

GUIDE TO MARIJUANA FACILITIES DESIGN

PART I: DESIGNING FOR HEDONISM

By Jeffrey Clay Ruebel Esq. & Casey Ann Quillen, Esq.

This information is provided for educational purposes only and should not be construed as legal advice. Laws, regulations, licensing requirements, and ethical codes vary by state, and individuals should seek legal counsel or professional advice to evaluate their specific set of facts and circumstances. AIA members should also be cognizant of their obligation to adhere to the AIA's Code of Ethics and Professional Conduct. The views stated herein are solely those of the authors and not of the AIA Trust or The American Institute of Architects.

Overview

The production and retail sale of alcohol has a long history in the United States, which allows those providing services to assess risks and benefits from engaging in the alcohol industry. The same cannot be said for the marijuana industry. Not only is this new, burgeoning industry struggling with the growing pains faced by any new business opportunity, it is handicapped by the Federal government's position that it is illegal as well as conflicting legal requirements by different states as well as uncertainty on the part of regulatory and safety bodies as to what standards should be applied to the industry. This paper summarizes unique issues in the design and construction of marijuana facilities including the considerations necessary for the safe and efficient delivery of product to the consumer. It will also discuss current and potential legal risks that a design professional may face, arising from work with this industry and highlight code provisions commonly adopted by municipalities where such activities take place.

Federalism

Any discussion of the marijuana industry must start with the problem arising from federalism. The continued illegality of marijuana at the federal level and in some states, while other states have wholeheartedly embraced marijuana decriminalization, has created an uneven legal landscape. The U.S. Department of Justice policy on drug enforcement includes preventing revenue from the sale of marijuana from going to criminal enterprises and preventing the diversion of marijuana from states where it is legal under state law to other states. As a result, marijuana companies face difficulties in their efforts to obtain legal advice, financial and banking services, and insurance coverage for certain types of claims.

Notwithstanding federal policy, many states have acted to decriminalize marijuana products for medicinal purposes and in some instances for recreational purposes. The legal question is whether states can take this action or whether federal law will preempt the states' laws. While the courts have yet to establish the precise contours of federal preemption doctrine, the preemptive reach of the federal Controlled Substances Act is relatively modest.¹

Yet even if the federal government continues its commitment not to enforce federal drug laws against those complying with state regulatory regimes, the consequences flowing from the continuing federal prohibition remain significant. Concerned about violating federal law, banks, attorneys, insurance companies and others are careful in providing capital, design services, legal advice, or other basic professional services necessary for marijuana businesses to function out of a concern that money from marijuana businesses may be subject to seizure as funds from illegal criminal enterprises.

Notwithstanding the legal issues, it is difficult to believe that an industry generating multiple billions of revenues will be dismantled by federal fiat. This leads to the conclusion that the marijuana industry will survive in some form. Presumably, a compromise solution will be reached which will involve a regulatory scheme combining both federal and state regulation.

Even if heavily regulated, however, we can expect that tort liability will survive as a component of the marijuana business. It is also rational to think that the liquor industry will provide a template for courts as they consider issues of first impression arising out of the marijuana business.

Finally, experience suggests that those involved in the marijuana industry are not reluctant to resort to lawsuits, and those providing services to owners and operators of these businesses need to be prepared for claims of all types.

Special Design Issues of the Marijuana Industry

The typical marijuana business model has three components: a dispensary, where the marijuana is sold; a grow facility, where plants are seeded, grown, and harvested; and infusion facilities, where THC is extracted from plants for use in hash oil, edibles, and other products. Each has its own set of unique risks.

Because marijuana as an industry is relatively new, building, fire and zoning regulators have struggled to identify risks and develop code provisions to ensure public safety. Start-up businesses put a premium on getting their businesses open and operating, and could act with some degree of impunity, as regulations governing the operations had not been developed. Further, each part of the operation is typically a different building site, and as a result, design concerns are also different for each site. However, as the operations started being inspected, common violations have been identified and addressed through regulation. Violations that have been identified include overloaded electrical systems, noncompliant construction (e.g., unpermitted construction, noncompliant locks), using unapproved marijuana extraction equipment, unapproved CO2 enrichment systems, and occupying a space without a certificate of occupancy.

Dispensaries

Dispensaries are not unlike many retail storefronts. However, because the sale of marijuana is not legal under federal law, operators have difficulty obtaining banking services. This has resulted in many dispensaries being all cash businesses in which patrons cannot use credit cards or write checks.

As a result, between marijuana inventory and cash on hand on-site, security is a big concern for retail centers. However, the security measures implemented frequently result in noncompliant means of egress. Deadbolted doors or electronically secured doors are not unusual, but since the premises is a retail space, the space must allow for unfettered egress for occupants at all times. Municipalities, recognizing the problems created by having a retail outlet which has large amounts of cash on the premises, have enacted a variety of code requirements to mitigate the risks associated with dispensary outlets.

Grow Facilities

Plant cultivation locations, or as they are called in slang, "grows," have many safety concerns that are increasingly heavily regulated. Greenhouses are traditionally regulated as U occupancies in the International Building Code; however, the hazards are different in a 'marijuana grow' than in a standard vegetable greenhouse. Thus, communities, led by efforts coming out of Denver, are now classifying grows as F1 occupancies. The F1 occupancy classification was determined based on high electric demand for grow lamps, fumigation operations, carbon dioxide (CO₂) enrichment, mazelike room layouts, and the fact that most grows in Denver are located in former storage occupancies (warehouses) which can potentially affect neighboring tenants.

Growing marijuana is labor intensive; the occupant load of workers is higher than one would expect in a typical U occupancy greenhouse. Larger grow operations can have more than 100 employees, and they operate around the clock. As a result, design professionals must also consider the effect of various systems designed to enhance product growth on a significant work force which will be exposed to those systems.

CO₂ enrichment systems found in marijuana grow rooms are different from traditional systems in that they intentionally flood the grow rooms with CO₂. These systems present potential asphyxiation hazards and are regulated by operational and system installation permits. These systems require a local CO₂ detection system in each enriched room, set to alarm at 5,000 ppm and a master control valve to shut off the flow of CO₂ at the source. Warning signs are also required.

