Okay, I've analyzed the CannaCribs "Earth's Healing" episode and cross-referenced it with the Project Chimera Briefing Document and your Asset List 1.4.

Here's the enhanced and annotated asset list. I've focused on:

1. \*\*Integrating specific examples from the video\*\* (e.g., specific equipment brands if they fit the aesthetic, observed cultivation practices).

2. \*\*Aligning with MVP scope\*\* as defined in the Briefing Document, marking items as MVP, Late-Game MVP (if implied as an unlockable progression within the initial maps/systems), or Post-MVP/Future.

3. \*\*Adding details or nuances\*\* to existing asset descriptions based on the video and briefing.

4. \*\*Identifying new assets\*\* or categories suggested by the video that align with the project's vision.

\*\*Key Observations from CannaCribs - Earth's Healing (Relevant to Project Chimera):\*\*

\* \*\*Facility Type:\*\* Mixed-light greenhouse (Agra Tech) with supplemental lighting (LEDs, HPS), cooling pad walls, exhaust fans, blackout/shade curtains (Ludvig Svensson). This aligns with the "Greenhouse" as a potential future map. The core facility in the video is high-tech and clean, fitting the Project Chimera aesthetic.

\* \*\*Cultivation Method:\*\* Coco coir in Dutch Plantin grow bags, trellis netting, drip irrigation.

\* \*\*Propagation:\*\* Clones in rockwool/trays under Iluminar 18W LED clone lights. OrganiPlugs are mentioned as a product they use/like.

\* \*\*Vegetative/Flower:\*\* Use of crop steering. Supplemental lighting is prominent (California Lightworks MDL400, MegaDrive power supplies).

\* \*\*Fertigation:\*\* Sophisticated fertigation room with HE Anderson injectors, Netafim Nutrisolve system, RO water, large batch tanks (though the video mentions they \*don't\* use batch tanks for the main feed, preferring direct injection). This supports the idea of basic abstracted utility connections in MVP, scaling to more complex systems.

\* \*\*Processing:\*\* Large-scale drying rooms (hang drying), curing in bins (Tough Stuff Pack Sacks mentioned), hand trimming, Quest dehumidifiers.

\* \*\*Lab:\*\* In-house analytical lab (conceptual mention of HPLC, GC-MS for R&D). Solventless (press) and solvent-based (BHO/PHO mentioned) extraction capabilities. This largely falls into Post-MVP for Chimera.

\* \*\*Pest Management (IPM):\*\* Focus on beneficial insects and OMRI certified products.

\* \*\*Branding:\*\* Earth's Healing has its own brands (EarthGrow, Earthvape, Earth Extracts, PRZM). This reinforces the idea of players developing their own strains and potentially brands.

\* \*\*Strains Mentioned:\*\* Violet Fog (Khalifa Mints x Grape Gasoline), Ice Cream Cake, Runtz Red Pop, High Society, Goofiez, Cleo. This shows a variety of modern, popular genetics.

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\*\*Project Chimera: Enhanced Asset List v1.5 (Incorporating Briefing & CannaCribs Insights)\*\*

\*\*Core Vision:\*\* Modern, High-Tech, Clinical/Scientific, Aspirational/Professional aesthetic; player-driven "Relaxed & Cozy" variations.

\*\*Detail paramount:\*\* (Satisfactory, Farming Sim benchmarks for equipment) for deep simulation. The simulation aims for a granular, scientifically grounded foundation.

\*\*Source Prioritization:\*\* Briefing Document > Asset List 1.4 > CannaCribs Video Examples.

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\*\*Structural & Architectural Elements\*\*

\*Purpose: Define grow spaces, support equipment, manage environment (materials affecting insulation, cleanliness, etc.). Layout and zoning will facilitate clean flow principles.\*

\*Variations: Interior (Drywall, Concrete, Insulated Panel - non-porous, smooth, durable, chemical-resistant for sanitation, e.g. FRP or epoxy coated walls seen in high-end facilities). Exterior (Siding, Brick, Metal - Map specific). Industrial (Pre-fab, Heavy-duty).\*

\*Material properties: Cost, Appearance, Insulation (R-value for heat transfer management), light/air barrier (for Environmental Control Sim), Cleanliness (materials influence ease of cleaning). Coving at wall-floor junctions recommended.\*

\* \*\*Walls:\*\* Sections/panels (various materials).

\* \*MVP Status:\* MVP. (Required for Residential & Warehouse construction).

\* \*Notes:\* Material properties (insulation R-value) are MVP for environmental sim.

\* \*\*Floors:\*\* Sections (Concrete, Epoxy-coated concrete, Wood, Grate - with load ratings). Non-porous, sloped to drain materials preferred.

\* \*MVP Status:\* MVP.

\* \*\*Drains:\*\* Standard, Trench (with varying capacity).

\* \*MVP Status:\* MVP.

\* \*\*Roofs/Ceilings:\*\* Sections (Drywall, Suspended Grid, Concrete). High ceilings can cause thermal stratification.

\* \*MVP Status:\* MVP.

\* \*(Future: Open Rafters/Trusses - e.g., for Greenhouse map).\*

\* \*\*Doors:\*\* Various types (Standard, Industrial Roller, Air Lock). Air locks minimize contaminant entry.

\* \*MVP Status:\* MVP.

\* \*\*Windows:\*\* Various types (Standard, Industrial). Can be blocked out in grow rooms.

\* \*MVP Status:\* MVP (for Residential/Warehouse).

\* \*(Future: Greenhouse-specific glazing like polycarbonate panels seen in CannaCribs - e.g., Agra Tech structures, for specific light transmission).\*

\* \*\*Stairs/Ladders/Catwalks:\*\* For vertical access.

\* \*MVP Status:\* Likely MVP (for multi-level Warehouse).

\* \*\*Support Pillars/Beams:\*\* (Concrete, Steel).

\* \*MVP Status:\* MVP (for Warehouse map shell).

\* \*\*Containment Structures (Tents):\*\* Pre-fab grow tents, sealable for environmental control.

\* \*MVP Status:\* MVP (early game/small scale).

\*\*Cultivation & Plant Care Tools\*\*

\*Purpose: Plant maintenance (pruning, training), scouting, applying treatments.\*

\*Variations: Size, Material (durability, cleanliness, rust), Quality (Basic, Pro), Sharpness/Condition (affects cut cleanliness, plant stress).\*

\* \*\*Pruning & Cutting Tools:\*\*

\* Types: Bypass Pruners (Std, HD), Snips/Scissors (Micro-Tip, Curved/Straight as seen in CannaCribs trimming), Scalpels, Loppers, Hand Saw.

\* \*MVP Status:\* MVP (for basic plant training: topping, manual LST, defoliation).

\* \*\*Spraying & Application Tools:\*\*

\* Hand Spray Bottles, Pump Sprayers (Gal, Backpack).

\* \*MVP Status:\* MVP (for manual pest/disease/foliar nutrient application).

\* \*(Future: Motorized spray carts, Foggers, Integrated Spraying Systems - as seen in CannaCribs).\*

\* \*\*Scouting & Monitoring Tools:\*\*

\* Sticky Traps (Yellow, Blue - Cards, Rolls).

\* Magnifying Loupes, Handheld Digital/Standard Microscopes.

\* Soil/Medium Sample Probes/Corers, Leaf Sample Bags/Vials.

\* Simulated Chlorophyll Meter.

\* \*MVP Status:\* MVP (for basic plant health, pest/disease ID - visual indicators, few common issues). Microscopes unlockable via Science skill tree.

\* \*\*Plant Support Tools:\*\*

\* Trellis netting (various sizes/materials, e.g., nylon), stakes, tie wire.

\* \*MVP Status:\* MVP (essential for canopy management, especially for techniques like ScrOG which could be basic LST). CannaCribs shows extensive use of trellis.

\*\*Nutrient & Irrigation Equipment\*\*

\*Purpose: Store, mix, deliver nutrients and water. Systems manage pH, EC/PPM, temp, DO of nutrient solutions.\*

\*Variations: Scale (Manual to Industrial), Control (Manual, Timed, Automated), Type (Drip, Ebb/Flow, DWC).\*

\* \*\*Watering Cans/Hoses:\*\*

\* \*MVP Status:\* MVP (basic manual irrigation).

\* \*\*Reservoirs/Tanks:\*\* Various sizes (Plastic, Poly, Stainless Steel). Dynamically reflect fill levels.

\* \*MVP Status:\* MVP (for manual/timed systems). CannaCribs shows very large outdoor tanks for RO water storage.

\* \*\*Water Pumps (Submersible, Inline), Air Pumps (for DWC/reservoir aeration):\*\*

\* \*MVP Status:\* MVP.

\* \*\*Plumbing: Pipes (PVC, PEX, Drip Line tubing/emitters), Fittings, Valves (manual, solenoid), Filters.\*\*

\* \*MVP Status:\* MVP (for basic abstracted utility connections; manual routing of pipes for irrigation).

\* \*Notes:\* CannaCribs features extensive Netafim drip irrigation components.

\* \*\*Nutrient Mixing Stations/Vats:\*\* For preparing basic nutrient recipes.

\* \*MVP Status:\* MVP (manual mixing).

\* \*\*Automated Dosing/Fertigation Systems:\*\* (e.g., HE Anderson injectors, Link4 or similar controllers as seen in CannaCribs).

\* \*MVP Status:\* Late-Game MVP / Post-MVP (basic automated environmental control is MVP, but complex fertigation is advanced).

\* \*\*Growing Mediums/Substrates:\*\* Bags/bulk (Soil, Coco Coir e.g., Dutch Plantin bags seen in CannaCribs, Rockwool cubes/slabs e.g. Grodan for propagation, Hydroton, Peat Moss).

\* \*MVP Status:\* MVP (consumable, core to cultivation).

\* \*(Future: Living Soil - more complex simulation).\*

\* \*\*Nutrient Containers:\*\* Bottles/Bags of base nutrients, additives.

\* \*MVP Status:\* MVP (manual mixing of basic recipes).

\*\*Environmental Control Equipment\*\*

\*Purpose: Manage temp, humidity, CO2, airflow, light cycles. Equipment projects a "radius of effect".\*

\*Variations: Size, Capacity, Efficiency, Control (Manual, Timed, Sensor-Controlled).\*

\* \*\*HVAC Systems:\*\* Air Conditioners (Window, Split, large commercial units like those implied for a large greenhouse), Heaters, Dehumidifiers (e.g., Quest 225/174 seen in CannaCribs dry/cure rooms), Humidifiers.

\* \*MVP Status:\* MVP (basic manual and automated environmental control).

\* \*\*Fans:\*\* Circulation Fans (Clip, Standing, Wall, large HAF fans seen in CannaCribs greenhouse), Exhaust Fans, Inline Duct Fans.

\* \*MVP Status:\* MVP.

\* \*\*Ducting:\*\* Flexible, Rigid, Fittings.

\* \*MVP Status:\* MVP.

\* \*\*CO2 Systems:\*\* CO2 Tanks, Regulators, (Basic) CO2 Controllers, CO2 Generators.

\* \*MVP Status:\* MVP (manual/basic automated CO2 management).

\* \*\*Grow Lights:\*\*

\* Types: HID (MH/HPS with Ballasts/Hoods), LED Panels (various wattages/spectrums e.g. California Lightworks MDL400 supplemental LEDs in CannaCribs), Fluorescent (T5/CFL e.g. Iluminar 18W LED clone lights in CannaCribs propagation).

\* \*MVP Status:\* MVP (essential, tiered progression).

\* \*\*Light Timers/Controllers:\*\* Mechanical, Digital.

\* \*MVP Status:\* MVP (for basic light cycle automation).

\* \*\*Thermostats, Humidistats, (Basic) Environmental Controllers:\*\* (e.g., Link4 systems or similar for integrated control as seen in CannaCribs).

\* \*MVP Status:\* MVP (for basic automation). Advanced integrated controllers are Late-Game MVP / Post-MVP.

\* \*\*Sensors:\*\* Environmental (Air Temp, RH, CO2, Light - PAR/PPFD), Leaf Surface Temp, Root Zone/Substrate (Moisture, EC, pH, Temp).

\* \*MVP Status:\* MVP (player-placed sensors for data dashboards; handheld meters for manual sampling).

\* \*\*Air Filters:\*\* Intake filters, Carbon filters.

\* \*MVP Status:\* Likely MVP (for air quality/odor).

\* \*(Future: Pad wall and fan cooling systems for Greenhouses, as seen in CannaCribs Agra Tech facility).\*

\* \*(Future: Shade/Blackout Curtains - e.g., Ludvig Svensson, for light deprivation and energy saving in Greenhouses).\*

\*\*Utility Systems & Equipment\*\*

\*Purpose: Deliver power, water. Manual routing in MVP. Utility View/"X-Ray" mode.\*

\* \*\*Electrical Wiring, Circuit Breakers / Panels:\*\*

\* \*MVP Status:\* MVP (abstracted utility connections, manual routing).

\* \*\*Generators (Diesel/Gas), Battery Banks / UPS:\*\*

\* \*MVP Status:\* Late-Game MVP / Post-MVP (backup power).

\* \*\*Main Power Grid Connection Point (Abstracted):\*\*

\* \*MVP Status:\* MVP.

\* \*\*Water Supply Connection Point (Abstracted - Tap, RO, Treated):\*\*

\* \*MVP Status:\* MVP. (CannaCribs shows large RO water storage tanks).

\*\*Pots, Containers, & Growing Surfaces\*\*

\* \*\*Pots (Standard Pot, Fabric Grow Bags e.g. Dutch Plantin coco bags in CannaCribs):\*\*

\* \*MVP Status:\* MVP.

\* \*\*Trays / Flats (Seedling, Propagation):\*\* (e.g., 1020 trays with clone domes).

\* \*MVP Status:\* MVP.

\* \*\*Rockwool Cubes / Slabs:\*\* (e.g., Grodan, OrganiPlug starter plugs seen in CannaCribs).

\* \*MVP Status:\* MVP.

\* \*\*Hydroponic Systems (Basic Ebb/Flow, DWC buckets):\*\*

\* \*MVP Status:\* MVP (basic options).

\* \*(Future: NFT, Aeroponics, more complex hydro).\*

\* \*\*Growing Benches / Tables (Flood tables, Wire racks, Rolling benches seen in CannaCribs):\*\*

\* \*MVP Status:\* MVP.

\*\*Pest & Disease Management\*\*

\*Purpose: Monitor, identify, treat basic plant health issues (visual indicators, few common pests/diseases, manual treatment).\*

\* \*\*Scouting Tools:\*\* Sticky Traps, Magnifying Loupes, Microscopes (Handheld, Benchtop).

\* \*MVP Status:\* MVP.

\* \*\*Application Tools:\*\* Hand Spray Bottles, Pump Sprayers.

\* \*MVP Status:\* MVP (manual treatment).

\* \*\*(Simulated) Pesticides/Fungicides/Biologicals:\*\* Consumables.

\* \*MVP Status:\* MVP (for few common pests/diseases, manual treatment). (CannaCribs mentions using beneficial insects and OMRI certified products).

\* \*\*In-game "Plant Problems Guide" UI/Asset:\*\*

\* \*MVP Status:\* MVP (essential for diagnostics).

\*\*Harvesting & Processing Equipment\*\*

\*Purpose: Manual harvest, trim, dry, cure. Environment impacts quality.\*

\* \*\*Harvesting Tools:\*\* Large Trimming Shears, Loppers, Collection Totes/Bins (Food-grade).

\* \*MVP Status:\* MVP (manual harvesting).

\* \*\*Trimming Tools:\*\* Trim Scissors (Micro-tip types), Trim Bins/Trays (with kief screens).

\* \*MVP Status:\* MVP (manual hand-trimming).

\* \*(Future: Bowl Trimmers, Automated Trimming Machines).\*

\* \*\*Drying Racks / Clotheslines & Hangers:\*\* In player-built dry space.

\* \*MVP Status:\* MVP (manual drying, environment impacts time/quality). CannaCribs shows dedicated, large, climate-controlled dry rooms.

\* \*\*Curing Containers (Jars, Food-grade Buckets/Bins e.g. with Tough Stuff Pack Sacks as liners seen in CannaCribs):\*\* Manual 'burping'.

\* \*MVP Status:\* MVP.

\* \*\*Weighing & Measuring:\*\* Digital Pocket Scales (Precision), Digital Bench Scales. Calibration Weights.

\* \*MVP Status:\* MVP (for basic post-harvest metrics, contract fulfillment).

\* \*(Future: Cold Storage, Extraction Equipment - explicitly Post-MVP in Briefing).\*

\*\*Facility Furniture & Fixtures\*\*

\*Purpose: Workspace, storage, safety, general utility.\*

\* \*\*Workbenches, HD Shelving, Storage Cabinets (Lockable for chemicals).\*\*

\* \*MVP Status:\* MVP.

\* \*\*Rolling Utility Carts, Seating (Stools, Chairs).\*\*

\* \*MVP Status:\* MVP.

\* \*\*Sinks (Industrial Wash Basin), Faucet Fixtures.\*\*

\* \*MVP Status:\* MVP (hygiene, cleaning).

\* \*\*Safety: Eye Wash Station, Fire Extinguishers, First Aid Kits.\*\*

\* \*MVP Status:\* MVP (basic safety).

\* \*\*General: Wall Clocks, Trash Cans/Recycling Bins, Mop & Bucket, Broom & Dustpan.\*\*

\* \*MVP Status:\* MVP.

\*\*Map Specific Assets\*\*

\* \*\*Residential House Shell & Unique Fixtures:\*\*

\* \*MVP Status:\* MVP (initial map).

\* \*\*Warehouse Shell & Unique Fixtures:\*\*

\* \*MVP Status:\* MVP (unlockable map).

\* \*(Future: Greenhouse Structure (e.g. Agra Tech style seen in CannaCribs - glass/polycarbonate, vents, cooling pad walls, light dep curtains), Research Lab Shell, Outdoor Field Elements, etc. - Post-MVP).\*

\*\*Decorative & "Cozy" Items\*\*

\*Purpose: Player customization, "Cozy" aesthetic. Lore delivery via item descriptions.\*

\* \*\*Posters, Art, Rugs, Small Furniture, Non-cannabis plants, Decorative lighting, Paint/Texture options (walls/floors - visual only for MVP).\*\*

\* \*MVP Status:\* MVP.

\*\*Plant Assets (Core for Procedural System)\*\*

\*Purpose: Central visual output, dynamic GxE reflection (Phenotypic Plasticity). Simplified inheritance model for core traits (cannabinoid potential, yield, flowering time, morphology) for MVP.\*

\* \*\*Base 3D Models:\*\* HQ, detailed base meshes/textures for 5-10 landrace-inspired foundational strains (MVP).

\* \*Variations (Morphology & Growth Stages):\* Seedling, Vegetative (Early, Mid, Late), Flowering (Early, Mid, Late - CannaCribs shows distinct phases), Maturation (trichome changes), Harvested, Dried.

\* \*Botanical Features:\* Plant Height, Stem Structure, Branching Pattern (Sativa-lanky vs. Indica-compact), Leaf Morphology (number, shape, serration, angle), Bud Structure (shape, density, leaf-to-calyx), Pistil Color, Trichome Density/Appearance.

\* \*MVP Strains (Examples inspired by CannaCribs & common archetypes):\*

\* "Original Haze" (Sativa-dominant, long flower, airy buds)

\* "Afghan Kush" (Indica-dominant, short/bushy, dense buds, shorter flower)

\* "Skunk #1" (Hybrid, balanced, pungent)

\* "Purple Erkle" (Indica-dominant, distinct purple hues in late flower based on temp)

\* "Columbian Gold" (Landrace Sativa, tall, thinner leaves)

\* \*Plus 5-10 more distinct archetypes for MVP.\*

\* \*MVP Status:\* MVP.

\* \*\*Procedural Generation System (Software/Code Asset):\*\*

\* \*Inputs:\* Abstracted Genetics Data (THC/CBD potential, yield factor, flowering time, rudimentary morphology for MVP), Environmental Parameters, Cultivation Actions (topping, basic LST for MVP).

\* \*MVP Status:\* MVP.

\* \*\*Dynamic Shader/Material Effects (MIDs, MPCs):\*\* For GxE viz.

\* \*Effects for MVP:\* Coloration (basic nutrient deficiencies), Wilting (hydration), Growth Rates, Basic Stress/Problem Symptoms (visual indicators for few common pests/diseases).

\* \*MVP Status:\* MVP.

\* \*\*Performance Optimization: LODs, HISMs/ISMs.\*\*

\* \*MVP Status:\* MVP.

\*\*Data Collection & Lab Equipment\*\*

\*Purpose: Manual data acquisition (MVP) with handheld meters. Simulated lab analysis abstracted initially.\*

\* \*\*Handheld Meters (Visual):\*\* For manual data acquisition (pH, EC/PPM, temp, humidity, basic soil moisture - MVP, as per Briefing).

\* Types: EC/PPM meter, pH meter, Temperature Probe, Soil Moisture meter, (Future: Simulated Chlorophyll Meter, PAR/PPFD meter, Infrared Thermometer, VPD Meter).

\* \*MVP Status:\* MVP (for pH, EC, Temp, Humidity, Soil Moisture).

\* \*\*Data Logging & Interface (Visual):\*\*

\* Types: Laptop, Tablet, Desktop, Clipboard, Pens.

\* \*MVP Status:\* MVP (visual representation for UI access).

\* \*\*Calibration Weights (for scales):\*\*

\* \*MVP Status:\* MVP (if scales require player calibration).

\* \*(Future: Benchtop Meters, HPLC, GC-MS, etc. - Post-MVP. Simulated lab analysis initially abstracted/off-site, with UI for results as a mid-late game unlock).\*

\* \*CannaCribs shows Earth's Healing has an in-house analytical lab for R&D, but this is advanced.\*

\*\*UI & Data Visualization Elements\*\*

\*Purpose: Present complex sim data for player decisions. Modern, clean, sophisticated, "dark mode" palette. Essential systems for MVP.\*

\* \*\*Core Environmental Data Dashboards (real-time sensor readouts):\*\*

\* \*MVP Status:\* MVP.

\* \*\*Plant Status UI Panels (essential health/growth info):\*\* Visual indicators for few common pests/diseases.

\* \*MVP Status:\* MVP.

\* \*\*Basic Logs/Notes Interface:\*\*

\* \*MVP Status:\* MVP.

\* \*\*Essential Alert System (Critical Deviations):\*\* Tiered (Blue/Info, Yellow/Warning, Red/Critical).

\* \*MVP Status:\* MVP.

\* \*\*Nutrient Management Interface:\*\* Manual mixing basic nutrient recipes, application, medium EC/pH monitoring.

\* \*MVP Status:\* MVP.

\* \*\*Genetics & Basic Breeding Interface:\*\* Identify plant sex, manual pollination for F1 seeds, clone mother plants, select phenotypes (visual & basic post-harvest metrics). Simplified inheritance model.

\* \*MVP Status:\* MVP.

\* \*\*Facility Management Overlays:\*\* Grid-based interior room construction (walls, doors). Essential equipment placement. Basic abstracted utility connections (power).

\* \*MVP Status:\* MVP.

\* \*\*Utility View ("X-Ray"):\*\* Crucial for MVP construction/troubleshooting.

\* \*MVP Status:\* MVP (unlocks with Warehouse).

\* \*\*Operational & Financial Data (Basic):\*\* Operational costs (utilities, consumables, initial equipment). NPC contracts, direct sales.

\* \*MVP Status:\* MVP.

\* \*\*Skill Tree UI ("The Tree"):\*\* Visualized as Cannabis plant. Core cultivation, basic genetics, facility operation branches for MVP.

\* \*MVP Status:\* MVP.

\* \*\*ADA Communication UI (Inbox, Notifications, Pop-ups):\*\* Text-based primarily.

\* \*MVP Status:\* MVP.

\* \*(Future: Advanced graphs, heat maps, detailed lab analysis UIs, complex genetic data displays - Post-MVP).\*

\*\*Advanced Breeding & Lab Equipment\*\*

\*Purpose: Support high-tier breeding, genetic research. Largely deferred Post-MVP.\*

\* \*\*Tissue Culture Station & Components:\*\* (Sterile Hood, Autoclave, Incubator, etc.)

\* \*MVP Status:\* Post-MVP (Briefing Section II & VI explicitly list advanced breeding/tissue culture as deferred).

\* \*\*Lab Furniture (Specialized Benches, etc.):\*\*

\* \*MVP Status:\* Post-MVP (tied to advanced lab functions).

\* \*(Other advanced items from List 1.4 like Cryopreservation, Genetic Modification Equipment, Bioinformatics Tools - Post-MVP).\*

\*\*Consumable Resources (Abstract/UI Representation)\*\*

\*Purpose: Track/manage consumed resources. UI/Inventory tracking for MVP.\*

\* \*\*Water (Tap, RO, Treated):\*\*

\* \*MVP Status:\* MVP.

\* \*\*Power (Grid):\*\*

\* \*MVP Status:\* MVP (abstracted utility cost).

\* \*(Future: Generator Fuel, Battery Charge - linked to Post-MVP equipment).\*

\* \*\*Nutrients (Packaged Fertilizers for basic recipes):\*\*

\* \*MVP Status:\* MVP.

\* \*\*CO2 (CO2 Tanks - visual asset, CO2 Gas - UI consumable):\*\*

\* \*MVP Status:\* MVP.

\* \*\*Building Materials (Abstracted for walls, doors, basic equipment):\*\*

\* \*MVP Status:\* MVP.

\* \*\*Seeds/Clones (Strain-specific):\*\*

\* \*MVP Status:\* MVP.

\* \*\*Finances (In-game Currency):\*\*

\* \*MVP Status:\* MVP.

\* \*(Future: Specialized Tissue Culture Media, PGRs, Agar, Hormones, etc. - Post-MVP).\*

\*\*New/Clarified from CannaCribs:\*\*

\* \*\*Trellis Slayer 9000 (Custom Tool):\*\* Device to rapidly deploy multiple layers of trellis netting.

\* \*MVP Status:\* Post-MVP (advanced automation/efficiency tool, not core to MVP loop).

\* \*Notes:\* Interesting real-world efficiency tool. For Chimera, MVP trellis is manual.

\* \*\*OrganiPlug / Grodan Starter Plugs:\*\* Specific examples of propagation media.

\* \*MVP Status:\* Covered by "Rockwool Cubes / Slabs" or "Growing Mediums" (MVP).

\* \*\*Dutch Plantin Coco Bags:\*\* Specific example of a container/medium.

\* \*MVP Status:\* Covered by "Fabric Grow Bags" or "Growing Mediums" (MVP).

\* \*\*Tough Stuff Pack Sacks:\*\* Large, durable bags used for curing/storage.

\* \*MVP Status:\* Could be a higher-tier "Curing Container" variant (Late-Game MVP) or just a visual/flavor for bulk curing if that mechanic is simple enough for MVP. Manual jar curing is primary MVP.

\* \*\*HE Anderson / Netafim / Link4 / California Lightworks / Quest / Ludvig Svensson:\*\* Specific brands seen. These inform the "high-tech, clinical/scientific" aesthetic but specific brand licensing is a separate issue. Functionality they represent is key.

\* \*MVP Status:\* Functionality is MVP for basic versions (e.g. simple timers, basic LEDs). High-end versions of these are Late-Game MVP or Post-MVP.

This enhanced list should provide a solid foundation, clearly distinguishing MVP assets from future additions, and grounding many items with real-world examples seen in the CannaCribs episode, all while respecting the design pillars outlined in the Project Chimera Briefing Document.Okay, I have thoroughly reviewed the Project Chimera Briefing Document, the existing Asset List v1.4, and the CannaCribs - Earth's Healing episode. My goal is to synthesize these into an enhanced, categorized asset list, clearly marking items for MVP (Minimum Viable Product), Late-Game MVP (features likely unlockable within the initial game scope but representing progression), or Post-MVP/Future, and incorporating specific details or examples observed.

\*\*Key Principles Applied:\*\*

1. \*\*Briefing Document is King:\*\* MVP scope is strictly defined by the Briefing Document.

2. \*\*Asset List 1.4 as Base:\*\* Enhance and refine, don't discard.

3. \*\*CannaCribs for Realism & Specificity:\*\* Use as a source for authentic examples that fit the "modern, high-tech, clinical/scientific" aesthetic and gameplay needs.

4. \*\*Gameplay Loop Support:\*\* Assets must support Build, Cultivate, Breed, Process, Analyze, Optimize loops as defined for MVP.

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\*\*Project Chimera: Enhanced Asset List v1.5\*\*

\*\*I. Structural & Architectural Elements\*\*

\*Purpose: Define grow spaces, support equipment, manage environment. Materials impact insulation, cleanliness. Clean flow principles considered.\*

\* \*\*Walls:\*\* Sections/panels (Drywall, Concrete, Insulated Panel).

\* \*Properties:\* Non-porous, smooth, durable, chemical-resistant (e.g., FRP, epoxy-coated for sanitation). Cost, Appearance, Insulation (R-value for heat transfer – MVP), Light/Air barrier (MVP). Coving at wall-floor junctions.

\* \*MVP Status:\* \*\*MVP\*\*. (Required for Residential & Warehouse construction).

\* \*\*Floors:\*\* Sections (Concrete, Epoxy-coated concrete for cleanability, Wood, Grate).

\* \*Properties:\* Non-porous, sloped to drain. Load ratings.

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Drains:\*\* Standard floor drains, Trench drains (varying capacity).

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Roofs/Ceilings:\*\* Sections (Drywall, Suspended Grid with cleanable tiles, Concrete).

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*(CannaCribs Reference: Agra Tech greenhouse structures show complex roofing allowing natural light, but for MVP internal rooms, simpler ceilings are key).\*

\* \*\*Doors:\*\* Standard Interior, Industrial Roller, (Basic) Air Lock (to minimize contaminant/pest entry between critical zones like propagation and flower).

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Windows:\*\* Standard, Industrial (can be blocked out).

\* \*MVP Status:\* \*\*MVP\*\* (for Residential/Warehouse exterior shells).

\* \*(Future: Greenhouse-specific glazing like polycarbonate panels - e.g., Agra Tech structures in CannaCribs).\*

\* \*\*Stairs/Ladders:\*\* For vertical access in multi-level designs.

\* \*MVP Status:\* \*\*Late-Game MVP\*\* (primarily for Warehouse customization).

\* \*(Future: Catwalks for industrial scale).\*

\* \*\*Support Pillars/Beams:\*\* (Concrete, Steel).

\* \*MVP Status:\* \*\*MVP\*\* (integral to Warehouse map shell).

\* \*\*Containment Structures (Grow Tents):\*\* Pre-fab, sealable.

\* \*MVP Status:\* \*\*MVP\*\* (early-game/small-scale environmental control).

\*\*II. Cultivation & Plant Care Tools\*\*

\*Purpose: Plant maintenance, scouting, manual treatments.\*

\* \*\*Pruning & Cutting Tools:\*\*

\* Types: Snips/Scissors (Micro-Tip, Curved/Straight - e.g., for trimming, topping, LST cuts), Scalpels (for precise cuts, cloning).

\* \*Properties:\* Sharpness/Condition (affects cut quality, plant stress, disease vector).

\* \*MVP Status:\* \*\*MVP\*\*. (Supports manual plant training: topping, LST, defoliation).

\* \*\*Spraying & Application Tools:\*\*

\* Hand Spray Bottles, Pump Sprayers (Small, Backpack).

\* \*MVP Status:\* \*\*MVP\*\* (manual application of water, nutrients, basic pest/disease treatments).

\* \*\*Scouting & Monitoring Tools:\*\*

\* Sticky Traps (Yellow, Blue - Cards).

\* Magnifying Loupes (Handheld).

\* \*MVP Status:\* \*\*MVP\*\* (basic visual pest identification).

\* \*(Future: Microscopes - explicitly unlockable via Science skill tree, potentially Late-Game MVP for more detailed scouting).\*

\* \*\*Plant Support Tools:\*\*

\* Trellis netting (rolls/sections), Stakes, Tie wire/Plant ties.

\* \*MVP Status:\* \*\*MVP\*\* (basic plant training, manual LST).

\* \*\*Cleaning Supplies for Tools:\*\* Isopropyl Alcohol Wipes/Spray, Rags.

\* \*MVP Status:\* \*\*MVP\*\* (maintaining tool hygiene to prevent disease spread is a basic good practice).

\*\*III. Nutrient & Irrigation Equipment\*\*

\*Purpose: Store, mix, deliver nutrients/water. MVP focuses on manual mixing/application and basic abstracted irrigation.\*

\* \*\*Watering Cans/Hoses (with basic nozzle):\*\*

\* \*MVP Status:\* \*\*MVP\*\* (manual watering).

\* \*\*Reservoirs/Tanks (Small to Medium Plastic):\*\* For storing water or mixed nutrient solutions. Dynamically reflect fill levels.

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Water Pumps (Submersible for reservoirs):\*\*

\* \*MVP Status:\* \*\*MVP\*\* (for moving water from reservoir to watering can or basic irrigation).

\* \*\*Basic Irrigation Components (Abstracted):\*\*

\* Pipes (PVC, basic drip line), Basic Emitters/Soaker Hoses, Manual Valves.

\* \*MVP Status:\* \*\*MVP\*\* (Grid-based placement for "basic irrigation" as per Briefing). Not complex Netafim style systems from CannaCribs for MVP.

\* \*\*Nutrient Mixing Containers:\*\* Buckets, Small Vats for manual nutrient recipe mixing.

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Measuring Tools for Nutrients:\*\* Measuring Cups, Spoons, Basic Graduated Cylinders.

\* \*MVP Status:\* \*\*MVP\*\* (for manual nutrient mixing).

\* \*\*Growing Mediums/Substrates:\*\*

\* Types: Bagged Soil (basic potting mix), Coco Coir (bricks/bags), Rockwool cubes (for clones/seeds), Perlite/Vermiculite (as amendments).

\* \*MVP Status:\* \*\*MVP\*\*. (CannaCribs uses Dutch Plantin coco bags – good example of a type).

\* \*\*Nutrient Containers (Bottles/Bags):\*\* Base NPK nutrients (e.g., Part A/B dry or liquid), basic Cal-Mag.

\* \*MVP Status:\* \*\*MVP\*\* (for manual mixing of basic nutrient recipes).

\*\*IV. Environmental Control Equipment\*\*

\*Purpose: Manual and basic automated environmental control (temp, humidity, light cycles). Equipment projects radius/cone of influence.\*

\* \*\*HVAC Basic Components:\*\*

\* Window Air Conditioner, Small Electric Heater.

\* Small Dehumidifier, Small Humidifier.

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Fans:\*\*

\* Circulation Fans (Clip-on, Small Oscillating).

\* Basic Exhaust Fan (window/wall mount).

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Ducting (Flexible):\*\* Basic flexible ducting for exhaust fans.

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*CO2 (Basic Abstracted):\*\* CO2 Tank (visual), basic regulator (manual release or tied to simple timer).

\* \*MVP Status:\* \*\*MVP\*\* (simplified system).

\* \*\*Grow Lights:\*\*

\* Basic Tier: Fluorescent (T5 for propagation/seedlings), CFL bulbs.

\* Mid Tier: Basic LED Panels (fixed spectrum, e.g., "blurple" or basic white), smaller HPS/MH lights (e.g., 250W, 400W with ballast/hood).

\* \*MVP Status:\* \*\*MVP\*\* (tiered progression). (California Lightworks from CannaCribs are high-end, likely Late-Game MVP or Post-MVP).

\* \*\*Light Timers (Mechanical/Basic Digital):\*\*

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Basic Thermostat / Humidistat:\*\* Simple on/off control for basic HVAC.

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Sensors (Player-placed for Dashboards):\*\* Basic Air Temperature Sensor, Basic Humidity Sensor.

\* \*MVP Status:\* \*\*MVP\*\*. (For real-time sensor readouts on dashboards).

\* \*(CannaCribs Link4 system is an example of advanced integrated control – Post-MVP).\*

\* \*\*Air Filters (Basic Carbon Filter for Exhaust):\*\* For rudimentary odor control.

\* \*MVP Status:\* \*\*MVP\*\*.

\*\*V. Utility Systems & Equipment\*\*

\*Purpose: Abstracted utility connections (power). Manual routing for MVP.\*

\* \*\*Electrical Wiring (Abstracted):\*\* Visual representation of wires connecting equipment to power outlets/panel.

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Basic Electrical Panel / Fuse Box:\*\* Visual, shows power load abstractly.

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Power Outlets (Wall-mounted):\*\*

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Main Power Grid Connection Point (Abstracted):\*\*

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Water Supply Connection Point (Abstracted - Tap):\*\*

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*(Future: RO water systems, as seen in CannaCribs, would be an upgrade).\*

\*\*VI. Pots, Containers, & Growing Surfaces\*\*

\* \*\*Pots:\*\* Standard Plastic Pots (various small to medium sizes for transplanting), Fabric Grow Bags (basic).

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Trays / Flats:\*\* Seedling Trays, Propagation Domes.

\* \*MVP Status:\* \*\*MVP\*\*. (CannaCribs shows OrganiPlug starter plugs, a type of medium within trays).

\* \*\*Rockwool Cubes/Small Slabs:\*\* For starting seeds/clones.

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Hydroponic Systems (Basic):\*\* Deep Water Culture (DWC) buckets (simple setup).

\* \*MVP Status:\* \*\*MVP\*\* (one basic hydro option to introduce the concept).

\* \*(Future: Ebb/Flow, NFT, Aeroponics).\*

\* \*\*Growing Benches / Tables:\*\* Basic wire racks, simple wooden/metal tables.

\* \*MVP Status:\* \*\*MVP\*\*. \*(Rolling benches from CannaCribs are efficient but Post-MVP).\*

\*\*VII. Pest & Disease Management\*\*

\*Purpose: Address basic plant health issues (visual indicators, few common pests/diseases, manual treatment).\*

\* \*\*Scouting Tools:\*\* (See Section II).

\* \*\*Application Tools:\*\* (See Section II).

\* \*\*(Simulated) Pesticides/Fungicides/Biologicals (Basic):\*\*

\* Types: Neem Oil (simulated), Insecticidal Soap (simulated), (Future: specific beneficial insects like those mentioned in CannaCribs - Ladybugs, Predatory Mites - likely tied to Science skill tree progression).

\* \*MVP Status:\* \*\*MVP\*\* (for manual treatment of a few common issues like spider mites, powdery mildew).

\* \*\*In-game "Plant Problems Guide" UI/Asset:\*\* (Cross-references with Data, UI, and Feedback Systems).

\* \*MVP Status:\* \*\*MVP\*\*.

\*\*VIII. Harvesting & Processing Equipment\*\*

\*Purpose: Manual drying, curing, hand-trimming. Environment impacts quality.\*

\* \*\*Harvesting Tools:\*\* Pruning Shears (larger), Loppers (for thicker stalks). Collection Totes/Bins (food-grade plastic).

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Trimming Tools:\*\* Trim Scissors (Micro-tip, spring-loaded). Trim Bins/Trays (basic, with kief screen).

\* \*MVP Status:\* \*\*MVP\*\* (manual hand-trimming).

\* \*\*Drying Equipment:\*\*

\* Drying Racks (stackable mesh racks), Clotheslines & Hangers (for hanging branches/whole plants).

\* \*MVP Status:\* \*\*MVP\*\* (manual hanging/rack in player-built dry space).

\* \*\*Curing Containers:\*\* Glass Jars (various sizes with lids), Food-grade Plastic Buckets (with lids).

\* \*MVP Status:\* \*\*MVP\*\* (manual container curing, manual 'burping'). (Tough Stuff Pack Sacks from CannaCribs are for large scale, Post-MVP).

\* \*\*Weighing & Measuring:\*\*

\* Digital Pocket Scale (for small amounts, buds).

\* Basic Digital Bench Scale (for larger harvests).

\* \*MVP Status:\* \*\*MVP\*\* (for basic post-harvest metrics).

\* \*\*(Post-MVP: Bowl Trimmers, Automated Trimming Machines, Cold Storage, Extraction Equipment).\*\*

\*\*IX. Facility Furniture & Fixtures\*\*

\* \*\*Workbenches, Heavy-Duty Shelving (Metal/Wire), Storage Cabinets (Metal, Plastic).\*\*

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Rolling Utility Carts, Seating (Basic Stools, Folding Chairs).\*\*

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Sinks (Industrial Stainless Steel Wash Basin), Faucet Fixtures.\*\*

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Safety Equipment (Basic):\*\* Fire Extinguisher, First Aid Kit.

\* \*MVP Status:\* \*\*MVP\*\*. \*(Eyewash/Emergency Shower are for more industrial/lab settings - Post-MVP).\*

\* \*\*General Utility:\*\* Wall Clock, Trash Cans/Waste Bins, Recycling Bins, Mop & Bucket, Broom & Dustpan.

\* \*MVP Status:\* \*\*MVP\*\*.

\*\*X. Map Specific Assets\*\*

\* \*\*Residential House Shell & Unique Fixtures:\*\* Pre-defined layout.

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Warehouse Shell & Unique Fixtures:\*\* Large open space for player construction.

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*(Future Maps: Greenhouse (Agra Tech style from CannaCribs), Research Lab, Outdoor Field - Post-MVP).\*

\*\*XI. Decorative & "Cozy" Items\*\*

\*Purpose: Player customization, aesthetic expression. Lore via item descriptions.\*

\* \*\*Posters, Art Prints, Rugs, Small Decorative Furniture (end tables, simple chairs), Non-cannabis Houseplants, Decorative Lighting (lamps), Paint/Texture options (walls/floors - visual change only for MVP).\*\*

\* \*MVP Status:\* \*\*MVP\*\*.

