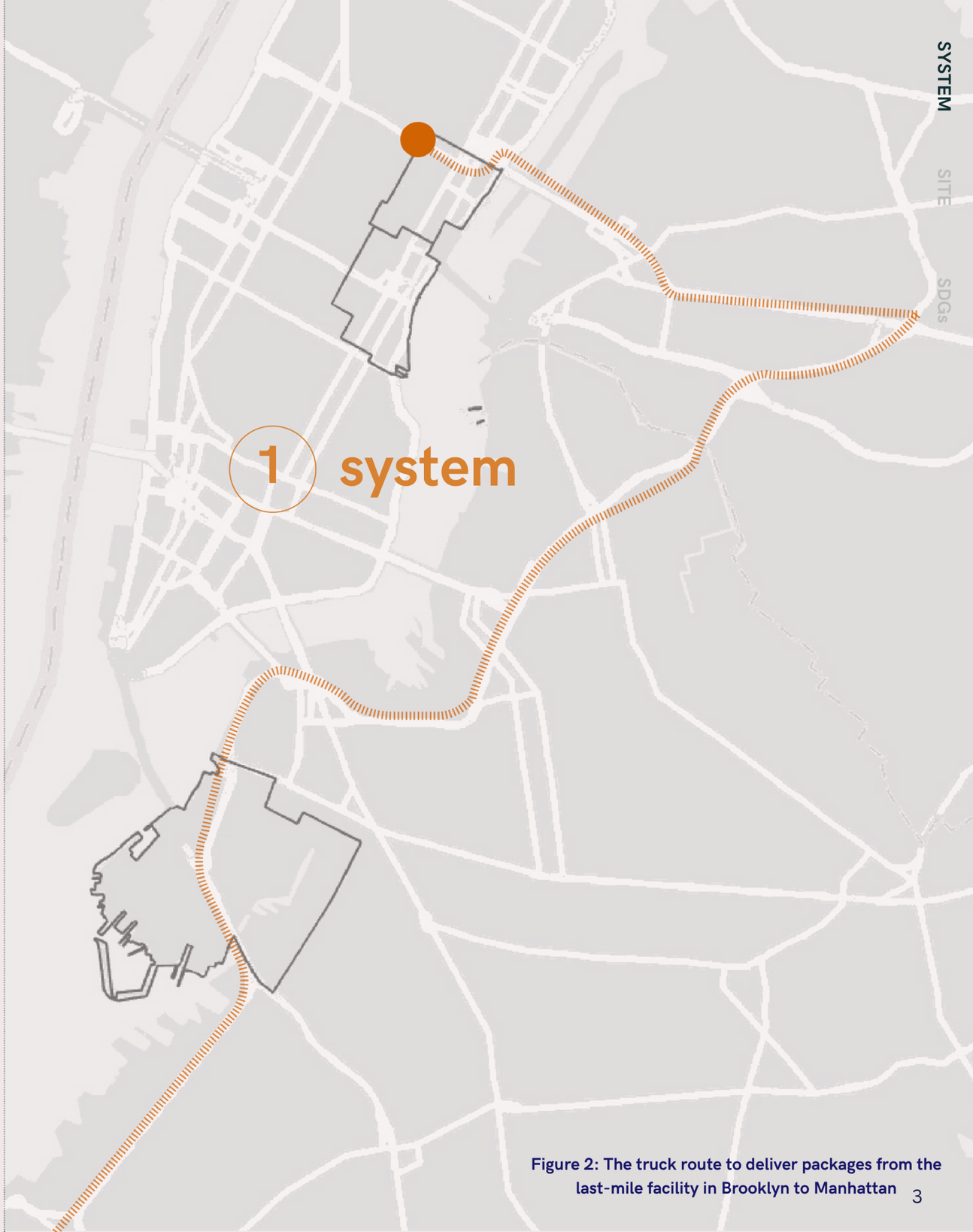


Figure 2: The truck route to deliver packages from the last-mile facility in Brooklyn to Manhattan

The Sites

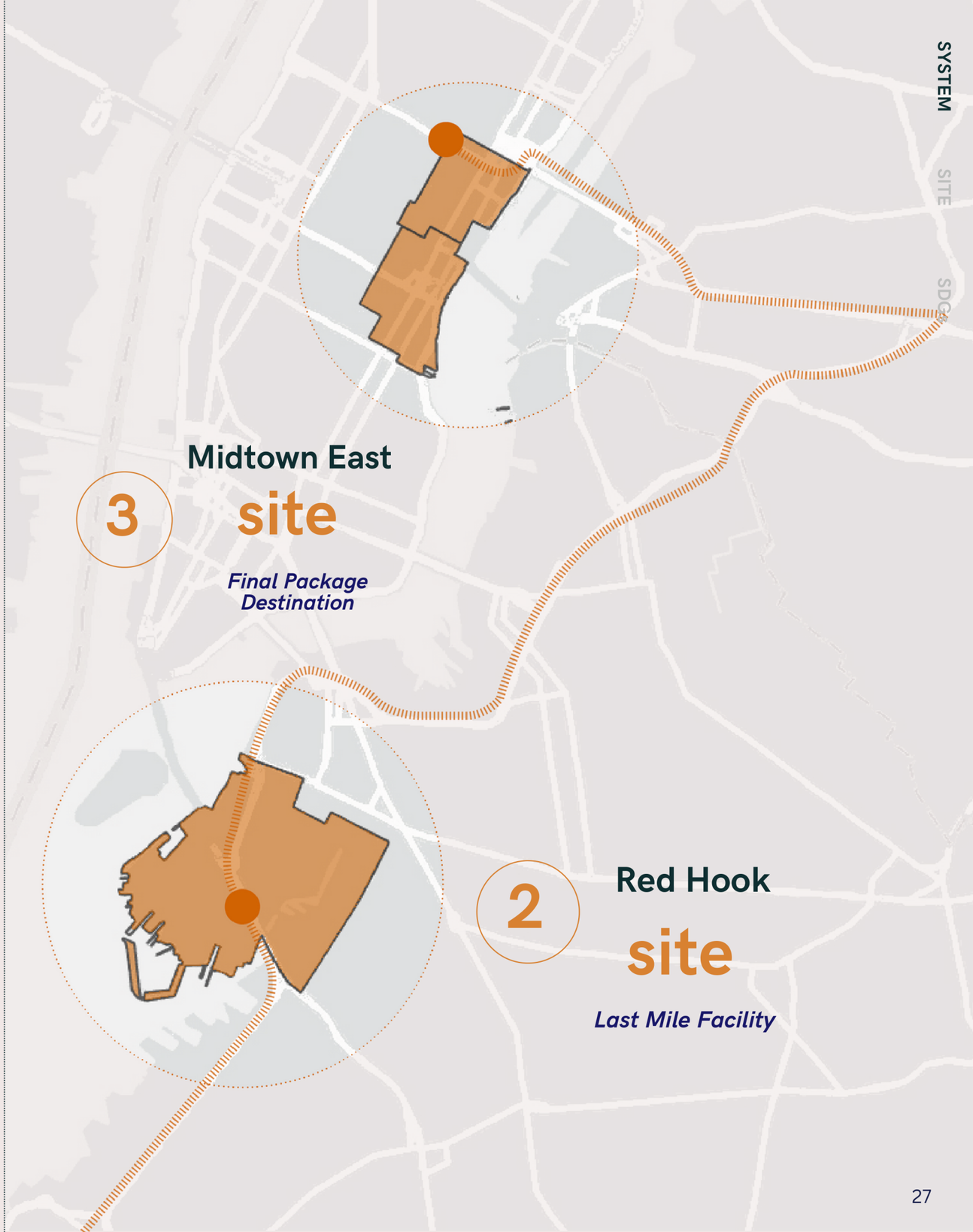
Shifting to site-specific solutions, we are first looking at a key component of delivery system, the last mile facility. At this point in the delivery system, packages are batched and prepared for transit to their final destination. We have selected a site in Red Hook to illustrate both the challenges and opportunities for the future of the last mile facility in New York City.

Red Hook

Addressing last mile delivery challenges in Red Hook requires a comprehensive approach that considers the unique characteristics and needs of the community. Historical investment in the area such as IKEA has had both positive and negative impacts for the community.

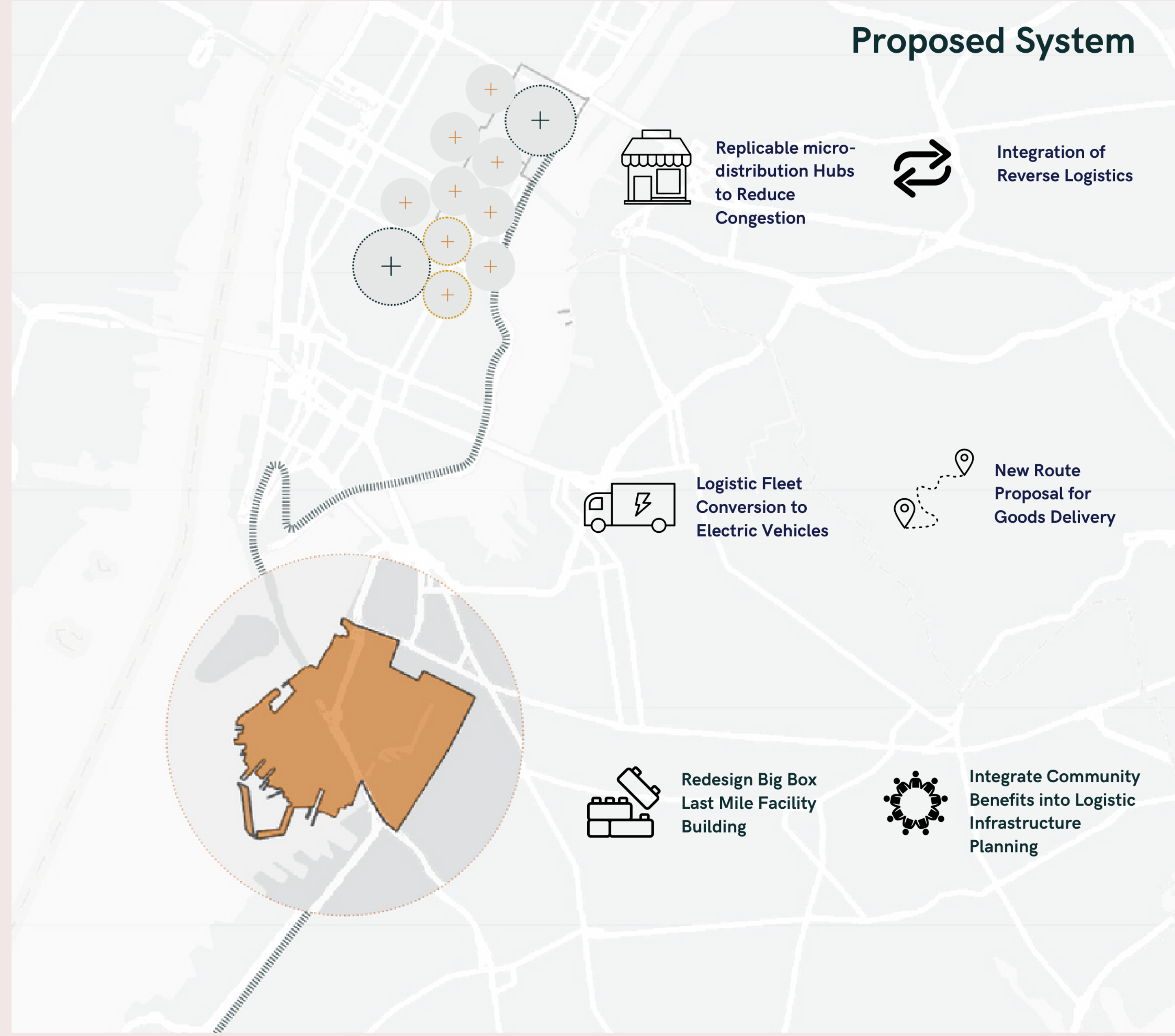
Midtown East

The dense landscape of Midtown East presents different site conditions from Red Hook and as such, requires a varying approach that can address its unique context.



Challenges in the Existing Sytem

The current system for delivering goods from a big box warehouse with a solid wall facade in Brooklyn to a destination in Manhattan has brought about various challenges. The existing system has led to significant disruptions such as increased truck traffic and pollution, and the building design does not interact or respond to the surrounding environment. The package is transported via diesel truck through the Brooklyn Queens Expressway. During the journey, the accumulation of trucks will increase traffic, and trucks will emit pollution into the air. Upon reaching the destination, the street drop and sorting process will disrupt the pedestrian walk and vehicle roads, causing congestion to the street.



System Improvement Recommendations

To improve the current delivery system, we recommend redesigning the last-mile facility warehouse through innovative design, planning, and financing approaches. We also suggest implementing a more sustainable freight transport system by converting logistic fleets to environmentally friendly options. Additionally, we propose creating replicable micro-distribution hubs closer to the customer's doorstep to reduce the problems caused by on-street sorting and integrating reverse logistics to enhance efficiency and reduce waste throughout the system. These recommendations have the potential to increase efficiency and sustainability in the delivery process while also addressing community and environmental concerns.

