



APPLICATION FOR APPEAL

Saint Paul City Council – Legislative Hearings

RECEIVED

SEP 23 2020

CITY CLERK

310 City Hall, 15 W. Kellogg Blvd.

Saint Paul, Minnesota 55102

Telephone: (651) 266-8585

We need the following to process your appeal:

- \$25 filing fee (non-refundable) (payable to the City of Saint Paul) (if cash: receipt number Check # 2073)
 - Copy of the City-issued orders/letter being appealed
 - Attachments you may wish to include
 - This appeal form completed
 - Walk-In OR Mail-In
- for abatement orders only: Email OR Fax

HEARING DATE & TIME
 (provided by Legislative Hearing Office)
 Tuesday, October 6, 2020

Time 11:00

Location of Hearing:
Room 330 City Hall/Courthouse
Teleconference

Call between 11:00 a.m. & 12:30 p.m.

Address Being Appealed:

Number & Street: 408 Sneilling Ave City: St. Paul State: MN Zip: 55116

Appellant/Applicant: Mitchell Karstens Email mkarstens@stthomas.edu

Phone Numbers: Business 719-661-7494 Residence _____ Cell _____

Signature: *Mitchell Karstens* Date: 9/18/2020

Name of Owner (if other than Appellant): Kieran Wells/ Syvan Park LLC

Mailing Address if Not Appellant's: 959 Bayard Ave., St Paul MN 55102

Phone Numbers: Business 651-695-1000 Residence _____ Cell 651-757-6136

What Is Being Appealed and Why?

Attachments Are Acceptable

- Vacate Order/Condemnation/Revocation of Fire C of O
- Summary/Vehicle Abatement
- Fire C of O Deficiency List/Correction
- Code Enforcement Correction Notice
- Vacant Building Registration
- Other (Fence Variance, Code Compliance, etc.)

Comments:
Please see attached.

Dear city officials,

This appeal is respectfully submitted to the City Clerk's Office on September 18, 2020. This appeal is in reference to code violation notice 20-072483 from the City of Saint Paul, issued to Minnesota Acre Farms, LLC, operating under commercial lease agreement with Sylvan Park, LLC, at 408 Snelling Avenue South. This violation cites section 34.08 of the Saint Paul Legislative Code, which prohibits "storage containers" from being located in residential areas.

With this written appeal we request that the City of Saint Paul changes their classification of the primary business asset of Minnesota Acre Farms, LLC: a "Greenery" farming system. We advocate that the primary use is not as a "storage container", but rather as an "agricultural production facility" or similar. This fully operational farm will become a treasured asset to our community. It brings sustainable urban agriculture to Saint Paul and is unlike anything else in the city. Within this unit we are able to grow herbicide and pesticide free, hyper-local produce on a commercial scale. The farm productivity is equivalent to that of a 3 acre traditional farm; however, it is done so in a way that does not impact surrounding properties. It does not require large machinery, generate loud and obnoxious noise, create light pollution, or increase traffic. Importantly, our facility operates year-round, delivering nutritionally superior produce with unavailable and unique flavor profiles even in the darkest and coldest months of the winter. This will allow the City of Saint Paul to modify its definition of the agricultural "growing season", as defined in Section 165.01 of the Saint Paul Legislative Code, from March 1 - November 1, to year-round. This is a truly revolutionary vision for the produce landscape in Minnesota. We have attached the product technical booklet (from the manufacturer, Freight Farms, Inc.) to showcase the unit and technology as well as pictures of the exterior and interior of the unit that is already here in Saint Paul.

Since receiving this code violation we have been working with city inspectors to understand what is needed for them to allow our farm to begin operating. Our conclusion is that since this is a new and highly innovative farming system, it does not neatly fit into a category that is easily described and processed according to the current Saint Paul Legislative Code. We look at this as an opportunity for the City of Saint Paul. Innovation requires embracing new ideas and technologies, and empowering the small businesses that strive to employ these ideals. We are committed to continue to work with the City of Saint Paul to enable it to be at the forefront of urban agriculture, as the other large municipalities listed below have already done.

All of the co-owners of Minnesota Acre Farms are residents of Saint Paul's Ward 3. We are passionate about our local community and we want to create this business for the people of Saint Paul. We do not want to be forced to move the farm to an industrial zone or to another municipality (indeed, the nearby cities of Minneapolis and Shoreview already host businesses operating a "Greenery" system built by Freight Farms). The "Greenery" unit has been successfully installed and is currently operating in more than 350 major urban areas across the country, including Chicago, Boston, Miami, Denver, Houston, and many more. Further, Freight Farms has distributed urban agriculture solutions in dozens of countries around the world.

With this appeal we are asking the City of Saint Paul to have the vision to think progressively about the future of our community. With a focus on the critical issue of food sustainability, we advocate for a modification of the Saint Paul Legislative Code to allow new and innovative agricultural technologies, such as our "Greenery", to be deployed in all areas of the City. As the population density grows, the need for technologically advanced urban agriculture solutions will become increasingly important. As

the working model that guides the happiness and welfare of hundreds of thousands of citizens, the Saint Paul Legislative Code can and should be continually updated and modernized in order to address current issues and to embrace new and transformative technologies. If our appeal is not viewed favorably, then we would request the opportunity to work with the City to pursue necessary code changes that would allow this use.

We thank you in advance for your help in navigating this complex situation. Please help us enable Minnesota Acre Farms to bring our amazing farming system to the citizens of Saint Paul.

Sincerely,
Minnesota Acre Farms, LLC



CITY OF SAINT PAUL

375 Jackson Street, Suite 220
St Paul, Minnesota 55101-1806

Telephone: 651-266-8989
Facsimile: 651-266-9124
Web: www.stpaul.gov/dsi

- Yog hais tias koj tsis to taub tsab ntwav no, hu rau tus txhais lus ntwam (651) 266-8989. Nws yuav pab dawb xwb.
 Si necessita un traductor, por favor llamanos al (651)266-8989. No costo.

September 09, 2020

Sylvan Park Llc
959 Bayard Ave
St Paul MN 55102-4003

Sylvan Park LLC
408 Snelling Ave S
St Paul MN 55116

CORRECTION NOTICE

Date: **September 09, 2020**
RE: **408 SNELLING AVE S**
File #: **20-072483**

Dear Sir/Madam:

The City of Saint Paul, Department of Safety and Inspections has inspected the above referenced property on **September 09, 2020** and has determined that the following deficiencies exist in violation of the Saint Paul Legislative Code¹ (see footnote 1, below).

1. SPLC 34.08 **STORED MATERIALS**: It shall be unlawful to accumulate and store building material, lumber, boxes, cartons, **portable storage containers, inter modal cargo containers or other containers**, machinery, scrap metal, junk, raw material, or fabricated goods.

PLEASE REMOVE THE UNAPPROVED STORAGE CONTAINER FROM THE REAR OF THE PROPERTY. THANK YOU.

You are hereby notified to correct these deficiencies in accordance with the appropriate codes. The Enforcement Officer will re-inspect these premises on or after **September 23, 2020**, by which date the violations noted must be corrected. **Failure to correct these deficiencies may result in the issuance of criminal charges²** and/or a civil lawsuit, and possible abatement/assessment by the City. All repairs and new installations must be made in accordance with the appropriate codes. Permits may be obtained by calling 651-266-8989.

You may file an appeal to this notice by contacting the City Clerk at 651-266-8585. Any appeal must be made in writing within 10 days of this notice. (You must submit a copy of this Notice when you appeal and pay a filing fee.)

If you have any questions or request additional information, please contact me. To arrange an appointment or request an

September 09, 2020
408 SNELLING AVE S
Page 2 of 2

extension of time to complete repairs, you will need to speak directly to me at 651-266-9141.

Sincerely,

Richard Kedrowski
Badge # 320
CODE ENFORCEMENT OFFICER

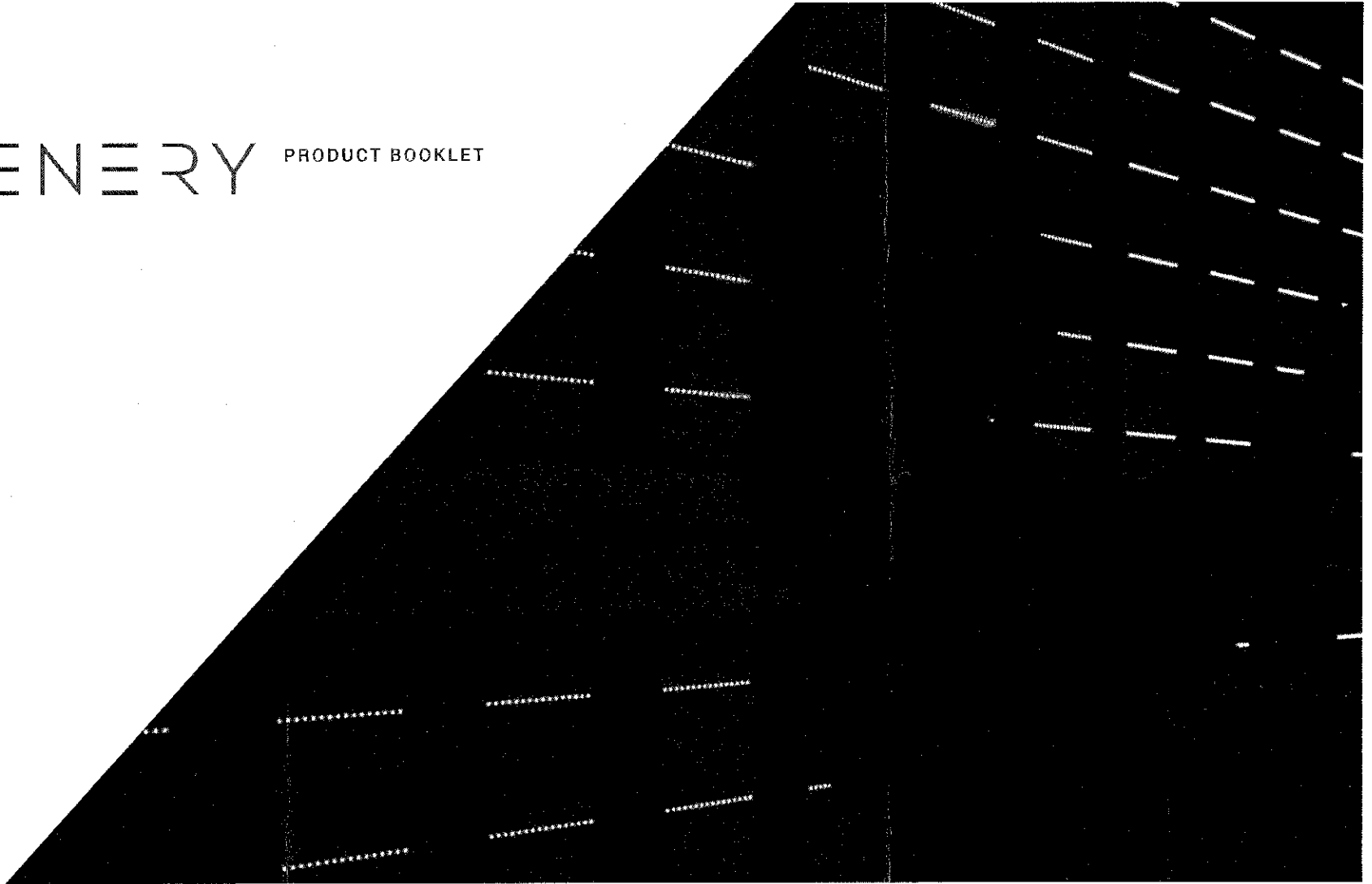
Footnotes:

- ¹ To see the Legislative Code go to www.stpaul.gov on the internet, click on "Departments", then click on "Department of Safety and Inspections", scroll down the page for the "Codes". Most Correction Notices derive from Chapter 34.
- ² Criminal charges can be brought on the day the violation is observed, but generally we allow time to correct unless this is a repeat violation.

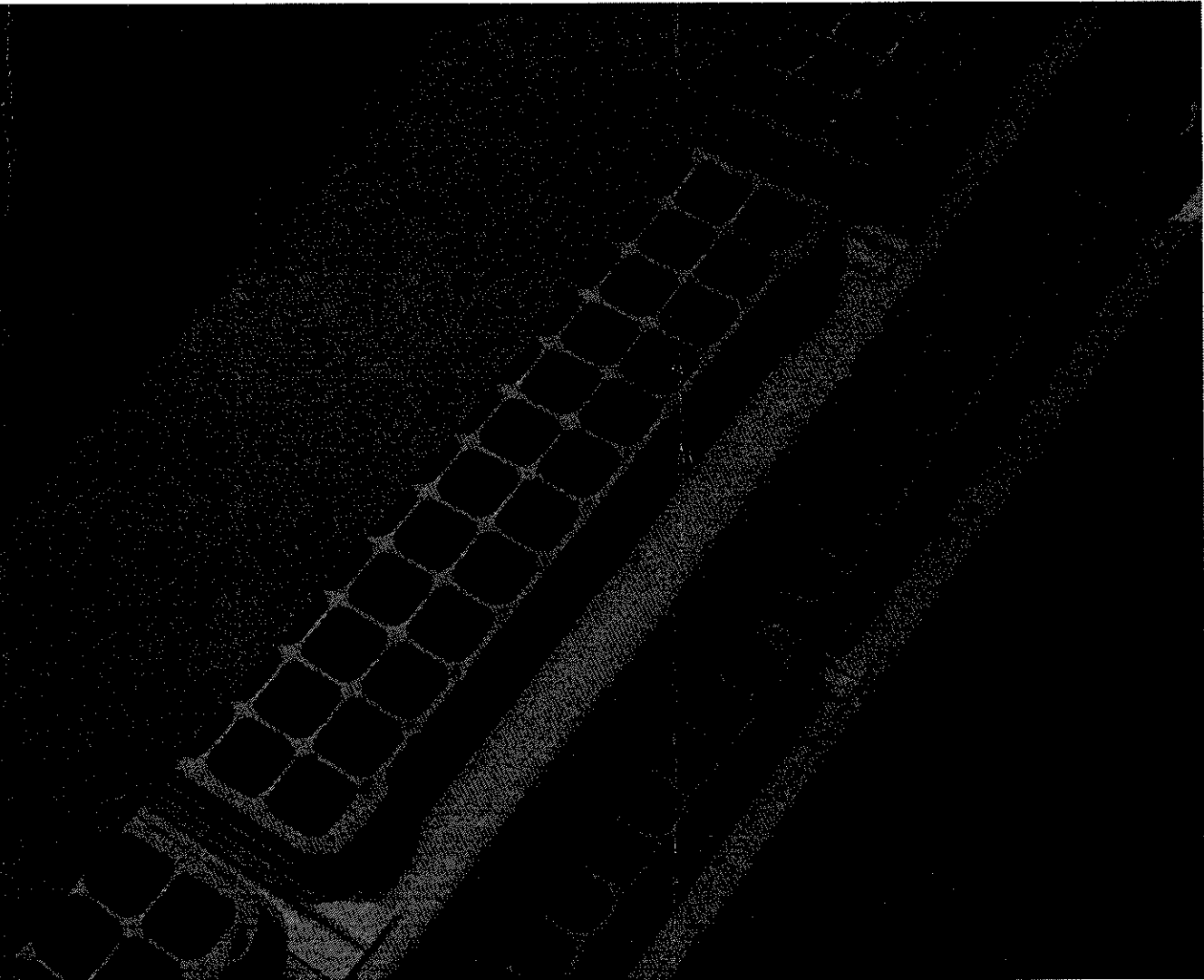
WARNING: Code inspection and enforcement trips cost the taxpayers money. If the violations are not corrected within the time period required in this notice, the city's costs in conducting a reinspection for compliance after the due date will be collected from the owner rather than being paid for by the taxpayers of the City. If additional new violations are discovered within the next following 12 months, the city's costs in conducting additional inspections at this same location within said 12 months will be collected from the owner rather than being paid for by the taxpayers of the City. Any such future costs will be collected via assessment against the real property and are in addition to any other fines or assessments which may be levied against you and your property.

