

Crisicity: Cyborg Infrastructure in the Anthropocene

ALEXANDRA BARKER

Pratt Institute

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In the Anthropocene thesis, nature is partly a human creation. Human activity has affected all ecologic, geologic and biological systems, eroding the boundary between human and non-human life and between nature and culture, producing catastrophic impacts on the Earth that have brought us to a point of climate crisis. As recent texts have argued, the current social and health crises are direct resultants of human actions dating back to the time of Western colonization.

Human pollution of the global ecosystem has produced the climate crisis. As the pandemic of COVID-19 continues to show, the health of people, animals, ecosystems and the environment are intimately linked. The health crisis has also exposed weaknesses in our global supply chain network for consumer goods. Localizing food and fuel production and storage for easy distribution is a key approach to addressing issues of food and energy insecurity in this context.

This graduate architecture studio project proposes additions to and reuse of existing urban infrastructure to locally situate small-scale food and energy production and storage facilities squarely within the dense urban fabric of major metropolitan areas as a retrofit embedded inside existing building fabric within the public realm. Seafood aquaculture, aquaponics, hydroponics, and algae farming processes produce high yields in relatively compact environments without the necessary access to light and space that typical crops require. Oyster aquaculture can produce food as well as seed for filtering oyster beds that are critical for the cleansing of polluted waterways. These programs also provide a source of jobs locally accessible to urban communities.

Our test site for this project is a speculative mixed-use addition and alteration to abandoned industrial buildings in Brooklyn's industrial waterfronts of Red Hook and Sunset Park proposing light manufacturing in combination with public programs. Anamorphic projection techniques in the design process produce specific orientations toward both human and non-human occupants.

THE ANTHROPOCENE AND CRISIS

In the Anthropocene epoch, nature has been significantly remade by the practices of human civilization. “[T]he familiar contrast between people and the natural world no longer holds. There is no more *nature* that stands apart from human beings. There is no place or living thing that we haven’t changed.”¹

New thoughts about the Anthropocene have shifted the starting point for this epoch from the Industrial Revolution back to the Colonial period. “The rapid founding of various colonial enterprises,...unleashed mission agrarian systems, plantations, fur trade outposts, and commercial fishing and whaling ventures into various tropical and temperate ecosystems in the Americas, Oceania, India, Asia, and Africa, which had tremendous repercussions for indigenous faunal and floral populations.”² Colonial-era enslavement and destruction of populations and ecosystems is the historical origin of the climate crisis, and, it can be argued, the social crisis that has emerged from the killing of George Floyd. “The Anthropocene began with widespread colonialism and slavery; it is a story of how people treat the environment and how people treat each other.”³

There are also ties between the Anthropocene and pandemics. Development that has encroached into wildlife habitats has brought humans into contact with other species, and diseases have an opportunity to crossover from animals to humans. As the pandemic of COVID-19 continues to show, the health of people, animals, ecosystems and the environment are intimately linked.⁴

LOCALIZING FOOD AND ENERGY SOURCES

As city migration continues on its current trajectory, urban areas will face ever increasing demands for food and energy supplies.⁵ The separation of urban centers from their food supplies threatens food security, produces pollution, and compromises healthy food supply by the need for preservatives to maintain freshness during transit.

Indoor vertical farming and biofuel production is quickly gaining traction in New York City. Water-based growing techniques like aquaculture, hydroponics and aquaponics, and other