Action Towards Zero Emission Freight Transport

1

Convert delivery fleet to electric vehicles

According to a study by the International Council on Clean Transportation (2023), electric trucks emit 63% less lifetime emissions than diesel, even when charging from a mixed fuel source. Based on this finding, we recommend expediting the transition from diesel to sustainable options, including electric trucks and vans for goods transportation, as well as electric bikes for door-to-door delivery.

2

Integrate smart circuit breaker for efficient and safety charging

Our proposal aims to enhance the charging infrastructure in the city to accommodate the growing demand for electric vehicles. To achieve this, we suggest integrating smart circuit breakers that can regulate and improve energy allocation and efficiency. This would also enhance the safety of the charging system while enabling the addition of more charging stations.

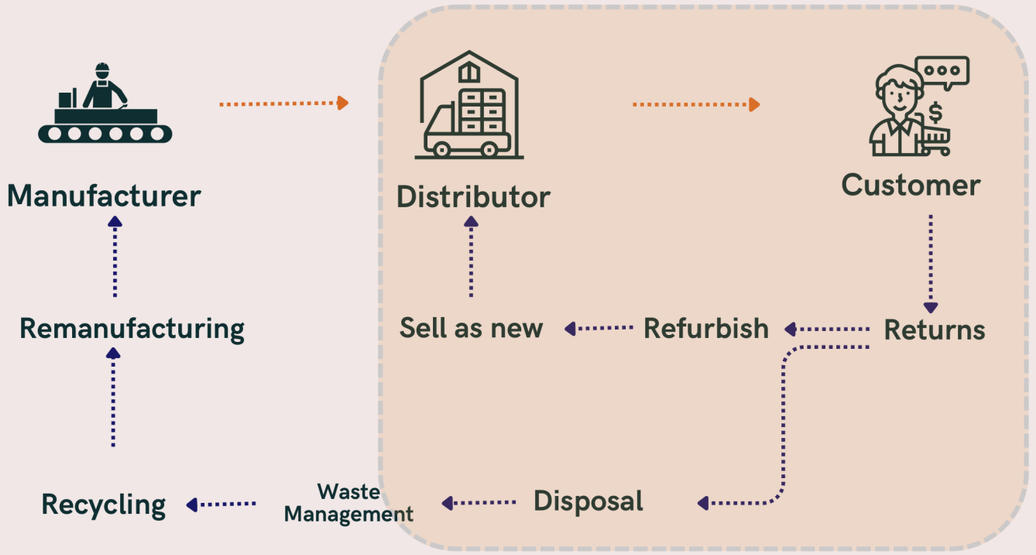
3

Access Brooklyn - Battery Tunnel with electric vans

Our third recommendation involves splitting traffic and freight loads between electric trucks and electric vans. This would not only reduce the number of trucks on the expressway but also enable electric vans to use the Brooklyn Battery Tunnel during off-peak hours, resulting in a shorter journey time to reach Manhattan.

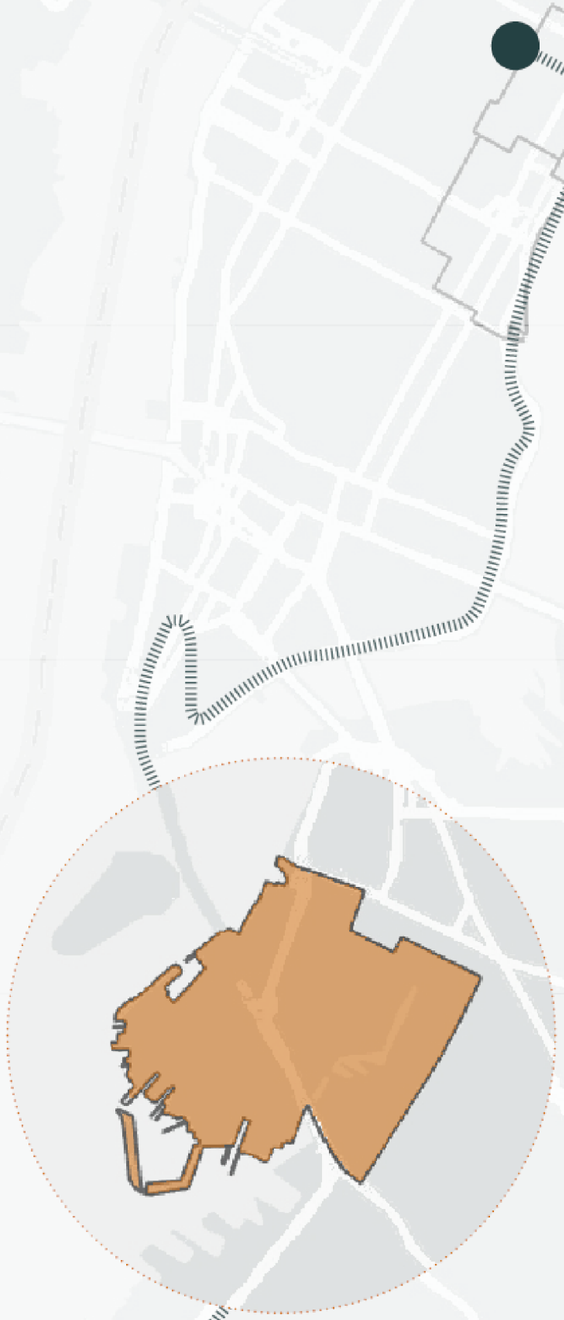
Integration of Reverse Logistics

Simplifying the returns process can help keep usable goods out of the trash



One point we propose is the integration of reverse logistics, which addresses the issue of wasted goods and products resulting from online returns. Research indicates that 30% of online purchases are returned, leading to the landfilling of 9.5 billion pounds of goods and up to $816 billion in lost value (Cosgrove, 2023). Reverse logistics offers the opportunity to resell returned products as new or recycle and remanufacture them.

To improve the reverse logistics system, we suggest focusing on the stage between the customer and the distributor. We recommend creating integrated return systems and providing facilities in neighborhoods with high e-commerce order density to enable more customers to return their packages conveniently. This approach would help to reduce the amount of waste generated by online returns while increasing efficiency in the distribution process.



Site 1

Red Hook

Last Mile Facility

Overview

The first site we chose to focus on is located in Red Hook at 688 Court Street. Our proposal envisions a mixed use distribution facility on this site that accommodates the demands of the last mile delivery system in a sustainable design that integrates community needs and enhances the local landscape.

The undeveloped site is located adjacent to Red Hook Park, a neighborhood hub for activity that has a variety of sports fields and recreational space. There is also a 300,000 square foot film studio slated for development across the street from the site. The designs for the film studio include a waterfront park for public use and aspires to foster a connection to the local area. There is a great opportunity to activate the space on Halleck Street that connects the park to the lot at 688 Court Street and contribute to this area's potential as a space for the local community to enjoy.

The facility at 688 Court Street will add to the growing presence of distribution facilities in Red Hook. Two thirds of the land in Red Hook is zoned for as of right development of last mile facilities, resulting in an explosion of facilities developed in the past decade. There is currently over 1,000,000 square feet of developed distribution space in the neighborhood.

Red Hook is a strong illustration of the all too common trend of last mile warehouses being developed in close proximity to low-income communities, generating pollution, traffic and noise for local residents. In Red Hook specifically, these impacts exacerbate the environmental inequities faced by residents living in the high flood risk area. The NYCHA Red Hook Houses are located blocks from the cluster of last mile facilities. The public housing development is home to nearly 6,000 residents, many of whom live below the poverty line. The unemployment rate is well above the city average at a staggering 31%. However, many residents operate informal businesses from their homes but lack the opportunity and skill sets needed to formalize and grow their businesses.

Red Hook Park
Source: DoNYC

Red Hook Houses
Source: City Limits

Red Hook Storefronts
Source: WSJ

688 Court Street

The demographics of the Red Hook Houses are starkly contrasted by those of residents living in the area west of the public housing development. The area has seen a high influx of affluent white residents in recent years who are drawn to the cultural scene of the waterfront area.

It is clear that e-commerce is not going anywhere and the demands of the delivery system will continue to grow. However, traditional last mile facilities can be reimagined to harmonize with the urban environment and provide benefits for local communities. In consideration of the existing conditions and challenges of the Red Hook community, we have identified four objectives to guide our site development- workforce development, small business support, community resilience, and community-minded design.

Objectives

Workforce Development

Small Business Support

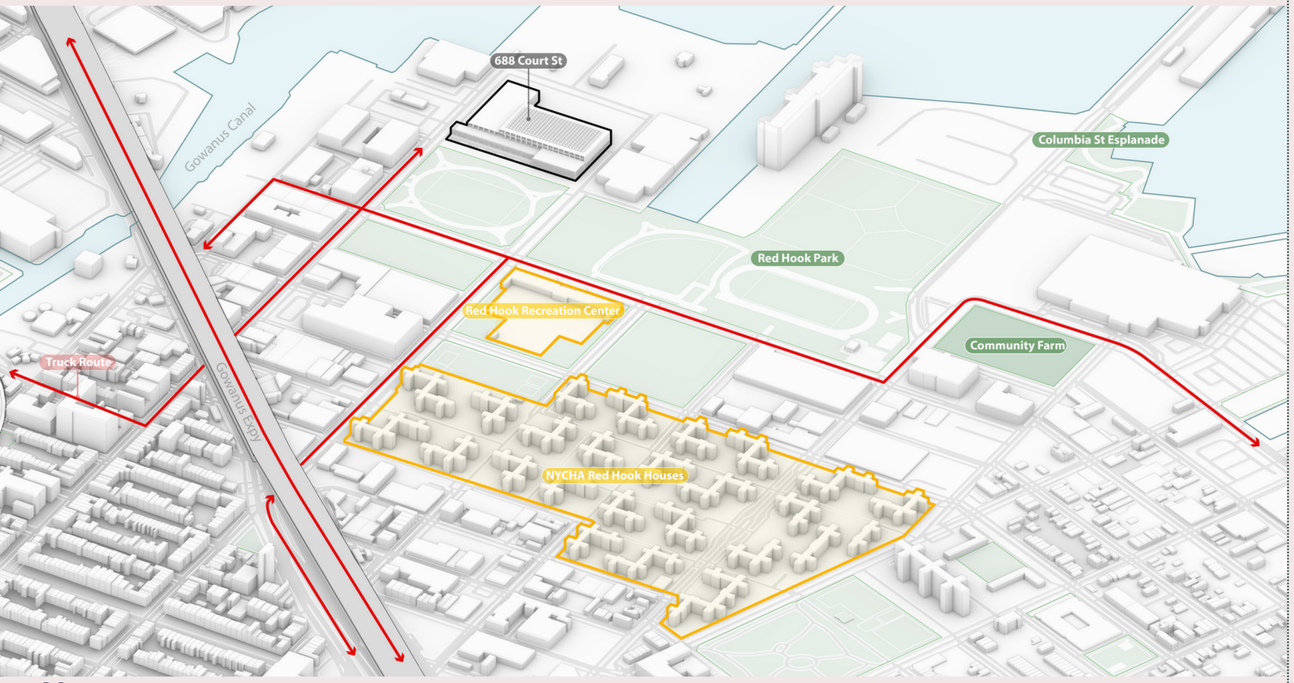
Community Resilience

Community Minded Design

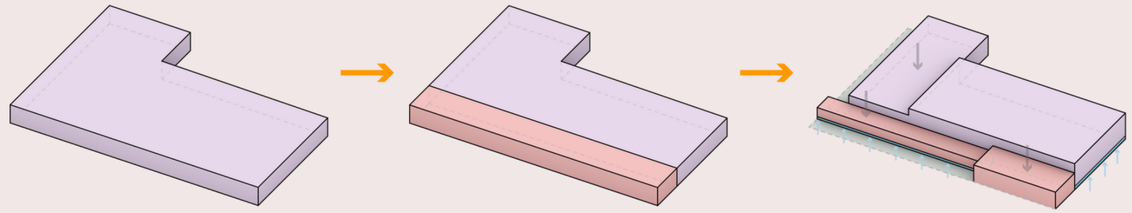
Massing

Our approach to designing a new mixed-use facility involved conducting a thorough analysis of the surrounding area. We placed particular emphasis on nearby existing programs, stakeholders, and parks, including the adjacent Red Hook Park and Recreation Center, and the NYCHA Red Hook houses. We also took into account the nearby Gowanus Expressway and the truck routes within the neighborhood. This information was essential in shaping a building design that was optimized for the needs of the community and the coexistence of the logistics operation of the last mile distribution operation.

By focusing on these key factors, we were able to create a design that enhances the community's access to essential services while also considering the needs of nearby residents and minimizing the impact of truck traffic on the surrounding area. We carefully tailored the design to the specific needs of the community, while also taking into account the surrounding context and local stakeholders. Ultimately, our approach resulted in a building design that strikes a balance between meeting the functional requirements of a mixed-use facility and enhancing the quality of life for the community it serves.



Massing and Urban Design Strategy



Traditional Single Use Warehouse

Add commercial uses along public front

Elevate and Compress

The massing strategy for our new typology of mixed-use distribution facility involves several key elements. Firstly, we have taken the traditional single-use distribution warehouse and added commercial uses along the public frontages, in our case the north face facing the Red Hook Park, to create a more diverse and attractive street frontage. Secondly, we have elevated the building by 5 feet for flood protection measures, providing added safety and resiliency. Finally, we have introduced variations in height, particularly for the commercial spaces to break up the monotony traditional warehouse structures and creates a human-scale experience that is more welcoming and inviting.