Typical CO₂ enrichment can be in the form of compressed/liquefied CO₂ systems or a CO₂ generator supplied by natural gas. Compressed/liquefied CO₂ systems can be as small as a few cylinders located inside each grow room or as large as a bulk tank located outdoors. CO₂ generators operate from a fuel-fired source that, as a part of the combustion process, off-gases CO₂ and carbon monoxide (CO). Because of the CO hazard, this appliance is regulated by the Mechanical Code as a non-vented fuel-fired appliance and requires a CO detector interlocked to an exhaust fan that operates on high levels of CO. Most jurisdictions in Colorado do not permit the use of portable propane tanks and cylinders to supply these generators. If used, they are required to be supplied from the building natural gas system.

Grow facilities have temperature and humidity which have been described as comparable to indoor swimming pool centers. In a grow facility, this leads to fungi and other undesirable results. To control this, growers fumigate the premises. Fumigation is an operation that is now typically regulated and

requires an operational permit to perform. Under this permit, hazard signage is posted at entrances, and the type of occupancy is reviewed for any potential threat to adjacent tenants. This has proven difficult to enforce, as growers sometimes fumigate overnight without the appropriate permits.

The fumigation method of most concern is sulfur burners to control powdery mildew and CO2 fumigation to control pests. Sulfur burners heat elemental sulfur, creating sulfur dioxide. If inhaled, sulfur dioxide can create sulfuric acid in the presence of moisture and can burn the respiratory tract. CO2 can be used to fumigate at levels above OSHA's immediately dangerous to life or health level of 40,000 ppm to control pests. Both of these operations are of concern to workers entering the space, adjacent tenants unaware of this fumigation activity, and first responders entering after hours.

Regulations have also addressed a 'nuisance problem' that come from grow facilities. Marijuana plants emit a very strong "skunk like" odor, and local authorities typically require ventilation systems to be installed such that any odors are prevented from leaving the premises. This is usually accomplished by installing a charcoal filter on the discharge of the exhaust duct. Other methods to reduce odors include ozone generators and ionizers.

Electrical demands to serve the numerous grow lamps typically operating at 1,000 watts each are very high. Fires have occurred as a result of the melting of the overhead electrical service. There have been reported instances where the inside electrical system was sized correctly and inspected, but the electric utility service from the transformer was never upgraded. Predictions are that states with vibrant marijuana growth are facing the increased demands for electricity. However, efforts by owners of grow facilities to utilize electricity more efficiently have reduced projections of that need.

Another problem results from efforts to maximize the amount of product grown in the space available. With most growing performed in former warehouse buildings, vertical building height already exists in their space. Growers have now been growing plants "vertically" on tiers of storage racks up to 30 feet in height. This has resulted in a new issue as municipalities are assessing whether to regulate these operations as high-pile storage or to utilize a different code regulation.

Manufacture of Infused Product

After marijuana is harvested, it is processed for sale in another facility. While the sale of marijuana flowers still makes up a majority of the type of product sold, the sale of concentrates is gaining a larger percentage of the total sales every year. These products take many forms, from oils, to vapes, from shatter to edibles.

Concentrates are exactly what the name implies -- a more concentrated form of tetrahydrocannabinol (THC), the principal psychoactive component of the marijuana plant. THC can be extracted in a highly-concentrated oil. Extraction using butane is the most cost effective, yet the most dangerous method used. For this reason, many Fire Codes prohibit open releases of butane to the atmosphere during the extraction.

Several manufacturers produce equipment that cycles butane around a closed loop system passing through the plant material. The butane under pressure in liquid form acts as a solvent and breaks the THC from the plant. The butane is then recollected, and oil can then be retrieved. Currently there is no listings [such as UL] for this equipment. Thus, Denver and other jurisdictions require an engineering analysis of the extraction process, signed and stamped by a professional engineer.

Businesses using this equipment are also required to have a hazardous exhaust system installed to capture any potential release of butane, and the Colorado state marijuana laws require that the operation be in a dedicated room. Additionally, a local hydrocarbon detector is required to alert the operator of butane leaks.

CO2 extraction is another method of producing marijuana oil. The equipment must follow the same approval and permitting process as the butane equipment. Although there is no explosion risk as there is with butane, the systems can run at pressures as high as 10,000 pounds per square inch (psi); consequently, the equipment must be reviewed to ensure it is constructed appropriately. Businesses using this equipment are required to perform the extraction in a dedicated room, and a local CO2 alarm is required to alert of CO2 leaks.

Another extraction method is an alcohol distillation or heated evaporation process. Although alcohol is common, any flammable liquid can be used. Marijuana is soaked in alcohol and then the liquid is boiled off, leaving the oil behind. Larger operations recapture the alcohol in a distillation process for reuse. This process can also be used as a refinement after a CO2 or butane extraction. A number of methods and types of equipment can be used for this extraction process. When employing this process, a hazardous exhaust hood is required over the extraction process to capture any flammable vapors released, and equipment must be rated for heating flammable liquids. The one exception is a piece of equipment called a "solvent distillation unit" that is regulated in International Fire Code 3405 and has a UL listing specifically for distilling solvents.

Process facilities also frequently contain other operations within the same facility which test and certify the safety and potency of the marijuana product.

Common Risk Problems

A design professional providing services in the construction of a grow facility must be aware of a wide variety of risks not necessarily seen in typical construction. These include the following:

Threat of Explosion and Fire

Marijuana facilities face a significant risk of fire or explosion. In 2014, there were 32 reported butane hash-oil explosions in Colorado alone caused by using unapproved butane open-blast extraction. Breweries, too, face a surprising risk of explosion from grain dust.

Municipalities have imposed requirements on marijuana extraction facilities and grow facilities and breweries to reduce the risk of explosion. The special design required in butane-based extraction is

illustrative of the concern municipalities have regarding the unavailability of manufactured equipment that will safely perform the desired process.

Worker Safety

At marijuana grow facilities, workers are also subject to chemical exposure from fertilizers and pesticides, from sulfur dioxide as a result of fumigation, and from carbon dioxide asphyxiation.

Damage to Real Property

Because the business is illegal under Federal law but legal by state law, there is a concern that the federal government will intervene and prosecute owners of grow rooms. For this reason, the facilities that house these grow rooms are frequently leased in most cases. As leased spaces, they are not designed to be used for this purpose. The environment required for a grow room can wreak havoc on a structure built for other enterprises.

