Marijuana Facilities and Building Codes
Marijuana Facilities and Building Codes

What are we going to talk about?

• State Laws
• Types of Facilities
• Building Code Issues
• Fire Code Issues
• Energy Code Issues
• Plumbing, Mechanical, Electrical Code Issues
• Open Discussion

Source: Governing Magazine, Current September 14, 2017
Profitable Business

- The table below shows medical and retail marijuana tax and fee collections totals by calendar year starting in 2014. Although sales of medical marijuana began prior to 2014, the Department of Revenue did not report tax collection data until February of 2014, after retail marijuana sales began.

<table>
<thead>
<tr>
<th>Calendar Year</th>
<th>Total Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>$174,376</td>
</tr>
<tr>
<td>2015</td>
<td>$131,411,729</td>
</tr>
<tr>
<td>2016</td>
<td>$143,408,912</td>
</tr>
<tr>
<td>2017 (Jan-Dec)</td>
<td>$206,060,000</td>
</tr>
</tbody>
</table>

Source: Colorado.gov

Facilities Categories

- Retail Shops
- Commercial Grow Operations
- Bakeries/Food Products (Edibles)
- Drying/Curing/Trimming/Processing
- Testing Labs
- Personal Grow Operations
- Coffeehouses
- Vacation/Spa Experiences

What is it and why do we care?

- Issues for building departments
  - Occupancy classification
  - Security (State Laws)
  - Electrical (High Demand)
  - Ventilation (Odors)
  - Political Pressure
- Legal issues
- Vulnerable Neighbors

State Regulations

- Licensing
  - Retail Marijuana Establishments
  - Medical Marijuana Business
  - Retail Cultivation Facilities
Marijuana and the Building Code

How do they grow it!

Reproduction

- Plants can be reproduced by:
  - Germination of seeds, or
  - Cloning
    - A clone is always taken from an adolescent female plant
    - Will have the same characteristics of the mother plant

Harvesting/Drying

- Hang plants upside down
- Place buds in canning jars

Harvesting/Drying

- Ovens
  - 125-140 degrees F
- Flat piece of foil under 100 watt lamp within 2-4 inches
- Wrap in paper and place over water heater, radiator or back of television
- Microwave oven
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How Do They Grow It?

- Lighting
  - Metal Halide (Blue Spectrum)
  - High Pressure Sodium (Red Spectrum)
  - 400 – 1,000 Watt bulbs

What Does It Need To Grow?

- Water
- Air
  - Often enriched with CO₂
- Medium
- Nutrients
- Chemicals
  - To control pH levels

How Do They Grow It?

- Heat and Temperature Control
  - Ventilation
  - Fans
  - Air Conditioning

- Temperature Control is KING
- Lights & ballasts give off lots of heat

Ventilation

- Large amounts of plants, photosynthesis uses up all the carbon dioxide and fills the room with oxygen
- Plants need a fresh supply of CO₂ in the room or they stop growing
Temperature

• Marijuana grows best at 68 – 72 degrees and will stop growing at temps above 90 degrees

Concerns

• Heat
• Electrical Loads
• Ventilation Rate
• Carbon Dioxide
• Egress
• Humidity
• Odor

Ventilation Equipment

• Large Squirrel Cage Fans
• Inline Fans
• Blowers
• Induction Fans
• Flex Hose Insulated Ducts

Ventilation Equipment

• CO\textsubscript{2} Bottles
• CO\textsubscript{2} Generators
• Environmental Controllers
  – Temp
  – Humidity
  – CO\textsubscript{2} Levels
• Carbon Filters
Ventilation Equipment

- Charcoal Filters
  - Reduce Odors
- Ionizers
  - Reduce Odors
- Ozone Generators
  - Odor Control
  - Humidity Control
- De-Humidifiers

Ventilation Equipment

- Oscillating Fans
  - Move the CO₂
  - Strengthen the stalks
  - Cool the plants
- Exhaust fans to eliminate the heat and excess oxygen

