urbanfoodsource

Design Objective: To create a microclimate of food-related commerce through networked small-scale growing, processing, and local distribution. Through a case study of abandoned warehouses in Brooklyn, a deployable method for transforming similar unused spaces was developed.

Brooklyn's waterfront is littered with a wealth of post-industrial sites. The massive structures that occupy these sites, like the Bush Terminal Warehouses in Sunset Park, have long been abandoned and their potential as an economic nexus has been virtually ignored. Located across from a once-bustling port and constructed for industrial-scale manufacturing, the buildings are primed to serve the purposes of the proposed food distribution system. Through site analysis and systematic operations to the existing conditions, we imagine this site transforming from a desolate place of latent potential to a vibrant, cross-pollinating complex that melds public activity with small-business commerce and local food production and awareness.The project is built on the idea that there are two keys to the success of small scale industrial and commercial food operations: **1) Efficient and sustainable distribution capacity 2) Sufficient public exposure and frontage.**

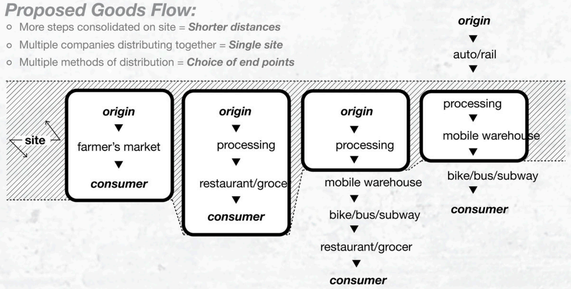
[concept] *GOODS FLOW ANALYSIS*

Typical Goods Flow:

- Goods travel long distances
- Goods visit multiple discrete points
- Distribution of goods at single end

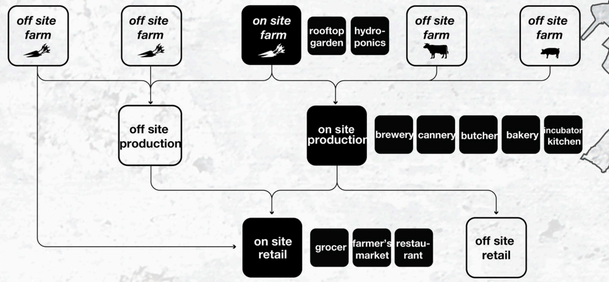
Proposed Goods Flow:

- More steps consolidated on site = ***Shorter distances***
- Multiple companies distributing together = ***Single site***
- Multiple methods of distribution = ***Choice of end points***



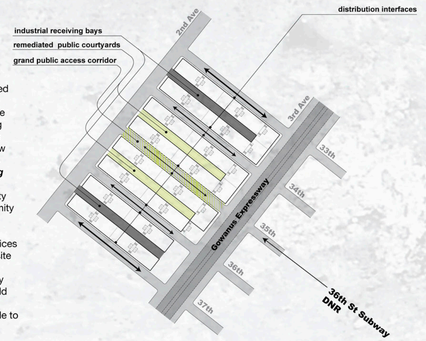
Proposed Goods Flow Programming:

- Growing, processing, and selling on and off site in any combination
- Single site to promote exposure for startup companies



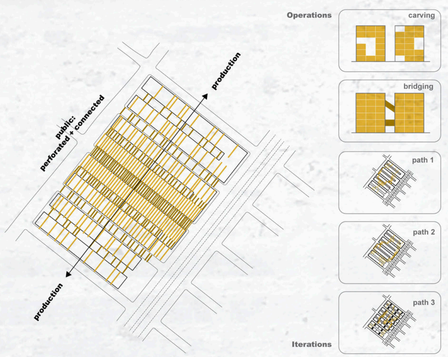
[concept] *SITE ANALYSIS*

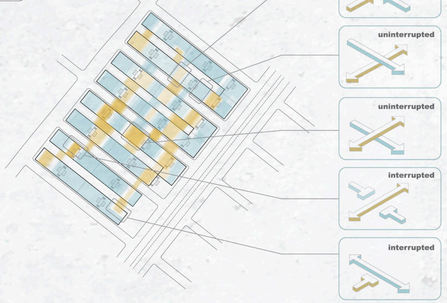
Keeping these fundamental principles in mind, we first analyzed the framework of the existing warehouses. The existing port site can function as the main receiving terminal, accepting farmed goods from New Jersey and Upstate New York. These sea-based deliveries could ideally be ***linked to existing infrastructure***, such as taking advantage of the return trips of city garbage barges. The site's proximity to the D, N, and R subway lines, shown above, could allow it to piggyback on existing transit services in order to transport goods to offsite distributors. Convenient but not environmentally ideal is the nearby Gowanus Expressway, which could allow for a larger breadth of local distribution, which is still preferable to existing conventional methods.