The conditions of these grow rooms are nearly identical to those of an indoor pool. Temperatures between 75° and 85°F and relative humidity [RH] values range between 60% and 65%. This elevated level of humidity comes from the natural transpiration of the plants themselves. The high levels of relative humidity can lead to condensation on building components. Many 'big box' buildings have not been designed to handle the resulting temperature gradient, moisture migration via air movement, and vapor diffusion from interior to exterior space. Elevated temperatures, together with the higher RH, are even more detrimental in cold climates where winter temperatures are cooler for longer periods of time. This causes the vapor drive to be directed from inside to outside, where it can be trapped within the wall/roof, or the wall/roof components can be exposed to this condition for a longer period of time before it can naturally dry out.²

Elevated temperature and RH can also produce an ideal environment for the propagation of biological growth and an increased likelihood of building material deterioration. This can range from moldy drywall and insulation to deteriorated structural components. This can not only cause health issues from poor indoor air quality but can make the structure susceptible to further damage from the elements.

Finally, with increased moisture also comes an accelerated rate of building material deterioration, including gypsum roofs, wood walls, and insulation.

Electrical Risks

Computerized control systems monitor the environment and operate the equipment to maintain optimum conditions to maximize the crop yield. Failure of the computer system or electrical system can result in compromise of the plants.

Miscellaneous Risks

Means of Egress as required in IBC, Chapter 10 is an important consideration for the facility. Marijuana growers typically do not grow in a building with one large open room. They need to isolate the plants that are at different stages of growth. Large converted warehouses can be maze-like with multiple

rooms. Care must be taken to ensure that egress paths are clear and do not become blocked by equipment or storage containers.

Design Professional Liability Issues

Inadequate design

An improperly designed, constructed, and operate facility can cause damage to the property or the product. Basic design elements are crucial.

1. *Vapor barrier.* The walls and ceiling construction of the room should include vapor barriers and corrosion resistant materials. The walls should have sufficient insulation behind the vapor barrier to minimize the chances of moisture in the air condensing and forming water droplets on the wall.
2. *Plumbing.* Grow rooms should be provided with floor drains to remove spilled water and nutrient solutions. The drains should be trapped and equipped with screens to catch any plant material or other debris. The International Plumbing Code requires that water supply lines used for irrigation purposes be provided with back-flow preventers to protect the domestic water supply from contamination. Environmental contamination is a common problem for these types of facilities.
3. *Electrical.* Grow facilities have a very high electrical demand due to the grow lights, air conditioning units, and other equipment. The electrical system must be sized and installed in accordance with the National Electric Code. Overloaded electrical wiring has caused fires in some marijuana grow facilities. In addition to ensuring that the electrical system inside the building is designed and installed properly, the electric service entrance equipment and conductors for the building need to be evaluated. If the facility was created as a remodel to an existing building, it may be necessary for the electric utility company to upgrade the conductors and/or transformer serving the building. A simple power outage, if prolonged, can cause the loss of a roomful of plants during sensitive phases of the growth cycle.

Product Liability

1. Plants that pass a state-mandated lab test may contain trace amounts of pesticides or mold, potentially exposing the entire chain of distribution – the grower, test lab and retailer -- to product liability suits. Robust humidity can lead to property and product damage from mold on the walls and the structure and to the growth of pathogenic organisms on the product. Fumigation is performed on plants in the grow facility, but the risk nevertheless remains. Contamination of the marijuana product is a valid concern and significant risk.
2. *Edibles.* Edibles, which utilize the oil created during extraction, are not well-regulated. Any user of such a product must realize that it takes at least 1-2 hours to experience the “high,” or euphoria, compared with smoking it. The quality and quantity of THC in an edible is not standardized. Consuming multiple servings, especially at one sitting, has an additive effect for potential psychological effects. Ingesting multiple servings in a short amount of time can also lead to paradoxical or unusual reactions that can trigger intense anxiety, paranoia, or even frank psychosis-

-seen more frequently among first time users (marijuana-naïve). Another issue is quality control of the product. At present, marijuana products are not tested for contaminants or potency and standards are still not established. The safety of edibles could be compromised by potential adulteration with other illicit substances or drugs of abuse.

One can easily envision cases where liability is sought to be imposed against the design professional under either a direct cause of action or a claim for contribution. Indeed, in recent years, the heightened concern for providing the innocent plaintiff with adequate compensation have combined to deny the design professional the traditional shields in negligence actions. Moreover, under the influence of product liability litigation, courts in some circumstances have recognized a right of action against design professionals predicated on the theory of implied warranty, and strict liability.³ Privity and 'acceptance rule' defenses, in some instances, are slowly being eroded.⁴

Nuisance.

The common law of nuisance may pose liability concerns for the design professional. While CERCLA has been deemed to preempt the federal common law of nuisance as an environmental remedy, the common law of nuisance is still available to private plaintiffs.⁵ Private nuisance is the unreasonable interference with the landowner's use and enjoyment of his property. As such, nuisance rests on tort liability. A person interfering with the landowner's use and enjoyment of his property may be liable in nuisance if his actions were intentional, reckless, or negligent.

Environmental contamination of real property can give rise to liability in nuisance.⁶ To the extent that the design professional's conduct contributes to the environmental contamination, he too may be liable in nuisance.⁷

A private nuisance—is an interference with the use or enjoyment of land that causes injury in relation to an ownership right in that land. A public nuisance—may be defined as an unlawful act or omission, which is so widespread in range and indiscriminate in its effect that it obstructs, damages, or inconveniences the rights of the community. Generally, public nuisance covers a wide variety of minor crimes (such as carrying on an offensive trade, obstructing the highway, etc.) for which a criminal prosecution may be pursued or, in some circumstances, an injunction sought to restrain the offending activity. A defendant may create a nuisance by negligence – for example, in the case of *Fisk v. Tow of Redding*⁸, where a manufacturing operation caused an unnecessary and unreasonable amount of smoke or fumes. Besides liability for a private nuisance, a design professional may face liability for environmental clean-up under the Comprehensive Environmental Response, Compensation and Liability Act [CERCLA] which provides for contribution claims.⁹

Conclusion

Any time a new industry is developed, government entities and those charged with developing safety policies and protocols must review the nascent industry and develop recommendations for the public safety. Legal solutions to the problems inherent in the new industry follow from there. While there

existed guidelines and a sound body of law to draw upon concerning the issues with craft breweries, the problems that arise with the marijuana industry are not so easily addressed, due to the conflict between the approach of the federal government and the approach of states in permitting the industry to develop. While there have been significant strides made in the technical aspects of marijuana facility safety, issues regarding legal and business questions appear to be in limbo and will continue to receive only tenuous resolution until the federalism issue is resolved.