\*\*XII. Plant Assets (Core for Procedural System)\*\*

\*Purpose: Visual representation of plant lifecycle and GxE interaction. Simplified inheritance for MVP.\*

\* \*\*Base 3D Models:\*\* 5-10 foundational landrace-inspired strains.

\* \*Growth Stages:\* Seed, Seedling (cotyledons, first true leaves), Vegetative (early, mid, late – increasing nodes/size), Pre-Flower, Flowering (early, mid, late – bud development, pistil changes, trichome maturation visual cues like milky/amber), Harvested Plant, Dried Buds.

\* \*Morphological Traits (MVP - rudimentary):\* Overall shape (tall/lanky Sativa vs. short/bushy Indica), basic leaf shape (broad vs. narrow).

\* \*Foundational Strain Examples for MVP (Archetypes):\*

1. "Highland Thai" (Classic Sativa: tall, long flowering, airy buds, distinct aroma profile)

2. "Hindu Kush" (Classic Indica: short, dense, fast flowering, earthy/piney)

3. "Original Skunk" (Early Hybrid: balanced, vigorous, pungent)

4. "Ruderalis Strain X" (Auto-flowering base for basic breeding experimentation)

5. "CBD Standard" (High CBD, low THC, distinct morphology if possible)

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Procedural Generation System (Software/Code Asset):\*\*

\* \*Inputs (MVP):\* Genetic predispositions (flowering time, cannabinoid potential category [High/Med/Low THC/CBD], basic yield factor, rudimentary morphology tag), Environmental Data (light, temp, humidity - deviations from ideal), Player Actions (topping, basic LST).

\* \*Outputs (MVP):\* Visual changes in plant size, leaf health (basic discoloration for deficiency/excess), flowering progression, basic bud size.

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Dynamic Shader/Material Effects:\*\*

\* \*Effects (MVP):\* Basic leaf yellowing/browning for nutrient issues, wilting for water stress, visual cues for growth stages.

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Performance Optimization:\*\* LODs crucial.

\* \*MVP Status:\* \*\*MVP\*\*.

\*\*XIII. Data Collection & Lab Equipment\*\*

\*Purpose: Manual environmental/plant sampling for MVP. Abstracted lab analysis.\*

\* \*\*Handheld Meters (Visual assets, tool-based interaction):\*\*

\* pH meter (for medium/water).

\* EC/PPM meter (for medium/water).

\* Thermometer (air, water, medium).

\* Hygrometer (air humidity).

\* Basic Soil Moisture Meter.

\* \*MVP Status:\* \*\*MVP\*\*. (Unlocks via skill tree/achievements).

\* \*\*Data Logging & Interface (Visual):\*\*

\* Clipboard & Pen (visual representation for manual note-taking UI).

\* Basic Digital Interface (on some equipment or a simple wall-mounted display for sensor readouts).

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*(Future: Advanced lab equipment like HPLC/GC-MS for detailed cannabinoid/terpene analysis, as conceptually mentioned for Earth's Healing's R&D lab - Post-MVP. Simulated lab analysis results UI is a later unlock).\*

\*\*XIV. UI & Data Visualization Elements\*\*

\*Purpose: Essential data for decision-making. Modern, clean, dark mode, functional. Abstract line art icons.\*

\* \*\*Core Environmental Data Dashboards:\*\* Real-time readouts from player-placed sensors (Temp, RH for MVP).

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Plant Status UI Panels:\*\* Essential health/growth info (stage, basic visual health status, warnings for critical deviations from ideal environment).

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Basic Logs/Notes Interface:\*\* Player-written notes, auto-logging of critical alerts.

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Alert System:\*\* Tiered visual/audio cues (Blue/Info, Yellow/Warning, Red/Critical) for environmental deviations, basic plant health issues.

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Nutrient Management Interface:\*\* Manual mixing UI for basic recipes, tracking application.

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Genetics & Basic Breeding Interface:\*\* UI for selecting parents (based on visual traits & basic post-harvest metrics), confirming manual pollination, F1 seed inventory, cloning mother plants. Display of core traits (THC/CBD potential, yield factor, flowering time, morphology tag).

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Facility Construction & Management UI:\*\* Grid-based placement interface for walls, doors, essential equipment. Basic power utility overlay (shows connected/powered items).

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Utility View ("X-Ray"):\*\* Highlighted view for power lines. (Irrigation/HVAC lines Post-MVP).

\* \*MVP Status:\* \*\*MVP\*\* (for power, unlocks with Warehouse).

\* \*\*Economy UI (Basic):\*\* Display for NPC contracts (strain, quantity, quality, deadline), direct sales interface to limited NPCs, basic operational cost tracking.

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Skill Tree UI ("The Tree"):\*\* Visualized as Cannabis plant. Branches for core cultivation, basic genetics, facility operation. Nodes unlock concepts/mechanics.

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*ADA Communication UI:\*\* Inbox, notifications, pop-ups (primarily text-based).

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Tutorial/Info Overlays:\*\*

\* \*MVP Status:\* \*\*MVP\*\*.

\*\*XV. Advanced Breeding & Lab Equipment\*\*

\*Largely Post-MVP as per Briefing Document.\*

\* \*\*Tissue Culture Station & Components:\*\*

\* \*MVP Status:\* \*\*Post-MVP\*\*.

\* \*(All other items like Cryopreservation, Advanced Genetic Mod Equipment, Bioinformatics Tools - Post-MVP).\*

\*\*XVI. Consumable Resources (Abstract/UI Representation)\*\*

\*Purpose: Track/manage consumed resources. UI/Inventory tracking for MVP.\*

\* \*\*Water (Tap):\*\*

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Power (Grid - Abstracted Cost):\*\*

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Nutrients (Basic NPK, Cal-Mag):\*\*

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*CO2 (from Tanks):\*\*

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Building Materials (Abstracted for basic construction):\*\*

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Seeds/Clones (Strain-specific):\*\*

\* \*MVP Status:\* \*\*MVP\*\*.

\* \*\*Finances (In-game Currency):\*\*

\* \*MVP Status:\* \*\*MVP\*\*.

\*\*XVII. Unique Items/Tools from CannaCribs (Post-MVP Considerations for Chimera)\*\*

\* \*\*Trellis Slayer 9000:\*\* A custom-built device for rapidly deploying multiple layers of trellis netting simultaneously by one person.

\* \*Relevance:\* Represents high-efficiency, custom tooling for large-scale operations. Could be a very late-game craftable/researchable item in Chimera.

\* \*MVP Status:\* \*\*Post-MVP\*\*.

\* \*\*Fogco High-Pressure Fogging System:\*\* Used by Earth's Healing for cooling, humidification, and potentially odor/pest control application.

\* \*Relevance:\* Advanced environmental control and application system.

\* \*MVP Status:\* \*\*Post-MVP\*\*.

\* \*\*Netafim Nutrisolve & HE Anderson Injectors:\*\* Sophisticated, direct-injection fertigation system.

\* \*Relevance:\* High-precision automated nutrient delivery.

\* \*MVP Status:\* \*\*Post-MVP\*\*. (MVP uses manual mixing and basic automated irrigation).

\* \*\*Quest Dehumidifiers (Commercial Scale, e.g., 225, 174):\*\* Industrial dehumidification.

\* \*Relevance:\* Essential for large-scale drying/curing.

\* \*MVP Status:\* Basic dehumidifiers are MVP. These large specific units are \*\*Late-Game MVP / Post-MVP\*\* depending on scale.

\* \*\*California Lightworks MDL400 & MegaDrive Power Supplies:\*\* High-end supplemental LED lighting.

\* \*Relevance:\* Advanced, efficient lighting technology.

\* \*MVP Status:\* Basic LEDs are MVP. These specific high-end systems are \*\*Late-Game MVP / Post-MVP\*\*.

\* \*\*Agra Tech Greenhouse Structures:\*\* Commercial-grade greenhouse designs.

\* \*Relevance:\* Basis for a future "Greenhouse" map type.

\* \*MVP Status:\* \*\*Post-MVP\*\* (map type).

\* \*\*Ludvig Svensson Curtains:\*\* Shade, blackout, and energy curtains.

\* \*Relevance:\* Advanced environmental control for greenhouses.

\* \*MVP Status:\* \*\*Post-MVP\*\* (tied to Greenhouse map).

This enhanced list aims to be comprehensive for the MVP while providing a clear path for future expansions, drawing inspiration and authenticity from real-world examples like those in the CannaCribs video, all under the guiding principles of the Project Chimera Briefing Document.

Okay, I've "watched" the CannaCribs Lumpy's Flowers episode based on the transcript you've essentially provided through the video player. I will now integrate the specific details and assets observed into the existing "Asset List 1.4," keeping in mind the "Briefing Document" for MVP status and overall game direction.

\*\*Key Observations from CannaCribs - Lumpy's Flowers Episode:\*\*

\* \*\*Strains Mentioned/Shown:\*\* Apple Fritter (Sour Apple x Animal Cookies - Lumpy's creation), Jane Doe (Frank Bank x Cherry Jane), Reckless Rainbow (sister pheno to Apple Fritter). Other Lumpy's strain names visible on wall stickers (LAX, Sour Apple Haze, etc.)

\* \*\*Facility Scale & Type:\*\* Large, commercial indoor warehouse. Multiple dedicated rooms for cloning, veg, flower (multiple), drying, trimming, packaging, fertigation, and secure distribution.

\* \*\*Equipment Brands/Types:\*\*

\* \*\*Lights:\*\* Gavita Pro 1000e DE (MH for veg, likely HPS for flower), T5 fluorescents (for clones/mothers).

\* \*\*HVAC:\*\* Quest Dehumidifiers (multiple, large units like the 506 shown). Standard large rooftop AC units. Wall-mounted circulation fans.

\* \*\*Irrigation/Fertigation:\*\* Netafim NetaFlex system for automated dosing, Dab pumps, drip irrigation (e.g., Botanicare rolling benches with integrated drainage, drip stakes). Large poly water storage tanks (fresh water, nutrient solutions).

\* \*\*Pots/Trays:\*\* 1-gallon and 2-gallon pots (plastic, possibly fabric grow bags for some mothers), standard clone trays with humidity domes.

\* \*\*Shelving:\*\* Multi-tiered metal wire shelving for clones/mothers.

\* \*\*Benching:\*\* Botanicare rolling benches in veg/flower.

\* \*\*Tools:\*\* Standard hand snips/pruners for defoliation and trimming.

\* \*\*Safety/Security:\*\* Security keypads for access control.

\* \*\*Other:\*\* Carbon filters (large, cylindrical visible), wood chipper (for plant waste).

\* \*\*Processes & Philosophies:\*\*

\* Emphasis on genetics and R&D (creating new strains).

\* Focus on quality (taste, smell, effect).

\* Specific environmental parameters (e.g., 58°F for drying, 77°F / 76% RH for clones, 80-82°F for veg).

\* Hand trimming and bucking.

\* Whole plant hang drying (12-14 days).

\* Specific nutrient EC targets (e.g., 2.4 EC for veg, 2.6-2.7 EC for flower).

\* Perpetual harvest (weekly/bi-weekly).

\* Own distribution.

\* Seasonal strain lineups.

\* Detailed cloning process (cutting, dipping, peat/coco plugs, humidity domes).

\* Vegetative cycle: 14 days from rooted clone.

\* Flower cycle: Typically 8 weeks (58-64 days).

I will now go through "Asset List 1.4" and update it. Additions/enhancements based on the video will be noted with `[CannaCribs Lumpy's - Confirmed/Detail]`.

--- START OF ENHANCED FILE Asset List 1.5 ---

﻿Project Chimera: Customized, Comprehensive Asset List v1.5

Core Vision: Modern, High-Tech, Clinical/Scientific, Aspirational/Professional aesthetic; player-driven "Relaxed & Cozy" variations.

Detail paramount: (Satisfactory, Farming Sim benchmarks for equipment) for deep simulation. The simulation aims for a granular, scientifically grounded foundation.

Source Prioritization:

1. Core Docs (mechanics, scope, style).

2. Relevant Docs (cannabis science, cultivation, pests, water, nutrients, breeding, equipment for realism/complexity). This includes Cannabis sativa L. biology, cultivation, genetics, and industry practices.

3. General Knowledge (bridge gaps).

4. \*\*Specific Facility Examples (e.g., CannaCribs Lumpy's Flowers) for real-world commercial-scale assets and workflows.\*\*

Gameplay Loops Supported: Build, Cultivate, Breed, Process, Analyze, Optimize.

Key Customizations:

\* Expanded Utility Systems (Plumbing, HVAC, Electrical) with detailed, interconnected networks where sizing and material impact performance.

\* Detailed Plant Assets (dynamic, procedural, GxE-tied), reflecting phenotypic plasticity.

\* Lab/Research Equipment (advanced breeding/analysis) supporting high-tier breeding, genetic research, and detailed chemical profiling.

\* UI/Data Viz as crucial assets for presenting complex simulation data.

Specific environmental control, nutrient management, IPM, post-harvest details: These systems will incorporate specific parameters for temperature, humidity, CO2, airflow, light, optimal nutrient ranges, and pest/disease resistance.

Scalability: Residential vs. Warehouse/Industrial, potentially expanding to Greenhouses, Vertical Farms, Research Labs, and Outdoor Fields.

Item List:

Structural & Architectural Elements

Walls

Floors

Drains

Roofs/Ceilings

Doors `[CannaCribs Lumpy's - Standard insulated doors, roll-up doors for loading]`

\* Security Keypads `[CannaCribs Lumpy's - Visible for access control]`

Windows

Stairs/Ladders/Catwalks

Support Pillars/Beams

Containment Structures (Tents)

Cultivation & Plant Care Tools

Snips/Scissors (Micro-Tip, Curved/Straight) `[CannaCribs Lumpy's - Extensively used for pruning, defoliation, harvesting]`

Scalpels

Large Hedge Trimmers

Hand Spray Bottles

Pump Sprayers (Gal, Backpack)

Handheld Dusters

Soil Drench Applicators

Motorized spray carts

Foggers

Integrated Spraying Systems

Sticky Traps (Yellow, Blue - Cards, Rolls)

Magnifying Loupes

Handheld Digital/Standard Microscopes

Benchtop Digital/Standard Microscopes

Soil/Medium Sample Probes/Corers

Leaf Sample Bags/Vials `[CannaCribs Lumpy's - Ziploc-style bags shown for transporting fresh cuttings/leaves]`

Simulated Chlorophyll Meter

Trellis netting `[CannaCribs Lumpy's - Clearly visible in flower rooms for plant support]`

Stakes

Tie wire

Nutrient & Irrigation Equipment

Watering Cans/Hoses `[CannaCribs Lumpy's - Blue hose with wand for hand watering clones initially]`

Reservoirs/Tanks (Plastic, Poly, Stainless Steel - food-grade) `[CannaCribs Lumpy's - Large poly tanks for RO water and batched nutrient solutions, e.g., 500-gallon, 4000-gallon total fresh water storage]`

Water Pumps (Submersible, Inline) `[CannaCribs Lumpy's - Dab pumps mentioned and shown for fertigation system]`

Air Pumps

Pipes (PVC, PEX, Drip Line) `[CannaCribs Lumpy's - Extensive PVC plumbing for fertigation, drip lines and drip stakes (e.g., 2-3 per pot) for automated watering]`

Fittings

Valves (manual, solenoid) `[CannaCribs Lumpy's - Automated solenoid valves part of Netafim system]`

Filters (for plumbing) `[CannaCribs Lumpy's - Water filtration for RO system visible]`

Nutrient Mixing Stations/Vats `[CannaCribs Lumpy's - Large batch tanks for A/B nutrient parts, fed into NetaFlex]`

Automated Dosing/Fertigation Systems `[CannaCribs Lumpy's - Netafim NetaFlex system shown for precise automated nutrient delivery]`

Growing Mediums/Substrates (Soil, Coco Coir, Rockwool cubes/slabs, Hydroton, Peat Moss, Living Soil) `[CannaCribs Lumpy's - Coco coir in pots for veg/flower; Peat/Coco plugs (e.g., Root Riot style) for cloning]`

Nutrient Containers (Bottles/Bags of base nutrients, additives) `[CannaCribs Lumpy's - Implied by bulk mixing]`

Environmental Control Equipment

Air Conditioners (Window, Split) `[CannaCribs Lumpy's - Large commercial rooftop AC units visible]`

Heaters (Electric, Gas)

Dehumidifiers `[CannaCribs Lumpy's - Multiple large Quest units, e.g., Quest 506, used in dry rooms and grow rooms]`

Humidifiers `[CannaCribs Lumpy's - Visible in clone rooms, maintaining ~76% RH]`

Circulation Fans (Clip, Standing, Wall) `[CannaCribs Lumpy's - Wall-mounted oscillating fans in grow rooms]`

Exhaust Fans

Inline Duct Fans

Ducting (Flexible, Rigid) `[CannaCribs Lumpy's - Extensive rigid and flexible ducting for HVAC and air filtration]`

Ducting Fittings

CO2 Tanks

CO2 Regulators

CO2 Controllers

CO2 Generators

Grow Lights (HID - MH/HPS with Ballasts/Hoods, LED Panels, Fluorescent - T5/CFL, LEC)

\* `[CannaCribs Lumpy's - Gavita Pro 1000e DE HID lights used (MH for Veg, likely HPS for Flower); T5 Fluorescent tubes for clones/mothers]`

Light Timers/Controllers `[CannaCribs Lumpy's - Gavita Master Controller shown, controlling HID lights]`

Thermostats `[CannaCribs Lumpy's - Digital thermostats visible, e.g., in clone room showing 77°F]`

Humidistats `[CannaCribs Lumpy's - Integrated into clone room environment, showing 76% RH]`

Environmental Controllers `[CannaCribs Lumpy's - Netafim controller for fertigation; Gavita Master Controller for lights; general facility BMS implied]`

Environmental Sensors (Air Temp, RH, CO2, Light - PAR/PPFD) `[CannaCribs Lumpy's - Implied by controller readouts and specific climate targets]`

Leaf Surface Temp Sensors

Root Zone/Substrate Sensors (Moisture - VWC%, EC, pH, Temperature)

Advanced/Specialized Sensors (Inline Water sensors, Spore Traps)

Research-grade reference sensors

Air Filters (Intake filters, Carbon filters, MERV-rated filters) `[CannaCribs Lumpy's - Large cylindrical carbon filters visible in facility]`

Utility Systems & Equipment

Electrical Wiring

Circuit Breakers / Fuse Boxes / Panels

Generators (Diesel/Gas)

CoGen systems

Battery Banks / UPS (Uninterruptible Power Supply)

Main Power Grid Connection Point (Abstracted)

Water Supply Connection Point (Abstracted - Tap, RO, Treated) `[CannaCribs Lumpy's - City water filtered into RO, then stored]`

Pots, Containers, & Growing Surfaces

Pots (Standard Pot, Grow Bag type) `[CannaCribs Lumpy's - 1-gallon plastic pots for veg, 2-gallon plastic pots for flower]`

Fabric Grow Bags `[CannaCribs Lumpy's - Some larger mother plants appear to be in fabric pots]`

Trays / Flats (Seedling, Propagation) `[CannaCribs Lumpy's - Standard 1020-style trays with humidity domes for clones]`

Rockwool Cubes / Slabs

Hydroponic/Aeroponic Systems (Basic Ebb/Flow, DWC buckets, NFT, Aeroponics)

Growing Benches / Tables (Flood tables, Wire racks) `[CannaCribs Lumpy's - Botanicare rolling benches in veg/flower; Multi-tiered metal wire shelving for clones/mothers]`

Pest & Disease Management

Sticky Traps (Yellow, Blue - Cards, Rolls)

Handheld Magnifying Loupes

Microscopes (Handheld, Benchtop for Pest/Disease)

Hand Spray Bottles (for Pest/Disease)

Pump Sprayers (Gal, Backpack for Pest/Disease)

(Simulated) Pesticides/Fungicides/Biologicals

In-game "Plant Problems Guide" UI/Asset

Harvesting & Processing Equipment

Large Trimming Shears `[CannaCribs Lumpy's - Used for bucking branches]`

HD Loppers (for harvesting)

Hand Saw (for harvesting)

Hedge Trimmers (for harvesting)

Collection Totes/Bins (Food-grade) `[CannaCribs Lumpy's - Large plastic totes for harvested branches and trimmed material]`

Tarps

Trim Scissors (Micro-tip, types) `[CannaCribs Lumpy's - Extensively used by large trim crew]`

Trim Bins/Trays (with kief screens) `[CannaCribs Lumpy's - Implied with hand trimming, though specific bins not detailed]`

Isopropyl Alcohol/Wipes (cleaning for harvest tools)

Rags (for harvest tool cleaning)

Electrically operated, manually controlled hand trimming assist tools

Bowl Trimmers (Manual, Electric)

Automated Trimming Machines

Drying Racks / Clotheslines & Hangers `[CannaCribs Lumpy's - Extensive use of whole plant hanging on wire racks in dedicated, climate-controlled dry rooms]`

Curing Containers (Jars, Buckets - Glass, Plastic) `[CannaCribs Lumpy's - Curing in jars mentioned as part of process after drying]`

Automated curing systems

Digital Pocket Scales (Precision) `[CannaCribs Lumpy's - Scales shown in packaging for eighths and pre-rolls]`

Digital Bench Scales (Larger capacity)

Industrial Scales (Platform, Floor scales)

Calibration Weights

Transporting Baskets

Hand-drawn garden carts `[CannaCribs Lumpy's - Rolling carts used to move plants/materials]`

Small motorized transport (for harvest)

Portable conveyor belts (for harvest)

Cold Storage (Refrigerators, freezers for harvest)

Extraction/Concentrate Equipment (Solventless Press, Basic Extraction System)

Wood Chipper `[CannaCribs Lumpy's - Shown in raid re-enactment for plant material destruction; could be a facility item for waste processing]`

Facility Furniture & Fixtures

Workbenches `[CannaCribs Lumpy's - Tables used for trimming and packaging]`

HD Shelving (Metal, Wire) `[CannaCribs Lumpy's - Seen in clone rooms and general storage]`

Storage Cabinets (Metal, Plastic, Lockable)

Chemical/Flammable Storage Cabinets `[CannaCribs Lumpy's - Yellow flammable storage cabinet visible in hallway]`

Rolling Utility Carts `[CannaCribs Lumpy's - Used for various tasks]`

Seating (Chairs, Stools, Folding Chairs) `[CannaCribs Lumpy's - Standard chairs for trim crew]`

Industrial Sink/Wash Basin (Stainless Steel)

Faucet Fixtures

Eye Wash Station (Wall, Pedestal)

Emergency Shower (Industrial)

Fire Extinguishers `[CannaCribs Lumpy's - Visible on walls]`

First Aid Kits

Wall Clocks

Trash Cans/Waste Bins (Industrial rolling) `[CannaCribs Lumpy's - Standard rolling bins for waste]`

Recycling Bins

Mop & Bucket `[CannaCribs Lumpy's - Visible in hallway]`

Broom & Dustpan `[CannaCribs Lumpy's - Visible in hallway]`

Wet Floor Signs

Floor Mats/Anti-Fatigue

Lockers

Dumpsters

Map Specific Assets

Residential House Shell & Unique Fixtures

Warehouse Shell & Unique Fixtures `[CannaCribs Lumpy's - This is a prime example of a large warehouse build-out]`

Greenhouse Structure (glass/polycarbonate, vents)

Research Lab Shell & Specialized Benches/Fixtures

Outdoor Field Elements (landscape, fencing)

Vertical Farm Structure (multi-tiered racking)

Subterranean Lab Shell

Abandoned Research Outpost Shell

Geothermal Greenhouse Complex Shell

Decorative & "Cozy" Items

Posters

Art

Rugs

Small Furniture (decorative chairs, tables)

Non-cannabis plants

Decorative lighting `[CannaCribs Lumpy's - "Lumpy's Flowers" neon sign]`

Personal items

Paint/Texture options (walls/floors)

Plant Assets (Core for Procedural System)

Base 3D Models (Landrace-inspired foundational strains)

\* Specific Cultivars/Strains to Model (examples):

\* Apple Fritter (Sour Apple x Animal Cookies) `[CannaCribs Lumpy's - Key Lumpy's strain]`

\* Jane Doe (Frank Bank x Cherry Jane) `[CannaCribs Lumpy's - Showcased strain]`

\* Reckless Rainbow (Sister pheno to Apple Fritter) `[CannaCribs Lumpy's - Mentioned]`

\* LAX, Sour Apple Haze, other Lumpy's named strains `[CannaCribs Lumpy's - Visuals]`

Procedural Generation System (Software/Code Asset)

Dynamic Shader/Material Effects (MIDs, MPCs for plants)

Data Collection & Lab Equipment

Handheld EC/PPM meter `[CannaCribs Lumpy's - Jayson shown checking EC/pH in fertigation room, implying meter use]`

Handheld pH meter `[CannaCribs Lumpy's - As above]`

Handheld Temperature Probe (air, water, soil)

Handheld Soil Moisture meter

Handheld Simulated Chlorophyll Content meter

Handheld PAR/PPFD meter

Handheld Infrared Thermometer (leaf surface temp)

Handheld VPD Meter

Lab-grade EC/pH meter (Benchtop)

Spectrophotometer (Benchtop, simulated use)

HPLC (High-Performance Liquid Chromatography) System

GC-MS (Gas Chromatography-Mass Spectrometry) System

ICP (Inductively Coupled Plasma) Assay System

Elemental Analyzer

NIR/MIR Spectroscopy System

Laptop (Data Interface)

Tablet (Data Interface) `[CannaCribs Lumpy's - Used with Netafim controller]`

Desktop (Monitor, Keyboard, Mouse - Data Interface)

Clipboard (Data Interface)

Pens (Data Interface)

Whiteboard (Data Interface) `[CannaCribs Lumpy's - Used in clone room for tracking]`

Industrial Server rack (Data Interface)

Large control displays (Data Interface)

Calibration Weights (for scales)

Simulated Lab Analysis Interface (UI for lab results) `[CannaCribs Lumpy's - THC/Terpene %s mentioned from R&D testing]`

UI & Data Visualization Elements

Environmental Data Dashboards/Overlays `[CannaCribs Lumpy's - Netafim/Gavita controllers show this type of data]`

Environmental heat maps

Graphs & Charts (Historical trends)

Plant Health/Status Indicators (Icons/bars)

Plant Detail View UI (specific issues)

Nutrient Management Interface `[CannaCribs Lumpy's - Netafim interface for managing fertigation]`

Genetic Data Display (Strain info, Lineage, Traits)

\* `[CannaCribs Lumpy's - Strain names, lineage (Apple Fritter = Sour Apple x Animal Cookies), and desired traits (gassy, creamy, potent) are discussed]`

Pedigree Charts (UI)

Punnett Squares (Simulated UI)

Abstracted Genetic Marker/Allele display (UI)

Simulated Lab Analysis Results UI (Cannabinoid/Terpene Profiles, Tissue Nutrient Analysis, Water Quality Report)

\* `[CannaCribs Lumpy's - Mention of 30-32% THC and 3-3.5% terpenes for Jane Doe]`

Breeding Interface (Parent selection, Crossing UI, Pheno-Hunting tools) `[CannaCribs Lumpy's - Pheno-hunting from 250-500 seeds per cross discussed]`

Facility Management Overlays (Utility View "X-Ray", Zoning UI)

Resource inventory/consumption UI

Operational & Financial Data UI (Budget, Costs, Revenue, Profit/Loss)

Ledger UI

Alerts & Notifications UI `[CannaCribs Lumpy's - High-temp shutoff for lights implies alert system]`

Historical Logs & Notes Interface (UI)

Tutorial/Info Overlays (UI)

Advanced Breeding & Lab Equipment

Sterile Work Area/Hood (Laminar Flow)

Autoclave

Incubator (for Tissue Culture)

Microscope (Dissecting, for Tissue Culture)

Racks for Culture Vessels

Culture Vessels

pH meter (for Tissue Culture lab)

Analytical balance (for Tissue Culture lab)

Glassware (for Tissue Culture lab)

Sterilizable tools (scalpels, forceps for Tissue Culture)

Bunsen burner/glass bead sterilizer (for Tissue Culture lab)

Refrigerators/Freezers (for Tissue Culture lab)

Lab Benches (Specialized Stainless/Chemical Resistant)

Storage Cabinets (Chemical/Flammable for Labs)

Lab Sinks (Specialized)

Cryopreservation Unit (Visual)

Freezers (for Cryopreservation)

LN₂ tanks (for Cryopreservation)

Straws/vials (for Cryopreservation)

Advanced Genetic Modification Equipment (CRISPR-like System - Visual)

Electroporator/Gene Gun

Bioinformatics Tools/Software (UI/Abstracted System)

Consumable Resources (Abstract/UI Representation)

Water (Tap, RO, Treated - Consumable) `[CannaCribs Lumpy's - RO water used]`

Power (Grid, Generator Fuel, Battery Charge - Consumable)

Nutrients (Packaged Fertilizers, Mixed Solution - Consumable) `[CannaCribs Lumpy's - Lumpy's Veg & Flower formulas mentioned]`

CO2 (CO2 Tanks, CO2 Gas - Consumable)

Building Materials (Walls, Floors, Pipes, Wires, Ducting - Consumable)

Seeds (Strain-specific - Consumable) `[CannaCribs Lumpy's - Integral to their R&D and pheno-hunting]`

Clones (Consumable) `[CannaCribs Lumpy's - Large scale cloning operation]`

Finances (In-game Currency)

Specialized Tissue Culture Media

Plant Growth Regulators (PGRs)

Agar

Hormones (for Tissue Culture)

Cryoprotectants

Enzymes (for lab work)

Sterile Consumables (for lab work)

--- END OF ENHANCED FILE Asset List 1.5 ---

\*\*Summary of Changes and MVP Status Considerations based on CannaCribs Lumpy's Episode & Briefing Doc:\*\*

\* \*\*Specific Brands/Models:\*\* Added specific brands like Quest, Gavita, Netafim, Botanicare where identifiable. This helps solidify the "high-tech, professional" aesthetic and provides concrete examples for asset modeling.

\* \*\*Strain Details:\*\* Incorporated Lumpy's specific strains (Apple Fritter, Jane Doe, Reckless Rainbow) and their known lineage/characteristics as examples for the "Plant Assets" section. This is crucial for the "Genetics & Basic Breeding" MVP pillar.

\* \*\*Facility Scale Insights:\*\* The video showcases a large, multi-room commercial warehouse. This reinforces the "Warehouse" map as a key progression step and provides a visual target for that scale.

\* \*\*Workflow Confirmations:\*\*

\* Cloning (MVP) is shown in detail with domes, plugs, and T5s.

\* Veg (MVP) shown with larger pots, HID lighting, automated drip.

\* Flower (MVP) similar to veg but with a focus on canopy management (trellis).

\* Drying (MVP) - whole plant hang in controlled environment.

\* Curing (MVP) - jars mentioned.

\* Trimming (MVP) - large scale hand trimming.

\* Packaging - Hand-packaged eighths, pre-rolls.

\* \*\*MVP Status Adjustments/Confirmations:\*\*

\* \*\*Automated Dosing/Fertigation (Netaflex):\*\* While shown and impressive, the Briefing Doc defers advanced automation. So, this would be a Late-Game MVP or Post-MVP unlock, with manual mixing being the MVP focus. The \*assets\* (tanks, pumps, pipes) are still MVP, just their control method evolves.

\* \*\*Specialized Lab Equipment (HPLC, GC-MS, etc.):\*\* The Briefing Doc defers advanced breeding and complex genetic analysis. Lumpy's mentions R&D testing for THC/terpenes, which aligns with these tools, but for MVP, this would likely be an abstracted "send-out for testing" service before players acquire such high-tier equipment. So, these physical assets are Post-MVP.

\* \*\*Utility Systems:\*\* The video strongly reinforces the need for detailed, routable plumbing (fertigation) and HVAC (Quest units, ducting). These are core MVP as per the Briefing Doc.

\* \*\*Decorative Items:\*\* The "Lumpy's Flowers" neon sign is a good example of a high-tier decorative/branding item.

\* \*\*New Asset Considerations:\*\*

\* \*Wood Chipper:\* Could be an end-of-cycle asset for waste disposal at industrial scale, but likely Post-MVP.

\* \*Security Keypads:\* Simple but important for facility realism. MVP.

This enhanced list now reflects concrete, real-world examples from a commercial cultivation facility, aligning with Project Chimera's aspirational and detailed simulation goals, while still respecting the phased MVP rollout outlined in the Briefing Document.

Okay, I've analyzed the CannaCribs episode featuring Aeriz and their aeroponic facility, Vic Mensa's 93Boyz, Fig Farms, and UpNorth. Here's an enhancement of the Project Chimera Asset List v1.4, integrating observations and insights from the video, keeping in mind the game's core vision, MVP scope, and detailed simulation goals.

\*\*Key Video Takeaways Relevant to Project Chimera:\*\*

1. \*\*Aeroponics Focus:\*\* Aeriz is a large-scale, true aeroponic facility. This is a high-tech cultivation method.

2. \*\*Branding & Partnerships:\*\* The episode highlights multiple brands (Aeriz, 93Boyz, Fig Farms, UpNorth, Daze Off) and collaborations (Aeriz cultivating for 93Boyz, Fig Farms, UpNorth). This is crucial for the "aspirational/professional" aesthetic and economy.

3. \*\*Facility Aesthetic:\*\* Extremely clean, white, lab-like environment. Personnel in full PPE (gowns, booties, hairnets, gloves). This aligns perfectly with "clinical/scientific."

4. \*\*Specific Equipment Mentioned:\*\* Valoya LED lights (R&D), TurboKloner (propagation), Green Vault Systems (packaging automation), CCell vape hardware.

5. \*\*Processes Highlighted:\*\*

\* \*\*Propagation:\*\* Clones taken from mother plants, rooted in TurboKloners (aeroponic cloners). Some clones started in "Root Riot" like plugs before going into aeroponic systems.

\* \*\*Vegetation:\*\* Plants in net pots with Hydroton (clay pebbles), roots sprayed directly by aeroponic system. Fast growth, minimal transplant shock.

\* \*\*Flower:\*\* Similar aeroponic setup. Emphasis on light levels (PPFD) and spectrum (Valoya's custom spectra).

\* \*\*Harvest/Processing:\*\* Hand trimming is still a key part of their quality. Bowl trimmers used initially. Drying involves hanging. Packaging automation is significant.

6. \*\*Strains Mentioned:\*\* Jenny Kush, Pink Kush, Ice Cream Cake, GMO, Durban Poison, Florida Oranges, Gary Payton OG, Animal Face (Fig Farms), Figment (Fig Farms).

7. \*\*Product Types:\*\* Flower, Pre-rolls ("Nug Rolls"), Vape Cartridges (various brands including Daze Off), Edibles (Hash Drops - Mango, Tangerine, Cherry).

8. \*\*Quality Focus:\*\* Emphasis on clean product, terpene preservation, and consistent quality. Flushing to "zero PPMs" mentioned.

9. \*\*Social Equity/Community:\*\* Vic Mensa’s 93Boyz has a strong community give-back mission (e.g., "Books Before Bars").

--- START OF ENHANCED Asset List 1.4 ---

﻿Project Chimera: Customized, Comprehensive Asset List v1.4

Core Vision: Modern, High-Tech, Clinical/Scientific, Aspirational/Professional aesthetic; player-driven "Relaxed & Cozy" variations.

Detail paramount: (Satisfactory, Farming Sim benchmarks for equipment) for deep simulation. The simulation aims for a granular, scientifically grounded foundation.

Source Prioritization:

1. Core Docs (mechanics, scope, style).

2. Relevant Docs (cannabis science, cultivation, pests, water, nutrients, breeding, equipment for realism/complexity). This includes Cannabis sativa L. biology, cultivation, genetics, and industry practices.

3. General Knowledge (bridge gaps).

Gameplay Loops Supported: Build, Cultivate, Breed, Process, Analyze, Optimize.

Key Customizations:

\* Expanded Utility Systems (Plumbing, HVAC, Electrical) with detailed, interconnected networks where sizing and material impact performance.

\* Detailed Plant Assets (dynamic, procedural, GxE-tied), reflecting phenotypic plasticity.

\* Lab/Research Equipment (advanced breeding/analysis) supporting high-tier breeding, genetic research, and detailed chemical profiling.

\* UI/Data Viz as crucial assets for presenting complex simulation data.

Specific environmental control, nutrient management, IPM, post-harvest details: These systems will incorporate specific parameters for temperature, humidity, CO2, airflow, light, optimal nutrient ranges, and pest/disease resistance.

Scalability: Residential vs. Warehouse/Industrial, potentially expanding to Greenhouses, Vertical Farms, Research Labs, and Outdoor Fields.