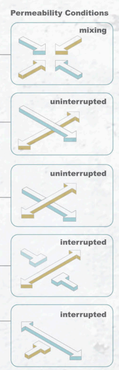


[concept] *CIRCULATION*

In addition to the urban growing parcels to be located on the buildings' topmost levels, small companies looking for rentable specialty spaces, such as industrial sized incubator kitchens or small scale canning or brewing facilities, would be provided affordable space as well as given public exposure. To create one large complex that interweaves public space with a multitude of small businesses and large scale food production, we devised a strategic system of carving into the warehouse buildings and bridging across the site's interstitial bays and streets. This intervening network creates a ***public promenade***, which affords small businesses a public "street front", where they otherwise might only have had a website or sold to grocery stores in the past. This promenade additionally reveals the food preparation and production processes to the public. For this site, we proposed locating small businesses closer to the central corridor, and pushing large scale production to either edge of the site, as shown to the right.



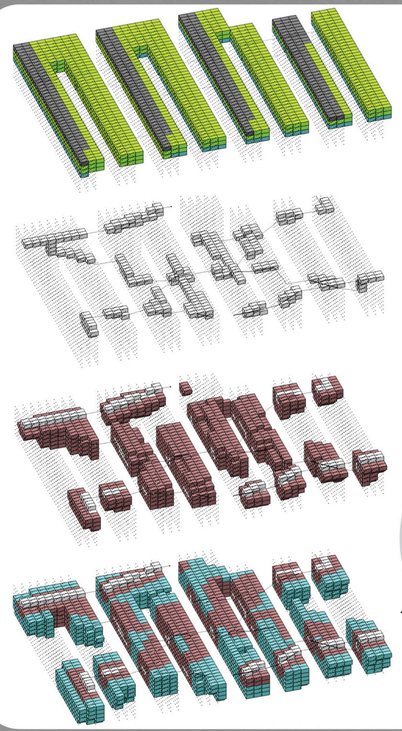




The main public corridor is a permeable interface that allows variable levels of interaction with the rented commercial or industrial spaces. At times consumers would directly mix with those renting space, as in the case of a vendor selling, for example, home-distilled liquor. At other times, consumers might only have a visual connection, perhaps looking into a production space dedicated to canning local or site-grown vegetables. In the boxes to the right, we have called out different levels of "mixing" for these different cases, where the programs of growing, processing and selling either share the same space (mixing), are visually connected (interrupted), or are simply adjacent to one another (uninterrupted).

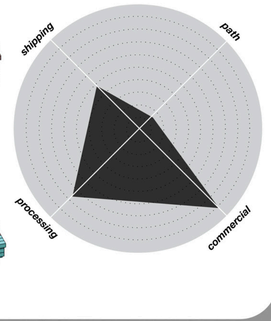
[macro scale] ***DESIGN TOOLS***

In the interest of a system that can be used repetitively over time, we developed a ***computational design tool*** that is scripted to intelligently meet the production and programmatic needs. Looping through the following steps, the tool iterates through a variety of design schemes, analyzing the output data to determine whether a given scheme meets the site's energy and production needs, as well as programmatic goals. ***Step 1*** of the design tool is automated and fills in the top two floors of each building with 'parcels' of growing spaces attached to processing spaces. ***Step 2*** responds to the public path, manually designed by our team, and ***Step 3*** again is automated and arranges parcels of the commercial and commercial-processing space, bundling them around the public path, filling in the spaces still unoccupied by growing and processing.