Besides the political question, the industry has only recently developed a consensus on design issues for the three different types of facilities utilized to grow, process, and deliver marijuana to the consumer. Not only must the grow facility maximize the plant growth, but care must be taken to avoid contamination and damage to the building. A design professional must also consider employee safety and minimize the impact of the facilities on the public.

Overall, while a growth industry going forward, marijuana facilities are still relatively new and design professionals must carefully consider potential – and unexpected – liabilities.

APPENDIX A - Marijuana Facility Code Provisions

1) Sample code where facilities are not permitted:

No person shall establish, develop, construct, maintain, or operate a medical marijuana dispensary, and no application for a building permit, use permit, variance, or any other entitlement authorizing the establishment, development, construction, maintenance, or operation of any medical marijuana dispensary shall be approved by xxxxxx or any officer or employee thereof.

2) Examples of code requirements from various Colorado jurisdictions

- Security Plan

Design plan must show the locations of all proposed exterior lighting and light fixture information; Design plan must show location of cameras, motion detectors, security system computer; and the locations of safes.

- Operation Plan (with attached narrative)

A plan for ventilation of the medical marijuana business that describes the ventilation systems that will be used to prevent any odor of medical marijuana off the premises of the business. For cultivation facilities, such plan shall also include all ventilation systems used to control the environment for the plants and describe how such systems operate with the systems preventing any odor from leaving the premises.

- Building Guidelines

The building permit application must meet the general building permit submittal requirements. The plans must be prepared by a Colorado Design Professional and must address specific medical marijuana related requirements including the following:

Cultivation facilities must meet International Building Code (IBC) Chapter 3 requirements based on a Use and Occupancy Classification of Factory Industrial, F-1, Moderate-hazard Occupancy (IBC 306.2).

Centers and dispensaries must meet IBC Chapter 3 requirements based on a Use and Occupancy Classification of a Mercantile Occupancy, M, or a Business Occupancy, B depending on the amount and level of treatment services provided (IBC 309.1).

Applicable Means of Egress requirements based on IBC Chapter 10.

Applicable Accessibility requirements based on IBC Chapter 11.

Applicable fire suppression system requirements based on IBC Section 903 and local amendments.

- Mechanical Guidelines

A ventilation system will be required to filter the odor from a business so that it cannot be detected at the exterior of the business or at any adjoining property. The ventilation system for a medical marijuana business requires, at a minimum:

Exhaust systems designed and constructed to capture sources of contaminants to prevent spreading of contaminants or odors to other occupied parts of the building reference "Contaminant sources," International Mechanical Code (IMC) 401.6.

Cultivation facilities must have a ventilation rate of 60 cfm/person. Centers and dispensaries must have an outside ventilation rate of 15 cfm/person

Center facility exhaust outlets must be 3 feet from property lines, operable openings into a building and from mechanical air intakes.

A ventilation system will be required to filter the odor from a business so that it cannot be detected at the exterior of the business or at any adjoining property.

Cultivation facility exhaust outlets must be 10 feet from property lines, operable openings into a building and from mechanical air intakes.

- Energy Efficiency Guidelines

Every medical marijuana business shall directly offset 100% of its electricity consumption through the purchase of renewable energy in the form of Colorado Wind Source, a verified subscription in a community solar garden, or renewable energy generated on-site, or an equivalent that is subject to approval by the city.

- Fire Protection

Many jurisdictions utilize NFPA 58 as a basis for regulating extraction facilities, but it is generally acknowledged that this standard is insufficient. The NFPA convened a task group to craft a new chapter for NFPA1, Fire Code on marijuana grow and processing facilities. The committee accepted the draft of the new chapter and the new Chapter 39 "Marijuana Growing, Processing or Extraction Facilities, can be found in the Second Draft Report available online. A publication date of 2018 is expected.

In addition, Denver [and other jurisdictions] have adopted a code requirement that a State licensed design professional shall provide detailed plans and specifications on the process for extracting cannabinoids from marijuana plant products with flammable solvents, gasses, and solids.

Post Construction Guidelines

After receipt of the building permit and no more than 10 days after completion of construction and final inspection by the building department, the applicant shall submit the following:

Complete procedure for monitoring of alarm system, including: 1) Names and emergency contact information of person responsible for notifying Police Department within 12 hours of criminal activity or attempts of criminal activity; and 2) Name and contact information for landlord if applicant rents the business space.

ADDENDUM A: Evolving Issues in Marijuana Grow Facility Design

October 4, 2019

By Jeffrey Clay Ruebel, Esq and Sam Andras, AIA

Cannabis production is a relatively new, yet dynamic industry. Given the multiple uses ascribed to hemp, the increasing acceptance of marijuana as having possible medicinal value, and the 'legalization' of marijuana for recreational use, changes in regulation of grow facilities and improvements in production are regularly occurring and promise to continue for some time. This article is intended to update and supplement an earlier article on marijuana design facilities published by the AIA Trust.

Regulatory change

As jurisdictions approve marijuana for medicinal and recreational use, there have been significant changes in the regulatory status of cannabis production. Several countries have legalized medical cannabis, with the result being that Canada and Europe have adopted regulatory constructs for the production of medical cannabis. In the United States, the Food and Drug Administration recommends guidelines for anything food, drug or pharmaceutical related. However, because cannabis remains illegal at the national level, none of the federal agencies that would normally oversee and/or require Good Manufacturing Practice guidelines have done so. As a result, each state where cannabis has been legalized is adopting their own requirements. All of this has resulted in a patchwork of regulations, with some states beginning to reference and/or require compliance with cGMP guidelines.

If the US does move towards a federal legalization, there will be many hurdles to align regulations, both at the state level and internationally to compete with the world's cannabis market. EU jurisdictions classified the product as medical and therefore looked to an already established standard commonly known as the EU-GMP for manufacturing and cultivation while also requiring compliance with the World Health Organization's Good Agricultural and Collection Practices (WHO-GACP). Looking forward, for domestic and international distribution, these are the systems that must be considered and possibly implemented in domestic cannabis production facility. Of course, given the possibility that recreational use may also occur, other changes are also possible. Design professionals should strive to be aware of all regulatory requirements, both nationally and internationally.

