Industry Densification and Urban Revitalization North Brooklyn Study

Spitzer School of Architecture
City College of New York
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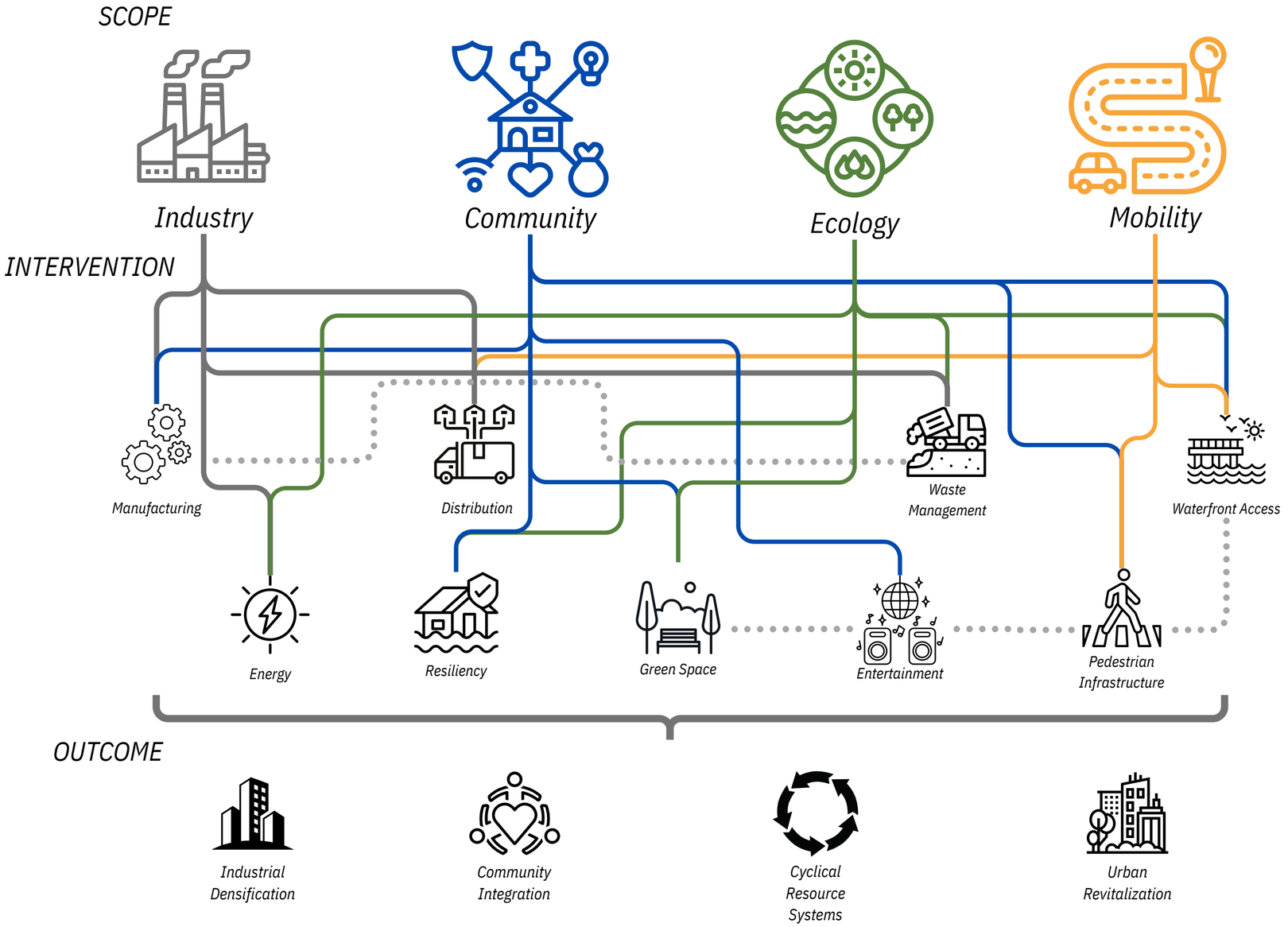
Project Overview

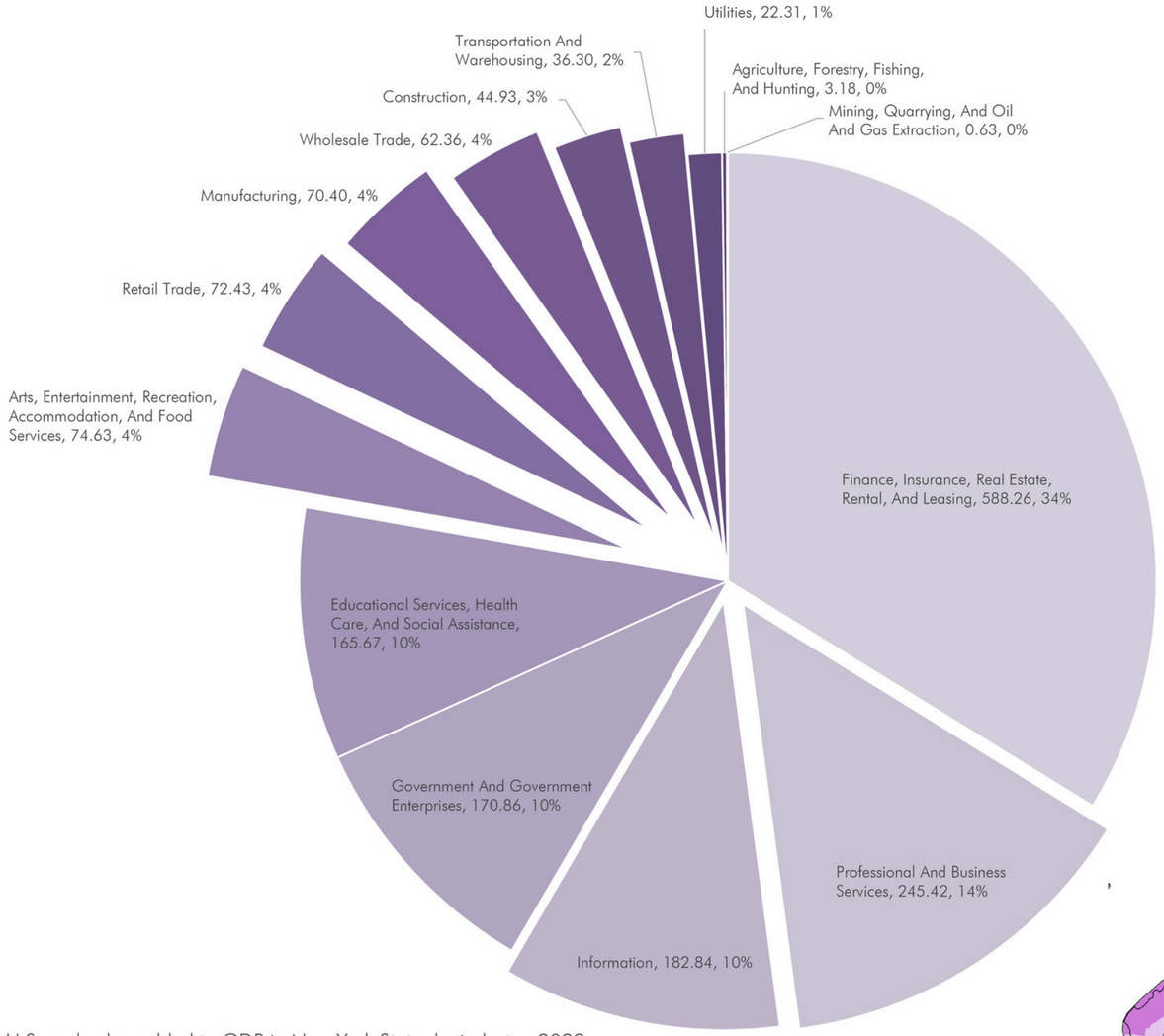
Using the existing conditions and program of East Williamsburg as a catalyst to revitalize diminishing industry while also enriching the public relationship to the region; this project seeks to integrate cyclical systems to merge boundaries between industry and urbanity creating a symbiotic relationship that promotes environmental stewardship, economic growth, and social well-being.



Before reaping the benefits of industrial densification, we must first grapple with the associated challenges that already exist. Transportation has been central to the industrial process for centuries, shipping materials and goods to manufacturers and end users via road, rail, and eventually air. Transportation, specifically planes and trucks, are large contributors to carbon emissions. In New York City, trucks are the overwhelming majority medium by which materials and goods are moved into, within, and out of the city. These trucks currently cause significant traffic congestion issues but also pose serious safety risks for all road users.

This proposal shines light on some of the current challenges faced in the North Brooklyn Industrial Business Zone. It addresses the fact that trucks will continue to be a large stakeholder in industrial processes and suggests ways to foster harmonious relationships within the built environment for all road users. Only through this harmony will industrial densification be feasible and its implementation achievable.

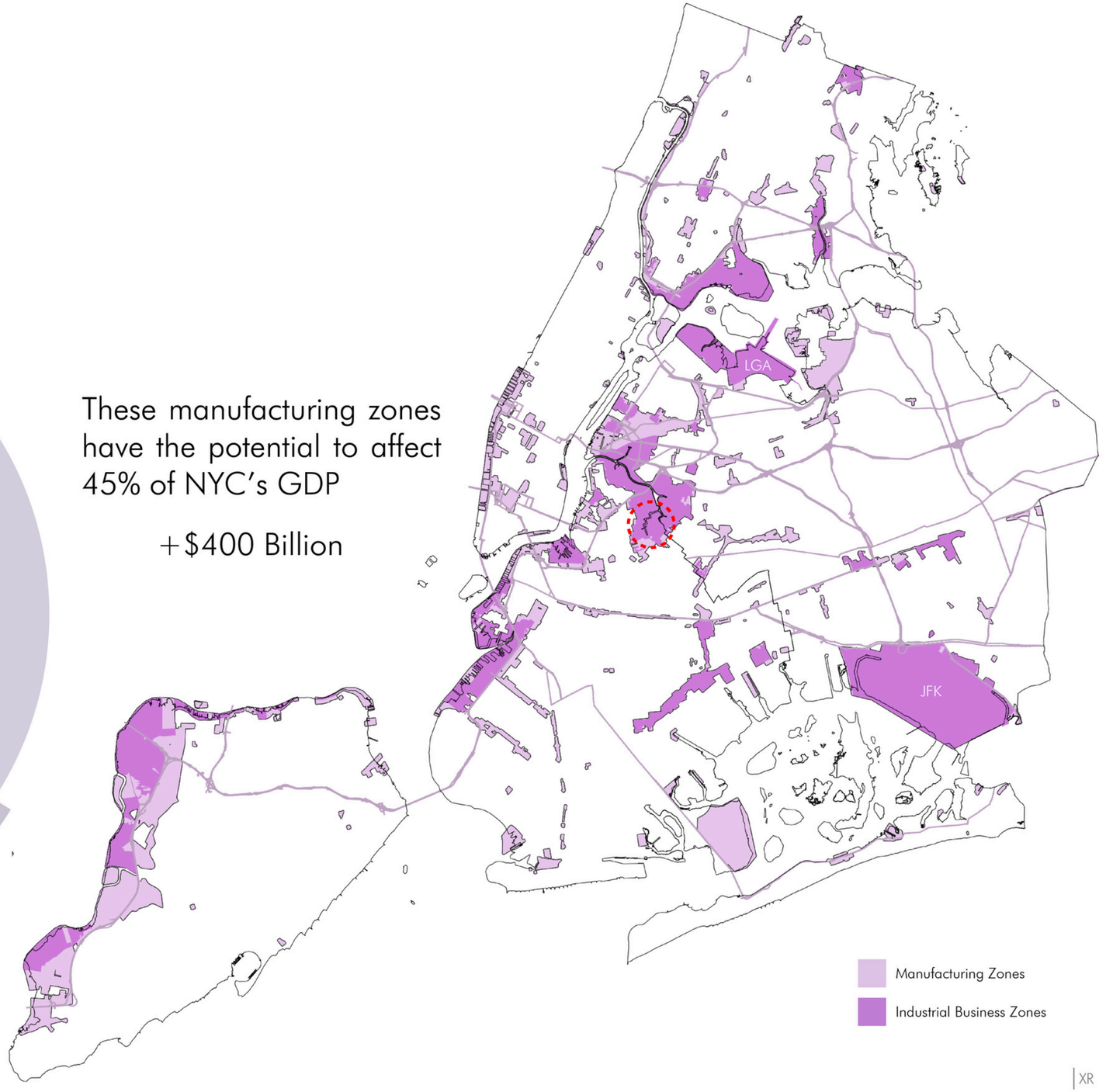
New York City Manufacturing Zones



U.S. real value added to GDP in New York State, by industry, 2022
(in billion chained 2017 U.S. dollars)
Source: Statista via US BEA 2022

These manufacturing zones have the potential to affect 45% of NYC's GDP

+$400 Billion



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Importance of Industrial Business Zones

Industrial Business Zones (IBZs) were created in 2006 to support industrial and manufacturing firms by providing a relocation tax credit of $1,000 per employee, up to $100,000, to industrial and manufacturing firms choosing to move into IBZs. To create more certainty on land use policy, the IBZ designation also carries a commitment by the City of New York not to support a rezoning permitting new residences. The IBZs are comprised entirely of manufacturing-zoned land. However, not all of the City's manufacturing-zoned land is included within IBZs.

Currently there are 21 IBZs throughout the City:

Brooklyn: Brooklyn Navy Yard, East New York, Flatlands/Fairfield, Greenpoint/Williamsburg, North Brooklyn, Southwest Brooklyn
Bronx: Bathgate, Eastchester, Hunts Point, Port Morris, Zerega
Queens: Jamaica, JFK, Long Island City, Maspeth, Ridgewood, Steinway, Woodside
Staten Island: North Shore, West Shore, Rossville

Zoning Districts	Use Groups															
	Community Facility		Retail & Commercial							Recreation				Gen. Service	Manufacturing	
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Light Manufacturing M1		x	x	x	x	x	x	x	x	x	x	x		x	x	
Medium Manufacturing M2				x	x	x	x	x	x	x	x	x		x	x	
Heavy Manufacturing M3				x	x	x	x	x	x	x	x	x		x	x	x

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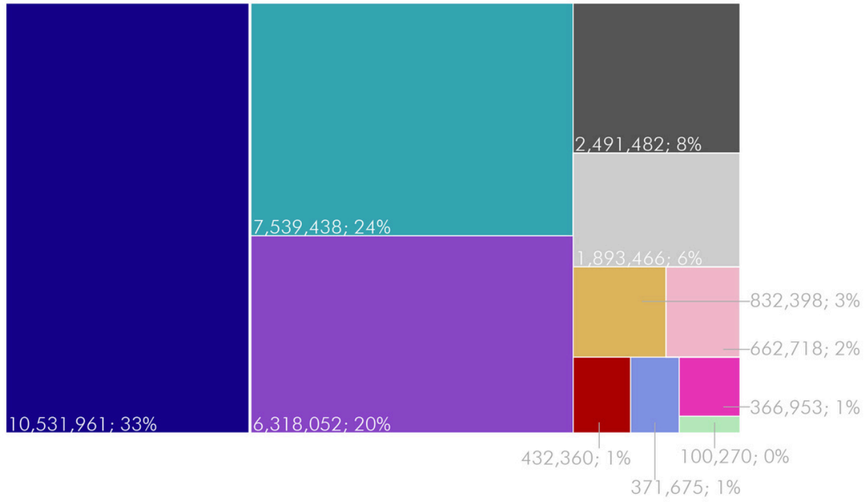
Building Classes within the IBZ

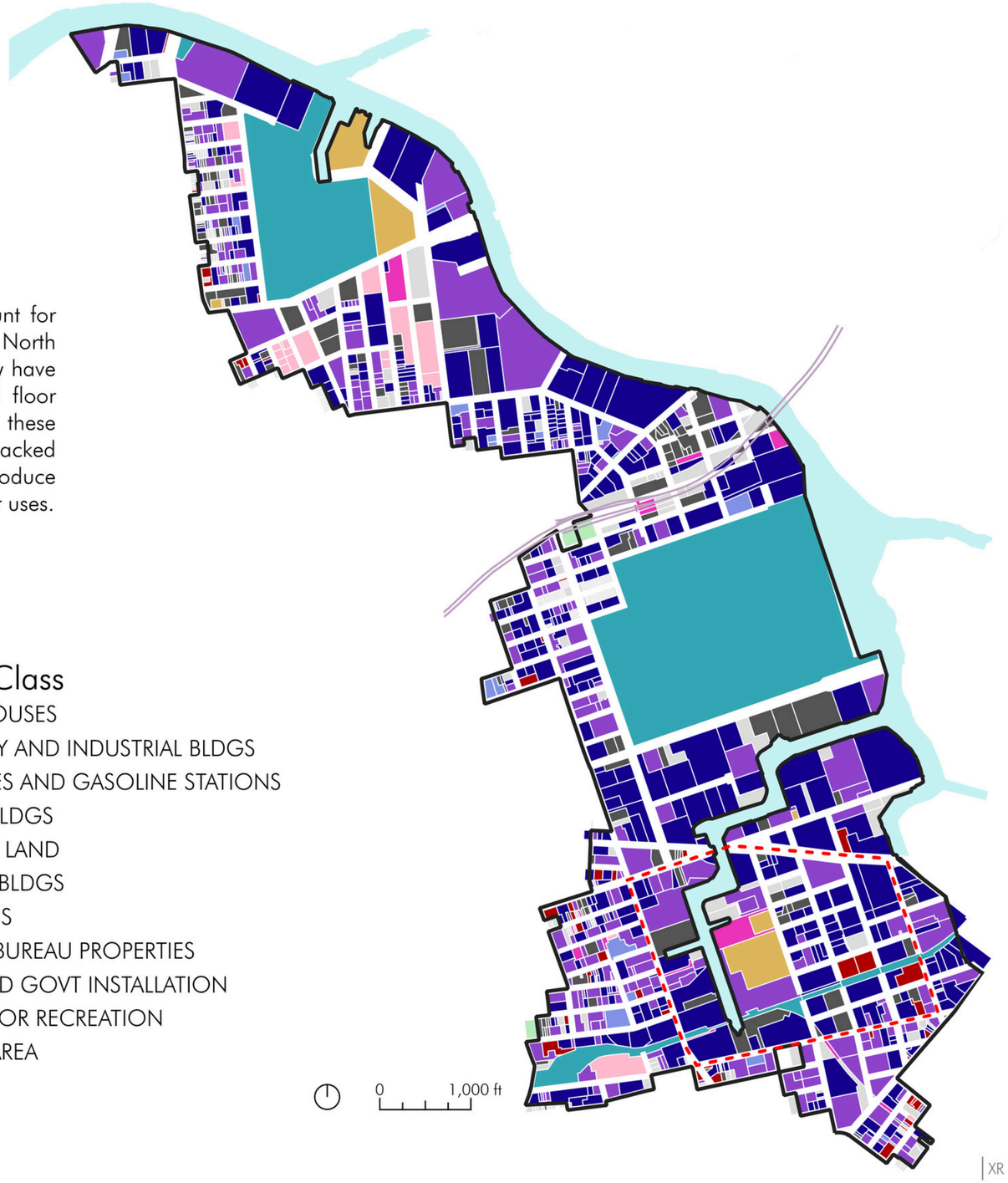
Building Class Count Table

Building Class	Count	Combined Lot Area (ft²)
WAREHOUSES	405	10,531,961
FACTORY AND INDUSTRIAL BLDGS	265	6,318,052
GARAGES AND GASOLINE STATIONS	165	2,491,482
STORE BLDGS	43	432,360
VACANT LAND	26	366,953
OFFICE BLDGS	23	371,675
THEATRES	21	662,718
UTILITY BUREAU PROPERTIES	12	7,539,438
SELECTED GOVT INSTALLATION	6	832,398
OUTDOOR RECREATION	3	100,270
OTHER	271	1,893,466
TOTAL	1240	31,540,773

Lot Area Proportions (ft²)



Warehouses and Factories account for over 50% of overall land area in North Brooklyn. These Buildings typically have large parking/loading areas and floor plates to facilitate operations. If these programs are consolidated and stacked land area can be freed up to introduce more industry or rezoned for other uses.



