

SURNA[®]
Cultivation Technologies



**COMPREHENSIVE CULTIVATION
FACILITY SOLUTIONS**

ABOUT SURNA

Extensive experience in both commercial construction and controlled environment agriculture (CEA), including cannabis facilities, is difficult to find. That's where we come in. Our team of project managers, licensed professional engineers, technology specialists and systems integration experts help to keep your construction project on time and on budget.

We understand, probably better than anyone, the real challenges associated with cultivation facility design, and deploying the systems required to truly perfect the cultivation environment. Every design decision made in the facility affects something else. Everything must work together; nothing operates in a vacuum. Every piece must be integrated at the design level.

Our engineering team has worked with every conceivable cultivation practice, and every type of system approach, to ensure that we can offer solid, unbiased advice during the decision-making process, then apply that experience to smart and well thought-out engineered designs. Our experience also provides us a stronger understanding of how HVACD energy is used in cultivation facilities, allowing us to give common sense recommendations to implement the most energy efficient options that align with the owner's budget. Our team can help identify the scope gaps and coordination issues common in cultivation facility design before they cause budget overruns or delays. And our project management and field teams ensure the systems we design are seamlessly integrated into the facility.



While our engineering expertise, vast selection of technology, and impressive controls capabilities are tangible, obvious reasons to choose us as your partner, the intangibles that we bring to the table throughout the process are just as compelling. With Surna, you don't get a vendor. You get a partner. We truly have your best interests in mind, and we have the experience to back it up.



DESIGNING A FACILITY THAT MEETS YOUR GOALS STARTS WITH THE RIGHT PARTNER

Our deep understanding of every aspect of cultivation facility design - not just the HVACD and systems in which we specialize - allows us to lend support from pre-design budgeting through facility commissioning and every step in between .

- FLOOR PLANS & ARCHITECTURAL SERVICES
- ENVIRONMENTAL CONTROLS
- CLIMATE (HVACD) SYSTEMS
- LIGHTING & BENCHING
- LICENSED MEP ENGINEERING
- MAINTENANCE SERVICES



CONTROLLED CLIMATE SYSTEMS

Surna provides energy and resource efficient technology solutions that allow growers to meet the unique demands of controlled environment agriculture.

We've often referred to the importance of HVAC systems to every layer of the cultivator's business, but how do you choose which approach is right for your facility?

The truth is, there are a number of technologies that can successfully manage the climate in an indoor facility. One of our most important responsibilities as your design partner is to review with you all options in depth, along with budgets and their respective pros and cons, to assist with the decision-making process. Your goals, not ours, inform the design process. Our job first and foremost is to understand your goals, and then to design a system that best meets those goals.

There is no substitute for a conversation with one of the experts on our team and the wealth of knowledge that comes along with it. Here's a summary of some of the HVACD technologies in which we specialize.

DX WITH INTEGRATED DEHUMIDIFICATION

Hot gas reheat systems are refrigerant based, DX systems, designed to integrate cooling and dehumidification operation within a single system. This allows for greater precision than with standalone dehumidification systems, and reduces or eliminates the need for additional, standalone dehumidifiers, which can improve energy efficiency and reduce electrical infrastructure requirements. Longevity is generally superior to standard, comfort cooling style DX systems as these systems are intended for cultivation applications, while installation requirements are similar to standard HVAC systems. These types of systems are a good mid-range cost option between cost, electrical infrastructure and complexity, where energy efficiency and longevity are generally superior to standalone systems.



VARIABLE REFRIGERANT SYSTEMS (VRF/VRV)

In variable refrigerant systems, refrigerant volumes are modulated and distributed to multiple areas of the building depending on cooling needs at any given time. With this type of system, multiple fan coils or air handlers can be connected to a single condenser, allowing condensing units to be shared between spaces without sharing air, (similar to chilled water systems with slightly less flexibility). Temperature is controlled by air handlers or fan coils and dehumidification is controlled by separate, standalone dehumidifiers. This approach may be a good option for cultivators seeking an improvement in energy efficiency and redundancy over standard light commercial HVAC systems, or cultivators whose authority having jurisdiction are calling out a specific EER for regulatory compliance.