Lighting

- High Intensity Discharge (HID) Grow Lights
  - High pressure sodium
  - Metal halide
- 250-1,000 watt bulbs
- Requires ballast
  - Increased heat and fire hazard

Lighting

- Compact Fluorescent Grow Lights
  - 300 W
- LED Grow Lighting
  - Lower temperature
Marijuana and the Building Code

Lighting

- Lighting Reflectors
  - Ceiling and walls
  - Directs lights onto plants
  - Reduces waste of lighting
  - Mylar used on walls

Power Consumption

- One 1,000 watt HID lamp draws approximately 1KW/Hr.
  - 12/12 light cycle will drawing 12KW per day or 360 KW per month
- Most growers will use more than one light

Power Consumption

- Average Home utilizes between 700 – 1200 KW per month
- Most homes can probably handle the increased loading of 305 HID lamps without additional wiring

Hydroponics

- Grow plants in an inert, sterile growing medium instead of soil.
  - Rockwool
  - Perlite
  - Clay pellets
- Flowering begins in 2-4 weeks
- Harvest two months later
Hydroponics

- Nutrients
  - Nitrogen (N)
  - Phosphorus (P)
  - Potassium (K)
- Basic plant food
  - Liquid
  - Powder

Big Picture...

What are these things?

- Dispensaries
- Grow Facilities
- Processing and Packaging
- Legal vs. Illegal Facilities
Dispensaries

• Mercantile Group M occupancy includes, among others, the use of a building or structure or a portion thereof, for the display and sale of merchandise and involves stocks of goods, wares or merchandise incidental to such purposes and accessible to the public.

Smoking/Treatment Rooms

• Group B
  – Less than 50 occupant assembly area

Grow Facilities

• Group F-1
  Factory Industrial Group F occupancy includes, among others, the use of a building or structure, or a portion thereof, for assembling, disassembling, fabricating, finishing, manufacturing, packaging, repair or processing operations that are not classified as a Group H hazardous or Group S storage occupancy.

Grow Facilities

• Group U
  Buildings and structures of an accessory character and miscellaneous structures not classified in any specific occupancy shall be constructed, equipped and maintained to conform to the requirements of this code commensurate with the fire and life hazard incidental to their occupancy. Group U shall include, but not be limited to, the following:
  – Agricultural buildings
**Processing & Packaging**

- **COMBUSTIBLE FIBERS.**
  - Readily ignitable and free-burning materials in a fibrous or shredded form, such as cocoa fiber, cloth, cotton, excelsior, hay, hemp, hempquen, istle, jute, kapok, oakum, rags, sisal, Spanish moss, straw, tow, wastepaper, certain synthetic fibers or other like materials. This definition does not include densely packed baled cotton.

**Extraction**

- A solvent is used to extract the oil from the dried plant.
- The product is soaked, mixed and stirred in the solvent.
- The solvent/oil solution is then boiled to evaporate the solvent to leave the oil.

**Processing and Packaging**

- **Group H-3**
  - Buildings and structures containing materials that readily support combustion or that pose a physical hazard shall be classified as Group H-3. Such materials shall include, but not be limited to, the following:
  
  - Combustible fibers, other than densely packed baled cotton

**Extraction**

- **Solvents include**
  - Alcohol
  - Naphtha
  - Ether
  - Butane

- **All flammable liquids or gases**
Extraction

- Depending on the amount of solvent that is used, the extraction area could be classified as a Group H-2.
- Ventilation is required regardless of occupancy classification.

Is it a Group H Occupancy?

- 307.1
  - High-hazard Group H occupancy includes, among others, the use of a building or structure, or a portion thereof, that involves the manufacturing, processing, generation or storage of materials that constitute a physical or health hazard in quantities in excess of those allowed in control areas complying with Section 404, based on the maximum allowable quantity limits for control areas set forth in Tables 307.1(1) and 307.1(2).

307.1.1
Uses other than Group H

- 3. Closed piping system containing flammable or combustible liquids or gases utilized for the operation of machinery or equipment.
- 8. The storage or utilization of materials for agricultural purposes on the premises.