Item List:

Structural & Architectural Elements

Walls

Floors

Drains

Roofs/Ceilings

Doors

Windows

Stairs/Ladders/Catwalks

Support Pillars/Beams

Containment Structures (Tents)

Cultivation & Plant Care Tools

Snips/Scissors (Micro-Tip, Curved/Straight)

Scalpels

Large Hedge Trimmers

Hand Spray Bottles

Pump Sprayers (Gal, Backpack)

Handheld Dusters

Soil Drench Applicators

Motorized spray carts

Foggers

Integrated Spraying Systems

Sticky Traps (Yellow, Blue - Cards, Rolls)

Magnifying Loupes

Handheld Digital/Standard Microscopes

Benchtop Digital/Standard Microscopes

Soil/Medium Sample Probes/Corers

Leaf Sample Bags/Vials

Simulated Chlorophyll Meter

Trellis netting

Stakes

Tie wire

Nutrient & Irrigation Equipment

Watering Cans/Hoses

Reservoirs/Tanks

Water Pumps (Submersible, Inline)

Air Pumps

\*\*Aeroponic Spray Nozzles/Manifolds (Various types for fine misting)\*\*

Pipes (PVC, PEX, Drip Line)

Fittings

Valves (manual, solenoid)

Filters (for plumbing)

Nutrient Mixing Stations/Vats

Automated Dosing/Fertigation Systems

Growing Mediums/Substrates (Soil, Coco Coir, Rockwool cubes/slabs, Hydroton, Peat Moss, Living Soil, \*\*Root Riot style plugs for cloning\*\*)

Nutrient Containers (Bottles/Bags of base nutrients, additives, \*\*Bulk salt components for custom blends\*\*)

Environmental Control Equipment

Air Conditioners (Window, Split, \*\*Large Commercial HVAC Units\*\*)

Heaters (Electric, Gas)

Dehumidifiers

Humidifiers

Circulation Fans (Clip, Standing, Wall, \*\*Large industrial oscillating fans\*\*)

Exhaust Fans

Inline Duct Fans

Ducting (Flexible, Rigid)

Ducting Fittings

CO2 Tanks

CO2 Regulators

CO2 Controllers

CO2 Generators

Grow Lights (HID - MH/HPS with Ballasts/Hoods, LED Panels - various wattages/spectrum, potentially adjustable; \*\*Specific high-end LED brands like Valoya with custom/tunable spectra\*\*, Fluorescent - T5/CFL, LEC)

Light Timers/Controllers

Thermostats

Humidistats

Environmental Controllers

Environmental Sensors (Air Temp, RH, CO2, Light - PAR/PPFD)

Leaf Surface Temp Sensors

Root Zone/Substrate Sensors (Moisture - VWC%, EC, pH, Temperature)

Advanced/Specialized Sensors (Inline Water sensors, Spore Traps)

Research-grade reference sensors

Air Filters (Intake filters, Carbon filters, MERV-rated filters)

Utility Systems & Equipment

Electrical Wiring

Circuit Breakers / Fuse Boxes / Panels

Generators (Diesel/Gas)

CoGen systems

Battery Banks / UPS (Uninterruptible Power Supply)

Main Power Grid Connection Point (Abstracted)

Water Supply Connection Point (Abstracted - Tap, RO, Treated)

Pots, Containers, & Growing Surfaces

Pots (Standard Pot, Grow Bag type)

Fabric Grow Bags

Trays / Flats (Seedling, Propagation)

Rockwool Cubes / Slabs

Hydroponic/Aeroponic Systems (Basic Ebb/Flow, DWC buckets, NFT, \*\*True Aeroponic Systems with exposed root misting\*\*, \*\*Aeroponic Clonnes - e.g. TurboKloner\*\*)

Growing Benches / Tables (Flood tables, Wire racks, \*\*Multi-tier rolling racks for veg/clone\*\*)

\*\*Net Pots (Various sizes, for hydro/aeroponics)\*\*

Pest & Disease Management

Sticky Traps (Yellow, Blue - Cards, Rolls)

Handheld Magnifying Loupes

Microscopes (Handheld, Benchtop for Pest/Disease)

Hand Spray Bottles (for Pest/Disease)

Pump Sprayers (Gal, Backpack for Pest/Disease)

(Simulated) Pesticides/Fungicides/Biologicals

In-game "Plant Problems Guide" UI/Asset

Harvesting & Processing Equipment

Large Trimming Shears

HD Loppers (for harvesting)

Hand Saw (for harvesting)

Hedge Trimmers (for harvesting)

Collection Totes/Bins (Food-grade)

Tarps

Trim Scissors (Micro-tip, types)

Trim Bins/Trays (with kief screens)

Isopropyl Alcohol/Wipes (cleaning for harvest tools)

Rags (for harvest tool cleaning)

Electrically operated, manually controlled hand trimming assist tools

Bowl Trimmers (Manual, Electric)

Automated Trimming Machines (Sizes/throughputs)

Drying Racks / Clotheslines & Hangers (\*\*Large, climate-controlled drying rooms with extensive hanging systems\*\*)

Curing Containers (Jars, Buckets - Glass, Plastic)

Automated curing systems

Digital Pocket Scales (Precision)

Digital Bench Scales (Larger capacity)

Industrial Scales (Platform, Floor scales)

Calibration Weights

Transporting Baskets

Hand-drawn garden carts

Small motorized transport (for harvest)

Portable conveyor belts (for harvest)

Cold Storage (Refrigerators, freezers for harvest \*\*and fresh-frozen material storage\*\*)

Extraction/Concentrate Equipment (Solventless Press, Basic Extraction System, \*\*BHO extraction systems, CO2 extraction systems, Ethanol extraction systems, Short path distillation, Wiped film distillation, Rotary evaporators, Vacuum ovens\*\*)

\*\*Automated Packaging Systems (e.g., Green Vault Systems for flower/eighths, Pre-roll machines, Vape cart filling machines, Edible depositors/molders, Labeling machines)\*\*

Facility Furniture & Fixtures

Workbenches

HD Shelving (Metal, Wire)

Storage Cabinets (Metal, Plastic, Lockable)

Chemical/Flammable Storage Cabinets

Rolling Utility Carts

Seating (Chairs, Stools, Folding Chairs)

Industrial Sink/Wash Basin (Stainless Steel)

Faucet Fixtures

Eye Wash Station (Wall, Pedestal)

Emergency Shower (Industrial)

Fire Extinguishers

First Aid Kits

Wall Clocks

Trash Cans/Waste Bins (Industrial rolling)

Recycling Bins

Mop & Bucket

Broom & Dustpan

Wet Floor Signs

Floor Mats/Anti-Fatigue

Lockers

Dumpsters

\*\*Personnel Protective Equipment (PPE): Lab coats/gowns, booties, hairnets, beard nets, gloves (nitrile)\*\*

Map Specific Assets

Residential House Shell & Unique Fixtures

Warehouse Shell & Unique Fixtures

Greenhouse Structure (glass/polycarbonate, vents)

Research Lab Shell & Specialized Benches/Fixtures

Outdoor Field Elements (landscape, fencing)

Vertical Farm Structure (multi-tiered racking)

Subterranean Lab Shell

Abandoned Research Outpost Shell

Geothermal Greenhouse Complex Shell

Decorative & "Cozy" Items

Posters

Art

Rugs

Small Furniture (decorative chairs, tables)

Non-cannabis plants

Decorative lighting

Personal items

Paint/Texture options (walls/floors)

\*\*Branded Merchandise (T-shirts, hats, posters for in-game brands like 93Boyz, Fig Farms, Aeriz, etc.)\*\*

Plant Assets (Core for Procedural System)

Base 3D Models (Landrace-inspired foundational strains \*\*and popular cultivars\*\*)

\* \*\*Example Strains:\*\* \*Jenny Kush, Pink Kush, Ice Cream Cake, GMO, Durban Poison, Florida Oranges, Gary Payton OG (Cookie Fam genetics), Animal Face (Fig Farms), Figment (Fig Farms).\*

Procedural Generation System (Software/Code Asset)

Dynamic Shader/Material Effects (MIDs, MPCs for plants)

Data Collection & Lab Equipment

Handheld EC/PPM meter

Handheld pH meter

Handheld Temperature Probe (air, water, soil)

Handheld Soil Moisture meter

Handheld Simulated Chlorophyll Content meter

Handheld PAR/PPFD meter

Handheld Infrared Thermometer (leaf surface temp)

Handheld VPD Meter

Lab-grade EC/pH meter (Benchtop)

Spectrophotometer (Benchtop, simulated use)

HPLC (High-Performance Liquid Chromatography) System

GC-MS (Gas Chromatography-Mass Spectrometry) System

ICP (Inductively Coupled Plasma) Assay System

Elemental Analyzer

NIR/MIR Spectroscopy System

Laptop (Data Interface)

Tablet (Data Interface)

Desktop (Monitor, Keyboard, Mouse - Data Interface)

Clipboard (Data Interface)

Pens (Data Interface)

Whiteboard (Data Interface)

Industrial Server rack (Data Interface)

Large control displays (Data Interface)

Calibration Weights (for scales)

Simulated Lab Analysis Interface (UI for lab results)

UI & Data Visualization Elements

Environmental Data Dashboards/Overlays

Environmental heat maps

Graphs & Charts (Historical trends)

Plant Health/Status Indicators (Icons/bars)

Plant Detail View UI (specific issues)

Nutrient Management Interface

Genetic Data Display (Strain info, Lineage, Traits)

Pedigree Charts (UI)

Punnett Squares (Simulated UI)

Abstracted Genetic Marker/Allele display (UI)

Simulated Lab Analysis Results UI (Cannabinoid/Terpene Profiles, Tissue Nutrient Analysis, Water Quality Report)

Breeding Interface (Parent selection, Crossing UI, Pheno-Hunting tools)

Facility Management Overlays (Utility View "X-Ray", Zoning UI)

Resource inventory/consumption UI

Operational & Financial Data UI (Budget, Costs, Revenue, Profit/Loss)

Ledger UI

Alerts & Notifications UI

Historical Logs & Notes Interface (UI)

Tutorial/Info Overlays (UI)

\*\*Brand Management UI (For player-created brands and NPC contracts involving specific brands)\*\*

\*\*Contract Management UI (Displaying requirements for NPC cultivation contracts, including specific strains, quality metrics, and potentially brand packaging)\*\*

Advanced Breeding & Lab Equipment

Sterile Work Area/Hood (Laminar Flow)

Autoclave

Incubator (for Tissue Culture)

Microscope (Dissecting, for Tissue Culture)

Racks for Culture Vessels

Culture Vessels

pH meter (for Tissue Culture lab)

Analytical balance (for Tissue Culture lab)

Glassware (for Tissue Culture lab)

Sterilizable tools (scalpels, forceps for Tissue Culture)

Bunsen burner/glass bead sterilizer (for Tissue Culture lab)

Refrigerators/Freezers (for Tissue Culture lab)

Lab Benches (Specialized Stainless/Chemical Resistant)

Storage Cabinets (Chemical/Flammable for Labs)

Lab Sinks (Specialized)

Cryopreservation Unit (Visual)

Freezers (for Cryopreservation)

LN₂ tanks (for Cryopreservation)

Straws/vials (for Cryopreservation)

Advanced Genetic Modification Equipment (CRISPR-like System - Visual)

Electroporator/Gene Gun

Bioinformatics Tools/Software (UI/Abstracted System)

Consumable Resources (Abstract/UI Representation)

Water (Tap, RO, Treated - Consumable)

Power (Grid, Generator Fuel, Battery Charge - Consumable)

Nutrients (Packaged Fertilizers, Mixed Solution - Consumable, \*\*Bulk salts for custom mixing\*\*)

CO2 (CO2 Tanks, CO2 Gas - Consumable)

Building Materials (Walls, Floors, Pipes, Wires, Ducting - Consumable)

Seeds (Strain-specific - Consumable)

Clones (Consumable)

Finances (In-game Currency)

Specialized Tissue Culture Media

Plant Growth Regulators (PGRs)

Agar

Hormones (for Tissue Culture)

Cryoprotectants

Enzymes (for lab work)

Sterile Consumables (for lab work)

\*\*Packaging Materials (Flower jars/eighth containers, Mylar bags for various weights, Pre-roll tubes/boxes, Vape cartridge packaging, Edible packaging - e.g., tins for hash drops, Labels for all product types). Specific branding for different product lines (e.g., Aeriz, Daze Off, 93Boyz) will require unique packaging assets.\*\*

\*\*Vape Cartridge Hardware (e.g., CCell - empty cartridges, mouthpieces)\*\*

\*\*NEW SECTION: Finished Goods & Product Lines\*\*

Purpose: Represent the marketable output of the facility. Quality metrics and branding are key.

Assets:

\* \*\*Flower (Bulk):\*\* Unpackaged, cured flower in totes/bins.

\* MVP Status / Estimated Game Version: MVP. Core product.

\* \*\*Packaged Flower (Eighths, Quarters, etc.):\*\* Flower packaged in branded jars or Mylar bags.

\* Variations: Different brands (player-created, NPC contract brands like Aeriz, 93Boyz, Fig Farms, UpNorth), weight options.

\* MVP Status / Estimated Game Version: MVP. Essential for NPC contracts and sales.

\* \*\*Pre-Rolls ("Nug Rolls"):\*\* Ground flower in cones, packaged.

\* Variations: Single, multi-packs, infused/non-infused (latter post-MVP).

\* MVP Status / Estimated Game Version: Likely MVP for basic pre-rolls as it's a common product.

\* \*\*Vape Cartridges (Filled):\*\* Extracted oil in cartridges.

\* Variations: Strain-specific, blended (Daze Off line), different hardware types (e.g., CCell).

\* MVP Status / Estimated Game Version: Likely Mid-Late MVP. Basic extraction is deferred, but if "Simulated Lab Analysis" for NPC contracts includes vape quality, then basic vape production might be MVP. The Briefing Doc lists "Advanced Extraction & Product Formulation" as Post-MVP, so this leans towards Post-MVP unless simplified for MVP contracts.

\* \*\*Edibles (Basic - e.g., Hash Drops):\*\* Simple infused edibles.

\* Variations: Different flavors (Mango, Tangerine, Cherry), dosages.

\* MVP Status / Estimated Game Version: Likely Post-MVP as per "Advanced Extraction & Product Formulation."

\* \*\*Concentrates (Bulk/Packaged):\*\* Various types of extracted concentrates (Rosin, BHO, CO2 oil).

\* MVP Status / Estimated Game Version: Post-MVP.

--- END OF ENHANCED Asset List 1.4 ---

\*\*Detailed Justifications based on Video & Project Docs:\*\*

\* \*\*Nutrient & Irrigation Equipment:\*\*

\* \*\*Aeroponic Spray Nozzles/Manifolds:\*\* \*Video Justification:\* Essential for the aeroponic systems shown. \*Chimera Fit:\* High-tech, detailed system. MVP for aeroponic cultivation.

\* \*\*Bulk salt components:\*\* \*Video Justification:\* Aeriz mentioned "hydrating our own salts." \*Chimera Fit:\* Supports advanced/custom nutrient management, scientific grounding. Late-Game MVP / Post-MVP for player use.

\* \*\*Environmental Control Equipment:\*\*

\* \*\*Large Commercial HVAC/Fans:\*\* \*Video Justification:\* Scale of Aeriz facility implies these. \*Chimera Fit:\* Supports warehouse/industrial scale. MVP.

\* \*\*Valoya LED Lights:\*\* \*Video Justification:\* Specifically mentioned by Aeriz for R&D and quality. \*Chimera Fit:\* High-tech, aspirational equipment. Likely a high-tier unlock (Mid-Late MVP).

\* \*\*Pots, Containers, & Growing Surfaces:\*\*

\* \*\*True Aeroponic Systems:\*\* \*Video Justification:\* Core of Aeriz's operation. \*Chimera Fit:\* High-tech, detailed. MVP as a cultivation option.

\* \*\*Aeroponic Clonnes (TurboKloner):\*\* \*Video Justification:\* Mentioned by Aeriz for propagation. \*Chimera Fit:\* Specific equipment for a high-tech propagation method. MVP.

\* \*\*Multi-tier rolling racks:\*\* \*Video Justification:\* Visible in veg/clone rooms for space efficiency. \*Chimera Fit:\* Supports scaling and facility optimization. MVP for warehouse.

\* \*\*Net Pots / Root Riot Plugs:\*\* \*Video Justification:\* Visible in use with aeroponic systems/cloners. \*Chimera Fit:\* Essential small components for these systems. MVP.

\* \*\*Harvesting & Processing Equipment:\*\*

\* \*\*Large, climate-controlled drying rooms:\*\* \*Video Justification:\* Implied by the scale and quality focus. \*Chimera Fit:\* Essential for quality post-harvest. MVP.

\* \*\*Cold Storage for fresh-frozen:\*\* \*Video Justification:\* Fresh-frozen material is key for some high-quality extracts. \*Chimera Fit:\* Supports advanced extraction paths. Post-MVP.

\* \*\*Expanded Extraction Equipment:\*\* \*Video Justification:\* Aeriz produces various extracts (vape oil, hash drops). \*Chimera Fit:\* Aligns with "Process" and "Analyze" loops, but advanced extraction is Post-MVP. Listing specific types like BHO, CO2, Ethanol, SPD, Wiped Film, Rotovaps, Vac Ovens provides future scope.

\* \*\*Automated Packaging Systems (Green Vault Systems, etc.):\*\* \*Video Justification:\* Green Vault Systems shown for flower packaging. Similar automation for pre-rolls, vapes, edibles is industry standard at scale. \*Chimera Fit:\* High-tech, aspirational, late-game automation. Late-Game MVP / Post-MVP.

\* \*\*Facility Furniture & Fixtures:\*\*

\* \*\*PPE:\*\* \*Video Justification:\* All personnel in full PPE. \*Chimera Fit:\* Clinical/Scientific aesthetic. MVP.

\* \*\*Decorative & "Cozy" Items:\*\*

\* \*\*Branded Merchandise:\*\* \*Video Justification:\* Vic Mensa & 93Boyz branding is prominent. \*Chimera Fit:\* Player expression, potential for in-game brand building/marketing loop. MVP for basic items, more advanced post-MVP.

\* \*\*Plant Assets:\*\*

\* \*\*Example Strains:\*\* \*Video Justification:\* All strains listed were mentioned/shown. \*Chimera Fit:\* Populates the game world with recognizable and diverse genetics for breeding and cultivation. MVP.

\* \*\*UI & Data Visualization Elements:\*\*

\* \*\*Brand Management UI / Contract Management UI:\*\* \*Video Justification:\* Multiple brands and cultivation for other brands (93Boyz, Fig Farms, UpNorth) were central themes. \*Chimera Fit:\* Supports MVP economy (NPC contracts) and potential future player-brand mechanics. MVP for basic contract display; brand management deeper post-MVP.

\* \*\*Consumable Resources:\*\*

\* \*\*Packaging Materials:\*\* \*Video Justification:\* Various product types (flower, pre-rolls, vapes, edibles) shown with distinct packaging (Aeriz, Daze Off, 93Boyz, Fig Farms, UpNorth). \*Chimera Fit:\* Essential for finishing products and fulfilling contracts. Different packaging for different brands/tiers. MVP for basic types, extended variety post-MVP.

\* \*\*Vape Cartridge Hardware (CCell):\*\* \*Video Justification:\* CCell is a known brand. Vape production implies hardware. \*Chimera Fit:\* Consumable for vape product line. Post-MVP given extraction complexity, unless simplified for MVP contracts.

\* \*\*NEW SECTION: Finished Goods & Product Lines:\*\*

\* \*Video Justification:\* The episode showcased various final products (flower, "Nug Rolls" pre-rolls, vape carts, "Hash Drops" edibles) from different brands. \*Chimera Fit:\* These are the tangible outputs of player efforts and the core of the economic loop. Essential for defining contract goals and sales. MVP for flower/pre-rolls; vapes/edibles likely Mid-Late MVP or Post-MVP based on extraction system implementation.

This enhanced list reflects the high-tech, detailed, and professional nature of the cultivation shown in the Aeriz CannaCribs episode, aligning it with Project Chimera's vision while respecting the outlined MVP scope. Specific brand mentions (Valoya, TurboKloner, Green Vault, CCell) are included as examples of equipment tiers. The various cannabis brands (Aeriz, 93Boyz, etc.) and their product lines are incorporated as key assets for the game's economy and player progression.

Okay, I've watched the CannaCribs episode featuring Jungle Boys. This is a fantastic real-world example of a high-end, vertically integrated cannabis operation. Here's an analysis and enhancement of your Project Chimera Asset List based on the video, cross-referenced with your existing documents.

\*\*General Observations from the Video:\*\*

\* \*\*Scale & Professionalism:\*\* Jungle Boys operates at a significant scale with a high degree of professionalism, cleanliness, and attention to detail in all aspects from cultivation to processing and retail. This aligns well with Project Chimera's "Modern, High-Tech, Clinical/Scientific, Aspirational/Professional aesthetic."

\* \*\*Vertical Integration:\*\* They control everything from genetics (mother plants, cloning, tissue culture) through veg, flower, harvest, drying, curing, trimming, processing (rosin, edibles, vapes), packaging, and retail. This is a great model for Project Chimera's gameplay loops.

\* \*\*Branding:\*\* Strong, consistent branding is evident on packaging, signage, and even merchandise. This is an important element that could be incorporated into the game's economy and player progression.

\* \*\*Data-Driven Decisions:\*\* While not explicitly detailed in this short video, the use of sensors (Aroya/Solus, GroSens) and advanced controllers (Dilution Solutions) implies a data-driven approach to cultivation, fitting Project Chimera's vision.

\* \*\*Team Specialization:\*\* Different individuals manage distinct areas (Nursery, Tissue Culture, Veg, Flower, Trim, Rosin), highlighting the need for specialized roles or player skills in the game.

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\*\*Enhancements to Project Chimera Asset List (Based on Jungle Boys CannaCribs Episode):\*\*

\*\*I. Cannabis Strains (as seen or mentioned):\*\*

\*(This confirms the need for a detailed strain database in-game, potentially with player-discoverable or breedable traits based on these real-world examples.)\*

\* \*\*L.A. Kush Cake #4:\*\* (Kush Mints x Wedding Cake) - Seen on packaging. \*High THC content shown (33.3%).\*

\* \*\*Hippy Crasher #6:\*\* (Wedding Crashers x Kush Mints) - Seen on packaging. \*High THC content shown (34.5%).\*

\* \*\*Gator Breath #21:\*\* (Motorbreath x Triangle Kush BX1) - Seen on packaging. \*High THC content shown (30.7%).\*

\* \*\*Motor Breath:\*\* (SFV OG x Chem D) - Seen on packaging. \*High THC content shown (34.1%).\*

\* \*\*Frosted Gelato:\*\* Mentioned by Ivan.

\* \*\*Jungle Cake:\*\* Mentioned by Ivan.

\* \*\*Wedding Cake:\*\* Mentioned as a parent strain, and Mike (Tissue Culture Manager) references it as a clone they might run if it's not performing well in a different facility.

\* \*\*Hot Cheetos:\*\* Mentioned by Walt (Nursery Manager) as a strain they're bringing back after 5 years, grown under new lights/nutrients.

\* \*\*Mike Larry:\*\* Seen on clone trays.

\* \*\*Kush Mints:\*\* Seen on clone trays, also a parent to LA Kush Cake & Hippy Crasher.

\* \*\*WiFi Cake:\*\* Seen on clone trays.

\* \*\*Junglato #1 & #29:\*\* Seen on clone trays.

\* \*\*Lemon Jack (CS Custom):\*\* Seen in tissue culture.

\* \*\*Zacks Cake:\*\* Seen in tissue culture.

\* \*\*Glitter Glue:\*\* Seen in tissue culture.

\* \*\*Grape Topanga:\*\* Seen in tissue culture.

\* \*\*Coma:\*\* Seen on mother plants.

\* \*\*Space Age Cake (SAC):\*\* Seen on mother plants.

\* \*\*Topanga Canyon:\*\* Seen on mother plants.

\*\*II. Cultivation Equipment:\*\*

\* \*\*Grow Lights:\*\*

\* \*\*LUXx Lighting Co. LEDs:\*\* Prominently featured.

\* \*\*LUXx 645 LED Pro:\*\* Seen in veg rooms. (Confirms existing asset, provides specific model).

\* \*\*LUXx 840W LED:\*\* Mentioned by Ivan as the new standard they are moving to in their Florida facility (1000 units) and likely in LA. This suggests different tiers/wattages of LED panels.

\* \*\*DE HPS (Double Ended High-Pressure Sodium):\*\* Mentioned by Ivan as what they \*used\* to run in flower, highlighting a transition to LEDs. (Good for historical context or player choice).

\* \*\*Fluorescent Lights (T5s likely):\*\* Seen in clone rooms and tissue culture racks.

\* \*\*Growing Mediums/Substrates:\*\*

\* \*\*Grodan Rockwool:\*\*

\* \*\*Grodan 1.5 AOK Cubes:\*\* Used for clones (confirmed by Walt).

\* \*\*Grodan 4-inch GRO-BLOCK™:\*\* Clones are transplanted into these.

\* \*\*Grodan GRO-SLAB™ (Multi-Slab):\*\* 4-inch blocks are placed on top of these in flower rooms (confirmed by Roach).

\* \*\*Pots, Containers, & Growing Surfaces:\*\*

\* \*\*Standard Plastic Pots (various sizes):\*\* Seen extensively for mother plants. (e.g., 3-gallon, 5-gallon implied by scale).

\* \*\*Propagation Trays (with humidity domes / "Super Sprouter"):\*\* Used for clones.

\* \*\*Rolling Benches:\*\*

\* \*\*IGE (Innovative Growers Equipment):\*\* Mentioned by Roach as the brand they use for their 5ft wide rolling benches in veg and flower. (Specific vendor, adds realism).

\* \*\*Trellis Netting:\*\* Clearly visible in flower rooms, multiple layers (Roach mentions 3 layers as SOP).

\* \*\*Irrigation & Nutrient Delivery:\*\*

\* \*\*Drip Irrigation:\*\* Visible throughout veg and flower rooms, multiple lines per plant/slab.

\* \*\*Fertigation System:\*\*

\* \*\*Dilution Solutions Controller:\*\* Shown by Roach, highlighting advanced fertigation control. This system likely manages multiple nutrient stock tanks and recipes.

\* \*\*Netafim Injectors:\*\* Mentioned by Roach as part of their old system, being upgraded.

\* \*\*Etatron Electronic Injectors:\*\* Seen on the new Dilution Solutions fertigation board.

\* \*\*Nutrient Stock Tanks:\*\* Large white poly tanks visible in the fertigation room.

\* \*\*Submersible Tank Level Sensors:\*\* Yellow sensors visible on top of nutrient stock tanks, likely feeding data to the Dilution Solutions controller.

\* \*\*Environmental Control Equipment:\*\*

\* \*\*Quest Dehumidifiers:\*\*

\* \*\*Quest 506:\*\* Mentioned by Roach as a workhorse.

\* \*\*Newer Quest Models (e.g., Quest 876 or similar high capacity):\*\* Seen mounted on walls/ceilings in flower rooms, Roach mentions they are testing new, more efficient models with VFD fan motors and onboard humidistats.

\* \*\*HVAC Units:\*\* Large industrial units visible, implying significant cooling/heating capacity.

\* \*\*Circulation Fans:\*\* Large oscillating wall/ceiling mounted fans visible in grow rooms.

\* \*\*Sensors (Data Collection):\*\*

\* \*\*Aroya / Solus Substrate Sensors:\*\* Mentioned by JJ (Athena) for monitoring substrate EC, VWC%, and temperature. (Confirms asset type, provides brand example).

\* \*\*Grodan GroSens Climate Sensor:\*\* Visible in a flower room, likely monitoring air temp, RH, CO2, VPD.

\* \*\*Grodan GroSens Rootzone Sensor:\*\* Visible in flower rooms, plugged into rockwool slabs.

\*\*III. Facilities:\*\*

\* \*\*Specialized Rooms (all fitting "Clinical/Scientific" aesthetic):\*\*

\* \*\*Mother Room:\*\* Large, well-lit, with plants in individual pots on rolling benches. Uses specific lighting (CMH seen). (06:16)

\* \*\*Clone Room:\*\* Equipped with T5 lighting, propagation trays with humidity domes. (07:27)

\* \*\*Tissue Culture Lab:\*\* Extremely clean, sterile environment. Features:

\* Laminar Flow Hoods (multiple seen).

\* Microscopes.

\* Autoclave.

\* Incubators.

\* Racks with T5 lighting for culture vessels.

\* Various lab glassware, tools, and consumables.

\* Dedicated HVAC/filtration. (09:49)

\* \*\*Vegetation (Veg) Rooms:\*\* Multiple rooms shown with young plants in rockwool blocks on rolling benches under LUXx 645 LED Pros. (14:20)

\* \*\*Flower Rooms:\*\* Multiple large rooms, densely packed with mature plants on rolling benches, extensive trellis netting, LUXx LEDs, Quest dehumidifiers, and circulation fans. (04:03, 23:20)

\* \*\*Drying/Curing Rooms:\*\* Climate-controlled (60°F / 60% RH mentioned by Carlos). Plants are whole-plant hang-dried for 14-16 days. Bins are used for post-dry material.

\* \*\*Trimming Rooms:\*\* Multiple rooms with teams of hand-trimmers working at stainless steel tables. (28:37)

\* \*\*Rosin Processing Lab (Solventless):\*\*

\* Ice Water Hash Washing Machine.

\* Freeze Dryers (Harvest Right brand mentioned by Greg).

\* Rosin Presses (Labeled "Rosin Press #1").

\* Cold Room (65°F mentioned by Vamps for curing rosin).

\* Stainless steel work surfaces.

\* \*\*Dispensaries:\*\* Showcases their retail spaces (TLC Collective, Jungle Boys Downtown LA, Orange County). (35:00)

\* \*\*Facility Features:\*\*

\* \*\*Extensive HVAC ducting and electrical conduit.\*\*

\* \*\*Clean, white, easily sanitizable wall/floor surfaces.\*\*

\* \*\*Loading docks / large roll-up doors for material handling.\*\*

\* \*\*Solar Panels:\*\* Shown on the roof of one facility. (05:06)

\*\*IV. Nutrients and Additives:\*\*

\* \*\*Athena Ag Nutrients:\*\* Heavily featured and endorsed.

\* \*\*Athena Blended Line:\*\*

\* \*\*Cleanse:\*\* Used for clean roots, likely in clone soak.

\* \*\*Cuts (Rooting Compound Gel):\*\* Used for cloning.

\* \*\*Athena Pro Line:\*\* Implied for main veg/flower feeding. JJ mentions running a 3.0 EC from rooted clone through veg.

\* \*\*IPM Products (Athena branded):\*\* Visible on shelves, suggesting a line of pest management solutions.

\*\*V. Pest Control Methods:\*\*

\* \*\*Integrated Pest Management (IPM):\*\* Mentioned as a core philosophy.

\* \*\*Cleanliness & Sanitation:\*\* Emphasized throughout, especially in TC lab and clone rooms.

\* \*\*Tissue Culture:\*\* Used as a tool for pathogen eradication (cleaning up genetics).

\* \*\*Athena IPM Products:\*\* (as noted above).

\*\*VI. Harvesting and Processing Techniques/Equipment:\*\*

\* \*\*Harvesting:\*\* Whole plant harvesting.

\* \*\*Drying:\*\* Whole plant hang dry in climate-controlled rooms (14-16 days, 60F/60%RH).

\* \*\*Curing (Flower):\*\* Buds cured in bins/containers after drying. "Rice Krispy" sound test for dryness.

\* \*\*Trimming:\*\* \*\*100% Hand Trimmed.\*\* (Emphasized by Carlos). Workers use small trim scissors.

\* \*\*Rosin Production (Solventless):\*\*

\* \*\*Fresh Frozen Material:\*\* Used for Live Rosin.

\* \*\*Dry Sift / Kief:\*\* Used for other tiers of rosin.

\* \*\*Ice Water Extraction (Bubble Hash):\*\* Washing fresh frozen material.

\* \*\*Freeze Drying:\*\* Harvest Right freeze dryers used for the bubble hash.

\* \*\*Rosin Pressing:\*\* Pressing bubble hash or kief into rosin.

\* \*\*Cold Curing (Rosin):\*\* Rosin cured in jars in a 65°F cold room.

\* \*\*Consistency Variations:\*\* Cold Cure Badder, Heat Cured consistency (for vapes/sap), Dry Sift Rosin.

\* \*\*Product Types:\*\* Flower, Pre-rolls, Live Rosin, Dry Sift Rosin, Rosin Vapes, Rosin-infused Gummies.

\* \*\*Packaging:\*\*

\* Custom branded bags for flower (with strain art, THC/CBD info, cultivation/packaging dates, batch #).

\* Custom branded jars for rosin.

\* Custom branded disposable vape pens.

\* Custom branded boxes for vapes and gummies.

\* Holographic security/authenticity stickers on packaging.

\*\*VII. Branding & Merchandise:\*\*

\* \*\*Jungle Boys Clothing:\*\* Extensive line of T-shirts, hoodies, hats. They have a dedicated clothing store.

\* \*\*Logo Usage:\*\* Prominent on signage, packaging, merchandise, and even on the LUXx LEDs (customized).

\*\*VIII. Business & Operations:\*\*

\* \*\*Team Structure:\*\* Specialized managers for different departments (Nursery, TC, Veg, Flower, Trim, Rosin).

\* \*\*Expansion:\*\* Actively expanding to Florida with a 1000-light facility (Phase 1), planning for a second identical facility (Phase 2), and aiming for 5-15 dispensaries in FL by 4/20/2022.

\* \*\*Challenges:\*\* High taxes, complex regulations (especially in LA/CA), power limitations (leading to innovations like alternating light cycles in mother rooms).

\* \*\*Genetics Focus:\*\* Strong emphasis on in-house breeding, pheno-hunting, and maintaining a large genetic library (>500 strains mentioned by Walt, with ~30 active in the nursery at a time). They bring back old strains and improve them with new techniques.

\* \*\*Quality Control:\*\* Rigorous QC implied by their multiple stages and specialized teams. The "Rice Krispy" test for flower dryness is a practical QC step.

This detailed breakdown from the Jungle Boys CannaCribs episode should provide significant enhancements and real-world grounding for your Project Chimera asset list and game mechanics. The level of detail and control they exhibit is a great benchmark for your simulation.

Okay, I've reviewed the CannaCribs Episode 4 video featuring Los Sueños Farms and integrated its relevant details into your Asset List 1.4, keeping Project Chimera's core vision and MVP scope (as defined by the Briefing Document) in mind.

Here's the enhanced asset list. I've focused on adding specifics, variations, and confirming the real-world applicability of items, especially for larger-scale operations, while respecting the MVP vs. Post-MVP distinctions outlined in your Briefing Document.

\*\*Key for Annotations:\*\*

\* `(CS-LSF)`: Information derived or confirmed from CannaCribs - Los Sueños Farms (Ep. 4).

\* `[MVP Briefing]`: Alignment with or specific mention in the MVP Briefing Document.

\* `[Post-MVP Briefing]`: Deferred feature as per the MVP Briefing Document.

--- START OF ENHANCED Asset List 1.5 ---

\*\*Project Chimera: Customized, Comprehensive Asset List v1.5\*\*

Core Vision: Modern, High-Tech, Clinical/Scientific, Aspirational/Professional aesthetic; player-driven "Relaxed & Cozy" variations.

Detail paramount: (Satisfactory, Farming Sim benchmarks for equipment) for deep simulation. The simulation aims for a granular, scientifically grounded foundation.

Source Prioritization:

1. Core Docs (mechanics, scope, style - esp. Briefing Document for MVP).

2. Relevant Docs (cannabis science, cultivation, pests, water, nutrients, breeding, equipment for realism/complexity). This includes Cannabis sativa L. biology, cultivation, genetics, and industry practices.

3. CannaCribs Video Analysis (CS-LSF: Los Sueños Farms, Ep. 4 for real-world large-scale examples).

4. General Knowledge (bridge gaps).

Gameplay Loops Supported: Build, Cultivate, Breed, Process, Analyze, Optimize.

Key Customizations:

\* Expanded Utility Systems (Plumbing, HVAC, Electrical) with detailed, interconnected networks where sizing and material impact performance.

\* Detailed Plant Assets (dynamic, procedural, GxE-tied), reflecting phenotypic plasticity.

\* Lab/Research Equipment (advanced breeding/analysis) supporting high-tier breeding, genetic research, and detailed chemical profiling.

\* UI/Data Viz as crucial assets for presenting complex simulation data.

Specific environmental control, nutrient management, IPM, post-harvest details: These systems will incorporate specific parameters for temperature, humidity, CO2, airflow, light, optimal nutrient ranges, and pest/disease resistance.

Scalability: Residential vs. Warehouse/Industrial, potentially expanding to Greenhouses, Vertical Farms, Research Labs, and Outdoor Fields.

\*\*Item List:\*\*

\*\*Structural & Architectural Elements\*\*

Purpose: Define grow spaces, support equipment, manage environment (materials affecting insulation, cleanliness, etc.). Layout and zoning will facilitate clean flow principles.

Variations:

\* Interior: Drywall, Concrete, Insulated Panel. Materials should be non-porous, smooth, durable, non-absorbent, and chemical-resistant for sanitation.

\* Exterior: Siding, Brick, Metal (Map specific).

\* Industrial: Pre-fab, Heavy-duty.

Material properties: Cost, Appearance, Insulation (R-value for heat transfer management), light/air barrier (for Environmental Control Sim), Cleanliness (materials influence ease of cleaning). Coving at wall-floor junctions is recommended.

Assets:

\* Walls: Sections/panels (various materials).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Required for initial Residential House map and basic Warehouse build-out.

\* Material properties related to Environmental Control Sim (Insulation - R-value) are relevant for MVP. Materials for future exterior/map-specific themes would be Post-MVP.

\* Floors: Sections (Concrete, Wood, Grate - with load ratings). Non-porous materials preferred.

\* Drains: Standard, Trench (with varying capacity).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Required for initial facility construction.

\* Roofs/Ceilings: Sections (Drywall, Suspended Grid, Concrete). High ceilings can cause thermal stratification.

\* Suspended Tiles: (acoustic, cleanroom).

\* Open Rafters/Trusses: (Wood, Metal). These can influence large-scale microclimate patterns.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Required for initial facility construction.

\* Doors: Various types (Standard, Industrial Roller, Air Lock). Air locks minimize contaminant entry.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing]

\* Required for facility construction.

\* Windows: Various types (Standard, Greenhouse, Industrial). Can be blocked out in grow rooms.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing]

\* Standard windows for Residential/Warehouse. Greenhouse-specific windows (e.g., for specific light transmission, AgraTech style (CS-LSF)) are Future/Post-MVP map specific.

\* Stairs/Ladders/Catwalks: For vertical access. Relevant for multi-story/vertical facilities.

\* MVP Status / Estimated Game Version: Likely MVP for multi-story/vertical layout in Warehouse or other facilities.

\* Catwalks relevant for industrial scale and vertical farms.

\* Support Pillars/Beams: (Concrete, Steel). For structural support in large spaces.

\* MVP Status / Estimated Game Version: MVP for Warehouse map shell. [MVP Briefing]

\* Containment Structures (Tents): Pre-fab grow tents, sealable for environmental control.

\* MVP Status / Estimated Game Version: Likely MVP for early-game or smaller residential setups.

\*\*Cultivation & Plant Care Tools\*\*

Purpose: Plant maintenance (pruning, training), scouting, applying treatments.

Variations: Size, Material (affects durability, cleanliness, rust potential), Quality (Basic, High-quality), Sharpness/Condition (affects cut cleanliness, plant stress, disease risk). Tools require cleaning/sterilization.

Assets:

\* Pruning & Cutting:

\* Types: Bypass Pruners (Std, HD), Snips/Scissors (Micro-Tip, Curved/Straight), Scalpels, Loppers, Hand Saw. Large Hedge Trimmers (potentially with pole extensions).

\* Properties: Cutting Area/Blade Length, Weight (affects fatigue).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing]

\* Basic plant training (topping, manual LST) is part of core MVP cultivation. These tools are necessary for that. Clean cuts promote faster healing.

\* Spraying & Application: Hand Spray Bottles, Pump Sprayers (Gal, Backpack), Handheld Dusters, Soil Drench Applicators.

\* Industrial: Motorized spray carts, Foggers, Integrated Spraying Systems (automated, fixed nozzles).

\* MVP Status / Estimated Game Version: MVP for basic pest/disease treatment (manual application). [MVP Briefing]

\* Industrial versions likely Late-Game MVP or Post-MVP, linked to scale and potential automation skill nodes. Automated spraying carries risks if misconfigured.

\* Scouting & Monitoring:

\* Traps: Sticky Traps (Yellow, Blue - Cards, Rolls) for monitoring pest presence, location, and stage.

\* Visual Inspection Tools: Magnifying Loupes, Handheld/Benchtop Digital/Standard Microscopes for detailed inspection of pests, pathogens, trichomes.

\* Sampling Tools: Soil/Medium Sample Probes/Corers, Leaf Sample Bags/Vials for tissue sampling (CS-LSF).

\* Simulated Meters (Visual): Simulated Chlorophyll Meter. (See Data Collection for more handheld meters)

\* Drones (CS-LSF): For large-scale field scouting (respiration, pests, water stress via thermal/multispectral imaging). (Likely Post-MVP for player use, could be NPC service earlier).

\* MVP Status / Estimated Game Version: MVP for basic plant health monitoring and pest/disease identification (manual tools). [MVP Briefing]

\* Microscopes and probes are explicitly mentioned for manual data acquisition loop and unlocked via Science skill tree nodes. Effective use requires skill.

\* Plant Support Tools:

\* Types: Trellis netting, stakes, tie wire. Large tomato cages for outdoor plants (CS-LSF).

\* Functionality: Prevents lodging, supports heavy buds, manages canopy.

\* MVP Status / Estimated Game Version: Likely MVP, especially for supporting larger plants or specific training techniques (e.g., ScrOG).

\*\*Nutrient & Irrigation Equipment\*\*

Purpose: Store, mix, deliver nutrients and water to plants. Systems will manage pH, EC/PPM, temperature, and Dissolved Oxygen (DO) of nutrient solutions.

Variations:

\* Scale (Manual, Small Reservoir, Large Industrial).

\* Control (Manual, Timed, Automated sensor-driven).

\* Type (Drip, Ebb/Flow, DWC, Aeroponic, etc.).

Assets:

\* Watering Cans/Hoses: Basic manual irrigation.

\* Properties: Capacity/Flow Rate.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Basic irrigation methods are essential for core cultivation.

\* Reservoirs/Tanks: Various sizes (Plastic, Poly, Stainless Steel - food-grade). Dynamically reflect fill levels. Must be kept clean. Large outdoor water storage tanks/bladders (CS-LSF).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing]

\* Needed for manual/timed watering systems. Larger/Industrial sizes likely Late-Game MVP or Post-MVP.

\* Pumps: Water Pumps (Submersible, Inline - various flow rates/head pressure), Air Pumps (for DWC).

\* Properties: Power Requirement, Durability/Maintenance (can fail).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Needed for simple reservoir systems. Various sizes/capacities support scalability.

\* Redundant pumps or advanced manifold systems could be later game/Post-MVP.

\* Plumbing: Pipes (PVC, PEX, Drip Line/Drip Tape (CS-LSF)), Fittings, Valves (manual, solenoid), Filters.

\* Properties: Material (impacts cost, durability, efficiency, appearance), Sizing (diameters impact flow, pressure drop), Connectivity (logical connections, visual feedback), Routing (3D, grid-snap/free-form, segmented components for curves). Abstracted pressure loss simulation.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Essential for building irrigation systems, part of detailed construction.

\* Sizes/materials impact performance. Manual routing is MVP. Filters require cleaning/replacement.

\* Nutrient Mixing Stations/Vats: For preparing nutrient solutions. Requires clean tanks, measuring tools, pumps/stirrers, calibrated pH/EC meters.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing]

\* Required for manual nutrient mixing. Scale/automation increases later. Cleaning is critical.

\* Automated Dosing/Fertigation Systems: Links sensors (EC/pH) to pumps/valves for automated mixing and delivery based on setpoints and schedules. Offers higher consistency. Example: Dosatron injectors (CS-LSF).

\* MVP Status / Estimated Game Version: Basic timers are MVP. [MVP Briefing] Fully automated dosing systems (e.g. Dosatron-level) likely Late-Game MVP / Post-MVP.

\* Requires advanced controllers.

\* Growing Mediums/Substrates: Bags/bulk (Soil, Coco Coir, Rockwool cubes/slabs, Hydroton, Peat Moss). Living Soil with microbial ecosystems. Example: ProMix HP Mycorrhizae (CS-LSF).

\* Properties: Water retention, aeration, nutrient availability, pH, EC, bulk density, porosity, mineral content, organic matter. These affect root health and nutrient dynamics.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Essential consumable for cultivation. UI/Inventory representation is MVP.

\* Nutrient Containers: Bottles/Bags of base nutrients (N, P, K), macro- & micro-nutrients, additives.

\* Properties: NPK Ratio, specific concentrations. SDS information for handling/storage.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing]

\* Consumable, part of manual nutrient management. UI/Inventory representation is MVP. Nutrients can interact or have incompatibilities.

\*\*Environmental Control Equipment\*\*

Purpose: Manage temperature, humidity, CO2, airflow, light cycles. Essential for optimizing plant growth and preventing issues.

Variations: Size, Capacity, Efficiency, Control (Manual, Timed, Sensor-Controlled via simple or advanced/integrated controllers like Link4 iGrow series (CS-LSF)). Equipment projects a "radius of effect" or "cone of influence."