2-PIPE CHILLED WATER SYSTEMS

Chilled water, as opposed to refrigerant, is utilized as the primary means of heat exchange in the cultivation space. From a climate management perspective, it operates very similarly to typical refrigerant based HVAC systems with dehumidifiers. Temperature is controlled by air handlers or fan coils and dehumidification is controlled by separate, standalone dehumidifiers. However, 2-pipe chilled water has a number of advantages over stand alone DX systems, including longevity, redundancy and electrical infrastructure reductions. With this type of approach, air handling systems operate independently of the compressors, allowing one central plant to operate multiple rooms without mixing air between them. This results in the ability to reduce electrical infrastructure, and offers greater opportunities for redundancy at lower cost. Further, chillers are generally designed for heavy commercial or industrial applications, resulting in less maintenance and a much longer life cycle. These types of systems are a great option in extreme climates or when redundancy, flexibility, and reduction in connected load is a high priority.

4-PIPE CHILLED WATER SYSTEMS

Chilled water is the primary mechanism for heat exchange for both temperature and humidity management. The air stream is routed first across a chilled water coil to remove heat and humidity, followed by a reheat coil to ensure temperature neutrality when operating in dehumidification mode, which allows for substantial reduction or elimination of standalone dehumidifiers, improving energy efficiency and reducing electrical infrastructure requirements. Reheat is accomplished through heat recovery chillers, reusing the heat produced by cultivation operations, with boilers as back up. With this type of approach, air handling systems operate independently of the compressors, allowing one central plant to operate multiple rooms without mixing air between them, allowing for further reductions in electrical infrastructure as well as cost effective redundancy. 4-pipe chilled water

utilizes a sophisticated controls system, which provides visibility into every area of the climate control system, allowing for significant data analysis by the cultivation and engineering teams to fine tune the system to ensure maximum precision with minimum energy consumption. These systems usually result in the tightest precision, most redundancy, highest flexibility (in both air handling options and achievable results), lowest electrical infrastructure requirements, and longest overall lifespan of all available options. Four pipe chilled water is the preferred option for cultivators for whom the maximum precision, flexibility, and insight into facility operations are a high priority.

HVAC STRATEGIES IN VERTICAL APPLICATIONS

In vertical or multi-tier applications, airflow to both the canopy and to the HVAC system is obstructed. Thus, special attention must be paid to airflow strategies to ensure that the environment is homogenized (all plants are seeing the same climate conditions), and that the HVAC system has access to all of the hot, humid air generated at the canopy level.

It can be exceptionally difficult for cultivators to find and incorporate a well-designed airflow system for their racking design. One size fits all strategies without proper engineering can be difficult to dial in, often resulting in improper air speed over the canopy, uneven temperatures, higher than necessary cost or higher than necessary energy use. Surna can provide the most effective systems that are incorporated into the HVAC design, where the cold and dry air leaving the air handling units is mixed with room air before being delivered, at the perfect temperature and humidity, directly to the canopy. This displaces the warm, humid air from the canopy, ensuring homogeneity and that the HVAC system has access to canopy air. This approach minimizes cost and energy use and ensures the best homogeneity by ensuring that each design is optimized for the specific application.

BENCHES & RACKS

DON'T LET THE SPACE LIMITATIONS OF INDOOR FARMING HOLD YOU BACK

We provide durable and customizable benches, trays, and racks to help you grow efficiently. Start with the essentials and get equipped with Ebb and Flow benches that make irrigation a breeze. Expand your horizons with rolling benches. Or go vertical with a multi-tier shelf solution.

Need guidance on which configuration is best for your business? Let us help! An expert Surna representative will walk you through your options based on your unique requirements.

SINGLE-TIER GROWING BENCHES

Ebb and Flow benches are available in a variety of configurations. Bench top trays feature sturdy polystyrene with UV inhibitors for decades of worry-free use. They come in 9 standard sizes, but other widths may be special ordered. All lengths are customized to meet your exact needs. Options include stationary benches, rolling benches, track benches, expanded metal benches, and custom designs.

Benches are also available with expanded metal tops in place of the Ebb and Flow trays. Ebb and Flow trays may also be ordered separately. This allows you to retrofit existing benches to an Ebb and Flow system.



MULTI-TIER VERTICAL FARMING RACKS

Multi-tier racks help you maximize precious square footage by stacking plants vertically. These grow racks take the concept of traditional archive racking and apply it to indoor ag. High quality, rust resistant materials make these racks durable and reliable. LED lights can be mounted to each level so your plants can photosynthesize unimpeded. And a direct chain driven system ensures ease of mobility.

We offer racks in three configurations:

- Stationary
- Mobile
- Stackable

Special designs are available, including multi-tiered Ebb and Flow benches, cloning racks, and drying racks.