GREENERY

PRODUCT BOOKLET



3	The Greenery™
5	Climate Control
9	LED Arrays
14	Nursery Station
21	Cultivation Area
31	Flexible Rack System
36	Crops & Plant Development
42	Operational Requirements
45	Specifications



GREENERY

GREEN • HOUSE

NURS • ERY

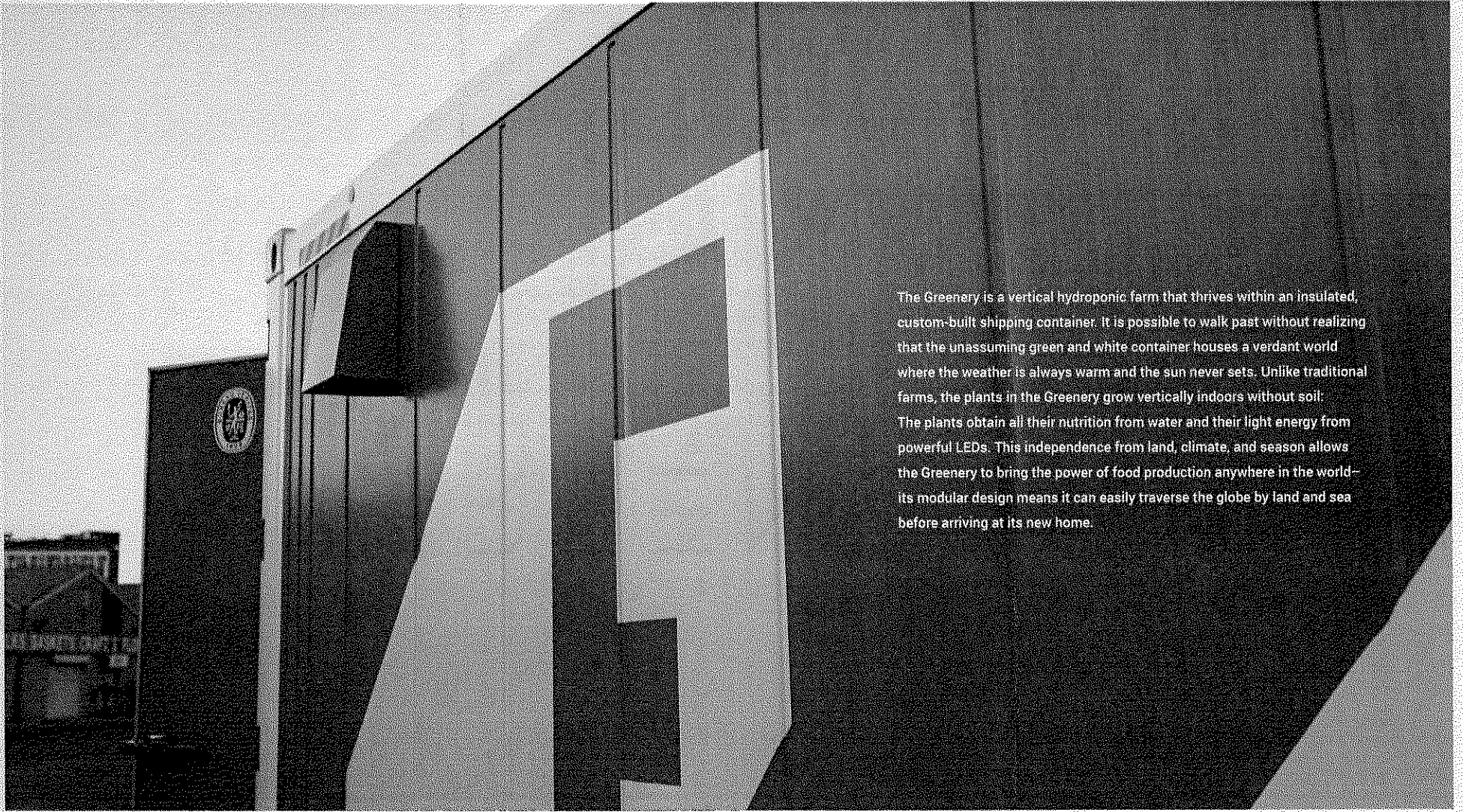
MACHINE • ERY

PLANT FACTO • RY

LABORATO • RY

The Greenery represents a new category onto itself, a distillation of an idea into a core, governing concept.

With the opportunity for countless unique applications, the Greenery cannot be confined to just one category: greenhouse, nursery, laboratory...none can capture the Greenery's full potential.



The Greenery is a vertical hydroponic farm that thrives within an insulated, custom-built shipping container. It is possible to walk past without realizing that the unassuming green and white container houses a verdant world where the weather is always warm and the sun never sets. Unlike traditional farms, the plants in the Greenery grow vertically indoors without soil. The plants obtain all their nutrition from water and their light energy from powerful LEDs. This independence from land, climate, and season allows the Greenery to bring the power of food production anywhere in the world—its modular design means it can easily traverse the globe by land and sea before arriving at its new home.

PERFECT DAYS

The Grower's climate control components work together to recreate an ideal growing day, everyday. As a result, plants can thrive inside the container regardless of the external environment—hard climates, light urban centers, and extreme weather conditions leave no effect on the plants growing inside.

CAUTION

A. Insulation

The Greenery's shell has a Department of Energy Insulation rating of R-28. This means the Greenery can maintain an average internal temperature of 70°F in extreme climates ranging from -40°F - 130°F and a variety of inclement weather conditions.

B. Climate Control

The 36,000 BTU Bard HVAC unit automatically cools the Greenery based on farmhand® programming. An integrated economizer saves energy by drawing in cool outside air when appropriate, doubling as an intake fan.

C. Dehumidifier

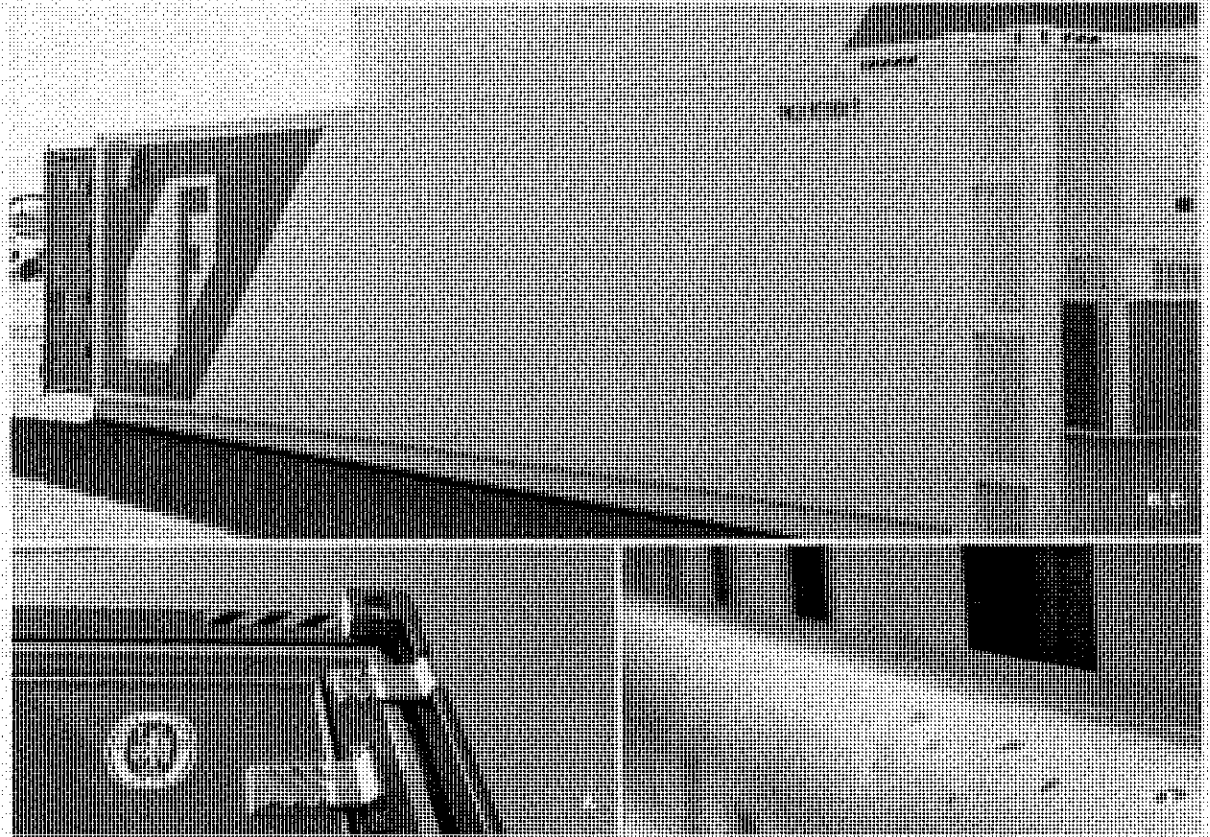
Integrated within the Bard unit, the Greenery's dehumidifier maintains optimal in-farm humidity levels. Condensate is captured and recirculated back into the water tanks at up to 1.88 gallons/hour, decreasing the farms overall water consumption.

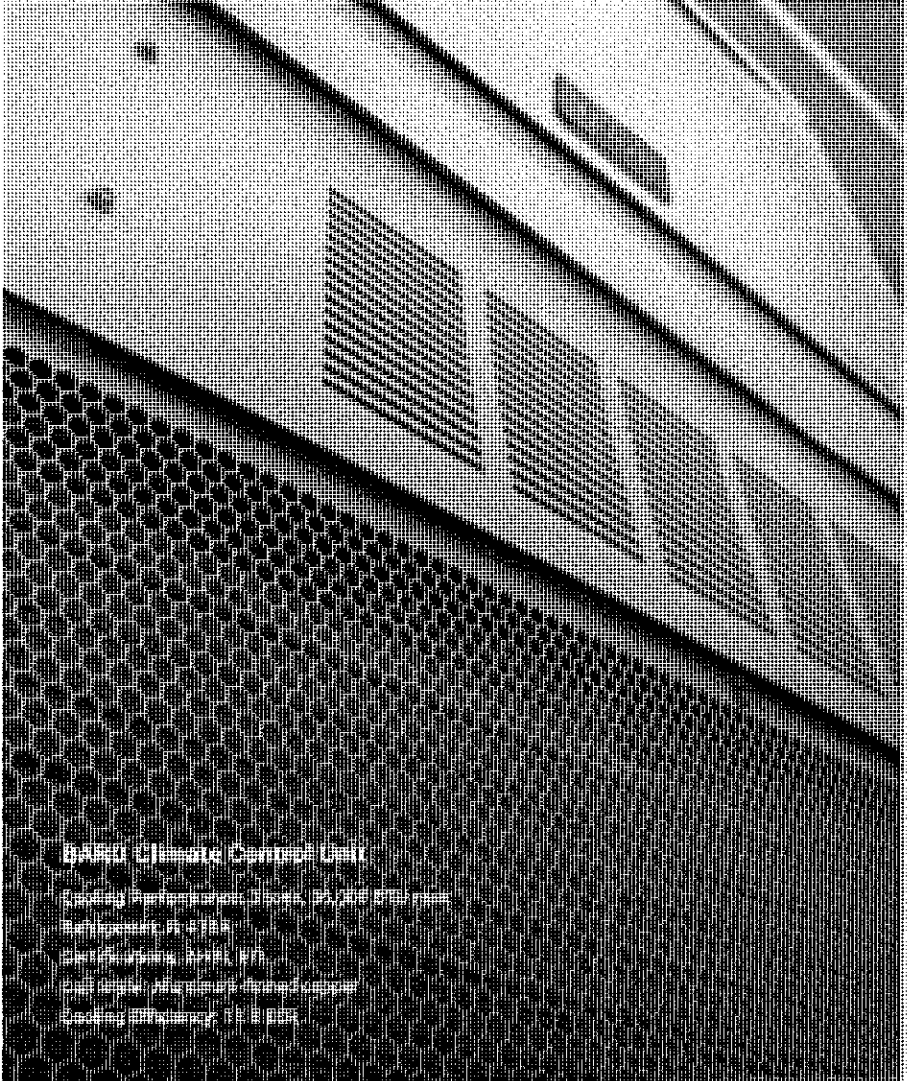
D. Airflow Ducts

Two fans power on-panel air ducts to distribute cool, CO₂ enriched air evenly through varied-sized holes in the anti-microbial material, creating uniform airflow in the entire container.

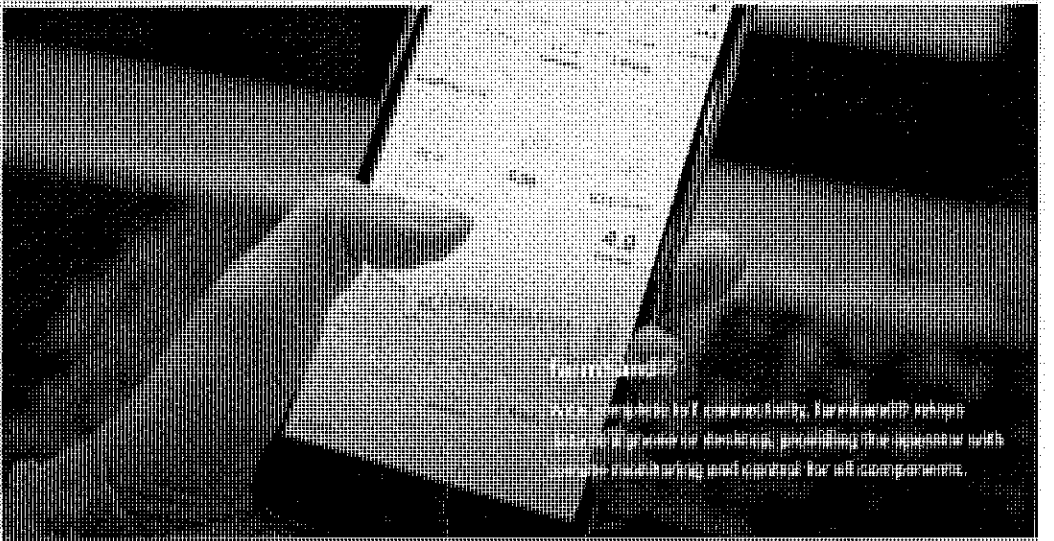
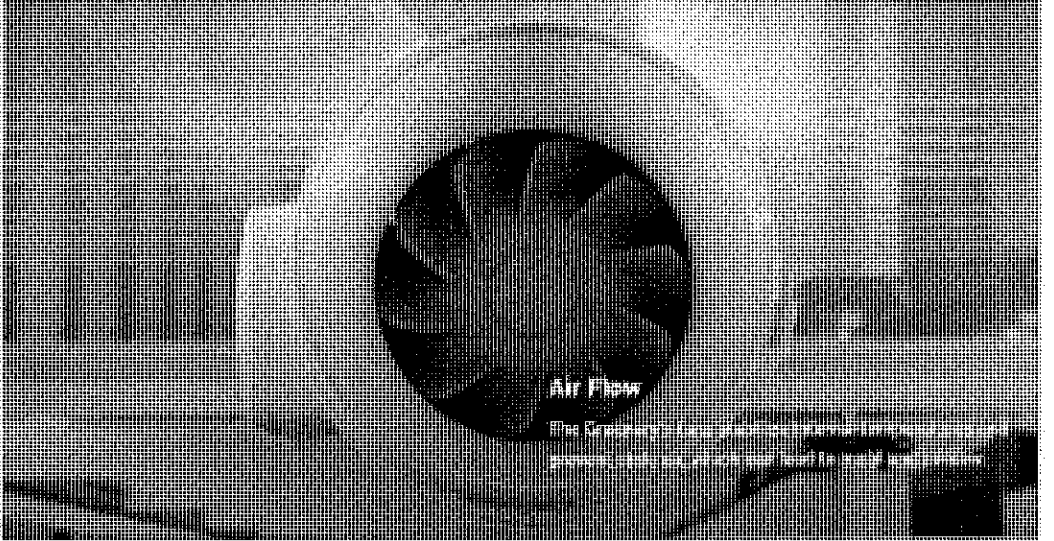
E. CO₂ Regulator

A precision regulator with a safety shut-off feature provides plants with the CO₂ needed for photosynthesis. CO₂ is fed directly into the airflow ducts and permeates into the main cultivation area.