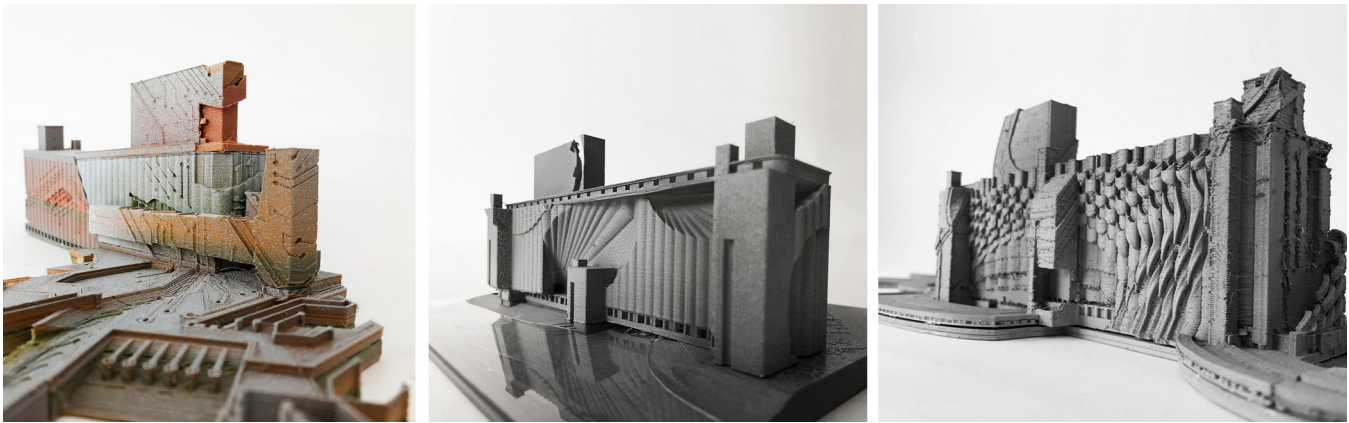


Figure 1. Site Models of Red Hook Seed Vault, Vertical Farm Incubator, and Aquaponics Market. Alexis Dorko, Matthew Mitchell, Jennifer Levy.

indoor farming techniques enable the rapid growth of food or biofuel in a controlled environment in a fraction of the land area required by traditional outdoor farming. These strategies drastically reduce food mileage, the distance required to bring food from its growing source to where it is consumed, and its associated effects on the environment. Indoor crops are unaffected by changing weather conditions. Local production eliminates the need for harmful preservative chemicals. The growth of indoor farming lessens a city's dependency on supply chains and maintains its access to food and fuel in the event of crisis-driven disruptions in national and international networks and markets.

ADAPTIVE REUSE AND INDUSTRIAL MIXED USE

New York City's manufacturing districts were neglected for decades with the decline in localized industry during late 20th century. These primarily waterfront sites in industrial hubs like Red Hook and Sunset Park, have now become an important source for development as well as for job growth. The trajectory of city development hinges on the way in which these sites are ultimately utilized. A NYC Planning department study to explore incentivizing the creation of industrial space within new developments⁶ identified food production and other light manufacturing uses as being suitable to safely combine with programs like office and retail. Industrial mixed use is a way to provide locally-accessible jobs in manufacturing as well as in businesses requiring more standard office space, particularly in the outer boroughs, which situates jobs near where residents live.

Adaptive reuse is a logical strategy for this proposed mix of manufacturing, office and retail space. The reuse of materials and structures is an established strategy to reduce construction waste⁷ and a way to re-densify underutilized sites in urban contexts. In New York City, there are many examples of abandoned infrastructure, often on valuable waterfront sites, that are excellent candidates for this proposal. Sunset Park and Red Hook are ideal case studies to test this approach. Over the course of the first half of the 20th century, these

neighborhoods shifted from being the busiest freight ports in the world to being abandoned once containerization changed the processes, storage, and distribution networks for shipping goods. Retail-focused adaptive reuse has saved some buildings in the neighborhood but at a cost of higher real estate prices that threaten to drive out local residents. Community groups have successfully argued in favor of green energy and food production in industrial zones to create jobs and keep real estate in check.

