

YOUR ROADMAP TO SETTING UP A COMMERCIAL GROW

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It was only a few decades ago that before taking a road trip, many people would consult experts. Usually that included a stop to your local American Automobile Association (AAA), where guides could help plan your journey, highlighting and circling maps as they plotted the best route and suggested points of interest along the way. Now, with GPS technology and the internet available at your fingertips, most people take directions from a device.

Some journeys, however, require a map and a trusted guide. The path to establish a commercial-scale cannabis cultivation facility can be full of regulatory potholes, wrong directions, and unexpected delays, and having an expert to help you drive through what is often a rough road is vital to success.

With more than 15 years serving the cannabis industry, Surna Cultivation Technologies helps business owners navigate the process of establishing commercial-scale grows, with expertise in everything that's needed to assemble and maintain your facility, from architectural design and floor plans to mechanical, electrical and plumbing (MEP) engineering, and preventive maintenance programs. Key controlled environment agriculture components such as HVAC, benching and racking, and lighting must be considered in tandem with construction, and Surna has not only engineering expertise in those areas, but a suite of technologies to help you run your operation efficiently.

So, where do you start? For the fifth year, we are proud to present this guide to help answer that question. "Your Roadmap to Setting Up a Commercial Grow" provides an overview of what cannabis companies can expect from the planning and design process and how to begin, written by Surna co-founder and senior technical advisor Brandy Keen, starting on p. S4. While having experts by your side is important, so is hearing from cultivators who have steered what was uncharted territory of expansion. Joe Rubinstein of Evolution Pharms provides an account of what went into a two-year reimagining and rebranding process at the company's growing facility in Arizona starting on p. S9.

We suggest that before any major construction process begins, cultivators consider budget first. But really, the first step is finding the right team and expert partner to help you make your vision a reality and arrive at your destination. If you get lost, we'll help you find your way.

TONY MCDONALD

PRESIDENT AND CEO,
SURNA CULTIVATION TECHNOLOGIES



SURNA HELPS BUSINESS OWNERS NAVIGATE THE PROCESS OF ESTABLISHING COMMERCIAL SCALE GROWS.



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YOUR ROADMAP TO SETTING UP A COMMERCIAL GROW: WHERE DOES THE JOURNEY BEGIN?

With all of the components and rules and regulations that accompany establishing a commercial scale cultivation facility, it can be difficult to know where to begin. With little time between when a license is awarded and when a project must be finalized, it can feel like a hurry-up-and-wait situation. But the journey must start somewhere, and whether you're new to growing at a commercial scale or you are simply building a new location, establishing your goals and setting a budget is an essential first step. These may (and probably will) change once you actually obtain your funding, so begin by estimating as best you can. Establishing CapEx and OpEx expectations will, at minimum, require a lot of research. And depending on your experience, it may require expenditures associated with engaging experts right from the start.

Begin by conducting market research to understand local demand and competition. Establish your goals for your brand and strain quality, understand which key metrics you will measure (yield per square foot, variable costs, plant quality, etc.), and begin molding your expectations for what kinds of cultivation systems you will need.

Consider not just the road in front of you, but what lies ahead by planning for scalability. Some growers will buy a building or land with enough room to add grow spaces later on, opting to build out in phases. Trying to expand an established grow without the space for it will force you to decide between running multiple locations, starting from scratch somewhere else, or stunting the growth of your business.

As with any industry, it's important that entrepreneurs

looking to start a business that requires a significant initial investment consult with a lawyer familiar with the industry they wish to enter. A reputable legal representative can help in a number of areas, including operating agreements with partners, investor agreements and pitch decks, vendor contracts, taxes, compliance, insurance, and other protections. For growers operating in the U.S., consulting with an attorney with other cannabis clients is especially beneficial as they can help you navigate state and local rules and regulations and help protect you against potential legal risks.

Starting a commercial grow requires a significant initial investment. Before you can begin putting plants into your facility, you will need to invest in the building, its design, an environmental system, lights, grow benches, and much more. Private investment is the primary means by which cannabis operations are currently funded. Some private lenders will work with cannabis businesses, but you should be prepared to carefully vet potential lenders to avoid predatory loans. Besides investors and private lenders, other sources for funding include hedge funds or even crowdsourcing.