This massing approach results in a mixed-use distribution facility that not only provides essential services but also adds value to the community by positively contributing to the local economy and enhancing the surrounding neighborhood fabric in a way that is contextually appropriate.

Program

157,680 SF Lot
Zoning District: M3-1

FAR (Manufacturing & Commercial)
Allowable FAR: 315,360 SF
Used FAR: 312,450 SF

Distribution Facility
244,000 sf
$32/sf/yr

Market Retail
13,000 sf
$30/sf/yr

Microgrid Storage

E-Bike Manufacturing
20,500 sf
$20/sf/yr

Vertical Farming
25,500 sf
$20/sf/yr

Shared Commercial Kitchen
12,000 sf
$15/sf/yr

Bryant St
Proposed Halleck St Extension
Court St
Clinton St
Bay St

SYSTEM
SITE
SDGs

Program

#1: Shared Commercial Kitchen

12,000 SF | $15/SF/YR

A commercial kitchen provides food entrepreneurs with a furnished space to make their products. The kitchen space can be rented out by both anchor tenants and local small businesses, such as those owned and operated by local NYCHA residents. Anchor tenants are established businesses who can afford to pay a higher rent to offset the comparatively low rent small businesses are able to pay. The space can be used for business training courses.

#2: Market Retail

13,000 SF | $30/SF/YR

The market retail space provides an opportunity for local independent retailers and small businesses under one roof. Working in partnership with the shared commercial kitchen, kitchen tenants can scale their businesses by selling their products at the market. In addition, NYCHA residents who operate non-food businesses can sell their products as well.

#3: E-Bike Manufacturing

25,500 SF | $20/SF/YR

Despite the widespread use of electric bicycles in New York City, there are currently no e-bike manufacturers located within the city. By producing e-bikes that use rechargeable batteries and emit zero emissions, the manufacturer provides a local source for furthering the city's ambitious climate goals to reduce carbon emissions while also promoting active and healthy lifestyles.

#4: Vertical Farming

25,500 SF | $20/SF/YR

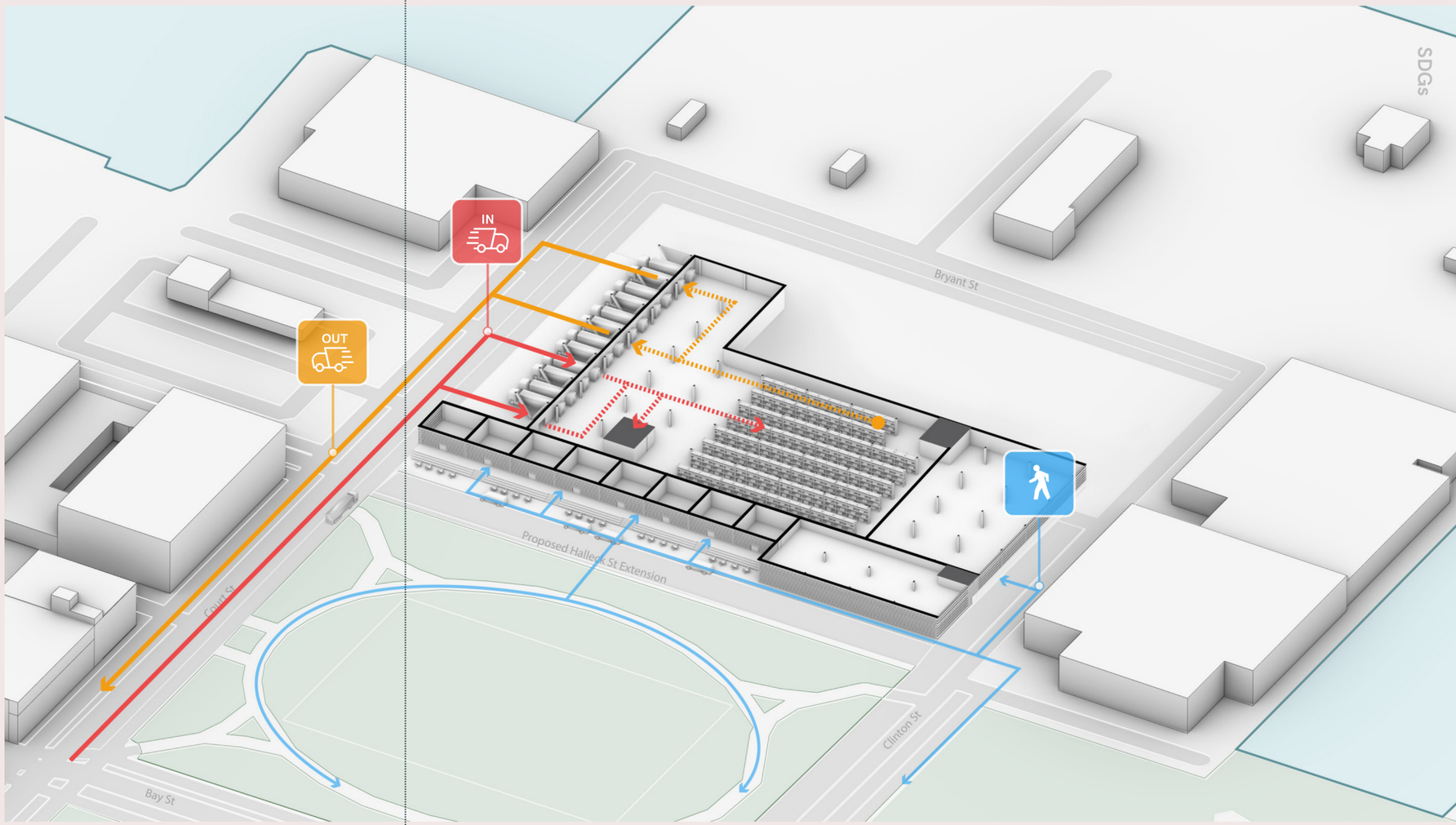
Vertical farming offers several benefits, including increased yield per square foot, reduced water usage, improved crop quality, and year-round production. It also eliminates the need for pesticides and herbicides, creating a more sustainable and environmentally friendly method of agriculture. This use generates jobs in the green workforce and reflects the City's prioritization of sustainable practices and local food production.

Access and Circulation

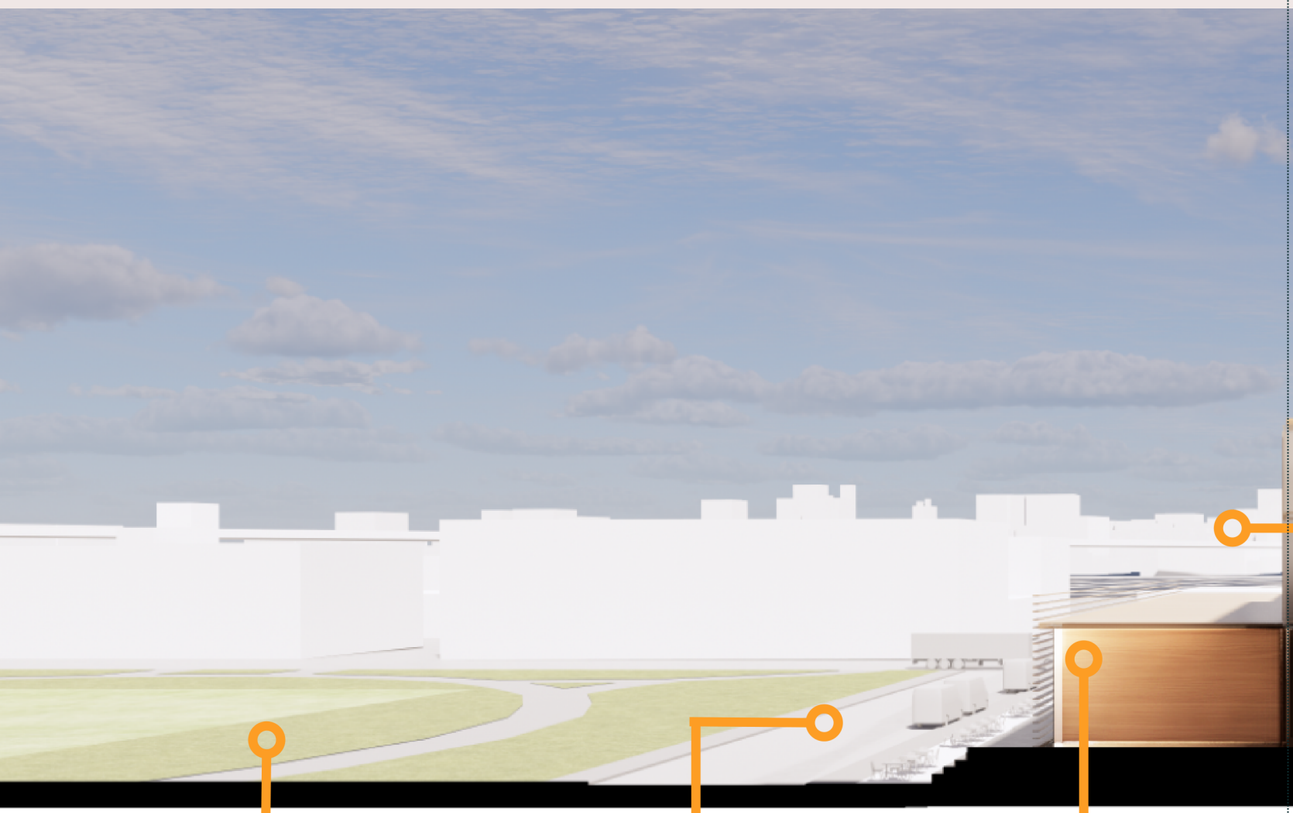
The design strategy for the new typology of warehouse involves the separation of truck and pedestrian access and circulation. By doing so, it ensures that the safety of pedestrians, including NYCHA Red Hook Houses residents, is prioritized, and the trucks' operation within the warehouse facility is not hampered.

The pedestrians will be able to access the commercial retail stores, shared community kitchen, and community garden from Clinton Street through the Red Hook Park. This pedestrian-friendly approach ensures that the residents have easy access to the amenities while creating a safer environment.

On the other hand, the trucks will have sole access to the warehouse facility from Court Street, which is currently a designated truck route. By separating the pedestrian and truck routes, the design strategy ensures that there is no overlap between these two traffic types, thus avoiding any accidents or mishaps.



688 Court Section Program and Public Front



Food Truck Vendors

Seating Area

Retail

Open Patio

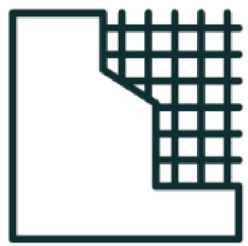
Distribution Facility

Storage

Sustainability And Resiliency Solutions

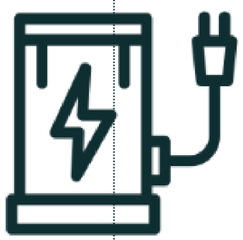
Mass Timber Construction

Cost: $17,500,000
Rebates/Tax Credits: None



Low Carbon Concrete

Cost: $2,000,000
Rebates/Tax Credits: None



EV Charging Stations

Cost: $800,000
Rebates/Tax Credits: $800,000

1.5 Megawatt Microgrid

Cost: $7,500,000
Rebates/Tax Credits: $2,250,000

Solar Panels

Cost: $18,500,000
Rebates/Tax Credits: $4,000,000

Valuation and Cost Analysis

Development Cost Analysis

A development cost analysis was conducted in order to understand the impacts of implementing the sustainability and resiliency methods used at 688 Court Street. When compared to a traditional warehouse, by implementing the various sustainability and resiliency methods at 688 Court Street it will leave a significant development cost gap. In order to close this development cost gap, three solutions have been proposed.

The first solution requires governmental authorities to create new policies surrounding sustainable materials used to construct buildings. For example, creating a new tax credit for developers to use sustainable materials like mass timber will help lower the otherwise large upfront cost.

The second solution includes updating current policies to provide larger incentives (i.e. larger tax credits) for implementing sustainable and renewable materials and methods. For example, by providing larger tax credits for solar panels, it will help mitigate some of the upfront cost of installing solar panels, providing an opportunity for more developers to install solar panels which could result in further energy independence for real estate developments.

The last solution is for the creation of more Environment, Social, and Governance (ESG) funds and investors who understand the impacts on the bottom line of implementing these various materials and methods.

Traditional Warehouse Cost: **$110M**

688 Court Street Cost: **$175M**
Existing Tax Credits/Rebates: **$7M**

Development Cost Gap: **-$58M**

Closing The Gap

New Policies (i.e. tax credits for mass timber construction)

Updating Existing Policies (i.e. larger tax credits for solar panels)

ESG Fund/Investors

Valuation Analysis

A valuation analysis was conducted in order to understand the impacts of implementing the proposed programs at 688 Court Street. When compared to a traditional warehouse, by implementing the various proposed programs at 688 Court Street it will leave a significant valuation gap. In order to close this valuation gap, two solutions have been proposed which require government intervention. The first solution requires governmental authorities to reduce the parking requirements at 688 Court Street. By reducing the parking requirements it will increase the rentable square footage of the building, allowing a landlord to capture additional upside at 688 Court Street by charging more rent or more square footage. A second solution would be to provide a tax abatement with the site that would run for 10+ years. The tax abatement would allow a landlord to charge more per square foot for rent since the operating expenses would be reduced.