Production changes

Not only must design professionals be aware of looming regulatory changes, economics and technology has also resulted in changes in design of grow facilities. Factors which affect the economics of a grow facility, such as the number of plants per square foot in the various stages of cultivation, the height of plants at harvest, the type of lighting, grow medium, and irrigation method are central to the success of any grow facility. As the trend in construction of grow facilities is toward vertically integrated facilities that combine cultivation, extraction, post-processing, consumables manufacture, and quality assurance testing labs, the designer must have an understanding of every step of the process, from bringing seed, or clones, into the facility up through a packaged product leaving the facility. Experience shows that small inefficiencies can easily turn into a large loss of money. A prudent designer must understand the flow of the functions and the required types of spaces as the cannabis plant moves through the production process. Proper spatial relationships are equally important in maximizing yields, and thereby profits.

The architect must be licensed in the state in which the facility is located. A design professional should also have [or consult with] an understanding of what's important to the grower and facility owners. Architects must understand that most owners don't know cultivation and therefore, owners rely on growers for planning facilities. An architect who understands cultivation methodologies can discuss the pros and cons with owners, thereby helping owners make educated decisions on how to develop the cultivation aspect of their operations. Additionally, there are many nuances of cannabis production which architects and engineers may not understand, including planning for cGMP and/or EU-GMP/WHO-GACP guidelines. Aspects to be considered are building materials, clean-ability, equipment & locations, functional flow, cost, and the speed of delivery and installation.

A designer must remember that cultivation is a labor-intensive endeavor. If there are insufficient walk spaces or the walk spaces are not large enough walk spaces to keep flow moving, larger than necessary labor costs will be incurred. Improper ratios of space, irrational flow, and flawed system design will also adversely impact productivity. Various mechanical systems can also have an impact on project cost and revenue. The architect must consider upfront equipment/installation cost, operational cost, and equipment space requirements.

Beyond space design, other factors need to be carefully considered. Zoning regulations can be a huge obstacle, particularly for dispensaries. For example, Brockton, Massachusetts required a proposed facility to be 2,500 feet from schools, houses of worship, or areas of high use by children. Signage is also frequently heavily restricted by local jurisdictions. Translucent or opaque glazing is usually required. Odor mitigation is also becoming a major obstacle in most areas of the country. Michigan regulations require cultivation facilities to operate under negative air pressure. This is counter to good design practices which ensure cultivation is under positive pressure.

Lighting is the single biggest operational cost in cannabis cultivation. Double-ended high-pressure sodium lamps are still the "go-to" lamp in flower rooms, but LEDs are also gaining interest from growers. In other areas of cultivation, LED and LECs, or light-emitting ceramics also known as ceramic metal halide (CMH) lamps, are being utilized to help reduce energy costs. Not only is the type of lamp crucial, but also correctly locating the lighting to ensure plants receive ample light to optimize growth and flowering yet appropriately spaced to ensure plants aren't burnt. The amount of light is not the only consideration when designing the facility, as "spectrum" is also a key to maximizing production.

Experience has taught us that facilities need to be designed with full clean-room protocols. Access to areas of production should be limited. Viewing windows placed in corridors throughout the facility can be used to accommodate visible access for inspectors, investors, etc., while limiting access that can lead to possible contamination of valuable crops. Technologies that can reduce airborne and surface contaminants such as bacteria, viruses, mold and other pathogens should to be used.

Conclusion

In the near term there will not be an alignment of regulations between jurisdictions. The independent evolution of the Canadian system, the state-mandated system within the US and the requirement for EU-GMP and WHO-GACP in the EU countries means that the national and international community will be left with regulatory barriers and having to host multiple regulatory authority inspections for markets where they are able to participate. The driving forces behind the need for implementation of national cGMP are the separately evolving regulatory regimes of numerous countries and states and the drive to trade internationally in a jurisdiction with a higher standard. It would appear likely that since EU countries have a known standard – the EU-GMP and WHO-CACP –as the requirement for production

of medicinal cannabis, the national cGMP will likely adopt large elements of the EU-GMP so as to permit the marijuana industry to partake in international trade of medicinal cannabis. This, along with improving science and technology, place a requirement on designers to be aware of new developments in this dynamic business.

ADDENDUM B: The Dilemma of Marijuana Legality

October 4, 2019

By Jeffrey Clay Ruebel, Esq.

An increasing number of states have legalized marijuana for medical and recreational use. The demand for high-tech grow facilities is spreading across the country, creating new and unique opportunities for architects and engineers.

However, marijuana remains a Class I narcotic under the federal Controlled Substance Act. The CSA makes it unlawful to “knowingly open, lease, rent, maintain, or use property for the manufacturing, storing, or distribution of controlled substances.” Participating in state-legal marijuana economies, even in ancillary ways, remains a felony crime under federal law. Thus, providing design services for a grow facility, while legal under state law, could result in criminal charges under federal law.

Not only could a design professional be criminally liable but providing design services for marijuana facilities could also result disciplinary action against the professional. Under the AIA Ethics Code Rule 2.101, architects can be disciplined for knowingly violating the law in their professional practice. As per the rule’s commentary, the violation of *any* law, local, state or federal, is the basis for discipline under this rule. Similarly, under Rule 2.106, members are not to counsel or assist a client in conduct that the architect knows, or reasonably should know, is fraudulent or illegal.

A review of AIA disciplinary proceedings demonstrate that the AIA strictly enforces its rules upon architects who violate the proscription on committing violations of the law.

On the other hand, as states have legalized marijuana, it has become crucial for states to regulate marijuana facilities to ensure the safety of the public. For example, Colorado retail marijuana regulations require a Professional Engineer to certify that applicable local and state building codes for solvent-based retail marijuana content were met (ref. 1 CCR 212-2).

Similarly, the Denver Fire Code has a separate section governing all types of marijuana facilities, including that grow facilities meet F-1 occupancy requirements. The code requires a review of design plans, which plans are to bear the seal and signature of the responsible design professional. Engineering is also crucial to ensure product safety and purity.

Performing these necessary services would arguably fall within the instructions of Canon II of the AIA Code, which states members should promote and serve the public interest in their personal and professional activities. Given the risks that would be potentially inflicted upon the public by refusing or failing to perform these services, an argument can be made that the design professional has an obligation to perform the required services to protect the public.

Another wrinkle has further complicated the issue. In some jurisdictions, unlicensed individuals have served as design professionals for marijuana facilities, a practice vigorously punished by administrative judges. In one instance, the ALJ fined the individual \$5,000 per day for a period of 40 days.