Table 307.1(1)

<table>
<thead>
<tr>
<th>Material</th>
<th>Group H-1</th>
<th>Group H-2</th>
<th>Group H-3</th>
<th>Group H-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butane</td>
<td>Flammable</td>
<td>Gas</td>
<td>Class IA</td>
<td>Class IB</td>
</tr>
<tr>
<td>Ethyl Alcohol</td>
<td>Class IB</td>
<td>Flammable</td>
<td>Class IA</td>
<td>Class IB</td>
</tr>
</tbody>
</table>

Butane = Flammable Gas
Ethyl Alcohol = Class IB Flammable Liquid
Maximum Allowable Quantities
MAQ

- Butane
  - 150 pounds storage
  - 150 pounds closed use
  - N/A open use
- Ethyl Alcohol
  - 120 gallons storage
  - 120 gallons closed use
  - 30 gallons open use

Table Footnotes

d. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1. Where Note e also applies, the increase for both notes shall be applied accumulatively.

e. Maximum allowable quantities shall be increased 100 percent when stored in approved storage cabinets, day boxes, gas cabinets, gas rooms or exhausted enclosures or in listed safety cans in accordance with Section 5003.9.10 of the International Fire Code. Where Note d also applies, the increase for both notes shall be applied accumulatively.

Is it a Group H Occupancy?

- Probably Not
- However, Section 414 still applies
  - Control Areas
  - Ventilation
  - Explosion control
  - Storage, dispensing and use
- IFC Requirements

CO2 Extraction

- Equipment isolates cannabinoid oils with a CO2 extraction process.
- No part of the cannabis plant is wasted.
- The cannabis by-products that would usually be discarded as waste are used in the extraction process.
- The CO2 equipment uses cannabis “trim” to produce a clean oil extract that can be used in food products and vape pens.
CO2 Extraction

- Compressed gas
- IFC Requirements
  - Chapter 53
  - Storage
  - Use & Handling

Fire Sprinklers

- F-1 exceeding 12,000 square feet
- All Group H Occupancies
- Group M Occupancies fire area exceeds 12,000 square feet.

Means of Egress

- Security Issues
- Egress doors shall be readily openable from the egress side without the use of a key or special knowledge or effort.

1010.1.9.8 Sensor release of electrically locked egress doors

- The electric locks on sensor released doors shall be installed in a means of egress in buildings with an occupancy in Group A, B, E, I-1, I-2, I-4, M, R-1 or R-2 and entrance doors to tenant spaces in occupancies in Group A, B, E, I-1, I-2, I-4, M, R-1 or R-2 are permitted where installed and operated in accordance with all of the following criteria:
1010.1.9.8 Sensor release of electrically locked egress doors

1. The sensor shall be installed on the egress side, arranged to detect an occupant approaching the doors. The doors shall be arranged to unlock by a signal from or loss of power to the sensor.
2. Loss of power to the lock or locking system shall automatically unlock the doors.

1010.1.9.8 Sensor release of electrically locked egress doors

3. The doors shall be arranged to unlock from a manual unlocking device located 40 inches to 48 inches vertically above the floor and within 5 feet of the secured doors. Ready access shall be provided to the manual unlocking device and the device shall be clearly identified by a sign that reads “PUSH TO EXIT.” When operated, the manual unlocking device shall result in direct interruption of power to the lock—indepedent of other electronics—and the doors shall remain unlocked for not less than 30 seconds.

4. Activation of the building fire alarm system, where provided, shall automatically unlock the doors, and the doors shall remain unlocked until the fire alarm system has been reset.

Access-Controlled Egress Doors

1008.1.4.4

5. Activation of the building automatic sprinkler system or fire detection system, where provided, shall automatically unlock the doors. The doors shall remain unlocked until the fire alarm system has been reset.