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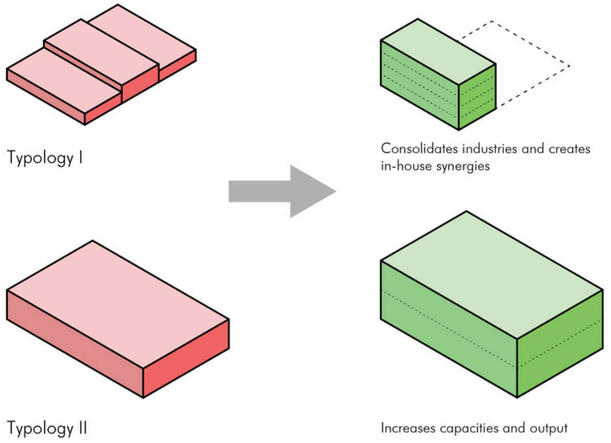
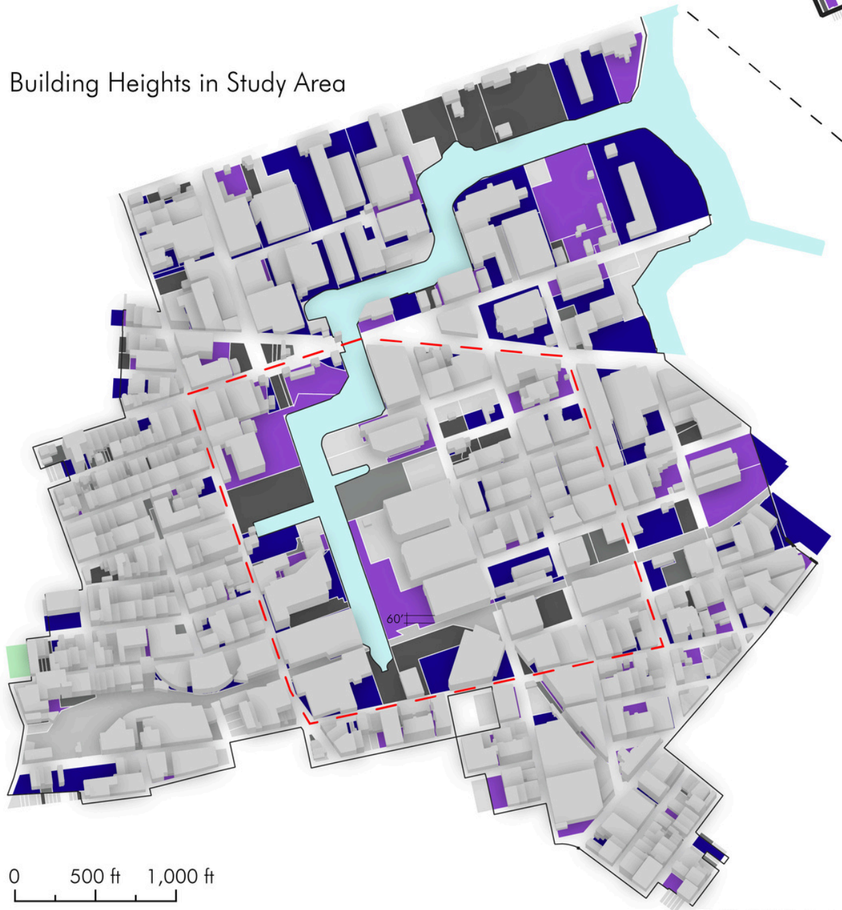
Land Utilization

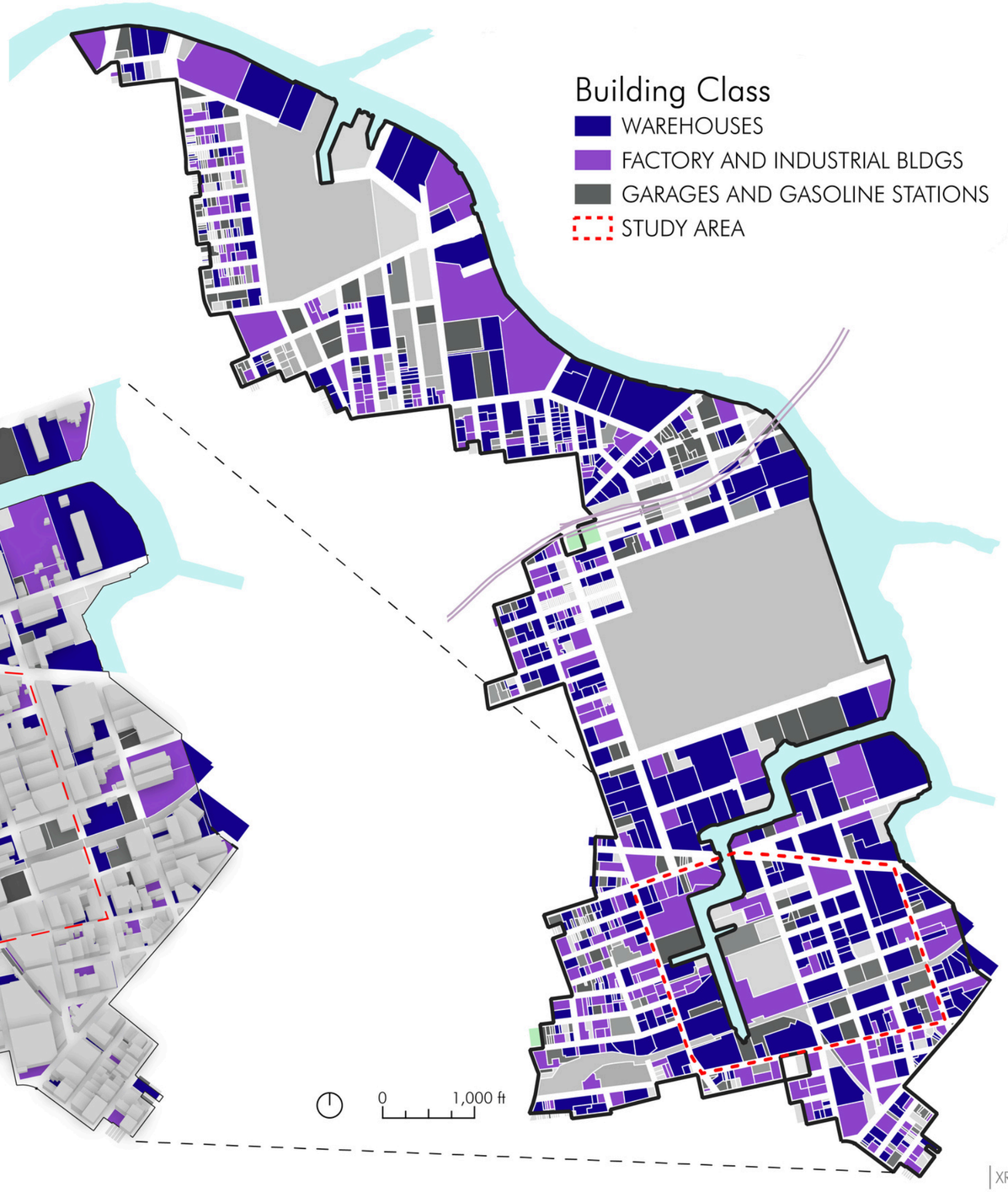
While there is fairly even distribution of warehouses and factories across North Brooklyn, land area usage is much greater along the creek's edge and most southern tip. There is an opportunity to use the land much more efficiently by consolidating and stacking these programs. This will also result in increased efficiency in operations as companies can pool resources and share expenses. When these programs are consolidated and stacked land area can be liberated to introduce more industry or rezoned for other uses.

DENSIFYING CURRENT CONDITIONS



Building Heights in Study Area





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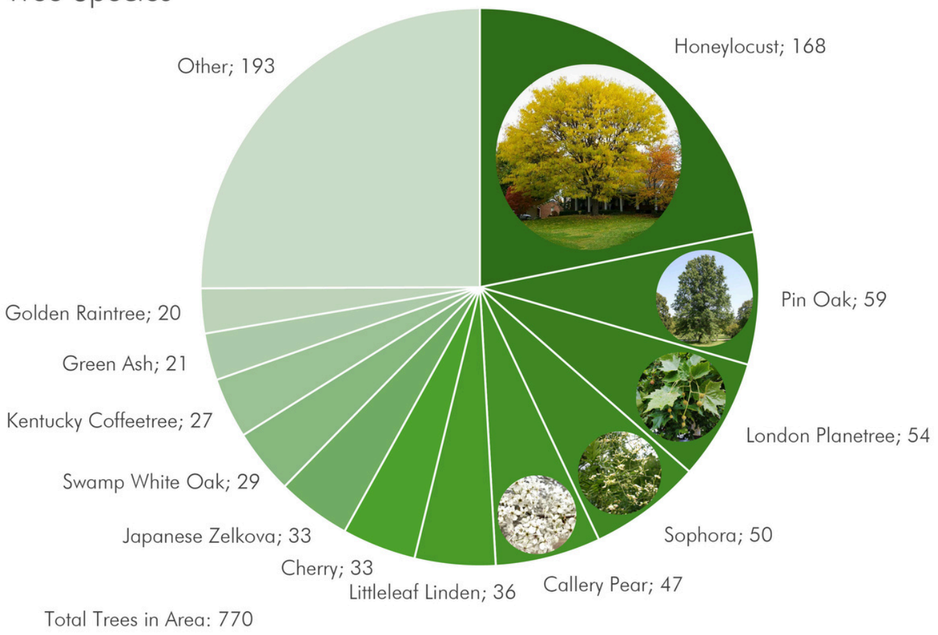
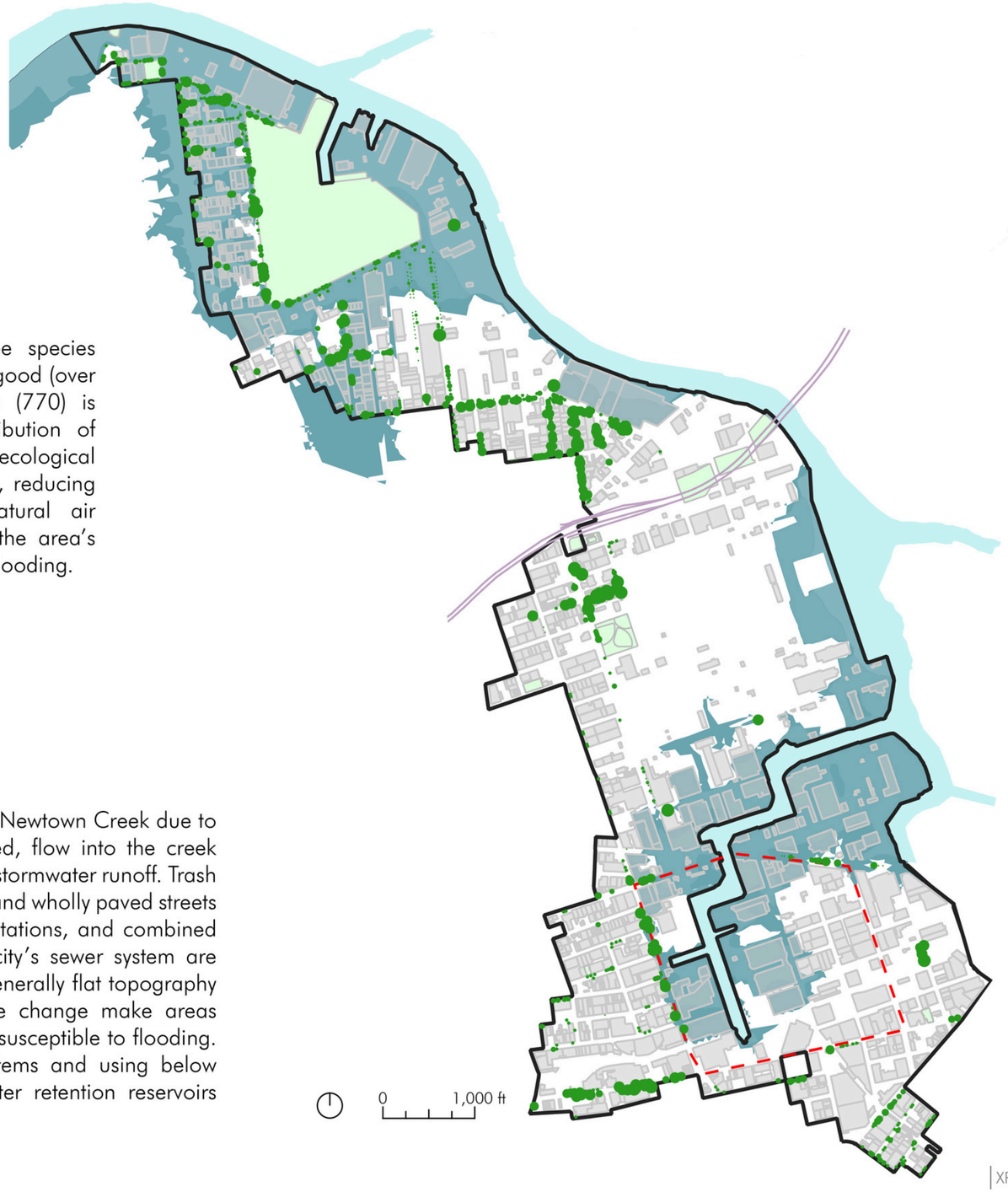
Ecology and Resiliency Concerns

Tree Species

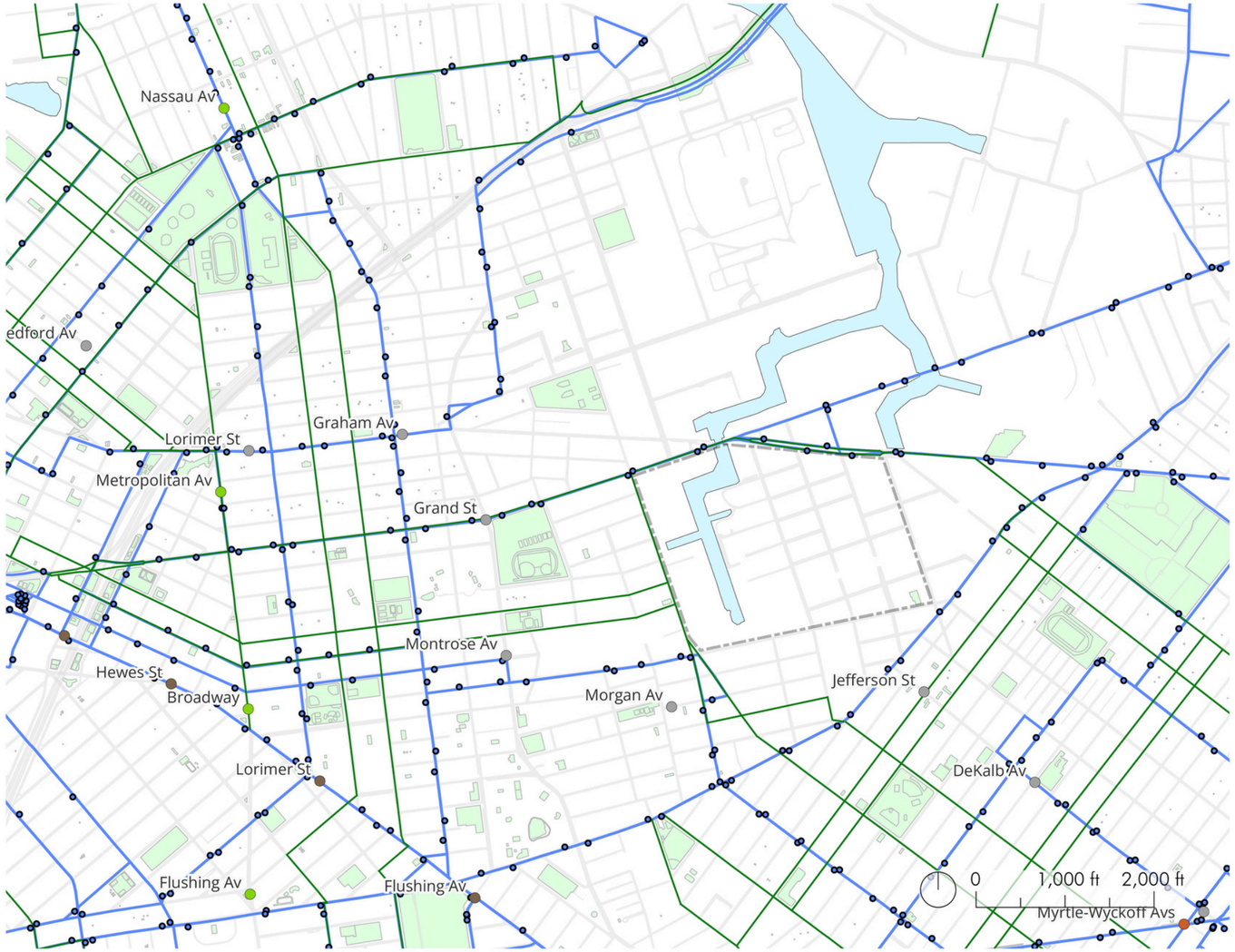


While the diversity of tree species within the area is relatively good (over 47), the number of trees (770) is alarming. This poor distribution of trees negatively impacts the ecological balance of natural systems, reducing the area's ability for natural air filtration and exacerbates the area's reduced resilience against flooding.