Our analysis also considered the possibility of rezoning the site as a mechanism to incorporate community benefits into the site development. However, after careful consideration it was decided that community benefit could be integrated through as of right development. The reduced parking and the use of ESG funds are essential to realizing our site proposal. By reducing the undue financial burden of the parking requirement and integrating investor driven values, the site can integrate local benefits without an arduous rezoning process.

Traditional Warehouse Rents: **$32 PSF**
Cap Rate: **5.00%**
Traditional Warehouse Valuation: **$200M**

688 Court Street Blended Rents: **$30 PSF**
Cap Rate: **5.00%**
688 Court Street Valuation: **$187.5M**

Valuation Gap: **-$12.5M**

Closing The Gap

Reduced Parking Requirements

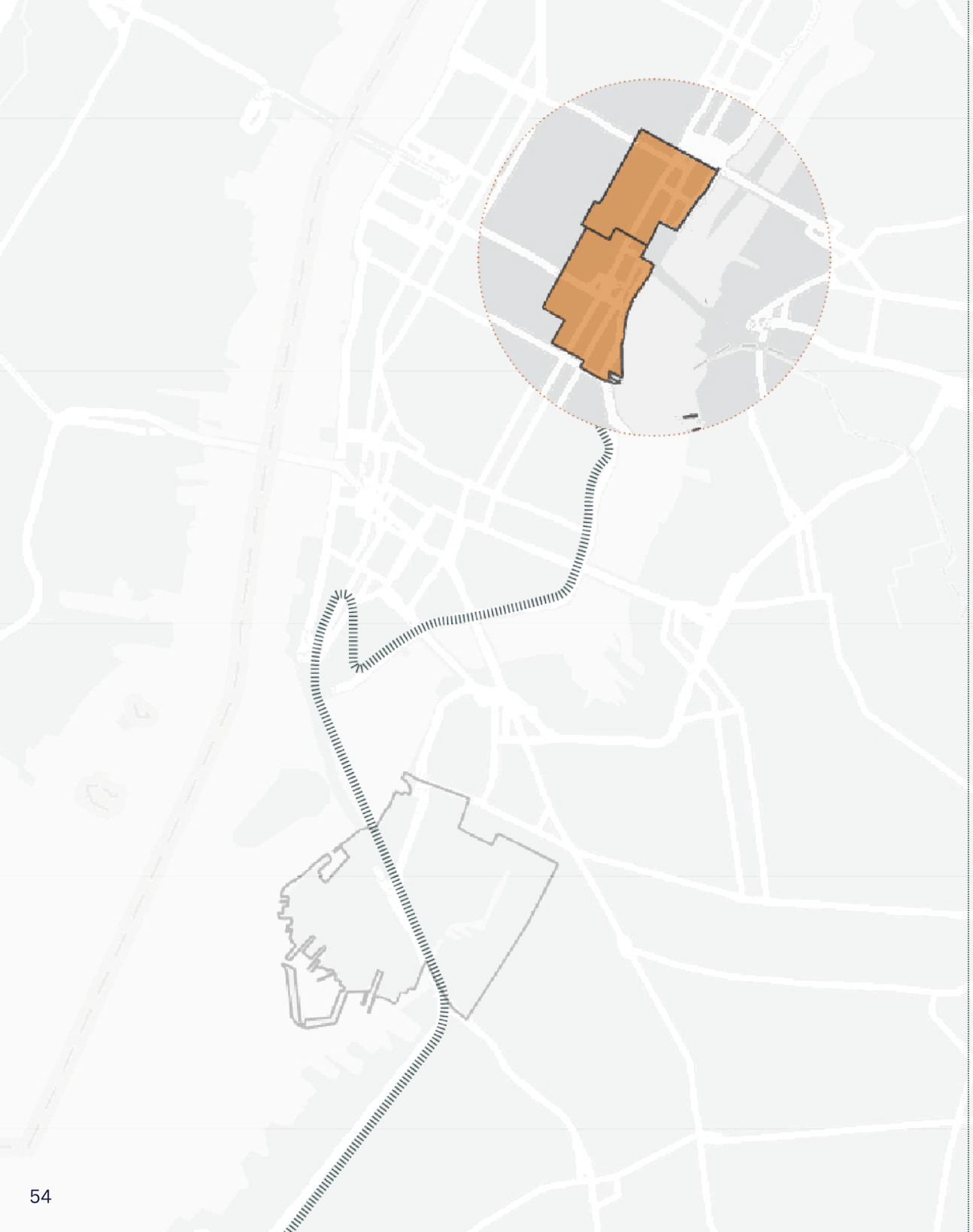
Real Estate Tax Abatements

Traditional

SYSTEM SITE SDGs

The proposed mixed use distribution center creates a connection to Red Hook Park that fosters a greater sense of community connection. In addition, the space creates opportunities for job and skill growth and commercial activity.

Proposed



Site 2

Midtown East

Final 50 ft Delivery

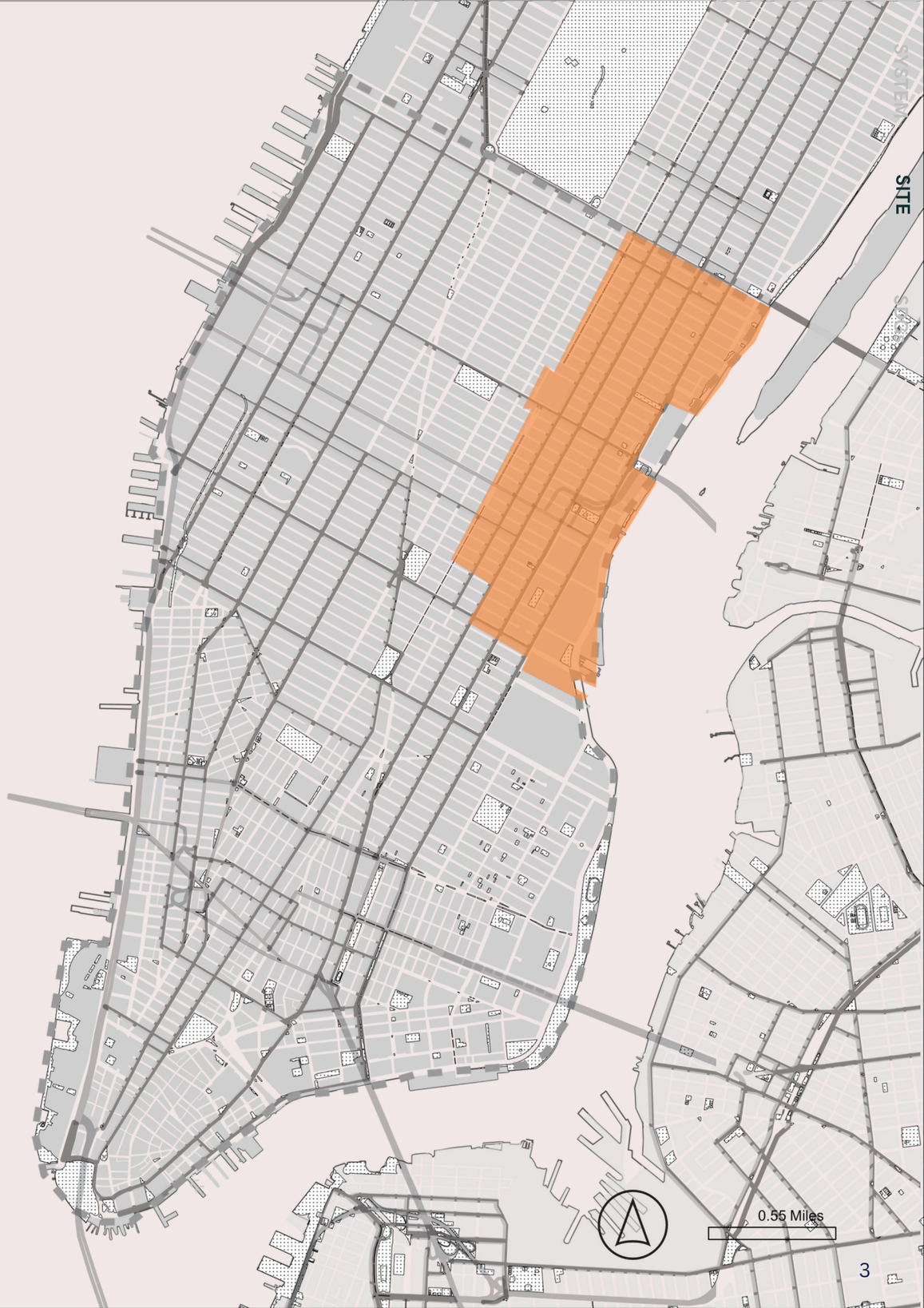
Study Area
Midtown East

Lower Manhattan

Truck Routes

Study Area Boundary

Our study focuses in Lower Manhattan, an area with the highest e-commerce density in the city. According to a study by Komanoff (2021), the area experiences over 34,700 weekday deliveries per square mile. However, the area is also subject to the MTA's central business district congestion pricing, where all vehicles entering roads during peak hours are charged a congestion fee. The networks of truck routes in the area highlight the volume of deliveries in Lower Manhattan. Once the delivery trucks reach their destinations, they often spend over 6-7 hours conducting drop-offs and sorting goods. This activity can disrupt pedestrian walkways and vehicle roads, creating a challenge for urban planners. In response to these issues, innovative solutions are needed, and this report will propose solution prototypes that can be applied in the neighborhood and potentially replicated elsewhere.



Opportunities in Midtown East

Demand: Housing

0.9%

Vacancy for low-rent apartments

(New York City Housing and Vacancy Survey, 2022)

560,000

Units need to be built by 2030

(Real Estate Board of New York, 2022)

Supply:
Vacant Office Building and Storefronts

10%

drop in long-term demand for office space

(Bloomberg, 2022)

29.9%

storefronts in Midtown are unoccupied

(Real Estate Board of New York, 2021)

Class B & C

19.5% Vacancy

(Moody's)

~2,000 SF

Average Size

(The Real Deal, 2022)

Responding to the opportunities by addressing vacant offices & storefronts to create mixed use building type

On the demand side, there is an urgent demand for housing, especially for affordable housing in Midtown East and across the city. The vacancy rate for low-rent apartments is quite low at 0.9%, indicating the scarcity of affordable housing. It is estimated that 560,000 units need to be built by 2030 to accommodate the population growth.

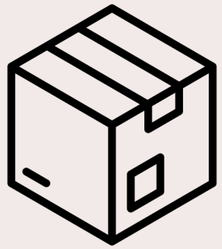
On the other hand, the long-term demand for office space will drop by 10% or more due to the shift to remote and hybrid work after the pandemic. Compared to class A offices, class B and C offices have a higher vacancy at 20%. About 30% of storefronts in Midtown East are unoccupied.

Thus, we think there are opportunities to convert vacant class B offices and storefronts into mixed-use buildings that include logistics and residential use and offer affordable housing.