The Sunset Park neighborhood is historically one of New York City's largest "walk to work" communities, with an extensive industrial waterfront that has historically provided local manufacturing jobs.⁸ It has the city's second largest Industrial Business District (IBZ), and its largest Significant Maritime and Industrial Area (SMIA) which were designated to protect existing industrial and waterfront districts and to encourage industrial and working waterfront growth. These districts currently provide over 12,000 jobs, many to local residents. The community became concerned that development would drive up housing costs, which would push out the local residents, new manufacturing businesses, and related jobs. A 2019 report commissioned by local community organizations proposes an alternative approach to development for the Sunset Park neighborhood. The "Green Resilient Industrial District" (G.R.I.D.) proposes to support maritime and industrial development that integrates "climate resilience and adaptation measures and provide[s] good local jobs and workforce training."⁹ Red Hook is a neighborhood that shares a similar industrial history and demographic as well as development potential. Existing manufacturing districts have shifted from heavy manufacturing to artisanal industries and information technology businesses, with jobs that are not in the skill level of existing residents. Current proposals like the one from AECOM from 2016 focus on developing vacant waterfront into mixed use developments of residential and retail space as well as improving transit as well as strategies for neighborhood-scaled localized energy production infrastructure.¹⁰ Absent from this proposal was any discussion of preserving any of the

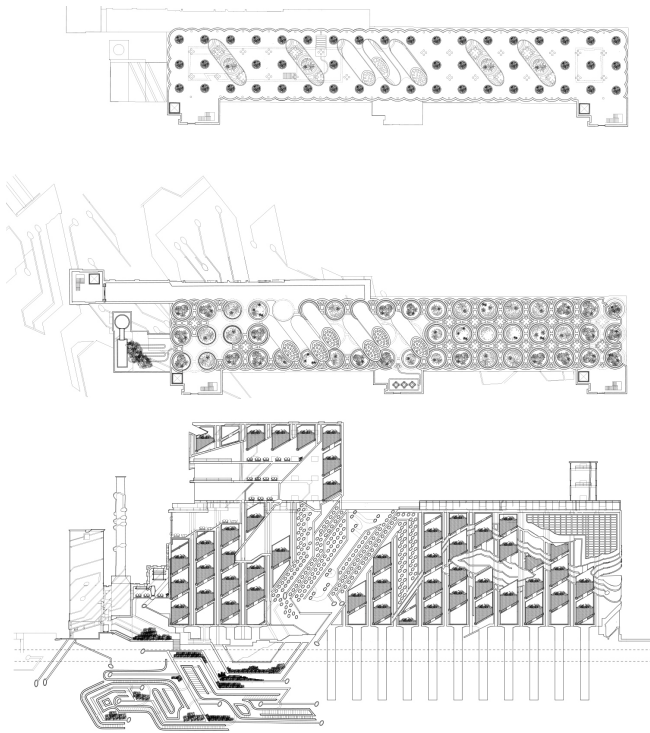


Figure 2. Red Hook Seed Vault plans and sections. Alexis Dorko.

existing remaining manufacturing businesses in the neighborhood. Also absent was any discussion of adaptive reuse, even though there are many existing buildings that are available for addition and alteration, some of which are being considered for Landmark status.¹¹

CYBORG INFRASTRUCTURE

The theorist Donna Haraway, writing in 1985 in the context of the Cold-War-era Strategic Defense Initiative (“Star Wars”) proposal, introduces a cyborg theory that reflects the time period’s anxiety about technology. “Late twentieth-century machines have made thoroughly ambiguous the difference between natural and artificial, mind and body, self-developing and externally designed, and many other distinctions that used to apply to organisms and machines. Our machines are disturbingly lively, and we ourselves frighteningly inert.”¹² This concept anticipates the Anthropocene thesis regarding nature as a human creation. Her theory rejects rigid boundaries between human, animal and machine. “By the late twentieth century, our time, a mythic time, we are all chimeras, theorized and fabricated hybrids of machine and organism—in short, cyborgs.”¹³ Cyborgs are incomplete and without origin, and blur the traditional hierarchy between nature and culture.