DAVE Climate Control Unit
Freight Farms, Inc. 10000 S. 10th St. Suite 100
Tulsa, OK 74116
Unit Weight: 10,000 lbs.
Cooling Capacity: 10,000 BTU

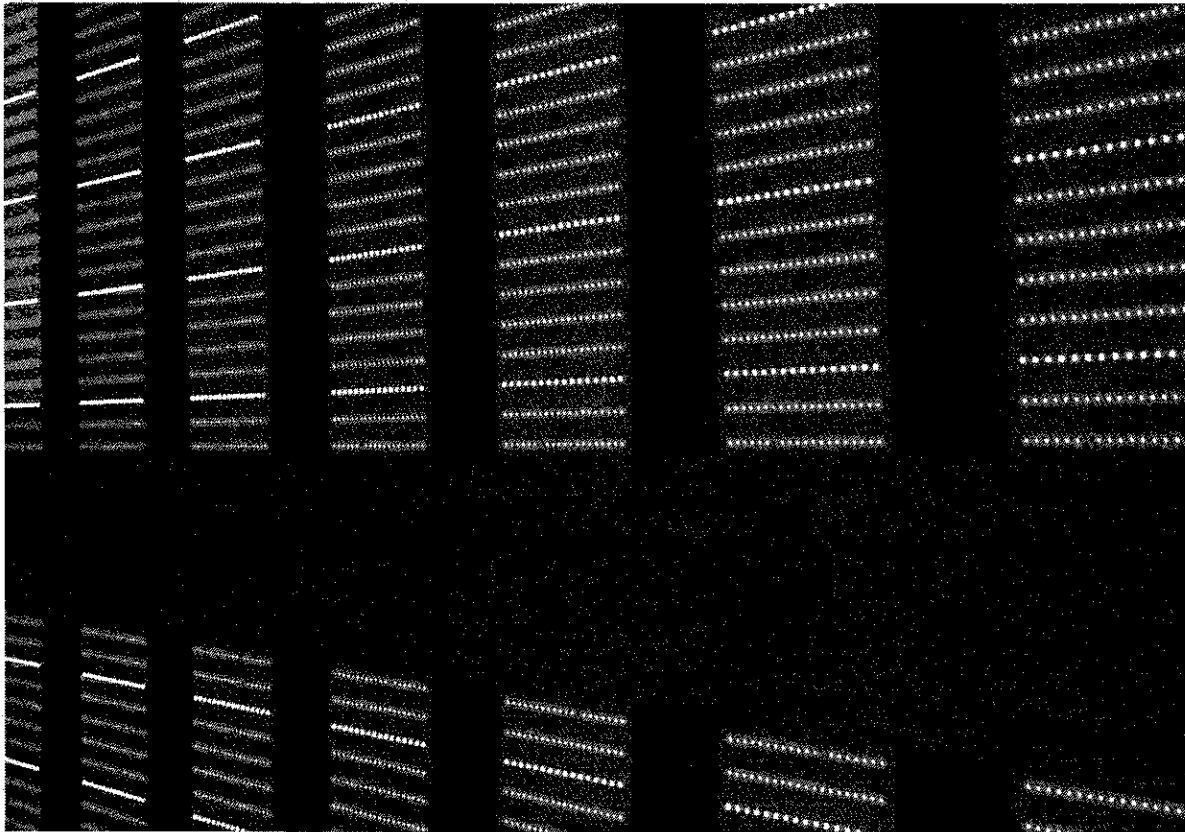


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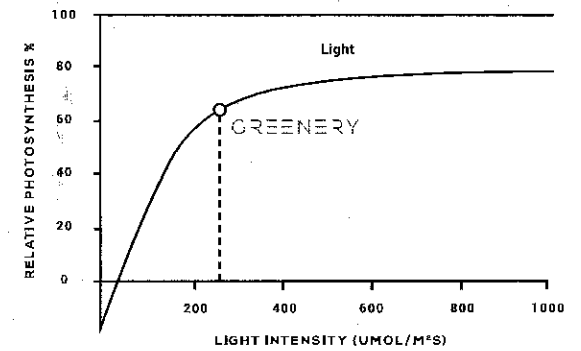
UNDER THE LIGHTS

Healthy, robust, and flavorful plants start with the perfect light source. For this reason, Freight Farms engineered custom LED arrays that encourage plants to grow strong without sunlight.

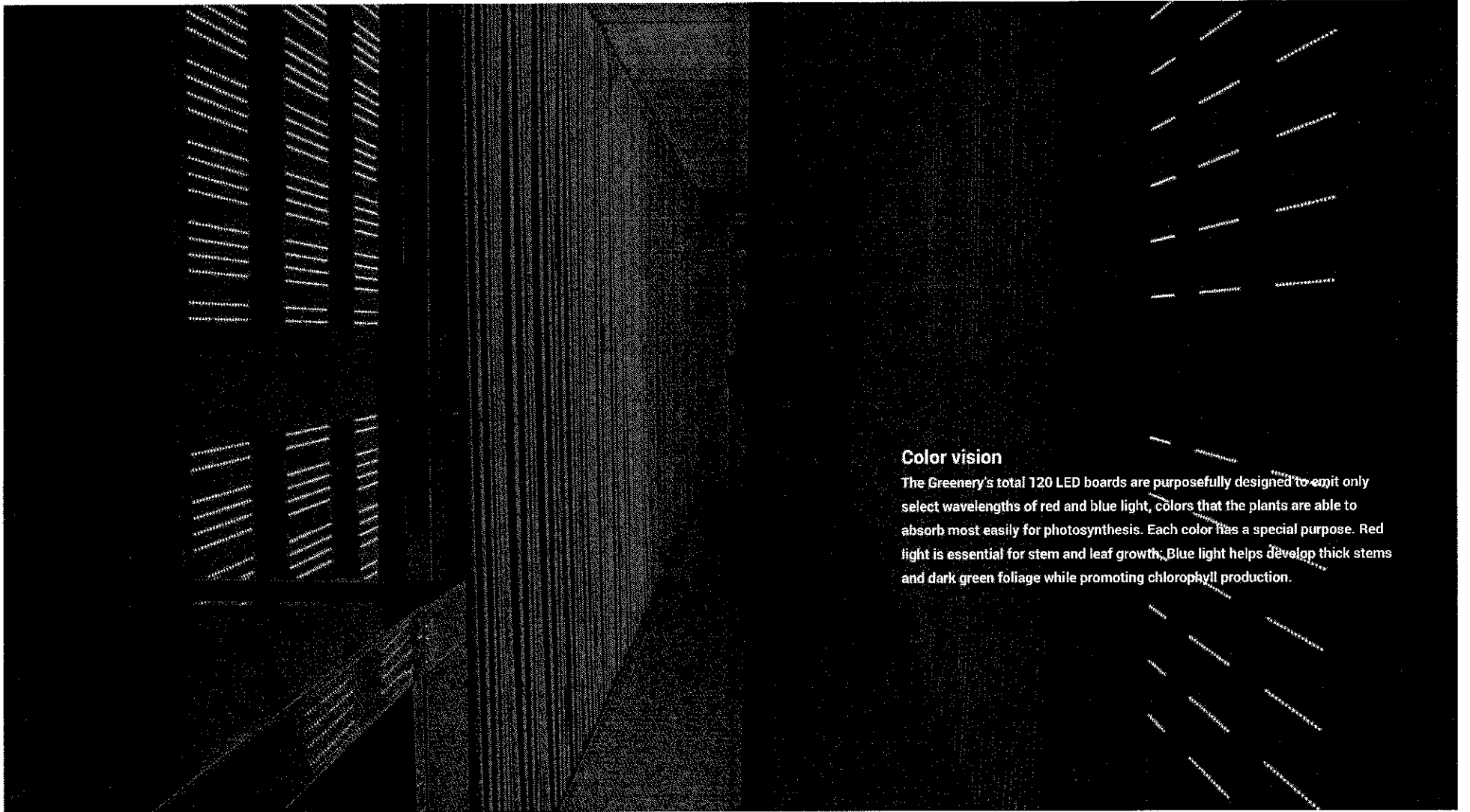


Balance of power

In the cultivation area, the Greenery's LED arrays output an average range of $250 \mu\text{mol}/\text{m}^2\text{s}$, meaning plants receive the best quality light at its most efficient point. While more light generally means healthier plants, there are diminishing returns on the rate of photosynthesis after light intensity exceeds a PPFD of approximately $300 \mu\text{mol}/\text{m}^2\text{s}$.

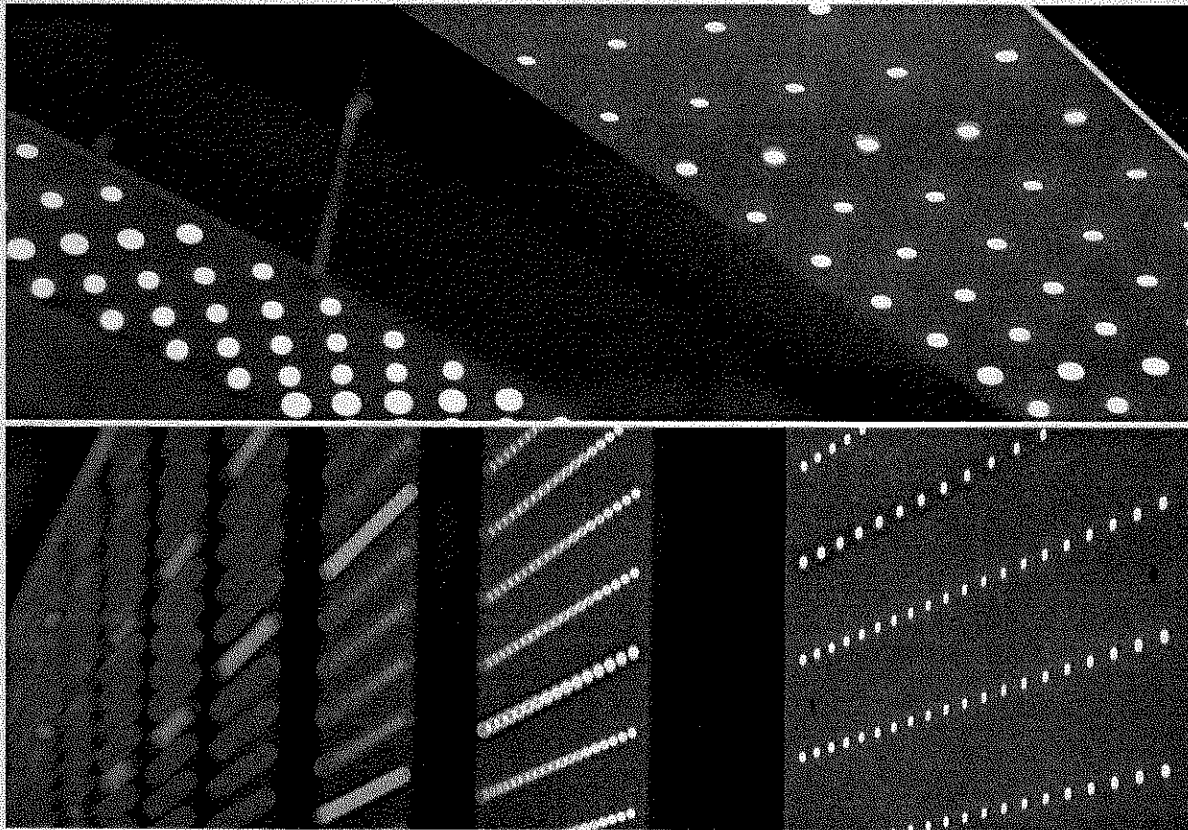


The rate of plant growth is directly affected by light intensity (X axis) and the rate of photosynthesis (Y axis). The rate of growth is exponential between 0 and $300 \mu\text{mol}/\text{m}^2\text{s}$, but decreases significantly beyond that point because the plant cannot absorb more light even if it is available. Beyond $500 \mu\text{mol}/\text{m}^2\text{s}$, light has a minimal effect on the plant's growth.



Color vision

The Greenery's total 120 LED boards are purposefully designed to emit only select wavelengths of red and blue light, colors that the plants are able to absorb most easily for photosynthesis. Each color has a special purpose. Red light is essential for stem and leaf growth. Blue light helps develop thick stems and dark green foliage while promoting chlorophyll production.



Light up the room

Dotted with evenly spaced diodes, the waterproof LED boards are braced by a rigid aluminum frame that focuses light directly onto the crops.

NURSERY STATION LED

8 LED Boards

4 1/2" x 43 1/2"

200 $\mu\text{mol}/\text{m}^2\text{s}$

Average PPFD

4:1 Red/ Blue Spectrum

660nm red, 450nm blue wavelengths,
independent color control.

CULTIVATION AREA LED

112 LED Boards

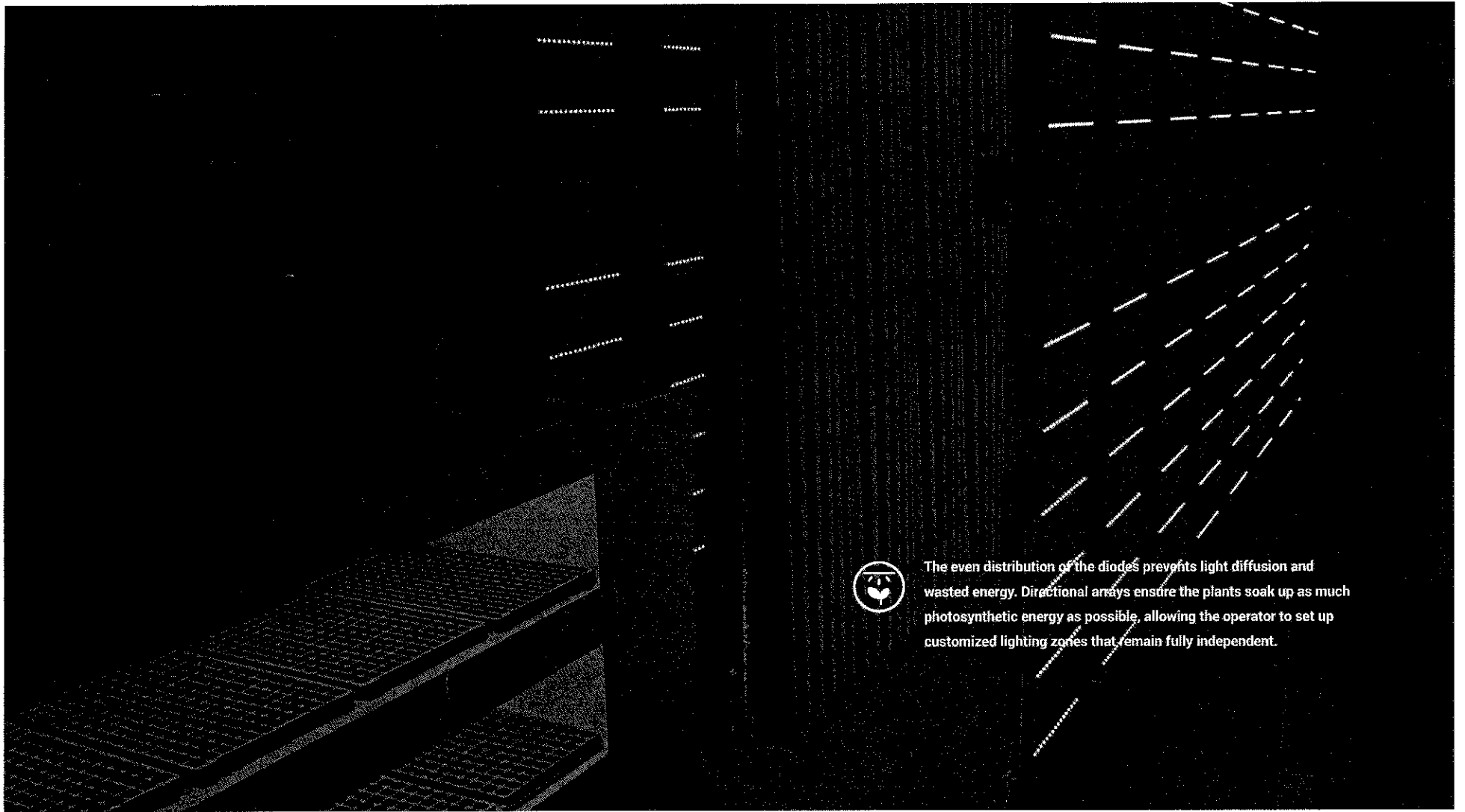
38 1/2" x 13 3/4"

250 $\mu\text{mol}/\text{m}^2\text{s}$

Average PPFD

5:1 Red/ Blue Spectrum

660nm red, 450nm blue wavelengths,
independent color control.