Last 50-feet problems

People

Driver spent 80% of their time on foot to find destination address



Package

33 million of packages are lost every year in NYC, adding up to $483 million in lost goods and services

Planet

Drop off and on street sorting activities causing congestion in narrow streets and pedestrian walkways

Profit

Up to 50% of the estimated $35 billion transportation supply chain costs are driven by the last phase delivery

Objectives for interventions

Reduce Congestion

Reduce truck trips for package drop offs

Optimize Building Capacity

Make use of underutilized areas in dense neighborhoods

Human-centered design

Interactive system that focuses on users

Responsible Consumption

Promote sustainable shift to manage consumption and waste

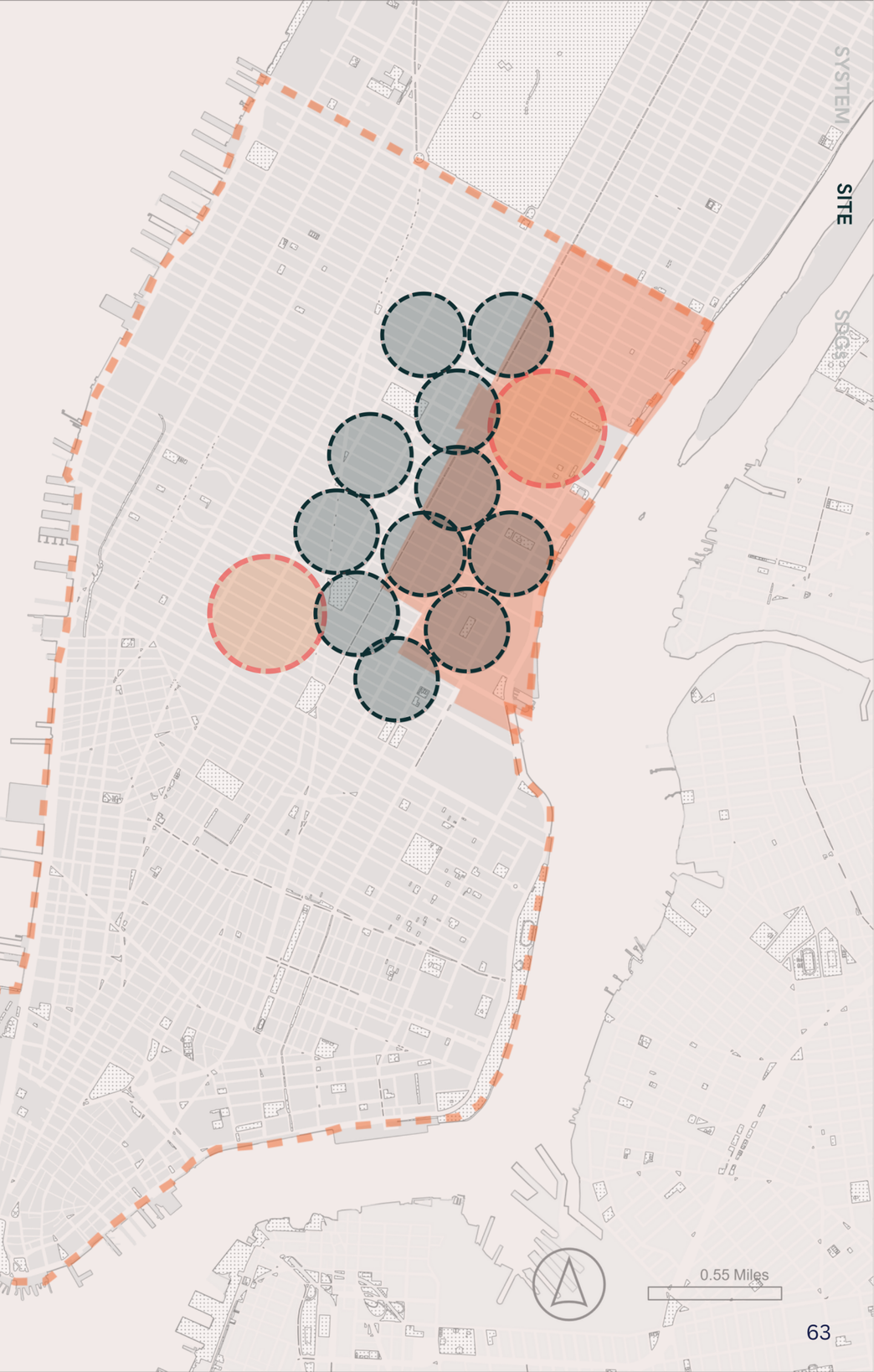
Summary of Interventions

Mixed-Use micro-distribution Hub

Larger storage area with garage; serving 4-5 blocks coverage radius

Storefront Pick-Up Center

Smaller facility area serving 2-3 blocks coverage radius; denser distribution



Prototype 1:
Mixed-use Micro-Distribution Hub

Site Choice Parameters

Class B office building

Located in less busy streets

3,000-10,000 Sqft Footprint

8'2" clearance for vans to unload

Solution Created

Up to 10-15k packages

Trucks and vans unload in the garage

Cater to hand cart & e-bike couriers

Convert single use into mixed use

For the mixed-use micro-distribution prototype, there are some parameter requirements to be a suitable building for conversion. The building should be an underutilized class B office building that is mostly vacant. To reduce the negative impact on traffic brought by delivery vans, bikes, and hand carts, the building should have access open to less busy streets rather than avenues or streets that already have heavy traffic.

The micro-distribution hub requires a footprint of 3,000-10,000 square feet and a garage of 8'2" clearance to allow van access.The mirodistribution hub, with a daily capacity of up to 15,000 packages, will solve the problem of on street delivery by having vans unload packages in the garage. Since it is closer to the final destination, it is possible to have packages delivered by e-bikes and hand carts and enable a shift to low emission transportation. The micro-distribution hub can be integrated with other uses in the building, such as residential and commercial use.

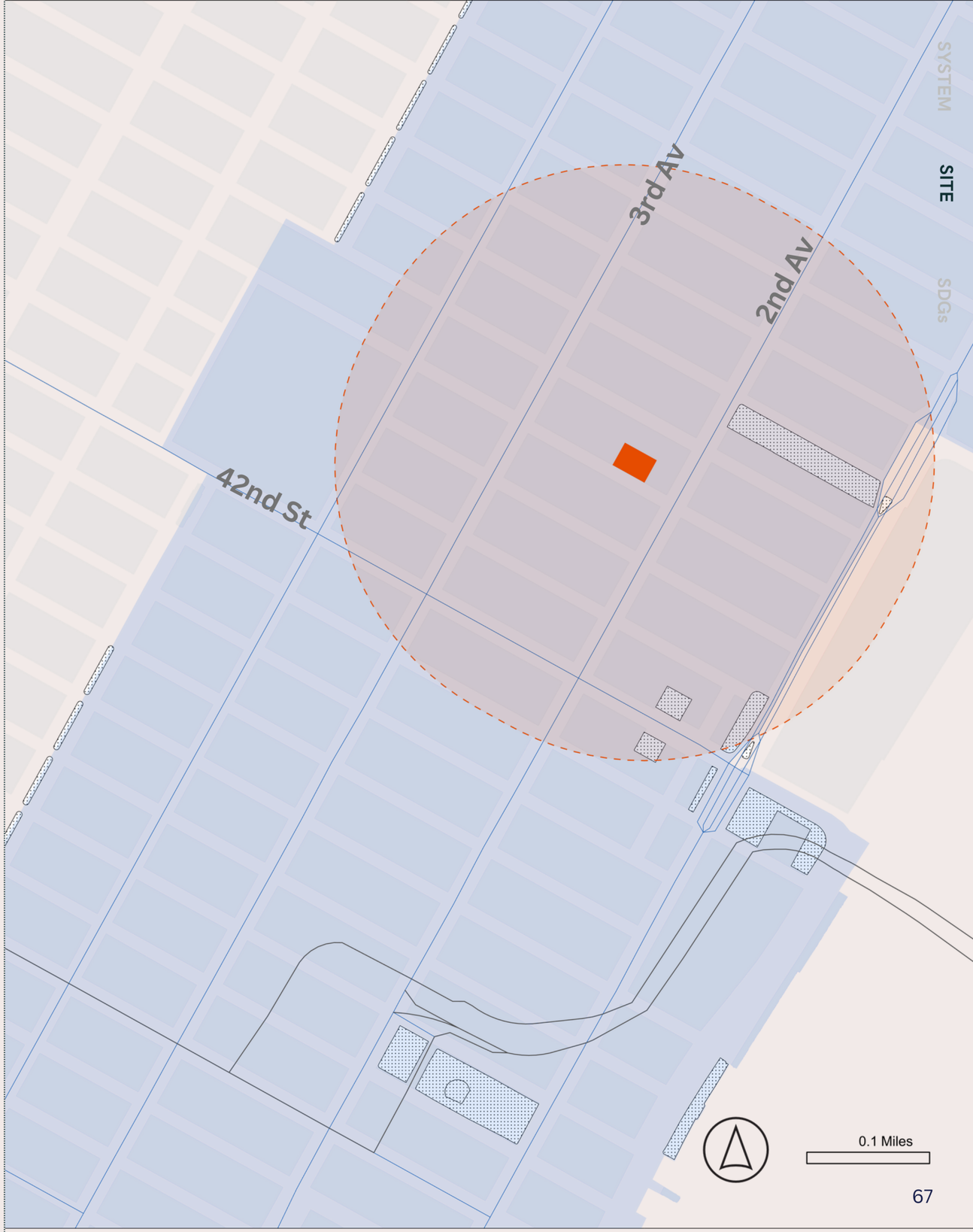
Class B Office Building Conversion

234 East 45th Street

Frontage: 150 ft
Depth: 100.42 ft

Zoning district: C6-4
Lot area: 15,062 sq ft

Our prototype study for this solution proposal will focus on a site located at 234 East 45th Street. This site is a 16-story office building with a 15062 sqft area, which includes a parking garage on the ground floor that has a dedicated truck-loading area. The size of the garage on the ground floor provides ample space for package storage, allowing for a larger service area for the proposed solution. Based on calculations of the buffer area, considering the number of households and weekday e-commerce deliveries per household (Komanoff, 2021), this facility has the potential to serve a quarter-mile radius. This site is ideal for our prototype study as it provides the necessary infrastructure to support the proposed solution and has the potential to improve the efficiency and effectiveness of e-commerce deliveries in the surrounding area.



Planning the Program

Planning for Microdistibution Hub Operation

Planning to accomodate the operation of micro-distribution hub in the building, we try to make use of the exisiting parking garage with estimated floor area of 7,612.27 sqft. This space could be utilized for sorting, storage, and operations, with an existing loading dock that can accommodate one electric truck for unloading inside the garage. Other openings in the garage could also be utilized for access by e-bike, hand cart couriers, and electric vans. However, it is important to consider potential disruptions that the facility may cause to the neighborhood, such as increased street traffic, noise pollution, and waste. These potential impacts should be carefully assessed and mitigated to ensure that the micro distribution hub can operate in a sustainable and socially responsible manner.

Converting Office to Residential Uses

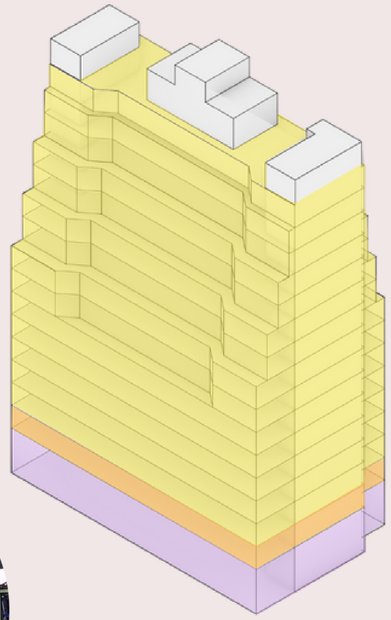
One possible solution to address the housing demand in the area is to convert existing office spaces into residential uses. With estimated over 128,000 sqft of gross office area, we could potentially create studio, 1-bedroom, and 2-bedroom units. With 100 ft building width in floors without setbacks, access to natural light for each unit's bedrooms is a primary consideration in the configuration planning. The project intends to allocate 35% of the units for affordable housing, while the remaining 65% will be market-rate housing. In addition to the residential units, the building will include resident amenities, such as laundry rooms and seating areas in each floors.

Adding Public Amenities

As part of our development plan, we aim to allocate 3-5% of the floor area for public amenities, which will cater not only to residents but also to the surrounding community. We plan to create a co-working space for remote workers, which can serve as a hub for entrepreneurs and freelancers. Additionally, we propose to add a child care facility adjacent to the co-working space to provide working parents with the necessary peace of mind. The child care facility will also benefit potential residents by providing a convenient option for child care. Furthermore, we intend to include an older care center that will offer recreational activities for senior citizens living in the area, contributing to their overall well-being and quality of life.

Program Summary

105,000 sqft
for Residential Area



6,500 sqft
for Micro- distribution Facility

4,000 sqft
for Public Amenities

182
total residential units

0.25 miles
radius served by micro-distribution Hub

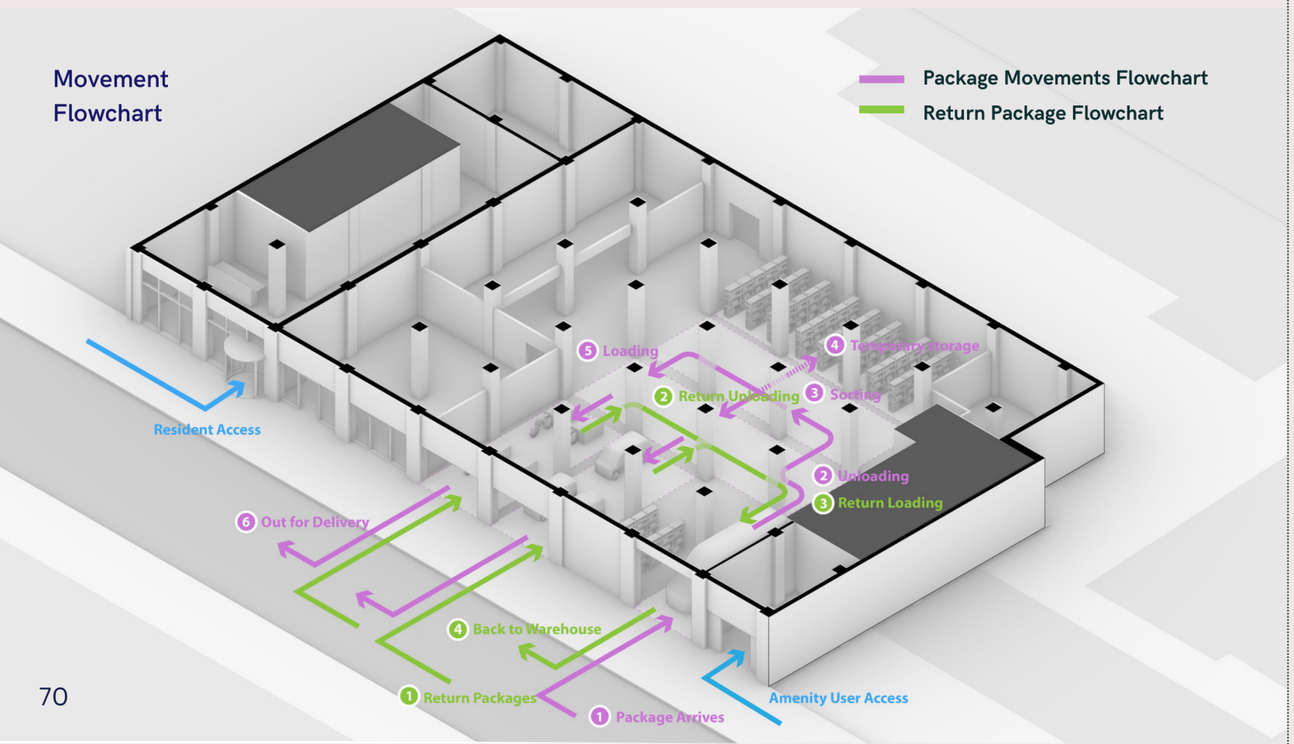
Public Amenities
older adult center, day care, co-working space

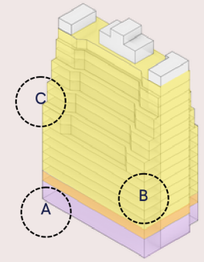
Spatial Configuration

Our building conversion proposal includes a number of features aimed at optimizing the use of space and providing a range of valuable amenities to residents and the community at large. At the ground level, we are proposing to convert the existing parking lot into a micro distribution center. In order to maximize the efficiency of space, we studied the flow of outgoing and return packages and took on-street activities into account. This involved developing flow charts that were used to inform our design choices and ensure that the building's layout was optimized for its intended use.

