

# AgriFlats

## Chicago's First Food District

Within three miles of the City's top restaurant corridors, a new food production facility in the heart of North Lawndale will provide the last puzzle piece to Chicago's first bona fide Food District. In a footprint of less than a square mile, food production will join existing processing, transporting, distributing, and preparation venues for the first time in our City's modern era. In contrast with surrounding neighborhoods built with exclusionary zoning, food production will interlock with community resources to create new synergies.

In its history, Chicago has derived great wealth from food. It served as the shipping hub for the Midwest's agricultural bounty, an outpost for immigrant cuisines, and an inventor for confections and variations on ethnic foods. In this innovative culinary chapter, Chicago will reinvent how it feeds itself by sustainably growing healthy hyperlocal food.

Unlike the status quo, food will be 100% pesticide-free, grown within a major US city year-round, creating new entry-level jobs where workers earn a living wage, using 90% less water than field-grown vegetables. In less than a day, harvested food will travel to the market. This revolution will be good for Chicago and good for the planet.

Assets already abound in the area, which was a hub of commercial activity half a century ago. The Hatchery, located in East Garfield Park, will provide food processing and storage. A

few miles northeast, restaurants along Randolph Street, Fulton Market, and Taylor Street will celebrate locally produced food to national acclaim. At The Farm on Ogden, Lawndale Christian Health Center and Windy City Harvest promote healthy eating through their VeggieRx program, an incubator kitchen, and an aquaponic farm.

North Lawndale Employment Networks (NLEN) new headquarters will feature Sweet Beginnings honey processing and the Worker Bee Cafe. Inspiration Kitchens, in adjacent East Garfield Park, will continue to celebrate healthy food through its restaurant and train individuals for culinary jobs.

Fostering food culture in North Lawndale will do more than feed people. It will connect citizens, without regard for socioeconomic status, gender, age, or ethnicity with a great unifier - food. The District will build resiliency through better food choices offered by a coherent food system. We call the missing puzzle piece **AgriFlats**.

**AgriFlats** recombines a business incubator with Dutch-style Controlled Environment Agriculture (CEA) to provide fourteen aspiring growers with a one-acre greenhouse and an attached live-work unit where they can launch new businesses while creating jobs in the community. Supported by a newly created Cooperative, **AgriFlats** includes support for the community, with spaces for meetings, learning, and housing to benefit the



Figure 1 - A view of the exterior of a Dutch Venlo greenhouse used to grow vine crops hydroponically. The greenhouses will be visible from Kostner.

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residents. Instead of the greenhouses just producing food, they will be economic generators, creating new year-round jobs.

As modeled in IMPLAN and shown in Figure 11, **AgriFlats** will create 230 nonseasonal, permanent jobs in the community. During construction, an additional 367 temporary construction jobs will be created. Annually, **AgriFlats** will be responsible for 159 direct jobs, most of which can be filled by local residents trained by not-for-profits already operating in the neighborhood.

For **AgriFlats** farmers, the greenhouses' passive solar habitat will allow them to grow food in hydroponic and aquaponic CEA systems, under intelligent digital control, in the middle of winter. Within the greenhouses, they will grow food faster than possible in the soil while consuming a tenth of the water. They will grow crops without pesticides year-round in less space, with less labor, without exposing soil to the threat of erosion, which has accelerated with climate change.

Chicagoans will be able to enjoy fruits and vegetables ripened on the vine in their City, year-round, selected for taste instead of durability for transport. The COVID pandemic has shown the fragility of the current food system's distant supply chain. Food grown locally will have a longer shelf life and a longer home life.

Local restaurants will have access to commodity and non-commodity produce that they can influence. As described in a July 2019 New York Times article, a single farmer located four hours away grows 1,300 different varieties of vegetables for the New York City's famed chefs. Chicago can easily replicate this system on a hyperlocal level. These farmers will not only produce food but seeds for new varieties.

Not only will community residents witness growing, but they will also have a chance to grow their food, too, under the tutelage of the farmers and local educators. In small community greenhouses located along Kildare, residents will be able to mimic the farmer's operations on a personal scale. With the nutrient solution, simple infrastructure, and guidance supplied by the farmers, residents will be able to grow and harvest their crops. As residents learn to employ modern CEA techniques firsthand and taste the results, they will raise awareness in their community, creating a food culture that values local food over generic imports.

Local students will learn about CEA, too. Ideally, some students could help growers develop new varieties of fruits or vegetables in the Learning Lab greenhouses. Because the food grown is hyperlocal, growers can experiment with older seed varieties that don't need to endure the artificial ripening and transport that modern commerce demands.

Like Farm on Ogden, growers at **AgriFlats** could raise both fish protein and vegetables in an aquaponic system, combining fish farming with hydroponic growing. In this arrangement, farmers feed fish that, with their waste, feed plants, which filter nutrients from the water. Farmers will raise domesticated fish such as tilapia, bluegill, and catfish from fry to maturity in water tanks located in the greenhouses. Mature fish will be harvested live and transported immediately to local restaurants or processing facilities.

As an added benefit, aquaponic systems typically produce a surplus of nutrients beyond those needed by the plants. Growers can export these nutrients as a liquid fertilizer to nearby urban soil farms or the Community Eco Orchard in East Garfield Park.

Instead of a permanent location for growers, **AgriFlats** intends to be an incubator and accelerator. Once growers achieve success at a modest scale within five to seven years, they will scale their operations in the exurbs to increase their profitability and reach. If the demand for tenant greenhouses grow beyond **AgriFlats**, developers can build additional greenhouses in North Lawndale and East Garfield Park.

As the Food District strengthens, the unifying influence of food will buttress resiliency. As food production increases, cooperatives of small, sophisticated urban farms will offer a broader range of food that tastes better. Consequently, discerning residents will diminish their reliance on large-scale monoculture and the long-range carbon-based transport that enables it.

In Illinois, which has lost over 99 percent of its soil-producing native prairies that naturally sequester carbon, citizens need to find a better balance between food systems and natural ecosystems. It is time to start cultivating what we want.

### **Decarbonization**

Merely reducing our carbon emissions is insufficient to stifle global warming. We have to return vast amounts of carbon to living ecosystems. **AgriFlats** will demonstrate how to do that, by using dense urban agriculture to liberate outsize tracts of land in rural areas currently being traditionally farmed.

The primary energy powering **AgriFlats** is renewable solar energy. The transparent skin of a greenhouse admits a broad range of solar energy that gets trapped inside, heating the interior during winter. During extreme cold, active energy harvested by solar thermal collectors mounted on the packing house, live-work, and residential rooftops will supplement the passive solar energy. These collectors will heat circulating water with the sun's energy and pump it to underground storage



Figure 2 - An interior view of a Dutch Venlo greenhouse, with vine crops growing vertically, with its horizontal solar screens deployed.

tanks, insulated with vacuums like thermos bottles. Instead of relying on ancient solar energy banked in carbon fossil fuels to heat its greenhouses, **AgriFlats** will use energy stored from the previous season.