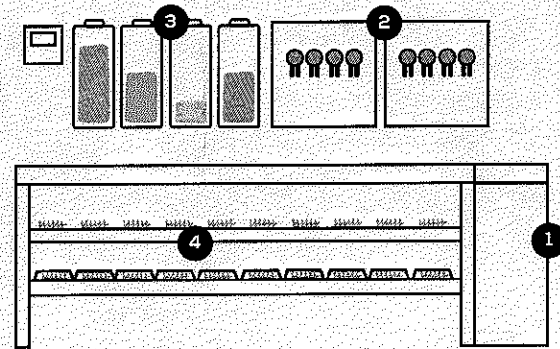
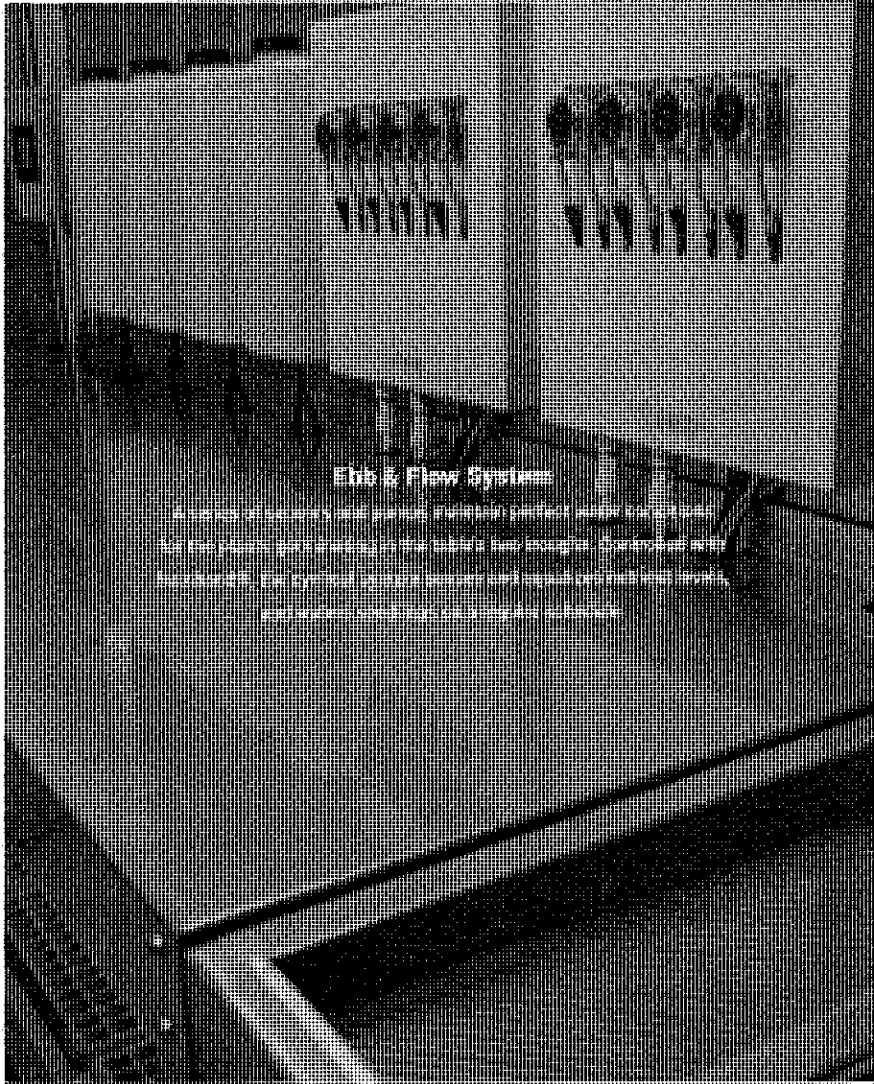


The even distribution of the diodes prevents light diffusion and wasted energy. Directional arrays ensure the plants soak up as much photosynthetic energy as possible, allowing the operator to set up customized lighting zones that remain fully independent.



STATION

The Greenery's seedling nursery is located in the farm's multi-purpose 7.5-foot stainless steel table. Below the worktop, two independently-controlled seedling troughs house up to 4,600 seedlings at once, providing plants with perfect conditions in their first weeks of life.



1. Nursery Station Tank

Water level sensors in the tank communicate to farmhand® when water levels fall below their set point, triggering the tank to auto-fill. An aerator and in-tank air stone oxygenate the water to mix nutrients evenly and prevent algae growth.

2. Dosing Panels

Nutrient, pH, and temperature sensors monitor water conditions and relay data to farmhand®. Peristaltic pumps automatically dose nutrient and pH solutions to maintain levels around predetermined set points.

3. Nutrient & pH Reservoirs

1-gal. refillable reservoirs contain nutrient and pH solutions for the Greenery's seedling and main tanks. The four reservoirs hold nutrient solutions A and B, a pH buffer, and experimental solutions, all of which are available for purchase online at farmhand® Shop.

4. Seedling Troughs

The dual-irrigated, full-width seedling troughs work using ebb and flow irrigation. Water pumps fill the troughs with nutrient-rich water, saturating the seedling roots to help the plants grow. The troughs can be controlled individually, and can multitask as germination, seedling, and microgreen shelves.



The stainless steel work table is the ideal space to manage business operations. Use the space to develop crop schedules, weigh and log harvests, and package crops ahead of distribution.

Nursery Station Features

i. 20-gallon Tank

The nursery station water tank is vertically integrated into the table for easy access. An attached hose drains water from the nursery tank into the Growery's main collection tank, where it is flushed through a drainage siphon. Consequently, operators can reuse the base directly outside through the farm door for precise focused watering and maintenance.

ii. Specialized LED Array

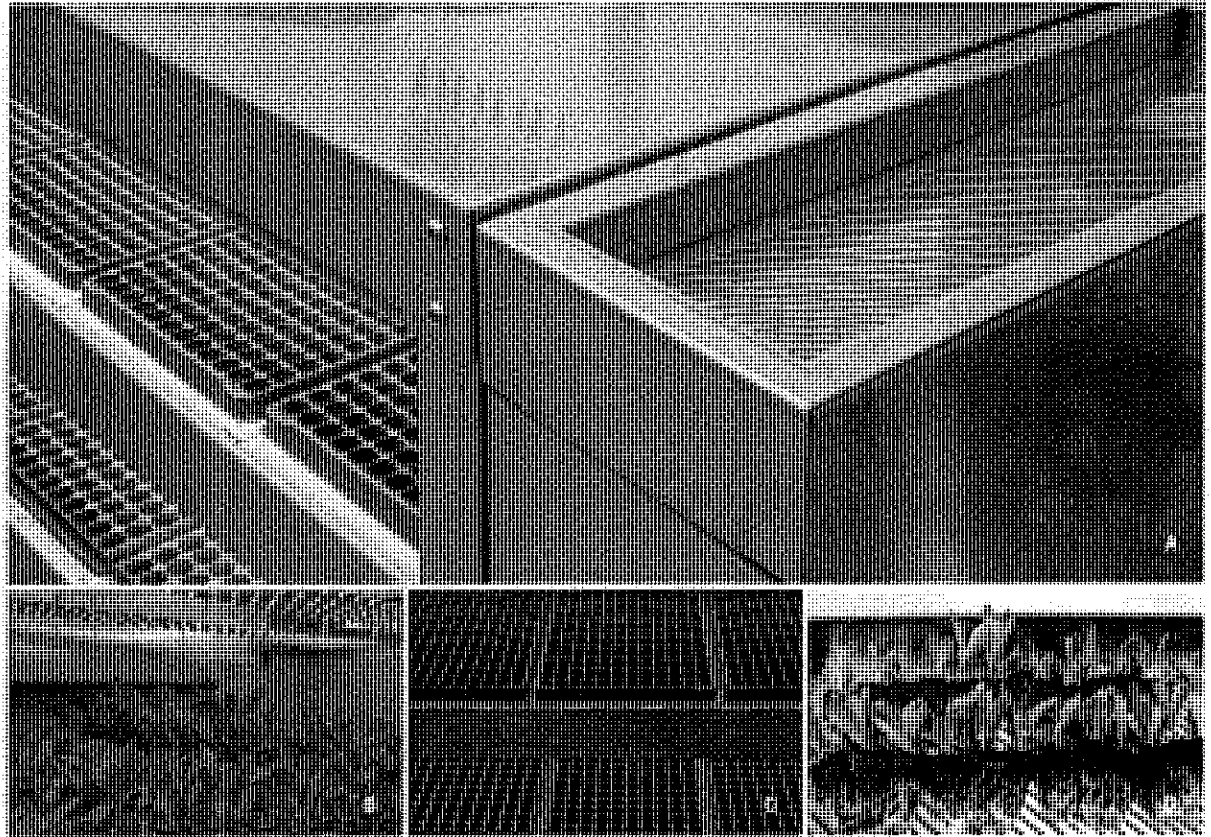
This nursery station features specialized light arrays with a higher ratio of blue light to encourage strong stem development from the earliest weeks of growth.

iii. Flexible Tray Capacity

This nursery station holds between 2000 to 2500 seed trays, so that the operators have a constant supply of seedlings. Interchangeable rails make routine tray replacement effortless.

iv. Drainage Media

The Growery's drainage table is designed specifically for enhanced green plugs, detached media, and other refuse. The removable table covers with stainless steel lip contain the media and help the waste surface sparkling clean.





Digital Farmer Toolbelt

A. Grow Controller

The grow controller is linked directly to farmhand®, compiling and transferring sensor data directly to the app. Additionally, the grow controller functions as an in-farm control panel: operators can turn components on and off as they perform farming, cleaning, or maintenance activities.

B. Camera

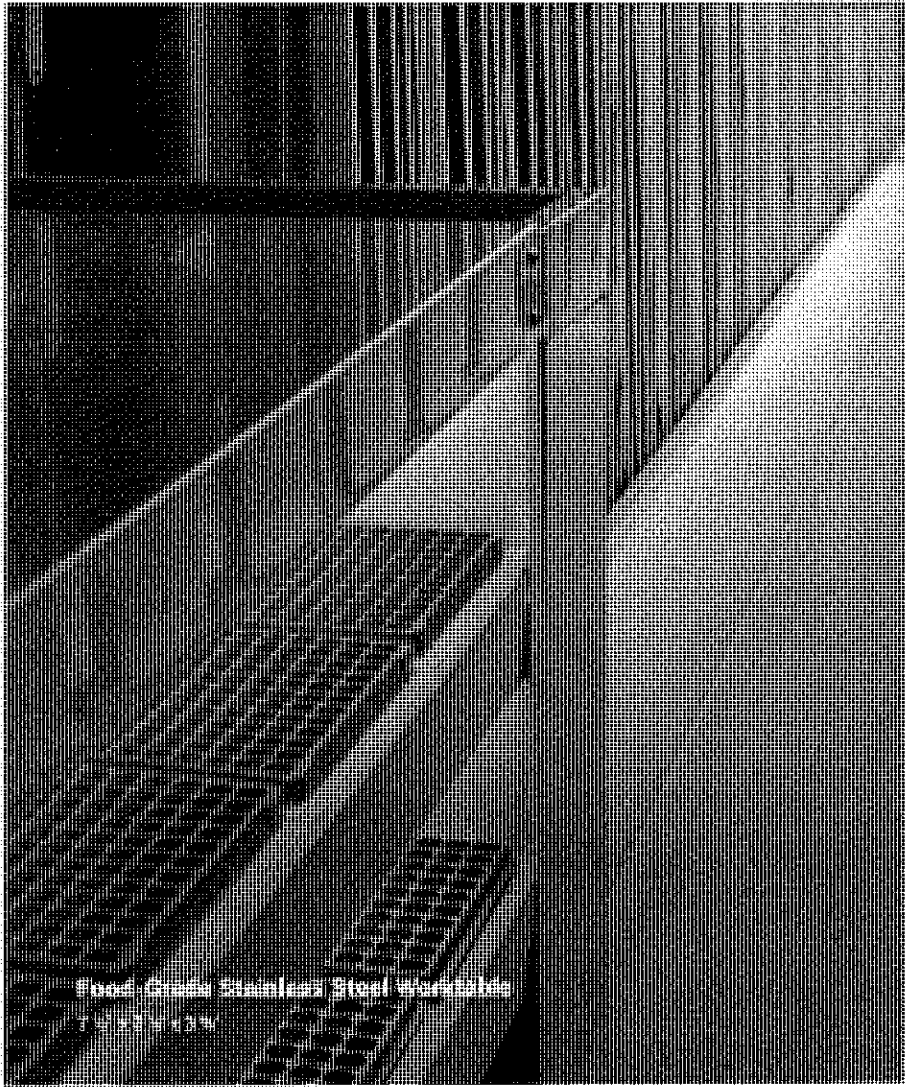
Keep a watchful eye on the Greenery with a farmhand-connected camera. Use the camera for added security, or stitch the photos together to create time-lapses. Easily add additional cameras, available for purchase on farmhand® Shop.

C. Farmhand®

Available for iOS and desktop, farmhand® allows the operator to remotely monitor and control the farm from anywhere in the world, ensuring all of the Greenery's internal components are functioning correctly.

D. Audio Bluetooth Speakers

Create a pleasant work environment with ambient music from the Greenery's two wall-mounted Dayton Audio IO525 premium weatherproof Bluetooth® speakers. By creating small vibrations in the air, music can stimulate plant growth and make the plant cells stronger.



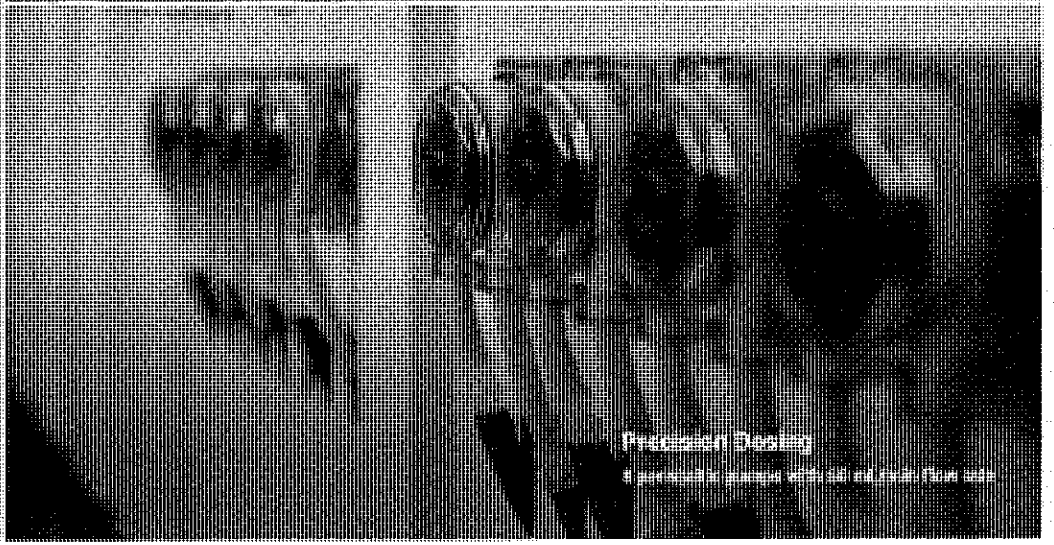
Food Grade Stainless Steel Worktable

12' x 24' x 28"