Overall, there are several cornerstones growers must establish in preparation for the design and build phase of construction. Your core goals and budgetary expectations will be the guiding force for all future decisions, from which light fixtures you will use, to the level of automation and controls you'll adopt, to the size of your canopy and cultivation team, and everything in between. In the following pages, you'll learn key steps to getting started and how one cultivator approached scaling an established operation.

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TIME YOUR DESIGN RIGHT

A COMBINATION OF CANNABIS CULTIVATION EXPERTISE, URGENCY AND PATIENCE CAN HELP YOU AVOID COSTLY DELAYS AND ENSURE YOUR CULTIVATION FACILITY'S LONG-TERM SUCCESS.

BY BRANDY KEEN

After spending over 15 years serving the cannabis industry, we at Surna Cultivation Technologies have found that every grower has one common goal: to start growing plants as soon as possible. It can be tempting to start ordering equipment and hiring contractors to begin work right away. After all, time is money, isn't it?

That may be true, but it isn't as simple as hitting the ground running. There are two primary ways cultivators run into project delays and unintentionally go over budget.

On one hand, failing to flesh out your design and coordinate all the moving parts before pulling the trigger on major construction or outfitting decisions will ultimately cost time and money. On the other hand, failing to make timely decisions on processes and equipment can slow down the project and also cost time and money. So how do you dedicate enough time to making informed decisions without giving the whole project a sedative? The answer is simple: Hire the right help and trust the process.

COORDINATION AND DESIGN PROJECT MANAGEMENT

Every decision that is made during the design of your facility will affect something else. That's why developing an experienced design and construction team is vital to your project's success. It's absolutely critical that the design team working on your facility is well-coordinated with a central point of responsibility directing traffic. Sometimes this is the General

Contractor (GC), sometimes it's the architect, and sometimes it's a project manager designated by the business owner. But no matter what, no decision should ever be made in a vacuum. All design decisions should be coordinated on a regular basis to ensure that there are no conflicts in the field.

ARCHITECTURE AND FLOOR PLANS

Plants have needs that differ from humans, so find an architect who understands this distinction. Interview architects or firms who have experience in designing for cannabis or other plants. They should have a familiarity of grow room layouts, the need for spaces dedicated to large equipment (e.g. irrigation, harvest/processing, and mechanical rooms) and special security measures that affect how a building is designed.

Choosing an architect specializing in controlled environment agriculture (CEA) provides benefits that go beyond optimizing your facility. Choosing the wrong architect could lead to frustrating and costly construction delays or, even worse, you risk getting stuck with an expensive facility that doesn't meet your operational needs.

MECHANICAL, ELECTRICAL AND PLUMBING (MEP)

Besides building permits, MEP permits must also be issued for construction to begin. MEP engineers provide services to prepare an indoor grow for operation. Engage an experienced engineering team as soon as possible in the planning process. A good MEP engineer will consider the entire operation when creating the design. They should coordinate closely with architects and construction



teams throughout the planning and building stages. Direct cultivation experience is a must.

Mechanical engineers design, specify, and provide permit and construction support primarily related to HVAC. They perform complex load calculations to ensure the climate system is properly sized to handle the heat and moisture loads. Besides ensuring the climate is appropriate, mechanical designs are also critical for cultivation operations for biosecurity, odor control, and energy use. Qualified mechanical engineers understand the questions that must be asked in order to coordinate all the moving parts and deliver a system design that meets all the needs of your cultivation team.

Electrical engineers design the electrical system within the facility. Their designs indicate overall power infrastructure requirements and provide the

Choosing the wrong architect could lead to frustrating and costly construction delays or, even worse, you risk getting stuck with an expensive facility that doesn't meet your operational needs.

design roadmap for electricians to follow when installing the electrical systems. Plumbing engineers provide designs related to the unique irrigation and waste removal needs of indoor agriculture and integrate them with the base building plumbing systems.