Since Chicago's climate demands three times as much energy annually to warm its buildings and cool them, **AgriFlats** prioritizes low-grade thermal energy over high-grade photovoltaic energy. Solar thermal collectors will harvest much more of the sun's energy, at up to 70 percent of the sun's available energy compared with only 20 percent for photovoltaic panels.

Summertime cooling will still be necessary. To provide passive cooling, roof vents in the Dutch Venlo greenhouses will open, allowing hot air to escape. Circulating water, stored underground at a stable 55F temperature, will cool the incoming air. Likewise, the nutrient solution, which resides below grade, will also contribute to cooling the greenhouse during the summer.

The residential units along Kildare will be heated and cooled with an active-slab radiant system that maximizes the comfort of the space with minimal energy use. Combined with the hyper-insulated, thermally massive structure, residents will have their energy needs met on site. Energy recovery ventilators (ERVs) will introduce fresh air into the apartments, recycling the greenhouse's heat and moisture.

Electricity can also be produced on-site by a Combined Heat and Power system (CHP) with gas produced by an anaerobic biomass digester. The digester can also produce natural gas for heating. See Figure 3 for a diagram of the closed-loop process. The biomass will come from the growing operation itself and the waste from restaurants and community members connected with **AgriFlats**. Growers can purchase any additional electrical energy required from off-site renewable sources.

In addition to powering pumps, the facility will use electricity to illuminate the greenhouses during winter and the residences year-round. The apartment interiors will be illuminated solely with LED sources to conserve energy. During winter, high-efficiency HID lamps, or spectrally selective LEDs will light the interior to extend the natural day to 14 hours. All waste heat emitted from these light fixtures will supplement greenhouse space heating. Greenhouse lighting will only be visible at night along Kostner.

#### **Achieving Balance**

If a shortfall of stored heat occurs during winter, the anaerobic digester's natural gas reserves will provide the energy. If additional heat is required, natural gas obtained from the grid will heat the space.

Unlike most projects, though, the CO<sub>2</sub> liberated by fossil fuel combustion will be captured for enriching the greenhouse, where rapidly growing plants will sequester it. In addition to

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13 nutrients and water, plants solely build themselves with the atmospheric elements of carbon, hydrogen, and oxygen.

### Materials

Contractors will build **AgriFlats** with materials that reduce carbon emissions with their long service lives, their recycled content, and their ability to be prefabricated. Workers will build the greenhouse with galvanized steel and glass, which are long-lived materials that can be perpetually recycled. The greenhouse roof glass is patterned to diffuse light, resulting in an interior free of sharp shadows but ideal for maximizing photosynthesis.

Contractors will construct the exterior walls of the live-work and housing with non-composite insulated precast concrete panels that optimize longevity, thermal storage, and fire-resistance. These continuously “outsulated” panels and their uninsulated interior counterparts dramatically reduce the power required for the heating, cooling and ventilation systems. Their thermal mass impedes rapid changes in interior air temperature and moisture, allowing small mechanical systems to replace large ones.

Workers will construct the upper floors and roofs of the residential units with exposed cross-laminated timber (CLT) panels, which will lend a warm, loft-like feel to the interior. Since manufacturers make them from solid wood, CLT panels bank copious amounts of carbon. Their ability to clear span between the precast bearing walls will facilitate a lifetime of inexpensive interior remodeling.

Prefabrication reduces waste, costs, on-site labor, energy use, and carbon emissions. The exterior walls, roofs, and floors will arrive at the site in their final form, needing only to be hoisted into place and joined together.

### Green Mobility

Since the new Food District is relatively compact, **AgriFlats** growers will be able to transport food quickly and economically. Commercial electric vehicles will deliver food harvested just-in-time to nearby produce distributors, restaurants, the Worker Bee Cafe, the Hatchery, Inspiration Kitchens, and the East Garfield Farmer’s Market. Non-food exports like liquid fertilizer can be exported from the greenhouses to the Eco Orchard or local urban soil farms with cooperatively operated electric vehicles.

Products used in the greenhouses for pollination, integrated pest management, nutrients, and germination will be cooperatively purchased and transported. Experts and consultants supporting farmers raising different crops can make

a single trip to the District, reducing time, expense, and carbon footprint.

Farmworkers and residents will have access to Blue Line stations within a half of a mile. Ample bike parking will be provided near the Learning Lab to serve staff and visitors.

### Resiliency

Our team designed **AgriFlats** to adapt to the escalating challenges of climate change. Last season, Illinois farmers experienced the worst growing conditions in over 50 years. Most importantly, **AgriFlats** will use the vast majority of rain and snow on-site for its internal processes, rendering stormwater irrelevant. Since rain is superior to treated water for hydroponics, it will be harvested and stored underground until needed, even when it comes in fits and spurts. After snows, some of the thermal energy stored in underground tanks heat the greenhouse’s gutters, promptly clearing the roof so growers can harvest the sun’s energy when skies clear.

Since hydroponic and aquaponic growing uses a tenth of the water required for growing in soil, it is exponentially more resistant to drought. The underground reservoirs for process water used in **AgriFlats** will be sized for 100-year drought conditions, securing the District’s food supply.

**AgriFlats** will also collect rain for non-potable (grey-water) uses in the live-work units and residences, such as toilet flushing and laundry. These systems, which will divert twice their volume from City sewers, will be isolated to maintain health by preventing cross-contamination. Low-flow fixtures will be installed throughout the residences, further conserving domestic water use. During the cooling season, valves will divert the condensate from cooling systems for grey-water use.

### Housing and Live Work Units

**AgriFlats** recombines ideas advanced forty years ago in Sweden with modern controlled environment agriculture (CEA) to allow people to live and grow food in the same place. This recombination will catalyze a decarbonized, resilient, and high-performing neighborhood.

In 1976, Swedish architect Bengt Warne proposed shrouding a residence with a greenhouse for mutual benefit in a cold climate. In this modern iteration, we’ve magnified his ideas to the scale of a City block. On both parcels, new two-story apartment buildings and live-work units for the growers unite with modern Dutch Venlo greenhouses.

As intended by Warne, **AgriFlats** growers and residents will occupy homes partially shrouded from the harsh winter cold, winds, and year-round destructive ultraviolet radiation. Amid

an unforgiving winter, they will enjoy the warm temperatures, restorative humidity, daylight, and views of an expansive growing environment. Beyond the pleasant atmosphere, the adjacency will save energy costs for residents and farmers. Instead of growing in a freestanding greenhouse exposed on all sides to winter winds, farmers will be sheltered by the walls of their live work units or homes able to store thermal energy, saving heating costs.

We've modeled all apartments on Kildare as single bedroom units. As the project develops, the unit mix may modify to reflect community needs. Since we designed the housing modularly, the combination can change without necessitating expensive structural modifications. At least twenty percent of the units will be affordable, as required by the City's current ordinances.

Hopefully, the affordable units onsite will be augmented by new Accessory Dwelling Units (ADUs) in the surrounding neighborhoods. Newly permitted in Chicago, the ADUs will help return the City to the days before modern zoning economically segregated its blocks.