With no natural freshwater flow into Newtown Creek due to the historic tributaries being covered, flow into the creek exclusively consists of contaminated stormwater runoff. Trash from numerous bridges, unsewered and wholly paved streets and industrial sites, waste transfer stations, and combined sewer overflows (CSOs) from the city's sewer system are carried into the creek. The area's generally flat topography coupled with the effects of climate change make areas along the creek's edge increasingly susceptible to flooding. Boosting the area's ecological systems and using below grade storage/parking as stormwater retention reservoirs will increase its overall resilience.



Connectivity



BUS ROUTES
BUS STOPS
BIKE LANES

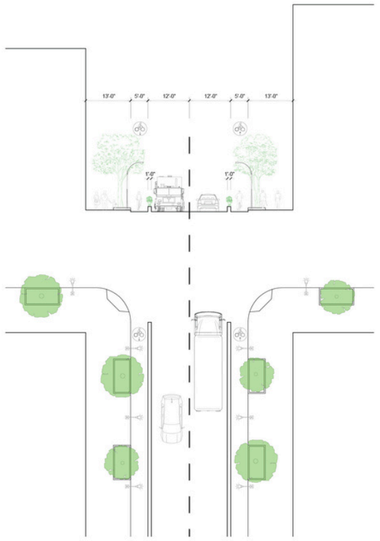
SUBWAY STATIONS
L LINE
J-M LINE
G LINE
M LINE

Concerns

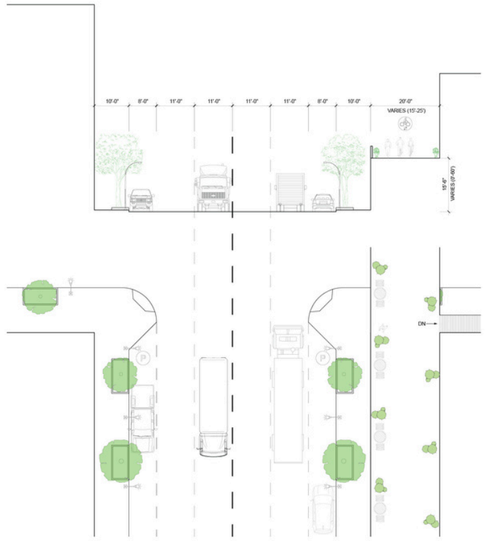
Transit throughout the North Brooklyn Area is generally insufficient. Buses provide reasonable East-West connections but North-South is lacking. The entire North Brooklyn IBZ is unserviced by the Subway. The L line comes closest at the IBZ's southern tip. These conditions make it difficult for workers to get to and from work and there is constant overcrowding at transit stations.

Bike lanes provide an avenue to alleviate congestion at transit stations. However, the lack of protected lanes, especially where truck routes and bike lanes overlap, cause considerate safety concerns. These concerns are vindicated due to several incidents including pedestrians and cyclists happening in the area, some resulting in fatalities.

Strategies

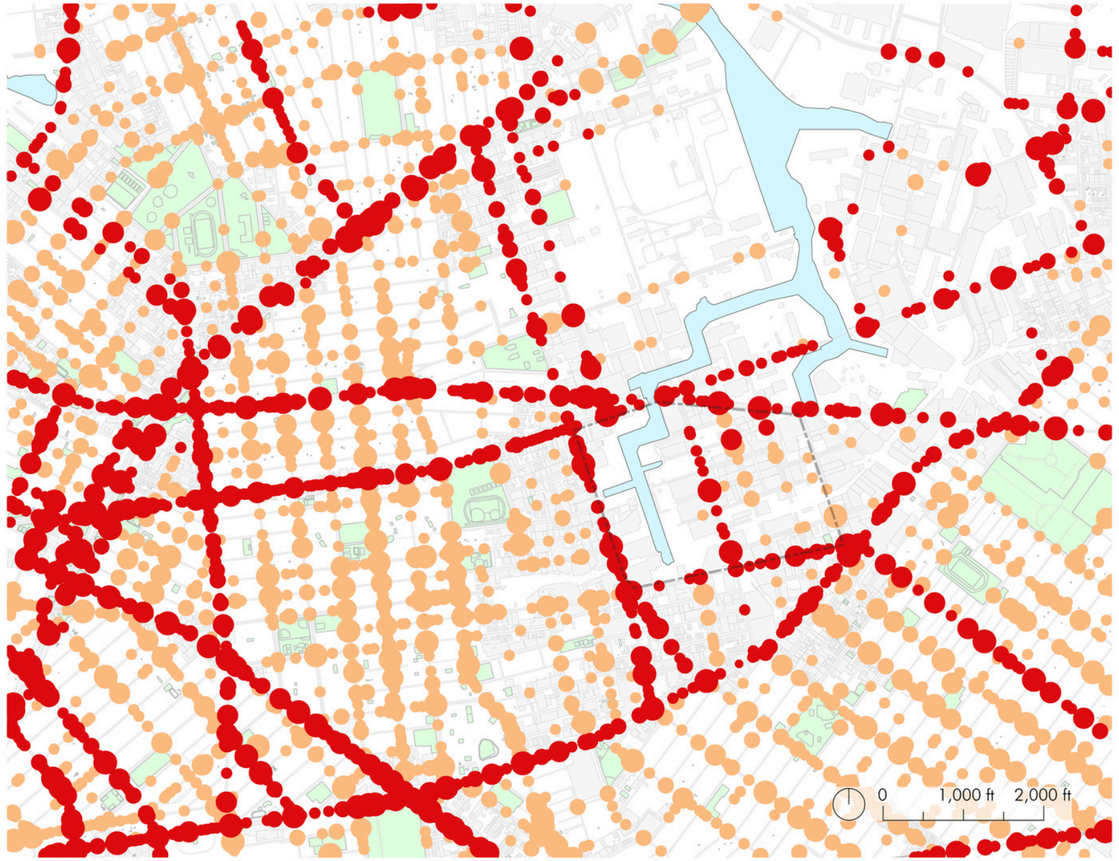


Protected Micro-mobility Lanes



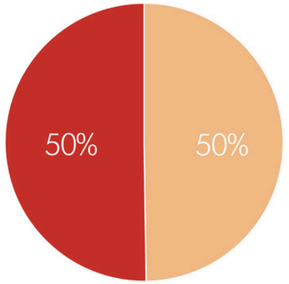
Elevated Active Transportation Paths

Road Risks



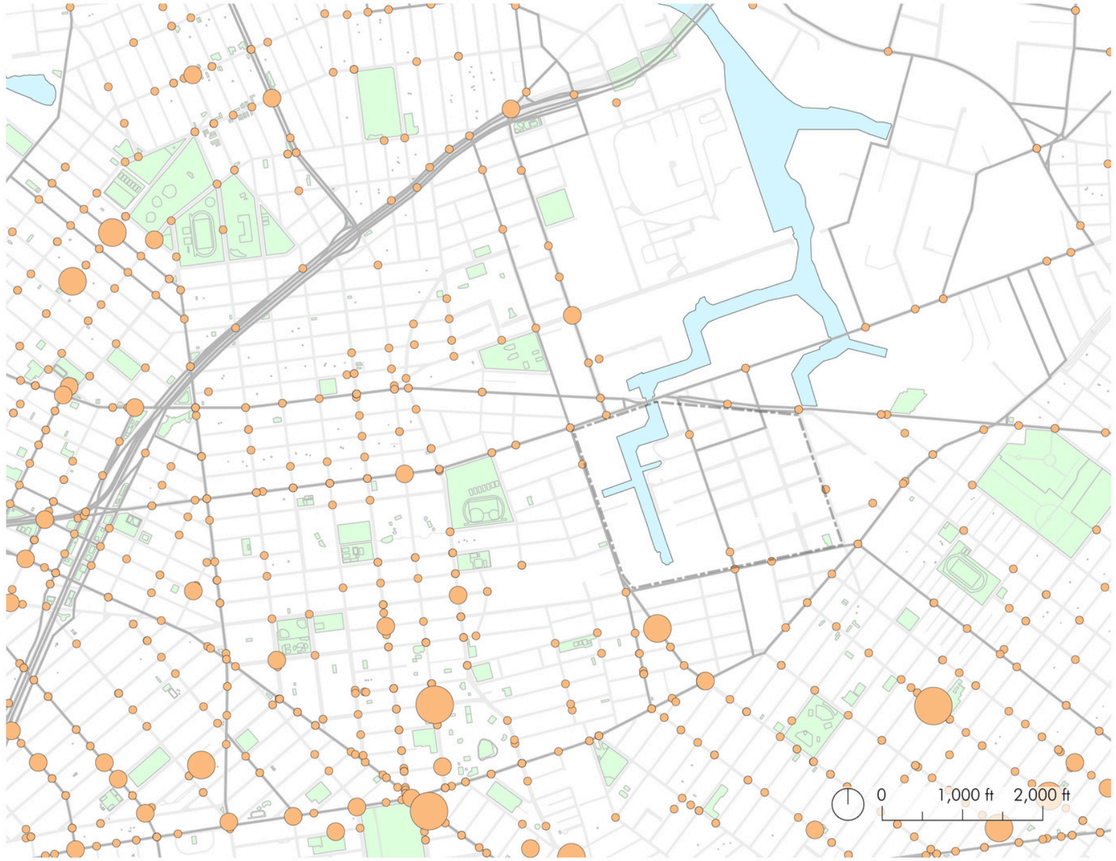
VEHICLE RELATED INJURIES (2013-2023)

- INJURIES ALONG TRUCK ROUTES
- INJURIES ON ALL OTHER ROADS
- STUDY AREA



Although truck routes make up a fraction of all roads, 50% of all vehicle related injuries (bicycles included) happen along them. (2013-2023)

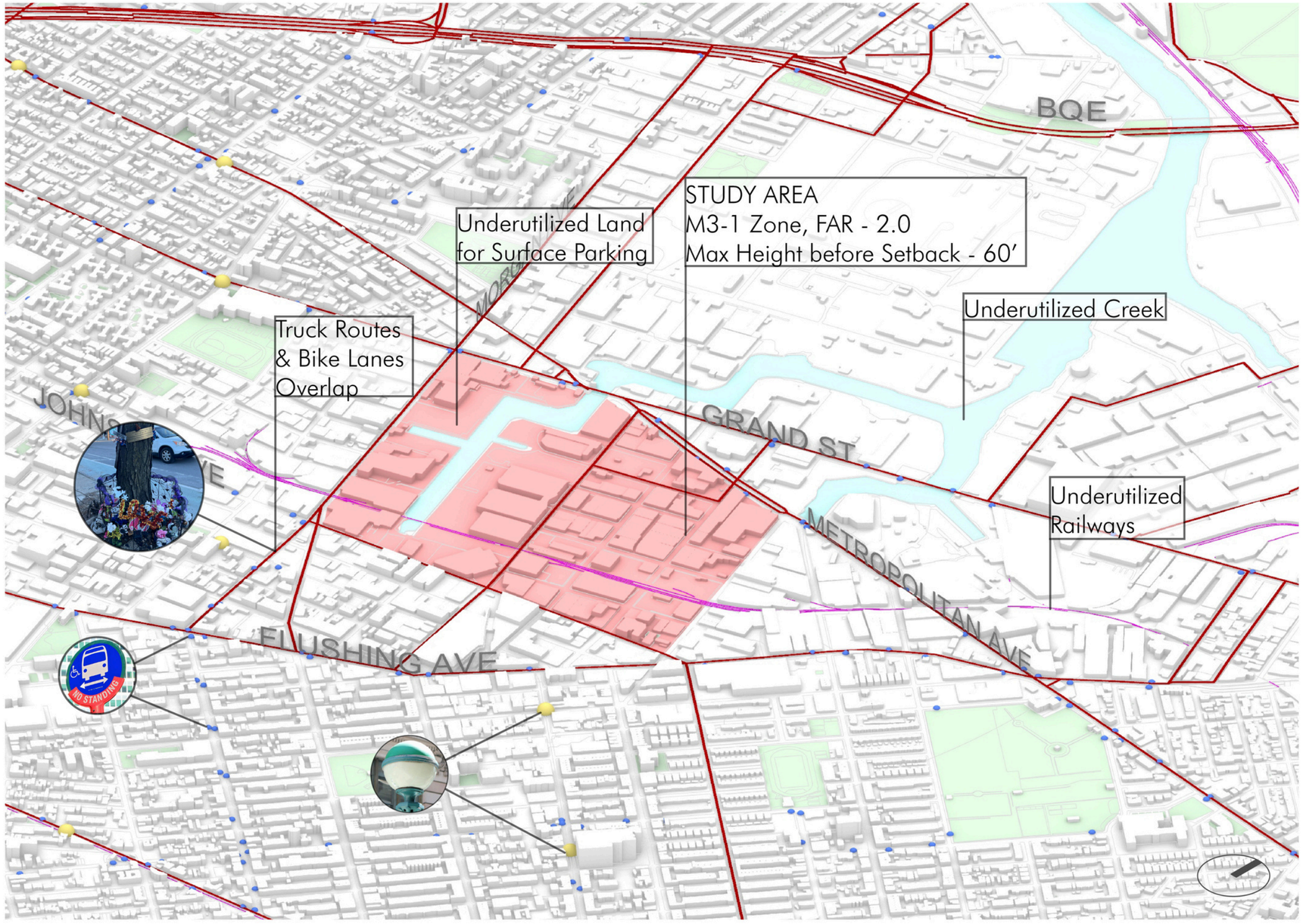
** Data relevant to 15,000 ft radius from site center



INJURIES INCLUDING PEDESTRIANS AND CYCLISTS (2013-2016)

Brooklynites have been calling for a safer Morgan Ave, a key but deadly corridor in North Brooklyn. The aim is to mediate truck traffic with last-mile distribution centers west of Creek and elevated pedestrian/bicycle paths.

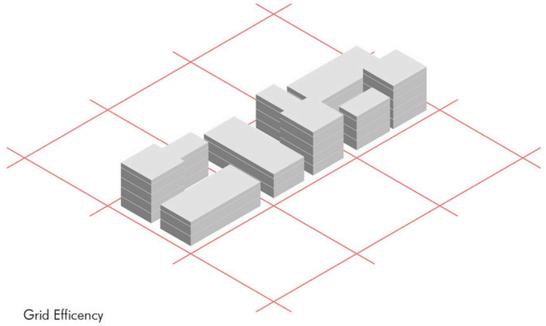
Current Conditions



The Study Area, located at the Southern most tip of Newtown Creek, presents a plethora of opportunity for redevelopment. The area's adjacency to roads, rail, and water makes it viable for becoming a manufacturing and distribution hub with the potential to process thousands of tons of products and waste daily.

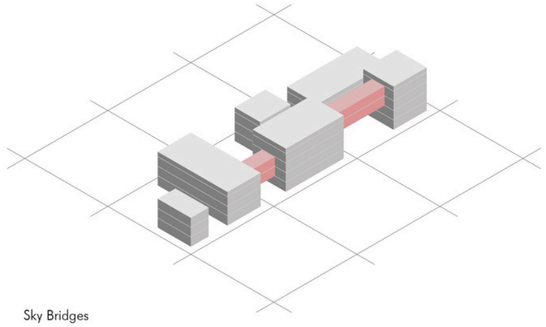
Many of buildings in the area are limited to two stories due to the current FAR (2.0) and the need for parking/loading or yard space.

Resurgence of Systems:
Historic Manufacturing Context



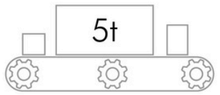
Grid Efficency

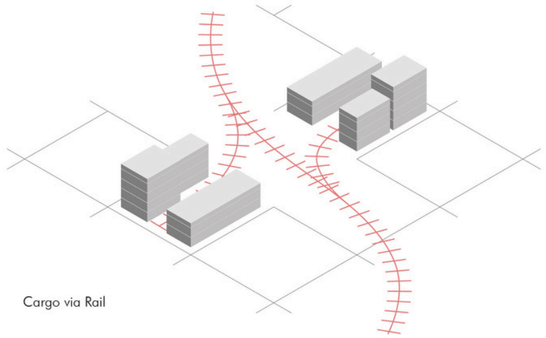
- Easily Navigable
- Adaptable/Sustainable
- Most Economical
- Walkable



Sky Bridges

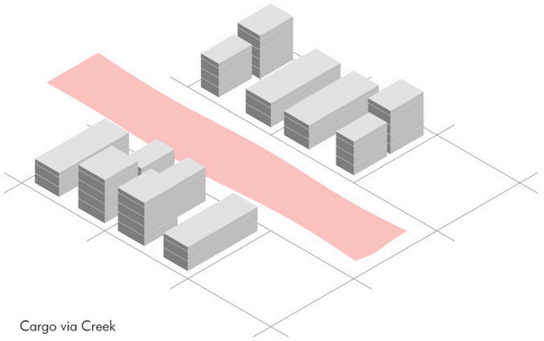
- Physical Connectivity
- Mobility
- Promotes Synergies





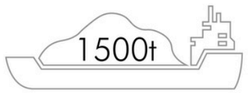
Cargo via Rail

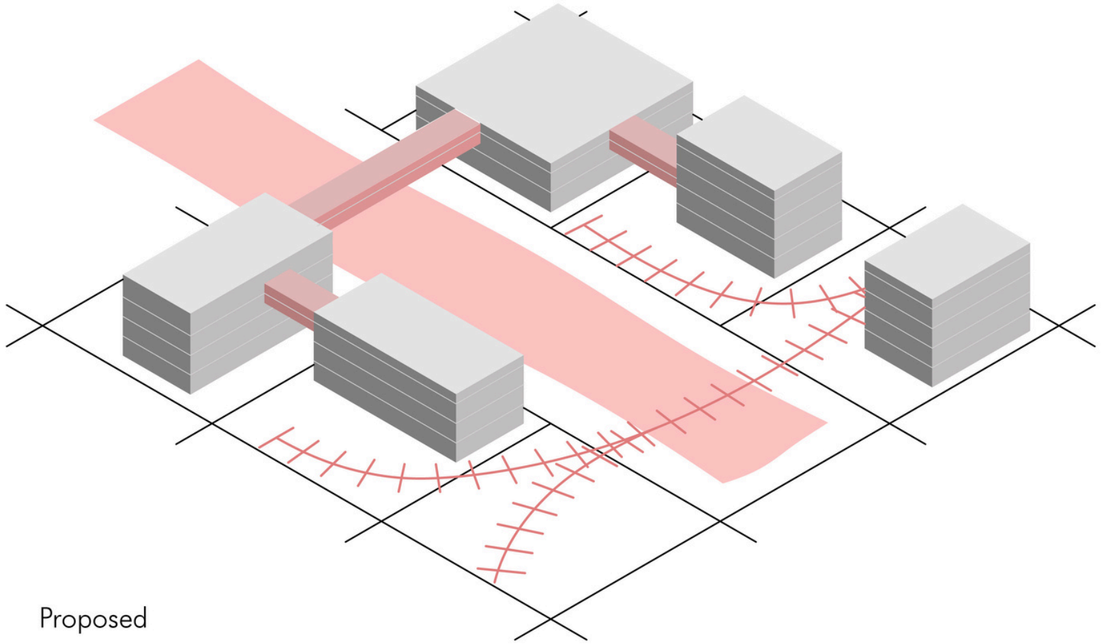
- High Capacity
- Reduced Traffic Congestion
- Cost Effective