AREA_grow	***: 900,000 sf***
AREA_solar	***: 144,643 sf***
AREA_processing	***: 315,000 sf***
YIELD_produce	***: 6,750 T***
INCOME_produce	***: $40,500,000***
DAILY USE_water	***: 54,000 gal***
ANNUAL gal SAVINGS_fuel	***: 86,323 gal***
ANNUAL $ SAVINGS_fuel	***: $345,000***
AREA_non-roof	***: 598,595 sf***
AREA_leftover public	***: 2,197,823 sf***

LENGTH_path	***: 7,656 ft***
AREA_commercial	***: 846,953 sf***
AREA_com. processing	***: 786,175 sf***
AREA_shipping/storage	***: 468,294 sf***
INCOME_rentals (@$25/sf)	***: $32,662,560***

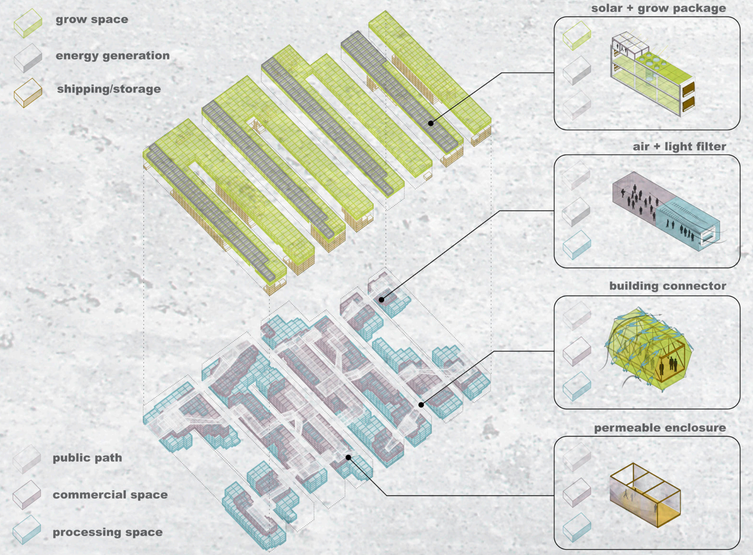


[macro scale] ***DESIGN***

Once an optimized scheme is chosen, to further develop the site with regard to both social and sustainable challenges, we designed a series of interventions that can be deployed across the complex in accordance with the distributed program. These four interventions are comprised of parametric building "components", collaboratively created during an 'intelligent building' project in which we partook.

The interventions are categorized to the right--they are first explained with an exploded axonometric distinguishing the individual parts, then as different arrangements based on design variables, and finally as a vignette showing how that space might be envisioned in a single snapshot.

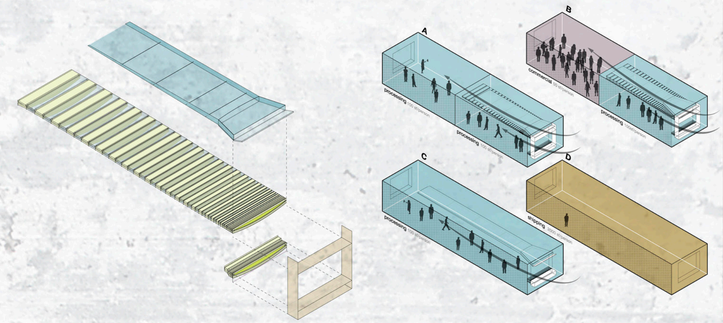
The idea for the design tool and interventions is that this idea could be applied not just to this specific site, but multiple sites.



[micro scale] ***DESIGN INTERVENTIONS***

1 *Air + Light Filter*

The first intervention reduces energy needs by providing natural ventilation and replacing the outdated windows with more efficient glazing. As seen in the diagrams to the right, the size and shape of the air +light filter changes based on occupancy and program. It would be used primarily for processing spaces, but is also useful for commercial and public areas.