It should be noted, however, that the federal government has generally and traditionally relied on state and local authorities to address marijuana. Further, instances of federal action against legal facilities are limited in number, for a variety of legislative and legal reasons. But what is a design professional to do?

There is no clear and ‘safe’ answer. The AIA has not addressed and interpreted its rules on the issue. However, recently the United States 10th Circuit Court of Appeals provided a possible solution to the issue.

In *Kenney v. Helix TCS, Inc.*, (No. 18-1105, Sept. 20, 2019), the Plaintiff was an employee of a state-sanctioned marijuana facility. Kenney filed suit, claiming his employer violated the Fair Labor Standards Act. The employer denied any obligation to comply with the FLSA, arguing the Controlled Substances Act (CSA) ‘repealed’ the FLSA for employers of the marijuana industry. The district court agreed, but the 10th Circuit reversed.

In its opinion, the Court found that the CSA did not directly conflict with the FLSA. It noted that this holding would allow the employer to reap the benefit from its own CSA violation. It noted that employers are not excused from complying with federal laws just because their business practices are federally prohibited. Thus, it held, the focus of regulatory statutes like the FLSA is on the employees’ well-being, and not their activities.

Applying this rationale to the requirements imposed by regulatory agencies on the marijuana industry, any disciplinary action by the AIA [or state regulatory board] would be improper. The purpose of the regulations is not to violate the Controlled Substances Act, but rather to ensure that construction practices are safe and that the public is protected from activities that would otherwise put the public at risk. The higher purpose of protecting the public is the focus of all the regulations, and any conflict between them should be decided with this purpose in mind.

A design professional is advised that engaging in this practice area may have adverse consequences – both criminally and professionally. If the professional chooses to practice in this area, though, one principle that is crucial: Know your potential partners in the cannabis industry to ensure that they fully comply with the drug laws of the state in which they operate and perform the duties imposed on you by law with the safety of the public in mind.

END NOTES

- ¹ Erwin Chemerinsky, Jolene Forman, Allen Hopper & Sam Kamin, *Cooperative Federalism and Marijuana Regulation*, 62 UCLA L. Rev. 74 (2015).
- ² Smoot, *Humidity 'gets high' on Medicinal Marijuana*, Interface, October 2012.
- ³ Flatt, THE EXPANDING LIABILITY OF DESIGN PROFESSIONALS, 20 Mem. St. U. L. Rev. 611 (1990).
- ⁴ Id.; See also *Flagstaff Affordable Housing, L.P. v. Design Alliance, Inc.* 223 Ariz. 320, 223 P.3d 664 (2010) (holding privity of contract is not required for foreseeable injuries to foreseeable victims)
- ⁵ *Middlesex County Sewerage Authority v. National Sea Clammers Ass'n*, 453 U.S. 1, 101 S. Ct. 2615, 69 L. Ed. 2d 435, 16 Env't. Rep. Cas. (BNA) 1118, 11 Env'tl. L. Rep. 20684 (1981)
- ⁶ *Kostyal v. Cass*, 163 Conn. 92, 302 A.2d 121 (1972) (groundwater contamination)
- ⁷ See *Knabe v. National Supply Division of Armco Steel Corp.*, 592 F.2d 841, 13 Env't. Rep. Cas. (BNA) 1119, 9 Env'tl. L. Rep. 20257 (5th Cir. 1979).
- ⁸ 164 Conn. App. 647 (2016)
- ⁹ 42 U.S.C. § 9613(f)(1) and §9613(f)(3)(B)

APPENDIX A - Marijuana Facility Code Provisions

1) Sample code where facilities are not permitted:

No person shall establish, develop, construct, maintain, or operate a medical marijuana dispensary, and no application for a building permit, use permit, variance, or any other entitlement authorizing the establishment, development, construction, maintenance, or operation of any medical marijuana dispensary shall be approved by xxxxxx or any officer or employee thereof.

2) Examples of code requirements from various Colorado jurisdictions

- Security Plan

Design plan must show the locations of all proposed exterior lighting and light fixture information; Design plan must show location of cameras, motion detectors, security system computer; and the locations of safes.

- Operation Plan (with attached narrative)

A plan for ventilation of the medical marijuana business that describes the ventilation systems that will be used to prevent any odor of medical marijuana off the premises of the business. For cultivation facilities, such plan shall also include all ventilation systems used to control the environment for the plants and describe how such systems operate with the systems preventing any odor from leaving the premises.

- Building Guidelines

The building permit application must meet the general building permit submittal requirements. The plans must be prepared by a Colorado Design Professional and must address specific medical marijuana related requirements including the following:

Cultivation facilities must meet International Building Code (IBC) Chapter 3 requirements based on a Use and Occupancy Classification of Factory Industrial, F-1, Moderate-hazard Occupancy (IBC 306.2).

Centers and dispensaries must meet IBC Chapter 3 requirements based on a Use and Occupancy Classification of a Mercantile Occupancy, M, or a Business Occupancy, B depending on the amount and level of treatment services provided (IBC 309.1).

Applicable Means of Egress requirements based on IBC Chapter 10.

Applicable Accessibility requirements based on IBC Chapter 11.

Applicable fire suppression system requirements based on IBC Section 903 and local amendments.

- Mechanical Guidelines

A ventilation system will be required to filter the odor from a business so that it cannot be detected at the exterior of the business or at any adjoining property. The ventilation system for a medical marijuana business requires, at a minimum:

Exhaust systems designed and constructed to capture sources of contaminants to prevent spreading of contaminants or odors to other occupied parts of the building reference "Contaminant sources," International Mechanical Code (IMC) 401.6.

Cultivation facilities must have a ventilation rate of 60 cfm/person. Centers and dispensaries must have an outside ventilation rate of 15 cfm/person

Center facility exhaust outlets must be 3 feet from property lines, operable openings into a building and from mechanical air intakes.

A ventilation system will be required to filter the odor from a business so that it cannot be detected at the exterior of the business or at any adjoining property.

Cultivation facility exhaust outlets must be 10 feet from property lines, operable openings into a building and from mechanical air intakes.

- Energy Efficiency Guidelines

Every medical marijuana business shall directly offset 100% of its electricity consumption through the purchase of renewable energy in the form of Colorado Wind Source, a verified subscription in a community solar garden, or renewable energy generated on-site, or an equivalent that is subject to approval by the city.