Cargo via Creek

- Largest Load Capacity
- Lowest Carbon Footprint

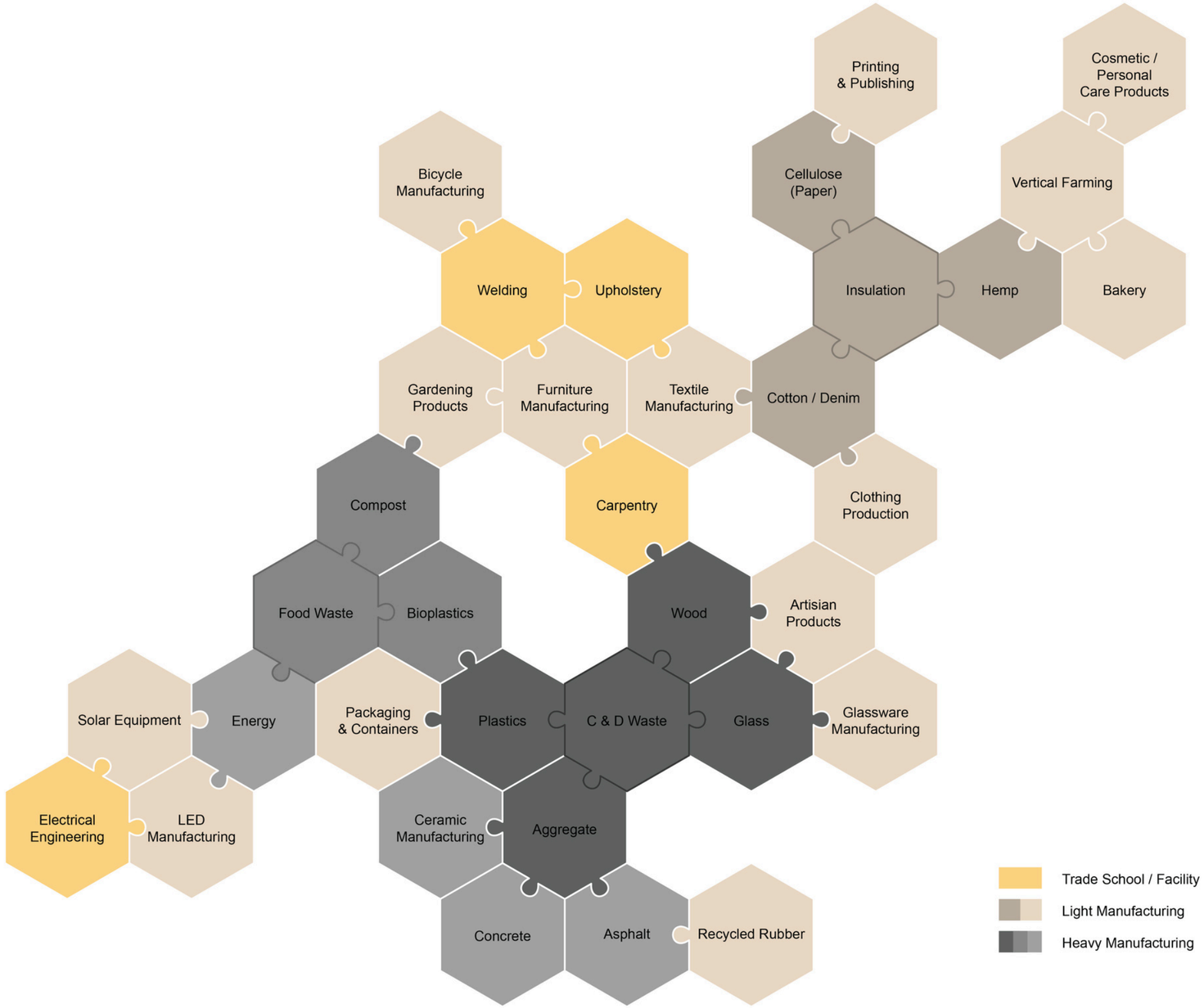


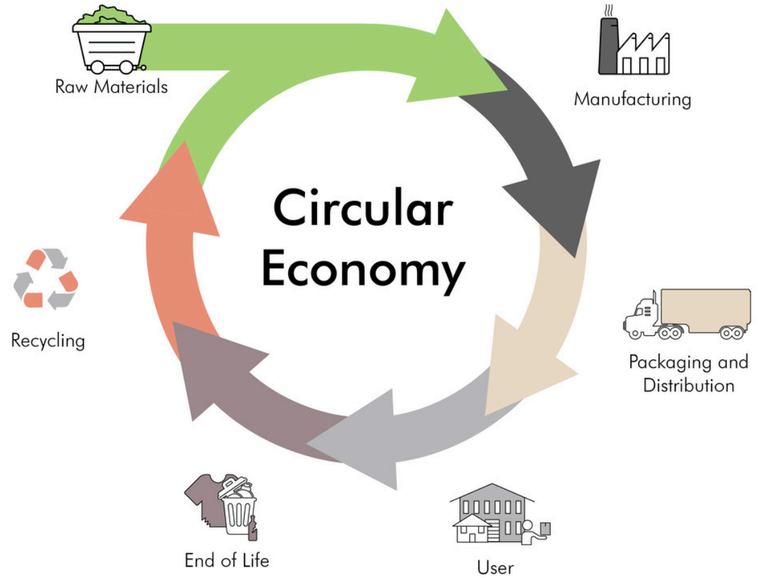


Proposed

** 1t = 2,000lbs

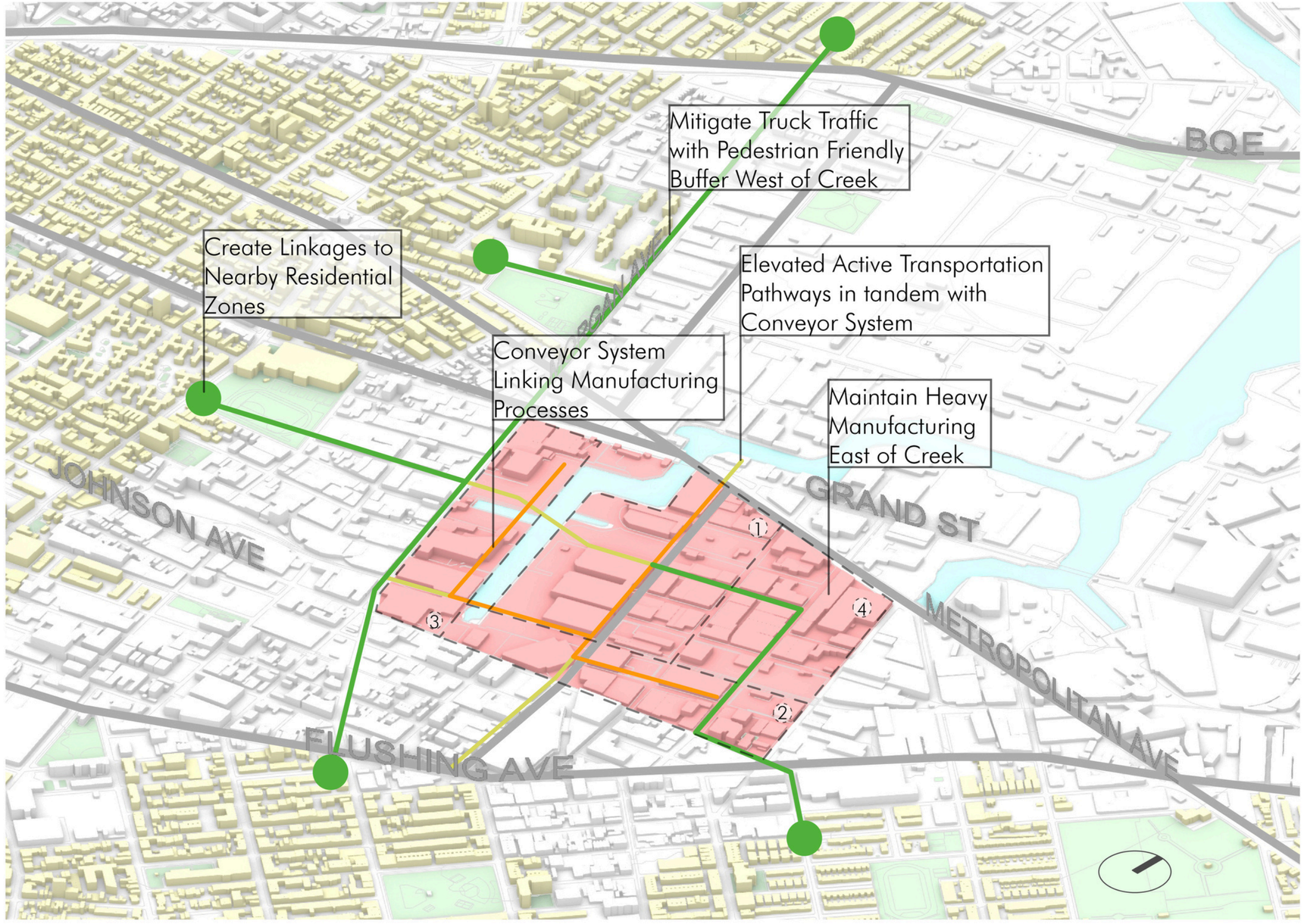
Potential Synergies





To foster circular economies within the area a list of potential synergies was generated. The list is neither exhaustive nor absolute but begins to outline the types of companies that can use each other's byproducts. When these processes exist in the same building or area it minimizes the travel distances these byproducts need to take, reducing the carbon footprint of the end products. Being able to use another process' waste as an input material also reduces the need for the extraction of raw materials and extends the life cycle of manufactured goods.

Site Strategies

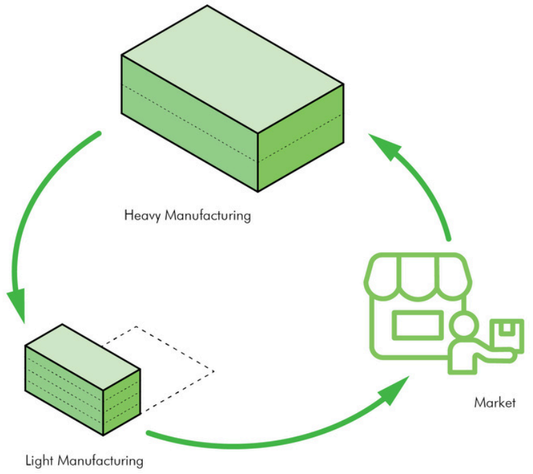


The Study Area is broken four segments, each having an area of focus.

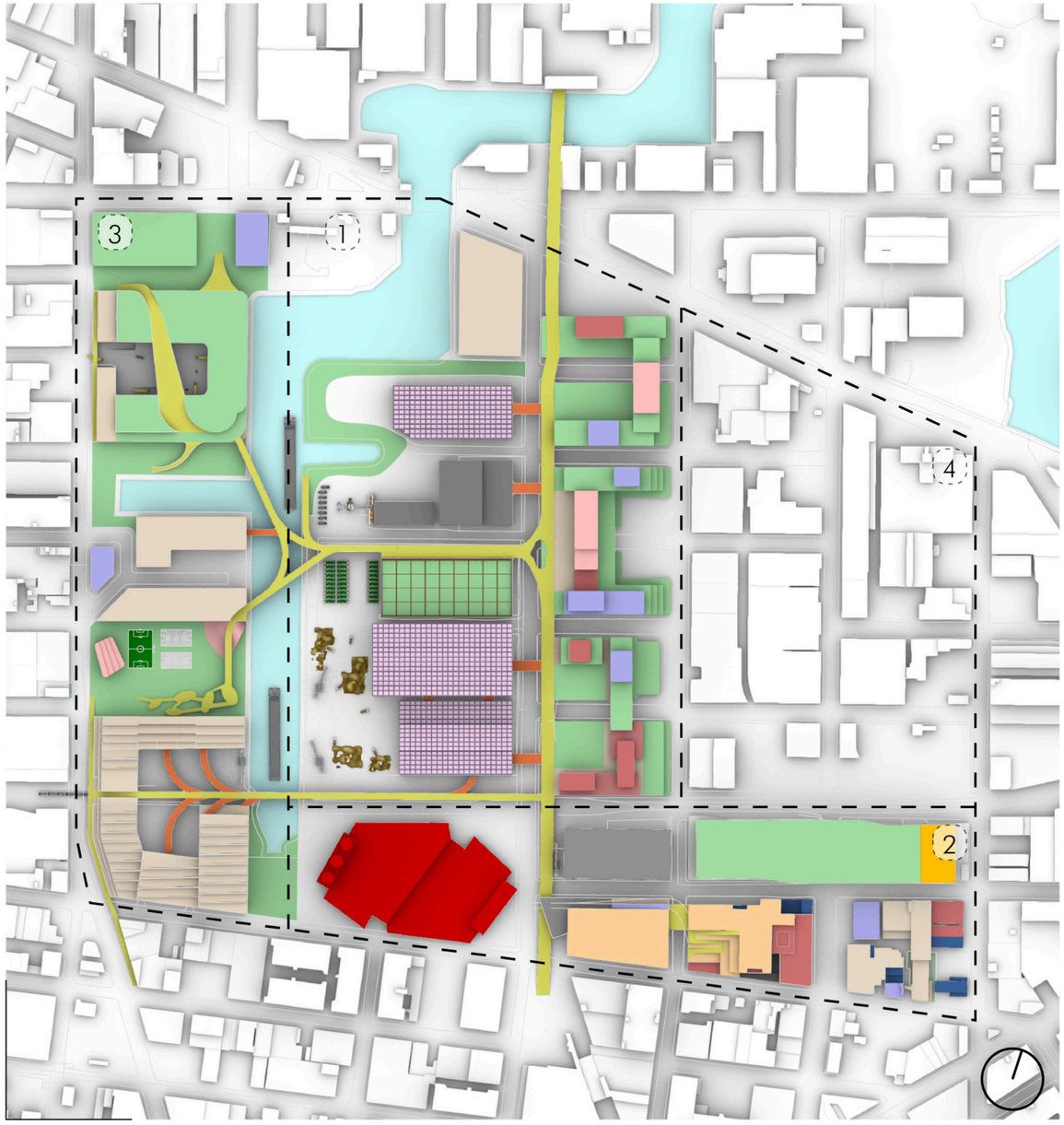
1. Construction and Demolition Waste
2. Food Processing and Energy Production
3. Distribution and Connectivity
4. Miscellaneous and other Synergies

The overall aim will be to densify manufacturing buildings by vertical stacking. Placing companies with synergies in close proximity to each other allows them to share raw materials and/or waste. This proximity also reduces the need for large trucks. Finally, a conveyor system will stretch across roadways, creating physical connections, allowing these companies to exchange goods and byproducts without the use of trucks.

CREATING UPCYCLING SYNERGIES

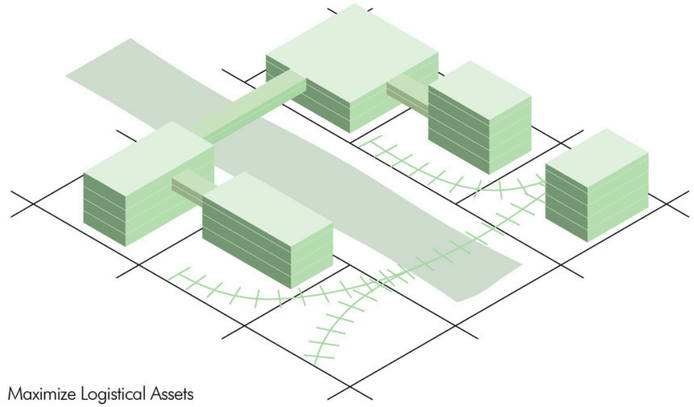


Proposal



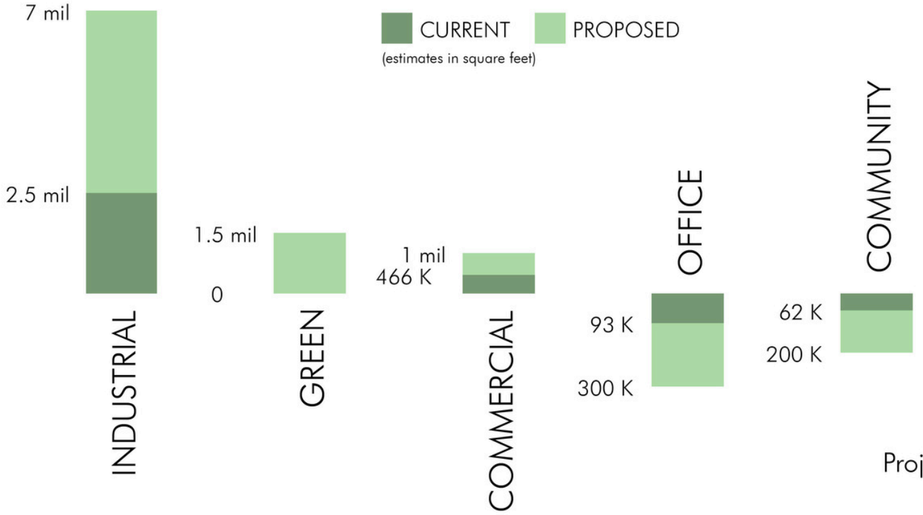
The changes in this proposal has the potential to provide three times (3x) as much industrial space than the current composition. Heavy manufacturing is maintained just East of the canal with a conveyor system connecting light manufacturing processes for optimal exchange of materials and waste creating a closed upcycling loop.