READOUTS

A

INPUT
length_CEILING VENT: ***40ft***
integer_OCC.: ***100 sf/person***
width_CEILING VENT: ***12.5ft***
width_SILL VENT: ***12.5ft***
length_LIGHT SHAFT: ***30ft***
length_INT. LIGHT: ***5ft***
angle_LIGHT SHAFT: ***10 deg.***

OUTPUT
depth_CEILING VENT: ***2in***
depth_SILL VENT: ***2in***
%_VENT PROP: ***6%***
avg. volumetric airflow: ***114 L/s***
area_CEILING VENT: ***1.75 ft2***
area_SILL VENT: ***1.75 ft2***
noise transmission drop: ***96%***

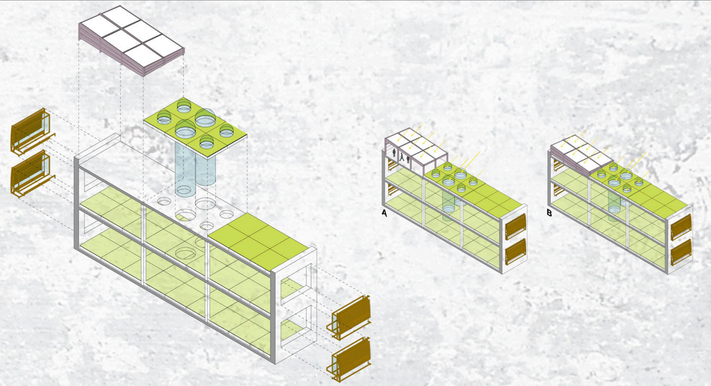
C

INPUT
length_CEILING VENT: ***N/A***
integer_OCC.: ***100 sf/person***
width_CEILING VENT: ***N/A***
width_SILL VENT: ***12.5ft***
length_LIGHT SHAFT: ***60ft***
length_INT. LIGHT: ***10ft***
angle_LIGHT SHAFT: ***10 deg.***

OUTPUT
depth_CEILING VENT: ***N/A***
depth_SILL VENT: ***3.5in***
%_VENT PROP: ***6%***
avg. volumetric airflow: ***228 L/s***
area_CEILING VENT: ***N/A***
area_SILL VENT: ***3.5 ft2***
noise transmission drop: ***93%***

2 *Solar + Grow*

The solar + grow intervention provides energy generation through solar panels, and can be used for growing space or shipping/storage space. In addition to the solar panels and growing uses, it is made up of light wells that puncture the top floor, and a window component that modulates light for indoor growing spaces, such as hydroponics.



READOUTS

A

INPUT
length_CHIMNEY DEPTH: ***2ft***
length_W THICK: ***2ft***
radius_TUBE 1: ***2ft***
radius_TUBE 2: ***3ft***
depth_TUBE 1: ***2ft***
depth_TUBE 2: ***20ft***
USE: ***solar panels + public path***

OUTPUT
area_GLASS: ***120ft2***
area_LOUVER FIN: ***88ft2***
area_FLOOR: ***440sf***

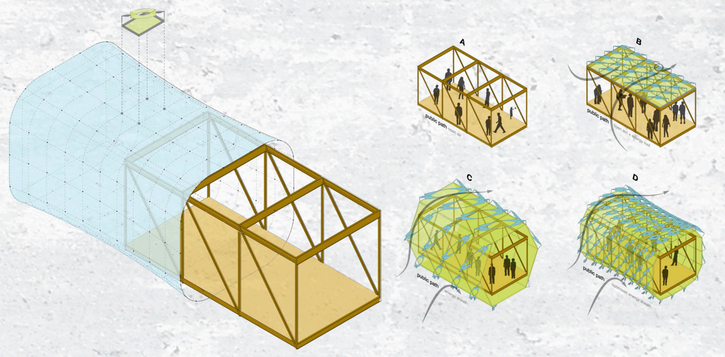
B

INPUT
length_CHIMNEY DEPTH: ***3ft***
length_W THICK: ***2ft***
radius_TUBE 1: ***2ft***
radius_TUBE 2: ***3ft***
depth_TUBE 1: ***2ft***
depth_TUBE 2: ***20ft***
USE: ***solar panels***

OUTPUT
area_GLASS: ***120ft2***
area_LOUVER FIN: ***88ft2***
area_FLOOR: ***440sf***

3 *Building Connector*

This intervention would be used along the public path, bridging across the site's interstitial bays and streets. It is a bridging element that has variable openness, and can host miniature wind turbines along its exterior surfaces. The variable openness allows for differences in the viewer's experience of the streets and alleys on the site, which are programmed with either public or transportation spaces.