- Fire Protection

Many jurisdictions utilize NFPA 58 as a basis for regulating extraction facilities, but it is generally acknowledged that this standard is insufficient. The NFPA convened a task group to craft a new chapter for NFPA1, Fire Code on marijuana grow and processing facilities. The committee accepted the draft of the new chapter and the new Chapter 39 "Marijuana Growing, Processing or Extraction Facilities, can be found in the Second Draft Report available online. A publication date of 2018 is expected.

In addition, Denver [and other jurisdictions] have adopted a code requirement that a State licensed design professional shall provide detailed plans and specifications on the process for extracting cannabinoids from marijuana plant products with flammable solvents, gasses, and solids.

Post Construction Guidelines

After receipt of the building permit and no more than 10 days after completion of construction and final inspection by the building department, the applicant shall submit the following:

Complete procedure for monitoring of alarm system, including: 1) Names and emergency contact information of person responsible for notifying Police Department within 12 hours of criminal activity or attempts of criminal activity; and 2) Name and contact information for landlord if applicant rents the business space.

Evolving Issues in Marijuana Grow Facility Design

By Jeffrey Clay Ruebel, Esq and Sam Andras, AIA

Cannabis production is a relatively new, yet dynamic industry. Given the multiple uses ascribed to hemp, the increasing acceptance of marijuana as having possible medicinal value, and the ‘legalization’ of marijuana for recreational use, changes in regulation of grow facilities and improvements in production are regularly occurring and promise to continue for some time. This article is intended to update and supplement an earlier article on marijuana design facilities published by the AIA Trust.

Regulatory change

As jurisdictions approve marijuana for medicinal and recreational use, there have been significant changes in the regulatory status of cannabis production. Several countries have legalized medical cannabis, with the result being that Canada and Europe have adopted regulatory constructs for the production of medical cannabis. In the United States, the Food and Drug Administration recommends guidelines for anything food, drug or pharmaceutical related. However, because cannabis remains illegal at the national level, none of the federal agencies that would normally oversee and/or require Good Manufacturing Practice guidelines have done so. As a result, each state where cannabis has been legalized is adopting their own requirements. All of this has resulted in a patchwork of regulations, with some states beginning to reference and/or require compliance with cGMP guidelines.

If the US does move towards a federal legalization, there will be many hurdles to align regulations, both at the state level and internationally to compete with the world’s cannabis market. EU jurisdictions classified the product as medical and therefore looked to an already established standard commonly known as the EU-GMP for manufacturing and cultivation while also requiring compliance with the World Health Organization’s Good Agricultural and Collection Practices (WHO-GACP). Looking forward, for domestic and international distribution, these are the systems that must be considered and possibly implemented in domestic cannabis production facility. Of course, given the possibility that recreational use may also occur, other changes are also possible. Design professionals should strive to be aware of all regulatory requirements, both nationally and internationally.

Production changes

Not only must design professionals be aware of looming regulatory changes, economics and technology has also resulted in changes in design of grow facilities. Factors which affect the economics of a grow facility, such as the number of plants per square foot in the various stages of cultivation, the height of plants at harvest, the type of lighting, grow medium, and irrigation method are central to the success of any grow facility. As the trend in construction of grow facilities is toward vertically integrated facilities that combine cultivation, extraction, post-processing, consumables manufacture, and quality assurance testing labs, the designer must have an understanding of every step of the process, from bringing seed,

or clones, into the facility up through a packaged product leaving the facility. Experience shows that small inefficiencies can easily turn into a large loss of money. A prudent designer must understand the flow of the functions and the required types of spaces as the cannabis plant moves through the production process. Proper spatial relationships are equally important in maximizing yields, and thereby profits.

The architect must be licensed in the state in which the facility is located. A design professional should also have [or consult with] an understanding of what's important to the grower and facility owners. Architects must understand that most owners don't know cultivation and therefore, owners rely on growers for planning facilities. An architect who understands cultivation methodologies can discuss the pros and cons with owners, thereby helping owners make educated decisions on how to develop the cultivation aspect of their operations. Additionally, there are many nuances of cannabis production which architects and engineers may not understand, including planning for cGMP and/or EU-GMP/WHO-GACP guidelines. Aspects to be considered are building materials, clean-ability, equipment & locations, functional flow, cost, and the speed of delivery and installation.

A designer must remember that cultivation is a labor-intensive endeavor. If there are insufficient walk spaces or the walk spaces are not large enough walk spaces to keep flow moving, larger than necessary labor costs will be incurred. Improper ratios of space, irrational flow, and flawed system design will also adversely impact productivity. Various mechanical systems can also have an impact on project cost and revenue. The architect must consider upfront equipment/installation cost, operational cost, and equipment space requirements.

Beyond space design, other factors need to be carefully considered. Zoning regulations can be a huge obstacle, particularly for dispensaries. For example, Brockton, Massachusetts required a proposed facility to be 2,500 feet from schools, houses of worship, or areas of high use by children. Signage is also frequently heavily restricted by local jurisdictions. Translucent or opaque glazing is usually required. Odor mitigation is also becoming a major obstacle in most areas of the country. Michigan regulations require cultivation facilities to operate under negative air pressure. This is counter to good design practices which ensure cultivation is under positive pressure.

Lighting is the single biggest operational cost in cannabis cultivation. Double-ended high-pressure sodium lamps are still the "go-to" lamp in flower rooms, but LEDs are also gaining interest from growers. In other areas of cultivation, LED and LECs, or light-emitting ceramics also known as ceramic metal halide (CMH) lamps, are being utilized to help reduce energy costs. Not only is the type of lamp crucial, but also correctly locating the lighting to ensure plants receive ample light to optimize growth and flowering yet appropriately spaced to ensure plants aren't burnt. The amount of light is not the only consideration when designing the facility, as "spectrum" is also a key to maximizing production.

Experience has taught us that facilities need to be designed with full clean-room protocols. Access to areas of production should be limited. Viewing windows placed in corridors throughout the facility can be used to accommodate visible access for inspectors, investors, etc., while limiting access that can lead to possible contamination of valuable crops. Technologies that can reduce airborne and surface contaminants such as bacteria, viruses, mold and other pathogens should to be used.

Addendum B:
**The Dilemma of
Marijuana Legality**

By Jeffrey Clay Ruebel, Esq.

An increasing number of states have legalized marijuana for medical and recreational use. The demand for high-tech grow facilities is spreading across the country, creating new and unique opportunities for architects and engineers.