LIGHTING SOLUTIONS

NEOCISION SPECTRA LED GROW LIGHTS

Surna Cultivation Technologies has partnered with BVV as a Neocision Spectra Grow Lights distributor. Available in spectrum models for Vegetative and Flowering phases, Neocision Spectra brings variety, efficiency, and performance to commercial and craft growers alike. These light fixtures are ETL certified, IP66 rated and DLC Listed. Grow with confidence with BBV's industry-leading 7-year limited warranty.

NEOCISION SPECTRA ELITE

Neocision Spectra Elite LED light fixtures feature a 20.6% blue spectra and 45.1% red spectra with a peak at 660nm for your flowering plants.

This unique spectra mix creates stronger plants for nutrient uptake with maximized red for increased photosynthesis. Get increased yields, quality bud formation and high rates of cannabinoid production levels.



NEOCISION SPECTRA PRO

Neocision Spectra Pro LED light fixtures feature a 18.5% blue spectra and 40.7% red spectra with a peak at 660nm for your flowering plants. This unique spectra mix creates stronger plants for nutrient uptake with maximized red for increased photosynthesis. Get increased yields, quality bud formation and high rates of cannabinoid production levels.

NEOCISION SPECTRA VEG

Our 3-Bar Veg Spectrum 5000k LED light fixture is designed to produce a healthy and more flavorful, aromatic yield and has an independently tested PPF efficacy of 2.51 $\mu\text{mol}/\text{J}$ and PPF of 853 $\mu\text{mol}/\text{s}$. Enjoy fast and simple installation so you can get growing faster.





CONTROLS

MORE THAN JUST A PRETTY INTERFACE.

For accurate visibility in your grow rooms, we go beyond snappy interfaces or turning things on and off. Surna SentryIQ® features proprietary controls sequences with predictive algorithms essential to optimum climate control.

WHAT'S AT STAKE?

After all you've invested in your grow, the last thing you want is sick or dead plants, rotting harvests, or batches that test positive for contamination.

GET REAL ABOUT YOUR GROW

You need the right equipment to protect your hard work and investments.

✓ YOU'LL BE GOOD TO GO

Surna SentryIQ® implements sophisticated controls sequences. Our system provides a more intelligent solution – area by area – preserving the growth cycle.

✓ CONTROL ENERGY COSTS

Surna's SentryIQ® can calibrate a facility's cooling system to account for high intensity lights. Save energy, drive costs down, and avoid waste.

✓ REDUCE TIME SPENT CHECKING DETAILS

Unlike residential units, industrial-grade equipment requires more complex controls. Let the system do the work.

✓ REDUCE TIME SPENT RECORDING DETAILS

Skip paper log books, tracking room by room. Get all the facts at once to make real-time decisions.

✓ ANALYZE HISTORICAL TRENDS AND NEXT STEPS

Surna SentryIQ® also provides analytical data to use for historical and trending data. Reduce or eliminate the need for manual intervention.

CENTRAL PLANT CONTROLLER

Industrial cultivation control equipment requires sophisticated sequencing to maintain an optimal climate. Surna SentryIQ® deploys proprietary controls sequences with predictive algorithms. Performing as a savvy and holistic system, Surna SentryIQ® orchestrates multiple pieces of industrial heating and cooling equipment precisely to sophisticated engineering sequences. The result? Direct temperature control, humidity control, and CO₂ monitoring. So your grow will stay alive and thrive.

The central plant controller monitors:

- Chillers
- Dry coolers
- Boilers
- Variable frequency drives
- Pumps
- Modulating valves
- Other exterior equipment

ROOM CONTROLLER

Four precision digital indoor sensors with aspirated fans actively draw in canopy air to accurately read temperature, CO₂, and humidity, 24/7. Each room has its own controller, ensuring the whole facility remains operational if one room is taken out of service.

The room controller provides:

- Custom control sequences
- Temperature, humidity and lighting controls
- Monitors and records temperature, humidity, CO₂, VPD, and cooling loop zone performance

FACILITY SUPERVISOR

The SentryIQ® Facility Supervisor delivers intelligent management of data with schedules, trends, monitoring and system alarms, providing visual insight to every room within your facility.

The facility supervisor helps:

- Monitor data
- Set and acknowledge alarms
- Receive off-site notifications
- Check system performance
- Monitor schedules
- See trends



FLOOR PLANS & ARCHITECTURAL DESIGN

Surna's comprehensive cultivation facility design services, rooted in deep experience, ensure a well-executed design and a well-coordinated project. Launch your cultivation business with the best foundation possible.