**Adaptability**

As proven by the efficiency of greenhouses in the Westland region of the Netherlands, Dutch Venlo greenhouses are machines for growing. Their clear height accommodates vertical vine crops like tomatoes, cucumbers, eggplant, peppers, squash, and strawberries. Growers use hydroponic drip irrigation systems, fed from pipes running along the floor of the greenhouse, to grow these crops.

The wide bays of the Dutch Venlo greenhouse also provide a broad area for growing leafy greens, vegetables, and herbs horizontally. The plants can be grown on rafts floating on aerated shallow ponds (deep water culture) or in continuously irrigated channels in a nutrient film technique (NFT) setup. Aquaponic growers can use the Dutch Venlo, too, since fish farm tanks can be situated next to hydroponic crops. In **AgriFlats**, the fish tanks will remain above ground to maintain ideal water temperatures throughout the year.

**Green Services**

With permanent full-time jobs supporting year-round food production, AgriFlats establishes a type of "permaculture" in

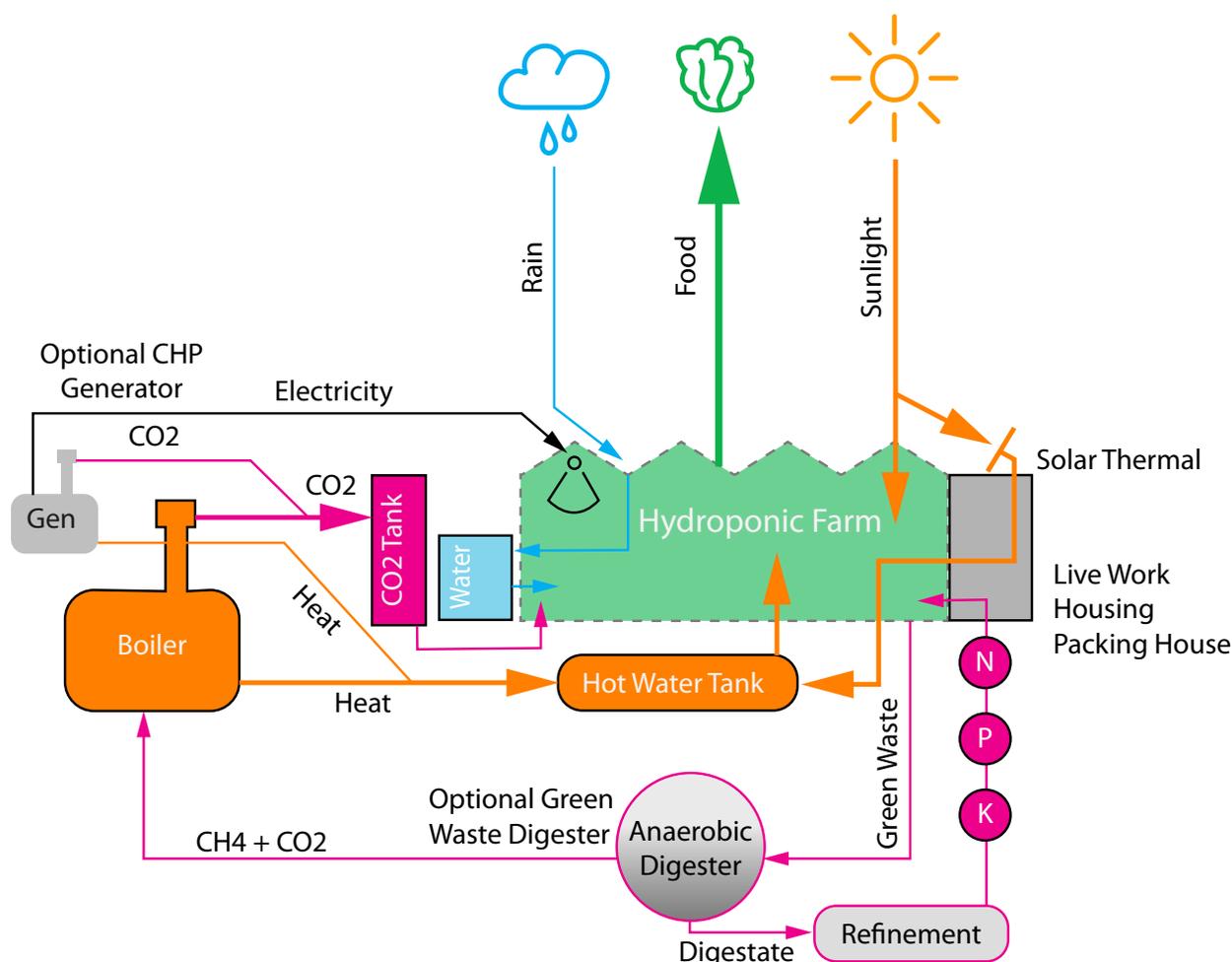


Figure 3 - The closed loop behind the AgriFlats circular economy which eliminates the concept of waste.

the City. Coined in the late 1970s, the term permaculture refers to agriculture that is both permanent and sustainable. With limited imported inputs of seed, nutrients, fry, feed, pollinators, and useful insects, AgriFlats will use the rain and sun that fall on the site and local labor to produce food indefinitely, while providing a series of green services to the neighborhood.

As mentioned earlier, farmers grow most produce in the US for its ability to be transported. Instead, food grown in **AgriFlats** will be selected for taste and harvested after it ripens. Dormant varieties of heirloom seeds, many existing only in seed banks today, will be reintroduced as potential sources of food. This “de-commodification” of food will distinguish Chicago’s first Food District, creating value while catalyzing a discerning food culture.

In addition to increasing appreciation for food, permaculture questions the concept of waste. Growers will recycle all traditional agricultural and food waste produced in the District in greenhouse biodigesters. Growers will transfer any viable food, unable to be sold within the community, to local food banks.

### Education

High-tech growing in a compact urban footprint provides exceptional educational opportunities. Four CPS elementary schools are located within three blocks of the western site depicted in Figure 6. High schools, such as DWR College Prep and North Lawndale College Prep are located within the neighborhood.

Rather than learning AP biology abstractly, students can witness biological processes and investigate optimal conditions for plant growth firsthand at **AgriFlats**, even in winter. Some qualified high school students could even work for the farmers and earn money in an internship program similar to Cristo Rey’s Corporate Work-Study program. These students could help urban growers research and identify new varieties of plants unique to Chicago’s Food District.

There will be a place for younger students, too. As evidenced by the work of Boston University professor Michael Barnett, after-school programs for elementary-aged youth from populations typically underrepresented in STEM fields can foster positive attitudes toward science. Dr. Barnett has shown that, by engaging young students in hydroponic growing, their anxiety tends to decrease while their attitudes toward science and their self-concept improve. AgriFlat’s Learning Lab is a perfect venue for these types of after school programs.

### Self-Sufficiency

Residents living at **AgriFlats** will be able to grow their food in the same location as the urban farmers. With coaching from farmers and educators, residents will observe the same integrated pest management practices adopted by the farmer. This partnership will increase cooperation, self-sufficiency, knowledge, and resilience in the District. As residents gain experience, they will be able to intuit nutrient deficiencies and other defects in their growing plants.