6. The door locking system units shall be listed in accordance with UL 294.

Delayed Egress Locks

1010.1.9.7

- Approved, listed,
- Permitted in any occupancy except Group A, E and H occupancies
- NFPA 13 sprinkler system or automatic smoke or heat detection system
- Doors must unlock in accordance with Items 1 through 6 below.
- Cannot pass through more than one door equipped with a delayed egress lock before entering an exit.
Delayed Egress Locks
1010.1.9.7

1. The doors unlock upon actuation of the automatic sprinkler system or automatic fire detection system.
2. The doors unlock upon loss of power controlling the lock or lock mechanism.
3. The door locks shall have the capability of being unlocked by a signal from the fire command center.

4. The initiation of an irreversible process which will release the latch in not more than 15 seconds when a force of not more than 15 pounds is applied for 1 second to the release device.
   Exception: Where approved, a delay of not more than 30 seconds is permitted.

5. A sign shall be provided on the door located above and within 12 inches of the release device reading: PUSH UNTIL ALARM SOUNDS.
   DOOR CAN BE OPENED IN 15 [30] SECONDS.

6. Emergency lighting shall be provided at the door.

High Humidity
• No Code Requirements for excessive humidity
Ventilation

- IMC Section 403.3
  - Smoking Lounges
    - 60 cfm of outdoor air per person
  - All air must be exhausted including air in excess of that required by Table 403.3

Exhaust Discharge
IMC 501.2.1

- Product Conveying Exhaust
  - 10' from the property lines; 3' from exterior walls and roofs; 10' from operable openings into buildings; 10' above adjoining grade.
- Environmental Air Exhaust
  - 3' from property lines; 3' from operable openings into buildings for all occupancies other than Group U, and 10' from mechanical air intakes. Such exhaust shall not be considered hazardous or noxious.

Odor Ventilation

- Local requirements
  - Ventilation rates
  - Charcoal filters
  - Exhaust termination
  - Effect on neighboring properties

City of Boulder Ventilation Requirements

- “A medical marijuana business shall be properly ventilated to filter the odor from marijuana so that the odor cannot be detected by a person with a normal sense of smell at the exterior of the medical marijuana business or at any adjoining use or property”.
Contaminant sources
IMC 401.6

- Stationary local sources producing airborne particulates, heat, odors, fumes, spray, vapors, smoke or gases in such quantities as to be irritating or injurious to health shall be provided with an exhaust system in accordance with Chapter 5 or a means of collection and removal of the contaminants.
- Such exhaust shall discharge directly to an approved location at the exterior of the building.

City of Boulder Ventilation Requirements

- Walls should be sealed between units to avoid odors from migrating into adjacent spaces.
- Exhaust from space filtered with a listed & labeled filter to avoid odors.
- Inlet for ventilation system located in area of highest contaminant concentration.

Required Outdoor Ventilation Air
IMC Table 403.3

- Cultivation Facilities
  - 60 cfm/person (similar to smoking lounges)
- Dispensaries
  - 7.5 cfm/person (retail sales)

Exhaust Outlets
IMC 501.2.1

- Cultivation Facilities
- Product-conveying outlets
  - 10 feet from the property lines;
  - 3 feet from exterior walls and roofs;
  - 10 feet from operable openings into buildings;
  - 10 feet above adjoining grade.
Exhaust Outlets
IMC 501.2.1

- Dispensaries
- Environmental air exhaust
  - 3 feet from property lines;
  - 3 feet from operable openings into buildings for all occupancies other than Group U, and
  - 10 feet from mechanical air intakes.

Carbon Dioxide Generators

- Listed Appliance?
- Gas Piping
  - Sizing
  - Installation
- Proper Venting
  - Is it really vented?