STRUCTURAL ENGINEERING

Structural engineers evaluate the structural load on a building and ensure that it's structurally sound to support the additional equipment associated with cultivation operations. Usually this is roof-mounted HVAC or electrical equipment.

CIVIL ENGINEERING

Civil engineers are required for projects that have a direct impact on public infrastructure, such as sewage treatment, waterways, or roads and bridges. In cultivation operations, their work usually

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Coordinate your benching and racking system selection in your overall floor plan design to maximize space efficiency and ensure that there are no conflicts in the field.

consists of wastewater disposal and site drainage and can include traffic patterns and access.

LIFE SAFETY DESIGN

Life safety must also be considered in cultivation facility design, and fire codes can vary from municipality to municipality. It's important you consult the fire marshal's office in your municipality during the design of the facility to ensure that there are no unpleasant surprises during inspection. Sometimes, interpretation of the fire code and related requirements can be somewhat subjective depending on the fire marshal

in your area. Fire safety is one consideration, but something many cultivators overlook is what the fire marshal's expectations will be associated with CO₂ safety, as most CEA cultivators will use supplemental CO₂ in their facility. Life safety requirements will need to be closely coordinated with electrical, plumbing, mechanical, and building automation designers.

BENCHING AND RACKING

Grow benches and racking systems are necessary for efficiently and cleanly organizing your plants within a grow space.

Few growers keep their plants in containers directly on the floor, as doing so makes organizing and tending to plants a hassle while also adding unnecessary hours of labor. Coordinate your benching and racking system selection in your overall floor plan design to maximize space efficiency and ensure that there are no conflicts in the field. Your mechanical design, irrigation system, and lighting systems will all be influenced by your benching and racking system.

LIGHTING

It is important that you begin your lighting selection early in the facility design process as it will influence architectural, HVAC/mechanical, electrical, and life safety design coordination. As soon as the benching and racking selections are made, you should move onto lighting design. The electrical design, HVAC/mechanical design (required for permitting), and the controls design (not required for permitting, but still a major design undertaking) are essentially held hostage until

This New Mexico facility worked with Surna Cultivation Technologies after upgrading to energy-efficient LED lights to ensure its climate system accounted for the new lighting approach.

lighting selections and quantities are made.

WATER PURIFICATION

Having a clean, consistent supply of water is essential for growing a repeatable product. Water purification allows you to remove particulates, pathogens, and debris, which is why many growers choose to purify their water supply before it's introduced to their plants. Cultivators often face the challenge of integrating municipal





Left: A well-coordinated facility design will provide optimal conditions for healthy plant growth.

Right: Surna Cultivation Technologies air handlers outside an Oklahoma cannabis cultivation facility.

water, reclaimed condensate or reverse osmosis (RO) and irrigation systems. Cultivators often purchase a number of independent systems (for instance, an RO skid and some holding tanks), but fail to plan how they will be controlled or integrated into the entire irrigation strategy.

Considerations you should make include: When does the RO tank need to be filled? How long does the water supply need to be engaged to fill the

tank? What happens when the tanks are full? The result of treating the irrigation room like an afterthought is usually a big headache (and a few floods). Working with a mechanical and plumbing design company that can help you with this integration on the front end can be an enormous help on the back end.

IRRIGATION

While smaller operations may be able to make do with manual watering, medium and large

grows are much more efficient when they incorporate an irrigation system into the facility design. This is true not just for the labor associated with plant watering, but for the overall consistency of the process, which ensures predictable costs as well as dependable yield and quality. The volume and method of irrigation will have a direct impact on the dehumidification requirements for your facility, as well as your controls design.

CONTROLS, DATA COLLECTION, AND AUTOMATION

Irrigation, CO₂ delivery and ventilation, fire systems, lighting, and HVAC systems must all be controlled in some manner. Variances in the sophistication of the systems and how you operate them will determine the controls required for your facility.

The extent of your monitoring and automation capabilities should be determined early on. Are you willing to sacrifice

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higher operating costs for lower initial start-up costs, or are you seeking to invest in the most precise and most energy- and labor-efficient systems? How much visibility do you want in the operation of the facility when you're not present? How much data do you want to collect about your operation to drive long-term operating decisions?