Food District institutions like NLEN’s Worker Bee Cafe and Inspiration Kitchens Garfield Park can teach neighbors how

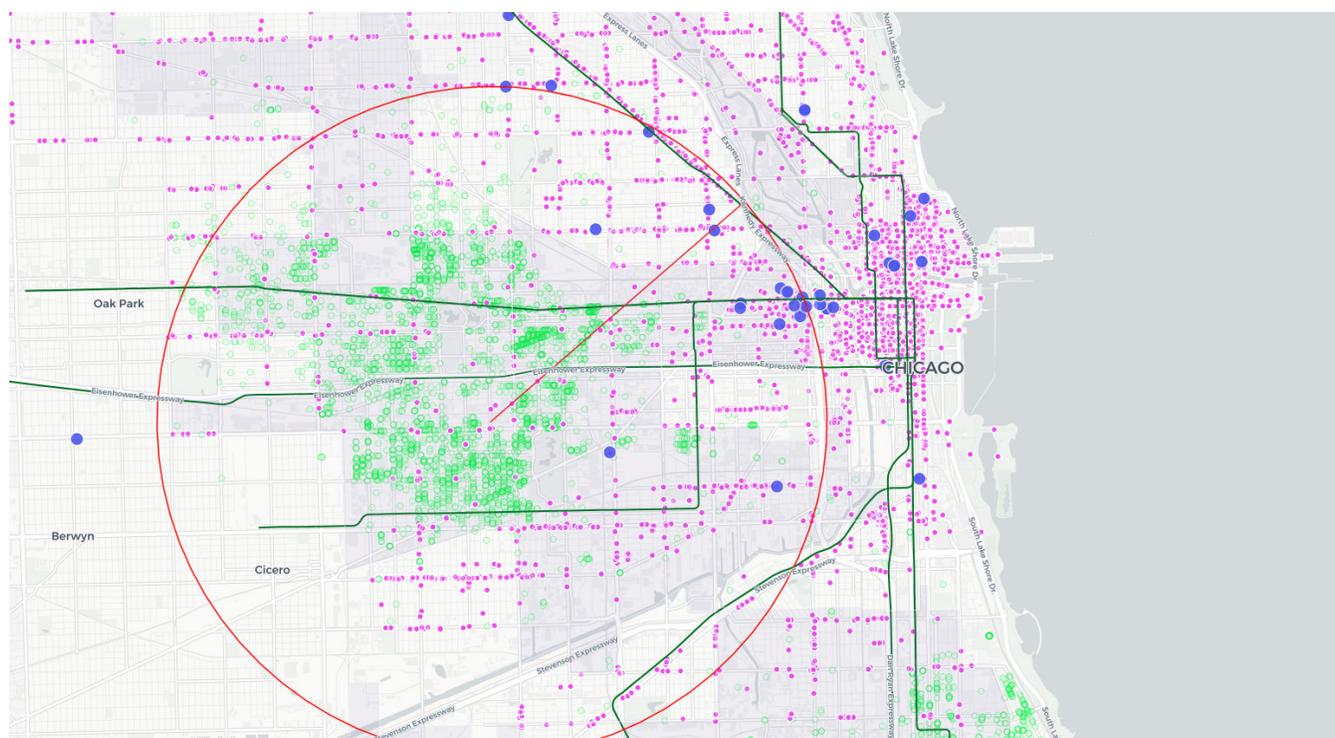


Figure 4 - AgriFlats is located within 3.25 miles of nearly a third of the City's top 50 restaurants, as identified by the Chicago Tribune. Restaurants are shown in purple. Top 50 restaurants are shown in blue. AgriFlats is located within an empowerment zone with the densest concentration of City-owned lots, shown in green.