Furthermore, we plan to introduce a smart grocery that would be shared by the residents, employees, and community, as well as two different entry points to the daycare and senior center on the second floor, and the residential units above.

On levels 3-7, we have designed a typical floor plan that includes a mix of market rate and affordable units, consisting of flex studios, 1 bedroom, and 2-bedroom units with shared laundry on each floor. On levels 8-16, there are market rate residential units, and because the building has a terraced form, the unit plans and mix change, with some upper floors having open balconies.



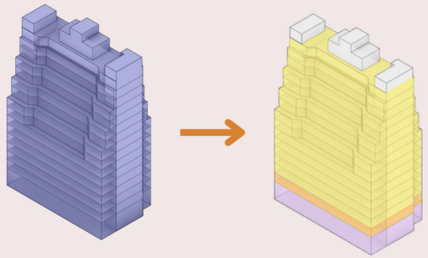


C
L8-L16
Residential
Configuration
(with set-back)

B
L3-L7
Residential
Configuration

A
L1
Residential
Entrance and
micro-distribution
Hub

Zoning Analysis



In order to determine the feasibility of our proposed solution for converting an office building into a mixed-use residential and micro-distribution facility, a thorough analysis of the zoning ordinances in New York City is necessary. While most commercial districts have a residential equivalent, such as the C6-4 with R10 residential equivalent zoning of our prototype site, which allows for the addition of residential units into the building, the potential for including micro-distribution hubs in commercial districts must also be examined. Our team is focused on identifying strategies that can support our proposal beyond what is currently allowed by zoning regulations, and we are actively exploring additional zoning tools that can be utilized to support this project.

Case Study on Existing Storefront Logistic Facilities

Our study includes a case study on two existing storefront logistic facilities located in commercial districts. Through our research, we found that Environmental Designation requirements can be applied to proposed use, promoting sustainability in our proposed solution. An E-Designation is a zoning regulation that triggers an environmental review for certain development projects in NYC. It requires developers to obtain an environmental permit before redevelopment proceeds to ensure compliance with environmental regulations, thus promoting sustainability in our proposed solution.

697 3rd Ave

Zoning Districts:
C5-3, MID
With <u>Environmental Designation</u>
Land Use:
Commercial & Office Buildings

105 E 34th St

Zoning Districts:
C5-3
Land Use:
Multi-Family Elevator Buildings

Zoning Tools: Use Groups

Use Group 6
Primarily of retail stores and personal service establishments

(1) provide for a wide variety of local consumer needs; and

(2) have a small service area and are, therefore, distributed widely throughout the City.

Post Office is under uses that are permitted within a large-scale residential development to provide daily convenience for its residents.

Use Group 10
Large retail establishments such as department stores and appliance stores which serve a large area

(1) <u>serve a wide area</u>, ranging from a community to the whole metropolitan area, and are, therefore, appropriate in secondary, major or central shopping areas; and

(2) are not appropriate in local shopping or local service areas because of the generation of considerable pedestrian, automobile or truck traffic.

Our recommendation focuses on exploring the feasibility of allowing micro-distribution hubs in commercial districts, by updating the NYC Zoning Ordinance through the use of potential zoning tools such as use groups. For instance, use group 10 may be compatible with the operation of micro-distribution hubs since it considers the possibility of truck traffic. We also propose incorporating an Environmental Designation requirement for such developments to minimize negative impacts on the local community. By doing so, we can ensure that our proposed solution meets the modern business and community needs while promoting environmental sustainability.

Recommendation:

10

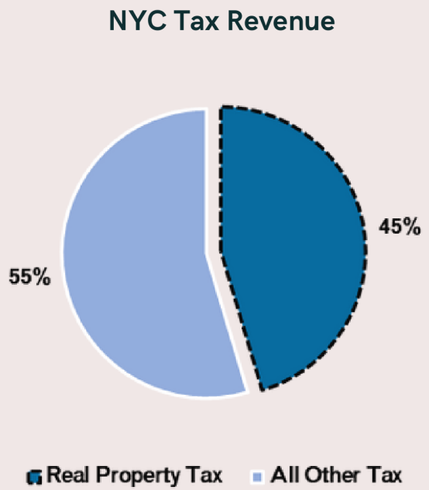
Refer to use group 10

To allow operation of micro-distribution hub in commercial district

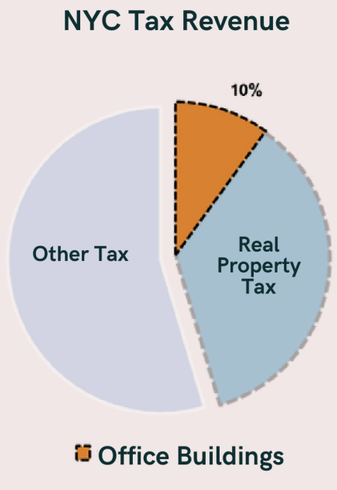
Compliance requirement for E-designation

Ensure compliance related to hazardous material, noise, and air pollution from commercial activity

Office Property Tax Implications



*per NYC Comptroller FY22 Report



*per NYC Comptroller FY22 Report

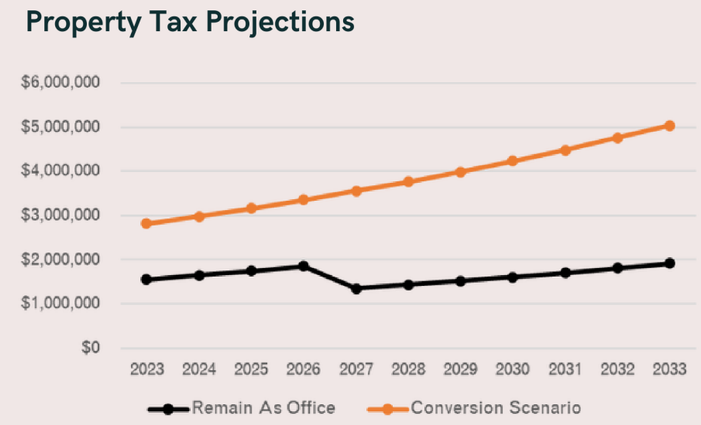
The NYC Comptroller's Fiscal Year 2022 Report highlights that real estate tax, and particularly real estate tax levied on offices, contributes to a large portion of the City's tax revenue. The report shows that real property tax or "real estate tax," makes up 45% of all tax revenue for the City. Further, office real estate contributes to ~10% of all tax revenue.

Per the New York Times, NYC office property tax revenue is down ~20% from 2021 to 2022 and office values across the city are down ~17% year-over-year. Another New York Times article states that over $1 trillion dollars in office mortgage's are maturing over the next three years. With both the City and property owners currently seeking ways to enhance revenue or property values, an opportunity exists for the parties to align their interests and deploying mutually beneficial solutions for office buildings.

Subsidizing Coversion Costs

10 Year Tax Revenue Projections

Remain as Office: $18 M
Conversion: $42 M
Delta: $24 M



*based on NYC Tax Guide

The above chart shows the projected tax revenue for the subject property if it remains as an office (black line) and if it is converted with the mix of uses outlined previously in this report. Using the in-place lease as a base, and assuming the building returns to market performance at lease expiration in 2026, the remain as office scenario yields ~$18 million in tax revenue over 10 years. For the conversion scenario, the yield is ~$42 million in tax revenue, producing a ~$24 million dollar difference.

Conversion Costs	**-$146 M**
Value of Conversion	**$113 M**
Residual Value	**-$32 M**
Tax Offset	**$24 M**
Remaining Gap	**-$8 M**

When comparing the cost of the conversion with its residual value, there is a negative funding gap of ~$32 million dollars. We propose that the delta in tax revenue over 10 years be used to help subsidize the cost of the conversion. Our conviction in this proposal comes from the multifaceted community and city benefit of the conversion. However, even with the tax offset, there is still ~$8 million dollars in funding needed. For this, we hope to realize Mayor Adams' proposal for increased subsidy for including affordable housing, senior care, and child care in conversions.

Prototype 2:
Storefront Pick-Up Center

Site Choice Parameters

Up to 3,000 Sqft Footprint

Located on a residential street

Solution Created

Trucks unload on the street

Up to 4,500 packages per day

Direct pick up and return by customers

Share space with other retail uses

For the storefront pick-up center prototype, we look at vacant storefronts with a 3,000 square foot footprint, preferably located on a street in close proximity to residential areas. Although the facility typically lacks garage space, unloading can still be performed on the street. Nevertheless, the sorting process can be performed inside the building, thereby reducing the amount of street activity and potential disruption to the surrounding area.

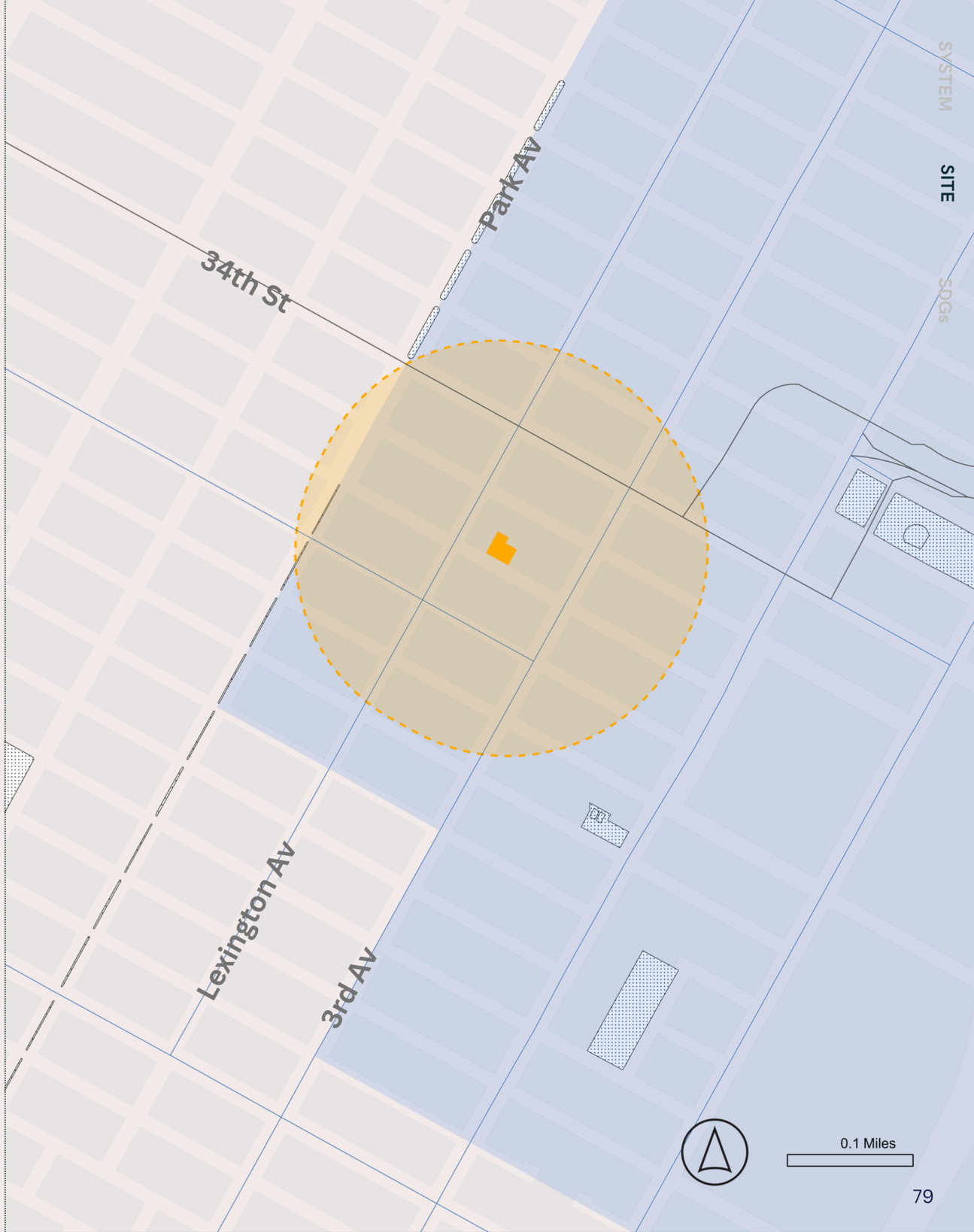
The prototype of a storefront pick-up center will have a smaller floor area and consequently, a smaller storage capacity of approximately 4,500 packages. However, this facility will focus on direct service to customers, with the primary objective of providing convenient package pick-up and return. The proximity of the return facility will enable customers to return their items promptly after receiving their packages, which is essential to maintain the quality of the goods through the reverse logistics process and prevent them from ending up in landfills.