CULTIVATION FACILITY DESIGN. DONE RIGHT.

Any designer can produce a set of drawings. But not many can be a true partner, helping you develop a facility ideal for achieving all of your unique goals. A true partner will develop and execute a design that meets all the needs of your business—those you've thought of, and those you haven't.

Your cultivation facility is the most important tool of your business, and the architectural design for your facility is the very foundation of the operation. Getting it wrong can be a recipe for disaster, but getting it right is the first step to success. That's why we're here. Lean on our experience to ensure that your cultivation facility design serves your unique requirements, and that nothing is overlooked.

Among the many benefits of choosing Surna to provide architectural design services are:



EFFICIENT DESIGN

We understand that workflow processes in cultivation facilities are vitally important to your bottom line. We will work with you to deliver a thoughtfully considered plan that addresses every requirement of your business. Our ultimate goal will always be to deliver a cost-effective design that enhances productivity, and our years of experience ensure that we deliver on that promise.



DEEP EXPERTISE

We've worked with cultivators all over the world, and over the course of that work we've seen it all. Understanding the systems in use in cultivation operations, and how those systems must be integrated within the building itself, is an under-appreciated but extremely important component to effective architectural design.



SIMPLICITY

From simple floor plan development and schematics, to a fully integrated architectural and MEP permit and construction plan set, we can help with any or all of your facility design needs. And if you're not familiar with the construction process and aren't sure exactly what you need, give us a call.

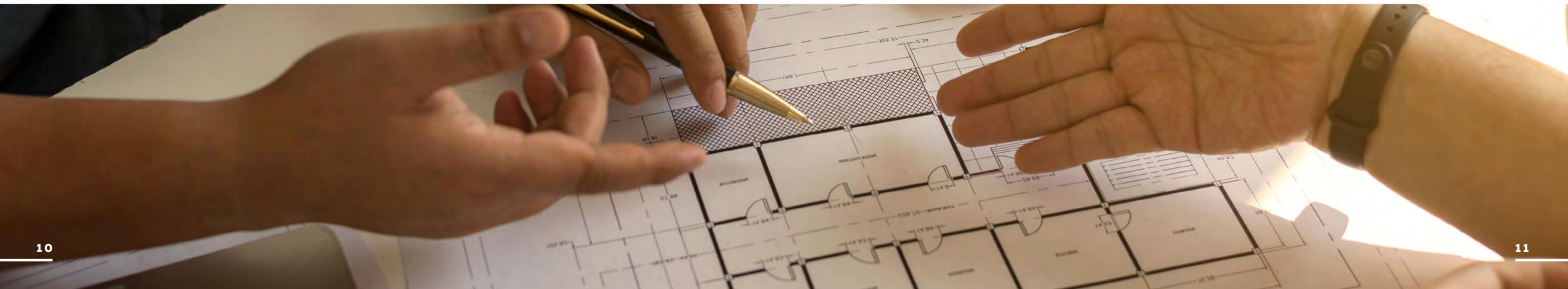


EVERYTHING ACCOUNTED FOR

The architectural design for your facility is the backbone of the construction project, and effective coordination with engineering teams and providers of cultivation-specific infrastructure for your facility is absolutely crucial to ensuring that the foundational design is accurate. We take the time to fully understand every process in the facility, accounting for every critical component at the earliest stages of the design, and to coordinate frequently with the other members of the team. This sets you up for an on time, on budget project, and long-term operational success.

LONG-TERM SUPPORT

Architectural services are so much more than a set of drawings. We view client relationships as long-term partnerships, and we approach every project with that intention. From permitting support, to construction administration, to post-construction assistance, and future design collaboration, we are here to support you and your needs for the long-haul.



ENGINEERING & DESIGN

Feel confident knowing that your environmental system has been engineered by experts in CEA climates who take your unique goals and budget into consideration.

PROPER CLIMATE CONTROL GOES BEYOND EQUIPMENT SELECTION

Unlike in a traditional HVAC setting, indoor cultivation facilities require climate control solutions that attend to the unique needs of the plant. In order to achieve the most precise and efficient grow room climate, engineers should have a solid understanding of variables unique to CEA such as lighting, watering schedules, humidity, plant transpiration rates, airflow, regulation requirements, and more. Our specialized team of engineers provide the sophisticated approach to indoor agriculture that you've been looking for.

Also, getting regulatory approval, requires stamped drawings. Our licensed PE's have the ability to help you get approvals quickly. Hiring experts to assist you with this process brings you numerous advantages over choosing an off-the-shelf solution.