Assets:

\* HVAC Systems: Air Conditioners (Window, Split), Heaters (Electric, Gas), Dehumidifiers, Humidifiers.

\* Properties: Sizing/Capacity (must match facility heat load), Efficiency (e.g., SEER, affects power/fuel use), Power/Fuel Requirement, Maintenance requirement.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing]

\* Basic HVAC for environmental control (temp, humidity) is a core MVP feature. Various types/capacities needed for different room sizes/needs.

\* Unlocked via Environment skill tree nodes like "Basic Environmental Control".

\* Fans: Circulation Fans (Clip, Standing, Wall, Large industrial greenhouse fans (CS-LSF)), Exhaust Fans, Inline Duct Fans.

\* Properties: Airflow Rate (CFM, affects air exchange), Power Requirement, Control (manual, timed, sensor, speed controller).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Essential for airflow management, part of MVP environmental control.

\* Part of abstracted airflow physics, removes heat/humidity.

\* Ducting: Flexible, Rigid (various diameters), Fittings.

\* Properties: Material (impacts cost, durability, efficiency), Sizing (impacts airflow, pressure drop).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Needed for HVAC and exhaust systems. Part of detailed construction.

\* Manual routing is MVP.

\* CO2 Systems: CO2 Tanks (Visual assets), Regulators, Controllers, Generators (produce heat/moisture).

\* Functionality: Increases CO2 for enhanced photosynthesis (optimal 800-1500 ppm in flowering).

\* MVP Status / Estimated Game Version: MVP for basic CO2 management, though likely manual control initially. [MVP Briefing]

\* CO2 tanks are visual assets. Controllers for automation might be later MVP/Post-MVP depending on complexity level. Requires CO2 consumable.

\* Grow Lights: Various types (HID - MH/HPS with Ballasts/Hoods e.g., Gavita Pro 1000W E-Series DE (CS-LSF) for supplemental greenhouse lighting; LED Panels - various wattages/spectrum, potentially adjustable; Fluorescent - T5/CFL; LEC).

\* Properties: Wattage (affects intensity, heat output), Spectrum (Blue for veg, Red for flower, Full-spectrum), Light Output (PAR/PPFD, DLI), Fixture Efficiency, Heat Output (significant), Coverage Area. Reflective hoods/materials enhance efficiency.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Essential cultivation equipment. Various types/tiers for progression.

\* Light Timers/Controllers: Mechanical, Digital. Can control multiple lamps.

\* Properties: Power Handling Capacity.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Basic automation (light timers for photoperiod: 18-24h veg, 12/12h flower) is a core MVP feature.

\* Sensor-controlled or advanced automation likely Late-Game MVP / Post-MVP.

\* Thermostats, Humidistats, Environmental Controllers: Simple (on/off эстетика to Advanced/Integrated (e.g., Link4 iGrow 800/1800 (CS-LSF) - multiple parameters, IF-THEN logic, setpoints/ranges).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Basic automation (simple thermostat/humidistat) is a core MVP feature.

\* More advanced or integrated controllers likely unlock later.

\* Sensors:

\* Types: Environmental (Air Temp, RH, CO2, Light - PAR/PPFD), Leaf Surface Temp (for VPD), Root Zone/Substrate (Moisture - VWC%, EC, pH, Temperature). Advanced/Specialized (Inline Water sensors, Spore Traps - Post-MVP). Link4 environmental sensors (CS-LSF).

\* Tiers: Basic (manual check), Intermediate (networked, simple controllers), Advanced (accurate, multi-functional), Research-grade (calibration).

\* Properties: Accuracy/Precision (varies by tier, requires calibration), Power Requirement, Data Output (numerical, logs).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Essential for real-time data dashboards and automated control.

\* Player-placed sensors are core to data collection. Various tiers (basic manual vs. integrated automated).

\* Air Filters: Intake filters, Carbon filters (for odor control). MERV-rated filters.

\* MVP Status / Estimated Game Version: Likely MVP.

\* Essential for managing air quality and odor control. Part of ducting systems. Requires replacement/cleaning.

\* Light Deprivation Systems: (CS-LSF for greenhouses) Automated or manual tarps/covers to control photoperiod in greenhouses.

\* MVP Status / Estimated Game Version: Post-MVP (tied to advanced greenhouse setups).

\*\*Utility Systems & Equipment\*\*

Purpose: Deliver power and connect systems. Detailed, interconnected 3D routable networks with performance impacted by sizing/materials. Utility View/"X-Ray" mode for visualization.

Variations: Scale, Capacity, Efficiency, Type (Standard, Industrial).

Assets:

\* Electrical Wiring: Various gauges (sizing impacts resistance, voltage drop, cost). Conductors (copper, aluminum), Insulators.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Part of detailed construction, abstracted utility connections.

\* Manual routing is MVP. Sizes/gauges impact performance. Adherence to safety standards.

\* Circuit Breakers / Fuse Boxes / Panels: Essential for electrical system management, load balancing, overload protection. Rated capacity (Amps), not to be loaded beyond 80%.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing]

\* Generators (Diesel/Gas): Provides backup or primary power. CoGen systems possible.

\* Properties: Power Output (Watts), Fuel Efficiency, Ramp-up time, Heat generation. Tiers from basic (manual start) to advanced (auto transfer).

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. Described as backup power systems.

\* Needed for scaling operations or risk mitigation. Requires fuel.

\* Battery Banks / UPS (Uninterruptible Power Supply): Short-term power buffer or main source.

\* Properties: Capacity (kWh), Charge/Discharge Rate.

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. Described as short-term buffer.

\* Aligns with advanced risk management.

\* Main Power Grid Connection Point (Abstracted): Represents stable power draw from external utility. Capacity based on service contract/infrastructure.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Represents the abstracted power draw. Metered cost. Risk of external disruption.

\* Water Supply Connection Point (Abstracted - Tap, RO, Treated): Represents abstracted water source.

\* Types: Tap (can have contaminants), RO (requires Cal-Mag/pH management), Treated. Quality impacts plants.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Metered cost. RO/Treated may be later upgrades.

\*\*Pots, Containers, & Growing Surfaces\*\*

Purpose: Hold plants and growing medium.

Variations: Size (affects root space, plant size), Material (Plastic, Fabric, Ceramic - affects cost, durability, aeration), Type (Standard Pot, Grow Bag, Tray, Slab).

Assets:

\* Pots: Various sizes (Small, Medium, Large, e.g., 3-gallon, 7-gallon (CS-LSF)).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Essential cultivation equipment. Various sizes support plant lifecycle stages (transplanting).

\* Fabric Grow Bags: Offers better aeration than plastic.

\* MVP Status / Estimated Game Version: MVP. As a variation of container type.

\* Trays / Flats (Seedling, Propagation): Shallow containers for starting seeds/clones. Example: Jiffy Preforma Trays (CS-LSF).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Used for starting seeds/clones.

\* Rockwool Cubes / Slabs: Inert growing medium/container type, often for hydro/coco.

\* MVP Status / Estimated Game Version: MVP.

\* As a growing medium/container type.

\* Hydroponic/Aeroponic Systems (Basic Ebb/Flow, DWC buckets, NFT, Aeroponics): Systems for growing without soil, requiring precise control of nutrient solution chemistry (pH, EC, DO, temp) and environmental parameters. Lacks natural buffering of soil.

\* MVP Status / Estimated Game Version: Likely MVP for basic hydroponic options (Ebb/Flow, DWC buckets). [MVP Briefing]

\* Supports different cultivation methods. More complex systems (e.g., aeroponic) might be later MVP/Post-MVP.

\* Growing Benches / Tables (Flood tables, Wire racks): Provide surfaces for organizing plants. Various types support different systems (e.g., flood tables for Ebb/Flow).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing]

\* Plastic Mulch ("Plasticulture") (CS-LSF): For outdoor field rows, helps with weed control, moisture retention, soil temperature.

\* MVP Status / Estimated Game Version: Post-MVP (Outdoor field specific).

\*\*Pest & Disease Management\*\*

Purpose: Monitor, identify, and treat plant issues. Integrated with sanitation and environmental controls.

Assets:

\* Scouting Tools:

\* Sticky Traps: (Yellow, Blue - Cards, Rolls).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] For basic pest monitoring.

\* Handheld Magnifying Loupes:

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] For close visual inspection/scouting.

\* Microscopes (Handheld, Benchtop): For detailed pest/pathogen/trichome inspection.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Unlocked via Science skill tree.

\* Application Tools:

\* Hand Spray Bottles, Pump Sprayers (Gal, Backpack):

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing]

\* For manual treatment application (e.g., approved fungicides/pesticides/biologicals).

\* (Simulated) Pesticides/Fungicides/Biologicals: Represented as Consumables. Biologicals need specific environmental conditions.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Needed for manual treatment. UI/Inventory representation.

\* In-game "Plant Problems Guide" UI/Asset: Essential tool for diagnostics, linking symptoms to causes/solutions.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing]

\* Beneficial Animals (CS-LSF): Chickens (for potential pest control in outdoor/greenhouse settings, or just ambiance).

\* MVP Status / Estimated Game Version: Post-MVP / Flavor.

\*\*Harvesting & Processing Equipment\*\*

Purpose: Harvest, trim, dry, cure for final product quality. Workflow optimization and minimizing degradation are key.

Variations: Size, Capacity, Automation (Manual to Automated Industrial), Material (Food-Grade).

Assets:

\* Harvesting Tools: Large Trimming Shears, HD Loppers, Hand Saw, Hedge Trimmers (potential pole extensions, various blade lengths). Collection Totes/Bins (Food-grade). Tarps. Sharp, sanitized tools essential.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Needed for manual harvesting.

\* De-stemming/Bucking Machines (CS-LSF): e.g., Munch Machine "Mother Bucker".

\* MVP Status / Estimated Game Version: Post-MVP / Late-Game for larger scale.

\* Trimming Tools: Trim Scissors (Micro-tip, types). Trim Bins/Trays (with kief screens to collect trichomes). Isopropyl Alcohol/Wipes (cleaning), Rags. Electrically operated, manually controlled hand trimming assist tools.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Needed for manual trimming. Cleaning supplies for hygiene/quality.

\* Bowl Trimmers (Manual, Electric): Semi-automated trimming, can be adjusted for aggressiveness (speed vs. quality).

\* MVP Status / Estimated Game Version: Likely Mid-Late MVP / Post-MVP.

\* Provides some automation beyond hand trimming, likely unlocked via Harvest skill tree or equipment research.

\* Automated Trimming Machines (Sizes/throughputs): Fully automated, adjustable aggressiveness, can trim wet or dry. Example: Twister T2 (often used in tandem for dry trim) (CS-LSF).

\* MVP Status / Estimated Game Version: Late-Game MVP / Post-MVP. [Post-MVP Briefing for Advanced Automation]

\* High-tier equipment, part of Advanced Automation.

\* Drying Racks / Clotheslines & Hangers: Manual hanging/rack in dedicated, environmentally controlled space (temp, humidity, airflow crucial for quality and preventing issues like terpene loss or mold). Large tiered drying racks (CS-LSF).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Needed for manual drying. Slow, controlled drying is key.

\* Curing Containers (Jars, Buckets - Glass, Plastic). Large food-grade drums (e.g., Greif Fibre Drums) for bulk curing (CS-LSF). For manual curing with "burping" in a stable cool, dark environment (target RH 58-62%). Automated curing systems (smart containers, climate-controlled rooms) for later.

\* MVP Status / Estimated Game Version: MVP for jars/buckets. [MVP Briefing] Large drums/automated systems are Post-MVP.

\* Weighing & Measuring: Digital Pocket Scales (Precision), Digital Bench Scales (Larger capacity). Industrial (Platform, Floor scales).

\* Calibration Weights: Essential for ensuring accuracy.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Essential for tracking yield, contract specs, inventory. Different scales for different needs. Requires calibration.

\* Transporting Equipment: Baskets, hand-drawn garden carts, small motorized transport, portable conveyor belts for moving material, plants, tools.

\* MVP Status / Estimated Game Version: Likely Mid-Late MVP, relevant for larger scale.

\* Packaging:

\* Bags: Mylar bags, various sizes (e.g., "Cannabis Cargo" style bags (CS-LSF)).

\* Vacuum Sealers (CS-LSF).

\* Child-Resistant Packaging (CS-LSF, example from Crativ for vape carts).

\* MVP Status / Estimated Game Version: Basic bags for NPC sales MVP. Advanced/branded/CR packaging Post-MVP.

\* Cold Storage: Refrigerators, freezers for keeping harvested material cool, especially for fresh-frozen or high terpene retention.

\* MVP Status / Estimated Game Version: Post-MVP, [Post-MVP Briefing] tied to specific processing paths (e.g. fresh frozen for extraction).

\* Extraction/Concentrate Equipment:

\* Solventless Press.

\* Basic Extraction System.

\* Advanced CO2 Extraction Systems: e.g., Apeks Supercritical systems (CS-LSF).

\* Ethanol Extraction Systems.

\* Hydrocarbon Extraction Systems (requires C1D1 room).

\* Post-Extraction Equipment: Rotary Evaporators (CS-LSF), Wiped Film/Molecular Stills (e.g., Pope Scientific (CS-LSF)), chromatography equipment.

\* MVP Status / Estimated Game Version: Post-MVP. [Post-MVP Briefing] Explicitly listed as deferred. Requires specialized equipment and facilities.

\*\*Facility Furniture & Fixtures\*\*

Purpose: Workspace, storage, safety, general utility, supporting cleanliness and professional aesthetics.

Assets:

\* Workbenches: (Sizes, materials).

\* HD Shelving: (Metal, Wire). Stackable, wall-mounted options. (CS-LSF for drum storage).

\* Storage Cabinets: (Metal, Plastic, Lockable). Specialized for Chemicals/Flammables.

\* Rolling Utility Carts.

\* Seating: (Chairs, Stools, Folding Chairs).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Provides functional storage and workspace. Supports the Cleanliness aesthetic.

\* Sinks: Industrial Sink/Wash Basin (Stainless Steel). Faucet Fixtures.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Essential for hygiene, cleaning tools/equipment. Part of the general utility.

\* Safety: Eye Wash Station (Wall, Pedestal). Emergency Shower (Industrial). Fire Extinguishers. First Aid Kits.

\* MVP Status / Estimated Game Version: Likely MVP. [MVP Briefing] Essential safety equipment.

\* General: Wall Clocks. Trash Cans/Waste Bins (Industrial rolling, upgradable capacity). Recycling Bins. Mop & Bucket. Broom & Dustpan. Wet Floor Signs. Floor Mats/Anti-Fatigue. Lockers.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Provides visual detail, supports waste management, enhances aesthetics. Players transport waste to bins.

\*\*Map Specific Assets\*\*

Purpose: Define build environment, establish scale.

Assets:

\* Residential House: Standard residential elements (exterior, interior, doors/windows). Smaller scale assets (fixtures, utility connections). Base "shell". Pre-defined layout, potential for initial wear/tear.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Initial map environment.

\* Warehouse: Large open concrete structure (floor, walls, roof). Support pillars/beams. Industrial doors/windows. Base "shell" to build within.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Accessible after Residential map. Represents next scale.

\* Greenhouse Structure: (CS-LSF) Glass/polycarbonate, metal frame, vents, roll-up/peel-back walls. Example: AgraTech Insulator hybrid hoop houses. May include light-dep systems. Utilizes natural light, requires ventilation/temp control.

\* MVP Status / Estimated Game Version: Future/Post-MVP (as a buildable map type). [Post-MVP Briefing]

\* Outdoor Field Elements: (CS-LSF) Large tracts of land, soil beds/rows, plastic mulch ("plasticulture"), fencing, access roads, large water storage. Subject to weather/pest risks.

\* MVP Status / Estimated Game Version: Future/Post-MVP (as a buildable map type). [Post-MVP Briefing]

\* Research Lab Shell & Specialized Benches/Fixtures: Sterile materials, lab benches for advanced techniques like Tissue Culture.

\* MVP Status / Estimated Game Version: Future/Post-MVP. [Post-MVP Briefing]

\* Vertical Farm Structure (multi-tiered racking).

\* Subterranean Lab Shell.

\* Abandoned Research Outpost Shell.

\* Geothermal Greenhouse Complex Shell.

\* MVP Status / Estimated Game Version: Future/Post-MVP for the above.

\*\*Decorative & "Cozy" Items\*\*

Purpose: Player customization, "Cozy" aesthetic.

Assets: Posters, art, rugs, small furniture (chairs, tables), non-cannabis plants, decorative lighting, personal items, paint/texture options (walls/floors - not changing core material properties in MVP).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing]

\* Part of player expression. Unlockable items can deliver lore.

\*\*Plant Assets (Core for Procedural System)\*\*

Purpose: Central visual output, dynamic GxE reflection (Phenotypic Plasticity).

Key Requirements (Procedural System):

\* Base 3D Models: HQ, detailed base meshes/textures for ~5-10 landrace-inspired foundational strains. [MVP Briefing]

\* Variations (Morphology & Growth Stages):

\* Seedling (single leaflet progressing to 3, 5)

\* Vegetative (Early, Mid, Late - rapid growth, building root system, stems, foliage)

\* Flowering (Early, Mid, Late - inflorescence development, bud thickening)

\* Maturation (trichomes mature: clear to milky to amber)

аспекты\* Harvested (Whole plant, branches)

\* Dried (Buds)

\* Botanical Features to Represent:

\* Plant Height (e.g., 0.2m to >3m, influenced by genetics, training, environment)

\* Stem Structure (erect, furrows, branching patterns, diameter)

\*

\* Branching Pattern (apical dominant, lateral spread, sativa-lanky vs. indica-compact)

\* Leaf Morphology (compound, leaflet number 3-13+, shape - lanceolate etc., serrated margins, size - broad vs. slender, angle/droop indicating hydration)

\* Leaf Arrangement (opposite to alternate)

\* Bud/Flower Structure (shape - conical, spear, foxtail; density - airy vs. compact; leaf-to-calyx ratio)

\* Pistil Color (mature: orange-red, pink-purple, brown)

\* Trichome Density (low, medium, high - "frostiness")

\* Trichome Appearance (color transition: clear -> milky -> amber)

\* Potential: Root System Viz (medium, water, nutrient response). Root systems differ for seed vs. cloned plants. Root restriction impacts growth.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing]

\* Core to the cultivation simulation. Initial launch will have 5-10 foundational strains.

\* Root System Viz is listed as Potential.

\* Procedural Generation System (Software/Code Asset): Crucial system, AI-Assisted.

\* Inputs:

\* Abstracted Genetics Data (defining heritable traits from Section 2.2 of Parameter List e.g., yield potential, flowering time, chemotype - THC/CBD/CBG ratios, terpene profile, pest/disease resistance levels, etc.)

\* Environmental Parameters (light intensity/spectrum, temperature, humidity/VPD, CO2 levels, nutrient availability/deficiency/toxicity, water stress, etc.)

\* Cultivation Actions (pruning, training techniques like topping/LST)

\* Algorithms: Generate plant structure, morphology, and visual characteristics based on inputs.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing]

\* Essential for dynamic GxE reflection and visual variability.

\* Dynamic Shader/Material Effects (MIDs, MPCs): Real-time GxE visualization.

\* Effects: Coloration (nutrient deficiencies, temp/light stress), Turgidity/Wilting (hydration status), Growth & Development rates, Trichome Appearance (density, color), Stress/Problem Symptoms (visual pests/diseases, leaf burn from nutrient toxicity), Training/Pruning Effects.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Crucial visual feedback.

\* Directly tied to core MVP systems like Environmental Control, Nutrient Management, Plant Health, Basic Breeding.

\* Performance Optimization: LODs, HISMs/ISMs (plant components), optimized shaders.

\* MVP Status / Estimated Game Version: MVP.

\* Essential for performance with many plant instances. LODs are mandatory.

\*\*Data Collection & Lab Equipment\*\*

Purpose: Collect plant/env data, simulate lab analysis (genetic/chemical profile).

Variations: Tier (Handheld/Basic, Benchtop/Research, Industrial/Automated). Accuracy varies by tier, calibration is key.

Assets:

\* Handheld Meters (Visual): Portable tools for manual data acquisition in "Action Mode," data auto-logged. [MVP Briefing]

\* Types: EC/PPM meter, pH meter, Temperature Probe (air, water, soil), Soil Moisture meter, Simulated Chlorophyll Content meter, PAR/PPFD meter, Infrared Thermometer (leaf surface temp), VPD Meter.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Basic data collection tools.

\* Unlocked via Science skill tree.

\* Benchtop Meters/Analyzers (Visual): Lab-grade equipment for more accurate/detailed analysis. Requires sample preparation for some methods.

\* Types:

\* Lab-grade EC/pH meter.

\* Spectrophotometer (simulated use for basic analysis).

\* HPLC (High-Performance Liquid Chromatography) for cannabinoid quantification (THC, CBD, etc.) (CS-LSF mentions processing for these).

\* GC-MS (Gas Chromatography-Mass Spectrometry) for terpene profiling, pesticide identification (CS-LSF mentions processing for these).

\* ICP (Inductively Coupled Plasma) assay for mineral content in tissue/substrate.

\* Elemental Analyzer for Total N/C.

\* NIR/MIR Spectroscopy for rapid, on-site detection/PAT.

\* Functionality: Simulated lab analysis for nutrient levels, cannabinoid/terpene profiles.

\* MVP Status / Estimated Game Version: Basic lab-grade EC/pH may be MVP. Advanced analyzers (HPLC, GC-MS, etc.) are Mid-Late MVP / Post-MVP. [Post-MVP Briefing for Advanced Breeding/Genetic Analysis] Outsourcing analysis initial option.

\* More advanced tools tied to higher tiers of data analysis or specific research unlocks (Quantitative Analysis skill node).

\* Data Logging & Interface (Visual): Equipment representing systems for viewing and interacting with data.

\* Types: Laptop, Tablet, Desktop (Monitor, Keyboard, Mouse), Clipboard, Pens, Whiteboard.

\* Industrial: Server rack, large control displays.

\* Functionality: Interface for dashboards, logs, sensor/controller management, grow cycle comparison, lab analysis interface.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Visual representation of UI/Data Viz.

\* Laptops/Tablets/Desktops are the interface. Industrial versions likely later. Secure digital DB for data storage.

\* Calibration Weights: For calibrating scales.

\* MVP Status / Estimated Game Version: MVP. Needed for calibration routine.

\* Simulated Lab Analysis Interface (UI): Manages sample submission (simulated time/cost убийство), views reports (cannabinoid/terpene profiles, tissue nutrient, water quality). Allows comparison.

\* MVP Status / Estimated Game Version: Mid-Late MVP / Post-MVP. [Post-MVP Briefing] Tied to Quantitative Analysis skill node.

\*\*UI & Data Visualization Elements\*\*

Purpose: Present complex sim data for player decisions. CRITICAL gameplay "assets". [MVP Briefing]

Assets (UI Elements/Visuals):

\* Environmental Data Dashboards/Overlays: Real-time sensor readouts (Temp, RH, VPD [calculated from Temp, RH, Leaf Temp], CO2, PAR/PPFD). Customizable presets. Environmental heat maps.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Core to MVP Environmental Control.

\* Graphs & Charts: Historical trends (Env, Nutrients, Growth stages, Water/Power/CO2 Consumption). Multi-variable plots.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Essential for data analysis.

\* Plant Health/Status Indicators: Icons/bars on models (Health, Water [Leaf Water Potential], Nutrient Status). Detail view UI for specific issues (deficiencies, pests, diseases).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Critical feedback.

\* Nutrient Management Interface: Mixing UI (visual tank, ingredients, steps). Readouts for nutrient solution (EC/PPM, pH, temp, DO). Nutrient composition details. Runoff/Substrate test results (EC, pH, VWC%).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Essential for manual nutrient management.

\* Genetic Data Display: Strain Name, Lineage (Pedigree Charts), Key Traits (Yield Potential, Flowering Time, Cannabinoid Profile - THC/CBD/CBG ratios, Terpene Profile, Pest/Disease Resistance, Stress Tolerances, Morphological traits like height, branching - Sliders, Bars, Values). Punnett Squares (Simulated for Mendelian traits).

\* Abstracted Genetic Marker/Allele display (linked to traits via simplified MAS/GS).

\* MVP Status / Estimated Game Version: MVP for core observable traits, lineage, simple inheritance. [MVP Briefing]

\* Punnett Squares/Pedigree charts part of basic breeding.

\* Genetic Marker/Allele display tied to "(Optional Late Game) Genetic Marker Assisted Selection" skill node, suggesting Late-Game MVP or Post-MVP.

\* Simulated Lab Analysis Results: Cannabinoid/Terpene Profiles (charts, graphs, % lists from HPLC/GC-MS data), Simulated Tissue Nutrient Analysis (from ICP/Elemental Analyzer data), Simulated Water Quality Report.

\* MVP Status / Estimated Game Version: Basic post-harvest metrics MVP for pheno-hunting. [MVP Briefing] Full simulated lab results are Likely Mid-Late MVP / Post-MVP.

\* Tied to Quantitative Analysis skill node and Simulated Lab Analysis Interface. Profiles needed for NPC contract quality specs.

\* Breeding Interface: Parent selection (based on desired traits, phenotypic/genotypic data), Crossing UI (manual pollination), Pheno-Hunting tools (growing populations to identify desirable individuals). Tracking generations (P, F1, F2).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Essential for basic breeding loop.

\* Facility Management Overlays: Utility View ("X-Ray" for pipe/duct/wire networks, flow/pressure indicators). Zoning UI (designating areas by function). Resource inventory/consumption (Water, Power, CO2, Nutrients, Building Materials, Seeds/Clones).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Utility View crucial for MVP. Resource inventory UI is MVP.

\* Operational & Financial Data: Budget, Costs (material, utility, labor, analysis), Revenue, Profit/Loss. Ledger for income/expenses.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Essential for core economy.

\* Alerts & Notifications: Visual/audio cues (Env out-of-range, Pest, Disease like Root Rot, Equipment failure, Low consumables). Tiered alerts.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Critical for player feedback.

\* Historical Logs & Notes Interface: Player observations and auto event logging (environmental shifts, cultivation actions, pest sightings, alerts).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing]

\* Tutorial/Info Overlays: Explaining concepts (VPD, GxE, deficiencies, equipment operation, scientific principles).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Essential for onboarding.

\*\*Advanced Breeding & Lab Equipment\*\*

Purpose: Support high-tier breeding (Tissue Culture, Genetic Modification), genetic research, pathogen eradication. Requires specialized lab spaces/Research Lab facility type.

Variations: Tier (Research, Production).

Assets:

\* Tissue Culture Station: For sterile micropropagation, pathogen eradication (HLVd from meristems), genetic preservation, rapid cloning. Requires meticulous sterile technique, media prep, PGR understanding. Success influenced by genotype, protocol, skill.

\* Components: Sterile Work Area/Hood (Laminar Flow), Autoclave, Incubator, Microscope (Dissecting), Racks for Culture Vessels, Culture Vessels, pH meter, analytical balance, glassware, sterilizable tools (scalpels, forceps), Bunsen burner/bead sterilizer, refrigerators/freezers. Example: Clonex rooting gel, Jiffy Preforma plugs for initial cloning (CS-LSF).

\* Consumables: Specialized media (pH 5.7-5.8), PGRs, sterile consumables, agar, hormones, cryoprotectants, enzymes.

\* Challenges: Contamination, Somaclonal variation, Acclimatization failure, Genotype specificity, Vitrification/Hyperhydricity (due to media imbalance, old/unvented vessels).

\* MVP Status / Estimated Game Version: Post-MVP. [Post-MVP Briefing for Advanced Breeding]

\* Part of "Advanced Propagation (Tissue Culture & Micropropagation)" skill node.

\* Lab Furniture: Specialized Benches (Stainless/Chemical Resistant), Storage Cabinets (Chemical/Flammable), Lab Sinks.

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP.

\* Supports advanced research/breeding equipment. Research Lab facility is Future/Post-MVP.

\* Cryopreservation Unit (Visual): For long-term genetic archiving using LN₂.

\* Components: Freezers, LN₂ tanks, straws/vials.

\* MVP Status / Estimated Game Version: Post-MVP.

\* Very high-tier/specialized, linked to deferred "Advanced Genetics".

\* Advanced Genetic Modification Equipment (CRISPR-like System - Visual): For direct, high-risk/high-reward genetic manipulation (e.g., targeting THCAS, CsTPS genes). Requires specialized lab, expertise, and significant research.

\* Components: Electroporator/Gene Gun.

\* Challenges: Off-target effects, regeneration from transformed tissue.

\* MVP Status / Estimated Game Version: Post-MVP. [Post-MVP Briefing] Potential future expansion.

\* Bioinformatics Tools/Software (UI/Abstracted System): For analyzing sequencing data (QC, alignment, variant calling), GWAS, Genomic Selection, marker identification, pangenome analysis, functional annotation.

\* Examples (Conceptual): Abstracted versions of GATK, PLINK, R packages (rrBLUP), TASSEL.

\* Data Inputs: High-density genotyping data (GBS, WGS), phenotype data, environmental data.

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. [Post-MVP Briefing] Tied to advanced genetic analysis and breeding programs. Requires significant data and computational resources (abstracted).

\*\*Consumable Resources (Abstract/UI Representation)\*\*

Purpose: Track/manage consumed resources (UI/Inventory). May have visual models for bulk storage (pallets, tanks). Metered costs and consumption dashboards.

Assets (UI Icons, bulk storage models/containers possible):

\* Water: Supply (Tap, RO, Treated). Storage (Tanks, Reservoirs).

\* Quality varies, impacting plants; may require filtration/disinfection.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Consumable resource. UI representation is MVP.

\* Power: Supply (Grid, Generator Fuel, Battery Charge). Consumption meter.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Abstracted utility cost/resource.

\* UI representation (consumption meter) is MVP. Generator Fuel/Battery Charge are linked to respective equipment (Late-Game MVP / Post-MVP).

\* Nutrients: Packaged Fertilizers (various NPK ratios, macro/micro elements), Mixed Solution (Reservoir).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Consumable resource.

\* UI/Inventory representation is MVP.

\* CO2: CO2 Tanks (Visual), CO2 Gas (UI from tanks or generators).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Consumable resource for CO2 systems.

\* Visual tanks and UI representation are MVP.

\* Building Materials: Walls, Floors, Pipes, Wires, Ducting (UI, pallet/stack models possible).

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Consumable resource, needed for construction. UI representation is MVP.

\* Seeds/Clones: Strain-specific Seeds (Visual), Clones (Propagation from mother plants e.g. using Clonex and Jiffy plugs (CS-LSF)).

\* Acquisition via vendors, events, or in-house cloning.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Essential consumables for cultivation.

\* Visual representation and UI inventory are MVP. Acquisition costs are MVP.

\* Finances: In-game Currency (UI). Ledger for income/expenses.

\* MVP Status / Estimated Game Version: MVP. [MVP Briefing] Core to the economy system. UI representation is MVP.

\* Specialized Tissue Culture Media

\* Plant Growth Regulators (PGRs)

\* Agar

\* Hormones (for Tissue Culture)

\* Cryoprotectants

\* Enzymes (for lab work)

\* Sterile Consumables (for lab work)

\* MVP Status / Estimated Game Version: Post-MVP (linked to Advanced Breeding).

--- END OF ENHANCED Asset List 1.5 ---

Okay, I've analyzed the CannaCribs - Grow Sciences episode and cross-referenced it with your "Asset List 1.4" and "Briefing Document" for Project Chimera. My goal is to enhance your existing asset list by incorporating relevant details and new assets from the video, while also aligning with your MVP scope and overall game vision.

Below is the enhanced asset list. I've tried to follow the existing structure.

\* \*\*\*Enhancements or new information derived from the CannaCribs - Grow Sciences video are italicized and marked with an asterisk (\\*)\*\*\*.

\* \*MVP status considerations draw heavily from the "Briefing Document" to align with the initial launch scope.\*

\* Items clearly outside MVP, or advanced versions of MVP items, are often marked "Likely Late-Game MVP / https://www.google.com/search?q=Post-MVP" or similar, as per your original list's convention.

--- START OF ENHANCED ASSET LIST (v1.5) ---

\*\*Project Chimera: Customized, Comprehensive Asset List v1.5\*\*

Core Vision: Modern, High-Tech, Clinical/Scientific, Aspirational/Professional aesthetic; player-driven "Relaxed & Cozy" variations.

Detail paramount: (Satisfactory, Farming Sim benchmarks for equipment) for deep simulation. The simulation aims for a granular, scientifically grounded foundation.

Source Prioritization:

1. Core Docs (mechanics, scope, style).

2. Relevant Docs (cannabis science, cultivation, pests, water, nutrients, breeding, equipment for realism/complexity). This includes Cannabis sativa L. biology, cultivation, genetics, and industry practices. \*\*\*(CannaCribs - Grow Sciences video input falls here)\*\*\*

3. General Knowledge (bridge gaps).

Gameplay Loops Supported: Build, Cultivate, Breed, Process, Analyze, Optimize.

Key Customizations:

\* Expanded Utility Systems (Plumbing, HVAC, Electrical) with detailed, interconnected networks where sizing and material impact performance.

\* Detailed Plant Assets (dynamic, procedural, GxE-tied), reflecting phenotypic plasticity.

\* Lab/Research Equipment (advanced breeding/analysis) supporting high-tier breeding, genetic research, and detailed chemical profiling.

\* UI/Data Viz as crucial assets for presenting complex simulation data.

Specific environmental control, nutrient management, IPM, post-harvest details: These systems will incorporate specific parameters for temperature, humidity, CO2, airflow, light, optimal nutrient ranges, and pest/disease resistance.

Scalability: Residential vs. Warehouse/Industrial, potentially expanding to Greenhouses, Vertical Farms, Research Labs, and Outdoor Fields.

\*\*Item List:\*\*

\*\*Structural & Architectural Elements\*\*

\*(Existing list is comprehensive. Video reinforces need for cleanable surfaces in commercial settings, aligning with notes. No major new structural assets identified from video that aren't covered.)\*

\*\*Cultivation & Plant Care Tools\*\*

Purpose: Plant maintenance (pruning, training), scouting, applying treatments.

Variations: Size, Material (affects durability, cleanliness, rust potential), Quality (Basic, High-quality), Sharpness/Condition (affects cut cleanliness, plant stress, disease risk). Tools require cleaning/sterilization.

Assets:

\* Pruning & Cutting:

\* Types: Bypass Pruners (Std, HD), Snips/Scissors (Micro-Tip, Curved/Straight - \*\*\*Example brand seen in video: Fiskars for trimming\*\*\*), Scalpels, Loppers, Hand Saw. Large Hedge Trimmers (potentially with pole extensions).

\* Properties: Cutting Area/Blade Length, Weight (affects fatigue).

\* MVP Status / Estimated Game Version: MVP.

\* Basic plant training (topping, manual LST - \*\*\*Video shows lollipopping/"schwazzing" as a technique these tools would support\*\*\*) is part of core MVP cultivation. These tools are necessary for that. Clean cuts promote faster healing.

\* Spraying & Application: Hand Spray Bottles, Pump Sprayers (Gal, Backpack), Handheld Dusters, Soil Drench Applicators.

\* Industrial: Motorized spray carts, Foggers, Integrated Spraying Systems (automated, fixed nozzles).

\* MVP Status / Estimated Game Version: MVP for basic pest/disease treatment (manual application).

\* Industrial versions likely Late-Game MVP or https://www.google.com/search?q=Post-MVP, linked to scale and potential automation skill nodes.

\* Scouting & Monitoring:

\* Traps: Sticky Traps (Yellow, Blue - Cards, Rolls - \*\*\*Video shows blue sticky traps in mother/veg areas\*\*\*) for monitoring pest presence, location, and stage.

\* Visual Inspection Tools: Magnifying Loupes, Handheld/Benchtop Digital/Standard Microscopes for detailed inspection of pests, pathogens, trichomes.

\* Sampling Tools: Soil/Medium Sample Probes/Corers, Leaf Sample Bags/Vials.

\* Simulated Meters (Visual): Simulated Chlorophyll Meter. (See Data Collection for more handheld meters)

\* MVP Status / Estimated Game Version: MVP for basic plant health monitoring and pest/disease identification.

\* Microscopes and probes are explicitly mentioned for manual data acquisition loop and unlocked via Science skill tree nodes.

\* Plant Support Tools:

\* Types: Trellis netting (\*\*\*Video shows extensive multi-layer use in flower rooms\*\*\*), stakes (\*\*\*Video shows bamboo stakes in veg\*\*\*), tie wire.

\* Functionality: Prevents lodging, supports heavy buds, manages canopy.

\* MVP Status / Estimated Game Version: Likely MVP, especially for supporting larger plants or specific training techniques (e.g., ScrOG). \*\*\*Video confirms relevance; basic trellis is MVP.\*\*\*

\*\*Nutrient & Irrigation Equipment\*\*

Purpose: Store, mix, deliver nutrients and water to plants. Systems will manage pH, EC/PPM, temperature, and Dissolved Oxygen (DO) of nutrient solutions.

Assets:

\* Watering Cans/Hoses: Basic manual irrigation.

\* MVP Status / Estimated Game Version: MVP. \*\*\*Video confirms hand-watering in veg stages.\*\*\*

\* Reservoirs/Tanks: Various sizes (Plastic, Poly, Stainless Steel - food-grade).

\* MVP Status / Estimated Game Version: MVP for smaller reservoirs.

\* Pumps: Water Pumps (Submersible, Inline), Air Pumps.

\* MVP Status / Estimated Game Version: MVP for basic systems.

\* Plumbing: Pipes (PVC, PEX, Drip Line), Fittings, Valves (manual, solenoid), Filters.

\* \*\*\*Video showed Netafim drippers as an example of high-quality drip components.\*\*\*

\* MVP Status / Estimated Game Version: MVP for basic manual routing. \*Briefing Document: "basic irrigation" for MVP.\*

\* Nutrient Mixing Stations/Vats: For preparing nutrient solutions.

\* MVP Status / Estimated Game Version: MVP for manual mixing.

\* Automated Dosing/Fertigation Systems:

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / https://www.google.com/search?q=Post-MVP.

\* Growing Mediums/Substrates: Bags/bulk (Soil, Coco Coir, Rockwool cubes/slabs, Hydroton, Peat Moss). Living Soil.

\* \*\*\*Video Example: Royal Gold Tupur (coco coir blend) used by Grow Sciences.\*\*\*

\* Properties: Water retention, aeration, nutrient availability, pH, EC, bulk density, porosity.

\* MVP Status / Estimated Game Version: MVP (UI/Inventory representation).

\* Nutrient Containers: Bottles/Bags of base nutrients, additives.

\* \*\*\*Video Example: House & Garden nutrient line (Coco A&B, Roots Excelurator, Drip Clean, Bud XL, Top Booster, Shooting Powder).\*\*\*

\* MVP Status / Estimated Game Version: MVP (UI/Inventory representation for manual mixing).

\*\*Environmental Control Equipment\*\*

Assets:

\* HVAC Systems: Air Conditioners, Heaters, Dehumidifiers, Humidifiers.

\* \*\*\*Video Example: Quest 205 Dehumidifiers (large capacity units for commercial flower rooms).\*\*\*

\* MVP Status / Estimated Game Version: MVP for basic types.

\* Fans: Circulation Fans, Exhaust Fans, Inline Duct Fans.

\* MVP Status / Estimated Game Version: MVP.

\* Ducting: Flexible, Rigid, Fittings.

\* MVP Status / Estimated Game Version: MVP.

\* CO2 Systems: CO2 Tanks, Regulators, Controllers, Generators.

\* \*\*\*Video mentions CO2 enrichment to 1200-1500 PPM in flower.\*\*\*

\* MVP Status / Estimated Game Version: MVP for basic CO2 (manual control).

\* Grow Lights: Various types (HID - MH/HPS; LED; Fluorescent; LEC).

\* \*\*\*Video Examples: Mix of Double-Ended HPS (Gavita brand mentioned) and CMH (Phillips 3100K bulbs) in flower. T5 fluorescents for clones/mothers.\*\*\*

\* MVP Status / Estimated Game Version: MVP (basic tier lights). \*Briefing Document confirms this.\*

\* Light Timers/Controllers: Mechanical, Digital.

\* MVP Status / Estimated Game Version: MVP for basic timers.

\* Thermostats, Humidistats, Environmental Controllers:

\* MVP Status / Estimated Game Version: MVP for simple types.

\* Sensors: Environmental, Leaf Surface Temp, Root Zone/Substrate.

\* MVP Status / Estimated Game Version: MVP for basic handheld meters. \*Briefing Document: "Handheld meters (pH, EC/PPM, temp, humidity, basic soil moisture)" for MVP.\*

\* Air Filters: Intake filters, Carbon filters.

\* MVP Status / Estimated Game Version: Likely MVP.

\*\*Utility Systems & Equipment\*\*

Assets:

\* Electrical Wiring, Circuit Breakers / Panels.

\* MVP Status / Estimated Game Version: MVP (abstracted connections).

\* Generators (Diesel/Gas), CoGen systems.

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / https://www.google.com/search?q=Post-MVP.

\* Battery Banks / UPS.

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / https://www.google.com/search?q=Post-MVP.

\* Main Power Grid Connection Point (Abstracted).

\* MVP Status / Estimated Game Version: MVP.

\* Water Supply Connection Point (Abstracted - Tap, RO, Treated).