Plumbing Issues

- Backflow Protection?
  - Lawn irrigation system
  - Chemical fertilizer dispensers
- Pipe installations
  - Support
  - Sizing

Energy Code Issues

- Total connected interior lighting power
  Exceptions:
  6. Task lighting for plant growth or maintenance
Marijuana and the Building Code

Electrical Code Issues

- Illegal installations
- Total Electrical Load
- Wiring methods

Electrical Code Issues

- GFCI Protection
- Ballast Installations
- Homeowner installations

Electrical Code Requirements

- One-line diagram
  - Existing system
  - Proposed electrical system
  - Include main electrical service
- All electrical equipment to be listed and labeled by an approved testing agency

Electrical Code Requirements

- Flexible cords not permitted to be substituted for fixed wiring systems
- Can’t run through walls, doors, ceiling, etc.
- Approved wiring methods required
**Electrical Code Requirements**

- NM cable not allowed for use in damp locations such as cultivation facilities

**2018 IFC Requirements**

- Plant Extraction
  - F338-16
  - Chapter 39
- CO2 Enrichment
  - F372-16
  - Section 5307

**PROCESSING AND EXTRACTION FACILITIES**

Chapter 39

- Plant processing or extraction facilities shall comply with this chapter and the IBC.
- The extraction process includes the act of extraction of the oils and fats by use of a solvent, desolventizing of the raw material, production of the miscella, distillation of the solvent from the miscella and solvent recovery.
- The use, storage, transfilling and handling of hazardous materials in these facilities shall comply with this chapter, other applicable provisions of this code and the IBC.

**3903.2 Prohibited occupancies**

- Extraction processes utilizing flammable gases or flammable cryogenic fluids shall not be located in any building containing a Group A, E, I or R occupancy.
3903.3 Location

- The extraction equipment and extraction processes utilizing hydrocarbon solvents shall be located in a room or area dedicated to extraction.

3903.4 Post-process purification and winterization

- Post-processing and winterization involving the heating or pressurizing of the miscella to other than normal pressure or temperature shall be approved and performed in an appliance listed for such use.
- Domestic or commercial cooking appliances shall not be used.

3903.5 - Use of flammable and combustible liquids

- The use of flammable and combustible liquids for liquid extraction processes where the liquid is boiled, distilled or evaporated shall be located within a hazardous exhaust fume hood, rated for exhausting flammable vapors.
- Electrical equipment used within the hazardous exhaust fume hood shall be rated for use in flammable atmospheres.
- Heating of flammable or combustible liquids over an open flame is prohibited.

3903.5 - Use of flammable and combustible liquids

- Exception:
  - The use of a heating element not rated for flammable atmospheres, where documentation from the manufacture, or approved testing laboratory indicates the element is rated for heating of flammable liquids.
3904
Systems and equipment

- General requirements. Systems and equipment used with the processing and extraction of oils and products from plants shall comply with Sections 3904.2 through 3904.4 and 5003.2, and other applicable provisions of this code, the International Building Code and the International Mechanical Code.

3904.2
Systems and equipment

- Systems or equipment used for the extraction of oils from plant material shall be listed or approved for the specific use.
- If the system used for extraction of oils and products from plant material is not listed, the system shall be reviewed by a registered design professional.
- The registered design professional shall review and consider any information provided by the system's designer or manufacturer.

3904.2
Systems and equipment

- For systems and equipment not listed for the specific use, a technical report in accordance with Section 3904.3 shall be prepared and submitted to the fire code official for review and approval.
- The firm or individual preparing the technical report shall be approved by the fire code official prior to performing the analysis.

3904.4
Site inspection

- Prior to operation of the extraction equipment, where required by the fire code official, the engineer of record or approved professional, as approved in Section 3904.2, shall inspect the site of the extraction process once equipment has been installed for compliance with the technical report and the building analysis.
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3905.1 Gas detection

- For extraction processes utilizing flammable gases as solvents, a continuous gas detection system shall be provided.
- The gas detection threshold shall be not greater than 25 percent of the lower explosive limit/lower flammability limit (LEL/LFL) of the materials.

3905.1.3 Operation

- Activation of the gas detection system shall result in all the following:
  - 1. Initiation of distinct audible and visual alarm signals in the extraction room.
  - 2. Deactivation of all heating systems located in the extraction room.
  - 3. Activation of the mechanical ventilation system, where the system is interlocked with gas detection.