The overview on the left outlines the project segments. These segments allow for program grouping, further improving process efficiency throughout the project. The additional height proposed on the site promotes the integration of other programs while the implementation of green spaces heightens resiliency and encourages after work life.


Maximize Logistical Assets

1. Construction and Demolition Waste
2. Food Processing and Energy Production
3. Distribution and Connectivity
4. Miscellaneous and other Synergies

SPACE ALLOCATION CHART



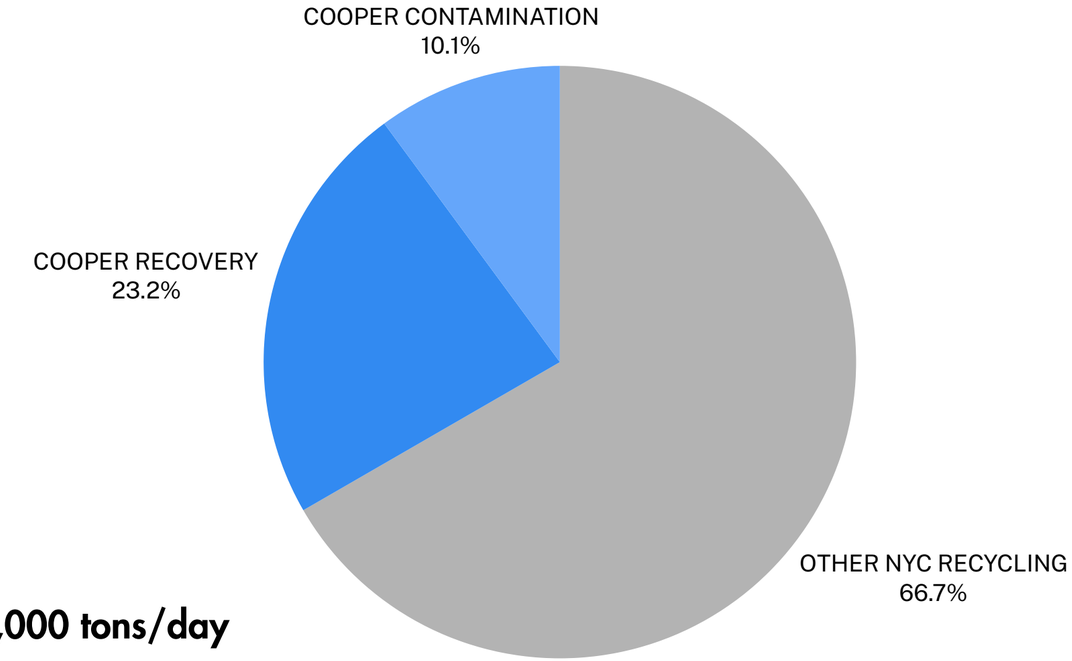
Project Area Size: 127ac

Construction & Demolition

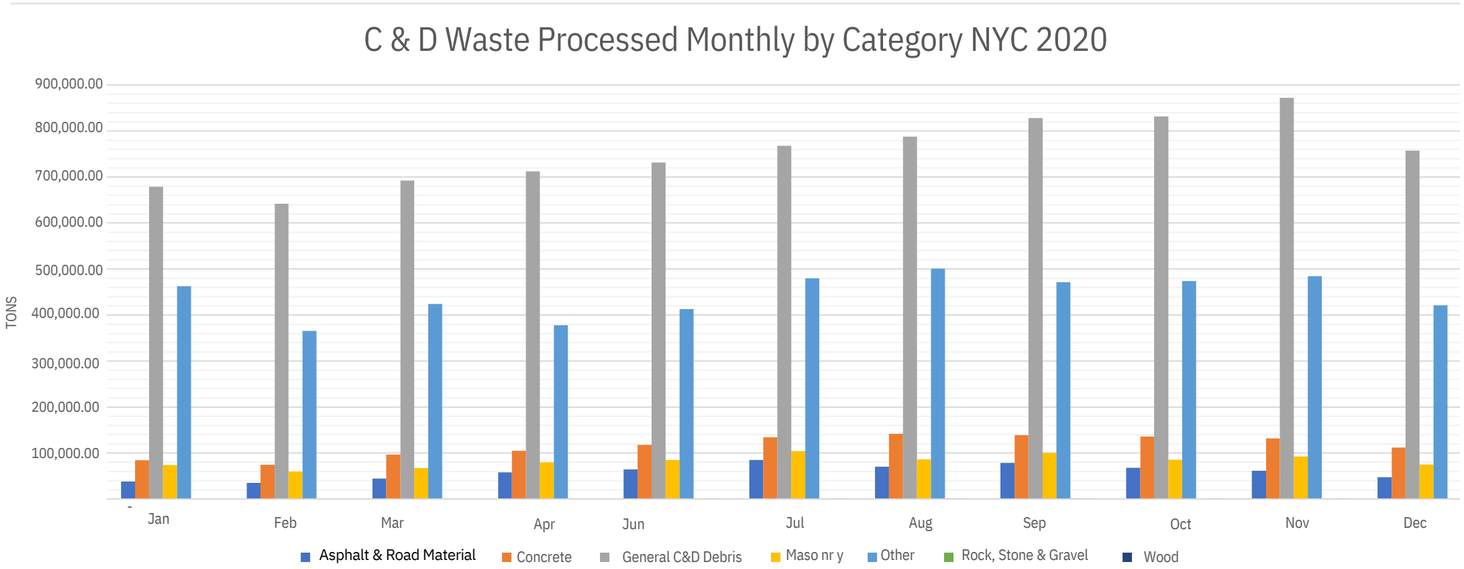
Construction and Demolition (C&D) waste processing is a critical component of New York City's sustainable waste management strategy. The city's constant development and renewal make managing debris generated from construction and demolition activities essential for minimizing environmental impacts. C&D waste processing facilities play a pivotal role in sorting, recycling, and responsibly disposing of materials such as concrete, wood, metal, and plastics. Through advanced technologies and stringent regulations, these facilities aim to maximize resource recovery, divert waste from landfills, and reduce overall carbon footprint. To take this initiative further, up-cycling economies where materials are continuously reused, recycled, or repurposed, have to be created. This minimizes the need for new resources and reuses waste generated.

In this proposal, materials recovered from construction sites will be reintegrated into the building process, either directly or after undergoing remanufacturing. This approach not only conserves valuable resources but also reduces energy consumption and greenhouse gas emissions associated with extracting, processing, and transporting new raw materials - embracing a closed-loop economy for C&D waste.

NYC Construction & Demolition Waste (CDW) Production



8,000 tons/day

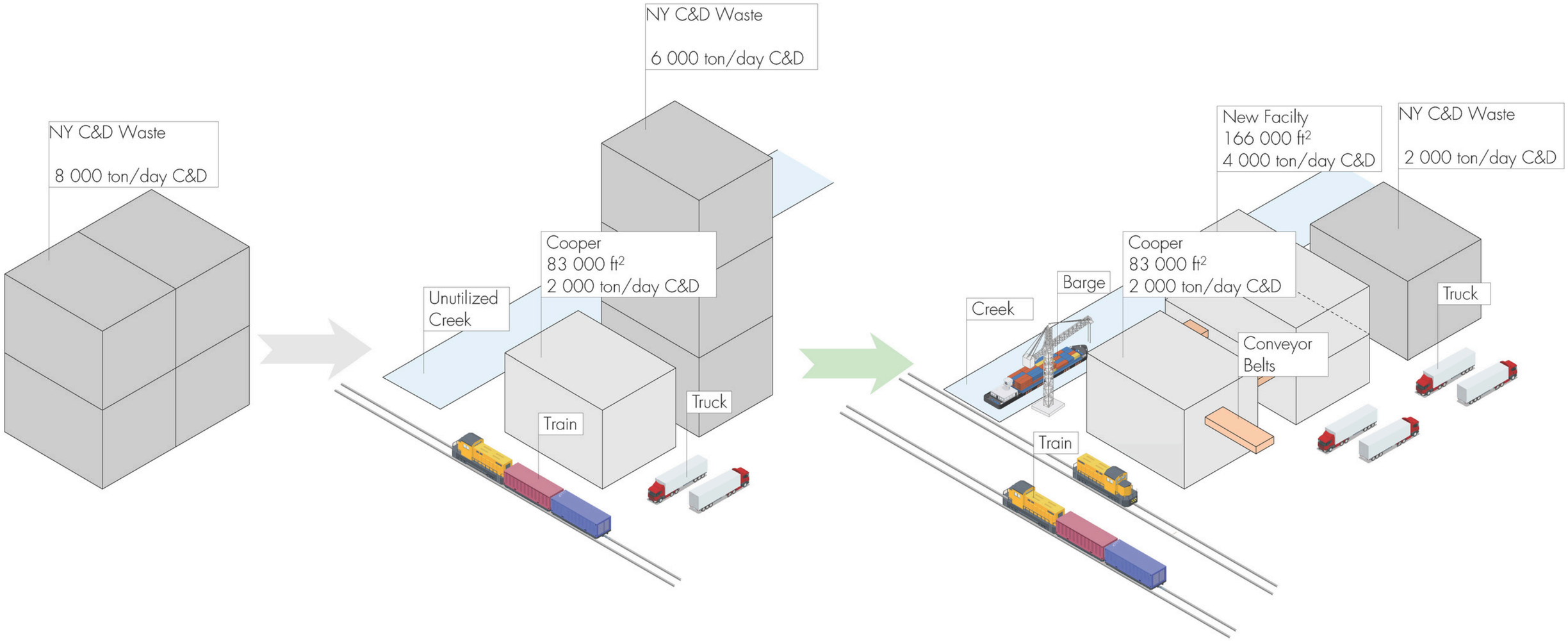


SOURCE: Cooper Recycling

COOPER RECYCLING YARD

C&D WASTE TRANSPORTED WITH TRUCK

NYC Construction & Demolition Waste Processing



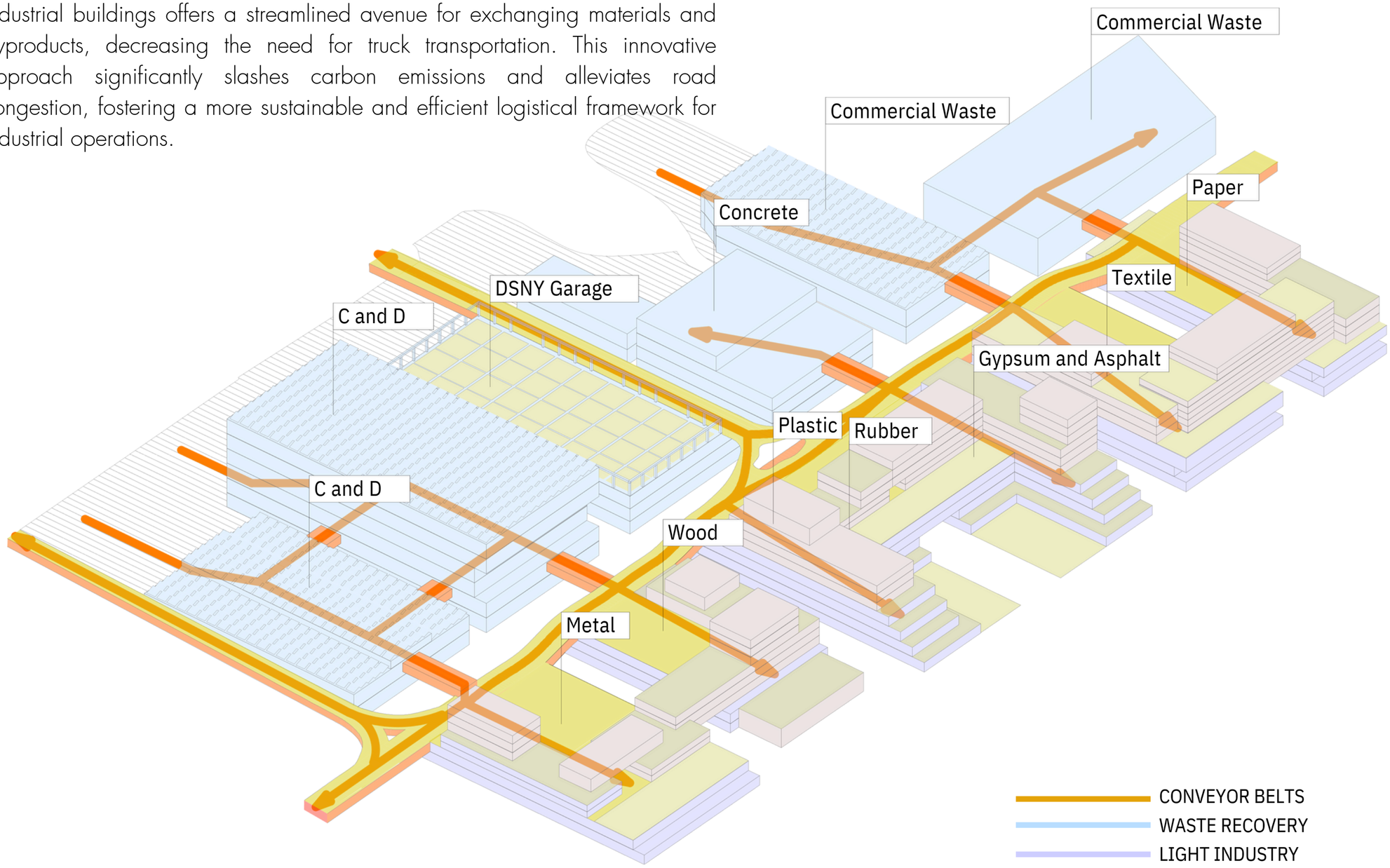
New York City generates approximately 8,000 tons of (C&D) waste due to ongoing construction, renovation, and demolition projects across the city.

Scaling up (C&D) waste processing is crucial for sustainability. Vertical industry integration optimizes waste management within construction by enabling on-site processing.

Increasing C&D waste processing can optimize the use of barges and trains for transport, reducing traffic congestion, carbon emissions.

Manufacturing Connections

By implementing conveyor belts to establish physical connections between industrial buildings offers a streamlined avenue for exchanging materials and byproducts, decreasing the need for truck transportation. This innovative approach significantly slashes carbon emissions and alleviates road congestion, fostering a more sustainable and efficient logistical framework for industrial operations.

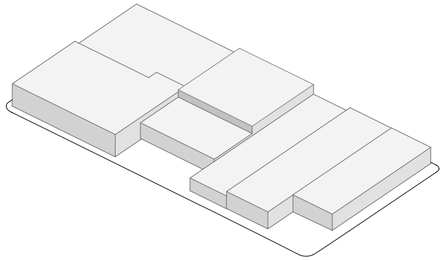


CONVEYOR BELTS

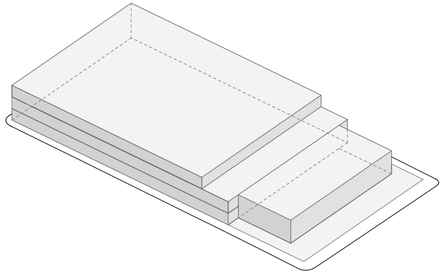
WASTE SORTING-RAW MATERIAL

FINAL PRODUCT

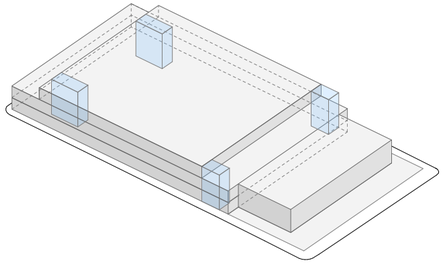
Industrial Vertical Transformation



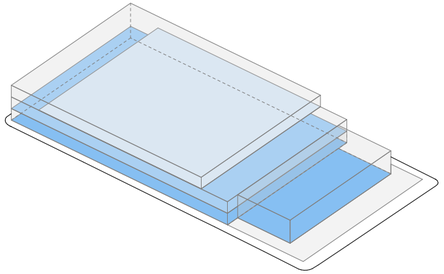
Existing Building



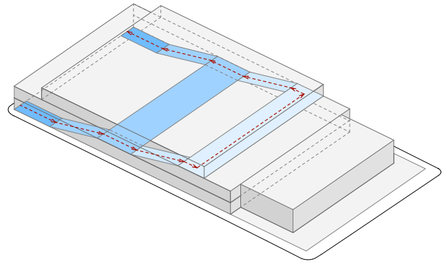
New volume



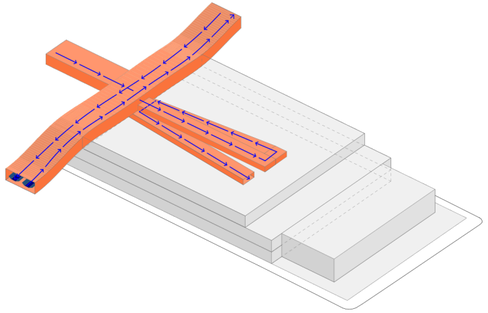
Build core (stair and elevator)