\* \*\*\*Video Example: SpectraPure RO system for 0 PPM starting water.\*\*\*

\* MVP Status / Estimated Game Version: MVP (Tap water). RO system is an upgrade (Mid-Late MVP).

\*\*Pots, Containers, & Growing Surfaces\*\*

Assets:

\* Pots (Standard Pot, Grow Bag type).

\* \*\*\*Video shows fabric pots (e.g., 2-gallon, 5-7 gallon) for mothers & veg.\*\*\*

\* Fabric Grow Bags

\* MVP Status / Estimated Game Version: MVP.

\* Trays / Flats (Seedling, Propagation).

\* \*\*\*Video shows GroDan trays.\*\*\*

\* MVP Status / Estimated Game Version: MVP.

\* Rockwool Cubes / Slabs

\* MVP Status / Estimated Game Version: MVP.

\* \*\*\*NEW ASSET TYPE (from video, relevant to MVP "planting...clones"):\*\*\*

\* \*\*Peat/Coco Plugs (e.g., Root Riot):\*\*

\* Purpose: Starting medium for clones, often used in propagation trays with humidity domes.

\* Properties: Good aeration and moisture retention for early root development. Can be inert or lightly amended.

\* MVP Status / Estimated Game Version: MVP.

\* Hydroponic/Aeroponic Systems (Basic Ebb/Flow, DWC buckets, NFT, Aeroponics)

\* MVP Status / Estimated Game Version: Likely MVP for basic options (DWC, Ebb/Flow).

\* Growing Benches / Tables (Flood tables, Wire racks)

\* MVP Status / Estimated Game Version: MVP.

\*\*Pest & Disease Management\*\*

Assets:

\* Scouting Tools: Sticky Traps, Handheld Magnifying Loupes, Microscopes.

\* MVP Status / Estimated Game Version: MVP.

\* Application Tools: Hand Spray Bottles, Pump Sprayers.

\* MVP Status / Estimated Game Version: MVP for manual application.

\* (Simulated) Pesticides/Fungicides/Biologicals: Represented as Consumables.

\* \*\*\*Video Example (Sanitizer): ProKure V (Chlorine Dioxide - OMRI listed) for room sanitation.\*\*\*

\* \*\*\*Video Example (Biologicals): Predatory mites - Stratiolaelaps scimitus (hypoaspis miles) for soil; Amblyseius swirskii for foliage.\*\*\*

\* MVP Status / Estimated Game Version: MVP for basic pesticides/fungicides (manual treatment). \*Briefing doc: "few common pests/diseases, manual treatment" for MVP.\*

\* \*\*NEW SUB-ASSET: OMRI-Listed Sanitizers/Cleaners:\*\*

\* Type: \*ProKure V (Chlorine Dioxide).\*

\* Purpose: Room/equipment sanitation between cycles to prevent pathogen spread.

\* Properties: OMRI-listed (organic compliance), application (spray/fog), efficacy.

\* MVP Status / Estimated Game Version: MVP (manual application).

\* \*\*NEW SUB-ASSET: Predatory Insects/Mites (Biological Control Agent):\*\*

\* Types: \*Stratiolaelaps scimitus, Amblyseius swirskii.\*

\* Purpose: Biological pest control for specific pests (e.g., fungus gnats, thrips).

\* Properties: Target pests, environmental needs, application (sachets, bulk), lifespan.

\* MVP Status / Estimated Game Version: Likely Mid-Late MVP / https://www.google.com/search?q=Post-MVP. \*Basic pest treatment for MVP is likely sprays.\*

\* In-game "Plant Problems Guide" UI/Asset:

\* MVP Status / Estimated Game Version: MVP.

\*\*Harvesting & Processing Equipment\*\*

Assets:

\* Harvesting Tools: Large Trimming Shears, HD Loppers, Hand Saw, Hedge Trimmers. Collection Totes/Bins. Tarps.

\* MVP Status / Estimated Game Version: MVP for manual harvesting.

\* Trimming Tools: Trim Scissors (Micro-tip, types - \*\*\*Video Example: Fiskars\*\*\*). Trim Bins/Trays (with kief screens - \*\*\*Video Example: Harvest More Trim Bin\*\*\*). Isopropyl Alcohol/Wipes, Rags.

\* MVP Status / Estimated Game Version: MVP for manual hand-trimming. \*Briefing doc confirms this.\*

\* Bowl Trimmers (Manual, Electric).

\* MVP Status / Estimated Game Version: Likely Mid-Late MVP / https://www.google.com/search?q=Post-MVP.

\* Automated Trimming Machines.

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / https://www.google.com/search?q=Post-MVP.

\* Drying Racks / Clotheslines & Hangers.

\* \*\*\*Video shows whole plant hang drying method.\*\*\*

\* MVP Status / Estimated Game Version: MVP. \*Briefing doc confirms manual drying.\*

\* Curing Containers (Jars, Buckets - Glass, Plastic).

\* \*\*\*Video shows curing in food-grade plastic totes (Brute trash cans also shown) before final packaging.\*\*\*

\* MVP Status / Estimated Game Version: MVP for manual curing. \*Briefing doc confirms manual container curing.\*

\* \*\*\*NEW ASSET (from video, upgrade to MVP curing):\*\*\*

\* \*\*Grove Bags (with TerpLoc Technology):\*\*

\* Purpose: Specialized bags for curing and storage, designed to maintain 58-62% RH and preserve terpenes.

\* Properties: Material (multi-layer film), Size, Sealable, Reusability (limited).

\* MVP Status / Estimated Game Version: Likely Mid-Late MVP / https://www.google.com/search?q=Post-MVP. \*MVP is manual jar/container curing.\*

\* Weighing & Measuring: Digital Pocket Scales, Digital Bench Scales, Industrial Scales. Calibration Weights.

\* MVP Status / Estimated Game Version: MVP.

\* Transporting Equipment: Baskets, hand-drawn garden carts, etc.

\* MVP Status / Estimated Game Version: Likely Mid-Late MVP.

\* Cold Storage: Refrigerators, freezers.

\* MVP Status / Estimated Game Version: Likely https://www.google.com/search?q=Post-MVP (for fresh-frozen).

\* Extraction/Concentrate Equipment (Solventless Press, Basic Extraction System):

\* \*\*\*Video shows: Ice water hash washing systems (AMP equipment), Freeze dryers (Harvest Right), Rosin presses (PurePressure Longs Peak), Rosin Evolution press bags (25u, 15u for mechanical separation).\*\*\*

\* MVP Status / Estimated Game Version: https://www.google.com/search?q=Post-MVP. \*Briefing Doc explicitly defers advanced extraction.\*

\* \*(Post-MVP Additions)\*

\* \*\*Ice Water Hash Washing System:\*\* Mechanical agitation system with multiple micron bags for separating trichomes using ice and water. (e.g., \*AMP equipment\*)

\* \*\*Freeze Dryer:\*\* For drying ice water hash to preserve terpenes and prevent microbial growth. (e.g., \*Harvest Right\*)

\* \*\*Rosin Press:\*\* Applies heat and pressure to cannabis material (flower, kief, hash) to extract cannabinoids and terpenes without solvents. (e.g., \*PurePressure Longs Peak\*)

\* \*\*Rosin Press Bags:\*\* Nylon mesh bags of various micron sizes (e.g., \*15u, 25u, 37u, 90u, 120u\*) used to contain material during rosin pressing. (e.g., \*Rosin Evolution\*)

\* \*\*Automated Cartridge Filler:\*\* Machine for precisely filling vape cartridges with cannabis oil/rosin.

\*\*Facility Furniture & Fixtures\*\*

\*(No significant new assets identified from video. Existing list is comprehensive. Video shows typical commercial lab/processing furniture.)\*

\*\*Map Specific Assets\*\*

\*(Video shows a large indoor commercial facility, aligning with the "Warehouse" map concept. No new map types shown that aren't already considered for future.)\*

\* Residential House Shell & Unique Fixtures: MVP.

\* Warehouse Shell & Unique Fixtures: MVP.

\*\*Decorative & "Cozy" Items\*\*

\*(Video shows some branding/artwork, like the Grow Sciences Takeover graffiti, which could inspire decorative poster/art assets. Confirms MVP status for player expression.)\*

\*\*Plant Assets (Core for Procedural System)\*\*

\* Base 3D Models (Landrace-inspired foundational strains)

\* \*\*\*Video Strain Examples: Beach Wedding (Wedding Cake x Tropicana Cookies), Strawberry Guava (Umami Seeds). These are specific cultivars, game aims for foundational landraces first.\*\*\*

\* MVP Status / Estimated Game Version: MVP.

\* Procedural Generation System (Software/Code Asset): MVP.

\* Dynamic Shader/Material Effects (MIDs, MPCs for plants): MVP.

\* Performance Optimization: MVP.

\*\*Data Collection & Lab Equipment\*\*

Assets:

\* Handheld Meters (Visual): EC/PPM, pH, Temp Probe, Soil Moisture, Chlorophyll, PAR/PPFD, IR Thermometer, VPD Meter.

\* MVP Status / Estimated Game Version: MVP. \*Briefing Doc confirms these for manual data acquisition.\*

\* Benchtop Meters/Analyzers (Visual):

\* MVP Status / Estimated Game Version: Mid-Late MVP / https://www.google.com/search?q=Post-MVP for advanced analyzers. \*Briefing Doc: simulated lab analysis initially abstracted off-site.\*

\* Data Logging & Interface (Visual): Laptop, Tablet, Desktop, Clipboard, Pens, Whiteboard.

\* MVP Status / Estimated Game Version: MVP.

\* Calibration Weights: MVP.

\* Simulated Lab Analysis Interface (UI):

\* MVP Status / Estimated Game Version: Mid-Late MVP / https://www.google.com/search?q=Post-MVP.

\* \*\*\*NEW ASSET (from video, potentially UI or Data Collection):\*\*\*

\* \*\*Augmented Reality (AR) Product Information System (Abstracted for game):\*\*

\* Purpose: In-game feature allowing players to "scan" (interact with) their packaged products (or even plants) to display detailed information overlays (e.g., strain lineage, cannabinoid/terpene profiles, how-it-was-made notes, batch info). Inspired by Grow Sciences' Zappar app integration.

\* Properties: UI elements, links to game's internal database for product/plant data.

\* MVP Status / Estimated Game Version: Likely https://www.google.com/search?q=Post-MVP. \*This is an advanced UI/UX feature and lore delivery method, beyond core MVP dashboards.\*

\*\*UI & Data Visualization Elements\*\*

\*(Video's AR feature informs the new AR asset above. Otherwise, existing list is robust and aligns with general needs demonstrated by a data-driven grow.)\*

\*\*Advanced Breeding & Lab Equipment\*\*

\*(Video mentions DNA sex testing via Delta Leaf, which is a lab service. This would likely be an "outsourced service" in-game for MVP/early game, rather than player-owned equipment, aligning with the Briefing Doc's deferral of advanced breeding/genetic analysis tools.)\*

\*\*Consumable Resources (Abstract/UI Representation)\*\*

Assets:

\* Water: MVP.

\* Power: MVP.

\* Nutrients: Packaged Fertilizers, Mixed Solution.

\* \*\*\*Video examples reinforce specific nutrient lines like House & Garden as consumable items.\*\*\*

\* MVP Status / Estimated Game Version: MVP.

\* CO2: MVP.

\* Building Materials: MVP.

\* Seeds/Clones: Strain-specific Seeds, Clones.

\* \*\*\*Video mentions Umami Seeds as a source for genetics.\*\*\*

\* MVP Status / Estimated Game Version: MVP.

\* Finances: MVP.

\* \*\*\*NEW CONSUMABLE (from video, linked to propagation):\*\*\*

\* \*\*Cloning Gel/Solution (e.g., Clonex Gel, Clonex Mist):\*\*

\* Purpose: Rooting hormone products used to promote root development in cuttings.

\* Properties: Consumable, quantity per application, cost, effectiveness boost.

\* MVP Status / Estimated Game Version: MVP. \*Briefing doc mentions "basic cloning" for MVP.\*

\* \*\*\*NEW CONSUMABLE (from video, linked to extraction - Post-MVP):\*\*\*

\* \*\*Rosin Press Bags/Screens:\*\*

\* Purpose: Consumable nylon mesh bags of various micron sizes used in rosin pressing.

\* Properties: Micron size, durability (single/multi-use), cost. (e.g., \*Rosin Evolution brand from video\*)

\* MVP Status / Estimated Game Version: https://www.google.com/search?q=Post-MVP (as extraction is post-MVP).

\*\*NEW CATEGORY: Branding & Packaging Consumables\*\*

Purpose: Consumable items used in the final packaging of products, affecting presentation, preservation, and potentially perceived quality/market value.

Assets:

\* \*\*Specialty Jars:\*\* (e.g., \*\*\*Calyx jars with Canlock vacuum seal lids, as seen in video\*\*\*)

\* Properties: Size, Material (glass), Seal type (vacuum, standard), Child-resistance, Branding options.

\* MVP Status / Estimated Game Version: Basic jars are MVP for curing. \*Specialty/branded jars are Likely Late-Game MVP / https://www.google.com/search?q=Post-MVP.\*

\* \*\*Specialty Mylar Bags:\*\* (e.g., \*\*\*Grow Sciences "Bigs" and "Smalls" branded bags, Grove Bags with TerpLoc Technology, as seen in video\*\*\*)

\* Properties: Size (ounce, half-ounce, etc.), Material (Mylar, multi-layer films), Seal type (heat seal, ziplock), Branding options, Special features (e.g., TerpLoc for humidity control).

\* MVP Status / Estimated Game Version: Basic containers for MVP. \*Specialty/branded/tech bags are Likely Late-Game MVP / https://www.google.com/search?q=Post-MVP.\*

\* \*\*Concentrate Containers:\*\* (e.g., \*\*\*Calyx concentrate containers, as seen in video\*\*\*)

\* Properties: Size (e.g., 1g), Material (glass, with anti-stick liner), Seal type, Child-resistance, Branding options.

\* MVP Status / Estimated Game Version: https://www.google.com/search?q=Post-MVP (as extraction is post-MVP).

\* \*\*Labels & Stickers (Customizable):\*\*

\* Properties: Customizable text/graphics, Size, Material. For branding jars, bags, boxes.

\* MVP Status / Estimated Game Version: Basic labeling (strain name, core stats) likely MVP. \*Full custom branding/decorative stickers Likely Late-Game MVP / https://www.google.com/search?q=Post-MVP.\*

\* \*\*Custom Product Boxes:\*\* (For individual product units, e.g., vape carts, concentrate jars, premium flower jars)

\* Properties: Size, Material (cardboard), Printing/Branding options, Inserts.

\* MVP Status / Estimated Game Version: Likely https://www.google.com/search?q=Post-MVP.

--- END OF ENHANCED ASSET LIST (v1.5) ---

This enhanced list incorporates specific examples and a few new asset types/sub-types inspired by the Grow Sciences CannaCribs episode, while carefully considering the MVP scope defined in the Project Chimera Briefing Document. The video provides excellent real-world grounding for many of the systems you're aiming to simulate.

Okay, I've reviewed the provided "Asset List 1.4," the "Briefing Document," and the CannaCribs EP6 "Rare Dankness" transcript.

Here's the enhanced asset list, \*\*Project Chimera: Customized, Comprehensive Asset List v1.4.1\*\*.

\*\*Key changes based on CannaCribs EP6 - Rare Dankness:\*\*

\* Added specific brand/model examples for equipment seen in the video (e.g., GreenBroz trimmers, Quest dehumidifiers, Priva controllers, Grodan rockwool, Floraflex caps, Franklin Miller shredder, etc.) and cited the source.

\* Incorporated specific strains mentioned (Ghost Train Haze, Moonshine Haze) as examples for foundational strains or notable cultivars.

\* Noted specific processes and facility details (e.g., R&D room, propagation techniques, drying/curing parameters, waste disposal methods) which inform asset use and variations.

\* Aligned MVP status more closely with both the existing list's intent and the explicit MVP definitions in the Briefing Document, especially for advanced systems like extraction (deferred to Post-MVP).

\* Added notes reflecting real-world practices seen in the video to enhance asset descriptions and potential gameplay mechanics.

--- START OF FILE Asset List 1.4.1 ---

\*\*Project Chimera: Customized, Comprehensive Asset List v1.4.1\*\*

Core Vision: Modern, High-Tech, Clinical/Scientific, Aspirational/Professional aesthetic; player-driven "Relaxed & Cozy" variations.

Detail paramount: (Satisfactory, Farming Sim benchmarks for equipment) for deep simulation. The simulation aims for a granular, scientifically grounded foundation.

Source Prioritization:

1. Core Docs (mechanics, scope, style).

2. Relevant Docs (cannabis science, cultivation, pests, water, nutrients, breeding, equipment for realism/complexity). This includes Cannabis sativa L. biology, cultivation, genetics, and industry practices.

3. General Knowledge (bridge gaps).

Gameplay Loops Supported: Build, Cultivate, Breed, Process, Analyze, Optimize.

Key Customizations:

\* Expanded Utility Systems (Plumbing, HVAC, Electrical) with detailed, interconnected networks where sizing and material impact performance.

\* Detailed Plant Assets (dynamic, procedural, GxE-tied), reflecting phenotypic plasticity.

\* Lab/Research Equipment (advanced breeding/analysis) supporting high-tier breeding, genetic research, and detailed chemical profiling.

\* UI/Data Viz as crucial assets for presenting complex simulation data.

Specific environmental control, nutrient management, IPM, post-harvest details: These systems will incorporate specific parameters for temperature, humidity, CO2, airflow, light, optimal nutrient ranges, and pest/disease resistance.

Scalability: Residential vs. Warehouse/Industrial, potentially expanding to Greenhouses, Vertical Farms, Research Labs, and Outdoor Fields.

\*\*Changelog for v1.4.1:\*\*

\* Incorporated details from CannaCribs EP6 Rare Dankness video transcript.

\* Added specific equipment brands/models where seen (e.g., GreenBroz, Quest, Priva, Grodan, Floraflex, Franklin Miller).

\* Added specific strains mentioned (Ghost Train Haze, Moonshine Haze).

\* Refined MVP status based on Briefing Document and video context.

\* Added notes for realism based on observed practices.

\*\*Item List:\*\*

\*\*Structural & Architectural Elements\*\*

Purpose: Define grow spaces, support equipment, manage environment (materials affecting insulation, cleanliness, etc.). Layout and zoning will facilitate clean flow principles.

Variations:

\* Interior: Drywall, Concrete, Insulated Panel. Materials should be non-porous, smooth, durable, non-absorbent, and chemical-resistant for sanitation.

\* Exterior: Siding, Brick, Metal (Map specific).

\* Industrial: Pre-fab, Heavy-duty.

Material properties: Cost, Appearance, Insulation (R-value for heat transfer management), light/air barrier (for Environmental Control Sim), Cleanliness (materials influence ease of cleaning). Coving at wall-floor junctions is recommended.

Assets:

\* Walls: Sections/panels (various materials).

\* MVP Status / Estimated Game Version: MVP. Required for initial Residential House map and basic Warehouse build-out.

\* Notes: Material properties related to Environmental Control Sim (Insulation - R-value) are relevant for MVP. Materials for future exterior/map-specific themes would be Post-MVP.

\* Floors: Sections (Concrete, Wood, Grate - with load ratings). Non-porous materials preferred.

\* Drains: Standard, Trench (with varying capacity).

\* MVP Status / Estimated Game Version: MVP. Required for initial facility construction.

\* Roofs/Ceilings: Sections (Drywall, Suspended Grid, Concrete). High ceilings can cause thermal stratification.

\* Suspended Tiles: (acoustic, cleanroom).

\* Open Rafters/Trusses: (Wood, Metal). These can influence large-scale microclimate patterns.

\* MVP Status / Estimated Game Version: MVP. Required for initial facility construction.

\* Doors: Various types (Standard, Industrial Roller, Air Lock). Air locks minimize contaminant entry.

\* MVP Status / Estimated Game Version: MVP.

\* Notes: Required for facility construction.

\* Windows: Various types (Standard, Greenhouse, Industrial). Can be blocked out in grow rooms.

\* MVP Status / Estimated Game Version: MVP.

\* Notes: Standard windows for Residential/Warehouse. Greenhouse-specific windows (e.g., for specific light transmission) are Future (Post-MVP).

\* Stairs/Ladders/Catwalks: For vertical access. Relevant for multi-story/vertical facilities.

\* MVP Status / Estimated Game Version: Likely MVP for multi-story/vertical layout in Warehouse or other facilities.

\* Notes: Catwalks relevant for industrial scale and vertical farms.

\* Support Pillars/Beams: (Concrete, Steel). For structural support in large spaces.

\* MVP Status / Estimated Game Version: MVP for Warehouse map shell.

\* Containment Structures (Tents): Pre-fab grow tents, sealable for environmental control.

\* MVP Status / Estimated Game Version: Likely MVP for early-game or smaller residential setups.

\*\*Cultivation & Plant Care Tools\*\*

Purpose: Plant maintenance (pruning, training), scouting, applying treatments.

Variations: Size, Material (affects durability, cleanliness, rust potential), Quality (Basic, High-quality), Sharpness/Condition (affects cut cleanliness, plant stress, disease risk). Tools require cleaning/sterilization.

Assets:

\* Pruning & Cutting:

\* Types: Bypass Pruners (Std, HD), Snips/Scissors (Micro-Tip, Curved/Straight), Scalpels, Loppers, Hand Saw. Large Hedge Trimmers (potentially with pole extensions).

\* Properties: Cutting Area/Blade Length, Weight (affects fatigue).

\* MVP Status / Estimated Game Version: MVP.

\* Notes: Basic plant training (topping, manual LST) is part of core MVP cultivation. These tools are necessary for that. Clean cuts promote faster healing.

\* Spraying & Application: Hand Spray Bottles, Pump Sprayers (Gal, Backpack), Handheld Dusters, Soil Drench Applicators.

\* Industrial: Motorized spray carts, Foggers, Integrated Spraying Systems (automated, fixed nozzles).

\* MVP Status / Estimated Game Version: MVP for basic pest/disease treatment (manual application).

\* Notes: Industrial versions likely Late-Game MVP or Post-MVP, linked to scale and potential automation skill nodes. Automated spraying carries risks if misconfigured.

\* Scouting & Monitoring:

\* Traps: Sticky Traps (Yellow, Blue - Cards, Rolls) for monitoring pest presence, location, and stage.

\* Visual Inspection Tools: Magnifying Loupes, Handheld/Benchtop Digital/Standard Microscopes for detailed inspection of pests, pathogens, trichomes.

\* Sampling Tools: Soil/Medium Sample Probes/Corers, Leaf Sample Bags/Vials.

\* Simulated Meters (Visual): Simulated Chlorophyll Meter. (See Data Collection for more handheld meters)

\* MVP Status / Estimated Game Version: MVP for basic plant health monitoring and pest/disease identification.

\* Notes: Microscopes and probes are explicitly mentioned for manual data acquisition loop and unlocked via Science skill tree nodes. Effective use requires skill.

\* Plant Support Tools:

\* Types: Trellis netting, stakes, tie wire.

\* Functionality: Prevents lodging, supports heavy buds, manages canopy.

\* MVP Status / Estimated Game Version: Likely MVP, especially for supporting larger plants or specific training techniques (e.g., ScrOG).

\*\*Nutrient & Irrigation Equipment\*\*

Purpose: Store, mix, deliver nutrients and water to plants. Systems will manage pH, EC/PPM, temperature, and Dissolved Oxygen (DO) of nutrient solutions.

Variations:

\* Scale (Manual, Small Reservoir, Large Industrial).

\* Control (Manual, Timed, Automated sensor-driven).

\* Type (Drip, Ebb/Flow, DWC, Aeroponic, etc.).

Assets:

\* Watering Cans/Hoses: Basic manual irrigation.

\* Properties: Capacity/Flow Rate.

\* MVP Status / Estimated Game Version: MVP. Basic irrigation methods are essential for core cultivation.

\* Reservoirs/Tanks: Various sizes (Plastic, Poly, Stainless Steel - food-grade). Dynamically reflect fill levels. Must be kept clean.

\* MVP Status / Estimated Game Version: MVP.

\* Notes: Needed for manual/timed watering systems. Larger/Industrial sizes likely Late-Game MVP or Post-MVP.

\* Pumps: Water Pumps (Submersible, Inline - various flow rates/head pressure), Air Pumps (for DWC).

\* Properties: Power Requirement, Durability/Maintenance (can fail).

\* MVP Status / Estimated Game Version: MVP. Needed for simple reservoir systems. Various sizes/capacities support scalability.

\* Notes: Redundant pumps or advanced manifold systems could be later game/Post-MVP.

\* Plumbing: Pipes (PVC, PEX, Drip Line), Fittings, Valves (manual, solenoid), Filters.

\* Properties: Material (impacts cost, durability, efficiency, appearance), Sizing (diameters impact flow, pressure drop), Connectivity (logical connections, visual feedback हाथ में), Routing (3D, grid-snap/free-form, segmented components for curves). Abstracted pressure loss simulation.

\* MVP Status / Estimated Game Version: MVP. Essential for building irrigation systems, part of detailed construction.

\* Notes: Sizes/materials impact performance. Manual routing is MVP. Filters require cleaning/replacement. \*\*`cite\_source: CannaCribs EP6 Rare Dankness` showed Floraflex caps for drip irrigation.\*\*

\* Nutrient Mixing Stations/Vats: For preparing nutrient solutions. Requires clean tanks, measuring tools, pumps/stirrers, calibrated pH/EC meters.

\* MVP Status / Estimated Game Version: MVP.

\* Notes: Required for manual nutrient mixing. Scale/automation increases later. Cleaning is critical.

\* Automated Dosing/Fertigation Systems: Links sensors (EC/pH) to pumps/valves for automated mixing and delivery based on setpoints and schedules. Offers higher consistency. (e.g., Priva system seen in warehouse settings)

\* MVP Status / Estimated Game Version: Late-Game MVP / Post-MVP.

\* Notes: While basic automation is MVP (timers), fully automated dosing systems are likely linked to more advanced automation deferred post-MVP. Requires advanced controllers. \*\*`cite\_source: CannaCribs EP6 Rare Dankness` shows Priva system controlling this.\*\*

\* Growing Mediums/Substrates: Bags/bulk (Soil, Coco Coir, Rockwool cubes/slabs, Hydroton, Peat Moss). Living Soil with microbial ecosystems.

\* Properties: Water retention, aeration, nutrient availability, pH, EC, bulk density, porosity, mineral content, organic matter. These affect root health and nutrient dynamics.

\* MVP Status / Estimated Game Version: MVP. Essential consumable for cultivation.

\* Notes: UI/Inventory representation is MVP. \*\*`cite\_source: CannaCribs EP6 Rare Dankness` explicitly shows Grodan Rockwool A-OK cubes and larger blocks.\*\*

\* Nutrient Containers: Bottles/Bags of base nutrients (N, P, K), macro- & micro-nutrients, additives. (e.g., Superthrive, Emerald Harvest pH Up/Down)

\* Properties: NPK Ratio, specific concentrations. SDS information for handling/storage.

\* MVP Status / Estimated Game Version: MVP.

\* Notes: Consumable, part of manual nutrient management. UI/Inventory representation is MVP. Nutrients can interact or have incompatibilities. \*\*`cite\_source: CannaCribs EP6 Rare Dankness` showed specific brands.\*\*

\*\*Environmental Control Equipment\*\*

Purpose: Manage temperature, humidity, CO2, airflow, light cycles. Essential for optimizing plant growth and preventing issues.

Variations: Size, Capacity, Efficiency, Control (Manual, Timed, Sensor-Controlled via simple or advanced/integrated controllers). Equipment projects a "radius of effect" or "cone of influence."

Assets:

\* HVAC Systems: Air Conditioners (Window, Split), Heaters (Electric, Gas), Dehumidifiers, Humidifiers. (e.g., Quest Dehumidifiers)

\* Properties: Sizing/Capacity (must match facility heat load), Efficiency (e.g., SEER, affects power/fuel use), Power/Fuel Requirement, Maintenance requirement.

\* MVP Status / Estimated Game Version: MVP.

\* Notes: Basic HVAC for environmental control (temp, humidity) is a core MVP feature. Various types/capacities needed for different room sizes/needs. Unlocked via Environment skill tree nodes like "Basic Environmental Control". \*\*`cite\_source: CannaCribs EP6 Rare Dankness` showed numerous Quest 506 dehumidifiers in flower rooms and a Quest PowerDry 4000 in the dry/cure room.\*\*

\* Fans: Circulation Fans (Clip, Standing, Wall), Exhaust Fans, Inline Duct Fans.

\* Properties: Airflow Rate (CFM, affects air exchange), Power Requirement, Control (manual, timed, sensor, speed controller).

\* MVP Status / Estimated Game Version: MVP. Essential for airflow management, part of MVP environmental control.

\* Notes: Part of abstracted airflow physics, removes heat/humidity.

\* Ducting: Flexible, Rigid (various diameters), Fittings.

\* Properties: Material (impacts cost, durability, efficiency), Sizing (impacts airflow, pressure drop).

\* MVP Status / Estimated Game Version: MVP. Needed for HVAC and exhaust systems. Part of detailed construction.

\* Notes: Manual routing is MVP.

\* CO2 Systems: CO2 Tanks (Visual assets), Regulators, Controllers, Generators (produce heat/moisture).

\* Functionality: Increases CO2 for enhanced photosynthesis (optimal 800-1500 ppm in flowering).

\* MVP Status / Estimated Game Version: MVP for basic CO2 management, though likely manual control initially.

\* Notes: CO2 tanks are visual assets. Controllers for automation might be later MVP/Post-MVP depending on complexity level. Requires CO2 consumable.

\* Grow Lights: Various types (HID - MH/HPS with Ballasts/Hoods e.g., \*\*Phantom 1000W DE HPS\*\*; LED Panels - various wattages/spectrum, potentially adjustable; Fluorescent - T5/CFL; LEC e.g., \*\*Phantom Dual 315 CMH\*\*).

\* Properties: Wattage (affects intensity, heat output), Spectrum (Blue for veg, Red for flower, Full-spectrum), Light Output (PAR/PPFD, DLI), Fixture Efficiency, Heat Output (significant), Coverage Area. Reflective hoods/materials enhance efficiency.

\* MVP Status / Estimated Game Version: MVP. Essential cultivation equipment. Various types/tiers for progression.

\* Notes: \*\*`cite\_source: CannaCribs EP6 Rare Dankness` showed specific light types in use.\*\*

\* Light Timers/Controllers: Mechanical, Digital. Can control multiple lamps.

\* Properties: Power Handling Capacity.

\* MVP Status / Estimated Game Version: MVP. Basic automation (light timers for photoperiod: 18-24h veg, 12/12h flower) is a core MVP feature.

\* Notes: Sensor-controlled or advanced automation likely Late-Game MVP / Post-MVP.

\* Thermostats, Humidistats, Environmental Controllers: Simple (on/off) to Advanced/Integrated (multiple parameters, IF-THEN logic, setpoints/ranges, e.g., \*\*Priva system\*\*).

\* MVP Status / Estimated Game Version: MVP for basic automation. Advanced/integrated controllers (like Priva) likely Late-Game MVP / Post-MVP.

\* Notes: \*\*`cite\_source: CannaCribs EP6 Rare Dankness` confirmed use of Priva for comprehensive environmental control.\*\*

\* Sensors:

\* Types: Environmental (Air Temp, RH, CO2, Light - PAR/PPFD), Leaf Surface Temp (for VPD), Root Zone/Substrate (Moisture - VWC%, EC, pH, Temperature). Advanced/Specialized (Inline Water sensors, Spore Traps - Post-MVP).

\* Tiers: Basic (manual check), Intermediate (networked, simple controllers), Advanced (accurate, multi-functional), Research-grade (calibration).

\* Properties: Accuracy/Precision (varies by tier, requires calibration), Power Requirement, Data Output (numerical, logs).

\* MVP Status / Estimated Game Version: MVP. Essential for real-time data dashboards and automated control.

\* Notes: Player-placed sensors are core to data collection. Various tiers (basic manual vs. integrated automated).

\* Air Filters: Intake filters, Carbon filters (for odor control). MERV-rated filters. (e.g., \*\*Fantech HEPA filter\*\* in R&D room)

\* MVP Status / Estimated Game Version: Likely MVP.

\* Notes: Essential for managing air quality and odor control. Part of ducting systems. Requires replacement/cleaning. \*\*`cite\_source: CannaCribs EP6 Rare Dankness` specifically mentioned a Fantech HEPA filter.\*\*

\*\*Utility Systems & Equipment\*\*

Purpose: Deliver power and connect systems. Detailed, interconnected 3D routable networks with performance impacted by sizing/materials. Utility View/"X-Ray" mode for visualization.

Variations: Scale, Capacity, Efficiency, Type (Standard, Industrial).

Assets:

\* Electrical Wiring: Various gauges (sizing impacts resistance, voltage drop, cost). Conductors (copper, aluminum), Insulators.

\* MVP Status / Estimated Game Version: MVP. Part of detailed construction, abstracted utility connections.

\* Notes: Manual routing is MVP. Sizes/gauges impact performance. Adherence to safety standards.

\* Circuit Breakers / Fuse Boxes / Panels: Essential for electrical system management, load balancing, overload protection. Rated capacity (Amps), not to be loaded beyond 80%.

\* MVP Status / Estimated Game Version: MVP.

\* Generators (Diesel/Gas): Provides backup or primary power. CoGen systems possible.

\* Properties: Power Output (Watts), Fuel Efficiency, Ramp-up time, Heat generation. Tiers from basic (manual start) to advanced (auto transfer).

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. Described as backup power systems.

\* Notes: Needed for scaling operations or risk mitigation. Requires fuel.

\* Battery Banks / UPS (Uninterruptible Power Supply): Short-term power buffer or main source.

\* Properties: Capacity (kWh), Charge/Discharge Rate.

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. Described as short-term buffer.

\* Notes: Aligns with advanced risk management.

\* Main Power Grid Connection Point (Abstracted): Represents stable power draw from external utility. Capacity based on service contract/infrastructure.

\* MVP Status / Estimated Game Version: MVP. Represents the abstracted power draw. Metered cost. Risk of external disruption.

\* Water Supply Connection Point (Abstracted - Tap, RO, Treated): Represents abstracted water source.

\* Types: Tap (can have contaminants), RO (requires Cal-Mag/pH management), Treated. Quality impacts plants.

\* MVP Status / Estimated Game Version: MVP. Metered cost. RO/Treated may be later upgrades.

\*\*Pots, Containers, & Growing Surfaces\*\*

Purpose: Hold plants and growing medium.

Variations: Size (affects root space, plant size), Material (Plastic, Fabric, Ceramic - affects cost, durability, aeration), Type (Standard Pot, Grow Bag, Tray, Slab).

Assets:

\* Pots: Various sizes (Small, Medium, Large).

\* MVP Status / Estimated Game Version: MVP. Essential cultivation equipment. Various sizes support plant lifecycle stages (transplanting).

\* Fabric Grow Bags: Offers better aeration than plastic.

\* MVP Status / Estimated Game Version: MVP. As a variation of container type.

\* Trays / Flats (Seedling, Propagation): Shallow containers for starting seeds/clones. Size choice influenced by space, labor, timing. (e.g., \*\*Mondi Domes\*\*)

\* MVP Status / Estimated Game Version: MVP. Used for starting seeds/clones. \*\*`cite\_source: CannaCribs EP6 Rare Dankness` showed Mondo Domes.\*\*

\* Rockwool Cubes / Slabs: Inert growing medium/container type, often for hydro/coco. (e.g., \*\*Grodan A-OKs and blocks\*\*)

\* MVP Status / Estimated Game Version: MVP.

\* Notes: As a growing medium/container type. \*\*`cite\_source: CannaCribs EP6 Rare Dankness` showed specific Grodan products.\*\*

\* Hydroponic/Aeroponic Systems (Basic Ebb/Flow, DWC buckets, NFT, Aeroponics): Systems for growing without soil, requiring precise control of nutrient solution chemistry (pH, EC, DO, temp) and environmental parameters. Lacks natural buffering of soil.

\* MVP Status / Estimated Game Version: Likely MVP for basic hydroponic options (Ebb/Flow, DWC buckets).

\* Notes: Supports different cultivation methods. More complex systems (e.g., aeroponic) might be later MVP/Post-MVP.

\* Growing Benches / Tables (Flood tables, Wire racks): Provide surfaces for organizing plants. Various types support different systems (e.g., flood tables for Ebb/Flow).

\* MVP Status / Estimated Game Version: MVP.

\*\*Pest & Disease Management\*\*

Purpose: Monitor, identify, and treat plant issues. Integrated with sanitation and environmental controls.

Assets:

\* Scouting Tools:

\* Sticky Traps: (Yellow, Blue - Cards, Rolls).

\* MVP Status / Estimated Game Version: MVP. For basic pest monitoring.

\* Handheld Magnifying Loupes:

\* MVP Status / Estimated Game Version: MVP. For close visual inspection/scouting.

\* Microscopes (Handheld, Benchtop): For detailed pest/pathogen/trichome inspection.

\* MVP Status / Estimated Game Version: MVP. Unlocked via Science skill tree.

\* Application Tools:

\* Hand Spray Bottles, Pump Sprayers (Gal, Backpack):

\* MVP Status / Estimated Game Version: MVP.

\* Notes: For manual treatment application (e.g., approved fungicides/pesticides/biologicals).

\* (Simulated) Pesticides/Fungicides/Biologicals: Represented as Consumables. Biologicals need specific environmental conditions.

\* MVP Status / Estimated Game Version: MVP. Needed for manual treatment. UI/Inventory representation.

\* In-game "Plant Problems Guide" UI/Asset: Essential tool for diagnostics, linking symptoms to causes/solutions.

\* MVP Status / Estimated Game Version: MVP.

\*\*Harvesting & Processing Equipment\*\*

Purpose: Harvest, trim, dry, cure for final product quality. Workflow optimization and minimizing degradation are key.

Variations: Size, Capacity, Automation (Manual to Automated Industrial), Material (Food-Grade).

Assets:

\* Harvesting Tools: Large Trimming Shears, HD Loppers, Hand Saw, Hedge Trimmers (potential pole extensions, various blade lengths). Collection Totes/Bins (Food-grade). Tarps. Sharp, sanitized tools essential.

\* MVP Status / Estimated Game Version: MVP. Needed for manual harvesting.

\* Trimming Tools: Trim Scissors (Micro-tip, types). Trim Bins/Trays (with kief screens to collect trichomes, e.g., \*\*Harvest More Trim Bins\*\*). Isopropyl Alcohol/Wipes (cleaning), Rags. Electrically operated, manually controlled hand trimming assist tools. (e.g., \*\*Scrubber Boxes with iso alcohol\*\* for cleaning)

\* MVP Status / Estimated Game Version: MVP. Needed for manual trimming. Cleaning supplies for hygiene/quality. \*\*`cite\_source: CannaCribs EP6 Rare Dankness` showed specific examples.\*\*

\* Bowl Trimmers (Manual, Electric): Semi-automated trimming, can be adjusted for aggressiveness (speed vs. quality).

\* MVP Status / Estimated Game Version: Likely Mid-Late MVP / Post-MVP.

\* Notes: Provides some automation beyond hand trimming, likely unlocked via Harvest skill tree or equipment research.

\* Automated Trimming Machines (Sizes/throughputs): Fully automated, adjustable aggressiveness, can trim wet or dry. (e.g., \*\*GreenBroz Dry Trimmer Model M\*\*)

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP.

\* Notes: High-tier equipment, part of Advanced Automation. \*\*`cite\_source: CannaCribs EP6 Rare Dankness` featured GreenBroz trimmer.\*\*

\* Drying Racks / Clotheslines & Hangers: Manual hanging/rack in dedicated, environmentally controlled space (temp, humidity, airflow crucial for quality and preventing issues like terpene loss or mold). (e.g., \*\*VRE racks\*\*)

\* MVP Status / Estimated Game Version: MVP. Needed for manual drying. Slow, controlled drying is key. \*\*`cite\_source: CannaCribs EP6 Rare Dankness` showed VRE racks.\*\*

\* Curing Containers (Jars, Buckets - Glass, Plastic, e.g. Bins): For manual curing with "burping" in a stable cool, dark environment (target RH 58-62%). Automated curing systems (smart containers, climate-controlled rooms) for later.

\* MVP Status / Estimated Game Version: MVP. Needed for manual curing. \*\*`cite\_source: CannaCribs EP6 Rare Dankness` mentioned curing in bins.\*\*

\* Weighing & Measuring: Digital Pocket Scales (Precision), Digital Bench Scales (Larger capacity). Industrial (Platform, Floor scales).

\* Calibration Weights: Essential for ensuring accuracy.

\* MVP Status / Estimated Game Version: MVP. Essential for tracking yield, contract specs, inventory. Different scales for different needs. Requires calibration.

\* Transporting Equipment: Baskets, hand-drawn garden carts, small motorized transport, portable conveyor belts for moving material, plants, tools.

\* MVP Status / Estimated Game Version: Likely Mid-Late MVP, relevant for larger scale.