PROJECT PROPOSAL

These graduate architecture studio projects propose a series of mitigation strategies for these crises that incorporate indoor food production, green water filtration systems in the form of oyster aquaculture, and green energy production within dense

urban neighborhoods to preserve access to food and jobs for local residents. Addition and alteration strategies were tested on abandoned industrial waterfront structures including the Red Hook Grain Terminal and the Brooklyn Army Terminal in Sunset Park. The Red Hook Grain Terminal, a concrete grain elevator located adjacent to the Gowanus Canal, was built in 1922 and has sat vacant since 1965. The Brooklyn Army Terminal is a complex of concrete structures that served as storage for Army supplies in World War 2. The main structures were designed by Cass Gilbert, and were completed in 1918. They have since been renovated to house boutique light manufacturing, while the power house remains abandoned. Projects explore ways to interweave spaces for plants, animals, humans and machines in ways that challenge typical hierarchies and partitions between programs. Green food and fuel production and storage programs explored include vertical farming, hydroponics, aquaponics, grain-based food production, and food banking, and energy production programs like biofuel and geothermal production which provide local jobs that do not require a college degree. Programs to engage the general public and local communities include job training facilities, food markets, and cultural spaces for performance and exhibition.

ANAMORPHIC PROJECTIONS

The design approach was driven in part by an exercise in anamorphic projective drawing strategies that have their roots in 16th century artwork where part or all of an image is only legible when viewing from a certain oblique vantage point. The projection embeds in the development of the design the viewpoint or orientation of the different human, animal, plant, or machinic inhabitants of the space. By explicitly referencing a position these projections expose the privilege afforded to certain vantage points. This “anamorphic gaze” reveals hierarchies in the design of the built environment. In the projects, two-dimensional projected linework is translated into relief and three-dimensional operations of addition and subtraction onto the building massing. The projects aim to preserve the image of projection from its original projection point. In other parts of the building, however, the projection linework is used to manipulate the existing surfaces of the structures and translated into three-dimensional form to create programmatic spaces, apertures, and circulation as necessary to the project. These manipulations are seen as opportunities to challenge typical relationships and hierarchies between spaces for human occupation and spaces for production through the reconfiguration of the existing structure.

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Figure 3. Red Hook Biofuelery by Brett Rappaport.

to the project. In “Biofuelery,” an adaptive reuse of the Red Hook Grain Terminal, the grain silos are recast as a lenticular projection. An image of a deep void or tunnel is imprinted on a portion of each silo and is visible from the land-side approach to the building, while the water approach reveals the decayed surface of the existing silos. The program was developed in parallel with the massing strategy and includes oyster aquaculture, vertical farming, and two grain-based food storage and production facilities, a bakery and a brewery. The monumental grain silos, never meant for human occupation, are re-originated and repurposed through subtracting, cutting, pushing, and pulling to create circulation paths, planter space, and platforms for viewing, brewing, and baking. In another project, an alteration to the Brooklyn Army Terminal powerhouse, the projected linework was derived from geometry of arches taken from the existing buildings. The linework was used to carve and extend the existing structure toward adjacent buildings and ground to create a range of interconnected interior and exterior spaces. The proposed programs include oyster farming and algae production as well as an agricultural farm with a small amount of stock animals which use the land and supplement an anaerobic digester. The anaerobic digester receives food waste from the surrounding neighborhood, returning it back as usable electricity.

CONCLUSION

These projects knit together a multipronged approach to sustainable, resilient urban development. The proposal of localizing access to food, energy, and jobs, the fundamental needs of a multiethnic urban community, within the boundaries of their neighborhood, working within a hybrid industrial-typology that engages the public, and operating on existing structures is a way to reclaim waterfront redevelopment projects for the local community. Localizing food and energy production is a health crisis response strategy to make a city more self-sustaining in times of food and energy insecurity and a smart development strategy that can form part of a critical climate crisis action plan. By hybridizing the new and the existing and the spaces for the machine, the plant, the animal, and the human, this project posits a sort of Harawayesque chimera or cyborg. As Haraway states, the project is an “argument for pleasure in the confusion of boundaries and for responsibility in their construction.”¹⁴ The cyborg approach, she writes, is about “transgressed boundaries, potent fusions, and dangerous possibilities, which progressive people might explore as one part of needed political [and design] work”¹⁵ to combat the crises of the Anthropocene using an anamorphic gaze to subvert the hierarchies inscribed in the built environment.