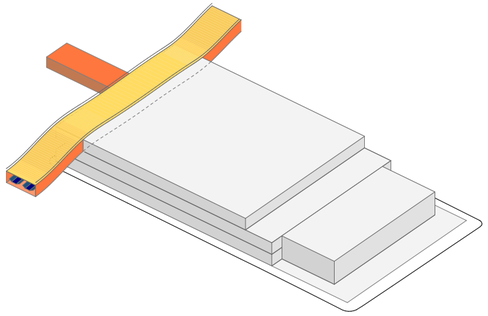
Interior space



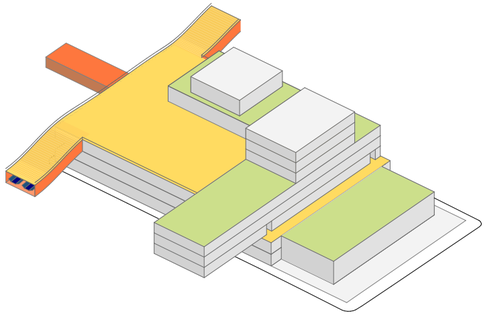
Ramp and peripheral corridor



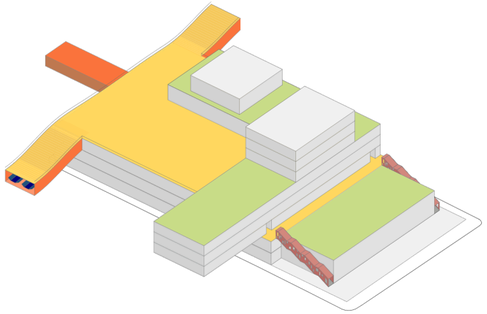
Conveyor belts



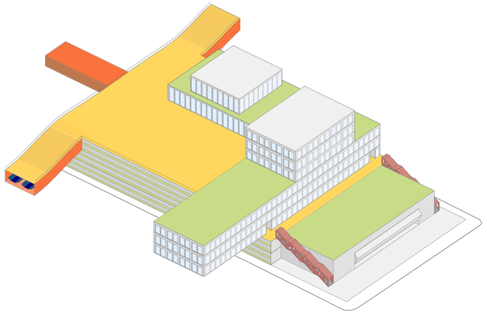
Active transportation pathway



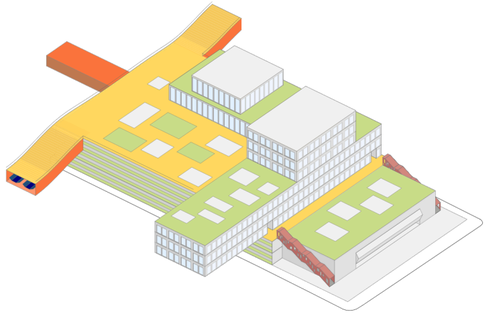
Open space



Provide Street Access



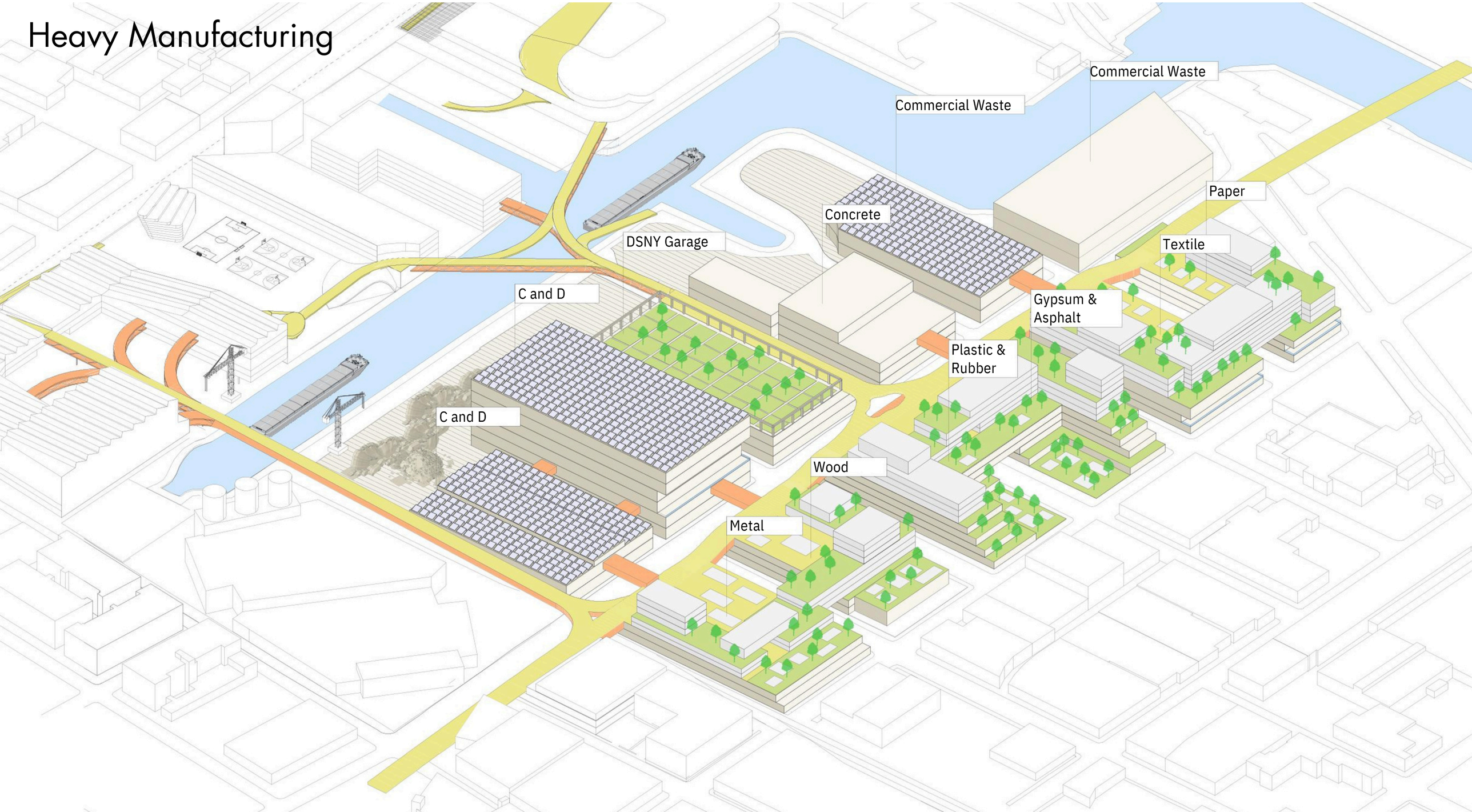
Open up facade



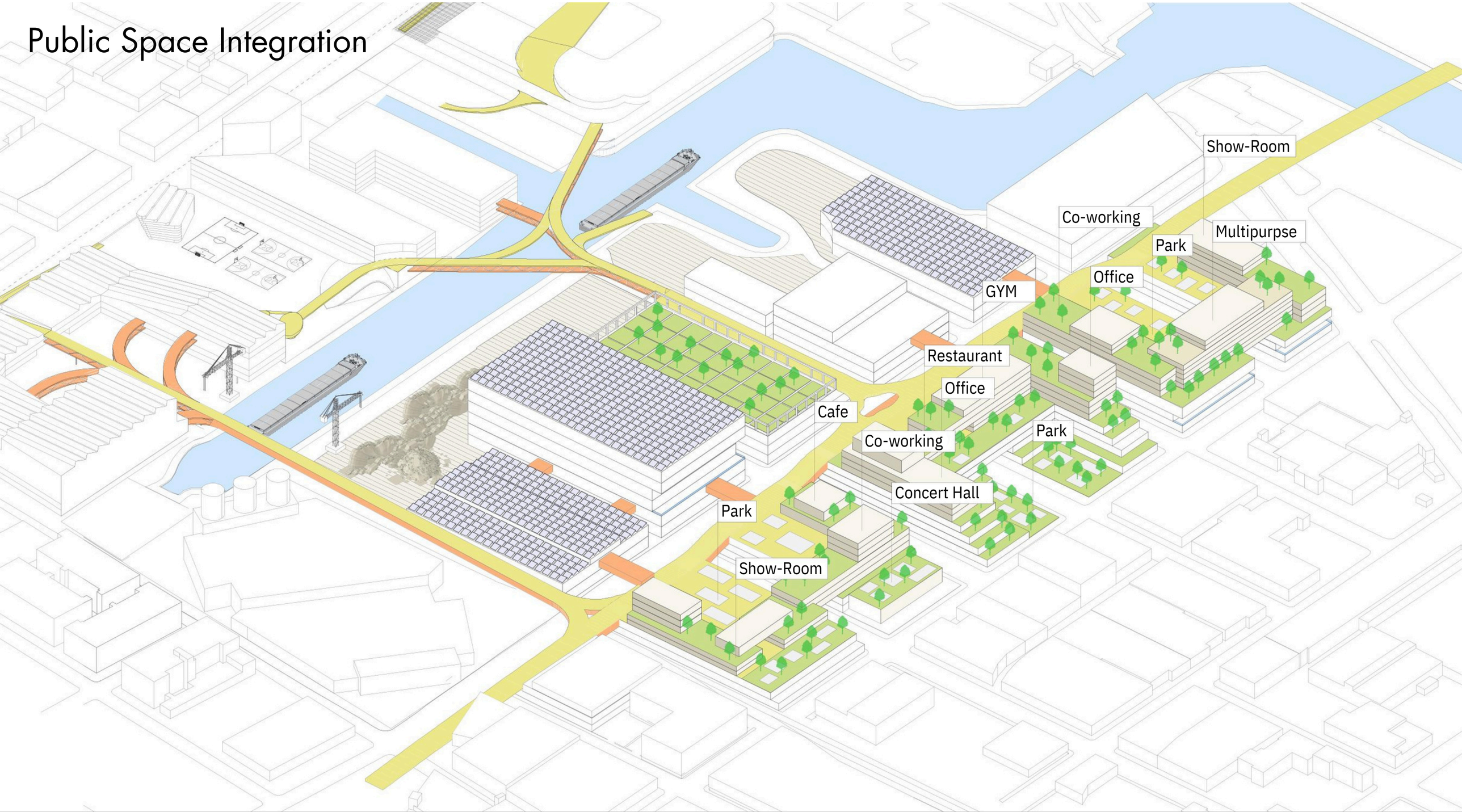
Creative spaces

Space Activation

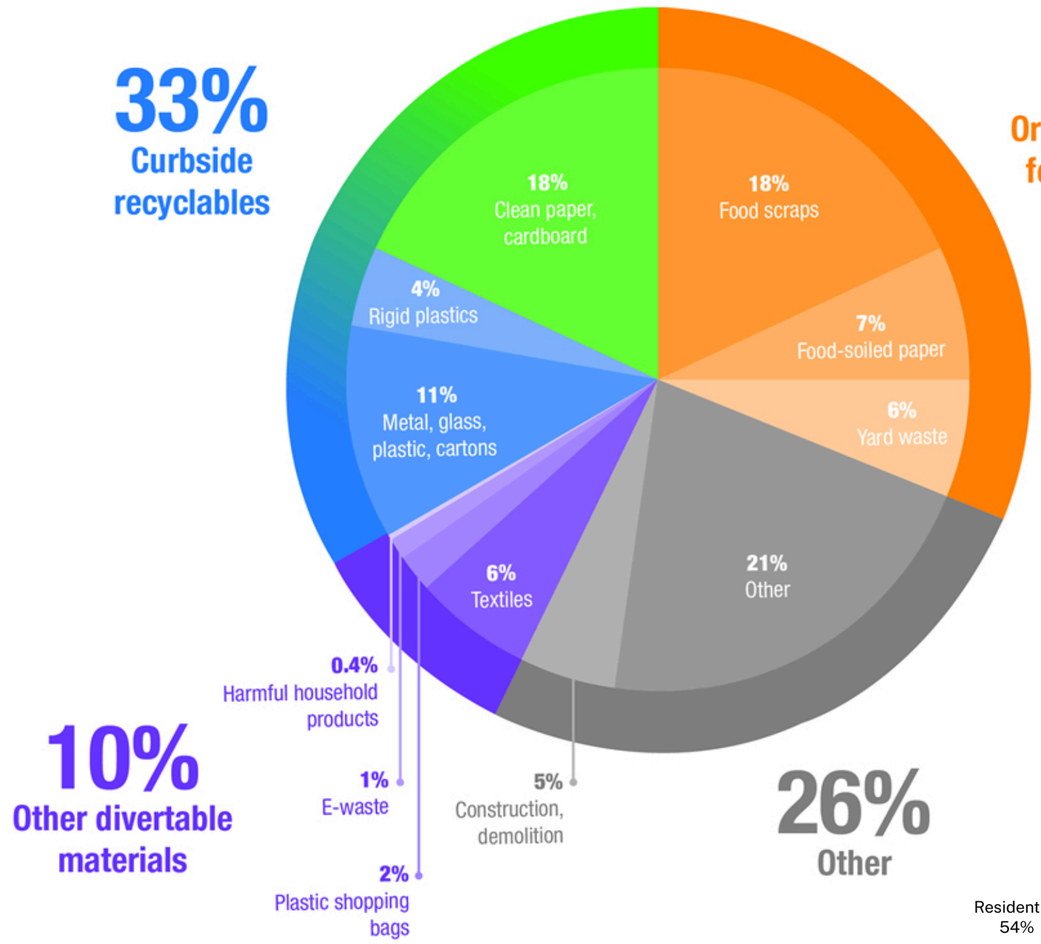
Heavy Manufacturing



Public Space Integration

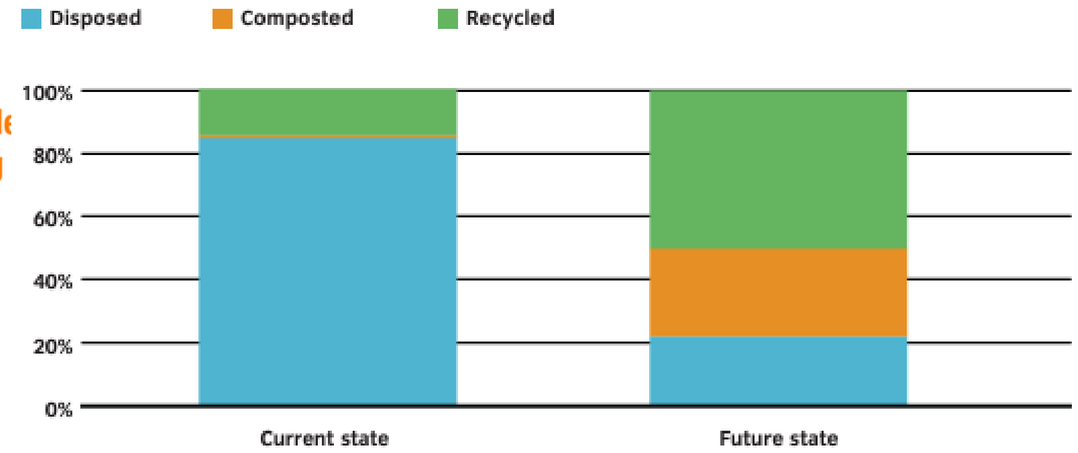


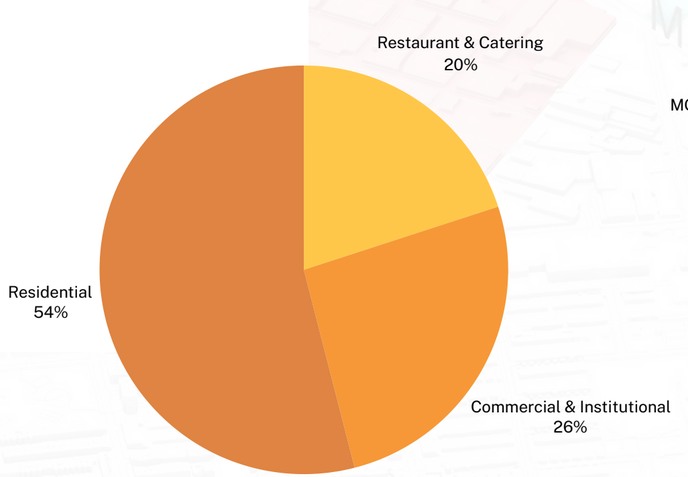
NYC Total Waste Production



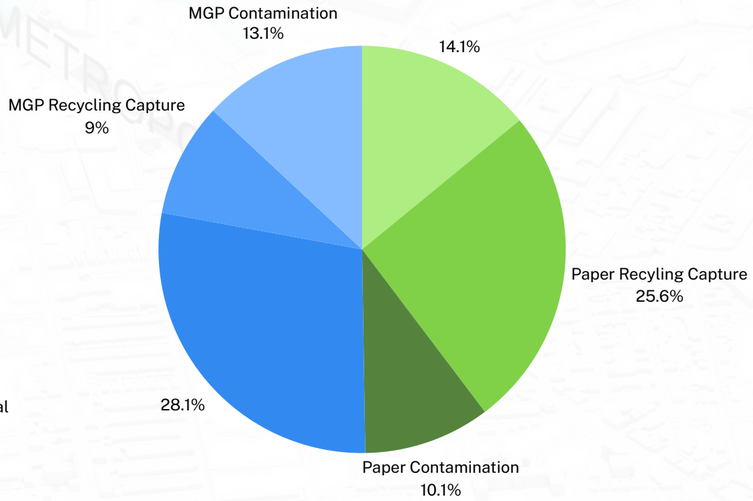
~12,000 tons/day

Potential of Residential and Street Basket Diversion





~3,700 tons/day



~2,000 tons/day

SOURCE: NYC Food Policy

SOURCE: Recycle Track Systems

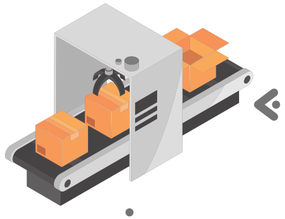
Organic Resource Recovery

Urban Farming

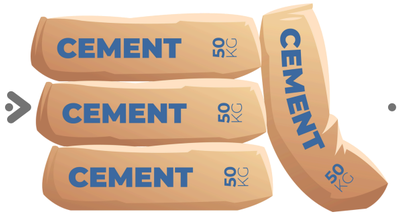
Initial Usage

Waste Recovery

Resource Production



Material Fabrication



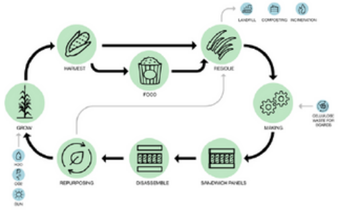
- Wood-like material
- stiff board (composite)
- Applications:
  - Construction panels
  - Insulation and internals
  - Furniture

- Highly versatile
- Textile, stiff, and flexible
- Applications:
  - Concrete
  - Insulation and internals
  - Furniture and carpetting

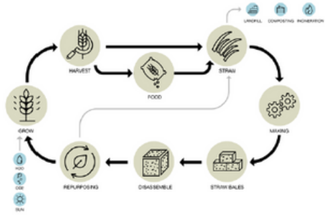
- Wood-like material
- stiff and flexible board (composite)
- Applications:
  - Acoustic Panels
  - Decorative finishes
  - Furniture

- Mycelium, blocks, biomass gasification
- Cement and Fuel
- Applications:
  - Concrete
  - Energy production

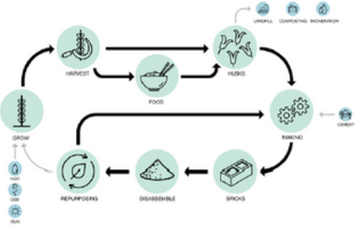
MAIZE



STRAW AND STALK



RICE HUSK ASH



CORNBOARD CLADDING

INSULATIVE "POPCORN"

RICE ASH IN CEMENT

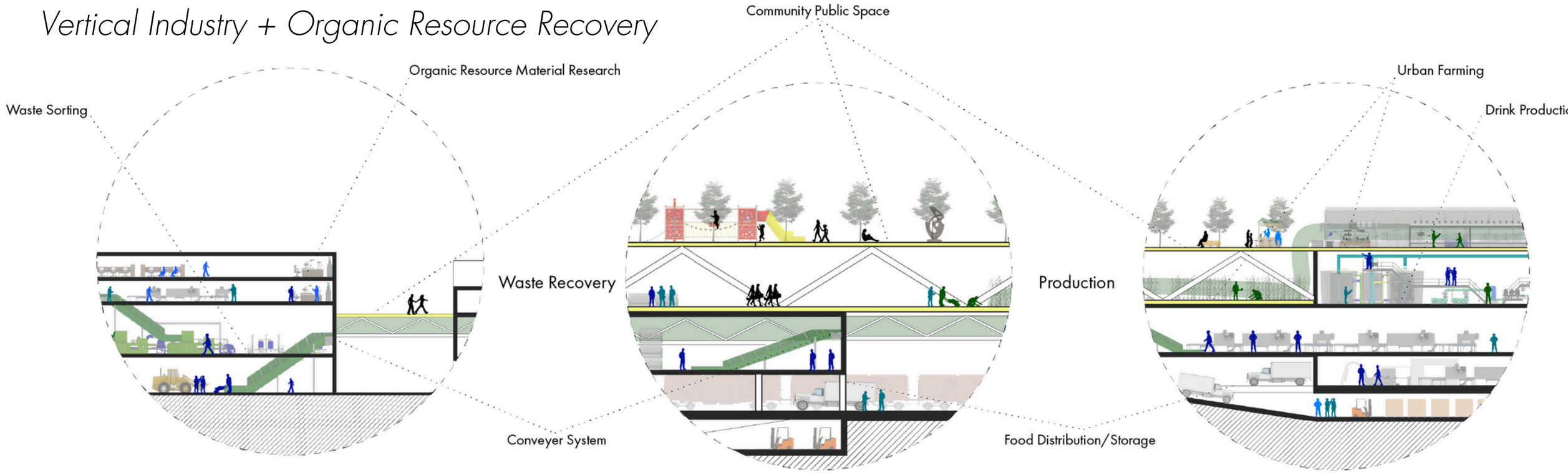
Organic Resource Recovery + Public Space

Intersecting with the waste management of in Construction and Heavy Manufacturing, this sector of the site focuses on the industry and waste management involved in the food industry and explores the possibilities of reuse and and upcycling of material for construction usage. The waste management superblock formations provide a densification of program, creating space for waste processing, material research, and artisan craftsmanship of goods like furniture and construction components.