4,000 Ceiling Tiles

A complete supply of coverings



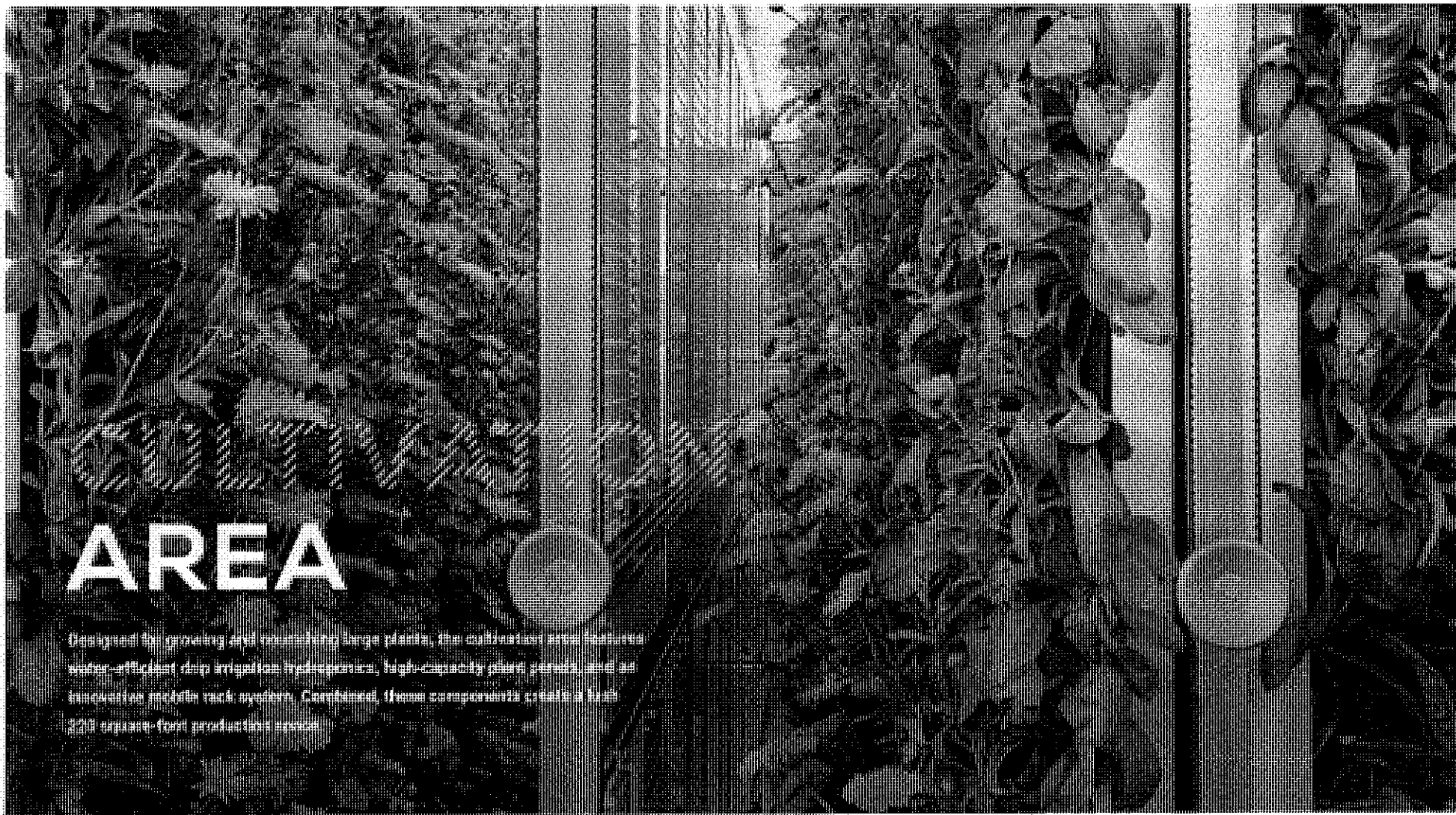
Freezer Door

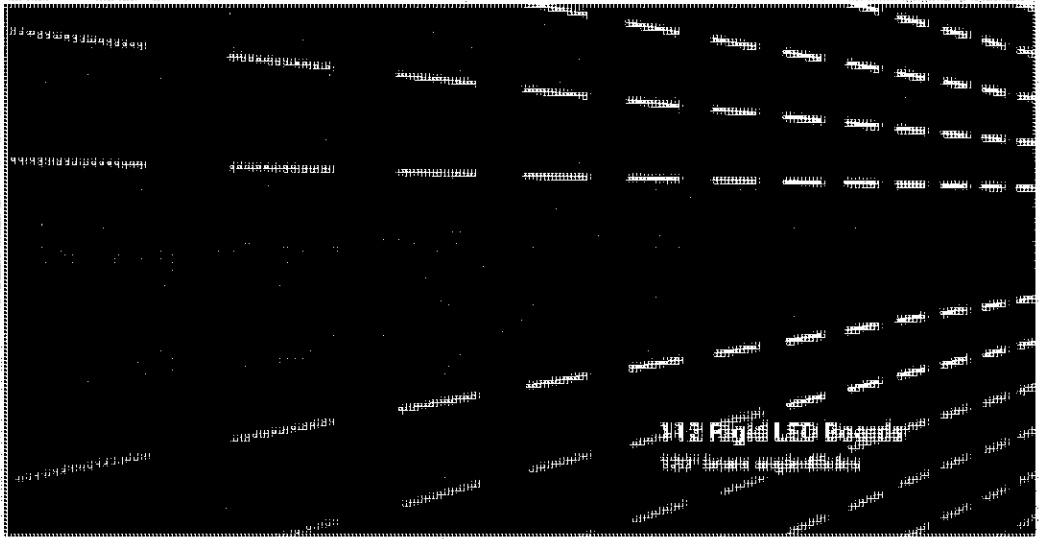
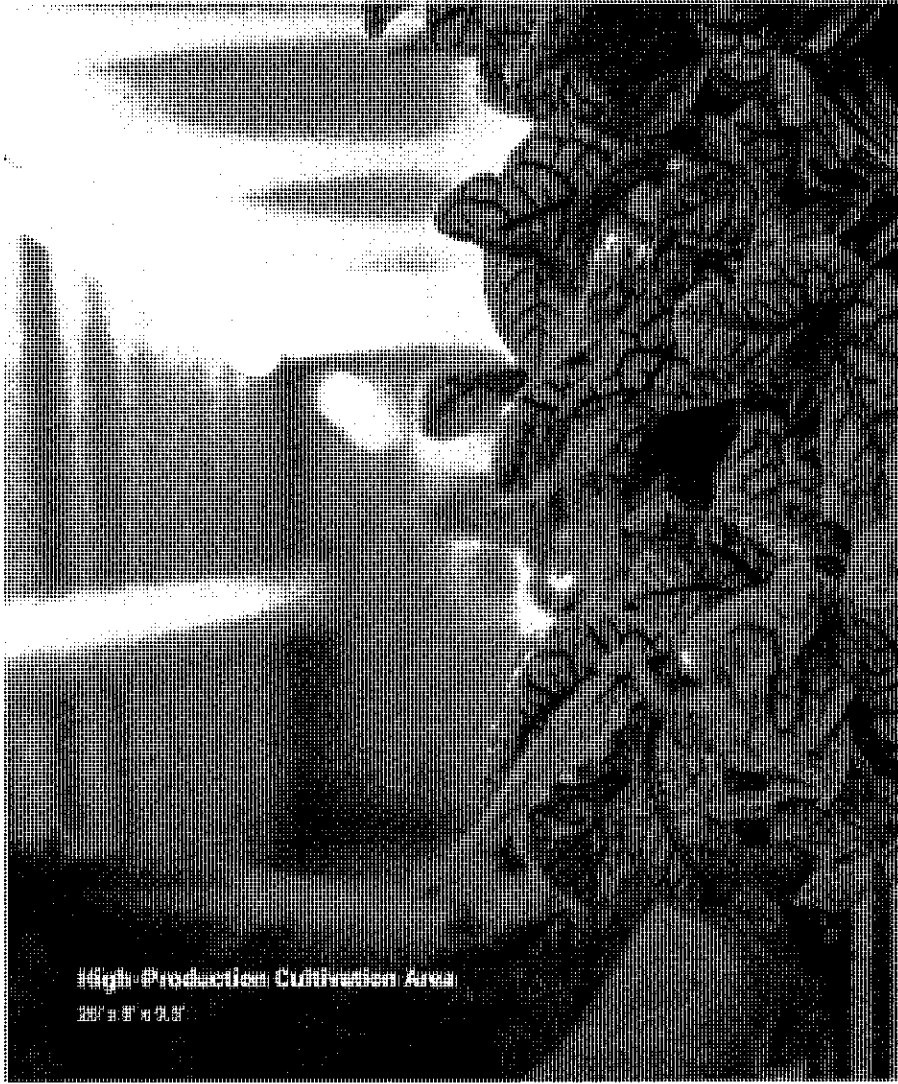
8' x 8' x 24" - 28" - 30" - 32" - 34" - 36" - 38" - 40" - 42" - 44" - 46" - 48" - 50" - 52" - 54" - 56" - 58" - 60" - 62" - 64" - 66" - 68" - 70" - 72" - 74" - 76" - 78" - 80" - 82" - 84" - 86" - 88" - 90" - 92" - 94" - 96" - 98" - 100"

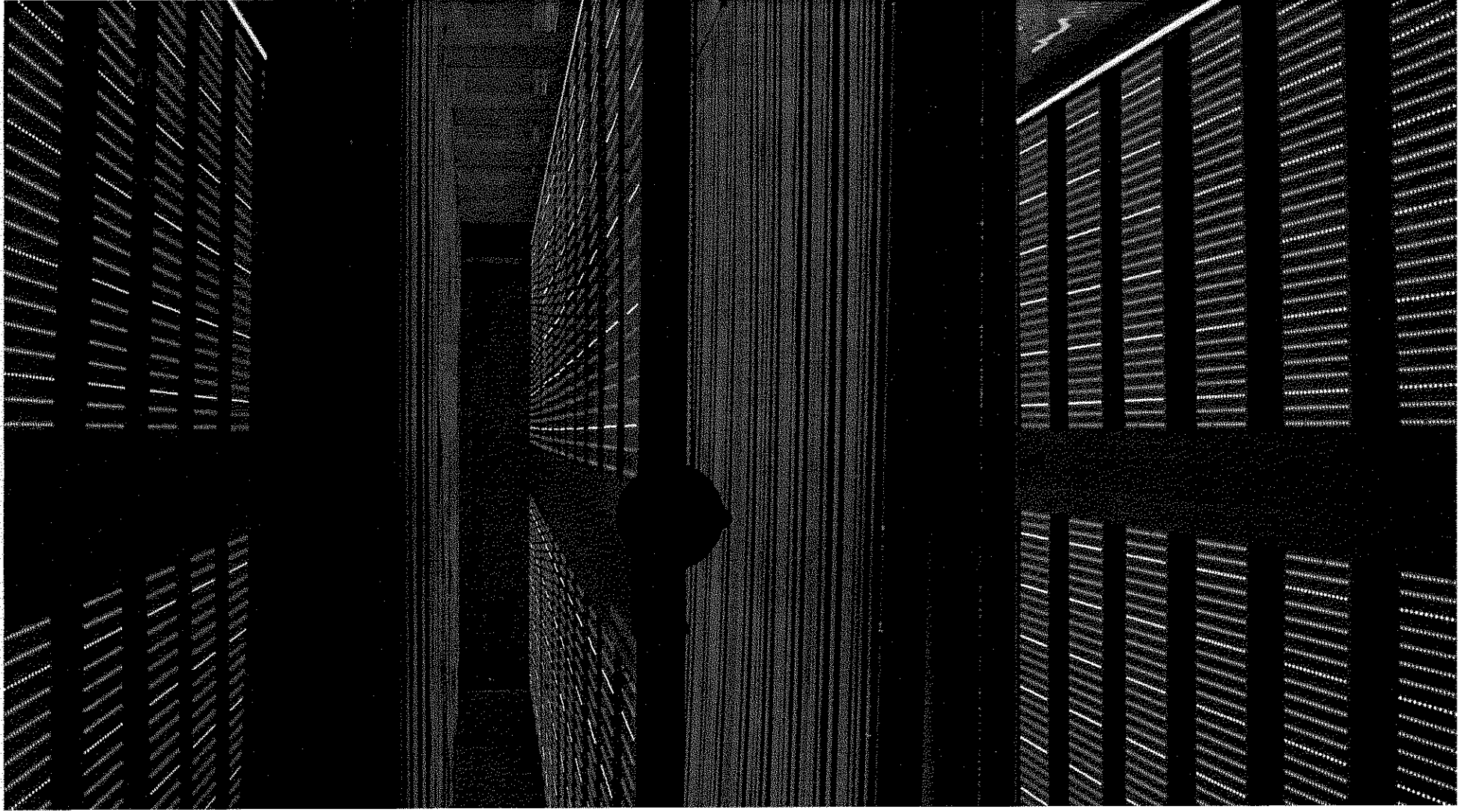


AREA

Designed for growing and finishing large plants, the cultivation area features water-efficient drip irrigation technology, high-capacity glass panels, and an innovative recirculate rack system. Combined, these components create a lush 22-ft organic-food production space.





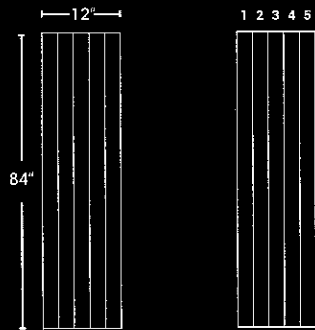


Expert Panel

The Greenery's high-density five-channel plant panels maximize usable space in the farm to unlock new crop possibilities, farming styles, and yield potentials.

The lightweight and sturdy removable panels are shaped from food-safe, high-impact polystyrene. All five channels are paired with a reticulated foam growing medium and an anti-drip wicking strip, which gives plants a structure on which to grow while making sure moisture remains at the root.

