Planning

- Planning factors externally driven by the municipality

- Planning zones are critical in site assessments - they stipulate what the site can and cannot be used for - and any further requirements

- The purpose of zones and overlays is to regulate and inform the use of land.

- The site may also have an ‘overlay’ - informs on a specific requirement of the land.
“Wheel of Fortune”

- Step-wise process
- Functional adjacencies
- ‘Lean Manufacturing’
- Collective set definitions
- Increasing levels of GMP
- Common support core
- Within security envelope
- Form follows function
Surrounds

Site masterplan

- Single point of entry
- Natural site features
- Concentric layering
- Vehicle/pedestrian controls
- Carparking requirements
- Perimeter site access
- Solar orientation
- Common loading
- Services considerations
- Central building services
Surrounds

Site security

• Natural site features
• Secure perimeter
• Site monitoring
• Staff within boundary
• Minimum 2 layers
• Single point of entry
• Concentric gradient
• Security access levels
• Levels 1 -5
• Product categorisation
Facility layout

- Natural site features
- Secure perimeter
- Site monitoring
- Staff within boundary
- Minimum 2 layers
- Single point of entry
- Concentric gradient
- Security access levels
- Levels 1-5
- Product categorisation
Example

- Single point of security
- ISO-8 areas & separation
- Scaling rooms based on equipment sizes
- Sampling and dispensing
- Inclusion of washing areas (WHO)
- Inclusion of all process steps
High level facility flow design

PRODUCTION FLOW
RAW MATERIALS
FINISHED GOODS
UNIDIRECTIONAL LAYOUT
High level facility flow design

PRODUCTION FLOW
RAW MATERIALS
FINISHED GOODS

U-DIRECTIONAL LAYOUT
## Systems

### 01: Germination and Cloning

<table>
<thead>
<tr>
<th></th>
<th><strong>Mother Room</strong></th>
<th><strong>Clone Room</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Process / Irrigation Water</strong></td>
<td>Yes, 0.5-5 litres per day</td>
<td>Yes, 0.2-0.75 litres per day per tray</td>
</tr>
<tr>
<td><strong>Airflow Rate (AC/H)</strong></td>
<td>60 AC/H</td>
<td>1 AC/H based on pressurisation and dehumidification requirements.</td>
</tr>
<tr>
<td><strong>CO2</strong></td>
<td>Ambient 600 ppm</td>
<td></td>
</tr>
<tr>
<td><strong>Temperature</strong></td>
<td>22-26°C @ Day and 22-26°C @ Night</td>
<td>26-28°C @ Day and 27-28°C @ Night</td>
</tr>
<tr>
<td><strong>Relative Humidity</strong></td>
<td>55-75%, (2% control accuracy)</td>
<td>90-100%, (2% control accuracy)</td>
</tr>
<tr>
<td><strong>Lighting (PPFD)</strong></td>
<td>700 -1200 µmol m⁻² s⁻¹</td>
<td>50-150 µmol m⁻² s⁻¹</td>
</tr>
<tr>
<td><strong>Security Access</strong></td>
<td>Camera, Card Reader, Motion Detector</td>
<td></td>
</tr>
</tbody>
</table>

**Note:**
- For airflow rate, 60 AC/H is selected, and the rate is adjusted based on pressurisation and dehumidification requirements.
- CO2 levels are maintained at ambient levels of 600 ppm.
- Temperature and humidity levels are controlled to ensure optimal growing conditions.
- Lighting intensity is adjusted to provide adequate PPFD for germination and cloning processes.
Germination and Cloning Examples
## Vegetative Room

<table>
<thead>
<tr>
<th>Process / Irrigation Water</th>
<th>Yes, 0.25 to 1 litres per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airflow Rate (AC/H)</td>
<td>60 AC/H</td>
</tr>
<tr>
<td>CO₂</td>
<td>700-1000 ppm</td>
</tr>
<tr>
<td>Temperature</td>
<td>24-26°C @ Day and 25-26°C @ Night</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>55-75%, (2% control accuracy)</td>
</tr>
<tr>
<td>lighting</td>
<td>PPFD of between 500-800 µmol m⁻² s⁻¹</td>
</tr>
<tr>
<td>Security and Access</td>
<td>Camera, Card Reader, Motion Detector</td>
</tr>
</tbody>
</table>
Pictures
### Flowering Room

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process / Irrigation Water</td>
<td>Yes, 1 to 4 litres per day</td>
</tr>
<tr>
<td>Airflow Rate (AC/H)</td>
<td>60 AC/H</td>
</tr>
<tr>
<td>CO₂</td>
<td>1000-1500 ppm</td>
</tr>
<tr>
<td>Temperature</td>
<td>24-28°C @ Day and 20-24°C @ Night</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>40-60%, (2% control accuracy)</td>
</tr>
<tr>
<td>lighting</td>
<td>PPFD of between 700-1200 µmol m⁻² s⁻¹</td>
</tr>
<tr>
<td>Security and Access</td>
<td>Camera, Card Reader, Motion Detector</td>
</tr>
</tbody>
</table>
Cooling Mode

- Outside air intake cooled via adiabatic cooling pads (on)
- Air is filtered and cooled via cooling coils
- Supply air distribution a lower level
- Warm air is removed at high level by motorized dampers
Heating Mode

- Return air is heated via heating coil
- Warm air is distributed at lower level
- Continues cycle
Ventilation Mode

- Outside air intake via adiabatic cooling pads (off)
- Air is filtered and mixed with return air
- Mixed air distribution a lower level
- Warm air is removed by high level motorized dampers (when required)
- Dehumidifier can be turned on when required.
## Systems

### 04-06 : Harvesting and Drying

<table>
<thead>
<tr>
<th>Drying Room</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Process / Irrigation Water</td>
<td>N/A</td>
</tr>
<tr>
<td>Airflow Rate (AC/H)</td>
<td>60 AC/H</td>
</tr>
<tr>
<td>CO₂</td>
<td>N/A</td>
</tr>
<tr>
<td>Temperature (Low/High/Setpoint)</td>
<td>16-33°C, 18°C</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>&lt;10%</td>
</tr>
<tr>
<td>lighting</td>
<td>Minimum 300 Lux (dark during the process)</td>
</tr>
<tr>
<td>Security and Access</td>
<td>Camera, Card Reader, Motion Detector</td>
</tr>
</tbody>
</table>
05-07: Trimming and Milling

<table>
<thead>
<tr>
<th>Trimming Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process / Irrigation Water</td>
</tr>
<tr>
<td>Airflow Rate (AC/H)</td>
</tr>
<tr>
<td>CO₂</td>
</tr>
<tr>
<td>Temperature (Low/High/Setpoint)</td>
</tr>
<tr>
<td>Relative Humidity</td>
</tr>
<tr>
<td>lighting</td>
</tr>
<tr>
<td>Security and Access</td>
</tr>
</tbody>
</table>

Systems
08-10 : Extract, Winterization, Filtration
Bulk cryogenic storage tanks for carbon dioxide and nitrogen Installation to AS1894-1997 "The Storage and handling of non-flammable cryogenic and refrigerated liquids".

Air cooled heat exchangers for vaporisation of liquid CO2/N2 (Right) Installation allows for bulk tanker delivery but in proximity to point of use

CO2 consumption for medicinal cannabis manufacturing facility - typically 500kg/week for CO2 extraction process (dependent on scale and process)
Medicinal Cannabis Facility Design

11-12 : Filling, Capping, Labelling (Final Product)
Medicinal Cannabis Facility Design

Support: Vault, Warehouse, Dispatch