The existing program of the site informs the culture of this heavily industrious zone. Among the existing manufacturing warehouses and plots there is a thriving nightlife, entertainment value, and artisan furniture and theatrical prop production. The proposal for this region looks to emphasize and densify these ideas to have greater synergies amongst each other, maintaining and exemplifying cultural and historic significance of industry and night life in the area.

DESIGN PROPOSAL

Vertical Industry + Organic Resource Recovery

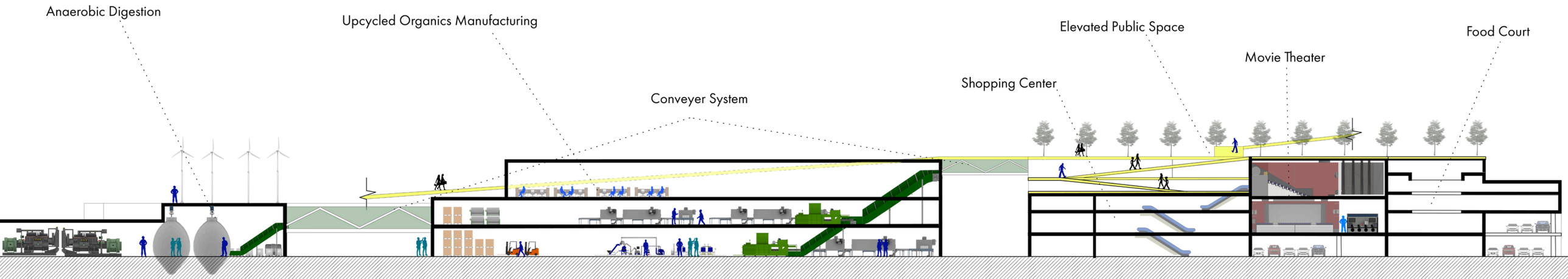


Organic Waste Processing
+
Recovery Reseach Facility

Food Processing and Distribution Hub
+
Elevated Pathway Ecological Center

DESIGN PROPOSAL

Urban Integration + Public Space



Energy Recovery Station

Waste Recovery Sorting + Upcycled Manufacturing

Commercial + Entertainment Public Space Complex

NYC's Delivering Green

A vision for a sustainable freight network serving New York City

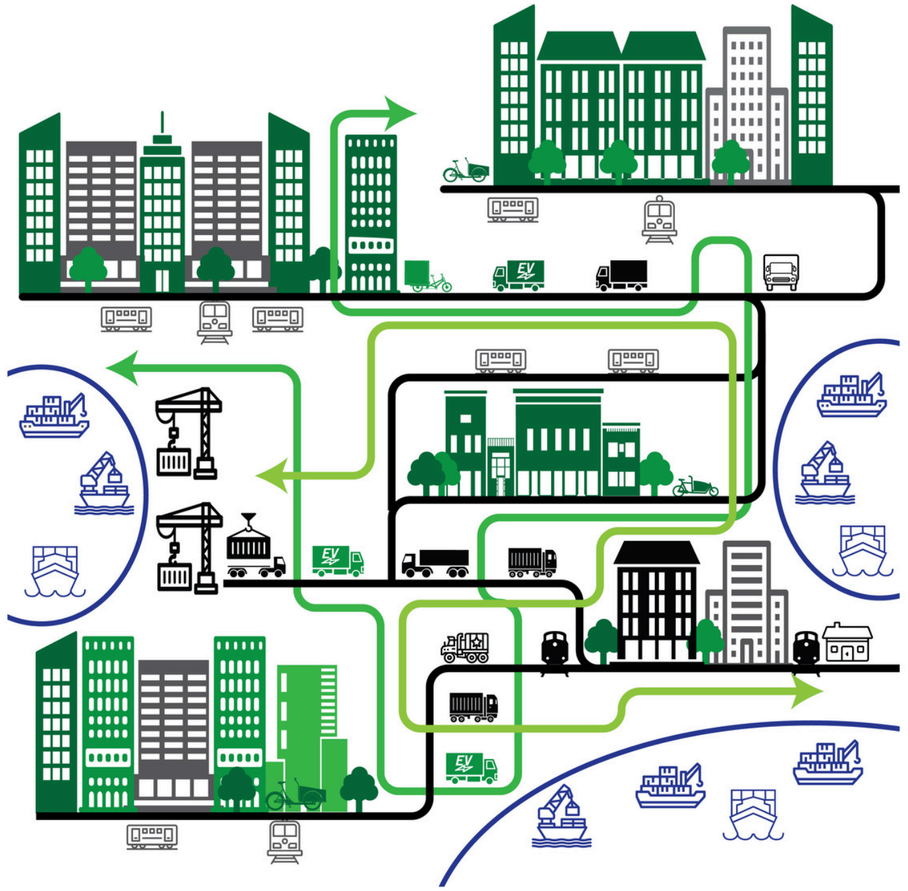
"Today close to 90% of the City's goods are moved into and around the city by truck—the result of the shift from rail and water networks to highways in the second half of the twentieth century. Now, our dependency on trucks to meet an increasing demand for goods exacerbates traffic congestion, pollutes our air, stresses our aging infrastructure, and harms the quality of life in our residential neighborhoods."

Five Key Goals:

1. Make the Last Mile More Efficient
2. Green the Last Mile
3. Create a Culture of Compliance
4. Shift Freight from Road to Water
5. Shift Freight from Road to Rail

NYC EDC

NEW YORK CITY DOT



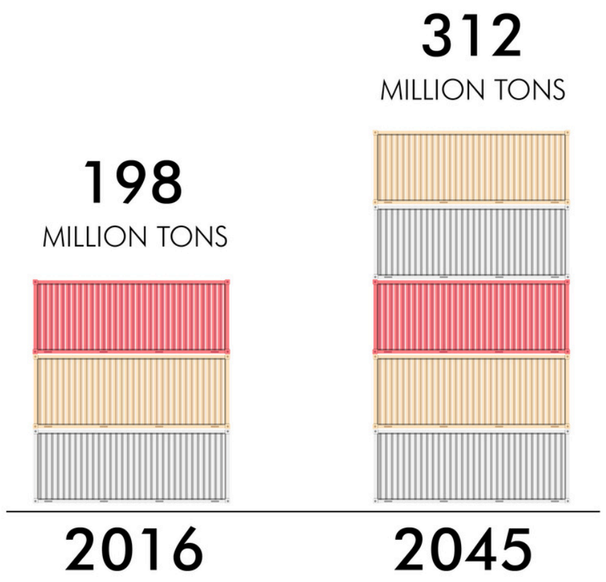
Source: NYC EDC, NYC DOT - Delivering Green

Freight and Distribution

New York City has seen a rapid growth in freight volume driven by population growth and higher consumer demands. This puts a strain on existing infrastructure and requires wise investments to upgrade freight systems and ensure a strong platform for economic growth.

In 2016, 198 millions tons of freight passed through New York City via highways, marine terminals, railways, airports and distribution centers. It is estimated to increase to 312 million tons, including commercial and consumer, based on expected population and economic growth rates.

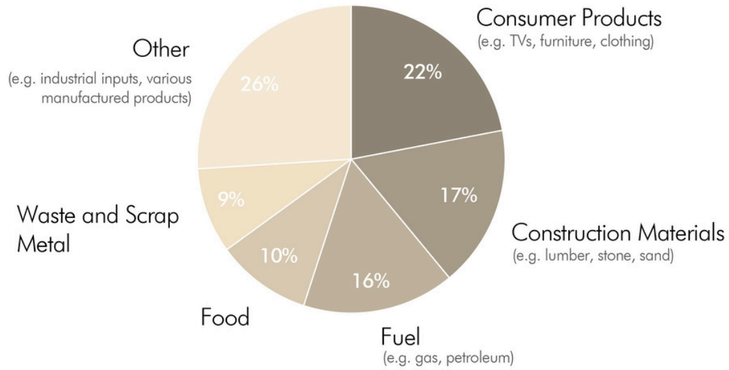
Freight Volumes



2045 estimate based on expected population and economic growth rates.

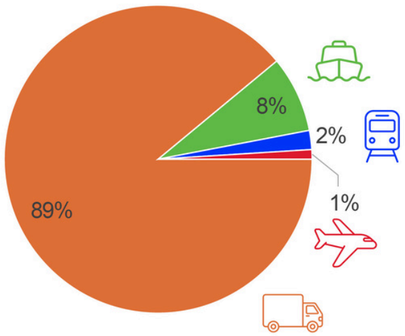
Source: NYCEDC, Port NYC - Freight NYC

Top Commodities Moved in NYC



Source: NYCEDC, Port NYC - Freight NYC

Freight Mediums



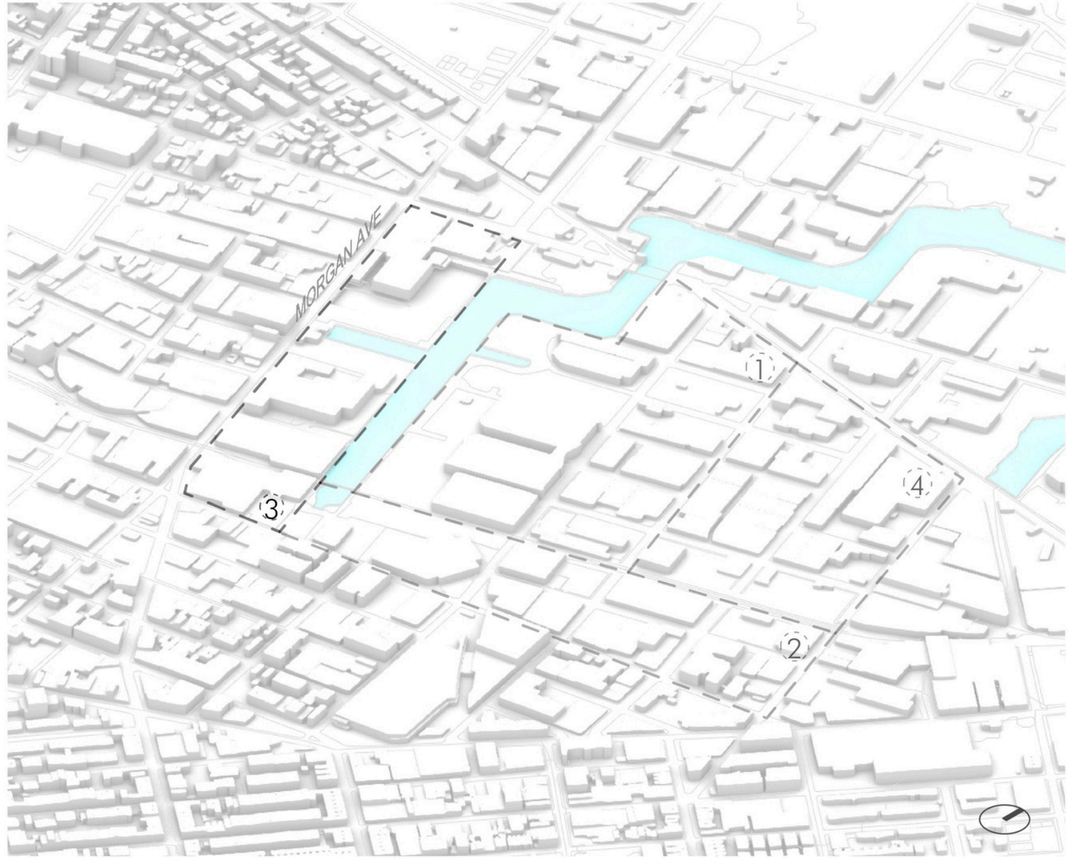
Source: NYCEDC, Port NYC - Freight NYC

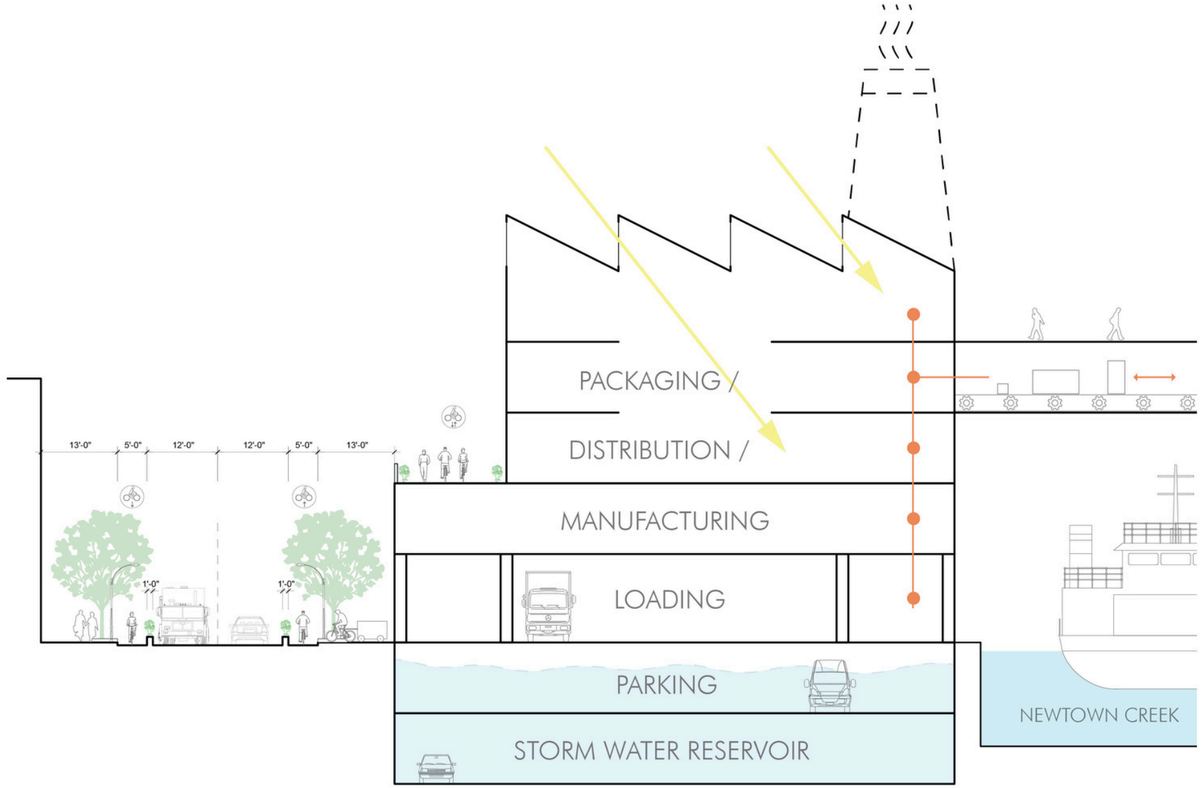
Related Occupations and Wages

Industry	Occupation (SOC code)	Avg Hrly Wages
Vehicle Operators, Pipeline Operators, And Primary Support	Railroad Brake, Signal, And Switch Operators (53-4022)	31.16
	Pump Operators, Except Wellhead Pumpers (53-7072)	28.44
	Gas Compressor And Gas Pumping Station Operators (53-7071)	29.57
	Bridge And Lock Tenders (53-6011)	22.55
	Ship Engineers (53-5031)	48.55
	Captains, Mates, And Pilots Of Water Vessels (53-5021)	50.09
	Sailors And Marine Oilers (53-5011)	25.65
	Railroad Conductors And Yardmasters (53-4031)	33.26
	Rail Yard Engineers, Dinkey Operators, And Hostlers (53-4013)	28.09
	Locomotive Engineers (53-4011)	35.50
	Truck Drivers, Light Or Delivery Services (53-3033)	21.65
	Truck Drivers, Heavy And Tractor-Trailer (53-3032)	25.52
	Driver/Sales Worker (53-3031)	17.10
Transportation Equipment Manufacturing And Maintenance	Rail Car Repairers (49-3043)	29.79
	Bus And Truck Mechanics And Diesel Engine Specialists (49-3031)	26.99
	Dredge Operators (53-7031)	24.89
	Signal And Track Switch Repairers (49-9097)	37.20
	Rail-Track Laying And Maintenance Equipment Operators (47-4061)	30.69
Secondary Support Service	Tank Car, Truck, And Ship Loaders (53-7121)	28.21
	Transportation Inspectors (53-6051)	38.35
	Shipping, Receiving, And Traffic Clerks (43-5071)	19.45
	Postal Service Mail Carriers (43-5052)	27.04
	Dispatchers, Except Police, Fire, And Ambulance (43-5032)	23.25