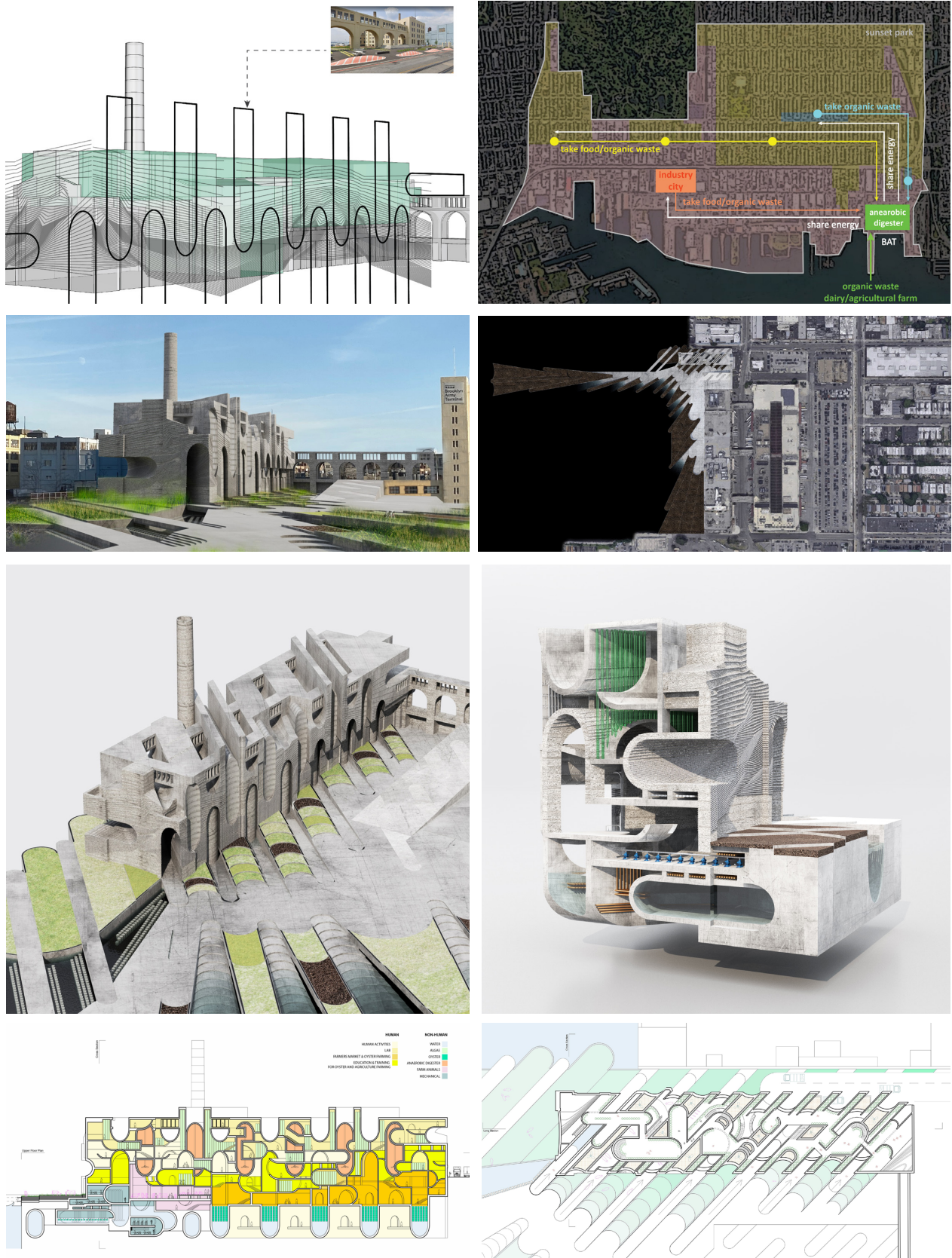


Figure 4. Sunset Park Anaerobic Digester and Farm by Sohhee Oh.

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