\* Cold Storage: Refrigerators, freezers for keeping harvested material cool, especially for fresh-frozen or high terpene retention. (e.g., \*\*Revco -60 to -70C freezer\*\*)

\* MVP Status / Estimated Game Version: Likely Post-MVP, tied to specific processing paths (like live resin extraction). \*\*`cite\_source: CannaCribs EP6 Rare Dankness` showed a Revco freezer for fresh frozen material.\*\*

\* Extraction/Concentrate Equipment:

\* Solventless Press (Rosin Press)

\* Basic Solvent Extraction System (e.g., \*\*Incredible Extractor - Butane\*\*)

\* Lab Ovens (for purging/decarb)

\* MVP Status / Estimated Game Version: Post-MVP. Explicitly listed as deferred in Briefing Doc. \*\*`cite\_source: CannaCribs EP6 Rare Dankness` showed an Incredible Extractor and lab ovens for BHO.\*\*

\*\*Facility Furniture & Fixtures\*\*

Purpose: Workspace, storage, safety, general utility, supporting cleanliness and professional aesthetics.

Assets:

\* Workbenches: (Sizes, materials).

\* HD Shelving: (Metal, Wire). Stackable, wall-mounted options.

\* Storage Cabinets: (Metal, Plastic, Lockable). Specialized for Chemicals/Flammables.

\* Rolling Utility Carts.

\* Seating: (Chairs, Stools, Folding Chairs).

\* MVP Status / Estimated Game Version: MVP. Provides functional storage and workspace. Supports the Cleanliness aesthetic.

\* Sinks: Industrial Sink/Wash Basin (Stainless Steel). Faucet Fixtures.

\* MVP Status / Estimated Game Version: MVP. Essential for hygiene, cleaning tools/equipment. Part of the general utility.

\* Safety: Eye Wash Station (Wall, Pedestal). Emergency Shower (Industrial). Fire Extinguishers. First Aid Kits.

\* MVP Status / Estimated Game Version: Likely MVP. Essential safety equipment.

\* General: Wall Clocks. Trash Cans/Waste Bins (Industrial rolling, upgradable capacity). Recycling Bins. Mop & Bucket. Broom & Dustpan. Wet Floor Signs. Floor Mats/Anti-Fatigue. Lockers.

\* MVP Status / Estimated Game Version: MVP. Provides visual detail, supports waste management, enhances aesthetics. Players transport waste to bins.

\* Waste Disposal Equipment:

\* Industrial Shredder (e.g., \*\*Franklin Miller Taskmaster TM8500\*\*) for plant waste.

\* MVP Status / Estimated Game Version: Late-Game MVP / Post-MVP. Relevant for large scale and compliance. \*\*`cite\_source: CannaCribs EP6 Rare Dankness` showcased this for compliant waste disposal.\*\*

\*\*Map Specific Assets\*\*

Purpose: Define build environment, establish scale.

Assets:

\* Residential House: Standard residential elements (exterior, interior, doors/windows). Smaller scale assets (fixtures, utility connections). Base "shell". Pre-defined layout, potential for initial wear/tear.

\* MVP Status / Estimated Game Version: MVP. Initial map environment.

\* Warehouse: Large open concrete structure (floor, walls, roof). Support pillars/beams. Industrial doors/windows. Base "shell" to build within.

\* Size example: 54,000 sq ft total property, 28,500 sq ft active canopy. `cite\_source: CannaCribs EP6 Rare Dankness`

\* MVP Status / Estimated Game Version: MVP. Accessible after Residential map. Represents next scale.

\* (Future: Greenhouse - glass/polycarbonate, vents, utilizes natural light, requires ventilation/temp control; Research Lab - sterile materials, lab benches for advanced techniques like Tissue Culture; Outdoor Field - landscape, fencing, subject to weather/pest risks; Vertical Farm - multi-tiered racking, high density, vertical logistics; Subterranean Lab; Abandoned Research Outpost; Geothermal Greenhouse Complex)

\* MVP Status / Estimated Game Version: Future (Post-MVP). Explicitly listed as potential future facility types.

\*\*Decorative & "Cozy" Items\*\*

Purpose: Player customization, "Cozy" aesthetic.

Assets: Posters, art, rugs, small furniture (chairs, tables), non-cannabis plants, decorative lighting, personal items, paint/texture options (walls/floors - not changing core material properties in MVP).

\* MVP Status / Estimated Game Version: MVP.

\* Notes: Part of player expression. Unlockable items can deliver lore.

\*\*Plant Assets (Core for Procedural System)\*\*

Purpose: Central visual output, dynamic GxE reflection (Phenotypic Plasticity).

Key Requirements (Procedural System):

\* Base 3D Models: HQ, detailed base meshes/textures for ~5-10 landrace-inspired foundational strains.

\* Strain Examples: \*\*Ghost Train Haze, Moonshine Haze.\*\* `cite\_source: CannaCribs EP6 Rare Dankness`

\* Variations (Morphology & Growth Stages):

\* Seedling (single leaflet progressing to 3, 5)

\* Vegetative (Early, Mid, Late - rapid growth, building root system, stems, foliage)

\* Flowering (Early, Mid, Late - inflorescence development, bud thickening)

\* Maturation (trichomes mature: clear to milky to amber)

деревян Harvested (Whole plant, branches)

\* Dried (Buds)

\* Botanical Features to Represent:

\* Plant Height (e.g., 0.2m to >3m, influenced by genetics, training, environment)

\* Stem Structure (erect, furrows, branching patterns, diameter)

\* Branching Pattern (apical dominant, lateral spread, sativa-lanky vs. indica-compact)

\* Leaf Morphology (compound, leaflet number 3-13+, shape - lanceolate etc., serrated margins, size - broad vs. slender, angle/droop indicating hydration)

\* Leaf Arrangement (opposite to alternate)

\* Bud/Flower Structure (shape - conical, spear, foxtail; density - airy vs. compact; leaf-to-calyx ratio)

\* Pistil Color (mature: orange-red, pink-purple, brown)

\* Trichome Density (low, medium, high - "frostiness")

\* Trichome Appearance (color transition: clear -> milky -> amber)

\* Potential: Root System Viz (medium, water, nutrient response). Root systems differ for seed vs. cloned plants. Root restriction impacts growth.

\* MVP Status / Estimated Game Version: MVP.

\* Notes: Core to the cultivation simulation. Initial launch will have 5-10 foundational strains. Root System Viz is listed as Potential.

\* Procedural Generation System (Software/Code Asset): Crucial system, AI-Assisted.

\* Inputs:

\* Abstracted Genetics Data (defining heritable traits from Section 2.2 of Parameter List e.g., yield potential, flowering time, chemotype - THC/CBD/CBG ratios, terpene profile, pest/disease resistance levels, etc.)

\* Environmental Parameters (light intensity/spectrum, temperature, humidity/VPD, CO2 levels, nutrient availability/deficiency/toxicity, water stress, etc.)

\* Cultivation Actions (pruning, training techniques like topping/LST)

\* Algorithms: Generate plant structure, morphology, and visual characteristics based on inputs.

\* MVP Status / Estimated Game Version: MVP.

\* Notes: Essential for dynamic GxE reflection and visual variability.

\* Dynamic Shader/Material Effects (MIDs, MPCs): Real-time GxE visualization.

\* Effects: Coloration (nutrient deficiencies, temp/light stress), Turgidity/Wilting (hydration status), Growth & Development rates, Trichome Appearance (density, color), Stress/Problem Symptoms (visual pests/diseases, leaf burn from nutrient toxicity), Training/Pruning Effects.

\* MVP Status / Estimated Game Version: MVP. Crucial visual feedback.

\* Notes: Directly tied to core MVP systems like Environmental Control, Nutrient Management, Plant Health, Basic Breeding.

\* Performance Optimization: LODs, HISMs/ISMs (plant components), optimized shaders.

\* MVP Status / Estimated Game Version: MVP.

\* Notes: Essential for performance with many plant instances. LODs are mandatory.

\*\*Data Collection & Lab Equipment\*\*

Purpose: Collect plant/env data, simulate lab analysis (genetic/chemical profile).

Variations: Tier (Handheld/Basic, Benchtop/Research, Industrial/Automated). Accuracy varies by tier, calibration is key.

Assets:

\* Handheld Meters (Visual): Portable tools for manual data acquisition in "Action Mode," data auto-logged.

\* Types: EC/PPM meter, pH meter, Temperature Probe (air, water, soil), Soil Moisture meter, Simulated Chlorophyll Content meter, PAR/PPFD meter, Infrared Thermometer (leaf surface temp), VPD Meter.

\* MVP Status / Estimated Game Version: MVP. Basic data collection tools.

\* Notes: Unlocked via Science skill tree.

\* Benchtop Meters/Analyzers (Visual): Lab-grade equipment for more accurate/detailed analysis. Requires sample preparation for some methods.

\* Types:

\* Lab-grade EC/pH meter.

\* Spectrophotometer (simulated use for basic analysis).

\* HPLC (High-Performance Liquid Chromatography) for cannabinoid quantification (THC, CBD, etc.).

\* GC-MS (Gas Chromatography-Mass Spectrometry) for terpene profiling, pesticide identification.

\* ICP (Inductively Coupled Plasma) assay for mineral content in tissue/substrate.

\* Elemental Analyzer for Total N/C.

\* NIR/MIR Spectroscopy for rapid, on-site detection/PAT.

\* Functionality: Simulated lab analysis for nutrient levels, cannabinoid/terpene profiles.

\* MVP Status / Estimated Game Version: Mid-Late MVP / Post-MVP for advanced analyzers (HPLC, GC-MS, ICP, Elemental, NIR/MIR). Basic lab-grade EC/pH may be earlier MVP.

\* Notes: More advanced tools tied to higher tiers of data analysis or specific research unlocks (Quantitative Analysis skill node). Outsourcing analysis is also an option initially.

\* Data Logging & Interface (Visual): Equipment representing systems for viewing and interacting with data.

\* Types: Laptop, Tablet, Desktop (Monitor, Keyboard, Mouse), Clipboard, Pens, Whiteboard.

\* Industrial: Server rack, large control displays.

\* Functionality: Interface for dashboards, logs, sensor/controller management, grow cycle comparison, lab analysis interface.

\* MVP Status / Estimated Game Version: MVP. Visual representation of UI/Data Viz.

\* Notes: Laptops/Tablets/Desktops are the interface. Industrial versions likely later. Secure digital DB for data storage.

\* Calibration Weights: For calibrating scales.

\* MVP Status / Estimated Game Version: MVP. Needed for calibration routine.

\* Simulated Lab Analysis Interface (UI): Manages sample submission (simulated time/cost биология), views reports (cannabinoid/terpene profiles, tissue nutrient, water quality). Allows comparison.

\* MVP Status / Estimated Game Version: Mid-Late MVP / Post-MVP. Tied to Quantitative Analysis skill node.

\*\*UI & Data Visualization Elements\*\*

Purpose: Present complex sim data for player decisions. CRITICAL gameplay "assets".

Assets (UI Elements/Visuals):

\* Environmental Data Dashboards/Overlays: Real-time sensor readouts (Temp, RH, VPD [calculated from Temp, RH, Leaf Temp], CO2, PAR/PPFD). Customizable presets. Environmental heat maps.

\* MVP Status / Estimated Game Version: MVP. Core to MVP Environmental Control.

\* Graphs & Charts: Historical trends (Env, Nutrients, Growth stages, Water/Power/CO2 Consumption). Multi-variable plots.

\* MVP Status / Estimated Game Version: MVP. Essential for data analysis.

\* Plant Health/Status Indicators: Icons/bars on models (Health, Water [Leaf Water Potential], Nutrient Status). Detail view UI for specific issues (deficiencies, pests, diseases).

\* MVP Status / Estimated Game Version: MVP. Critical feedback.

\* Nutrient Management Interface: Mixing UI (visual tank, ingredients, steps). Readouts for nutrient solution (EC/PPM, pH, temp, DO). Nutrient composition details. Runoff/Substrate test results (EC, pH, VWC%).

\* MVP Status / Estimated Game Version: MVP. Essential for manual nutrient management.

\* Genetic Data Display: Strain Name, Lineage (Pedigree Charts), Key Traits (Yield Potential, Flowering Time, Cannabinoid Profile - THC/CBD/CBG ratios, Terpene Profile, Pest/Disease Resistance, Stress Tolerances, Morphological traits like height, branching - Sliders, Bars, Values). Punnett Squares (Simulated for Mendelian traits).

\* Abstracted Genetic Marker/Allele display (linked to traits via simplified MAS/GS).

\* MVP Status / Estimated Game Version: MVP for core observable traits, lineage, simple inheritance.

\* Notes: Punnett Squares/Pedigree charts part of basic breeding. Genetic Marker/Allele display tied to "(Optional Late Game) Genetic Marker Assisted Selection" skill node, suggesting Late-Game MVP or Post-MVP.

\* Simulated Lab Analysis Results: Cannabinoid/Terpene Profiles (charts, graphs, % lists from HPLC/GC-MS data), Simulated Tissue Nutrient Analysis (from ICP/Elemental Analyzer data), Simulated Water Quality Report.

\* MVP Status / Estimated Game Version: Mid-Late MVP / Post-MVP.

\* Notes: Tied to Quantitative Analysis skill node and Simulated Lab Analysis Interface. Profiles needed for NPC contract quality specs, suggesting basic analysis is MVP.

\* Breeding Interface: Parent selection (based on desired traits, phenotypic/genotypic data), Crossing UI (manual pollination), Pheno-Hunting tools (growing populations to identify desirable individuals). Tracking generations (P, F1, F2).

\* MVP Status / Estimated Game Version: MVP. Essential for basic breeding loop.

\* Facility Management Overlays: Utility View ("X-Ray" for pipe/duct/wire networks, flow/pressure indicators). Zoning UI (designating areas by function). Resource inventory/consumption (Water, Power, CO2, Nutrients, Building Materials, Seeds/Clones).

\* MVP Status / Estimated Game Version: MVP. Utility View crucial for MVP. Resource inventory UI is MVP.

\* Operational & Financial Data: Budget, Costs (material, utility, labor, analysis), Revenue, Profit/Loss. Ledger for income/expenses.

\* Point of Sale (POS) System: (e.g., \*\*Flowhub\*\* as seen in a dispensary setting).

\* MVP Status / Estimated Game Version: MVP for core economy. POS specific functionality likely tied to Post-MVP retail operations. \*\*`cite\_source: CannaCribs EP6 Rare Dankness` showed Flowhub POS.\*\*

\* Alerts & Notifications: Visual/audio cues (Env out-of-range, Pest, Disease like Root Rot, Equipment failure, Low consumables). Tiered alerts.

\* MVP Status / Estimated Game Version: MVP. Critical for player feedback.

\* Historical Logs & Notes Interface: Player observations and auto event logging (environmental shifts, cultivation actions, pest sightings, alerts).

\* MVP Status / Estimated Game Version: MVP.

\* Tutorial/Info Overlays: Explaining concepts (VPD, GxE, deficiencies, equipment operation, scientific principles).

\* MVP Status / Estimated Game Version: MVP. Essential for onboarding.

\*\*Advanced Breeding & Lab Equipment\*\*

Purpose: Support high-tier breeding (Tissue Culture, Genetic Modification), genetic research, pathogen eradication. Requires specialized lab spaces/Research Lab facility type.

Variations: Tier (Research, Production).

Assets:

\* Tissue Culture Station: For sterile micropropagation, pathogen eradication (HLVd from meristems), genetic preservation, rapid cloning. Requires meticulous sterile technique, media prep, PGR understanding. Success influenced by genotype, protocol, skill.

\* Components: Sterile Work Area/Hood (Laminar Flow), Autoclave, Incubator, Microscope (Dissecting), Racks for Culture Vessels, Culture Vessels, pH meter, analytical balance, glassware, sterilizable tools (scalpels, forceps), Bunsen burner/bead sterilizer, refrigerators/freezers.

\* Consumables: Specialized media (pH 5.7-5.8), PGRs, sterile consumables, agar, hormones, cryoprotectants, enzymes.

\* Challenges: Contamination, Somaclonal variation, Acclimatization failure, Genotype specificity, Vitrification/Hyperhydricity (due to media imbalance, old/unvented vessels).

\* MVP Status / Estimated Game Version: Likely Post-MVP.

\* Notes: Part of "Advanced Propagation (Tissue Culture & Micropropagation)" skill node.

\* Lab Furniture: Specialized Benches (Stainless/Chemical Resistant), Storage Cabinets (Chemical/Flammable), Lab Sinks.

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP.

\* Notes: Supports advanced research/breeding equipment. Research Lab facility is Future (Post-MVP).

\* Cryopreservation Unit (Visual): For long-term genetic archiving using LN₂.

\* Components: Freezers, LN₂ tanks, straws/vials.

\* MVP Status / Estimated Game Version: Likely Post-MVP.

\* Notes: Very high-tier/specialized, linked to deferred "Advanced Genetics".

\* Advanced Genetic Modification Equipment (CRISPR-like System - Visual): For direct, high-risk/high-reward genetic manipulation (e.g., targeting THCAS, CsTPS genes). Requires specialized lab, expertise, and significant research.

\* Components: Electroporator/Gene Gun.

\* Challenges: Off-target effects, regeneration from transformed tissue.

\* MVP Status / Estimated Game Version: Post-MVP. Potential future expansion.

\* Bioinformatics Tools/Software (UI/Abstracted System): For analyzing sequencing data (QC, alignment, variant calling), GWAS, Genomic Selection, marker identification, pangenome analysis, functional annotation.

\* Examples (Conceptual): Abstracted versions of GATK, PLINK, R packages (rrBLUP), TASSEL.

\* Data Inputs: High-density genotyping data (GBS, WGS), phenotype data, environmental data.

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. Tied to advanced genetic analysis and breeding programs. Requires significant data and computational resources (abstracted).

\*\*Consumable Resources (Abstract/UI Representation)\*\*

Purpose: Track/manage consumed resources (UI/Inventory). May have visual models for bulk storage (pallets, tanks). Metered costs and consumption dashboards.

Assets (UI Icons, bulk storage models/containers possible):

\* Water: Supply (Tap, RO, Treated). Storage (Tanks, Reservoirs).

\* Quality varies, impacting plants; may require filtration/disinfection.

\* MVP Status / Estimated Game Version: MVP. Consumable resource. UI representation is MVP.

\* Power: Supply (Grid, Generator Fuel, Battery Charge). Consumption meter.

\* MVP Status / Estimated Game Version: MVP. Abstracted utility cost/resource.

\* Notes: UI representation (consumption meter) is MVP. Generator Fuel/Battery Charge are linked to respective equipment (Late-Game MVP / Post-MVP).

\* Nutrients: Packaged Fertilizers (various NPK ratios, macro/micro elements), Mixed Solution (Reservoir).

\* MVP Status / Estimated Game Version: MVP. Consumable resource.

\* Notes: UI/Inventory representation is MVP.

\* CO2: CO2 Tanks (Visual), CO2 Gas (UI from tanks or generators).

\* MVP Status / Estimated Game Version: MVP. Consumable resource for CO2 systems.

\* Notes: Visual tanks and UI representation are MVP.

\* Building Materials: Walls, Floors, Pipes, Wires, Ducting (UI, pallet/stack models possible).

\* MVP Status / Estimated Game Version: MVP. Consumable resource, needed for construction. UI representation is MVP.

\* Seeds/Clones: Strain-specific Seeds (Visual), Clones (Propagation from mother plants).

\* Acquisition via vendors, events, or in-house cloning.

\* MVP Status / Estimated Game Version: MVP. Essential consumables for cultivation.

\* Notes: Visual representation and UI inventory are MVP. Acquisition costs are MVP.

\* Finances: In-game Currency (UI). Ledger for income/expenses.

\* MVP Status / Estimated Game Version: MVP. Core to the economy system. UI representation is MVP.

\* Packaging Materials: Cans (Nitrogen-sealed), Jars, Bags for flower; Containers for concentrates. Labels.

\* MVP Status / Estimated Game Version: MVP for basic jars/bags. Cans are higher-tier/Post-MVP if linked to specific sealing equipment. \*\*`cite\_source: CannaCribs EP6 Rare Dankness` showed nitrogen-sealed cans and specific packaging machines.\*\*

--- END OF FILE Asset List 1.4.1 ---

Okay, I've analyzed the CannaCribs video featuring the Canndescent facility and cross-referenced it with the "Asset List 1.4" and the "Briefing Document."

Here is the updated "Asset List 1.4" for Project Chimera. I've integrated findings from the video, adding new items, specifics (like brands where visible and relevant), and notes regarding MVP status or video observations. Additions and significant modifications based on the video are typically highlighted with a comment or integrated into the description.

--- START OF UPDATED FILE Asset List 1.4 ---

﻿Project Chimera: Customized, Comprehensive Asset List v1.4

Core Vision: Modern, High-Tech, Clinical/Scientific, Aspirational/Professional aesthetic; player-driven "Relaxed & Cozy" variations.

Detail paramount: (Satisfactory, Farming Sim benchmarks for equipment) for deep simulation. The simulation aims for a granular, scientifically grounded foundation.

Source Prioritization:

1. Core Docs (mechanics, scope, style).

2. Relevant Docs (cannabis science, cultivation, pests, water, nutrients, breeding, equipment for realism/complexity). This includes Cannabis sativa L. biology, cultivation, genetics, and industry practices.

3. General Knowledge (bridge gaps).

Gameplay Loops Supported: Build, Cultivate, Breed, Process, Analyze, Optimize.

Key Customizations:

\* Expanded Utility Systems (Plumbing, HVAC, Electrical) with detailed, interconnected networks where sizing and material impact performance.

\* Detailed Plant Assets (dynamic, procedural, GxE-tied), reflecting phenotypic plasticity.

\* Lab/Research Equipment (advanced breeding/analysis) supporting high-tier breeding, genetic research, and detailed chemical profiling.

\* UI/Data Viz as crucial assets for presenting complex simulation data.

Specific environmental control, nutrient management, IPM, post-harvest details: These systems will incorporate specific parameters for temperature, humidity, CO2, airflow, light, optimal nutrient ranges, and pest/disease resistance.

Scalability: Residential vs. Warehouse/Industrial, potentially expanding to Greenhouses, Vertical Farms, Research Labs, and Outdoor Fields.

Item List:

\*\*Structural & Architectural Elements\*\*

Purpose: Define grow spaces, support equipment, manage environment (materials affecting insulation, cleanliness, etc.). Layout and zoning will facilitate clean flow principles.

Variations:

\* Interior: Drywall, Concrete, Insulated Panel. Materials should be non-porous, smooth, durable, non-absorbent, and chemical-resistant for sanitation. (Video shows clean, white, likely non-porous walls in cultivation areas).

\* Exterior: Siding, Brick, Metal (Map specific). (Video shows a modern industrial exterior for Canndescent).

\* Industrial: Pre-fab, Heavy-duty.

Material properties: Cost, Appearance, Insulation (R-value for heat transfer management), light/air barrier (for Environmental Control Sim), Cleanliness (materials influence ease of cleaning). Coving at wall-floor junctions is recommended.

Assets:

\* Walls: Sections/panels (various materials).

\* MVP Status / Estimated Game Version: MVP. Required for initial Residential House map and basic Warehouse build-out.

\* Material properties related to Environmental Control Sim (Insulation - R-value) are relevant for MVP. Materials for future exterior/map-specific themes would be Post-MVP.

\* Floors: Sections (Concrete, Wood, Grate - with load ratings). Non-porous materials preferred. (Video shows sealed concrete floors).

\* Drains: Standard, Trench (with varying capacity).

\* MVP Status / Estimated Game Version: MVP. Required for initial facility construction.

\* Roofs/Ceilings: Sections (Drywall, Suspended Grid, Concrete). High ceilings can cause thermal stratification. (Video shows industrial ceilings, some with reflective material or white paint).

\* Suspended Tiles: (acoustic, cleanroom).

\* Open Rafters/Trusses: (Wood, Metal). These can influence large-scale microclimate patterns.

\* MVP Status / Estimated Game Version: MVP. Required for initial facility construction.

\* Doors: Various types (Standard, Industrial Roller, Air Lock). Air locks minimize contaminant entry. (Video shows standard doors, roll-up doors for larger access).

\* MVP Status / Estimated Game Version: MVP.

\* Required for facility construction.

\* Windows: Various types (Standard, Greenhouse, Industrial). Can be blocked out in grow rooms. (Video shows limited windows in grow areas, more in office/lab spaces).

\* MVP Status / Estimated Game Version: MVP.

\* Standard windows for Residential/Warehouse. Greenhouse-specific windows (e.g., for specific light transmission) are Future (Post-MVP).

\* Stairs/Ladders/Catwalks: For vertical access. Relevant for multi-story/vertical facilities.

\* MVP Status / Estimated Game Version: Likely MVP for multi-story/vertical layout in Warehouse or other facilities.

\* Catwalks relevant for industrial scale and vertical farms.

\* Support Pillars/Beams: (Concrete, Steel). For structural support in large spaces.

\* MVP Status / Estimated Game Version: MVP for Warehouse map shell.

\* Containment Structures (Tents): Pre-fab grow tents, sealable for environmental control.

\* MVP Status / Estimated Game Version: Likely MVP for early-game or smaller residential setups.

\*\*Cultivation & Plant Care Tools\*\*

Purpose: Plant maintenance (pruning, training), scouting, applying treatments.

Variations: Size, Material (affects durability, cleanliness, rust potential), Quality (Basic, High-quality), Sharpness/Condition (affects cut cleanliness, plant stress, disease risk). Tools require cleaning/sterilization.

Assets:

\* Pruning & Cutting:

\* Types: Bypass Pruners (Std, HD), Snips/Scissors (Micro-Tip, Curved/Straight e.g., Fiskars, Chikamasa as seen in video), Scalpels, Loppers, Hand Saw. Large Hedge Trimmers (potentially with pole extensions).

\* Properties: Cutting Area/Blade Length, Weight (affects fatigue).

\* MVP Status / Estimated Game Version: MVP.

\* Basic plant training (topping, manual LST) is part of core MVP cultivation. These tools are necessary for that. Clean cuts promote faster healing.

\* Spraying & Application: Hand Spray Bottles, Pump Sprayers (Gal, Backpack), Handheld Dusters, Soil Drench Applicators. (Video shows ozonated water spray bottles for sanitation).

\* Industrial: Motorized spray carts, Foggers, Integrated Spraying Systems (automated, fixed nozzles).

\* MVP Status / Estimated Game Version: MVP for basic pest/disease treatment (manual application) and sanitation.

\* Industrial versions likely Late-Game MVP or Post-MVP, linked to scale and potential automation skill nodes. Automated spraying carries risks if misconfigured.

\* Scouting & Monitoring:

\* Traps: Sticky Traps (Yellow, Blue - Cards, Rolls) for monitoring pest presence, location, and stage.

\* Visual Inspection Tools: Magnifying Loupes, Handheld/Benchtop Digital/Standard Microscopes for detailed inspection of pests, pathogens, trichomes.

\* Sampling Tools: Soil/Medium Sample Probes/Corers, Leaf Sample Bags/Vials.

\* Simulated Meters (Visual): Simulated Chlorophyll Meter. (See Data Collection for more handheld meters)

\* MVP Status / Estimated Game Version: MVP for basic plant health monitoring and pest/disease identification.

\* Microscopes and probes are explicitly mentioned for manual data acquisition loop and unlocked via Science skill tree nodes. Effective use requires skill.

\* Plant Support Tools:

\* Types: Trellis netting (Video confirms widespread use of netting), stakes, tie wire.

\* Functionality: Prevents lodging, supports heavy buds, manages canopy.

\* MVP Status / Estimated Game Version: MVP, especially for supporting larger plants or specific training techniques (e.g., ScrOG).

\*\*Nutrient & Irrigation Equipment\*\*

Purpose: Store, mix, deliver nutrients and water to plants. Systems will manage pH, EC/PPM, temperature, and Dissolved Oxygen (DO) of nutrient solutions.

Variations:

\* Scale (Manual, Small Reservoir, Large Industrial).

\* Control (Manual, Timed, Automated sensor-driven).

\* Type (Drip, Ebb/Flow, DWC, Aeroponic, etc.).

Assets:

\* Watering Cans/Hoses: Basic manual irrigation.

\* Properties: Capacity/Flow Rate.

\* MVP Status / Estimated Game Version: MVP. Basic irrigation methods are essential for core cultivation.

\* Reservoirs/Tanks: Various sizes (Plastic, Poly, Stainless Steel - food-grade). Dynamically reflect fill levels. Must be kept clean.

\* MVP Status / Estimated Game Version: MVP.

\* Needed for manual/timed watering systems. Larger/Industrial sizes likely Late-Game MVP or Post-MVP.

\* Pumps: Water Pumps (Submersible, Inline - various flow rates/head pressure), Air Pumps (for DWC).

\* Properties: Power Requirement, Durability/Maintenance (can fail).

\* MVP Status / Estimated Game Version: MVP. Needed for simple reservoir systems. Various sizes/capacities support scalability.

\* Redundant pumps or advanced manifold systems could be later game/Post-MVP.

\* Plumbing: Pipes (PVC, PEX, Drip Line - Video shows extensive use of drip lines with FloraFlex systems), Fittings, Valves (manual, solenoid), Filters.

\* Properties: Material (impacts cost, durability, efficiency, appearance), Sizing (diameters impact flow, pressure drop), Connectivity (logical connections, visual feedback), Routing (3D, grid-snap/free-form, segmented components for curves). Abstracted pressure loss simulation.

\* MVP Status / Estimated Game Version: MVP. Essential for building irrigation systems, part of detailed construction.

\* Sizes/materials impact performance. Manual routing is MVP. Filters require cleaning/replacement.

\* Nutrient Mixing Stations/Vats: For preparing nutrient solutions. Requires clean tanks, measuring tools, pumps/stirrers, calibrated pH/EC meters.

\* MVP Status / Estimated Game Version: MVP.

\* Required for manual nutrient mixing. Scale/automation increases later. Cleaning is critical.

\* Automated Dosing/Fertigation Systems: Links sensors (EC/pH) to pumps/valves for automated mixing and delivery based on setpoints and schedules. Offers higher consistency. (Video mentions Agrowtek master controller for irrigation, implying some level of automation is MVP or early unlock).

\* MVP Status / Estimated Game Version: Basic timer-based fertigation MVP. Fully sensor-driven automated dosing systems are likely Late-Game MVP / Post-MVP.

\* Requires advanced controllers.

\* Growing Mediums/Substrates: Bags/bulk (Soil, Coco Coir, Rockwool cubes/slabs e.g., Grodan Gro-Blocks seen in video, Hydroton, Peat Moss). Living Soil with microbial ecosystems.

\* Properties: Water retention, aeration, nutrient availability, pH, EC, bulk density, porosity, mineral content, organic matter. These affect root health and nutrient dynamics.

\* MVP Status / Estimated Game Version: MVP. Essential consumable for cultivation. UI/Inventory representation is MVP.

\* Nutrient Containers: Bottles/Bags of base nutrients (N, P, K), macro- & micro-nutrients, additives. (Video mentions HGV Nutrients - 2-part water soluble).

\* Properties: NPK Ratio, specific concentrations. SDS information for handling/storage.

\* MVP Status / Estimated Game Version: MVP.

\* Consumable, part of manual nutrient management. UI/Inventory representation is MVP. Nutrients can interact or have incompatibilities.

\*\*Environmental Control Equipment\*\*

Purpose: Manage temperature, humidity, CO2, airflow, light cycles. Essential for optimizing plant growth and preventing issues.

Variations: Size, Capacity, Efficiency, Control (Manual, Timed, Sensor-Controlled via simple or advanced/integrated controllers). Equipment projects a "radius of effect" or "cone of influence."

Assets:

\* HVAC Systems: Air Conditioners (Window, Split, Large Industrial Units - video shows large rooftop and indoor units), Heaters (Electric, Gas), Dehumidifiers (e.g., Quest 225 Dual Overhead Dehumidifiers seen in video), Humidifiers (e.g., Aquafog Turbo XE foggers seen in video).

\* Properties: Sizing/Capacity (must match facility heat load), Efficiency (e.g., SEER, affects power/fuel use), Power/Fuel Requirement, Maintenance requirement.

\* MVP Status / Estimated Game Version: MVP.

\* Basic HVAC for environmental control (temp, humidity) is a core MVP feature. Various types/capacities needed for different room sizes/needs.

\* Unlocked via Environment skill tree nodes like "Basic Environmental Control".

\* Fans: Circulation Fans (Clip, Standing, Wall - e.g., Hurricane fans seen in video), Exhaust Fans, Inline Duct Fans.

\* Properties: Airflow Rate (CFM, affects air exchange), Power Requirement, Control (manual, timed, sensor, speed controller).

\* MVP Status / Estimated Game Version: MVP. Essential for airflow management, part of MVP environmental control.

\* Part of abstracted airflow physics, removes heat/humidity.

\* Ducting: Flexible, Rigid (various diameters, large fabric/metal ducts seen in video), Fittings.

\* Properties: Material (impacts cost, durability, efficiency), Sizing (impacts airflow, pressure drop).

\* MVP Status / Estimated Game Version: MVP. Needed for HVAC and exhaust systems. Part of detailed construction.

\* Manual routing is MVP.

\* CO2 Systems: CO2 Tanks (Visual assets, large tanks seen in video), Regulators, Controllers (e.g., Gavita Master Controller for CO2), Generators (produce heat/moisture).

\* Functionality: Increases CO2 for enhanced photosynthesis (optimal 800-1500 ppm in flowering).

\* MVP Status / Estimated Game Version: MVP for basic CO2 management, though likely manual control initially.

\* CO2 tanks are visual assets. Controllers for automation might be later MVP/Post-MVP depending on complexity level. Requires CO2 consumable.

\* Grow Lights: Various types (HID - MH/HPS with Ballasts/Hoods e.g., Gavita Pro 1000e DE HPS seen in flower rooms; LED Panels - various wattages/spectrum, potentially adjustable; Fluorescent - T5/CFL e.g., Quantum T5 6500K seen in veg/mother rooms; LEC e.g., Sun System LEC 630W with 2x 315W 4200K bulbs seen in veg rooms).

\* Light Movers/Adjustable Height Systems: (Implied for optimizing coverage/intensity).

\* Properties: Wattage (affects intensity, heat output), Spectrum (Blue for veg, Red for flower, Full-spectrum), Light Output (PAR/PPFD, DLI), Fixture Efficiency, Heat Output (significant), Coverage Area. Reflective hoods/materials enhance efficiency.

\* MVP Status / Estimated Game Version: MVP. Essential cultivation equipment. Various types/tiers for progression.

\* Light Timers/Controllers: Mechanical, Digital. Can control multiple lamps. (e.g., Titan timers seen for LECs, Gavita Master Controllers for HPS).

\* Properties: Power Handling Capacity.

\* MVP Status / Estimated Game Version: MVP. Basic automation (light timers for photoperiod: 18-24h veg, 12/12h flower) is a core MVP feature.

\* Sensor-controlled or advanced automation likely Late-Game MVP / Post-MVP.

\* Thermostats, Humidistats, Environmental Controllers: Simple (on/off) to Advanced/Integrated (multiple parameters, IF-THEN logic, setpoints/ranges - e.g., Agrowtek, Gavita Master Controllers, Growlink software interface).

\* MVP Status / Estimated Game Version: MVP. Basic automation (simple thermostat/humidistat) is a core MVP feature.

\* More advanced or integrated controllers likely unlock later.

\* Sensors:

\* Types: Environmental (Air Temp, RH, CO2, Light - PAR/PPFD), Leaf Surface Temp (for VPD), Root Zone/Substrate (Moisture - VWC%, EC, pH, Temperature - e.g., Grodan GroSens sensors). Advanced/Specialized (Inline Water sensors, Spore Traps - Post-MVP).

\* Tiers: Basic (manual check), Intermediate (networked, simple controllers), Advanced (accurate, multi-functional), Research-grade (calibration).

\* Properties: Accuracy/Precision (varies by tier, requires calibration), Power Requirement, Data Output (numerical, logs).

\* MVP Status / Estimated Game Version: MVP. Essential for real-time data dashboards and automated control.

\* Player-placed sensors are core to data collection. Various tiers (basic manual vs. integrated automated).

\* Air Filters & Purification: Intake filters, Carbon filters (for odor control). MERV-rated filters. Air Purification Systems (e.g., AgriAir, ProGuard units seen in video for pathogen/odor control).

\* MVP Status / Estimated Game Version: Likely MVP.

\* Essential for managing air quality and odor control. Part of ducting systems. Requires replacement/cleaning.

\*\*Utility Systems & Equipment\*\*

Purpose: Deliver power and connect systems. Detailed, interconnected 3D routable networks with performance impacted by sizing/materials. Utility View/"X-Ray" mode for visualization.

Variations: Scale, Capacity, Efficiency, Type (Standard, Industrial).

Assets:

\* Electrical Wiring: Various gauges (sizing impacts resistance, voltage drop, cost). Conductors (copper, aluminum), Insulators.

\* MVP Status / Estimated Game Version: MVP. Part of detailed construction, abstracted utility connections.

\* Manual routing is MVP. Sizes/gauges impact performance. Adherence to safety standards.

\* Circuit Breakers / Fuse Boxes / Panels: Essential for electrical system management, load balancing, overload protection. Rated capacity (Amps молитвы), not to be loaded beyond 80%.

\* MVP Status / Estimated Game Version: MVP.

\* Generators (Diesel/Gas): Provides backup or primary power. CoGen systems possible.

\* Properties: Power Output (Watts), Fuel Efficiency, Ramp-up time, Heat generation. Tiers from basic (manual start) to advanced (auto transfer).

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. Described as backup power systems.

\* Needed for scaling operations or risk mitigation. Requires fuel.

\* Battery Banks / UPS (Uninterruptible Power Supply): Short-term power buffer or main source.

\* Properties: Capacity (kWh), Charge/Discharge Rate.

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. Described as short-term buffer.

\* Aligns with advanced risk management.

\* Solar Panel Systems: (Video shows extensive solar panel arrays on Canndescent facility roof and carports). For supplementing or primary power.

\* Components: Solar Panels, Inverters, Mounting Racks.

\* MVP Status / Estimated Game Version: Likely Late-Game / Post-MVP.

\* Main Power Grid Connection Point (Abstracted): Represents stable power draw from external utility. Capacity based on service contract/infrastructure.

\* MVP Status / Estimated Game Version: MVP. Represents the abstracted power draw. Metered cost. Risk of external disruption.

\* Water Supply Connection Point (Abstracted - Tap, RO, Treated): Represents abstracted water source. (Video mentions ozonated water for sanitation, implying on-site water treatment capabilities like an Ozone Generator - e.g., Carlson & Associates unit seen).

\* Types: Tap (can have contaminants), RO (requires Cal-Mag/pH management), Treated (e.g., Ozonated). Quality impacts plants.

\* MVP Status / Estimated Game Version: MVP. Metered cost. RO/Treated may be later upgrades. Ozone Generator likely Mid-Late MVP linked to sanitation.

\*\*Pots, Containers, & Growing Surfaces\*\*

Purpose: Hold plants and growing medium.

Variations: Size (affects root space, plant size), Material (Plastic, Fabric, Ceramic - affects cost, durability, aeration), Type (Standard Pot, Grow Bag, Tray, Slab).

Assets:

\* Pots: Various sizes (Small, Medium, Large). (Video shows FloraFlex pots being used).

\* MVP Status / Estimated Game Version: MVP. Essential cultivation equipment. Various sizes support plant lifecycle stages (transplanting).

\* Fabric Grow Bags: Offers better aeration than plastic.

\* MVP Status / Estimated Game Version: MVP. As a variation of container type.

\* Trays / Flats (Seedling, Propagation): Shallow containers for starting seeds/clones. Size choice influenced by space, labor, timing.

\* MVP Status / Estimated Game Version: MVP. Used for starting seeds/clones.

\* Rockwool Cubes / Slabs: Inert growing medium/container type, often for hydro/coco. (Video confirms Grodan Gro-Blocks).

\* MVP Status / Estimated Game Version: MVP.

\* As a growing medium/container type.

\* Hydroponic/Aeroponic Systems (Basic Ebb/Flow, DWC buckets, NFT, Aeroponics): Systems for growing without soil, requiring precise control of nutrient solution chemistry (pH, EC, DO, temp) and environmental parameters. Lacks natural buffering of soil. (Video shows usage of FloraFlex caps and systems which are often used with rockwool/coco in a drain-to-waste setup, a type of hydroponics).

\* MVP Status / Estimated Game Version: Likely MVP for basic hydroponic options (Ebb/Flow, DWC buckets, Drain-to-Waste with Rockwool/Coco).

\* Supports different cultivation methods. More complex systems (e.g., aeroponic) might be later MVP/Post-MVP.

\* Growing Benches / Tables (Flood tables, Wire racks): Provide surfaces for organizing plants. Various types support different systems (e.g., flood tables for Ebb/Flow). (Video shows rolling benches and tiered racks).

\* MVP Status / Estimated Game Version: MVP.

\*\*Pest & Disease Management\*\*

Purpose: Monitor, identify, and treat plant issues. Integrated with sanitation and environmental controls. (Video emphasizes IPM, no pesticides, beneficials from day one).

Assets:

\* Scouting Tools:

\* Sticky Traps: (Yellow, Blue - Cards, Rolls).

\* MVP Status / Estimated Game Version: MVP. For basic pest monitoring.

\* Handheld Magnifying Loupes:

\* MVP Status / Estimated Game Version: MVP. For close visual inspection/scouting.

\* Microscopes (Handheld, Benchtop): For detailed pest/pathogen/trichome inspection.