Source: Bureau of Labor Statistics via Bureau of Transportation Statistics (May 2022)

Distribution District





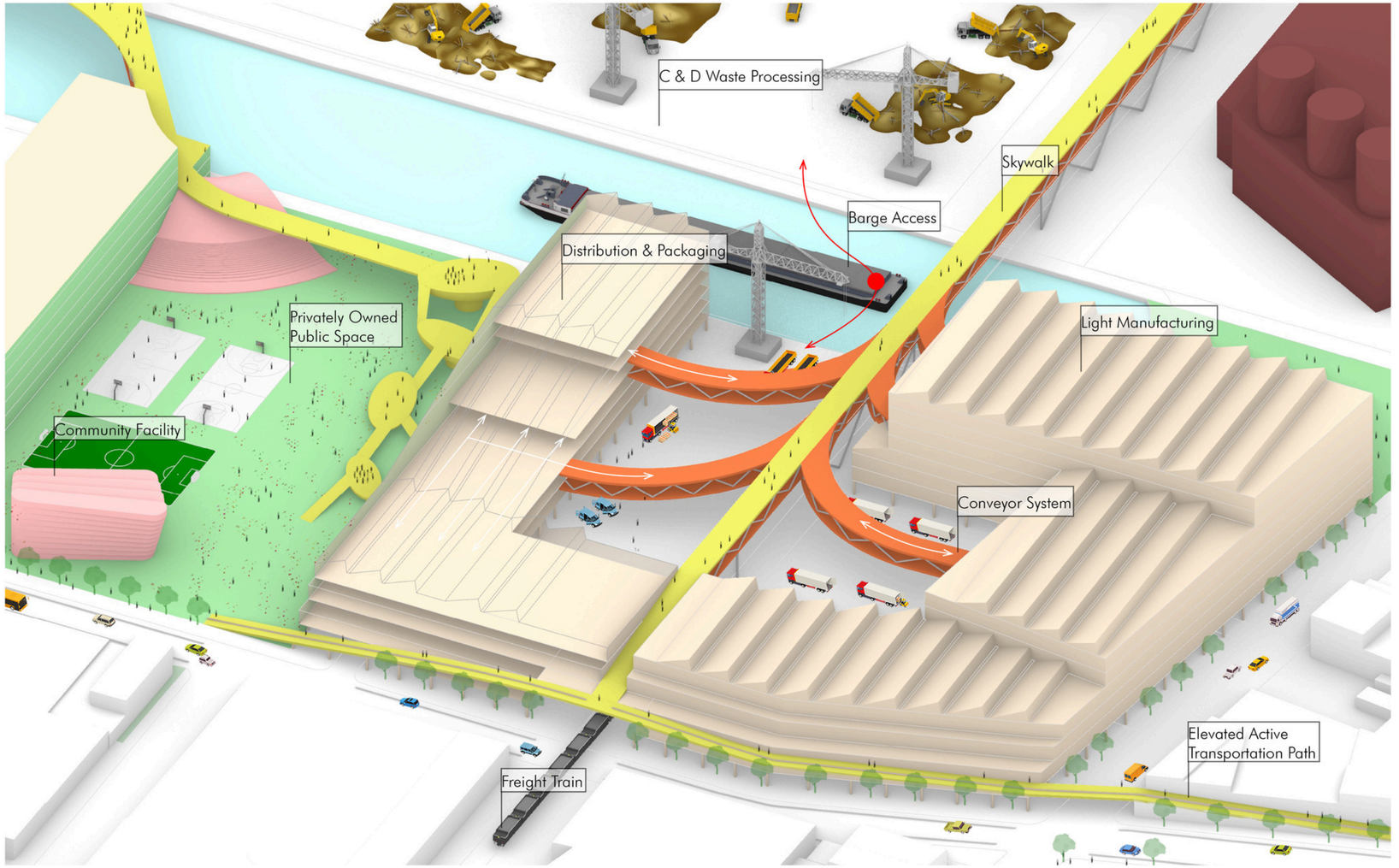
Location on Site

Morgan Ave is a key corridor both for this industrial area and the surrounding communities. It provides direct access to and from the Brooklyn-Queens Expressway but also serves as important path for pedestrians and cyclists to get to work, transit, and the connecting neighborhoods. In this area of the project, pedestrian and micro-mobility integration is paramount while maintaining Morgan Ave's vital contribution to this Industrial Business Zone.

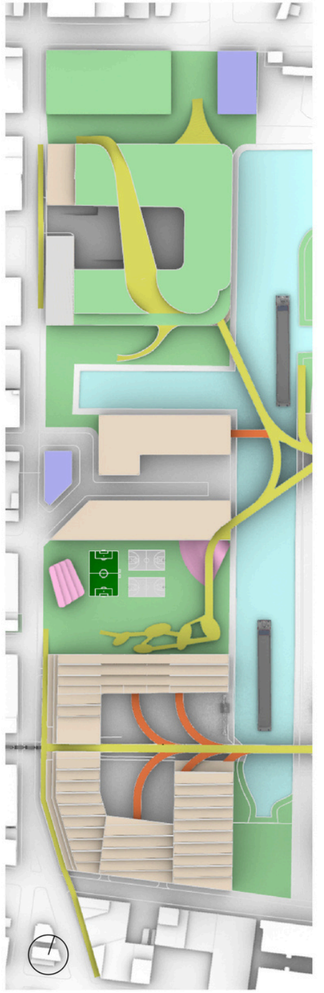
Design Principles

These distribution hubs aim to take full advantage of the logistical assets at their disposal, i.e. roadways, railways, waterways, and skyways. Conveyors connecting buildings throughout the project reduce the need for vehicular traffic in the area as businesses are able to exchange materials and/or waste in the sky. To further mitigate truck traffic in this region of the project a protected micro-mobility lane will be instituted along Morgan Ave. This gives additional protection to active transportation. East-West connectivity of the project region is facilitated by the conveyor system which doubles as an active transportation path. Resiliency concerns are improved upon with the increase of greenery but also below grade parking and storage areas. In time of need, these spaces will serve as storm water reservoirs, easing flooding in the area and protecting infrastructure and other assets.

Distribution District

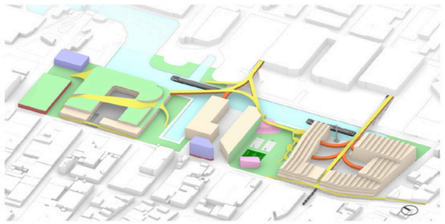


South Distribution Hub



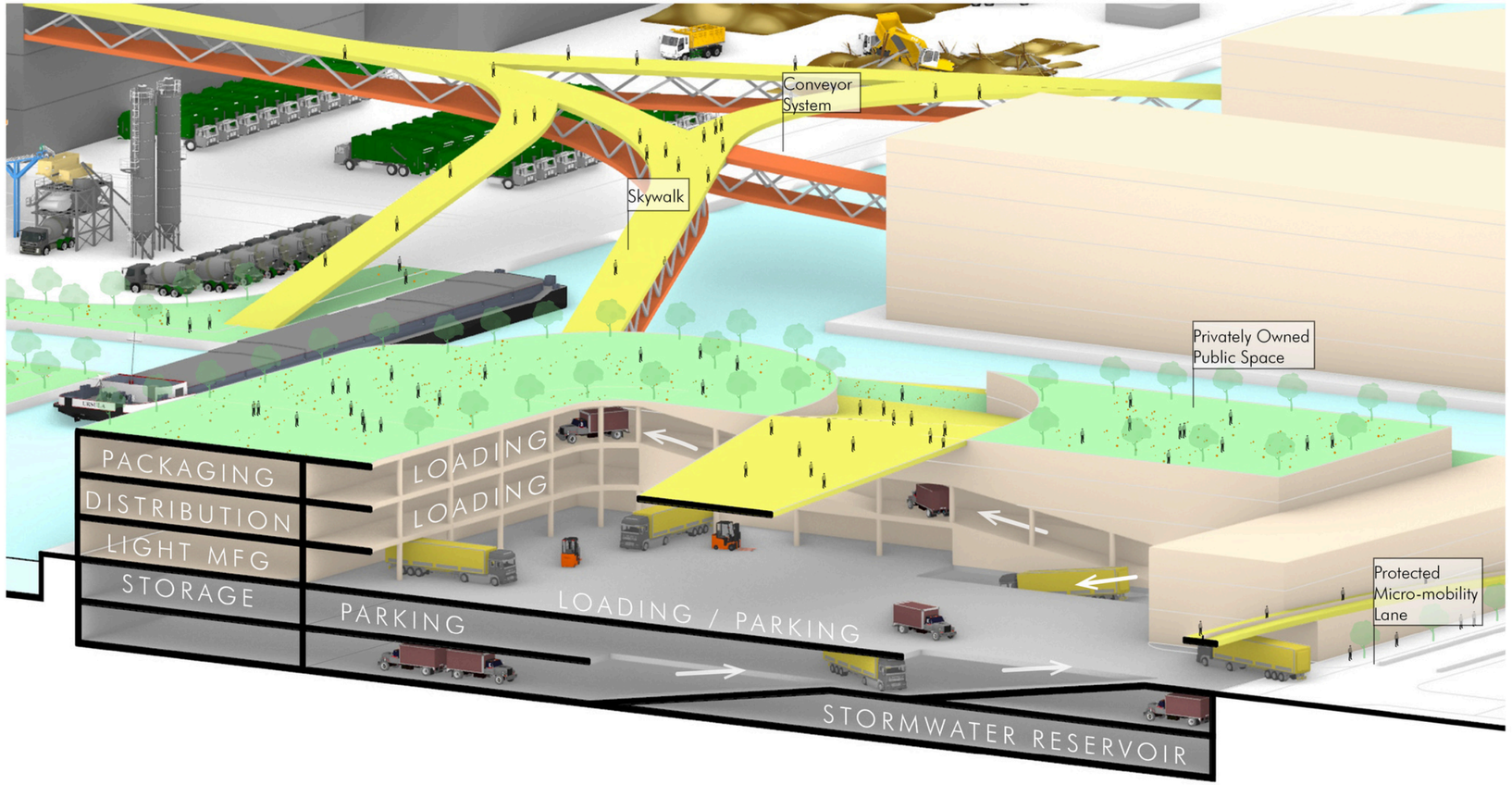
Key Plan

Strategically located along Morgan Avenue, the Westside of the project area provides an opportunity to become a distribution hub. This area has direct access to not only the BQE but to Newtown Creek and the road network. The integration of a conveyor system in the sky facilitates a hybridity not achievable by most sites. Products, materials and waste can move to, from and through the project area in the most efficient way based on volume.

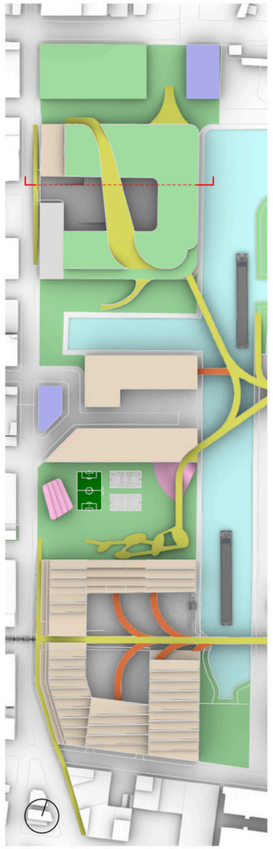


Key Axon

Distribution District

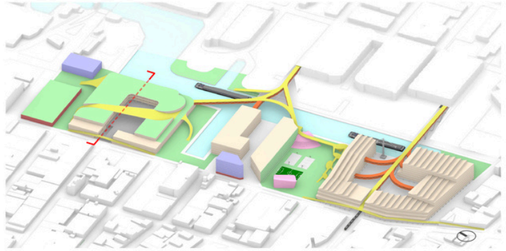


North Distribution Hub Section



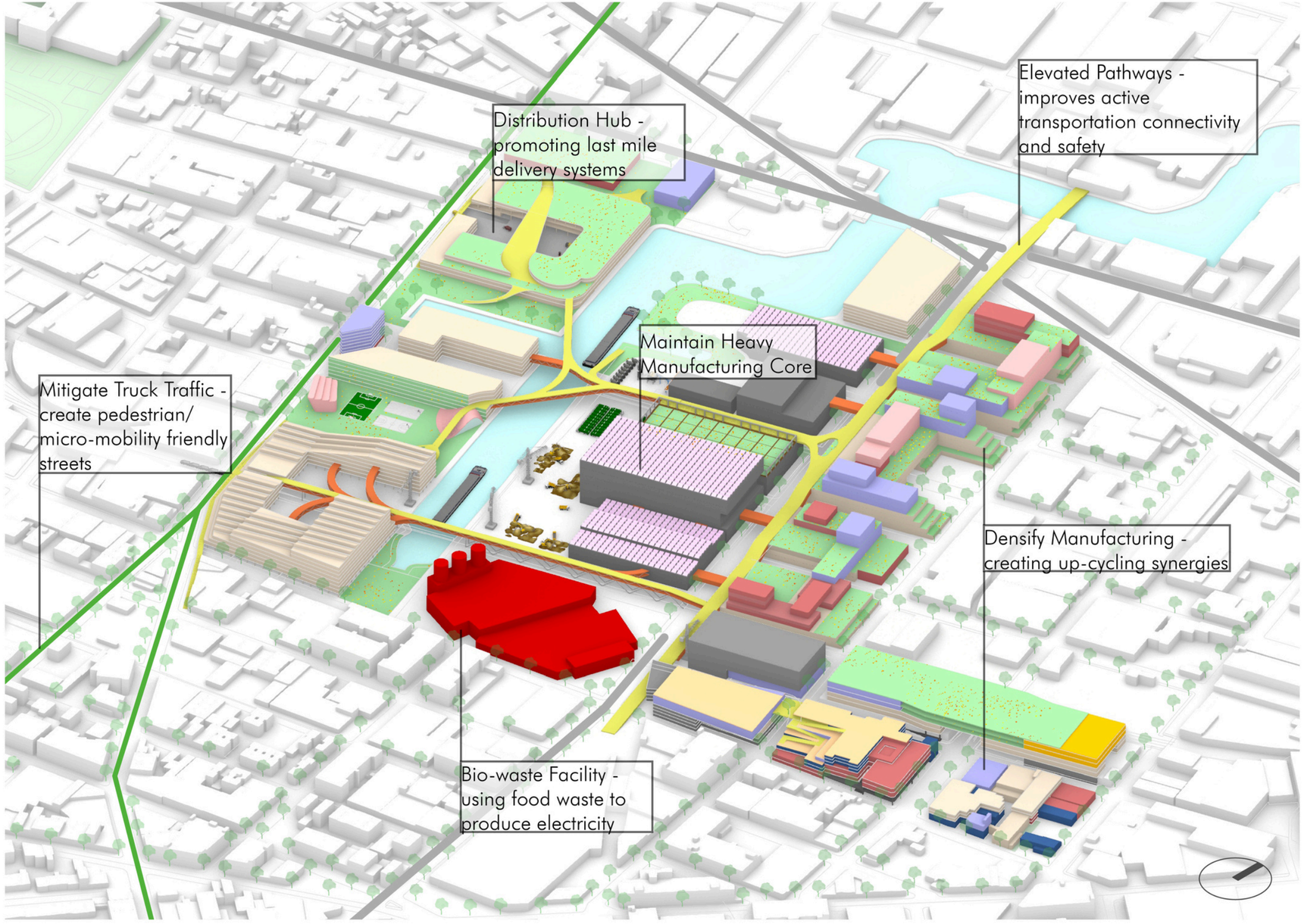
Key Plan

The North Distribution Center has no barge access but creates an efficient loading and unloading system via a series of ramps. These ramps are designed to facilitate delivery vehicles access on all levels of the facility in a one direction, circular fashion. Manufacturers often want to be on the ground floor because of delivery vehicle access but also the ease of getting bulky equipment onto their floors. The ramp system not only satisfies this want, but lessens the reliance on lifts making for an all around more efficient logistical process.



Key Axon

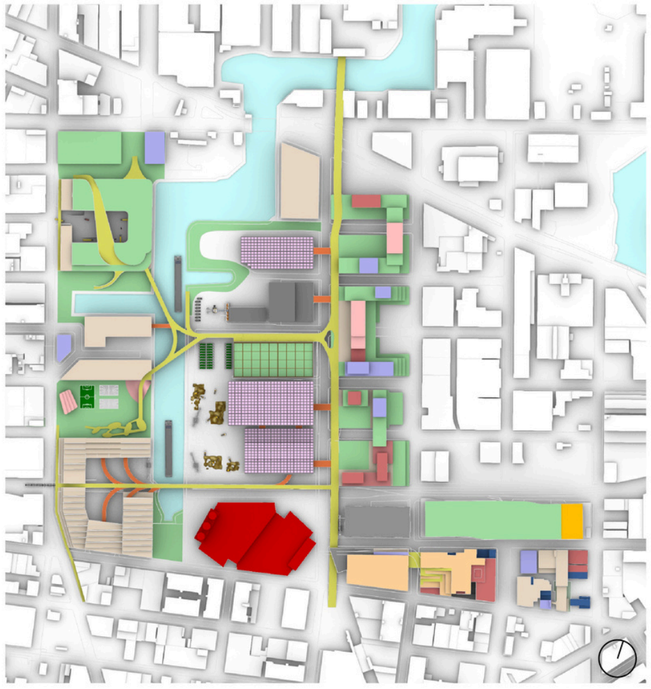
All the Pieces



As all of the pieces come together into a final proposal it is important to reiterate the importance of industry to cities. This importance cannot be undervalued due to growing populations and increasing consumer demands. As cities continue to grapple with the effects of climate change, industrial operations must be mindful of their large contributions and find ways to do so sustainably. This proposal aims to foster new ideas about urban industrial infrastructure and finding ways to harmonize with the growing populations around it in a sustainable fashion.

Proposal Key Ingredients

1. Consolidating and grouping industry harnessing synergies with the potential of sharing resources and costs
2. Pushing the boundaries of industrial FAR to allow the stacking of industries into a smaller overall footprint
3. Physically connecting buildings so that these synergies can be harnessed beyond a building's envelope, promoting interconnectivity of industries
4. Using waste as a raw material for other industrial process and energy production
5. Promoting circular economies within IBZs making production processes more sustainable and efficient
6. Finding harmony between industrial logistics and active transportation, prioritizing safety and well-being of ALL road users



Spitzer School of Architecture
City College of New York
Spring 2024

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Xavier Raymore

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Town+Gown

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