Your controls system provider must have a deep understanding of all the systems in your facility that they are controlling, how they work, and what the controls needs really are. Controls seem simple, but it's not just an on/off switch with a nice user interface. Often, complex programming is required behind the scenes to make sure all the various industrial systems you're using work as intended.

SECURITY

While general security surveillance may be beneficial for most businesses, it is an absolute necessity for cannabis grow operators. In fact, your cultivation license requires it. Security system requirements vary from state-to-state, but should be well-coordinated with the architect, electrical engineer, and sometimes the controls and automation designer.

EQUIPMENT COMMISSIONING

There are many complex industrial systems utilized in your cultivation facility and, after construction is complete, each of them will need to be commissioned to ensure everything is operating correctly. Some of them will need to be commissioned in parallel, and for others successful commissioning may be dependent on other

Above: Equipment installation and commissioning on a 4-pipe chilled water system.

Right: A Surna Cultivation Technologies custom air handler located indoors.

systems. Be sure you understand who will be responsible for start-up and commissioning before purchasing your equipment, and the sequence of starting up the various systems. Some vendors will leave it up to you to find a contractor for installation and commissioning, and very few will offer support throughout the process.

LIGHT IT UP!

Construction is complete. You've finished the long process of building a cannabis cultivation facility, all of the systems are operable, and you've handed the facility over to your cultivation team. The financial stress of construction is over. Plants are in, everything will work perfectly right from the jump, and your cultivation team is going to hit it out of the park on day one, right? Not so fast.



The truth is, once plants are in the building, there is still a lot of fine-tuning to be done, in both cultivation processes and the building and support systems themselves, even for very experienced cultivators. That dial-in period might take a few harvests before everything starts firing on all cylinders.

But ask anyone successfully growing on a commercial scale and they will tell you this is all

part of the process. That is why it is so important that you work with experienced teams to help keep the process moving each step of the way, as proper planning and expert help are the easiest ways you can avoid costly delays and get growing on schedule.

Brandy Keen is co-founder and senior technical advisor at Surna Cultivation Technologies.



CULTIVATING IN THE 21ST CENTURY



HOW EVOLUTION PHARMS FOUND THE RIGHT EQUIPMENT PARTNER TO MODERNIZE ITS ARIZONA OPERATION

BY **JOLENE HANSEN**

As general operations manager for Kingman, Arizona-based Evolution Pharms, Joe Rubinstein oversees every aspect of the company's medical and adult-use cannabis cultivation operation. Whether tasks and decisions get delegated or stay with him, everything from

day-to-day operations to facility retrofitting ultimately falls under Rubinstein's purview.

Since the company began commercial cultivation under the name Green Pasture Arizona in 2016, a lot has changed. The cultivation operation rebranded and launched as Evolution Pharms in 2020. With its dual-cultivation license leased from multi-state

operator Ayr Wellness, Evolution Pharms product helps supply five Ayr dispensaries operated throughout Arizona under the Oasis and the Total Health and Wellness names.

Evolution Pharms' 3-acre property holds a 1-acre greenhouse facility with approximately 34,000 square feet of canopy and a 4,000-square-foot indoor grow room, with a second indoor grow scheduled for completion this year. As the company and the cannabis industry matured, Rubinstein realized the time for more change was here.