PLANT PANEL PROFILE



Plant Panel
Dimensions

5 Channels Per Panel
Up to 100 plant sites

BUILT TO GROW

88 Plant Panels

Up to 8,800 plant sites

36,960 Inches

Total linear planting space

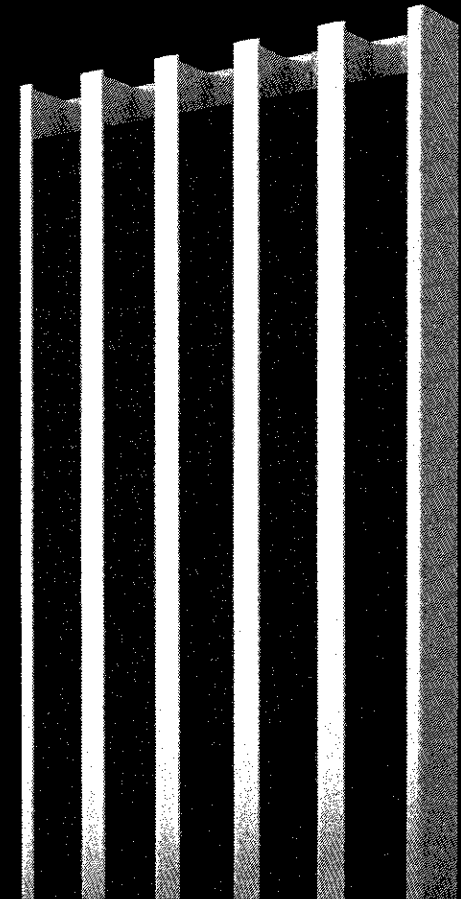
BUILT FROM

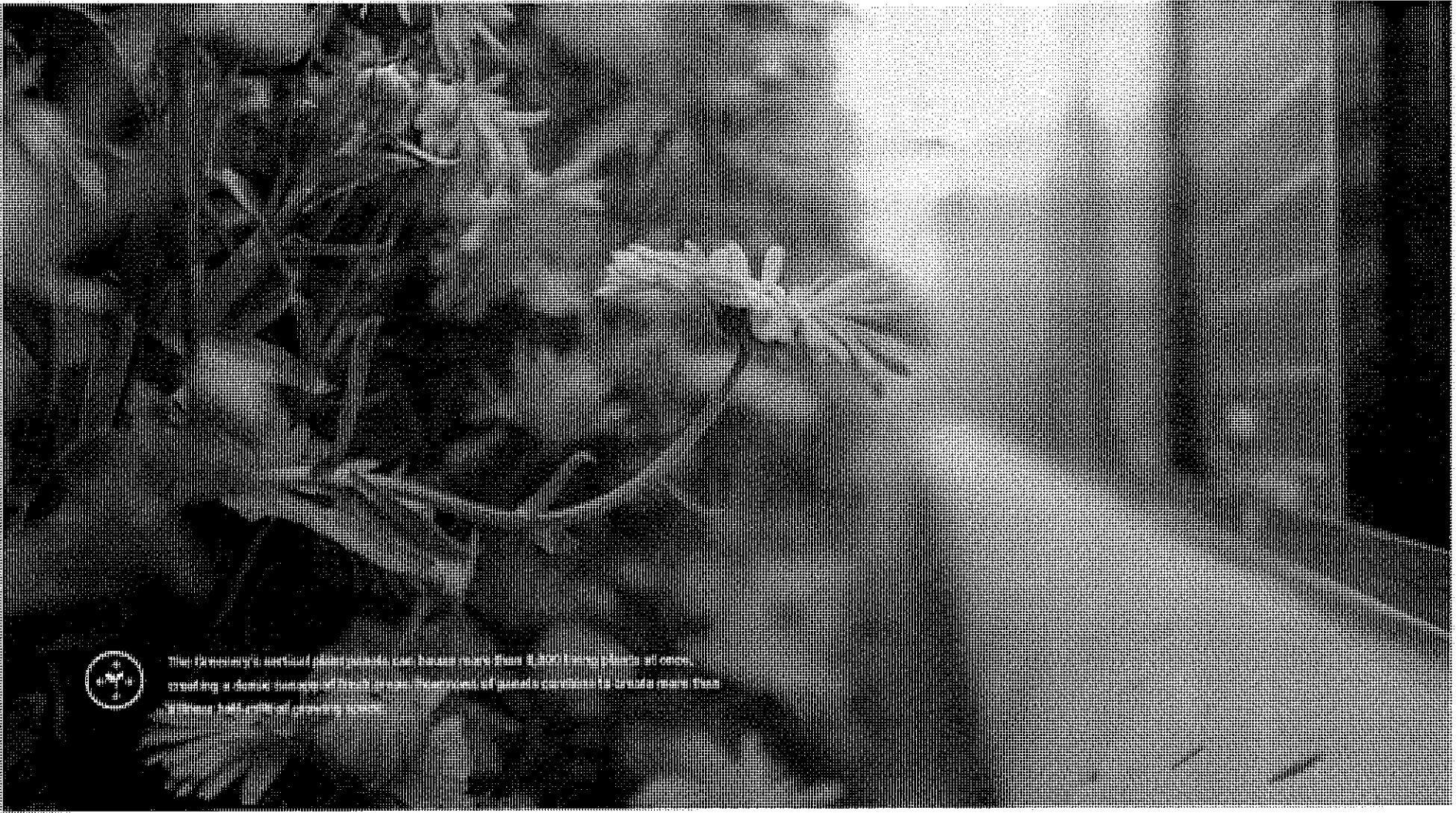
High-Impact Polystyrene

Food safe panel material

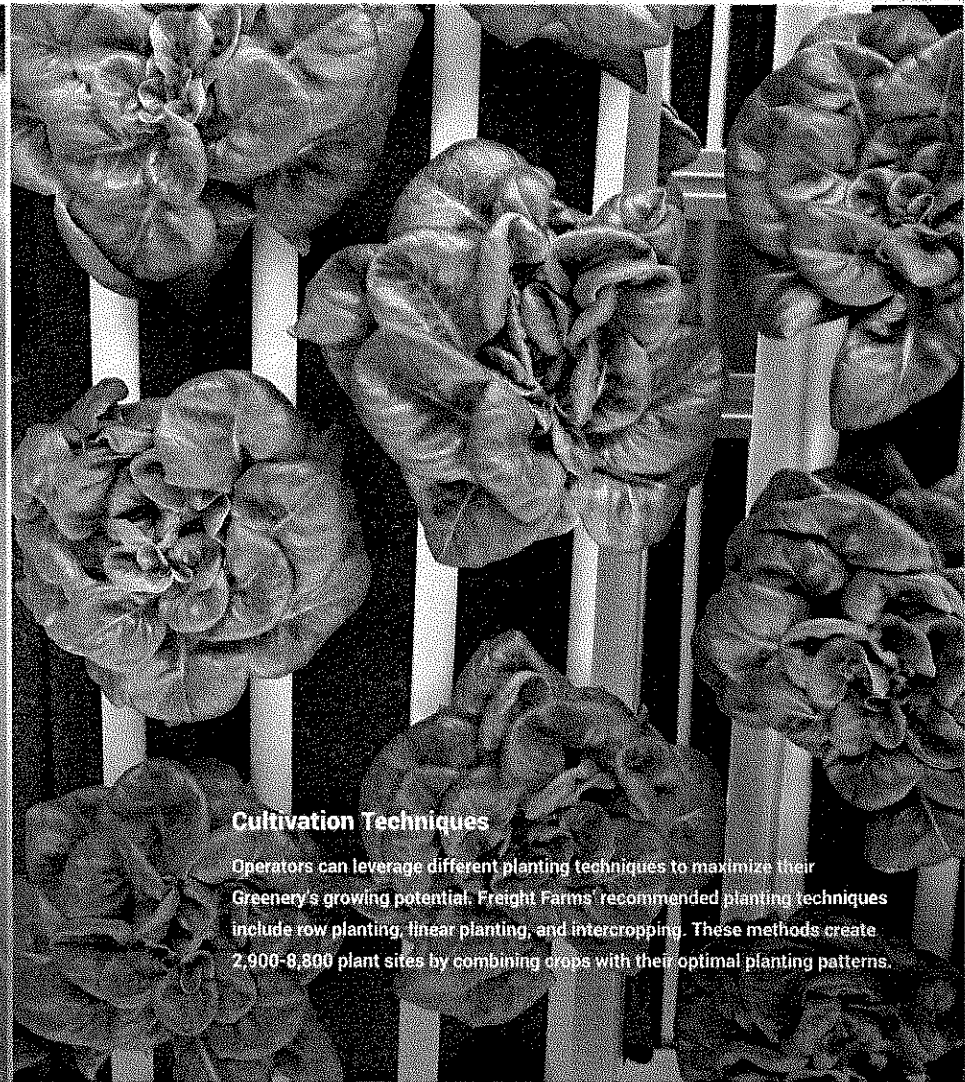
Inert Reticulated Foam

Food safe growing medium



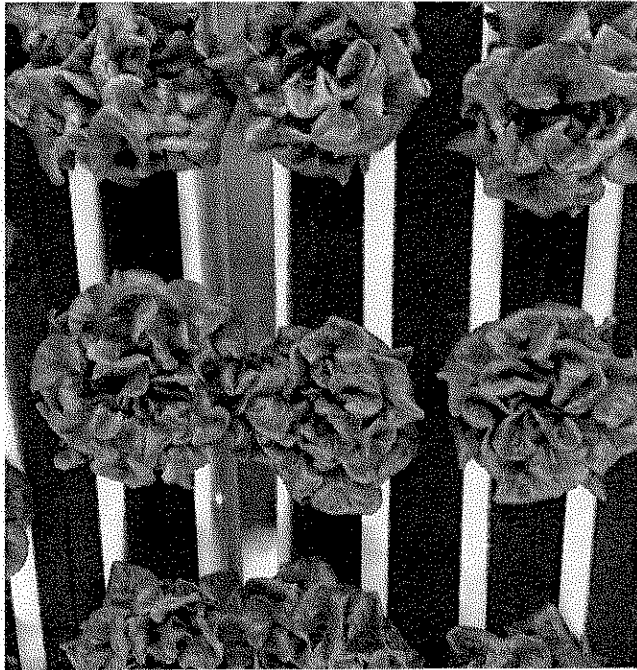


The company's method of growing plants uses less than 1/100th the amount of water, creating a more sustainable and eco-friendly product available in Canada more than



Cultivation Techniques

Operators can leverage different planting techniques to maximize their Greenery's growing potential. Freight Farms' recommended planting techniques include row planting, linear planting, and intercropping. These methods create 2,900-8,800 plant sites by combining crops with their optimal planting patterns.



Row planting

Active channels	1 3 5
Plant sites per channel	10-15
Total farm plant sites	2,600-3,900
Recommended crops*	Large crops: Lettuces, kale, mizuna, Swiss chard



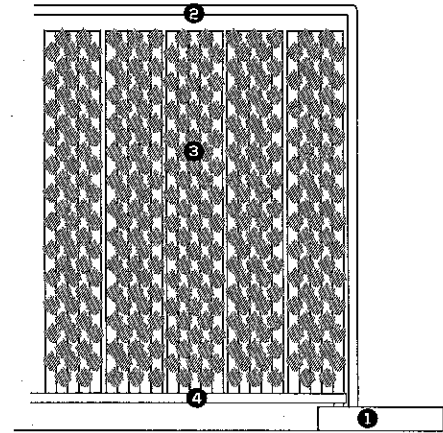
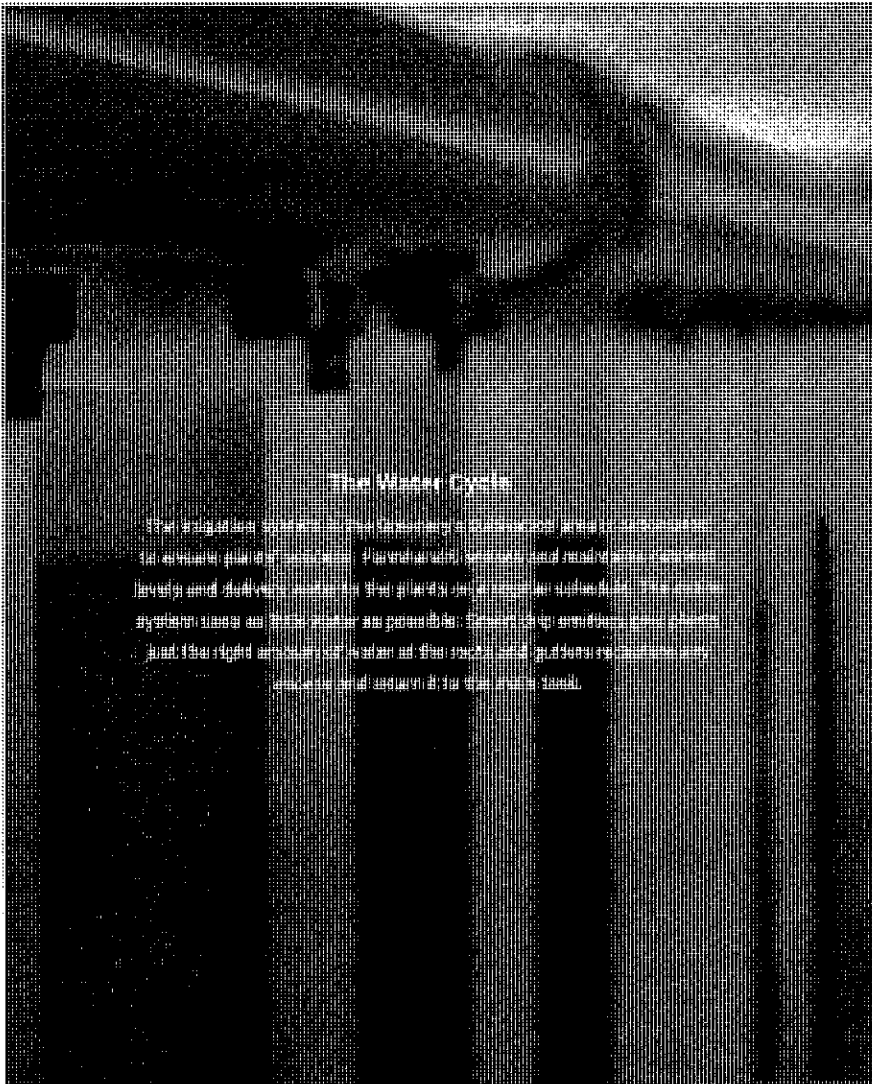
Linear planting

Active channels	1 2 3 4 5
Plant sites per channel	15-20
Total farm plant sites	6,600 - 8,800
Recommended crops*	Small trim crops: Arugula, watercrest, mustard greens Herbs: Basil, parsley, cilantro, thyme



Intercropping

Active channels	1 2 3 4 5
Plant sites per channel	Large crops: 10-15 Small crops: 17-20
Total farm plant sites	5,600-7,900
Recommended pairings*	Large crops: Lettuces, kale, mizuna, Swiss chard + Root vegetables: Radishes, turnips, carrots, beets



- 1. Cultivation Area Tank**
 The 1,10-gallon tank supplies nutrient-rich water to the entire irrigation system. Farmhand® automatically monitors and manages the water's nutrient concentration and pH balance.
- 2. Gravity-Assisted Drip Irrigation**
 Pumps send nutrient-rich water from the cultivation tank to overhead plumbing at regular intervals based on a pre-set watering schedule. 440 pressure-regulating emitters control the water flow at a continuous drip, as water travels towards the ground at a rate of 2 gallons/hour.
- 3. Plant Panel**
 Reticulated foam nestled in rigid plant channels holds crops in place as gravity pulls water down the cloth wicking strip along the length of the plant panel, giving the roots direct access to water.
- 4. Gutters**
 Recirculation gutters move with each row and drain unused water back into the main tank, where pH and nutrients are rebalanced and the water is recycled.



Flexible irrigation in the main tank connects pumps to rows, allowing water to flow uninterrupted regardless of the row's position.



Cultivation Area Features

A. 110-Gallon Tank

The main cultivation tank is situated along the floor at the rear of the Greenery. Sensors inside the tank provide automatic water-level management by triggering smart valves to open and refill water to the proper level. Five aerator tubes and corresponding air stones constantly oxygenate the water and mix nutrients evenly throughout.

B. Work Lights

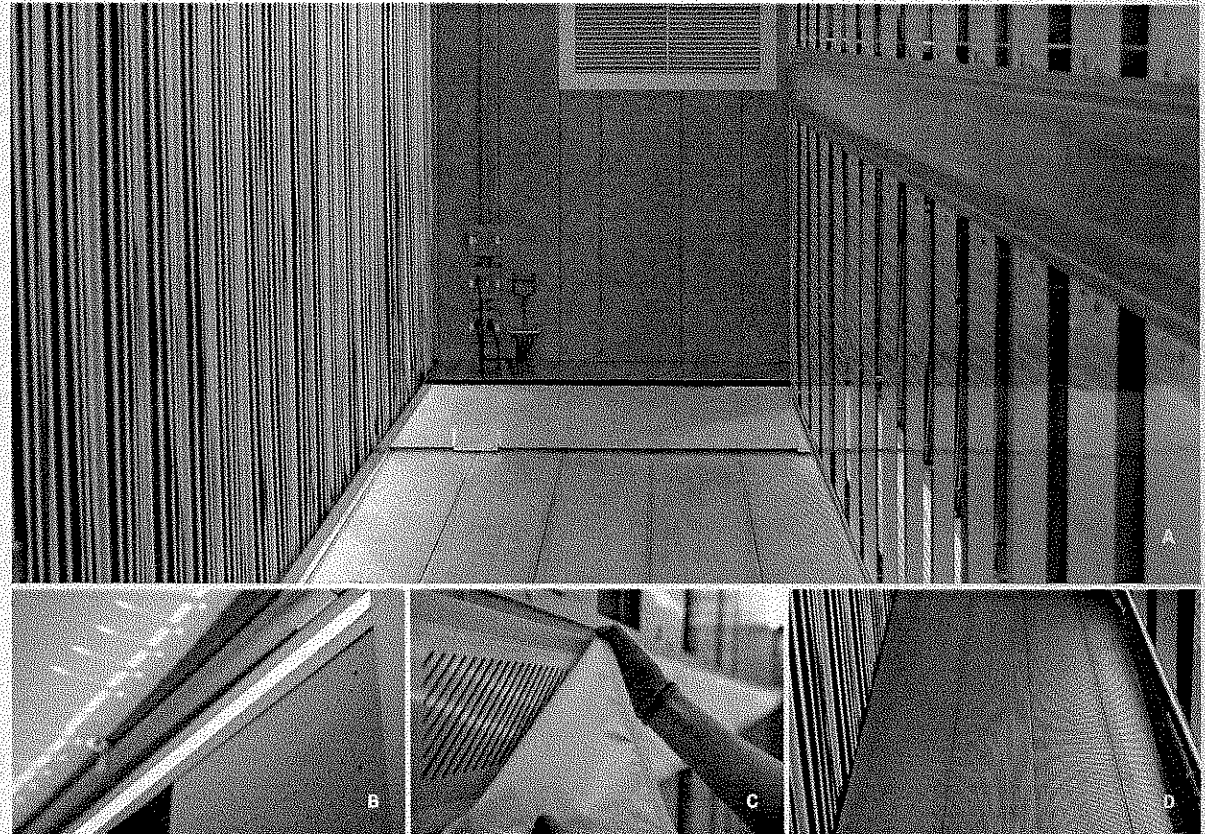
LED work lights run along the top and bottom of the rows, illuminating the space for operators as they work in the farm. The work lights emit a white light that is simultaneously gentle on the eyes and bright enough for in-depth cleaning and plant care.