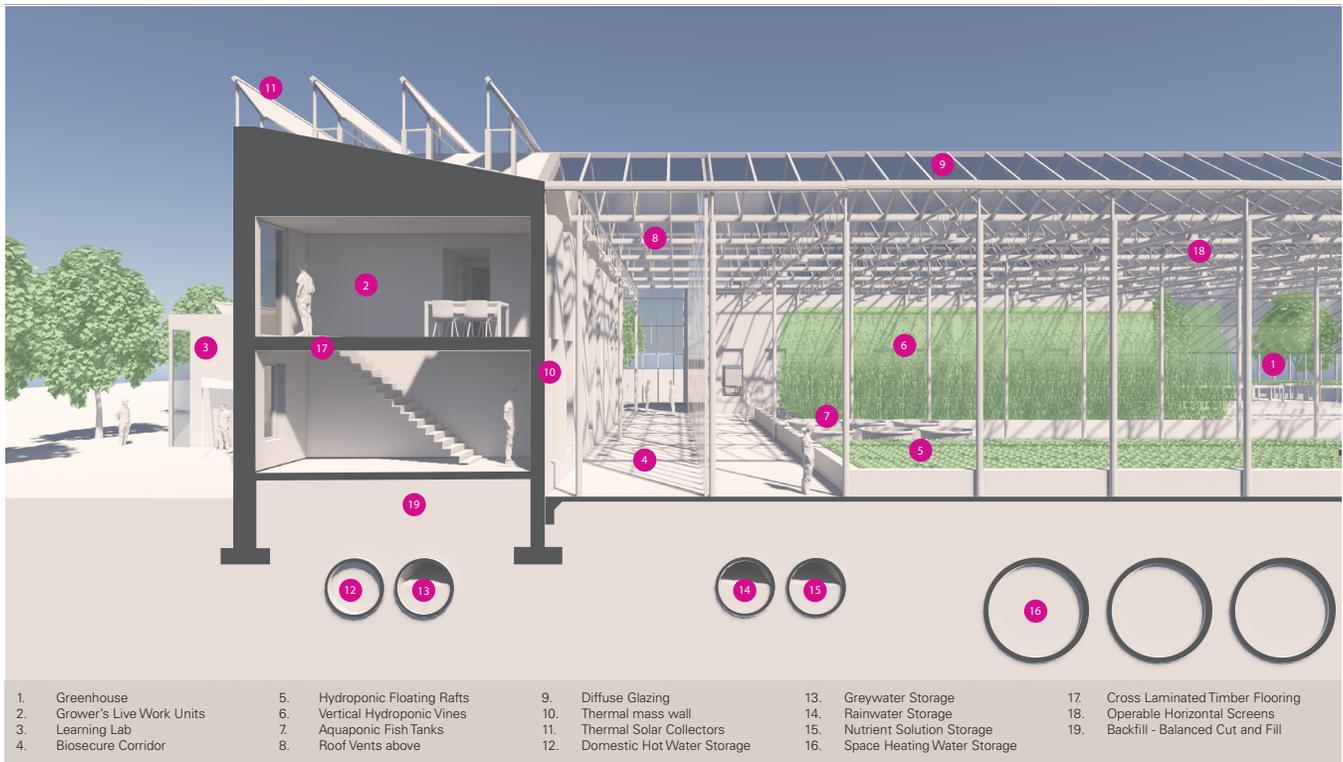


Figure 5 - A north-south section along Fifth Avenue

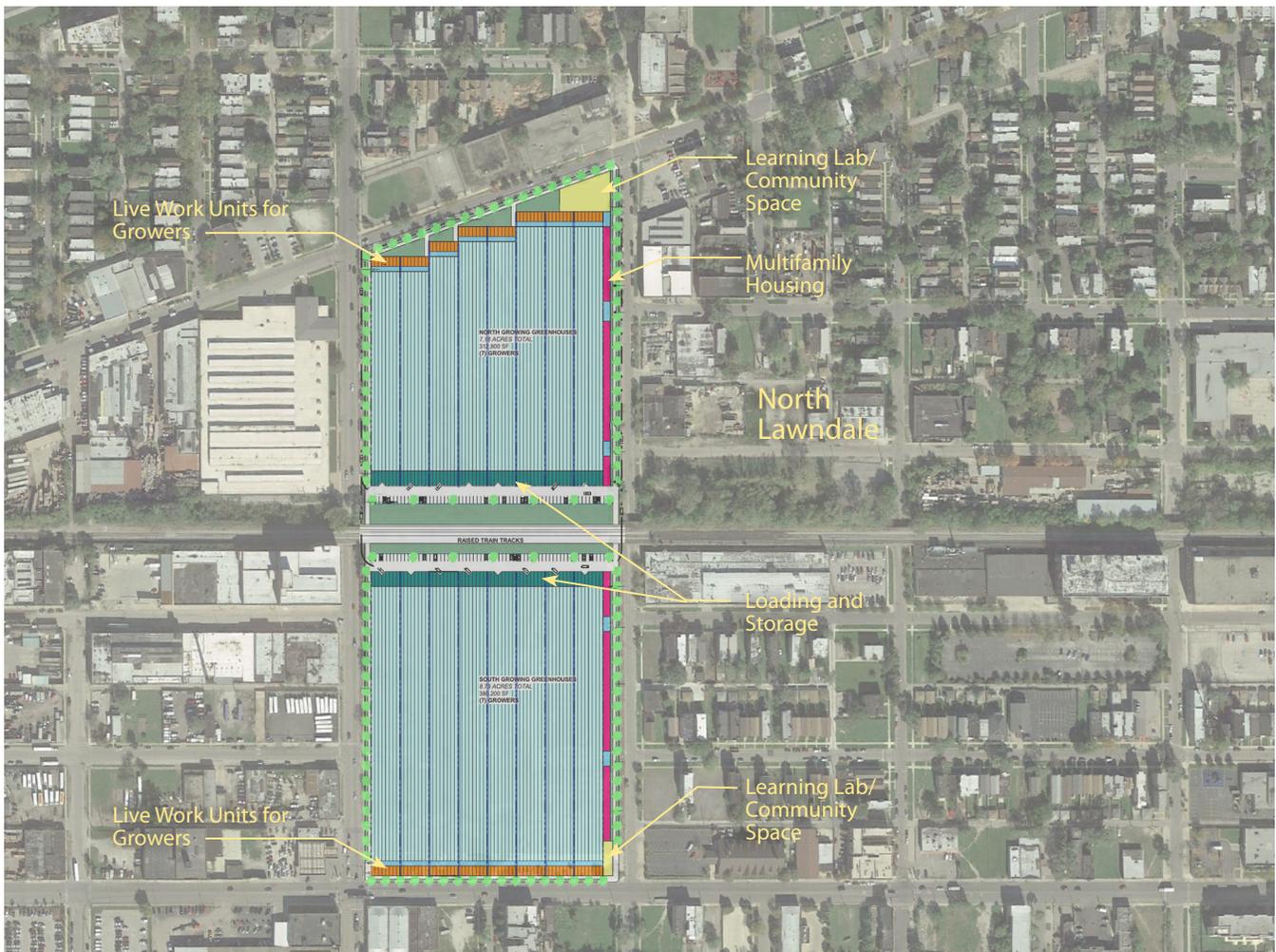


Figure 6 - Aerial depicting the larger AgriFlats development on the 21-acre site at Kostner and Roosevelt. Sixteen acres are under glass in the greenhouses.

to prepare healthy meals with fresh food grown in their neighborhood. Rather than cook with food with outsized carbon footprints shipped from distant climates, Chicagoans will be able to learn to cook with food grown out of season locally.

### Cooperative Biodiversity

In contrast to the monocultures raised by America's farmers, **AgriFlats** will promote biodiversity unheard of in modern farming. Even in CEA greenhouses in the exurbs of Chicago, up to 30-acres in size, crops are usually raised in monocultures to prevent disease and pest infestations.

In contrast, a congregation of smaller greenhouses like **AgriFlats** will encourage urban growers to grow a diverse range of crops cooperatively. Although lacking the economy of scale possible in the exurbs, **AgriFlats** will compensate for uncommon availability and variety of fresh food.

Farmers can gain efficiencies from sharing transportation, marketing, consulting expertise, and buying power among a cluster of small-scale commercial greenhouses. Favorable City policies, which lawmakers will hopefully memorialize in zoning and business regulations, will promote the Food District's unheard of biodiversity.

In addition to cooperative purchasing, urban growers could negotiate cooperative crop insurance, leveraging their aggregate size. As climate change increases the failures of traditional crops, urban CEA could offset risk for the insurers.

Reflecting the Smart City movement, data gathered from growing operations will be shared cooperatively, too. Growers could participate in an online business-to-business (B2B) exchange, creating a hyperlocal marketplace that anticipates and values non-commodity food. Buyers like processors or restaurants could access real-time data about the maturity, nature, and variety of food growing in clusters of greenhouse farms to plan new products and menus. Separately, an online business to consumer (B2C) exchange could be used by growers to schedule activities with community partners and on-site residents.

### Purposeful Design

By establishing cooperative permaculture in Chicago's first real Food District, food producers will be able to share risk and resources. At the same time, residents enjoy a wide variety of healthy, local fresh food.

Along with Sweet Beginnings, the Work Bee Cafe, Hatchery, Inspiration Kitchens, and local chefs, **AgriFlats** will promote a food culture that will build community, awareness, and economic vitality. Good food will be more valued than ever.

Most important, **AgriFlats** will connect North Lawndale residents with their local food system. Residents will boast the City's broadest and best food choices in a place once known as its largest food desert. With the participation of neighborhood partners, unsustainable health practices will reverse, leading to a renaissance of vitality.