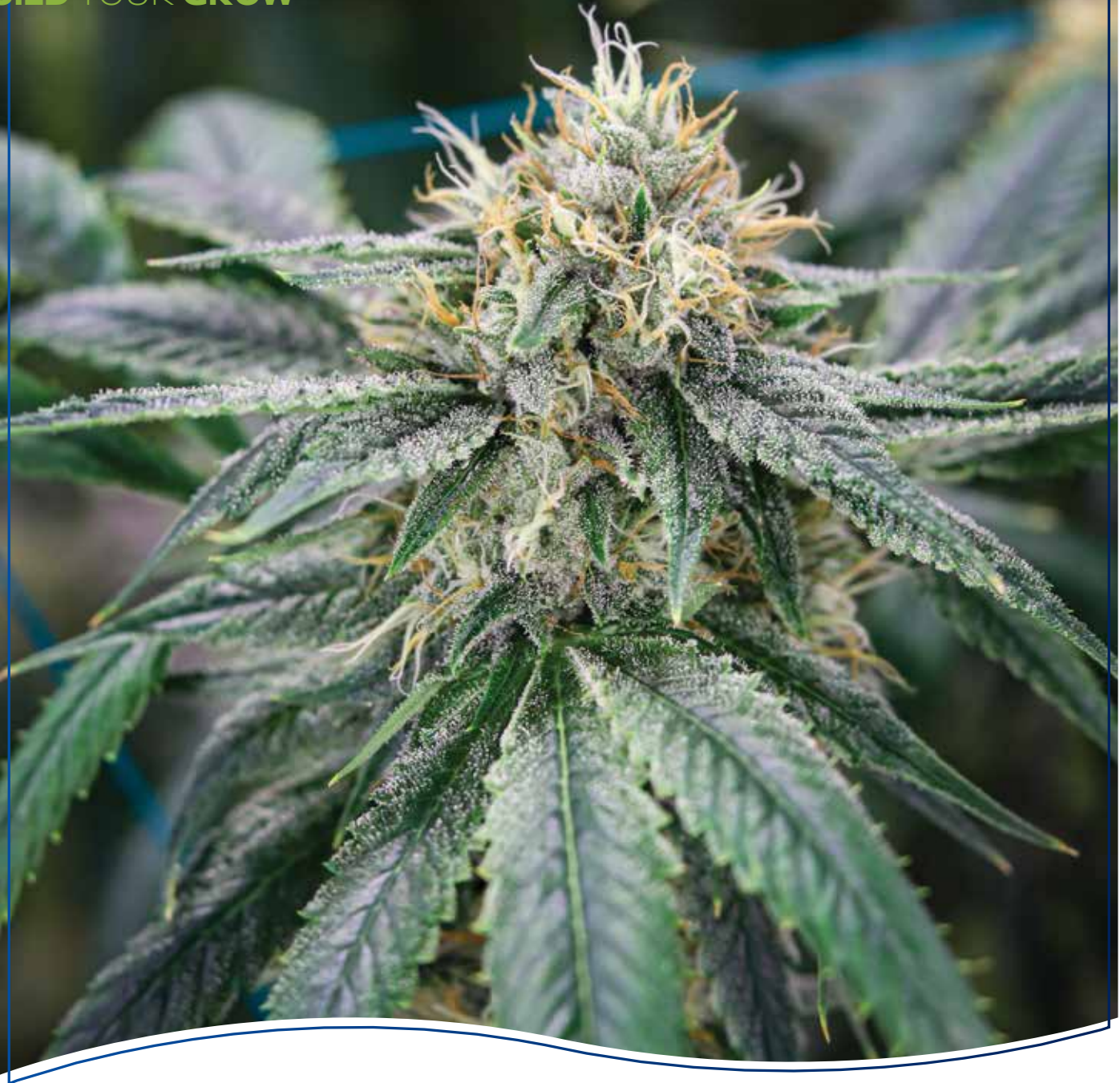
Above: Evolution Pharms' Kingman, Arizona, facility after overhauling its indoor cultivation operations with Surna Cultivation Technologies.

EVOLVING WITH INDUSTRY STANDARDS

In early 2020, Rubinstein took stock of where the cultivation operation and cannabis cultivation technology stood.

"After three or four years of cultivating, the industry had changed quite a bit, and industry norms and standards had changed quite a bit," he recalls. That introspection triggered

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Above: Having the right controlled environment agriculture systems in place is key to growing healthy plants and boosting yield.

the decision to retrofit Evolution Pharms' indoor room to meet what Rubinstein considered the new indoor standard, dominated by advances in lighting, HVAC, and temperature controls.

"All of that kind of forced us to change our indoor [grow] into

the modern era—sort of moving into the 21st century of cultivating indoors," Rubinstein says. "Now, a lot more can be done on the planning side to try and mitigate some of the problems that you see cultivating."