C. Removable Ducting

On-panel ducting made of antimicrobial flexible polyester ensures consistent airflow in the dense growing environment. Unhook the VELCRO® fastening to move ducting during cleaning, or remove entirely to launder the machine-washable fabric.

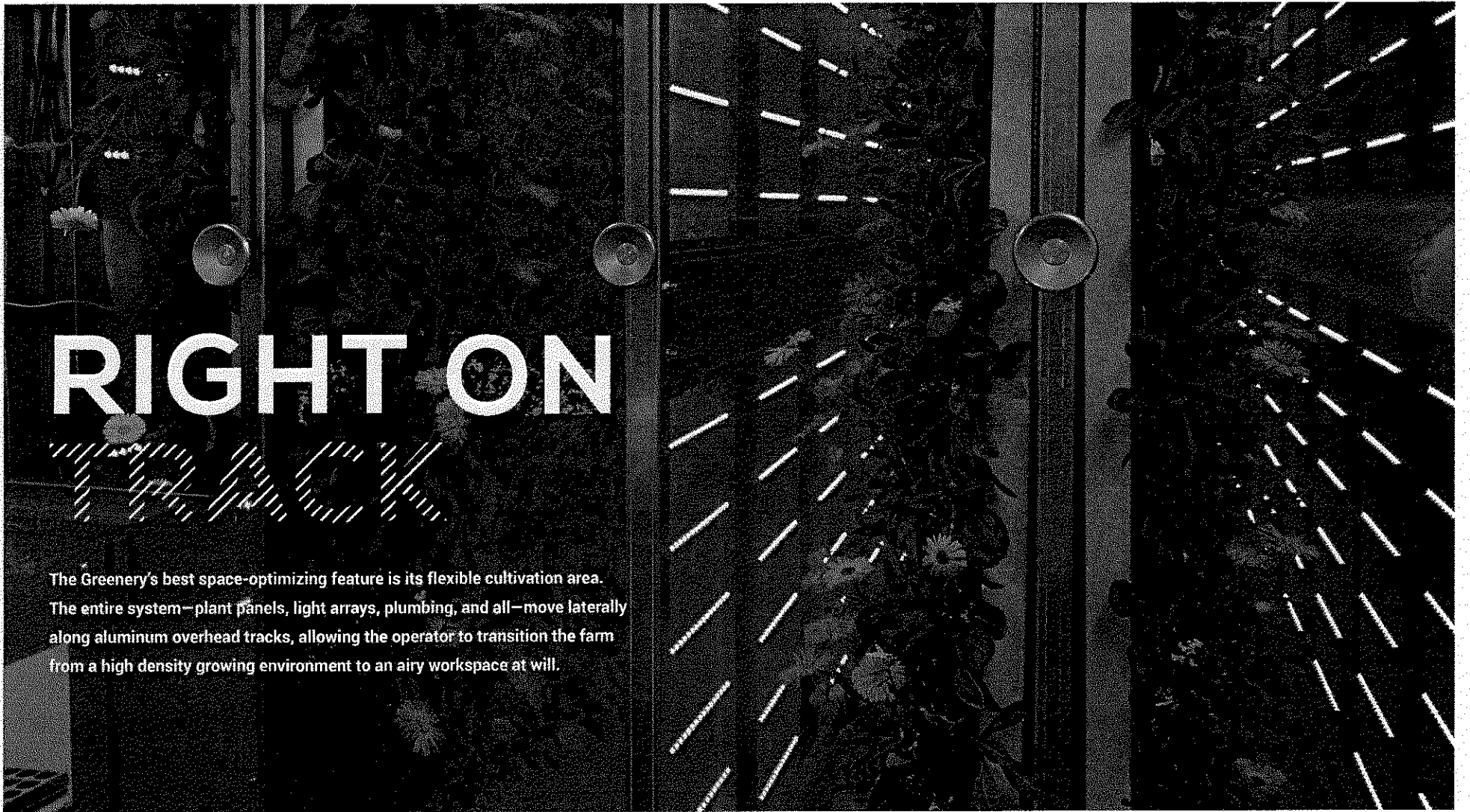
D. Easy-to-Clean Surfaces

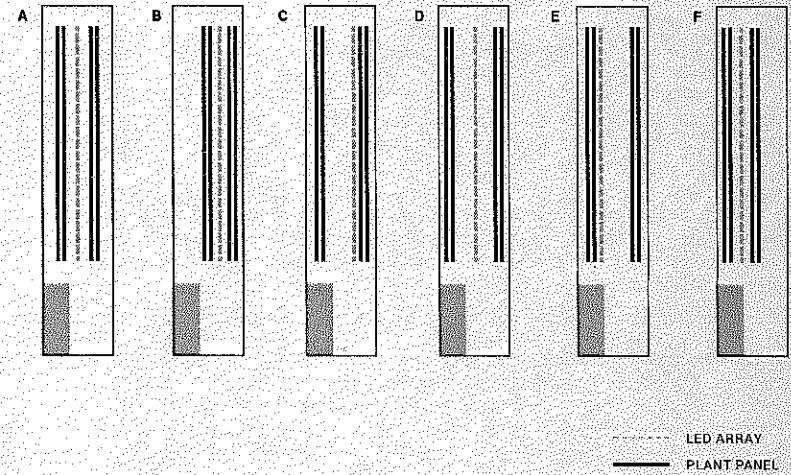
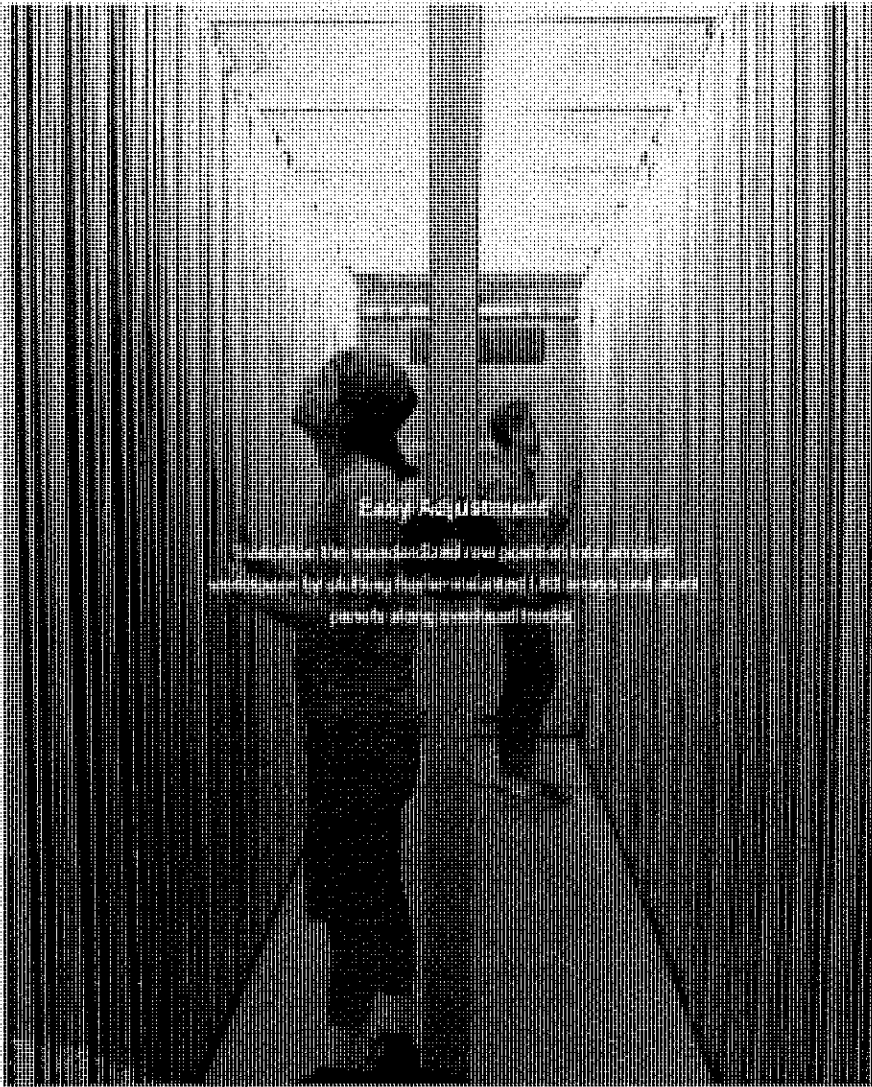
The Greenery is a clean, food-safe environment with aluminum and stainless steel surfaces that are easy to wipe down, including a lightly grooved floor that is convenient to sweep or vacuum.



RIGHT ON

The Greenery's best space-optimizing feature is its flexible cultivation area. The entire system—plant panels, light arrays, plumbing, and all—move laterally along aluminum overhead tracks, allowing the operator to transition the farm from a high density growing environment to an airy workspace at will.





A. Standard Growing Position

For the majority of the time, the Greenery's racks remain in four evenly-spaced rows, with plant panels and LED arrays separated by 18 inches. Visual guides help operators reposition back to this default spacing.

B - F. Customizable Spacing

Row widths can be easily adjusted to allow for in-row transplanting, harvesting, cleaning, and maintenance. Additionally, row widths can be shifted and fixed to meet the spacing needs of different plant varieties. For example, herbs grow small and close together, while vining crops need room to expand. The Greenery is able to accommodate both simultaneously.



Row Mobility Features

A. Frames

Supporting the plant panels and middle LED arrays, the Greenery's aluminum frames run the length of the Greenery.

B. Tracks

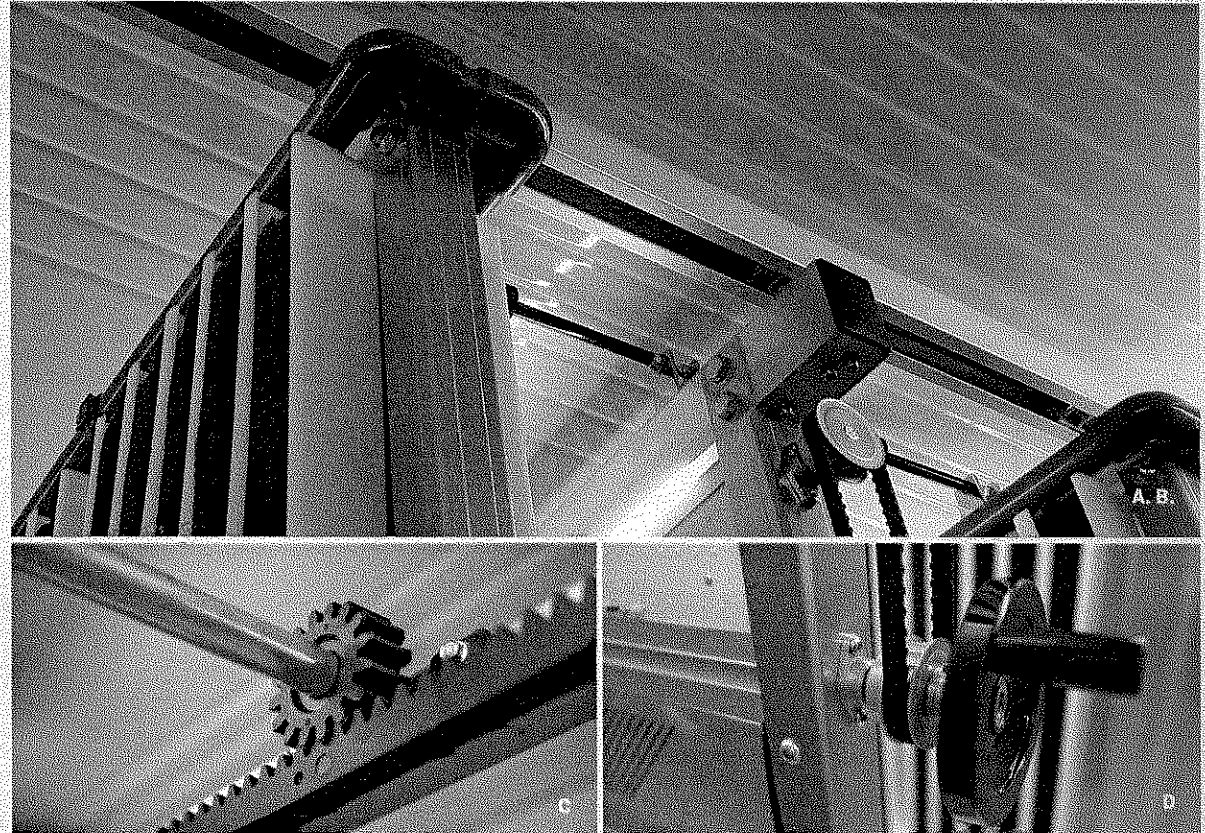
Eight anodized aluminum tracks are set perpendicular to the Greenery's frames and are the structures that allow the frames to be shifted laterally to create more direct plant access or custom row spacing. Overhead rubber stoppers prevent frames from colliding during adjustment.

C. Carriages

A total of 24 carriages connect the Greenery's frames to the overhead tracks. The carriages work in conjunction with the rack and pinion system to adjust row widths. Made of anodized aluminum and steel with rubber-coated wheels, the carriages glide noiselessly.

D. Rack and Pinion System

The spacing between each row is controlled with a simple rack and pinion system. A hand wheel on the front of each moveable row attaches to a pulley, which spins a shaft to move the pinion along two rack gears—one at the front, one in the rear. In addition to moving the rows, the system also holds the rows in place.





Our commitment

... can be used to help...
... successful business, creating...
... or sustainable program, an...
... that requires the effort.

ANYTHING UNDER THE



The Greenery's ultimate purpose is to grow food in the most unlikely of circumstances. The powerful lights, precise climate control, and a constant supply of nutrient-rich water allow operators to achieve this mandate and bring fresh produce directly to their communities.





Hundreds of Varieties

The Greenery can produce over 500 types of lettuces, herbs, leafy greens, and small root vegetables at a commercial scale. Operators are also able to grow fruiting and vine plants, such as berries, small peppers, tomatoes, and more—a capability not often feasible in other vertical farm systems.

Recipes for Success

Greenery operators can grow unique, flavorful, and high quality plants using standardized Freight Farms 'recipes'—combinations of light and water schedules with temperature, pH, CO2, and nutrient levels that create perfect growing environments for a variety of crops, all controlled with the farmhand® app.



Specialty Crops

Grow uncommon and non-native crops that are difficult to find in the standard marketplace.



Flavor Profile

Finely-tune the inside environment to boost plant's natural flavor characteristics.