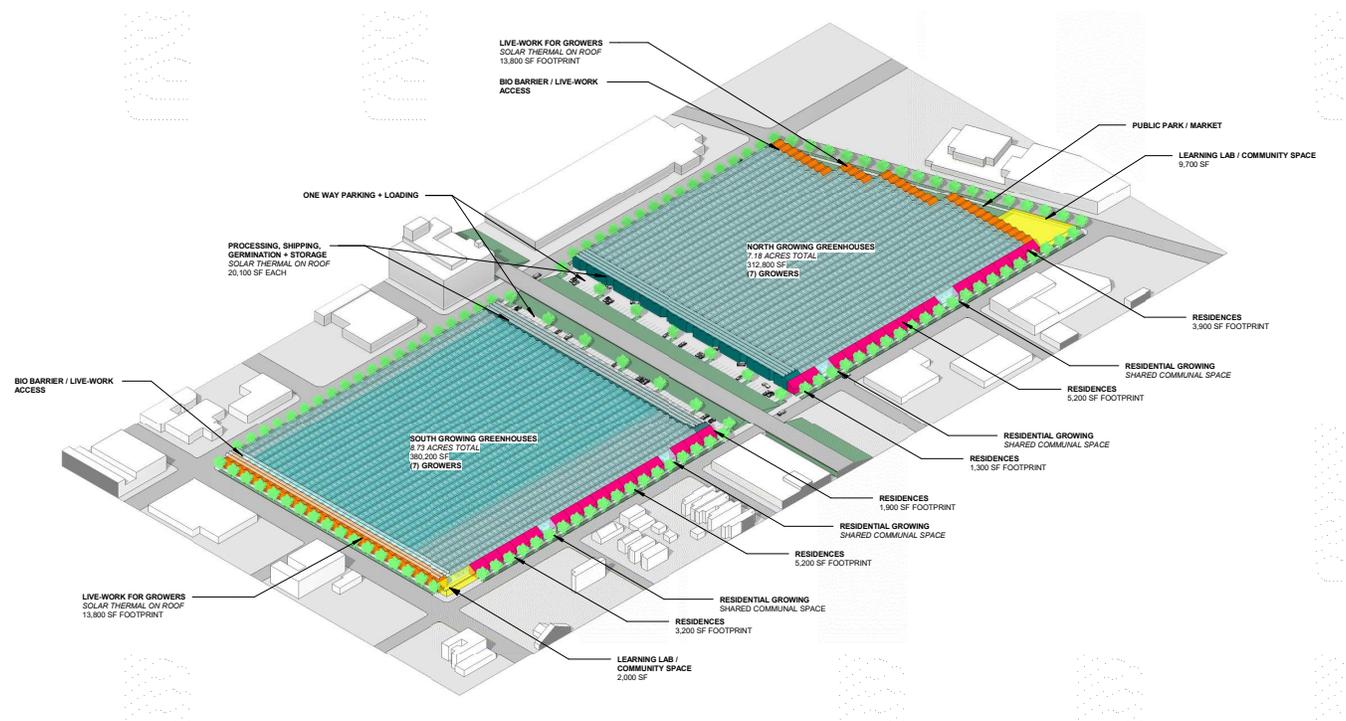


Figure 7 -An isometric aerial of the AgriFlats development.

# Team and Feasibility

As depicted in the diagram in Figure 8, a new Owner / Operator named **AgriFlats**, will work in concert with the Master Developer. **AgriFlats** will hire the design team, the general contractor, and a residential property manager.

The 21-acre parcel shown in Figures 6 and 7 is currently owned by the City. In return for purchasing the land from the City for a modest sum, AgriFlats would unleash unprecedented economic activity in the neighborhood. Kevin Augustyn, a 30-year real estate veteran, will assist the **AgriFlats** development team with advancing the early stage pro-formas and economic models.

Wheeler Kearns Architects will lead the design team, synthesizing the input of other team members. Our team’s environmental sustainability expert, dbHMS, will design the mechanical, electrical, and plumbing (MEP) engineering systems for the project. Nine years ago, dbHMS collaborated with Wheeler Kearns Architects on Inspiration Kitchens Garfield Park, which laid the groundwork for the emerging Food District. Most recently, dbHMS served as the MEP engineer for the Hatchery. WKA and dbHMS are currently working on the new headquarters for North Lawndale Employment Network’s at Homan and Greshaw.

Among local growers, GrowForward will consult on the deployment of hydroponic CEA systems in the greenhouse. GrowForward is affiliated with local brands like MightyVine, Local Foods, HandCut Foods, and FingerLakes Fish. GrowForward will help growers develop proformas for potential greenhouse operations and help recruit founding urban growers.

Since 2003, the Chicago Botanic’s Garden’s Windy City Harvest training program has been building Chicago’s labor supply of candidate urban growers. Their continued investment in local human capital will provide a pipeline of talent for the greenhouses.

North Lawndale Employment Network will also provide a candidate workers for growers through its U-turn Permitted program, which provides job-readiness training to local ex-offenders. NLEN has already placed over 500 residents through its Sweet Beginnings enterprise. NLEN has set the bold goal of reducing unemployment in North Lawndale by 10 percent by 2023.

A new not-for-profit, **AgriFlats CoOP**, will be created to carry the mission of the new Food District forward. By negotiating cooperative purchasing of supplies, **AgriFlats CoOP** will

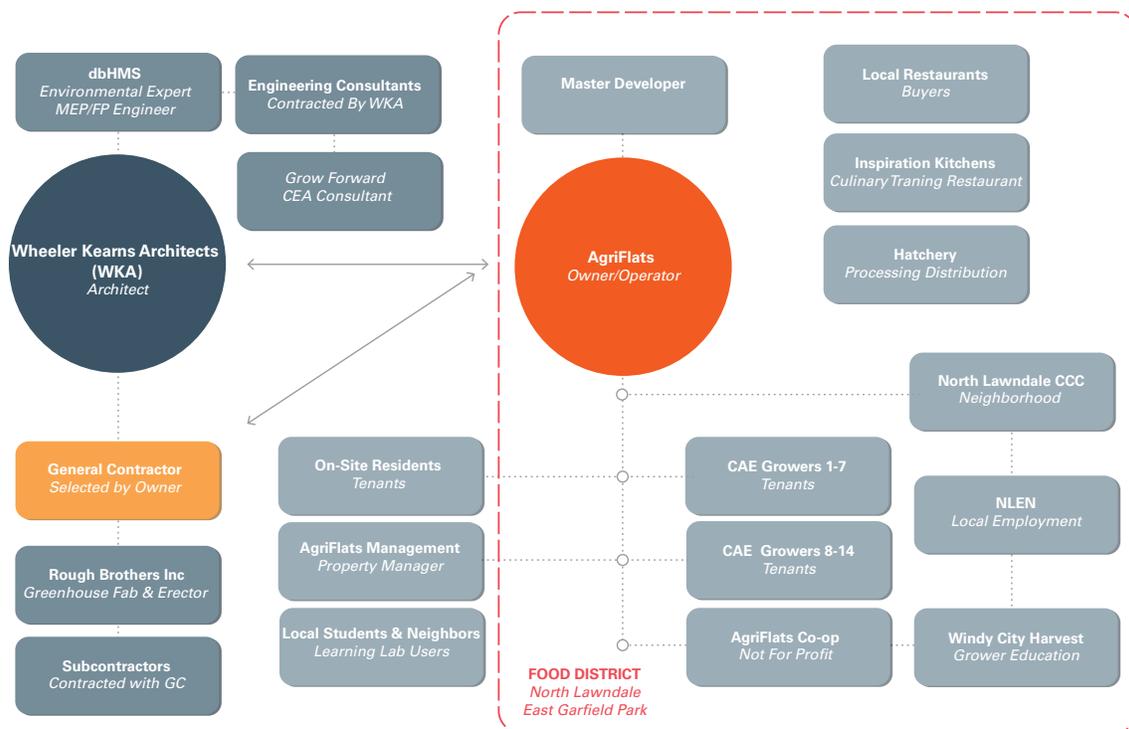


Figure 8 -An organizational chart for AgriFlats.

provide an economy of means for small growers. It will negotiate shared costs for consulting expertise, equipment, and infrastructure for the future network of urban farmers in North Lawndale. It will develop the B2B online market for food buyers to purchase hyperlocal heirloom produce raised in the Food District. It will innovate the B2C online market for farmers to connect with residents and students.