Storefront Pick-Up Center

145 East 32 Street

Zoning district R8 with Office and
Commercial Land Use

For this prototype study, we have chosen a vacant storefront located at 145 East 32 Street. This storefront is situated under a commercial office building and has an estimated 5,000 sqft area. Given its smaller size compared to the previously selected site, the storage capacity of this storefront facility will be limited. However, based on calculations of the buffer area, considering the number of households and weekday e-commerce deliveries per household (Komanoff, 2021), this facility could serve a 700 ft radius. While the service area is smaller than the previous site, this storefront facility's strategic location allows for convenient and accessible direct pick up and return for the surrounding households.



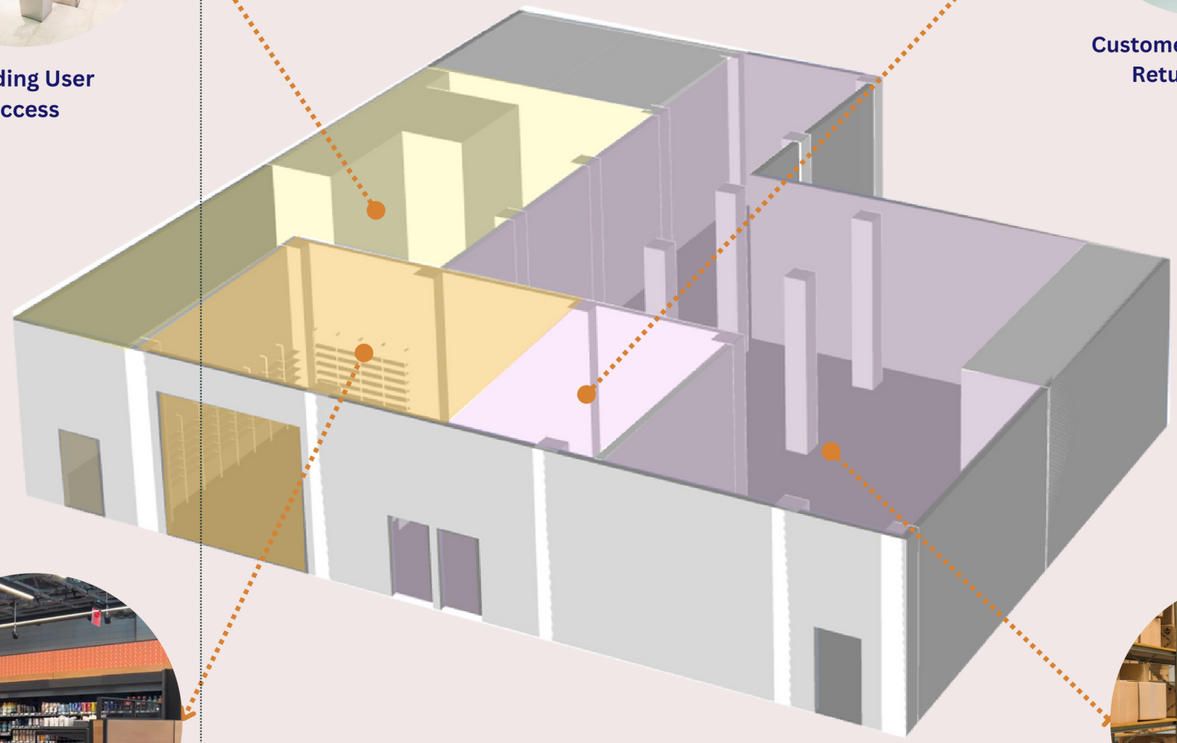
Spatial Configuration

In our proposed solution for this prototype we developed a space configuration that allows us to preserve the private entrance for users of adjacent office or residential spaces while providing a lively and convenient customer experience for package pick-up and return. To enhance the customer experience, we have included a shared customer service area with other retail and service uses, such as a smart grocery store, coffee shop, or laundromat.

This approach provides customers with the opportunity to complete multiple errands in one stop, adding value to the overall service. Despite the emphasis on customer experience, we have also ensured sufficient space for sorting, storage, and operations to ensure efficient and effective service.

Building User Access

Customer Pick-Up and Return Service



Smart Grocery Store

Storage

Project Evaluation

Sustainable Development Goals

Project Evaluation

Sustainable Development Goals (SDGs) are the 17 Sustainable Development Goals adopted by all United Nations Member States since 2015, providing an agreement for meeting the need of the present generation without compromising the future generations to meet their needs. The SDGs represent the urgent call for the construction of a community with a shared future for mankind by all countries in a global framework. Our studio utilized the sustainable development goals to evaluate the impact of our proposed strategies. As a globally recognized metric of social, economic, and environmental responsibility, the SDGs provide a measurable framework to evaluate the impact of our interventions.

Prioritized SDGs: System

In the whole project, our combined actions comply with different detailed SDGs to meet the requirements of our client and meanwhile integrate the themes of sustainability and environmental protection into our sites for a brighter future. From the system view, we aim to prioritize the clean energy source (Goal 7), drive economic growth (Goal 8), integrate innovation and infrastructure (Goal 9), promote sustainable communities (Goal11), and improve resiliency with climate adaptation (Goal 13).

Prioritized SDGs: Red Hook

Metrics: SDG indicators

Goal 2. End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.

Target

2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment

Indicator

2.3.1 Volume of production: 100,000 lbs of produce/year

Goal 4. Ensure inclusive and equitable quality education and promote life-long learning opportunities for all

Target

4.2 By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education

Indicator

4.2.2 Participation in organized learning: 170hr/yr

Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all

Target

7.2 By 2030, increase substantially the share of renewable energy in the global energy mix

7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology

Indicator

7.2.1 Renewable energy share in the total energy consumption: 1.5 MW

7.a.1 Financial flows to clean energy research and development and renewable energy production: $ 26 M w/o tax credits

Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

Target	Indicator
8.2 Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors	8.2.1 Increased GDP: $1.59M
8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value	8.5.2 Unemployment rate: 18%

Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Target	Indicator
9.3 Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets	9.3.1 Small-scale industries added: 175
9.b Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities	9.b.1 Medium and high-tech additions: Solar panels, microgrid and vertical farming

Prioritised SDGs: Midtown East

Metrics: SDG indicators

Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Target	Indicator
9.2 Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries	9.2.1 Growth value added: $24M (tax revenue)
9.b Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities	9.b.1 Medium and high-tech industry added: Smart grocery stores, smart pick-up center
9.2 Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries	9.c.1 Service range covered by a mobile network, by technology: r=0.25mi/distribution hub

Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable

Target	Indicator
11.1 By 2030, ensure access for all to adequate, safe and affordable housing and basic services	11.1.1 Urban household added: 182
11.7 By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities	11.7.1 Open space for public use: 4000 square feet

Goal 12. Ensure sustainable consumption and production patterns

Target	Indicator
12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse	12.5.1 Material recycled: ~1360 kg/weekday
12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle	12.6.1 Potential companies to adopt our design: Amazon, UPS, USPS, FedEx

Goal 13. Take urgent action to combat climate change and its impacts

Target	Indicator
13.2 Integrate climate change measures into national policies, strategies and planning	13.2.2 Total greenhouse gas emissions per year: 788.5 tons CO2e

Conclusion

Parcel delivery is only set to grow as digital connectivity becomes more embedded in our evolving urban environment. These system-based and site-specific opportunities to improve last-mile delivery systems can have beneficial impacts for profits, planet and people as your package is delivered.

The last-mile delivery system is already part of our daily lives and is only set to grow. The growth of e-commerce has placed tremendous burdens on road networks and adjacent communities, leading to congestion, environmental concerns, and disruptions in residential areas. Addressing these challenges requires innovative strategies and collaborative efforts and the proposals presented can help address these challenges.

Ultimately, addressing last mile delivery challenges requires a multi-stakeholder approach involving collaboration between logistics providers, local authorities, businesses, and residents. By implementing a combination of infrastructure improvements, technology integration, alternative delivery methods, and community engagement, the goal of creating a more efficient and sustainable approach can be achieved.

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Appendix

Market Analysis

Market Retail

Retail stores in Red Hook offers a unique and authentic shopping experience, with a focus on locally sourced and artisanal products. The area is popular with both locals and tourists, and it is a great place to discover new and interesting products while supporting small and independent businesses. Retail spaces typically generates a rent price at $30/SF/YR.

There aren't too many markets especially food in Red Hook. The biggest market is Food Bazaar, close to the sites. In Carroll Gardens and Gowanus, there are a lot of markets which also close to the site. The purchasing power of residents is still high and it is a good opportunity to build the market and retail. The food market retail provides customers with fresh, natural, local, and seasonal ingredients, promoting healthy eating and catering to the tastes and preferences of different cultures.

E-Bike Manufacturing

The COVID-19 pandemic has had a significant impact on the transportation industry, leading to a growing demand for zero-emission vehicles. Electric bikes have emerged as a popular choice among consumers, and automotive manufacturers have been working to improve their performance by expanding battery range and reducing bulk. This has created profitable markets for original equipment manufacturers (OEMs).

However, there are concerns about the safety of e-bikes, particularly those with uncertified batteries. Reports of shoddy batteries causing fires and explosions have led to new laws banning the sale of uncertified e-bikes and unregulated lithium-ion batteries. While it remains unclear how effective these laws will be in preventing accidents caused by pre-existing e-bikes, there is an opportunity for e-bike manufacturers to partner with delivery services to develop safer and more eco-friendly batteries.

The rental price for e-bike manufacturing facilities is $20/SF/YR, which could provide a cost-effective solution for e-bike manufacturers looking to expand their operations or enter the market. By working with delivery services, e-bike manufacturers can leverage their expertise to develop safer batteries while also tapping into a growing market for zero-emission transportation. This could not only help to improve the safety of e-bikes but also promote their use as a more sustainable mode of transportation.

Shared Commercial Kitchen

In New York City, shared commercial kitchens are gaining popularity due to the high cost of real estate and the difficulty small food businesses have in locating affordable, appropriate commercial kitchen space. In New York City, communal kitchens typically include professional-grade appliances like ovens, stovetops, refrigerators, and freezers, as well as shared storage areas, prep stations, and dishwashing facilities. In addition to cost reductions, shared commercial kitchens provide small food businesses with rental agreement flexibility, access to a community of food entrepreneurs, and the ability to scale up or down as necessary. Based on the market comparable, the rent price for ground floor share kitchen is $15/SF/YR.

Red Hook Commercial Kitchen: the facility features multiple fully-equipped commercial kitchens in addition to a variety of storage, preparation, and packaging areas.

Brooklyn FoodWorks Kitchen Incubator: provides access to business development support, marketing services, and distribution channels, in addition to a shared kitchen.

By renting a shared kitchen, entrepreneurs can reduce their administrative costs, gain access to professional-grade equipment, and receive support services that will aid in the expansion and scaling of their businesses. In addition, having a shared kitchen adjacent could make it easier for entrepreneurs to transport their products to the market and provide customers with fresh, high-quality products.

Zoning Analysis

The Site is made up of two adjacent lots in Brooklyn's Red Hook district, with a total area of 157,680 square feet. These lots are located in the M3-1 District, designated for heavy industrial use near waterways and away from residential areas. To comply with the district regulations, an enclosed building is necessary as it generates noise. The maximum allowable buildable area for our assemblage is 315,360 SF, based on the M3 district's maximum floor area ratio (FAR) of 2.0. The district requires one parking spot per 300 SF, and the maximum building height is four stories, with a 15-foot setback from the street wall on a wide street and a 20-foot setback on a narrow street if the building height exceeds 60 feet. As a through lot and corner lot, 20-foot set back from the street is required for the through lot, while the corner lot can allow 100% lot coverage.

The site's location in the Red Hook district of Brooklyn, adjacent to Red Hook Park and Recreational center, provides a unique opportunity for the development to be visible to pedestrians walking from the Court Street. The area is known for its vibrant community and bustling commercial activity, making it an ideal location for a modern and sustainable development.