3905.4 - Failure of the gas detection system

- Failure of the gas detection system shall result in the deactivation of the heating system; activation of the mechanical ventilation system where the system is interlocked with the gas detection system; and initiation of a trouble signal to sound in an approved location.
3905.1.5 Interlocks

- Electrical components within the extraction room shall be interlocked with the gas detection system.
- Activation of the gas detection system shall disable all light switches and electrical outlets.

3905.2 Emergency shutoff

- Extraction processes utilizing gaseous hydrocarbon-based solvents shall be provided with emergency shutoff systems in accordance with Section 5803.1.3.

5307 - Compressed gases not otherwise regulated

- Compressed gases in storage or use not regulated by the material-specific provisions of Chapters 6, 54, 55, and 60 through 67, including asphyxiant, irritant and radioactive gases, shall comply with this section in addition to other requirements of this chapter.

5307.2 Ventilation

- Indoor storage and use areas and storage buildings shall be provided with ventilation in accordance with Section 5004.3.
- Where mechanical ventilation is provided, the systems shall be operational during such time as the building or space is occupied.

Exceptions:
- 1. A gas detection system complying with Section 5307.2.1 shall be permitted in lieu of mechanical ventilation.
- 2. Areas containing insulated liquid carbon dioxide systems used in beverage dispensing applications shall comply with Section 5307.3.
5307.2.1 Gas detection system
- In rooms or areas not provided with ventilation in accordance with Section 5307.2, a gas detection system complying with Section 916 or, where approved, an oxygen depletion alarm system, either of which initiates audible and visible alarm signals in the room or area where sensors are installed, shall be provided.

5307.4 Carbon dioxide enrichment systems
- The design, installation and maintenance of carbon dioxide enrichment systems with more than 100 pounds of carbon dioxide, and carbon dioxide enrichment systems with any quantity of carbon dioxide having a remote fill connection, shall comply with Sections 5307.4.1 through 5307.4.7.

5307.4.3 Gas detection system
- A gas detection system complying with Section 916 shall be provided in rooms or indoor areas in which the carbon dioxide enrichment process is located, in rooms or indoor areas in which container systems are located, and in other areas where carbon dioxide is expected to accumulate.
- Carbon dioxide sensors shall be provided within 12 inches of the floor in the area where the gas is expected to accumulate or leaks are most likely to occur.

5307.4.3 Gas detection system
- The system shall be designed as follows:
  - 1. Activates a low-level alarm upon detection of a carbon dioxide concentration of 5,000 ppm.
  - 2. Activates a high-level alarm upon detection of a carbon dioxide concentration of 30,000 ppm.
5307.4.3.1 System activation

• Activation of the low-level gas detection system alarm shall automatically:
  – 1. Stop the flow of carbon dioxide to the piping system.
  – 2. Activate the mechanical exhaust ventilation system.
  – 3. Activate an audible and visible supervisory alarm signal at an approved location within the building.

5307.4.4 Pressurization and ventilation

• A mechanical ventilation system shall be provided in accordance with the International Mechanical Code that complies with all of the following:
  – 1. Mechanical ventilation in the room or area shall be at a rate of not less than 1 cfm per square foot.
  – 2. When activated by the gas detection system, the mechanical ventilation system shall remain on until manually reset.
  – 3. The exhaust system intakes shall be taken from points within 12 inches of the floor.
  – 4. The ventilation system shall discharge to the outdoors in an approved location.

5307.4.5 Signage

• Hazard identification signs shall be posted at the entrance to the room and indoor areas where the carbon dioxide enrichment process is located, and at the entrance to the room or indoor area where the carbon dioxide containers are located.
• The sign shall be not less than 8 inches in width and 6 inches in height and indicate:

  CAUTION – CARBON DIOXIDE GAS VENTILATE THE AREA BEFORE ENTERING.

  A HIGH CARBON DIOXIDE (CO2) GAS CONCENTRATION IN THIS AREA CAN CAUSE ASPHYXIATION.

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