READOUTS

B

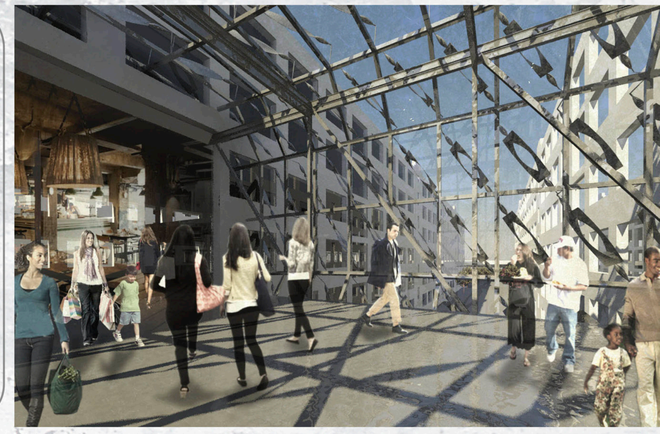
INPUT
integer_# OF FLOORS: ***1***
integer_SEGMENTS: ***3***
length_BRIDGE SPAN: ***60ft***
string_MATERIAL: ***ETFE***
ratio_WIDTH OF BLADE: ***.7***
string_PROGRAM: ***public path***

OUTPUT
power_KW GENERATED: ***243***
string_SURFACE: ***energy***
quality_LIGHT: ***yes***
quality_VISIBILITY: ***connected***

D

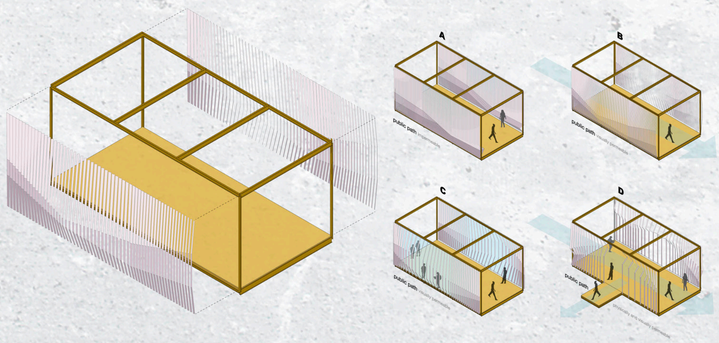
INPUT
integer_# OF FLOORS: ***1***
integer_SEGMENTS: ***3***
length_BRIDGE SPAN: ***60ft***
string_MATERIAL: ***black glass***
ratio_WIDTH OF BLADE: ***.7***
string_PROGRAM: ***public path***

OUTPUT
power_KW GENERATED: ***2363***
string_SURFACE: ***energy***
quality_LIGHT: ***no***
quality_VISIBILITY: ***no***



4 *Permeable Enclosure*

Lastly, shaping the interior experience of the public path, this final intervention would also have variable openness, or permeability, curating the public's views and interactions with commercial and processing space. The louvers that make up this intervention can be designed into storefront windows as well as openings, solid walls, built-in seating, or simply aesthetic variation.



READOUTS

C

INPUT
integer_LOUVER NUM: ***38***
real_SCALAR GRAD: ***4.76***
angle_L. TOP ANGLE: ***0 deg***
angle_L. BOT ANGLE: ***0 deg***
angle_R. TOP ANGLE: ***80 deg***
angle_R. BOT ANGLE: ***60 deg***
length_L. LOUV DEPTH: ***1.25 ft***
length_R. LOUV DEPTH: ***.5 ft***
string_GLASS: ***yes***

OUTPUT
area_TOT LOUV: ***700 sqft***
area_TOT GLASS: ***1020 sqft***
area_TOT OPENNESS: ***0 sqft***
%_TOT SHADE PERCNT: ***n/a***

D

INPUT
integer_LOUVER NUM: ***23***
real_SCALAR GRAD: ***0.6***
angle_L. TOP ANGLE: ***0 deg***
angle_L. BOT ANGLE: ***0 deg***
angle_R. TOP ANGLE: ***0 deg***
angle_R. BOT ANGLE: ***0 deg***
length_L. LOUV DEPTH: ***.5 ft***
length_R. LOUV DEPTH: ***.5 ft***
string_GLASS: ***no***

OUTPUT
area_TOT LOUV: ***308 sqft***
area_TOT GLASS: ***0 sqft***
area_TOT OPENNESS: ***1500 sqft***
%_TOT SHADE PERCNT: ***n/a***