**AgriFlats CoOP** will lease and operate electric vehicles to transport harvests of small growers to local buyers, restaurants, or processors like those located at the Hatchery. In contrast to field crops, hydroponic crops will be harvested on a rolling schedule, ensuring local buyers a reliable year-round supply. Consequently, the need for transportation will persist throughout the year, unlike traditional agriculture. Waste will also be collected cooperatively and transported to biodigesters.

Along with Windy City Harvest and North Lawndale Employment Network, **AgriFlats CoOP** will organize job training for those desiring to work in Controlled Environment Agriculture. It will collaborate with Inspiration Kitchens and Rick Bayless' program at the Hatchery to teach residents and culinary students how to use hyperlocal food to prepare healthy dishes. Additionally, the cooperative will arrange educational opportunities for local students and adults, including on-site residents interested in growing their own produce in the greenhouse under the tutelage of the urban farmer.

The cooperative will assist growers in identifying and developing new hydroponic seed varieties of produce aimed at the Chicago market. These could include items such as hydroponic peppers, tomatillos and okra. To encourage research and development, the cooperative will assist growers in recruiting local high school students in AP biology programs to act as interns.

**AgriFlats** will hire a third party company to manage and rent the apartments. The management company will be a local company experienced with grass roots development. Initially, the company will solicit feedback at community meetings to determine the initial unit mix. The management company will promote the units' sustainability and their assisted growing facilities in the greenhouse.

The majority of units will have rental rates half those three miles away in Wicker Park and Logan Square. All apartments will be universally accessible. A minimum of twenty percent of the units will be affordable to comply with the City's Affordable Requirements Ordinance.

### Financial Feasibility

Aided by initial philanthropy, Neighborhood Opportunity Funds, and New Market Tax Credit proceeds, **AgriFlats** will demonstrate to future investors that Chicago's first Food District has sufficient demand for additional new housing and fresh food, all provided at competitive rates. Our team has already

Construction Cost Kostner Roosevelt						
	Housing		Learning Lab		Greenhouse	
Roosevelt Kostner	40,000	gsf	11,700	gsf	609,840	
Total	40,000	gsf	11,700	gsf	609,840	
Cost/sf	\$	250.00	psf	\$	250.00	
Totals	\$	10,000,000.00	\$	2,925,000.00	\$	21,496,860.00

Development Costs (Use of Funds)				
		Base	Max	
Acquisition	\$	10.00	\$	10.00
Site Remediation and Utilities	\$	15,000.00	\$	100,000.00
Solar Thermal System	\$	3,400,000.00	\$	3,400,000.00
Construction Costs (15% var)	\$	34,421,860.00	\$	39,585,139.00
Design Contingency (7.5%)	\$	2,581,639.50	\$	2,968,885.43
Soft Cost (15%)	\$	5,163,279.00	\$	5,937,770.85
Construction Contingency (10%)	\$	3,442,186.00	\$	3,958,513.90
<b>Total Development Costs</b>	\$	49,023,974.50	\$	55,950,319.18

Financing (Sources of Funds)				
		Base	Max	
Potential Loan or Bond Issuance	\$	33,819,179.60	\$	37,360,255.34
ICECF Solar Thermal Grant	\$	3,400,000.00	\$	3,400,000.00
Neighborhood Opportunity Fund	\$	1,000,000.00	\$	2,000,000.00
Tax Increment Financing	\$	-	\$	-
Philanthropy	\$	2,000,000.00	\$	4,000,000.00
NMTC Proceeds (20%)	\$	9,804,794.90	\$	11,190,063.84
<b>Total Financing Sources</b>	\$	50,023,974.50	\$	57,950,319.18

Loan Calculation				
Term		30	30	
Interest Rate		6%	6%	
<b>Annual Debt Service</b>	\$	(2,456,926.59)	\$	(2,714,181.88)

Revenues							
	Rate	Rate	Rental Area		Annual		
	psf/month	psf/yr					
Apartment Rental	\$	1.25	\$	15.00	40,000	\$	600,000.00
Greenhouse Rental	\$	0.50	\$	6.00	609,840	\$	3,659,040.00
Lab Rental Fees						\$	100,000.00
Agritourism						\$	-
<b>Total</b>						\$	4,359,040.00

Expenses		
Management	\$	250,000.00
Real Estate Taxes	\$	250,000.00
Insurance	\$	100,000.00
Security System	\$	50,000.00
Water and Sewage	\$	50,000.00
Waste Removal	\$	100,000.00
Snow Removal Landscape	\$	50,000.00
Preventative Maintenance	\$	125,000.00
<b>Total</b>	\$	975,000.00

Net Operating Income		
Total Revenues	\$	4,359,040.00
Total Expenses	\$	975,000.00
Net Operating Income	\$	3,384,040.00
Debt Service	\$	(2,456,926.59)
<b>Total Operating Income</b>	\$	927,113.41

Figure 9 - A summary of AgriFlats capital and operating expenses for the Owner Operator.

received interest from a national foundation willing to fund the effort.

Estimates for capital costs and operating costs for the small site in Figures 6 and 7 are tabulated in Figure 9. Capital costs include construction, development, and financing costs.

Construction costs for the housing component are estimated from recent historical data for multistory multifamily buildings in Chicago constructed with union labor. We extrapolated the costs for the greenhouses from historical data from larger scale projects in the exurbs of Chicago, magnified by 15% to account for the lack of economy of scale and higher labor costs.

We have included site improvement costs in the unit costs for both project components. Development costs include soft costs for architectural and engineering fees, legal fees, and real estate transaction fees estimated at 15% of the cost of construction. A 7.5% contingency accounts for design refinements. An overall contingency, shared by the owner and general contractor for the duration of the project, is calculated at 10% of the cost of construction.

Two separate tallies - one for the expected baseline costs and one magnified by 15%, establish a range of development costs.

Financing will include proceeds from New Market Tax Credits (NMTC) accounting for 20% of the total development costs. The federal NMTC program, initiated during the Clinton administration, is designed to spur investment in low-income communities where it otherwise might not occur.

For the initial project, a philanthropic donation is assumed to jump-start the project ensuring that AgriFlats will demonstrate viability to future investors. The remainder of the financing sources is a loan or bond to be repaid over a 30-year term. At this time, we have assumed \$1M in proceeds from a Neighborhood Opportunity Fund (NOF) grant. Individual growers will also be encouraged to apply for a NOF grant.