However, marijuana remains a Class I narcotic under the federal Controlled Substance Act. The CSA makes it unlawful to “knowingly open, lease, rent, maintain, or use property for the manufacturing, storing, or distribution of controlled substances.” Participating in state-legal marijuana economies, even in ancillary ways, remains a felony crime under federal law. Thus, providing design services for a grow facility, while legal under state law, could result in criminal charges under federal law.

Not only could a design professional be criminally liable but providing design services for marijuana facilities could also result disciplinary action against the professional. Under the AIA Ethics Code Rule 2.101, architects can be disciplined for knowingly violating the law in their professional practice. As per the rule’s commentary, the violation of *any* law, local, state or federal, is the basis for discipline under this rule. Similarly, under Rule 2.106, members are not to counsel or assist a client in conduct that the architect knows, or reasonably should know, is fraudulent or illegal.

A review of AIA disciplinary proceedings demonstrate that the AIA strictly enforces its rules upon architects who violate the proscription on committing violations of the law.

On the other hand, as states have legalized marijuana, it has become crucial for states to regulate marijuana facilities to ensure the safety of the public. For example, Colorado retail marijuana regulations require a Professional Engineer to certify that applicable local and state building codes for solvent-based retail marijuana content were met (ref. 1 CCR 212-2).

Similarly, the Denver Fire Code has a separate section governing all types of marijuana facilities, including that grow facilities meet F-1 occupancy requirements. The code requires a review of design plans, which plans are to bear the seal and signature of the responsible design professional. Engineering is also crucial to ensure product safety and purity.

Performing these necessary services would arguably fall within the instructions of Canon II of the AIA Code, which states members should promote and serve the public interest in their personal and professional activities. Given the risks that would be potentially inflicted upon the public by refusing or failing to perform these services, an argument can be made that the design professional has an obligation to perform the required services to protect the public.

Another wrinkle has further complicated the issue. In some jurisdictions, unlicensed individuals have served as design professionals for marijuana facilities, a practice vigorously punished by administrative judges. In one instance, the ALJ fined the individual \$5,000 per day for a period of 40 days.

It should be noted, however, that the federal government has generally and traditionally relied on state and local authorities to address marijuana. Further, instances of federal action against legal facilities are limited in number, for a variety of legislative and legal reasons. But what is a design professional to do?

There is no clear and ‘safe’ answer. The AIA has not addressed and interpreted its rules on the issue. However, recently the United States 10th Circuit Court of Appeals provided a possible solution to the issue.

In *Kenney v. Helix TCS, Inc.*, (No. 18-1105, Sept. 20, 2019), the Plaintiff was an employee of a state-sanctioned marijuana facility. Kenney filed suit, claiming his employer violated the Fair Labor Standards Act. The employer denied any obligation to comply with the FLSA, arguing the Controlled Substances Act (CSA) ‘repealed’ the FLSA for employers of the marijuana industry. The district court agreed, but the 10th Circuit reversed.

In its opinion, the Court found that the CSA did not directly conflict with the FLSA. It noted that this holding would allow the employer to reap the benefit from its own CSA violation. It noted that employers are not excused from complying with federal laws just because their business practices are federally prohibited. Thus, it held, the focus of regulatory statutes like the FLSA is on the employees’ well-being, and not their activities.

Applying this rationale to the requirements imposed by regulatory agencies on the marijuana industry, any disciplinary action by the AIA [or state regulatory board] would be improper. The purpose of the regulations is not to violate the Controlled Substances Act, but rather to ensure that construction practices are safe and that the public is protected from activities that would otherwise put the public at risk. The higher purpose of protecting the public is the focus of all the regulations, and any conflict between them should be decided with this purpose in mind.

A design professional is advised that engaging in this practice area may have adverse consequences – both criminally and professionally. If the professional chooses to practice in this area, though, one principle that is crucial: Know your potential partners in the cannabis industry to ensure that they fully comply with the drug laws of the state in which they operate and perform the duties imposed on you by law with the safety of the public in mind.

This information is provided for educational purposes only and should not be construed as legal advice. Laws, regulations, licensing requirements, and ethical codes vary by state, and individuals should seek legal counsel or professional advice to evaluate their specific set of facts and circumstances. AIA members should also be cognizant of their obligation to adhere to the AIA’s Code of Ethics and Professional Conduct. The views stated herein are solely those of the authors and not of the AIA Trust or The American Institute of Architects.

All information in the Guide is copyrighted by Jeff Ruebel and Casey Ann Quillen. A license is granted to the AIA Trust and to members of the American Institute of Architects to use the same with permission. The authors and the AIA Trust assume no liability for the use of this information by AIA members or by others who by clicking on any of the links above agree to use the same at their sole risk. Any other reproduction or use is strictly prohibited.

Conclusion

In the near term there will not be an alignment of regulations between jurisdictions. The independent evolution of the Canadian system, the state-mandated system within the US and the requirement for EU-GMP and WHO-GACP in the EU countries means that the national and international community will be left with regulatory barriers and having to host multiple regulatory authority inspections for markets where they are able to participate. The driving forces behind the need for implementation of national cGMP are the separately evolving regulatory regimes of numerous countries and states and the drive to trade internationally in a jurisdiction with a higher standard. It would appear likely that since EU countries have a known standard – the EU-GMP and WHO-CACP – as the requirement for production of medicinal cannabis, the national cGMP will likely adopt large elements of the EU-GMP so as to permit the marijuana industry to partake in international trade of medicinal cannabis. This, along with improving science and technology, place a requirement on designers to be aware of new developments in this dynamic business.

This information is provided for educational purposes only and should not be construed as legal advice. Laws, regulations, licensing requirements, and ethical codes vary by state, and individuals should seek legal counsel or professional advice to evaluate their specific set of facts and circumstances. AIA members should also be cognizant of their obligation to adhere to the AIA's Code of Ethics and Professional Conduct. The views stated herein are solely those of the authors and not of the AIA Trust or The American Institute of Architects.

All information in the Guide is copyrighted by Jeff Ruebel and Casey Ann Quillen. A license is granted to the AIA Trust and to members of the American Institute of Architects to use the same with permission. The authors and the AIA Trust assume no liability for the use of this information by AIA members or by others who by clicking on any of the links above agree to use the same at their sole risk. Any other reproduction or use is strictly prohibited.