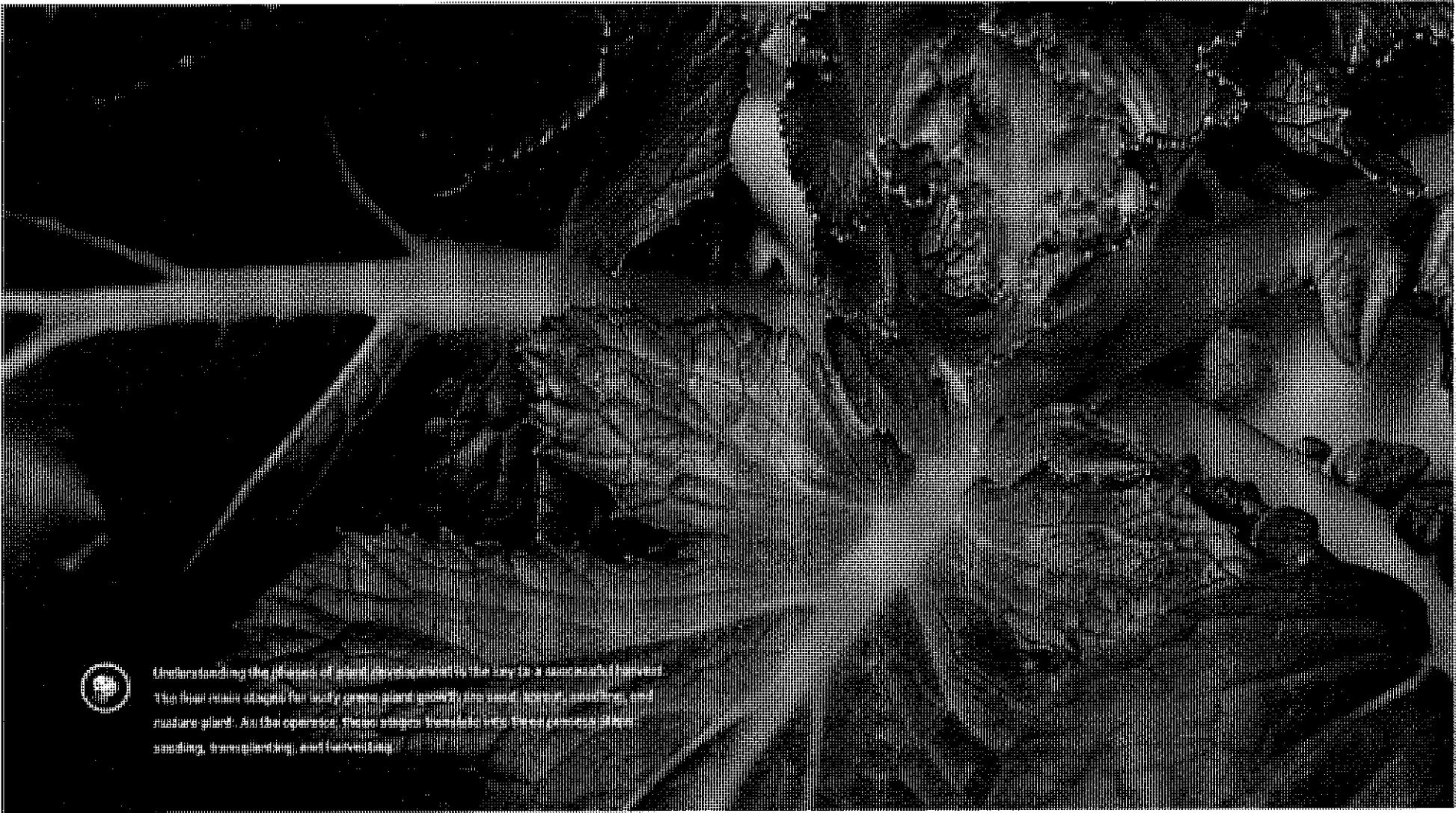


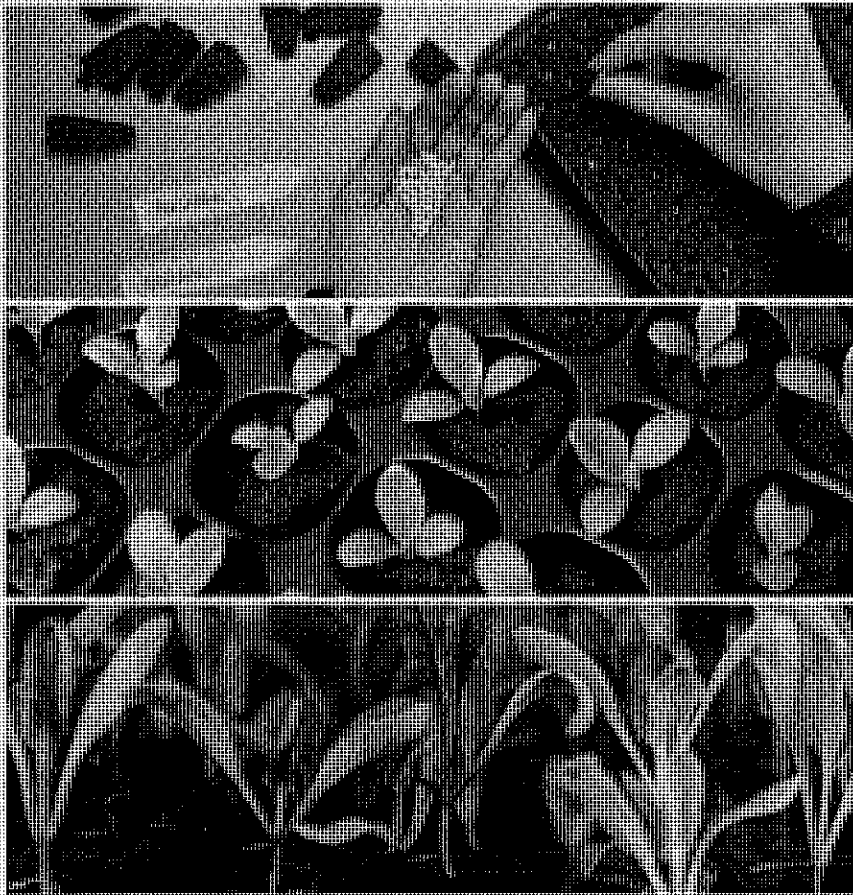
Consistent Production

Untether crops from their typical growing season and grow a consistent quality and quantity year-round in the protected indoor environment.



Understanding the impact of land development is the key to a successful program. The four main steps for land development are: 1) the initial site assessment and analysis, 2) the site plan, 3) the site plan, and 4) the site plan. An effective program should include the following steps: 1) site assessment and analysis, 2) site plan, 3) site plan, and 4) site plan.





The Whole Life Cycle

Seeding

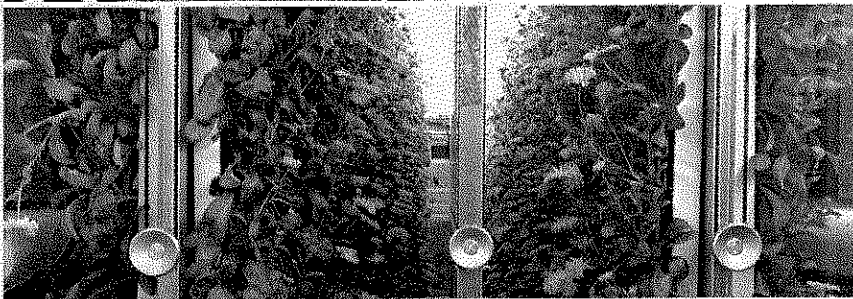
The plant's life cycle begins when seeds are planted in peat moss grow plugs. The peat-moss itself does not provide the seed with nutrients. Instead, the pH-balanced plug acts as a sponge for absorbing nutrient-rich water and—as the seedling matures—containing and supporting the plant's developing root structure.

Germination

To activate germination, the seeds and plugs require a one-time soak in nutrient-rich water, after which they are covered with a humidity dome and left to grow. After a week, the seeds become sprouts, characterized by small roots, short stems, and a few immature leaves.

Seedling Growth

Over two weeks, the sprouts develop into seedlings—taller, sturdier plants with a secure root system. During this time, seedlings need consistent access to water and light. The young plants are automatically given nutrient-rich water and direct light based on farmhand® programming to develop strong stems that support the plant's weight later in its life cycle.



Transplanting

Seedlings are transplanted into the main cultivation area where they grow vertically for the first time. The roots (still in the peat-moss grow plug) are wedged into the the plant panel's stiff foam, which provides firm support and access to nutrient-rich water. The plants face outwards towards the LED arrays, exposing the leaves to the strong directional light and encouraging them to grow.

Leaf Development & Harvesting

Based on the desired size and weight at harvest, plants spend 2-5 weeks in the Greenery's cultivation area. During this time, leaves acquire their rich green, purple, or red color and identifying flavor. When the time comes, the plants can be harvested (removing the entire plant, including roots) or trimmed (cutting mature leaves while the roots and small leaves remain).

Flowering & Fruiting

All plants have a vegetative phase, at which point many are harvested. However, other plants can continue to grow and develop flowers and even 'fruit' (this can be fruit, vegetables, or berries). Flowering and fruiting crops can be grown in conjunction with greens using hand-pollination techniques, or the Greenery operator can focus solely on flower and fruit production by switching to specialized nutrients that maximize outputs.



REQUIREMENTS

The Greenery has only a handful of simple requirements to get started: a designated site, access to water and electricity, internet connection, and basic growing supplies.

GREENERY OPERATIONS & SITE PREPARATION



Site

Place the Greenery on a flat, unobstructed plot measuring 50'x10'. The site surface must support the Greenery's 8-ton gross weight. Asphalt, trap rock, railroad ties, sonotubes, or a concrete pad are all adequate.

Site Dimensions

Farm Site Length	50 Feet	1524 Centimeters
Farm Site Width	10 Feet	305 Centimeters
Farm Site Height	9.7 Feet	296 Centimeters



Electricity

The Greenery requires a 100 amp, 120 volt split-phase connection (120/208 volt three phase is also acceptable.)



Water

The Greenery uses an average of 5 gallons of water a day. The site should have water access within 50 feet; alternatively, operators can schedule regular water deliveries.



Supplies

Operators can source their supplies from any vendor or conveniently replenish them via farmhand® Shop. Everyday consumables include peat moss plugs, seeds, nutrient solutions, and cleaning supplies.



WIFI

A WiFi signal is necessary for farmhand® connectivity. Farmhand® will use about 1 GB per month per farm.



Farm Delivery

Compared to a traditional farm or warehouse grow operation, the Greenery's modular design makes it easy to transport anywhere in the world via truck, train, or boat. Freight Farms works with operators to schedule all delivery logistics.



GREENERY SPECIFICATIONS

Container & Climate

Container	
Dimensions	40' x 8' x 9.5'
Insulation	R-28 Department of Energy Insulation Rating
BARD Climate Control Unit	
Air Conditioner	3 ton 36,000 BTU Max. Packaged unit with integrated dehumidifier & economizer
Economizer Air Intake	1,100 CFM
Moisture Reclamation	1.88 gal. / hour at 75°F, 65% relative humidity
A/C Efficiency Rating	11.0 EER
A/C Refrigerant	R-410A
A/C Certifications	AHRI, ETL
A/C Coil Style	Aluminum-finned copper
Fans	
Exhaust Air Speed	141 CFM
Air Exchange Rate	Up to 6 exchanges/hour
Overhead Fan Ventilation	880 CFM
Ducted Fans Ventilation	473 CFM
Ducted Fans Diameter	8 in.
CO ₂ Regulator	
Regulator	Precision Regulator with Heavy-Duty Solenoid Valve

LEDs

Overview	
Red LED Photosynthetic Wavelength	660nm
Blue LED Photosynthetic Wavelength	450nm
LED Board Waterproof Rating	IP65
LED Diode Blended Efficiency	2.7 µmol/joule
Nursery Station	
Number of LED Boards	8
LED Boards Dimensions	4.3 in x 43.3 in
LED Array Intensity	200 µmol/m ² s average
LED Array Ratio	4:1 red / blue
LED Wattage	164W per trough, 328W per station
Cultivation Area	
Number of LED boards	112
Number of LED Arrays	4
LED Boards Dimensions	38.5 in x 13.75 in
LED Array Intensity	250 µmol/m ² s average
LED Array Ratio	5:1 red / blue
LED Wattage	2,030W per array, 8,120W total

Worktable & Nursery Station

Nursery Station	
Seedling Capacity	Up to 4,608
Seedling Tray Capacity	16 200 or 288-cell trays
Number of Seedling Troughs	Two full-width seedling troughs
Worktable	
Table Dimensions	90 in x 27 in x 43 in
Table Construction	TIG-welded stainless steel

Hydroponics

Irrigation	
Circulation Pump Filtration	6 Nylon Monofilament Meshes
Aeration System	793 gal. / hr. fluid oxygenator
Mesh Rating	75 micron
Number of Peristaltic Dosing Pumps	8
Peristaltic Dosing Pumps Flow Rate	50 mL/min
Nursery Station	
Hydroponic System	Ebb and flow configuration
Seedling Tank Capacity	38 gal.
Cultivation Area	
Hydroponic System	Overhead drip configuration
Main Tank Capacity	110 gal.
Plumbing	NSF61 PVC
Drip Emitters	Self-flushing, clog-resistant
Drip Emitter Flow Rate	2 gallons/hour

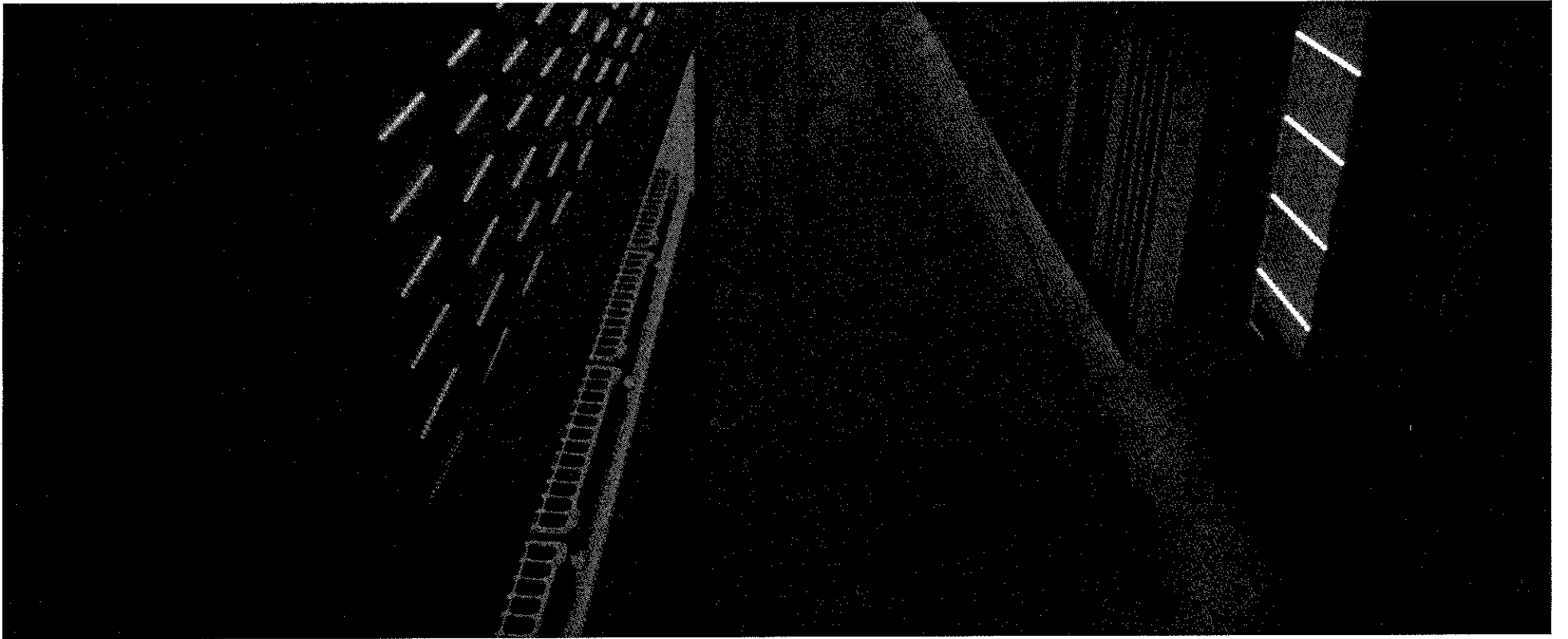
GREENERY SPECIFICATIONS

Plant Panels & Adjustable Rows

Plant Panel	
Plant Panel Design	5-channel
Plant Panel Construction	High impact polystyrene
Plant Panel Growing Medium	Inert reticulated foam
Total Number of Panels	88
Total Number of Channels	440
Combined Linear Growing Space	36,960 in/ 3,080 ft/ 3.6 acres
Adjustable Rows	
Number of Grow Rows	4
Adjustment System	Rack and pinion
Rack System Load-bearing Capacity	1,300 lbs max.
Number of Frames	3
Frame Construction	Aluminum
Track Construction	Anodized aluminum
Carriage Construction	Anodized aluminum, rubber-coated wheels

Tech

Grow Controller	
Number of Controlled Outputs	32
Number of Spare Outputs	1
Number of Controlled Inputs	8
Number of Spare Inputs	6
Zones & Sensors	2 Hydro zones (pH, EC, and temperature sensors) 1 Climate zone (Temp, RH%, CO ₂) 2 Water level sensors (Nursery Station Tank, Cultivation Area Tank)
farmhand®-Connected Camera	
Number of Cameras	1 Amcrest ProHD Shield Wireless IP Security Camera
Camera Data Storage	MicroSD and Cloud Storage
Camera Resolution	960P 1.3 Megapixel (1280*960P) 140° Viewing Angle Digital Zoom & Night Vision
Bluetooth® Speakers	
Number of Speakers	2 Dayton Audio IO525 Speakers
Speaker Connection	Bluetooth®-connected
Speaker Construction	Weather resistant ABS plastic enclosure and aluminum grills Polypropylene 5-1/4" woofer Metalized Mylar 1" dome tweeter



freightfarms.com

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