✓ OPTIMIZED CLIMATE

Our licensed engineers specialize in CEA climates, meaning our designs are based on a deep understanding of how climate parameters affect plant health and growth.

✓ GREATER OPTIONS

With a wide arsenal of available technologies, our engineered climate control systems provide many efficient environment solutions to choose from for your unique application.

✓ SIMPLICITY

Our comprehensive engineering solutions provide expert designs that adhere to state regulations, with fully-stamped construction documents available.

✓ COST EFFECTIVE

Since we provide equipment, we are keenly aware of systems costs throughout the industry (more so than an independent engineer). We are constantly striving to provide the most cost-effective approaches available in the market.

LICENSED MEP ENGINEERING

After architects complete the floor plans, engineers must design the nuts and bolts of the facility; how will you heat, cool and dehumidify the cultivation spaces? Do you need an electrical service upgrade? Can your plumbing systems handle fresh and waste water effectively? Don't worry, we've got you covered, and we can provide fully-stamped construction documents.

GROW ROOM ODOR MITIGATION

Cannabis consumers and growers may love the smell of good bud in the morning, but it's important to properly contain that sweet, sweet, dank aroma. Your neighbors will thank you when you incorporate Surna into your odor mitigation planning. Allow us to use our expertise to help your facility comply with all regulations and local ordinances.



Meet Local Odor Control Regulations

Surna can provide a review of your facility's current odor control equipment and assist in developing a plan for cannabis odor control that can be submitted to applicable governing bodies. Our odor control plans are based on industry best practices and minimum requirements set by ASHRAE and include analyzing the current setup and state assumptions, determining relevant code reference, calculating ventilation for occupancy requirements and odor control and providing documentation that can be presented to the governing body.

Did you know?

- Many cities require cannabis cultivation facilities to develop a comprehensive cannabis odor control plan (OCP).
- Odor mitigation can reduce your risk of break in's and theft. Proper odor control can improve community acceptance and integration.
- According to the Colorado Department of Public Health and Environment, the terpenes that produce the smell of marijuana are volatile organic compounds (VOC's), and when released into the atmosphere they can react negatively with other gases in the air and produce excessive ozone (and possibly other issues).



INSTALLATION & MAINTENANCE SERVICES

We offer a variety of services from project inception to post-production maintenance and support, catered specifically to your unique needs

GET UP AND RUNNING - AND STAY UP AND RUNNING.

Many engineering firms and equipment suppliers will part ways with you following the purchase of the system or will point the finger at each other if a problem occurs, leaving you, the buyer, high and dry. Not only do we offer both remote and on-site support, but we also provide other maintenance and service options to ensure that if there is an issue, you'll have the support of the Surna team to help find a solution. Better yet, we can implement a preventative maintenance plan to help prolong your climate system's life and to ensure optimal performance.

Among the many benefits of choosing Surna to provide installation and maintenance services are:

✓ RELIABILITY

Even the most sophisticated, well-designed climate system can become a nightmare if improperly installed or maintained. That's why Surna offers comprehensive service plans to keep your system operating as it was intended.

✓ GREATER EFFICIENCY

Dirty equipment takes more energy to operate and breaks down before it should. Our service plans offer the maintenance necessary for optimal performance and system longevity.

✓ SIMPLICITY

Surna offers comprehensive service plans, with options including installation, preventative maintenance, and local on-site support. Our goal is to keep your job as simple as possible.

INSTALLATION & SUPPORT

Surna is your climate partner every step of the way, and that includes installation and commissioning. Most Surna projects include access to our installation support team who will assist in the proper implementation of the system via site visits throughout the build out phase and over-the-phone consultations. Surna's extensive certified contractor network gives you the ability to have your climate system both supplied and installed by vetted, qualified professionals for a smoother installation process.

LOCAL ON-SITE SUPPORT

Don't let an under-qualified local technician learn how to service a specialized climate system on your dime. Surna's extensive certified contractor network allows us to offer expert local support across the U.S. and Canada and provides you with a painless option for servicing your equipment should any complications arise.

PREVENTATIVE MAINTENANCE PLANS

Protect your investment and cut the hassle out of maintaining your HVACD system when you opt into a Surna preventative maintenance plan. Receive scheduled visits from qualified professionals to properly maintain equipment, monitor, track and analyze performance and recommend adjustments to address potential problems before they happen.



We've helped cultivators take control of their grows for over 15 years,
and we want to pass the benefits of that experience on to you.



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Surna Cultivation Technologies

Contact Us

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