

GUIDE TO MARIJUANA FACILITIES DESIGN

PART I: DESIGNING FOR HEDONISM

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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 FI occupancies. The F1 occupancy classification was determined based on high electric demand for grow lamps, fumigation operations, carbon dioxide (CO₂) enrichment, maze-like 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, and 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 operated 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.

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)