Brownfield Land:

The Red Hook Brownfield Opportunity Area presents an opportunity to address longstanding issues surrounding brownfields, and explore the economic potential for the industry's future. The process involves assessing and investigating the extent and nature of contamination through soil, groundwater, and air quality testing, followed by the implementation of appropriate remediation measures to remove or mitigate contamination, in accordance with relevant environmental regulations and guidelines.

View from Court Street

View from Clinton Street

Financial Analysis

The development plan for 688 & 702 Court Street requires a total development cost of $129,299,247, which includes acquisition cost, hard cost, soft cost, and financing cost. The purchase price of the land is $45 million, with an estimated closing cost fee of 3%, bringing the total land cost to $46,350,000, which is $140 per zoning square foot. The hard cost estimate resulting in a total of $72,201,832, or $283 per gross square foot. The soft cost estimate brings the total to $5,542,293.

The development timeline includes 6 months of due diligence, concept design, and consultant onboarding, followed by an additional 6 months of pre-development work, including continued design work, entitlement, and contractor selection. The on-site construction phase is estimated to take 12 months, which is feasible given the primarily vacant nature of the site and the floor plan efficiency. As the asset type is rental, the construction is expected to be straightforward, and high-quality construction expectations.

Sources	
Equity:	$38,244,736
Loan:	$84,044,511
Total Sources:	$129,299,247
Uses	
Purchase Price:	$45,000,000
Closing Costs:	$1,350,000
Hard Costs:	$72,201,832
Soft Costs:	$5,542,293
Origination Fee:	$694,016
Mortgage Recording Tax:	$1,735,041
Interest Reserve:	$2,776,065
Total Uses:	$129,299,247

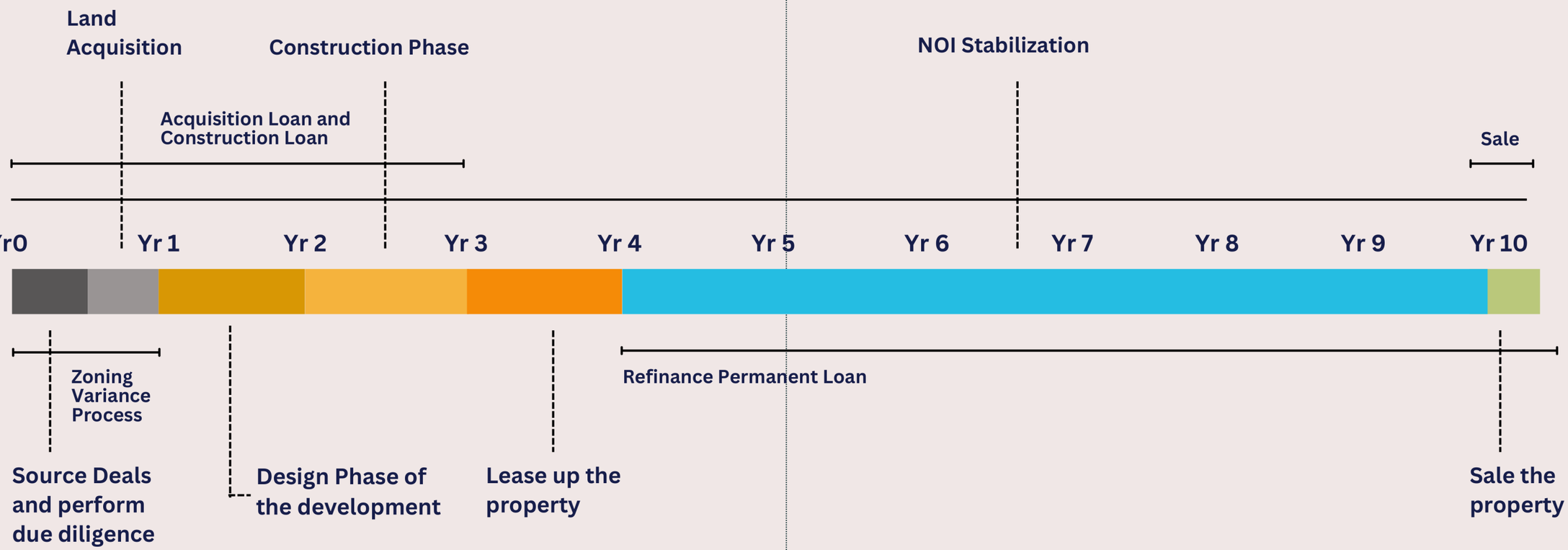
Based on the current market conditions, our project will require a construction loan of $84,044,511 with an interest rate of 8%. We plan to obtain this loan from a traditional bank and relationship lender, given the minimal risk profile and established previous business. This construction loan will accommodate the project's development needs. Once the construction is complete, we will stabilize the project's NOI for a year, and then pursue a refinance option at a lower interest rate of 5.75%. This refinance will be for $69,401,622 with an amortization term of 10 years and an DSCR of 1.25. The refinance loan will be used to pay down the construction loan and utilize the stabilized NOI. We plan to execute this loan with a large institutional lender, such as JP Morgan Chase, Bank of America, US Bank, or HSBC.

To complete the capital stack, we plan to seek a structured equity contribution from LP investors. We will have a two-tiered waterfall structure in place, with a preferred return of 8% for tier one and 12% for tier two. After the first hurdle, the GP and LP split will be 20% and 80%, respectively, and after the second hurdle, it will be a 50-50 split. Our projected GP IRR is 18.3%, with an equity multiple of 4.19, while our projected LP IRR is 15.3%, with an equity multiple of 2.63. Financial Proforma will be found in the Appendix.

The exit strategy for the project is to sell the asset 10 years after stabilization at a sale price of $120,116,912, with a cap rate at 6.5% achieving a 15.7% IRR with an equity multiple of 2.95, and total profit of $74,449,712. The development period includes one year for architectural design and site analysis, followed by a two-year construction period.

Advertising will begin prior to the completion of construction, and leasing will commence two months after construction ends. The NOI is expected to stabilize within a year of lease-up. Following stabilization, the project will pursue a refinance to secure a lower interest rate permanent loan. The asset will be held for ten years and then sold. The sustainable project development approach is specifically designed to optimize the equity multiple and maximize overall profits, which we believe will be highly appealing to potential investors.

Development Timeline



Case Studies

Amazon Hub Locker

Amazon Hub Lockers are self-service kiosks that enable Amazon consumers to retrieve their packages from a convenient location. These vaults are typically located in apartment buildings, convenience stores, and grocery stores, and are accessible 24 hours a day, seven days a week.

When making a purchase on Amazon, consumers must select the locker location as their shipping address in order to utilize a Hub Locker. Once their package has been delivered to the locker, the consumer receives an email or text message with a unique pick-up code. After entering the code into the locker kiosk, the package-containing locker is promptly unlocked.

Amazon Hub Lockers are intended to provide a more convenient and secure method for customers to receive their shipments, particularly for those who are not home during the day to accept deliveries. In addition to reducing the risk of package theft, the containers offer an alternative to having packages delivered to an office or other location.

Amazon provides customers with a variety of convenient and adaptable delivery options, including same-day delivery and Amazon Fresh grocery delivery, in addition to Amazon Hub Lockers. Amazon Locker is already in use in certain apartment buildings, providing a convenient and secure way for residents to receive their Amazon packages.

Chapelle International Logistics Hotel, Paris

Chapelle International logistics hotel in Paris is a successful case of mixed-use logistics architecture. Chapelle logistics hotel integrates logistics terminal with other uses like offices, retail, a data center, and a fitness center. It has a sports field and urban farm on the rooftop, which contributes to the “fifth facade”. The heat generated by the data center is collected and used for district heating.

Images credit: A.26 Architectures, Jean-Claude N'Diaye

Logistics Hub, London

A logistics hub is used for day-to-day deliveries as a place to sort and store goods before they are picked up and delivered. It allows for unused space to be utilized whilst also helping to improve the efficiency of delivery. Goods are sent to spaces close to urban centers in areas with dense population, and then distributed via low and zero-emission vehicles, like electric vehicles and cargo bikes, for the ‘last mile’ of the supply chain. This reduces delivery vehicle trips, pollution, and congestion on the roads. An online tool has been developed by Cross River Partnership to allow those with empty commercial space to advertise to courier firms who could make use of the space as an urban logistics hub.

Logistics Hubs

Location

Needs to be near Transport for London Rood Network for easy vehicle access. Ideally not inside any one-way systems.

(Cross River Partnership)

Space

Floorspace of > 3000 square feet, but ideally between 5,000-10,000 square feet and as much headroom as possible.

Access

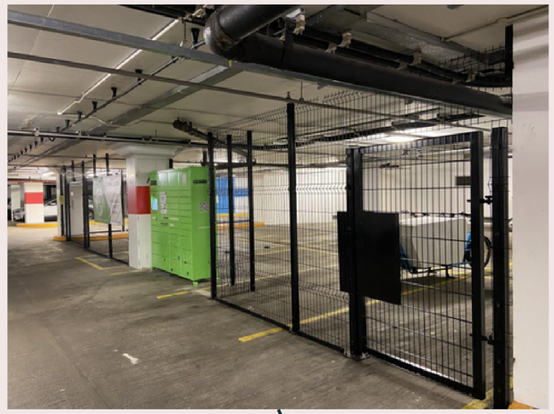
Needs height of more than 3m for access. Standard opening hours: 8:00 - 18:00.

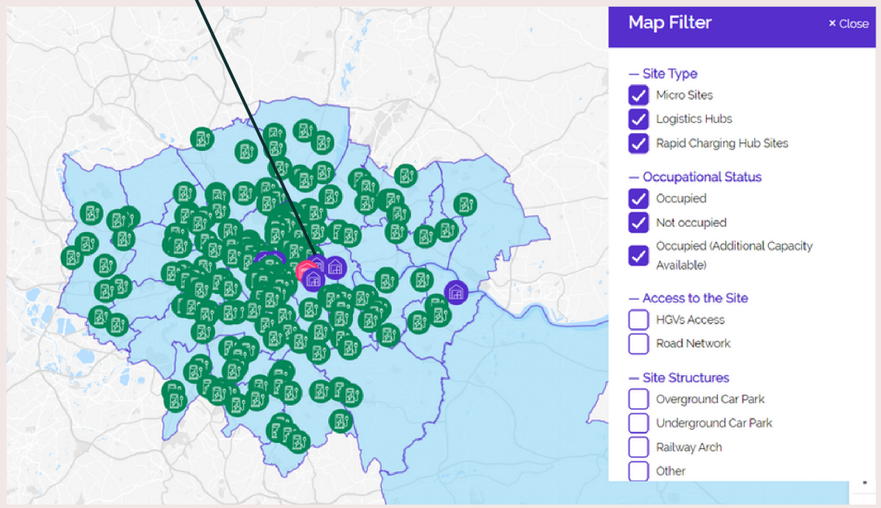
Contract

Longer lease period of 5+ years preferable

Other Information

Electric vehicle charging points may be necessary depending on vehicles in use.





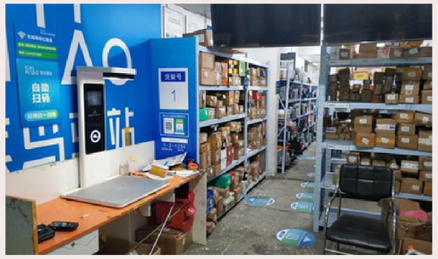
(Cross River Partnership)

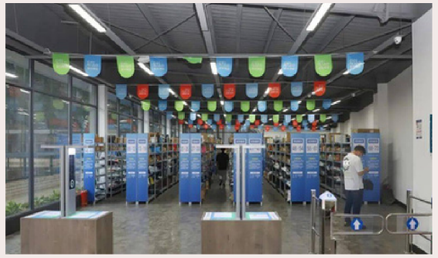
The logistics hub is near Transport for London Road Network for easy vehicle access. Ideally, not inside any one-way systems. It needs a floorspace larger than 3,000 square feet, but ideally between 5,000-10,000 square feet. It requires a height of more than 10 feet for the truck access, and the more headroom, the better. Electric vehicle charging points may be necessary depending on the vehicles in use. The lease contract is negotiable, but a longer lease period of 5+ years is preferable.

Pick-up Centers, China

Pick-up centers are a common delivery facility in Asian countries like China and Japan. A pick-up center is a place to receive and store packages from delivery companies, and also a place for customers to pick up their packages. It does not have a space for truck access and receives packages from cargo bikes. It requires a minimum footprint of 200 square feet, typically 500 square feet, and a 0.3 mile service radius. Study shows that more than 60% of the pick-up centers are within 0.6 mile from their nearest pick-up center. 0.5 - 0.8 mile is the most common range of the distance between two pick-up centers. The small-scale and densely distributed pick-up centers offer convenient and secure pick-up services for people who cannot receive their packages due to some reasons like the apartment does not have a place for package storage or the customer is not at home then the package is delivered.

There are two types of pick-up centers in China: a) Self-built, which is built by e-commerce or logistics companies such as Alibaba, Jingdong, and Shunfeng; b) Franchised, in which case small businesses like shops and restaurants are franchised by e-commerce or logistics companies to receive and store the packages. Franchised pick-up centers integrate commercial use with pick-up and return services so that customers can go shopping or dining and pick up their packages by the way. The pick-up center ensures package safety by storing the packages either in a secure area monitored by staff at the center.





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