Evolution Pharms' indoor retrofit included a move from standard HPS bulbs to LED fixtures—70 of them. Another major piece of the renovation puzzle involved finding the right company—a true partner—to

work with for environmental controls for the indoor grow. "We were looking for an all-in-one solution that does temperature and humidity control," Rubinstein says. That narrowed his options down to Surma Cultivation Technologies and one other company.

PARTNERING FOR PROGRESS

While cost was a consideration in Rubinstein's decision,

he says the two competing companies were within 15% of each other, which wasn't a huge difference in his eyes. Instead, energy savings and customer service, including factors such as parts availability, drove his decision-making process. Being able to deal directly with the manufacturer rather than a third-party distributor was important. "For me, that's kind of a roadblock because when we have a problem, I need help

now," Rubinstein explains. Only Surna offered that direct link.

In the end, customer service won Rubinstein over. "Surna customer service attracted me more to them as a manufacturer and an installer," he says. Included in the company's customer service is remote monitoring, which Rubinstein says catches and corrects problems before the Evolution Pharms team even knows they exist. By the time he gets an email about an issue in the grow, units have already been adjusted to correct the problem.

"Normally, I like to tour facilities that have equipment by a particular manufacturer before I purchase it," Rubinstein says. "I did not do that this time, and they were able to sell me without touring a facility or seeing the equipment. The first time I saw it was the day it was delivered."

It has been about a year since the design and production process started, and Rubinstein's glad he made that choice. About 20 weeks past installation, the retrofitted indoor grow was in its second cycle as of press time, and Rubinstein is continuing his relationship with Surna on the new indoor room.

"Their system, by all means, is excellent. It manages temperature and humidity down to 1 or 2 degrees, which is difficult for us in Kingman because our ambient temperature outside swings from 25 degrees in the winter lows to 110 degrees high in the summer," Rubinstein says.

PREPARING FOR THE FUTURE

Rubinstein shares that he takes steps to avoid common mistakes that new and retrofitted facilities often make—such as

"We over-engineer, so everything is built for 25 to 30% over our capacity. For instance, our air conditioners are rated 30% larger than we need, so that they don't work as hard, so they're a little more efficient."

- Joe Rubinstein, Evolution Pharms

underestimating facility needs. "We over-engineer, so everything is built for 25 to 30% over our capacity," he says. "For instance, our air conditioners are rated 30% larger than we need, so that they don't work as hard, so they're a little more efficient. Same with our lighting. Really everything that we purchase we over-engineer."

Preventive maintenance is a priority for the company. Evolution Pharms' cultivation operation has two dedicated maintenance technicians that work on nothing but ensuring the facility stays at peak performance. The grow's equipment is on a weekly maintenance checklist known as the "weekly welfare check," and Rubinstein says the grow also benefits from a yearly maintenance plan with Surna, which includes an annual on-site check on the equipment's health.

For cultivators planning moves into 21st-century commercial cannabis cultivation—whether new or retrofitted facilities—Rubinstein recommends asking vendors a lot of questions and trying to think ahead. "Trust, but verify," he says. "That was hard for me to do with Surna because I didn't go anywhere to see any of their units operating. I really had to take their word for it, which I did. And so far, it's working out well."

Rubinstein also advises that assembling the right team for setting up your commercial grow is essential. "I consider Surna a team member because we built our cultivation around them being part of our team," he says.



Left: Evolution Pharms before the Surna Cultivation Technologies upgrade.



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- ✓ FLOOR PLANS AND ARCHITECTURAL DESIGN
- ✓ CLIMATE (HVACD) SYSTEMS
- ✓ LIGHTING AND BENCHING
- ✓ MEP ENGINEERING
- ✓ ENVIRONMENTAL CONTROLS
- ✓ MAINTENANCE SERVICES



With Surna Cultivation Technologies, bringing your vision to life has never been easier. Designing or expanding a cultivation facility can be a daunting task, and you will need a team that understands your goals. We offer comprehensive services and equipment to suit every unique grower's needs. With years of experience in the industry, we can guide you in creating the facility you've imagined, keeping your budget in mind. Create an efficient and sustainable environment for your plants and see your yields and profits grow!

