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Addendum A:

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.

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.