\* MVP Status / Estimated Game Version: MVP. Unlocked via Science skill tree.

\* Application Tools:

\* Hand Spray Bottles, Pump Sprayers (Gal, Backpack): (Video shows spray bottles with ozonated water for sanitation).

\* MVP Status / Estimated Game Version: MVP.

\* For manual treatment application (e.g., approved fungicides/pesticides/biologicals, sanitation sprays).

\* (Simulated) Pesticides/Fungicides/Biologicals: Represented as Consumables. Biologicals need specific environmental conditions. (Focus on biologicals for MVP based on video's IPM emphasis).

\* MVP Status / Estimated Game Version: MVP. Needed for manual treatment. UI/Inventory representation.

\* In-game "Plant Problems Guide" UI/Asset: Essential tool for diagnostics, linking symptoms to causes/solutions.

\* MVP Status / Estimated Game Version: MVP.

\* Sanitation Equipment:

\* Shoe Cover Dispenser (e.g., Shoe Inn automated dispenser seen in video).

\* Shoe Covers (Consumable).

\* Foot Baths (at entry points to grow areas).

\* Lab Coats, Hair Nets, Gloves (Consumables or player skins).

\* Ozonated Water Sprayers/Systems (e.g., Carlson & Associates unit for tool/surface sanitation).

\* MVP Status / Estimated Game Version: Basic sanitation (gloves, cleaning tools) MVP. Shoe covers/dispensers likely MVP for warehouse scale. Foot baths and ozonated water systems might be Mid-MVP.

\*\*Harvesting & Processing Equipment\*\*

Purpose: Harvest, trim, dry, cure for final product quality. Workflow optimization and minimizing degradation are key.

Variations: Size, Capacity, Automation (Manual to Automated Industrial), Material (Food-Grade).

Assets:

\* Harvesting Tools: Large Trimming Shears, HD Loppers, Hand Saw, Hedge Trimmers (potential pole extensions, various blade lengths). Collection Totes/Bins (Food-grade). Tarps. Sharp, sanitized tools essential.

\* MVP Status / Estimated Game Version: MVP. Needed for manual harvesting.

\* Trimming Tools: Trim Scissors (Micro-tip, types e.g., Fiskars, Chikamasa). Trim Bins/Trays (with kief screens to collect trichomes). Isopropyl Alcohol/Wipes (cleaning), Rags. Scissor Fix (plant-based scissor cleaner, as seen in video). Electrically operated, manually controlled hand trimming assist tools.

\* Ergonomic Trimming Stations: (Stand-up desks, good lighting, ergonomic chairs as seen in video).

\* MVP Status / Estimated Game Version: MVP. Needed for manual trimming. Cleaning supplies for hygiene/quality. Ergonomic stations enhance "Aspirational/Professional" and "Cozy" (for player comfort).

\* Bowl Trimmers (Manual, Electric): Semi-automated trimming, can be adjusted for aggressiveness (speed vs. quality).

\* MVP Status / Estimated Game Version: Likely Mid-Late MVP / Post-MVP.

\* Provides some automation beyond hand trimming, likely unlocked via Harvest skill tree or equipment research.

\* Automated Trimming Machines (Sizes/throughputs): Fully automated, adjustable aggressiveness, can trim wet or dry.

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP.

\* High-tier equipment, part of Advanced Automation.

\* Bud Sorters (e.g., EZ Trim Bud Sorter seen in video): For sizing buds post-trim.

\* MVP Status / Estimated Game Version: Likely Mid-Late MVP / Post-MVP, tied to quality control and packaging efficiency at scale.

\* Drying Racks / Clotheslines & Hangers: Manual hanging/rack in dedicated, environmentally controlled space (temp, humidity, airflow crucial for quality and preventing issues like terpene loss or mold - video confirms whole plant hang dry).

\* MVP Status / Estimated Game Version: MVP. Needed for manual drying. Slow, controlled drying is key.

\* Curing Containers (Jars, Buckets - Glass, Plastic, Food-Grade Bins as seen in video, e.g., CValt containers). For manual curing with "burping" in a stable cool, dark environment (target RH 58-62%). Automated curing systems (smart containers, climate-controlled rooms) for later.

\* Humidity Control Packs (e.g., Integra Boost 55% or 62% RH packs seen in video, used in final packaging and potentially curing).

\* MVP Status / Estimated Game Version: MVP. Needed for manual curing. Humidity packs MVP for quality control.

\* Weighing & Measuring: Digital Pocket Scales (Precision), Digital Bench Scales (Larger capacity, Ohaus scales seen in video). Industrial (Platform, Floor scales). Multihead Weigher (e.g., Multiweigh machine seen for packaging 1/8ths).

\* Calibration Weights: Essential for ensuring accuracy.

\* MVP Status / Estimated Game Version: MVP for basic scales. Multihead weigher likely Late-Game MVP / Post-MVP for large scale packaging automation. Requires calibration.

\* Transporting Equipment: Baskets, hand-drawn garden carts, small motorized transport, portable conveyor belts for moving material, plants, tools.

\* MVP Status / Estimated Game Version: Likely Mid-Late MVP, relevant for larger scale.

\* Cold Storage: Refrigerators, freezers for keeping harvested material cool, especially for fresh-frozen or high terpene retention.

\* MVP Status / Estimated Game Version: Likely Post-MVP, tied to specific processing paths.

\* Extraction/Concentrate Equipment:

\* CO2 Extraction System (e.g., Green Mill SFE Pro seen in video).

\* Distillation Equipment (e.g., B/R Spinning Band distillation unit seen in video).

\* Wiped Film Evaporator (Mentioned as an alternative/complement to spinning band).

\* MVP Status / Estimated Game Version: Post-MVP as per briefing and existing list. Video confirms these are advanced, high-tier systems. (Will note these specific types under the existing Post-MVP entry).

\* Pre-Roll Machines (e.g., STM Canna RocketBox seen in video): For automated or semi-automated pre-roll production.

\* MVP Status / Estimated Game Version: Likely Mid-Late MVP / Post-MVP, tied to product diversification.

\* Vape Cartridge Filling Machines (e.g., Convectium 710 Shark seen in video): For filling vape cartridges with oil.

\* Custom Jigs for Cartridges: (As mentioned for the 710 Shark).

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP, as it's part of advanced product formulation.

\*\*Facility Furniture & Fixtures\*\*

Purpose: Workspace, storage, safety, general utility, supporting cleanliness and professional aesthetics.

Assets:

\* Workbenches: (Sizes, materials - stainless steel common in labs/processing).

\* HD Shelving: (Metal, Wire - Video shows extensive use for storage and drying racks). Stackable, wall-mounted options.

\* Storage Cabinets: (Metal, Plastic, Lockable). Specialized for Chemicals/Flammables.

\* Rolling Utility Carts.

\* Seating: (Chairs, Stools, Folding Chairs, Ergonomic chairs for trimmers).

\* MVP Status / Estimated Game Version: MVP. Provides functional storage and workspace. Supports the Cleanliness aesthetic.

\* Sinks: Industrial Sink/Wash Basin (Stainless Steel). Faucet Fixtures.

\* MVP Status / Estimated Game Version: MVP. Essential for hygiene, cleaning tools/equipment. Part of the general utility.

\* Safety: Eye Wash Station (Wall, Pedestal). Emergency Shower (Industrial). Fire Extinguishers. First Aid Kits.

\* MVP Status / Estimated Game Version: Likely MVP. Essential safety equipment.

\* General: Wall Clocks. Trash Cans/Waste Bins (Industrial rolling, upgradable capacity). Recycling Bins. Mop & Bucket. Broom & Dustpan. Wet Floor Signs. Floor Mats/Anti-Fatigue. Lockers.

\* MVP Status / Estimated Game Version: MVP. Provides visual detail, supports waste management, enhances aesthetics. Players transport waste to bins.

\*\*Map Specific Assets\*\*

Purpose: Define build environment, establish scale.

Assets:

\* Residential House: Standard residential elements (exterior, interior, doors/windows). Smaller scale assets (fixtures, utility connections). Base "shell". Pre-defined layout, potential for initial wear/tear.

\* MVP Status / Estimated Game Version: MVP. Initial map environment.

\* Warehouse: Large open concrete structure (floor, walls, roof). Support pillars/beams. Industrial doors/windows. Base "shell" to build within. (Video shows Canndescent's large warehouse-style facility).

\* MVP Status / Estimated Game Version: MVP. Accessible after Residential map. Represents next scale.

\* (Future: Greenhouse - glass/polycarbonate, vents, utilizes natural light, requires ventilation/temp control; Research Lab - sterile materials, lab benches for advanced techniques like Tissue Culture; Outdoor Field - landscape, fencing, subject to weather/pest risks; Vertical Farm - multi-tiered racking, high density, vertical logistics; Subterranean Lab; Abandoned Research Outpost; Geothermal Greenhouse Complex)

\* MVP Status / Estimated Game Version: Future (Post-MVP). Explicitly listed as potential future facility types.

\*\*Decorative & "Cozy" Items\*\*

Purpose: Player customization, "Cozy" aesthetic. (Video shows some branded posters/art in Canndescent's facility).

Assets: Posters, art, rugs, small furniture (chairs, tables), non-cannabis plants, decorative lighting, personal items, paint/texture options (walls/floors - not changing core material properties in MVP).

\* MVP Status / Estimated Game Version: MVP.

\* Part of player expression. Unlockable items can deliver lore.

\*\*Plant Assets (Core for Procedural System)\*\*

Purpose: Central visual output, dynamic GxE reflection (Phenotypic Plasticity). (Video showcases various stages of healthy plant growth).

Key Requirements (Procedural System):

\* Base 3D Models: HQ, detailed base meshes/textures for ~5-10 landrace-inspired foundational strains.

\* Variations (Morphology & Growth Stages):

\* Seedling (single leaflet progressing to 3, 5)

\* Vegetative (Early, Mid, Late - rapid growth, building root system, stems, foliage)

\* Flowering (Early, Mid, Late - inflorescence development, bud thickening)

\* Maturation (trichomes mature: clear to milky to amber)

\* Harvested (Whole plant, branches)

\* Dried (Buds)

\* Botanical Features to Represent:

\* Plant Height (e.g., 0.2m to >3m, influenced by genetics, training, environment)

\* Stem Structure (erect, furrows, branching patterns, diameter)

\* Branching Pattern (apical dominant, lateral spread, sativa-lanky vs. indica-compact)

\* Leaf Morphology (compound, leaflet number 3-13+, shape - lanceolate etc., serrated margins, size - broad vs. slender, angle/droop indicating hydration)

\* Leaf Arrangement (opposite to alternate)

\* Bud/Flower Structure (shape - conical, spear, foxtail; density - airy vs. compact; leaf-to-calyx ratio)

\* Pistil Color (mature: orange-red, pink-purple, brown)

\* Trichome Density (low, medium, high - "frostiness")

\* Trichome Appearance (color transition: clear -> milky -> amber)

\* Potential: Root System Viz (medium, water, nutrient response). Root systems differ for seed vs. cloned plants. Root restriction impacts growth.

\* MVP Status / Estimated Game Version: MVP.

\* Core to the cultivation simulation. Initial launch will have 5-10 foundational strains.

\* Root System Viz is listed as Potential.

\* Procedural Generation System (Software/Code Asset): Crucial system, AI-Assisted.

\* Inputs:

\* Abstracted Genetics Data (defining heritable traits from Section 2.2 of Parameter List e.g., yield potential, flowering time, chemotype - THC/CBD/CBG ratios, terpene profile, pest/disease resistance levels, etc.)

\* Environmental Parameters (light intensity/spectrum, temperature, humidity/VPD, CO2 levels, nutrient availability/deficiency/toxicity, water stress, etc.)

\* Cultivation Actions (pruning, training techniques like topping/LST)

\* Algorithms: Generate plant structure, morphology, and visual characteristics based on inputs.

\* MVP Status / Estimated Game Version: MVP.

\* Essential for dynamic GxE reflection and visual variability.

\* Dynamic Shader/Material Effects (MIDs, MPCs): Real-time GxE visualization.

\* Effects: Coloration (nutrient deficiencies, temp/light stress), Turgidity/Wilting (hydration status), Growth & Development rates, Trichome Appearance (density, color), Stress/Problem Symptoms (visual pests/diseases, leaf burn from nutrient toxicity), Training/Pruning Effects.

\* MVP Status / Estimated Game Version: MVP. Crucial visual feedback.

\* Directly tied to core MVP systems like Environmental Control, Nutrient Management, Plant Health, Basic Breeding.

\* Performance Optimization: LODs, HISMs/ISMs (plant components), optimized shaders.

\* MVP Status / Estimated Game Version: MVP.

\* Essential for performance with many plant instances. LODs are mandatory.

\*\*Data Collection & Lab Equipment\*\*

Purpose: Collect plant/env data, simulate lab analysis (genetic/chemical profile).

Variations: Tier (Handheld/Basic, Benchtop/Research, Industrial/Automated). Accuracy varies by tier, calibration is key.

Assets:

\* Handheld Meters (Visual): Portable tools for manual data acquisition in "Action Mode," data auto-logged.

\* Types: EC/PPM meter, pH meter, Temperature Probe (air, water, soil), Soil Moisture meter (e.g., Ohaus moisture analyzer for post-harvest, but handheld for substrate needed), Simulated Chlorophyll Content meter, PAR/PPFD meter, Infrared Thermometer (leaf surface temp), VPD Meter.

\* MVP Status / Estimated Game Version: MVP. Basic data collection tools.

\* Unlocked via Science skill tree.

\* Benchtop Meters/Analyzers (Visual): Lab-grade equipment for more accurate/detailed analysis. Requires sample preparation for some methods.

\* Types:

\* Lab-grade EC/pH meter.

\* Spectrophotometer (simulated use for basic analysis).

\* HPLC (High-Performance Liquid Chromatography) for cannabinoid quantification (THC, CBD, etc.).

\* GC-MS (Gas Chromatography-Mass Spectrometry) for terpene profiling, pesticide identification.

\* ICP (Inductively Coupled Plasma) assay for mineral content in tissue/substrate.

\* Elemental Analyzer for Total N/C.

\* NIR/MIR Spectroscopy for rapid, on-site detection/PAT.

\* Moisture Analyzer (e.g., Ohaus unit seen for checking flower moisture content post-drying).

\* Functionality: Simulated lab analysis for nutrient levels, cannabinoid/terpene profiles.

\* MVP Status / Estimated Game Version: Likely Mid-Late MVP / Post-MVP for advanced analyzers (HPLC, GC-MS, ICP etc.). Basic lab-grade EC/pH and Moisture Analyzer may be earlier/MVP.

\* More advanced tools tied to higher tiers of data analysis or specific research unlocks (Quantitative Analysis skill node). Outsourcing analysis is also an option initially.

\* Data Logging & Interface (Visual): Equipment representing systems for viewing and interacting with data. (Video shows extensive use of computers, large monitor dashboards e.g., Growlink interface).

\* Types: Laptop, Tablet, Desktop (Monitor, Keyboard, Mouse), Clipboard, Pens, Whiteboard.

\* Industrial: Server rack, large control displays.

\* Functionality: Interface for dashboards, logs, sensor/controller management, grow cycle comparison, lab analysis interface.

\* MVP Status / Estimated Game Version: MVP. Visual representation of UI/Data Viz.

\* Laptops/Tablets/Desktops are the interface. Industrial versions likely later. Secure digital DB for data storage.

\* Calibration Weights: For calibrating scales.

\* MVP Status / Estimated Game Version: MVP. Needed for calibration routine.

\* Simulated Lab Analysis Interface (UI): Manages sample submission (simulated time/cost), views reports (cannabinoid/terpene profiles, tissue nutrient, water quality). Allows comparison.

\* MVP Status / Estimated Game Version: Mid-Late MVP / Post-MVP. Tied to Quantitative Analysis skill node.

\*\*UI & Data Visualization Elements\*\*

Purpose: Present complex sim data for player decisions. CRITICAL gameplay "assets". (Video shows examples of Growlink dashboards).

Assets (UI Elements/Visuals):

\* Environmental Data Dashboards/Overlays: Real-time sensor readouts (Temp, RH, VPD [calculated from Temp, RH, Leaf Temp], CO2, PAR/PPFD). Customizable presets. Environmental heat maps.

\* MVP Status / Estimated Game Version: MVP. Core to MVP Environmental Control.

\* Graphs & Charts: Historical trends (Env, Nutrients, Growth stages, Water/Power/CO2 Consumption). Multi-variable plots.

\* MVP Status / Estimated Game Version: MVP. Essential for data analysis.

\* Plant Health/Status Indicators: Icons/bars on models (Health, Water [Leaf Water Potential], Nutrient Status). Detail view UI for specific issues (deficiencies, pests, diseases).

\* MVP Status / Estimated Game Version: MVP. Critical feedback.

\* Nutrient Management Interface: Mixing UI (visual tank, ingredients, steps). Readouts for nutrient solution (EC/PPM, pH, temp, DO). Nutrient composition details. Runoff/Substrate test results (EC, pH, VWC% - data from Grodan GroSens).

\* MVP Status / Estimated Game Version: MVP. Essential for manual nutrient management.

\* Genetic Data Display: Strain Name, Lineage (Pedigree Charts), Key Traits (Yield Potential, Flowering Time, Cannabinoid Profile - THC/CBD/CBG ratios, Terpene Profile, Pest/Disease Resistance, Stress Tolerances, Morphological traits like height, branching - Sliders, Bars, Values). Punnett Squares (Simulated for Mendelian traits).

\* Abstracted Genetic Marker/Allele display (linked to traits via simplified MAS/GS).

\* MVP Status / Estimated Game Version: MVP for core observable traits, lineage, simple inheritance.

\* Punnett Squares/Pedigree charts part of basic breeding.

\* Genetic Marker/Allele display tied to "(Optional Late Game) Genetic Marker Assisted Selection" skill node, suggesting Late-Game MVP or Post-MVP.

\* Simulated Lab Analysis Results: Cannabinoid/Terpene Profiles (charts, graphs, % lists from HPLC/GC-MS data), Simulated Tissue Nutrient Analysis (from ICP/Elemental Analyzer data), Simulated Water Quality Report.

\* MVP Status / Estimated Game Version: Likely Mid-Late MVP / Post-MVP.

\* Tied to Quantitative Analysis skill node and Simulated Lab Analysis Interface. Profiles needed for NPC contract quality specs, suggesting basic analysis is MVP.

\* Breeding Interface: Parent selection (based on desired traits, phenotypic/genotypic data), Crossing UI (manual pollination), Pheno-Hunting tools (growing populations to identify desirable individuals). Tracking generations (P, F1, F2).

\* MVP Status / Estimated Game Version: MVP. Essential for basic breeding loop.

\* Facility Management Overlays: Utility View ("X-Ray" for pipe/duct/wire networks, flow/pressure indicators). Zoning UI (designating areas by function). Resource inventory/consumption (Water, Power, CO2, Nutrients, Building Materials, Seeds/Clones).

\* MVP Status / Estimated Game Version: MVP. Utility View crucial for MVP. Resource inventory UI is MVP.

\* Operational & Financial Data: Budget, Costs (material, utility, labor, analysis), Revenue, Profit/Loss. Ledger for income/expenses.

\* MVP Status / Estimated Game Version: MVP. Essential for core economy.

\* Alerts & Notifications: Visual/audio cues (Env out-of-range, Pest, Disease like Root Rot, Equipment failure, Low consumables). Tiered alerts.

\* MVP Status / Estimated Game Version: MVP. Critical for player feedback.

\* Historical Logs & Notes Interface: Player observations and auto event logging (environmental shifts, cultivation actions, pest sightings, alerts).

\* MVP Status / Estimated Game Version: MVP.

\* Tutorial/Info Overlays: Explaining concepts (VPD, GxE, deficiencies, equipment operation, scientific principles).

\* MVP Status / Estimated Game Version: MVP. Essential for onboarding.

\*\*Advanced Breeding & Lab Equipment\*\*

Purpose: Support high-tier breeding (Tissue Culture, Genetic Modification), genetic research, pathogen eradication. Requires specialized lab spaces/Research Lab facility type. (Video mentions TC as a future consideration for Canndescent for cleaning genetics).

Variations: Tier (Research, Production).

Assets:

\* Tissue Culture Station: For sterile micropropagation, pathogen eradication (HLVd from meristems), genetic preservation, rapid cloning. Requires meticulous sterile technique, media prep, PGR understanding. Success influenced by genotype, protocol, skill.

\* Components: Sterile Work Area/Hood (Laminar Flow), Autoclave, Incubator, Microscope (Dissecting), Racks for Culture Vessels, Culture Vessels, pH meter, analytical balance, glassware, sterilizable tools (scalpels, forceps), Bunsen burner/bead sterilizer, refrigerators/freezers.

\* Consumables: Specialized media (pH 5.7-5.8), PGRs, sterile consumables, agar, hormones, cryoprotectants, enzymes.

\* Challenges: Contamination, Somaclonal variation, Acclimatization failure, Genotype specificity, Vitrification/Hyperhydricity (due to media imbalance, old/unvented vessels).

\* MVP Status / Estimated Game Version: Likely Post-MVP.

\* Part of "Advanced Propagation (Tissue Culture & Micropropagation)" skill node.

\* Lab Furniture: Specialized Benches (Stainless/Chemical Resistant), Storage Cabinets (Chemical/Flammable), Lab Sinks. (Video shows lab benches in extraction area).

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP for dedicated research labs. Basic benches for any lab work MVP.

\* Supports advanced research/breeding equipment. Research Lab facility is Future (Post-MVP).

\* Cryopreservation Unit (Visual): For long-term genetic archiving using LN₂.

\* Components: Freezers, LN₂ tanks, straws/vials.

\* MVP Status / Estimated Game Version: Likely Post-MVP.

\* Very high-tier/specialized, linked to deferred "Advanced Genetics".

\* Advanced Genetic Modification Equipment (CRISPR-like System - Visual): For direct, high-risk/high-reward genetic manipulation (e.g., targeting THCAS, CsTPS genes). Requires specialized lab, expertise, and significant research.

\* Components: Electroporator/Gene Gun.

\* Challenges: Off-target effects, regeneration from transformed tissue.

\* MVP Status / Estimated Game Version: Post-MVP. Potential future expansion.

\* Bioinformatics Tools/Software (UI/Abstracted System): For analyzing sequencing data (QC, alignment, variant calling), GWAS, Genomic Selection, marker identification, pangenome analysis, functional annotation.

\* Examples (Conceptual): Abstracted versions of GATK, PLINK, R packages (rrBLUP), TASSEL.

\* Data Inputs: High-density genotyping data (GBS, WGS), phenotype data, environmental data.

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. Tied to advanced genetic analysis and breeding programs. Requires significant data and computational resources (abstracted).

\*\*Consumable Resources (Abstract/UI Representation)\*\*

Purpose: Track/manage consumed resources (UI/Inventory). May have visual models for bulk storage (pallets, tanks). Metered costs and consumption dashboards.

Assets (UI Icons, bulk storage models/containers possible):

\* Water: Supply (Tap, RO, Treated - Ozonated water as seen in video). Storage (Tanks, Reservoirs).

\* Quality varies, impacting plants; may require filtration/disinfection.

\* MVP Status / Estimated Game Version: MVP. Consumable resource. UI representation is MVP.

\* Power: Supply (Grid, Generator Fuel, Battery Charge - Solar panels provide power in video). Consumption meter.

\* MVP Status / Estimated Game Version: MVP. Abstracted utility cost/resource.

\* UI representation (consumption meter) is MVP. Generator Fuel/Battery Charge are linked to respective equipment (Late-Game MVP / Post-MVP). Solar Panels also Late-Game / Post-MVP.

\* Nutrients: Packaged Fertilizers (various NPK ratios, macro/micro elements - HGV Nutrients seen), Mixed Solution (Reservoir).

\* MVP Status / Estimated Game Version: MVP. Consumable resource.

\* UI/Inventory representation is MVP.

\* CO2: CO2 Tanks (Visual - large bulk tanks seen), CO2 Gas (UI from tanks or generators).

\* MVP Status / Estimated Game Version: MVP. Consumable resource for CO2 systems.

\* Visual tanks and UI representation are MVP.

\* Building Materials: Walls, Floors, Pipes, Wires, Ducting (UI, pallet/stack models possible).

\* MVP Status / Estimated Game Version: MVP. Consumable resource, needed for construction. UI representation is MVP.

\* Seeds/Clones: Strain-specific Seeds (Visual), Clones (Propagation from mother plants).

\* Acquisition via vendors, events, or in-house cloning.

\* MVP Status / Estimated Game Version: MVP. Essential consumables for cultivation.

\* Visual representation and UI inventory are MVP. Acquisition costs are MVP.

\* Finances: In-game Currency (UI). Ledger for income/expenses.

\* MVP Status / Estimated Game Version: MVP. Core to the economy system. UI representation is MVP.

\* Packaging Materials:

\* Glass Jars (for 1/8ths, grams).

\* Childproof Lids.

\* Product Boxes (e.g., Canndescent orange boxes).

\* Labels/Stickers (Strain info, compliance, branding).

\* Humidity Control Packs (e.g., Integra Boost).

\* Pre-Roll Cones.

\* Pre-Roll Tubes/Containers.

\* Vape Cartridges (Hardware).

\* Vape Cartridge Packaging.

\* Larger bags for bulk transport/storage (e.g., CannaLine bags).

\* MVP Status / Estimated Game Version: Basic packaging for flower (jars, bags, labels) MVP. Pre-roll and vape packaging tied to those product lines (Mid-Late MVP / Post-MVP).

\* Sanitation Supplies:

\* Shoe Covers.

\* Gloves.

\* Hair Nets.

\* Lab Coats.

\* Cleaning Solutions (e.g., Scissor Fix, ozonated water source).

\* MVP Status / Estimated Game Version: MVP for basic cleaning. Specific attire like lab coats/shoe covers likely MVP for larger facilities.

--- END OF UPDATED FILE Asset List 1.4 ---

Okay, I've analyzed the CannaCribs video ("Hybrid Houses: Dr. Robb Farms & Palomar | CannaCribs Episode 30") and cross-referenced it with your "Asset List 1.4" and "Briefing Document."

Here's the enhanced asset list. I've focused on:

\* \*\*Adding details and variations\*\* to existing assets based on what was shown or discussed in the video.

\* \*\*Confirming or suggesting adjustments to MVP status\*\* based on the video's depiction of cultivation practices and the Briefing Document's MVP scope.

\* \*\*Highlighting new specific examples\*\* (like strains or branded equipment that inspire generic types) using `[VIDEO\_REF]` for clarity.

\* Ensuring alignment with the "Modern, High-Tech, Clinical/Scientific, Aspirational/Professional aesthetic" and scalability.

\*\*Key Overarching Observations from the Video:\*\*

\* \*\*Hybrid Facilities:\*\* The video showcases "Hybrid Houses" (Dr. Robb Farms) and "Clear Top Indoor" (Palomar), which are essentially advanced greenhouses with significant indoor environmental control capabilities. This reinforces "Greenhouse Structures" as a viable future map type, potentially with variations reflecting these high-tech approaches.

\* \*\*Layered Benches/Verticality (Implicit):\*\* Dr. Robb's facility uses multi-tiered vertical farming for veg, which is a good reference for the "Vertical Farm Structure" (Future).

\* \*\*Data-Driven Cultivation:\*\* Palomar emphasizes data analytics with their "Palomar Data Systems," aligning perfectly with Project Chimera's core vision for UI/Data Viz and optimization gameplay.

\* \*\*Brand Inspiration:\*\* Specific brands seen (Photobio, AGS, AG Gas, IGE, Heavy 16, Roots Organics) can inspire the \*type\* and \*tier\* of generic equipment available in-game.

\* \*\*Cleanliness and Professionalism:\*\* Both facilities showcase a high degree of cleanliness and organized workflow, matching the desired aesthetic.

--- START OF ENHANCED Asset List 1.4 ---

﻿Project Chimera: Customized, Comprehensive Asset List v1.4

Core Vision: Modern, High-Tech, Clinical/Scientific, Aspirational/Professional aesthetic; player-driven "Relaxed & Cozy" variations.

Detail paramount: (Satisfactory, Farming Sim benchmarks for equipment) for deep simulation. The simulation aims for a granular, scientifically grounded foundation.

Source Prioritization:

1. Core Docs (mechanics, scope, style).

2. Relevant Docs (cannabis science, cultivation, pests, water, nutrients, breeding, equipment for realism/complexity). This includes Cannabis sativa L. biology, cultivation, genetics, and industry practices.

3. General Knowledge (bridge gaps).

Gameplay Loops Supported: Build, Cultivate, Breed, Process, Analyze, Optimize.

Key Customizations:

\* Expanded Utility Systems (Plumbing, HVAC, Electrical) with detailed, interconnected networks where sizing and material impact performance.

\* Detailed Plant Assets (dynamic, procedural, GxE-tied), reflecting phenotypic plasticity.

\* Lab/Research Equipment (advanced breeding/analysis) supporting high-tier breeding, genetic research, and detailed chemical profiling.

\* UI/Data Viz as crucial assets for presenting complex simulation data.

Specific environmental control, nutrient management, IPM, post-harvest details: These systems will incorporate specific parameters for temperature, humidity, CO2, airflow, light, optimal nutrient ranges, and pest/disease resistance.

Scalability: Residential vs. Warehouse/Industrial, potentially expanding to Greenhouses, Vertical Farms, Research Labs, and Outdoor Fields.

Item List:

Structural & Architectural Elements

Walls

Floors

Drains

Roofs/Ceilings

\* `[VIDEO\_REF]` Ceilings in hybrid/greenhouse facilities include clear roofing materials (e.g., polycarbonate) and internal structures for blackout curtains/shade cloths (0:41-0:43 Palomar, 11:58 Dr. Robb).

Doors

Windows

Stairs/Ladders/Catwalks

\* `[VIDEO\_REF]` Ladders are shown for accessing high-mounted equipment in greenhouses (13:16 Dr. Robb).

Support Pillars/Beams

Containment Structures (Tents)

Cultivation & Plant Care Tools

Snips/Scissors (Micro-Tip, Curved/Straight)

\* `[VIDEO\_REF]` Multiple trimmers shown using various snips for hand-trimming (3:08 Dr. Robb, 19:55 Rove processing).

Scalpels

Large Hedge Trimmers

Hand Spray Bottles

Pump Sprayers (Gal, Backpack)

Handheld Dusters

Soil Drench Applicators

Motorized spray carts

Foggers

Integrated Spraying Systems

Sticky Traps (Yellow, Blue - Cards, Rolls)

\* `[VIDEO\_REF]` Yellow sticky traps visible in Dr. Robb's facility (10:38). MVP for basic IPM.

Magnifying Loupes

Handheld Digital/Standard Microscopes

Benchtop Digital/Standard Microscopes

Soil/Medium Sample Probes/Corers

Leaf Sample Bags/Vials

\* `[VIDEO\_REF]` Palomar mentions leaf tissue testing (32:46), implying collection tools. Aligns with advanced analysis (Post-MVP for player in-house, but NPC service could be MVP).

Simulated Chlorophyll Meter

Trellis netting

\* `[VIDEO\_REF]` Extensively used in both facilities for canopy support/ScROG (0:03 Dr. Robb, 0:24 Palomar, 0:52 Dr. Robb flower room). Essential for managing larger plants, likely MVP.

Stakes

\* `[VIDEO\_REF]` Bamboo stakes used for initial plant support in some pots (7:07 Palomar mothers).

Tie wire

Nutrient & Irrigation Equipment

Watering Cans/Hoses

\* `[VIDEO\_REF]` Hand watering shown in Palomar's veg area (28:08), likely with hoses/wands. MVP for early game/small scale.

Reservoirs/Tanks

\* `[VIDEO\_REF]` Large nutrient batch tanks visible at Palomar (0:15, with logo), implying central mixing.

Water Pumps (Submersible, Inline)

Air Pumps

Pipes (PVC, PEX, Drip Line)

\* `[VIDEO\_REF]` Extensive drip irrigation tubing visible in Dr. Robb's facility (2:24, 16:00) and Palomar (22:28, 28:11, 31:03). MVP.

Fittings

Valves (manual, solenoid)

Filters (for plumbing)

Nutrient Mixing Stations/Vats

\* `[VIDEO\_REF]` Palomar uses Heavy 16 nutrients, implying a mixing station (29:20). Dr. Robb also mentions nutrient mixing (15:43). MVP for manual mixing.

Automated Dosing/Fertigation Systems

\* `[VIDEO\_REF]` Dr. Robb uses automated drip irrigation (16:00). Palomar uses an automated irrigation boom in one area (16:04). Full sensor-driven dosing is likely Late-Game MVP/Post-MVP as per briefing, but basic timed fertigation is MVP.

Growing Mediums/Substrates (Soil, Coco Coir, Rockwool cubes/slabs, Hydroton, Peat Moss, Living Soil)

\* `[VIDEO\_REF]` Dr. Robb uses coco coir in fabric pots (0:06, 2:13, 4:05). Palomar uses organic living soil (Roots Organics Original & Green Lite) (22:59, 23:27). These inform properties for "Coco Coir" and "Living Soil" options. MVP.

Nutrient Containers (Bottles/Bags of base nutrients, additives)

\* `[VIDEO\_REF]` Palomar shows Heavy 16 nutrient line (Prime, Veg A/B, Bud A/B, Fire, Finish, Roots, Foliar) (29:20). This can inspire the types of multi-part nutrient lines available. MVP.

Environmental Control Equipment

Air Conditioners (Window, Split)

\* `[VIDEO\_REF]` Dr. Robb Farms utilizes large-scale AGS (Accelerated Growth Solutions) HVAC units, which are all-in-one HVAC/Dehumidification/Odor Abatement (11:29, 11:40). This would be a high-tier industrial AC/environmental control unit. MVP requires basic ACs.

Heaters (Electric, Gas)

Dehumidifiers

\* `[VIDEO\_REF]` AGS units at Dr. Robb's include dehumidification. Palomar mentions not needing many dehumidifiers due to their hybrid design, but having them for emergencies (31:11). Basic dehumidifiers are MVP.

Humidifiers

Circulation Fans (Clip, Standing, Wall)

\* `[VIDEO\_REF]` Numerous circulation fans (wall-mounted, oscillating) shown in Palomar's greenhouse (30:59). MVP.

Exhaust Fans

\* `[VIDEO\_REF]` Palomar uses exhaust fans as part of their evaporative cooling/ventilation (30:59). MVP.

Inline Duct Fans

Ducting (Flexible, Rigid)

\* `[VIDEO\_REF]` Dr. Robb's facility shows large silver insulated ducting connected to AGS HVAC units (11:33). Both facilities use large fabric air ducts/air socks (e.g., Prihoda) for air distribution (0:17 Dr. Robb, 11:45 Dr. Robb, 12:23 Palomar). Fabric ducts are a specific type of "Flexible Ducting." MVP.

Ducting Fittings

CO2 Tanks

CO2 Regulators

CO2 Controllers

CO2 Generators

\* `[VIDEO\_REF]` Dr. Robb Farms uses an AG Gas carbogation system with AI-controlled micro-bursts of CO2 directly into the plant canopy, claiming significant yield increases (4:39, 5:07). This represents an advanced, targeted CO2 delivery system. MVP is basic CO2 (tanks/regulators), this is a high-tier upgrade.

Grow Lights (HID - MH/HPS with Ballasts/Hoods, LED Panels, Fluorescent - T5/CFL, LEC)

\* `[VIDEO\_REF]` Both facilities heavily feature Photobio LEDs (Phantom PHOTOBIO, S4 Spectrum) (0:44 Dr. Robb, 10:09 Dr. Robb, 13:15 Dr. Robb, 22:21 Palomar, 23:59 Palomar). Characteristics mentioned: full spectrum, low shadow profile, daisy-chainable, designed to shed heat. HPS lights are mentioned as older tech being replaced (13:19). This informs LED panel properties. MVP.

Light Timers/Controllers

\* `[VIDEO\_REF]` Automated blackout curtains imply sophisticated light cycle control (11:58 Dr. Robb, 22:39 Palomar). MVP includes basic timers.

Thermostats

Humidistats

Environmental Controllers

\* `[VIDEO\_REF]` Palomar's Kyle Castanon mentions their custom software (Palomar Data Systems) for environmental control (22:57, 32:27). Dr. Robb's AG Gas CO2 system is AI-controlled. These are advanced controllers. MVP includes basic controllers.

Environmental Sensors (Air Temp, RH, CO2, Light - PAR/PPFD)

\* `[VIDEO\_REF]` Implied by the sophisticated environmental control and data systems shown/discussed. Palomar mentions DLI targets (22:27). MVP includes basic sensors.

Leaf Surface Temp Sensors

Root Zone/Substrate Sensors (Moisture - VWC%, EC, pH, Temperature)

\* `[VIDEO\_REF]` Dr. Robb mentions target EC/pH in the coco (15:45), implying monitoring. Palomar also discusses EC/pH (28:13). MVP includes handheld meters.

Advanced/Specialized Sensors (Inline Water sensors, Spore Traps)

\* `[VIDEO\_REF]` AG Gas CO2 system uses AI, likely integrating with CO2 sensors (4:57).

Research-grade reference sensors

Air Filters (Intake filters, Carbon filters, MERV-rated filters)

\* `[VIDEO\_REF]` AGS HVAC units at Dr. Robb's include odor abatement, implying carbon filters (11:40). MVP.

Utility Systems & Equipment

Electrical Wiring

Circuit Breakers / Fuse Boxes / Panels

Generators (Diesel/Gas)

CoGen systems

Battery Banks / UPS (Uninterruptible Power Supply)

Main Power Grid Connection Point (Abstracted)

Water Supply Connection Point (Abstracted - Tap, RO, Treated)

Pots, Containers, & Growing Surfaces

Pots (Standard Pot, Grow Bag type)

\* `[VIDEO\_REF]` Palomar uses standard black plastic pots for veg (28:05). MVP.

Fabric Grow Bags

\* `[VIDEO\_REF]` Dr. Robb Farms uses black fabric grow bags for their coco grows (0:06, 4:05). Palomar uses tan fabric pots for flower (0:09, 22:28). MVP.

Trays / Flats (Seedling, Propagation)

\* `[VIDEO\_REF]` Standard 1020-style trays with humidity domes used for cloning at both facilities (6:59 Dr. Robb, 24:40 Palomar). MVP.

Rockwool Cubes / Slabs

Hydroponic/Aeroponic Systems (Basic Ebb/Flow, DWC buckets, NFT, Aeroponics)

\* `[VIDEO\_REF]` Dr. Robb Farms mentions hydroponics (1:58) and is shown using a system that appears to be a form of drain-to-waste in coco with extensive drip irrigation. Palomar uses an automated irrigation boom which might be part of an ebb & flow or flood table system in one area (16:04).

Growing Benches / Tables (Flood tables, Wire racks)

\* `[VIDEO\_REF]` Dr. Robb's facility uses IGE (Innovative Growers Equipment) Ebb & Flow Max rolling benches (17:00, 17:27). These are high-tier, automated rolling benches. Palomar uses static wire/metal benches (0:06, 22:28). MVP includes basic benches.

Pest & Disease Management

Sticky Traps (Yellow, Blue - Cards, Rolls)

\* `[VIDEO\_REF]` Yellow sticky traps shown (10:38 Dr. Robb). MVP.

Handheld Magnifying Loupes

Microscopes (Handheld, Benchtop for Pest/Disease)

Hand Spray Bottles (for Pest/Disease)

Pump Sprayers (Gal, Backpack for Pest/Disease)

(Simulated) Pesticides/Fungicides/Biologicals

\* `[VIDEO\_REF]` HLVd (Hop Latent Viroid) is a major concern discussed by Palomar, who perform in-house testing and use clean stock (7:23). This implies a need for diagnostic tools and disease management strategies.

In-game "Plant Problems Guide" UI/Asset

Harvesting & Processing Equipment

Large Trimming Shears

HD Loppers (for harvesting)

Hand Saw (for harvesting)

Hedge Trimmers (for harvesting)

Collection Totes/Bins (Food-grade)

\* `[VIDEO\_REF]` Large totes used for harvested material (3:05 Dr. Robb processing).

Tarps

Trim Scissors (Micro-tip, types)

\* `[VIDEO\_REF]` Multiple staff hand-trimming with scissors (3:08 Dr. Robb, 19:55 Rove processing). MVP.

Trim Bins/Trays (with kief screens)

Isopropyl Alcohol/Wipes (cleaning for harvest tools)

Rags (for harvest tool cleaning)

Electrically operated, manually controlled hand trimming assist tools

Bowl Trimmers (Manual, Electric)

Automated Trimming Machines

Drying Racks / Clotheslines & Hangers

\* `[VIDEO\_REF]` Dr. Robb mentions a "dry cure space" (3:06).

Curing Containers (Jars, Buckets - Glass, Plastic)

Automated curing systems

Digital Pocket Scales (Precision)

Digital Bench Scales (Larger capacity)

Industrial Scales (Platform, Floor scales)

Calibration Weights

Transporting Baskets

Hand-drawn garden carts

Small motorized transport (for harvest)

Portable conveyor belts (for harvest)

Cold Storage (Refrigerators, freezers for harvest)

Extraction/Concentrate Equipment (Solventless Press, Basic Extraction System)

\* `[VIDEO\_REF]` Rove brand (partnered with Dr. Robb) is known for concentrates (20:00). Palomar also produces pre-rolls which may use extracted terpenes or kief (3:58). While full extraction is Post-MVP, this suggests a demand for high-quality material suitable for extraction.