Using conservative estimates, the internal rate of return for a potential investor is over 25% for a twenty-five-year holding period assuming a 3 percent escalation factor. The project does not rely on any Tax Increment Financing (TIF) at this time, although this could be used by the City to spur subsequent developments.

Since we plan for aggressive solar thermal energy use, we have assumed our project will receive the maximum grant amount available from the Illinois Clean Energy Community Foundation (ICECF). Multiple WKA and dbHMS projects have been awarded ICECF grants in the past.

### Grower Financial Feasibility

Estimates for the urban grower renting and operating within a typical one-acre greenhouse are depicted in Figure 10 below.

Revenue and expenses, including labor, are benchmarked to the average annual production density of hydroponic leafy greens and the average wholesale price. The average harvest is assumed to be 10 lbs of produce per square foot per year. Wholesale prices for produce was assumed to be \$2.75 per pound. Revenues anticipate that parts of the greenhouse will

Equipment Cost One Acre Greenhouse		
	Base	Max
Growing System	\$ 433,000.00	\$ 497,950.00
Installation	\$ 433,000.00	\$ 497,950.00
Design Contingency (7.5%)	\$ 32,475.00	\$ 37,346.25
Soft Cost (5%)	\$ 43,300.00	\$ 74,692.50
Construction Contingency (10%)	\$ 43,300.00	\$ 49,795.00
<b>Total Development Costs</b>	<b>\$ 985,075.00</b>	<b>\$ 1,157,733.75</b>

Financing (Sources of Funds)		
	Base	Max
Small Business Loan	\$ 788,060.00	\$ 926,187.00
Neighborhood Opportunity Grant	\$ 500,000.00	\$ 1,000,000.00
Equity	\$ 197,015.00	\$ 231,546.75
<b>Total Financing Sources</b>	<b>\$ 1,485,075.00</b>	<b>\$ 2,157,733.75</b>
<b>Loan Calculation</b>		
Term	5 yrs	7 yrs
Interest Rate	4%	4%
<b>Annual Debt Service</b>	<b>\$ (177,019.64)</b>	<b>\$ (154,311.66)</b>

Revenues			
	Revenue psf/yr	Production Area	Annual
Revenue psf	\$ 26.00	43,560 sf	\$ 1,132,560.00
Surplus Nutrient Sales			\$ 5,000.00
Agritourism			\$ 2,500.00
<b>Total</b>			<b>\$ 1,137,560.00</b>

Expenses	
Greenhouse Rental	\$ 261,360.00
Real Estate Taxes	in rent
Crop Insurance	\$ 10,000.00
Labor	\$ 546,024.60
Water and Sewage	in rent
Waste Removal	in rent
Supplemental Heating	\$ 21,780.00
Electric	\$ 87,120.00
<b>Total</b>	<b>\$ 926,284.60</b>

Net Operating Income	
Total Revenues	\$ 1,137,560.00
Total Expenses	\$ 926,284.60
Net Operating Income	\$ 211,275.40
Debt Service	\$ (177,019.64)
<b>Total Operating Income</b>	<b>\$ 34,255.76</b>

Figure 10 - A summary of the urban farmer's capital and operating expenses for the greenhouse for one year. Growers are assumed to incubate their operation for five to seven years before scaling elsewhere.

be devoted to non-production activities such as staging and packaging.

The figures assume the grower will make a capital investment of 20% of the development costs to secure a loan for a 5 to 7-year term. These funds will be used to purchase and erect the growing system. A \$500k to \$1M NOF grant is assumed in the calculations.

Expenses assume costs for supplemental heating and electrical service, which will be used primarily for lighting. The internal rate of return for a five year holding period considering the total operating income after debt service and a 3 percent escalation is 19 percent. After five to seven years, growers should be able to scale to the exurbs, taking some local employees with them, creating even more future jobs.

**Affirmative Action**

Both the design and construction teams will surpass the City’s current goals of 26% participation goal for Minority Business Enterprises (MBE) and 6% for Women’s Business Enterprises (WBE). We will select a General Contractor from respondents to an invited General Conditions and Fees RFP issued early in the project’s development, allowing us to manage costs as MBE and WBE goals are assured. The successful General Contractor will be asked to solicit proposals from local subcontractors identified by Alderman Scott or local trade groups.

**Green Matrix**

At this point, our team will achieve the necessary 100 points as required by the City’s green matrix for new planned developments. Sustainability remains our primary goal and not

third-party validation. If the unusual combination of program elements frustrates LEED 4.1 certification, our team will postpone certification. Since our project leverages renewable energy, a registered Commissioning Agent will assure the proper operation of all mechanical and control systems.

**Phasing**

Because the financial model for the project benefits from an economy of scale, the project will not be phased. In fact, other developers will be invited to replicate **AgriFlats** close by so that the **AgriFlats CoOP** can strengthen competitive purchasing arrangements.

**Involving Neighborhood Stakeholders**

**AgriFlats** will not be a UFO that lands in North Lawndale uninvited. In pursuit of mutual benefit, our team will solicit feedback from multiple stakeholders during the project’s development. Our team has already been coordinating with the North Lawndale Coordinating Community Council (NLCCC), a recent finalist in the Chicago Prize.

Other stakeholders will include key members of the Food District including Windy City Harvest, local restaurants, wholesale produce buyers, the Hatchery and its tenants, the local Farmers Market and aspiring or established urban farmers. Stakeholders will also include neighborhood groups from local schools, and other not-for-profit institutions.

For transparency, we will summarize stakeholder feedback on a public website, along with illustrations and explanations of the project. We will also summarize feedback from stakeholders without digital access, expressed during town hall style

**IMPLAN** AgriFlats North Lawndale REGIONS IMPACTS RESULTS

Economic Indicators by Impact

Impact ^	Employment	Labor Income	Value Added	Output
1 - Direct	261.25	\$14,860,834.40	\$18,491,289.00	\$33,757,058.11
2 - Indirect	37.18	\$3,308,747.78	\$5,444,950.94	\$9,041,395.97
3 - Induced	69.05	\$4,192,356.24	\$7,412,302.89	\$11,536,071.82
Total	367.48	\$22,361,938.42	\$31,348,542.83	\$54,334,525.90

**IMPLAN** AgriFlats North Lawndale REGIONS IMPACTS RESULTS

Economic Indicators by Impact

Impact ^	Employment	Labor Income	Value Added	Output
1 - Direct	159.50	\$3,271,271.78	\$5,802,885.91	\$19,646,965.70
2 - Indirect	48.71	\$2,849,981.95	\$5,399,447.31	\$9,127,232.75
3 - Induced	23.24	\$1,411,119.59	\$2,495,710.35	\$3,884,124.47
Total	231.45	\$7,532,373.32	\$13,698,043.56	\$32,658,322.92

Figure 11 - The economic impact of AgriFlats as modeled in IMPLAN for the construction (top) and annual operation (bottom). AgriFlats will create 230 new permanent jobs and generate \$32M of annual economic activity.

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meetings arranged by Alderman Scott or other community groups. We will work with the Department of Planning to maintain alignment with overarching City objectives.