Facility Furniture & Fixtures

Workbenches

\* `[VIDEO\_REF]` Visible in processing areas (3:08 Dr. Robb, 19:55 Rove). MVP.

HD Shelving (Metal, Wire)

\* `[VIDEO\_REF]` Wire shelving used for clone trays (6:59 Dr. Robb, 24:40 Palomar). MVP.

Storage Cabinets (Metal, Plastic, Lockable)

Chemical/Flammable Storage Cabinets

Rolling Utility Carts

Seating (Chairs, Stools, Folding Chairs)

\* `[VIDEO\_REF]` Trimmers are seated (3:08 Dr. Robb, 19:55 Rove). MVP.

Industrial Sink/Wash Basin (Stainless Steel)

Faucet Fixtures

Eye Wash Station (Wall, Pedestal)

Emergency Shower (Industrial)

Fire Extinguishers

\* `[VIDEO\_REF]` Visible in background shots (e.g., 7:31 Palomar). MVP.

First Aid Kits

Wall Clocks

Trash Cans/Waste Bins (Industrial rolling)

Recycling Bins

Mop & Bucket

Broom & Dustpan

Wet Floor Signs

Floor Mats/Anti-Fatigue

Lockers

Dumpsters

Map Specific Assets

Residential House Shell & Unique Fixtures

Warehouse Shell & Unique Fixtures

Greenhouse Structure (glass/polycarbonate, vents)

\* `[VIDEO\_REF]` Both facilities are essentially advanced greenhouses. Dr. Robb's "Hybrid Indoor" (0:41) and Palomar's "Clear Top Indoor" (22:23) feature clear roofing, extensive ventilation (ridge vents at Palomar 31:15), automated blackout/shade systems (11:58 Dr. Robb, 22:39 Palomar), and evaporative cooling walls (Palomar 30:55). These details significantly inform "Future" Greenhouse structures.

Research Lab Shell & Specialized Benches/Fixtures

Outdoor Field Elements (landscape, fencing)

Vertical Farm Structure (multi-tiered racking)

\* `[VIDEO\_REF]` Dr. Robb's veg room shows multi-tiered racking for vertical farming (10:50). This informs the "Future" Vertical Farm Structure.

Subterranean Lab Shell

Abandoned Research Outpost Shell

Geothermal Greenhouse Complex Shell

Decorative & "Cozy" Items

Posters

\* `[VIDEO\_REF]` Palomar has branded posters and educational material in their office area (32:42, 33:02).

Art

Rugs

Small Furniture (decorative chairs, tables)

Non-cannabis plants

Decorative lighting

Personal items

Paint/Texture options (walls/floors)

Plant Assets (Core for Procedural System)

Base 3D Models (Landrace-inspired foundational strains)

\* `[VIDEO\_REF]` Strains discussed:

\* \*\*Bubble Burst\*\* (Dr. Robb): Indica dominant, deep purple coloration, distinct sour/fruity aroma/flavor (9:28).

\* \*\*Animal Tree\*\* (Palomar): (Lemon Tree x Animal Mints BX1), lemon-forward aroma, minty exhale (26:30).

\* These provide specific examples of desirable visual and aromatic traits for procedural generation.

Procedural Generation System (Software/Code Asset)

Dynamic Shader/Material Effects (MIDs, MPCs for plants)

\* `[VIDEO\_REF]` Dr. Robb discusses how UV impacts plant morphology and cannabinoid/terpene production (15:05), directly linking to GxE effects. The visual difference between green and purple strains also highlights shader needs.

Data Collection & Lab Equipment

Handheld EC/PPM meter

Handheld pH meter

Handheld Temperature Probe (air, water, soil)

Handheld Soil Moisture meter

Handheld Simulated Chlorophyll Content meter

Handheld PAR/PPFD meter

Handheld Infrared Thermometer (leaf surface temp)

Handheld VPD Meter

\* `[VIDEO\_REF]` Use of handheld meters is MVP. The video shows staff checking plants, implying manual data collection could be occurring (e.g., 2:01 Dr. Robb).

Lab-grade EC/pH meter (Benchtop)

Spectrophotometer (Benchtop, simulated use)

HPLC (High-Performance Liquid Chromatography) System

GC-MS (Gas Chromatography-Mass Spectrometry) System

ICP (Inductively Coupled Plasma) Assay System

Elemental Analyzer

NIR/MIR Spectroscopy System

\* `[VIDEO\_REF]` Palomar mentions sending samples for leaf tissue analysis to Arvin Plant Labs (32:46) and getting terpene/cannabinoid profiles. This supports the need for these advanced lab analyses (player outsources initially, potentially develops in-house Post-MVP).

Laptop (Data Interface)

Tablet (Data Interface)

\* `[VIDEO\_REF]` Kyle Castanon from Palomar is shown using a tablet with their custom data system (23:55). Dr. Robb is also shown with a tablet (15:41). MVP for UI.

Desktop (Monitor, Keyboard, Mouse - Data Interface)

\* `[VIDEO\_REF]` Palomar Data Systems shown on a large monitor (32:27). MVP for UI.

Clipboard (Data Interface)

Pens (Data Interface)

Whiteboard (Data Interface)

\* `[VIDEO\_REF]` Whiteboards visible in Palomar's office/lab area (32:42, 33:02).

Industrial Server rack (Data Interface)

Large control displays (Data Interface)

Calibration Weights (for scales)

Simulated Lab Analysis Interface (UI for lab results)

\* `[VIDEO\_REF]` Palomar Data Systems showing trimmer optimization and inventory (33:03, 33:23) is a direct visual inspiration for this UI.

UI & Data Visualization Elements

Environmental Data Dashboards/Overlays

Environmental heat maps

Graphs & Charts (Historical trends)

Plant Health/Status Indicators (Icons/bars)

Plant Detail View UI (specific issues)

Nutrient Management Interface

Genetic Data Display (Strain info, Lineage, Traits)

Pedigree Charts (UI)

Punnett Squares (Simulated UI)

Abstracted Genetic Marker/Allele display (UI)

Simulated Lab Analysis Results UI (Cannabinoid/Terpene Profiles, Tissue Nutrient Analysis, Water Quality Report)

\* `[VIDEO\_REF

`Palomar Data Systems displays operational data like trimmer performance, inventory levels, and potentially yield forecasts (32:27, 33:03, 33:23). This directly informs the need and potential layout for these UIs. MVP includes basic versions.

Breeding Interface (Parent selection, Crossing UI, Pheno-Hunting tools)

Facility Management Overlays (Utility View "X-Ray", Zoning UI)

Resource inventory/consumption UI

Operational & Financial Data UI (Budget, Costs, Revenue, Profit/Loss)

Ledger UI

Alerts & Notifications UI

Historical Logs & Notes Interface (UI)

Tutorial/Info Overlays (UI)

Advanced Breeding & Lab Equipment

Sterile Work Area/Hood (Laminar Flow)

Autoclave

Incubator (for Tissue Culture)

Microscope (Dissecting, for Tissue Culture)

Racks for Culture Vessels

Culture Vessels

pH meter (for Tissue Culture lab)

Analytical balance (for Tissue Culture lab)

Glassware (for Tissue Culture lab)

Sterilizable tools (scalpels, forceps for Tissue Culture)

Bunsen burner/glass bead sterilizer (for Tissue Culture lab)

Refrigerators/Freezers (for Tissue Culture lab)

\* `[VIDEO\_REF]` Palomar mentions doing in-house HLVd testing and using tissue culture for remediation if needed (7:23, 7:34). This confirms the relevance of Tissue Culture Stations as Post-MVP content.

Lab Benches (Specialized Stainless/Chemical Resistant)

Storage Cabinets (Chemical/Flammable for Labs)

Lab Sinks (Specialized)

Cryopreservation Unit (Visual)

Freezers (for Cryopreservation)

LN₂ tanks (for Cryopreservation)

Straws/vials (for Cryopreservation)

Advanced Genetic Modification Equipment (CRISPR-like System - Visual)

Electroporator/Gene Gun

Bioinformatics Tools/Software (UI/Abstracted System)

\* `[VIDEO\_REF]` Palomar Data Systems (32:27) is a form of advanced data analytics software, aligning with the concept of bioinformatics tools for optimizing cultivation, even if not purely genetic bioinformatics in this instance.

Consumable Resources (Abstract/UI Representation)

Water (Tap, RO, Treated - Consumable)

Power (Grid, Generator Fuel, Battery Charge - Consumable)

Nutrients (Packaged Fertilizers, Mixed Solution - Consumable)

\* `[VIDEO\_REF]` Heavy 16 nutrients shown at Palomar (29:20). Roots Organics soil bags also represent consumable growing media (22:59). MVP.

CO2 (CO2 Tanks, CO2 Gas - Consumable)

\* `[VIDEO\_REF]` AG Gas system at Dr. Robb's implies consumable CO2 source (bulk tank likely) (4:39). MVP.

Building Materials (Walls, Floors, Pipes, Wires, Ducting - Consumable)

Seeds (Strain-specific - Consumable)

Clones (Consumable)

\* `[VIDEO\_REF]` Both facilities have extensive propagation areas for clones (6:59 Dr. Robb, 24:40 Palomar). MVP.

Finances (In-game Currency)

Specialized Tissue Culture Media

Plant Growth Regulators (PGRs)

Agar

Hormones (for Tissue Culture)

Cryoprotectants

Enzymes (for lab work)

Sterile Consumables (for lab work)

--- END OF ENHANCED Asset List 1.4 ---

This enhanced list incorporates specific examples and details from the CannaCribs episode, aligning them with the existing asset categories and MVP considerations from the Briefing Document. The video provides excellent visual and practical references for many of the game's core systems and future expansion possibilities.

Okay, I've analyzed the provided CannaCribs video featuring SunMed Growers and cross-referenced it with your "Asset List 1.4" and "Briefing Document" for Project Chimera.

Here's the enhanced Asset List. I've focused on integrating new details, adding assets suggested by the video, and ensuring alignment with your project's vision and MVP scope. Additions or significant modifications based on the video analysis are typically commented or an MVP status is re-affirmed/clarified.

--- START OF ENHANCED FILE Asset List 1.5 ---

﻿Project Chimera: Customized, Comprehensive Asset List v1.5

Core Vision: Modern, High-Tech, Clinical/Scientific, Aspirational/Professional aesthetic; player-driven "Relaxed & Cozy" variations.

Detail paramount: (Satisfactory, Farming Sim benchmarks for equipment) for deep simulation. The simulation aims for a granular, scientifically grounded foundation.

Source Prioritization:

1. Core Docs (mechanics, scope, style).

2. Relevant Docs (cannabis science, cultivation, pests, water, nutrients, breeding, equipment for realism/complexity). This includes Cannabis sativa L. biology, cultivation, genetics, and industry practices. CannaCribs SunMed Video (visuals, processes, specific equipment).

3. General Knowledge (bridge gaps).

Gameplay Loops Supported: Build, Cultivate, Breed, Process, Analyze, Optimize.

Key Customizations:

\* Expanded Utility Systems (Plumbing, HVAC, Electrical) with detailed, interconnected networks where sizing and material impact performance.

\* Detailed Plant Assets (dynamic, procedural, GxE-tied), reflecting phenotypic plasticity.

\* Lab/Research Equipment (advanced breeding/analysis) supporting high-tier breeding, genetic research, and detailed chemical profiling.

\* UI/Data Viz as crucial assets for presenting complex simulation data.

Specific environmental control, nutrient management, IPM, post-harvest details: These systems will incorporate specific parameters for temperature, humidity, CO2, airflow, light, optimal nutrient ranges, and pest/disease resistance.

Scalability: Residential vs. Warehouse/Industrial, potentially expanding to Greenhouses, Vertical Farms, Research Labs, and Outdoor Fields.

Item List:

Structural & Architectural Elements

Purpose: Define grow spaces, support equipment, manage environment (materials affecting insulation, cleanliness, etc.). Layout and zoning will facilitate clean flow principles and support concepts like Dutch-style zoned greenhouses.

Variations:

\* Interior: Drywall, Concrete, Insulated Panel. Materials should be non-porous, smooth, durable, non-absorbent, and chemical-resistant for sanitation.

\* Exterior: Siding, Brick, Metal (Map specific).

\* Industrial: Pre-fab, Heavy-duty.

Material properties: Cost, Appearance, Insulation (R-value for heat transfer management), light/air barrier (for Environmental Control Sim), Cleanliness (materials influence ease of cleaning). Coving at wall-floor junctions is recommended.

Assets:

\* Walls: Sections/panels (various materials).

\* MVP Status / Estimated Game Version: MVP. Required for initial Residential House map and basic Warehouse build-out.

\* Material properties related to Environmental Control Sim (Insulation - R-value) are relevant for MVP. Materials for future exterior/map-specific themes would be Post-MVP.

\* Floors: Sections (Concrete, Wood, Grate - with load ratings). Non-porous materials preferred.

\* Drains: Standard, Trench (with varying capacity).

\* MVP Status / Estimated Game Version: MVP. Required for initial facility construction.

\* Roofs/Ceilings: Sections (Drywall, Suspended Grid, Concrete). High ceilings can cause thermal stratification.

\* Suspended Tiles: (acoustic, cleanroom).

\* Open Rafters/Trusses: (Wood, Metal). These can influence large-scale microclimate patterns.

\* Greenhouse Roofs: (Glass, Polycarbonate with automated vent systems, potentially diffused options for light management).

\* MVP Status / Estimated Game Version: MVP for basic Drywall/Concrete. Greenhouse-specific roofs with advanced features Post-MVP, aligning with Greenhouse map.

\* Doors: Various types (Standard, Industrial Roller, Air Lock, Plastic Strip Curtains). Air locks and strip curtains minimize contaminant entry and aid zone separation.

\* MVP Status / Estimated Game Version: MVP for standard doors. Air Locks and Strip Curtains likely Mid-Late MVP as facility complexity increases.

\* Windows: Various types (Standard, Greenhouse, Industrial). Can be blocked out in grow rooms.

\* MVP Status / Estimated Game Version: MVP.

\* Standard windows for Residential/Warehouse. Greenhouse-specific windows (e.g., for specific light transmission) are Future (Post-MVP).

\* Stairs/Ladders/Catwalks: For vertical access. Relevant for multi-story/vertical facilities.

\* MVP Status / Estimated Game Version: Likely MVP for multi-story/vertical layout in Warehouse or other facilities.

\* Catwalks relevant for industrial scale and vertical farms.

\* Support Pillars/Beams: (Concrete, Steel). For structural support in large spaces.

\* MVP Status / Estimated Game Version: MVP for Warehouse map shell.

\* Containment Structures (Tents): Pre-fab grow tents, sealable for environmental control.

\* MVP Status / Estimated Game Version: Likely MVP for early-game or smaller residential setups.

Cultivation & Plant Care Tools

Purpose: Plant maintenance (pruning, training), scouting, applying treatments.

Variations: Size, Material (affects durability, cleanliness, rust potential), Quality (Basic, High-quality), Sharpness/Condition (affects cut cleanliness, plant stress, disease risk). Tools require cleaning/sterilization.

Assets:

\* Pruning & Cutting:

\* Types: Bypass Pruners (Std, HD), Snips/Scissors (Micro-Tip, Curved/Straight), Scalpels, Loppers, Hand Saw. Large Hedge Trimmers (potentially with pole extensions).

\* Properties: Cutting Area/Blade Length, Weight (affects fatigue).

\* MVP Status / Estimated Game Version: MVP.

\* Basic plant training (topping, manual LST) is part of core MVP cultivation. These tools are necessary for that. Clean cuts promote faster healing.

\* Spraying & Application: Hand Spray Bottles, Pump Sprayers (Gal, Backpack), Handheld Dusters, Soil Drench Applicators.

\* Industrial: Motorized spray carts, Foggers, Integrated Spraying Systems (e.g., automated boom sprayers over benches, as seen in large greenhouses), Automated Dip Station/Tank (for large-scale root drenching/pest control, e.g., for root aphids).

\* MVP Status / Estimated Game Version: MVP for basic pest/disease treatment (manual application).

\* Industrial versions (boom sprayers, dip stations) likely Late-Game MVP or Post-MVP, linked to scale and potential automation skill nodes. Automated spraying carries risks if misconfigured.

\* Scouting & Monitoring:

\* Traps: Sticky Traps (Yellow, Blue - Cards, Rolls) for monitoring pest presence, location, and stage.

\* Visual Inspection Tools: Magnifying Loupes, Handheld/Benchtop Digital/Standard Microscopes for detailed inspection of pests, pathogens, trichomes.

\* Sampling Tools: Soil/Medium Sample Probes/Corers, Leaf Sample Bags/Vials.

\* Simulated Meters (Visual): Simulated Chlorophyll Meter. (See Data Collection for more handheld meters)

\* MVP Status / Estimated Game Version: MVP for basic plant health monitoring and pest/disease identification.

\* Microscopes and probes are explicitly mentioned for manual data acquisition loop and unlocked via Science skill tree nodes. Effective use requires skill.

\* Plant Support Tools:

\* Types: Trellis netting, stakes, tie wire.

\* Functionality: Prevents lodging, supports heavy buds, manages canopy.

\* MVP Status / Estimated Game Version: Likely MVP, especially for supporting larger plants or specific training techniques (e.g., ScrOG).

Nutrient & Irrigation Equipment

Purpose: Store, mix, deliver nutrients and water to plants. Systems will manage pH, EC/PPM, temperature, and Dissolved Oxygen (DO) of nutrient solutions. Includes sustainable water practices.

Variations:

\* Scale (Manual, Small Reservoir, Large Industrial).

\* Control (Manual, Timed, Automated sensor-driven).

\* Type (Drip, Ebb/Flow, DWC, Aeroponic, etc.).

Assets:

\* Watering Cans/Hoses: Basic manual irrigation.

\* Properties: Capacity/Flow Rate.

\* MVP Status / Estimated Game Version: MVP. Basic irrigation methods are essential for core cultivation.

\* Reservoirs/Tanks: Various sizes (Plastic, Poly, Stainless Steel - food-grade). Dynamically reflect fill levels. Must be kept clean. Includes tanks for fresh water, mixed nutrients, and potentially treated/recirculated water.

\* MVP Status / Estimated Game Version: MVP.

\* Needed for manual/timed watering systems. Larger/Industrial sizes likely Late-Game MVP or Post-MVP.

\* Pumps: Water Pumps (Submersible, Inline - various flow rates/head pressure), Air Pumps (for DWC). Includes pumps for recirculation and water treatment.

\* Properties: Power Requirement, Durability/Maintenance (can fail).

\* MVP Status / Estimated Game Version: MVP. Needed for simple reservoir systems. Various sizes/capacities support scalability.

\* Redundant pumps or advanced manifold systems could be later game/Post-MVP.

\* Plumbing: Pipes (PVC, PEX, Drip Line), Fittings, Valves (manual, solenoid), Filters.

\* Properties: Material (impacts cost, durability, efficiency, appearance), Sizing (diameters impact flow, pressure drop), Connectivity (logical connections, visual feedback), Routing (3D, grid-snap/free-form, segmented components for curves). Abstracted pressure loss simulation.

\* MVP Status / Estimated Game Version: MVP. Essential for building irrigation systems, part of detailed construction.

\* Sizes/materials impact performance. Manual routing is MVP. Filters require cleaning/replacement.

\* Nutrient Mixing Stations/Vats: For preparing nutrient solutions. Requires clean tanks, measuring tools, pumps/stirrers, calibrated pH/EC meters. Can utilize treated/recirculated water.

\* MVP Status / Estimated Game Version: MVP.

\* Required for manual nutrient mixing. Scale/automation increases later. Cleaning is critical.

\* Automated Dosing/Fertigation Systems: Links sensors (EC/pH) to pumps/valves for automated mixing and delivery based on setpoints and schedules. Offers higher consistency.

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP.

\* While basic automation is MVP (timers), fully automated dosing systems are likely linked to more advanced automation deferred post-MVP. Requires advanced controllers.

\* Water Treatment & Recirculation Systems: (Fits under "Expanded Utility Systems (Plumbing)")

\* Purpose: Enable sustainable water use, reduce costs, manage environmental impact (e.g., protecting local water bodies like Chesapeake Bay).

\* Assets: Advanced Filtration Systems (e.g., for pathogen removal, nutrient stripping from runoff), Water Treatment Tanks (holding/processing tanks), Recirculation Pumps, Monitoring Sensors for treated water quality (EC, pH, ORP).

\* MVP Status / Estimated Game Version: Basic filtration MVP. Full recirculation/advanced treatment Post-MVP.

\* Growing Mediums/Substrates: Bags/bulk (Soil, Coco Coir, Rockwool cubes/slabs, Hydroton, Peat Moss). Living Soil with microbial ecosystems. Specific mixes (e.g., 70% Coco, 15% Perlite, 15% Rice Hulls).

\* Properties: Water retention, aeration, nutrient availability, pH, EC, bulk density, porosity, mineral content (e.g., Silicon from Rice Hulls for PM resistance), organic matter. These affect root health and nutrient dynamics.

\* MVP Status / Estimated Game Version: MVP. Essential consumable for cultivation. UI/Inventory representation is MVP. Rice Hulls added as an example amendment.

\* Nutrient Containers: Bottles/Bags of base nutrients (N, P, K), macro- & micro-nutrients, additives (e.g., Stash Blend as a complex additive example from video).

\* Properties: NPK Ratio, specific concentrations. SDS information for handling/storage.

\* MVP Status / Estimated Game Version: MVP.

\* Consumable, part of manual nutrient management. UI/Inventory representation is MVP. Nutrients can interact or have incompatibilities.

Environmental Control Equipment

Purpose: Manage temperature, humidity, CO2, airflow, light cycles. Essential for optimizing plant growth and preventing issues. Zoned control capability is important for larger facilities.

Variations: Size, Capacity, Efficiency, Control (Manual, Timed, Sensor-Controlled via simple or advanced/integrated controllers). Equipment projects a "radius of effect" or "cone of influence."

Assets:

\* HVAC Systems: Air Conditioners (Window, Split), Heaters (Electric, Gas), Dehumidifiers, Humidifiers.

\* Properties: Sizing/Capacity (must match facility heat load), Efficiency (e.g., SEER, affects power/fuel use), Power/Fuel Requirement, Maintenance requirement.

\* MVP Status / Estimated Game Version: MVP.

\* Basic HVAC for environmental control (temp, humidity) is a core MVP feature. Various types/capacities needed for different room sizes/needs.

\* Unlocked via Environment skill tree nodes like "Basic Environmental Control".

\* Fans: Circulation Fans (Clip, Standing, Wall), Exhaust Fans, Inline Duct Fans.

\* Properties: Airflow Rate (CFM, affects air exchange), Power Requirement, Control (manual, timed, sensor, speed controller).

\* MVP Status / Estimated Game Version: MVP. Essential for airflow management, part of MVP environmental control.

\* Part of abstracted airflow physics, removes heat/humidity.

\* Ducting: Flexible, Rigid (various diameters), Fittings.

\* Properties: Material (impacts cost, durability, efficiency), Sizing (impacts airflow, pressure drop).

\* MVP Status / Estimated Game Version: MVP. Needed for HVAC and exhaust systems. Part of detailed construction.

\* Manual routing is MVP.

\* CO2 Systems: CO2 Tanks (Visual assets), Regulators, Controllers, Generators (produce heat/moisture).

\* Functionality: Increases CO2 for enhanced photosynthesis (optimal 800-1500 ppm in flowering).

\* MVP Status / Estimated Game Version: MVP for basic CO2 management, though likely manual control initially.

\* CO2 tanks are visual assets. Controllers for automation might be later MVP/Post-MVP depending on complexity level. Requires CO2 consumable.

\* Grow Lights: Various types (HID - MH/HPS with Ballasts/Hoods; LED Panels - various wattages/spectrum, potentially adjustable, e.g., Fluence Viper/Raptor as high-tier examples; Fluorescent - T5/CFL; LEC).

\* Properties: Wattage (affects intensity, heat output), Spectrum (Blue for veg, Red for flower, Full-spectrum), Light Output (PAR/PPFD, DLI), Fixture Efficiency, Heat Output (significant), Coverage Area. Reflective hoods/materials enhance efficiency. Importance of supplemental lighting for yield in certain conditions (e.g., winter, greenhouses).

\* MVP Status / Estimated Game Version: MVP. Essential cultivation equipment. Various types/tiers for progression.

\* Light Timers/Controllers: Mechanical, Digital. Can control multiple lamps.

\* Properties: Power Handling Capacity.

\* MVP Status / Estimated Game Version: MVP. Basic automation (light timers for photoperiod: 18-24h veg, 12/12h flower) is a core MVP feature.

\* Sensor-controlled or advanced automation likely Late-Game MVP / Post-MVP.

\* Thermostats, Humidistats, Environmental Controllers: Simple (on/off) to Advanced/Integrated (multiple parameters, IF-THEN logic, setpoints/ranges for zoned control).

\* MVP Status / Estimated Game Version: MVP. Basic automation (simple thermostat/humidistat) is a core MVP feature.

\* More advanced or integrated controllers likely unlock later.

\* Sensors:

\* Types: Environmental (Air Temp, RH, CO2, Light - PAR/PPFD), Leaf Surface Temp (for VPD), Root Zone/Substrate (Moisture - VWC%, EC, pH, Temperature). Advanced/Specialized (Inline Water sensors, Spore Traps - Post-MVP).

\* Tiers: Basic (manual check), Intermediate (networked, simple controllers), Advanced (accurate, multi-functional), Research-grade (calibration).

\* Properties: Accuracy/Precision (varies by tier, requires calibration), Power Requirement, Data Output (numerical, logs).

\* MVP Status / Estimated Game Version: MVP. Essential for real-time data dashboards and automated control.

\* Player-placed sensors are core to data collection. Various tiers (basic manual vs. integrated automated).

\* Air Filters: Intake filters, Carbon filters (for odor control). MERV-rated filters.

\* MVP Status / Estimated Game Version: Likely MVP.

\* Essential for managing air quality and odor control. Part of ducting systems. Requires replacement/cleaning.

Utility Systems & Equipment

Purpose: Deliver power and connect systems. Detailed, interconnected 3D routable networks with performance impacted by sizing/materials. Utility View/"X-Ray" mode for visualization.

Variations: Scale, Capacity, Efficiency, Type (Standard, Industrial).

Assets:

\* Electrical Wiring: Various gauges (sizing impacts resistance, voltage drop, cost). Conductors (copper, aluminum), Insulators.

\* MVP Status / Estimated Game Version: MVP. Part of detailed construction, abstracted utility connections.

\* Manual routing is MVP. Sizes/gauges impact performance. Adherence to safety standards.

\* Circuit Breakers / Fuse Boxes / Panels: Essential for electrical system management, load balancing, overload protection. Rated capacity (Amps терроризм not to be loaded beyond 80%).

\* MVP Status / Estimated Game Version: MVP.

\* Generators (Diesel/Gas): Provides backup or primary power. CoGen systems possible.

\* Properties: Power Output (Watts), Fuel Efficiency, Ramp-up time, Heat generation. Tiers from basic (manual start) to advanced (auto transfer).

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. Described as backup power systems.

\* Needed for scaling operations or risk mitigation. Requires fuel.

\* Battery Banks / UPS (Uninterruptible Power Supply): Short-term power buffer or main source.

\* Properties: Capacity (kWh), Charge/Discharge Rate.

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. Described as short-term buffer.

\* Aligns with advanced risk management.

\* Main Power Grid Connection Point (Abstracted): Represents stable power draw from external utility. Capacity based on service contract/infrastructure.

\* MVP Status / Estimated Game Version: MVP. Represents the abstracted power draw. Metered cost. Risk of external disruption.

\* Water Supply Connection Point (Abstracted - Tap, RO, Treated): Represents abstracted water source.

\* Types: Tap (can have contaminants), RO (requires Cal-Mag/pH management), Treated (e.g., via in-house recirculation system). Quality impacts plants.

\* MVP Status / Estimated Game Version: MVP for Tap. RO/Treated may be later upgrades or tied to Water Treatment systems. Metered cost.

Pots, Containers, & Growing Surfaces

Purpose: Hold plants and growing medium.

Variations: Size (affects root space, plant size), Material (Plastic, Fabric, Ceramic - affects cost, durability, aeration), Type (Standard Pot, Grow Bag, Tray, Slab, Air-Pruning Pot).

Assets:

\* Pots: Various sizes (Small, Medium, Large). Standard plastic, Fabric Grow Bags.

\* Specialized: Air-Pruning Pots (e.g., RootMaker style, for improved root structure).

\* Accessories: Reflective Pot Shells/Covers (visual, helps with root zone temperature).

\* MVP Status / Estimated Game Version: MVP for Standard Pots & Grow Bags. Air-Pruning Pots and Shells as upgrades/variations (Mid-MVP). Essential cultivation equipment. Various sizes support plant lifecycle stages (transplanting).

\* Trays / Flats (Seedling, Propagation): Shallow containers for starting seeds/clones. Size choice influenced by space, labor, timing.

\* MVP Status / Estimated Game Version: MVP. Used for starting seeds/clones.

\* Rockwool Cubes / Slabs: Inert growing medium/container type, often for hydro/coco.

\* MVP Status / Estimated Game Version: MVP.

\* As a growing medium/container type.

\* Hydroponic/Aeroponic Systems (Basic Ebb/Flow, DWC buckets, NFT, Aeroponics): Systems for growing without soil, requiring precise control of nutrient solution chemistry (pH, EC, DO, temp) and environmental parameters. Lacks natural buffering of soil.

\* MVP Status / Estimated Game Version: Likely MVP for basic hydroponic options (Ebb/Flow, DWC buckets).

\* Supports different cultivation methods. More complex systems (e.g., aeroponic) might be later MVP/Post-MVP.

\* Growing Benches / Tables (Flood tables, Wire racks, Rolling Benches): Provide surfaces for organizing plants. Various types support different systems (e.g., flood tables for Ebb/Flow). Rolling benches are key for large-scale space optimization as seen in videos.

\* MVP Status / Estimated Game Version: MVP for basic tables/racks. Rolling Benches for Mid-Late MVP or tied to Warehouse scale.

\* Automated Potting/Media Handling Machines: (New Category - see also Nutrient & Irrigation)

\* Automated Potting Machine (e.g., Agronomics inspired): Fills pots with substrate at industrial scale. (Post-MVP)

\* Media Mixing Machine: For creating custom substrate blends in bulk. (Post-MVP)

Pest & Disease Management

Purpose: Monitor, identify, and treat plant issues. Integrated with sanitation and environmental controls.

Assets:

\* Scouting Tools:

\* Sticky Traps: (Yellow, Blue - Cards, Rolls).

\* MVP Status / Estimated Game Version: MVP. For basic pest monitoring.

\* Handheld Magnifying Loupes:

\* MVP Status / Estimated Game Version: MVP. For close visual inspection/scouting.

\* Microscopes (Handheld, Benchtop): For detailed pest/pathogen/trichome inspection.

\* MVP Status / Estimated Game Version: MVP. Unlocked via Science skill tree.

\* Application Tools:

\* Hand Spray Bottles, Pump Sprayers (Gal, Backpack):

\* MVP Status / Estimated Game Version: MVP.

\* For manual treatment application (e.g., approved fungicides/pesticides/biologicals).

\* Automated Dip Station/Tank: Large-scale system for immersing plant pots/root balls in treatment solutions (e.g., for root aphids). (Late-Game MVP / Post-MVP, as seen in large-scale ops).

\* (Simulated) Pesticides/Fungicides/Biologicals: Represented as Consumables. Biologicals need specific environmental conditions.

\* MVP Status / Estimated Game Version: MVP. Needed for manual treatment. UI/Inventory representation.

\* In-game "Plant Problems Guide" UI/Asset: Essential tool for diagnostics, linking symptoms to causes/solutions.

\* MVP Status / Estimated Game Version: MVP.

Harvesting & Processing Equipment

Purpose: Harvest, trim, dry, cure for final product quality. Workflow optimization and minimizing degradation are key.

Variations: Size, Capacity, Automation (Manual to Automated Industrial), Material (Food-Grade).

Assets:

\* Harvesting Tools: Large Trimming Shears, HD Loppers, Hand Saw, Hedge Trimmers (potential pole extensions, various blade lengths). Collection Totes/Bins (Food-grade). Tarps. Sharp, sanitized tools essential.

\* MVP Status / Estimated Game Version: MVP. Needed for manual harvesting.

\* Trimming Tools: Trim Scissors (Micro-tip, types). Trim Bins/Trays (with kief screens to collect trichomes). Isopropyl Alcohol/Wipes (cleaning), Rags. Electrically operated, manually controlled hand trimming assist tools.

\* MVP Status / Estimated Game Version: MVP. Needed for manual trimming. Cleaning supplies for hygiene/quality.

\* Bowl Trimmers (Manual, Electric): Semi-automated trimming, can be adjusted for aggressiveness (speed vs. quality).

\* MVP Status / Estimated Game Version: Likely Mid-Late MVP / Post-MVP.

\* Provides some automation beyond hand trimming, likely unlocked via Harvest skill tree or equipment research.

\* Automated Trimming Machines (Sizes/throughputs): Fully automated, adjustable aggressiveness, can trim wet or dry. (e.g. Mobius Trimmer from video implies such tiers exist)

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP.

\* High-tier equipment, part of Advanced Automation.

\* Drying Racks / Clotheslines & Hangers: Manual hanging/rack in dedicated, environmentally controlled space (temp 60F, humidity 58% RH crucial for quality and preventing issues like terpene loss or mold - 14 day dry cycle example).

\* MVP Status / Estimated Game Version: MVP. Needed for manual drying. Slow, controlled drying is key.

\* Curing Containers (Jars, Buckets - Glass, Plastic): For manual curing with "burping" in a stable cool, dark environment (target RH 58-62%). Automated curing systems (smart containers, climate-controlled rooms) for later.

\* MVP Status / Estimated Game Version: MVP. Needed for manual curing.

\* Bud Sorter/Sizer: (Manual station or automated machine). For sorting buds by size post-drying, pre-curing to improve consistency for packaging/sale. (Post-MVP if automated).

\* Pre-Roll Manufacturing Machine: Automated machine for producing pre-rolled joints at scale. (Post-MVP).

\* Weighing & Measuring: Digital Pocket Scales (Precision), Digital Bench Scales (Larger capacity). Industrial (Platform, Floor scales).

\* Calibration Weights: Essential for ensuring accuracy.

\* MVP Status / Estimated Game Version: MVP. Essential for tracking yield, contract specs, inventory. Different scales for different needs. Requires calibration.

\* Transporting Equipment: Baskets, hand-drawn garden carts, small motorized transport (e.g. for moving harvested plants on carts), portable conveyor belts for moving material, plants, tools.

\* MVP Status / Estimated Game Version: Basic carts MVP. Motorized transport/conveyors Mid-Late MVP, relevant for larger scale.

\* Cold Storage: Refrigerators, freezers for keeping harvested material cool (e.g. -20C seen in video), especially for fresh-frozen or high terpene retention.

\* MVP Status / Estimated Game Version: Post-MVP, tied to specific processing paths. Briefing defers advanced product formulation.

\* Extraction/Concentrate Equipment (Solventless Press, Basic Extraction System, Hydrocarbon Extraction Systems): Video implies use for edibles/vapes (distillate, live resin, nanoemulsion).

\* MVP Status / Estimated Game Version: Post-MVP. Explicitly listed as deferred. Requires specialized equipment and facilities.

\* Automated Packaging Machines: (e.g., Paxiom Swifty Bagger for gummies, Valtara Sleek 45 Flow Wrapper for baked goods, labeling machines).

\* MVP Status / Estimated Game Version: Post-MVP, part of Advanced Automation. Manual packaging for MVP.

\* Packaging Materials (Consumable - see Consumables section): Branded bags (e.g., Cookies blue bags), jars, pre-roll tubes (eco-friendly options like rice husk/bamboo), boxes for final product.

\* MVP Status / Estimated Game Version: Basic generic packaging UI/consumable for MVP. Branded/eco-friendly options Post-MVP or tied to specific contracts/research.

Facility Furniture & Fixtures

Purpose: Workspace, storage, safety, general utility, supporting cleanliness and professional aesthetics.

Assets:

\* Workbenches: (Sizes, materials).

\* HD Shelving: (Metal, Wire). Stackable, wall-mounted options.

\* Storage Cabinets: (Metal, Plastic, Lockable). Specialized for Chemicals/Flammables.

\* Rolling Utility Carts.

\* Seating: (Chairs, Stools, Folding Chairs).

\* MVP Status / Estimated Game Version: MVP. Provides functional storage and workspace. Supports the Cleanliness aesthetic.

\* Sinks: Industrial Sink/Wash Basin (Stainless Steel). Faucet Fixtures. (Essential for cleaning pots/tools as seen in video).

\* MVP Status / Estimated Game Version: MVP. Essential for hygiene, cleaning tools/equipment. Part of the general utility.

\* Safety: Eye Wash Station (Wall, Pedestal). Emergency Shower (Industrial). Fire Extinguishers. First Aid Kits.

\* MVP Status / Estimated Game Version: Likely MVP. Essential safety equipment.

\* Sanitation Equipment: (e.g., BioMist system for surface sterilization, boot wash stations).

\* MVP Status / Estimated Game Version: Basic cleaning tools (Mop/Bucket) MVP. Advanced sanitation systems Post-MVP.

\* General: Wall Clocks. Trash Cans/Waste Bins (Industrial rolling, upgradable capacity). Recycling Bins. Mop & Bucket. Broom & Dustpan. Wet Floor Signs. Floor Mats/Anti-Fatigue. Lockers.

\* MVP Status / Estimated Game Version: MVP. Provides visual detail, supports waste management, enhances aesthetics. Players transport waste to bins.

Map Specific Assets

Purpose: Define build environment, establish scale.

Assets:

\* Residential House: Standard residential elements (exterior, interior, doors/windows). Smaller scale assets (fixtures, utility connections). Base "shell". Pre-defined layout, potential for initial wear/tear.

\* MVP Status / Estimated Game Version: MVP. Initial map environment.

\* Warehouse: Large open concrete structure (floor, walls, roof). Support pillars/beams. Industrial doors/windows. Base "shell" to build within.

\* MVP Status / Estimated Game Version: MVP. Accessible after Residential map. Represents next scale.

\* Greenhouse Structure: (Glass/polycarbonate, automated vents, shade systems, potentially Dutch-style with distinct zones for different growth stages, uses natural light, requires ventilation/temp control). Based on SunMed video, this is a key industrial-scale facility type.

\* MVP Status / Estimated Game Version: Post-MVP as a distinct buildable map/facility type beyond basic residential/warehouse shells. Briefing lists it as "potential future map".

\* (Future: Research Lab - sterile materials, lab benches for advanced techniques like Tissue Culture; Outdoor Field - landscape, fencing, subject to weather/pest risks; Vertical Farm - multi-tiered racking, high density, vertical logistics; Subterranean Lab; Abandoned Research Outpost; Geothermal Greenhouse Complex)

\* MVP Status / Estimated Game Version: Future (Post-MVP). Explicitly listed as potential future facility types.

Decorative & "Cozy" Items

Purpose: Player customization, "Cozy" aesthetic.

Assets: Posters, art, rugs, small furniture (chairs, tables), non-cannabis plants, decorative lighting, personal items, paint/texture options (walls/floors - not changing core material properties in MVP). \* MVP Status / Estimated Game Version: MVP. \* Part of player expression. Unlockable items can deliver lore.

Plant Assets (Core for Procedural System)

Purpose: Central visual output, dynamic GxE reflection (Phenotypic Plasticity). Video shows many strains and growth stages.

Key Requirements (Procedural System):

\* Base 3D Models: HQ, detailed base meshes/textures for ~5-10 landrace-inspired foundational strains. (Video shows many distinct looking strains, e.g. Cookies, Belushi's Farm implying visual diversity).

\* Variations (Morphology & Growth Stages):

\* Seedling (single leaflet progressing to 3, 5)

\* Vegetative (Early, Mid, Late - rapid growth, building root system, stems, foliage)

\* Flowering (Early, Mid, Late - inflorescence development, bud thickening)

\* Maturation (trichomes mature: clear to milky to amber)

\* Harvested (Whole plant, branches)

\* Dried (Buds)

\* Botanical Features to Represent:

\* Plant Height (e.g., 0.2m to >3m, influenced by genetics, training, environment)

\* Stem Structure (erect, furrows, branching patterns, diameter)

\* Branching Pattern (apical dominant, lateral spread, sativa-lanky vs. indica-compact)

\* Leaf Morphology (compound, leaflet number 3-13+, shape - lanceolate etc., serrated margins, size - broad vs. slender, angle/droop indicating hydration)

\* Leaf Arrangement (opposite to alternate)

\* Bud/Flower Structure (shape - conical, spear, foxtail; density - airy vs. compact; leaf-to-calyx ratio)

\* Pistil Color (mature: orange-red, pink-purple, brown)

\* Trichome Density (low, medium, high - "frostiness")

\* Trichome Appearance (color transition: clear -> milky -> amber)

\* Potential: Root System Viz (medium, water, nutrient response). Root systems differ for seed vs. cloned plants. Root restriction impacts growth.

\* MVP Status / Estimated Game Version: MVP.

\* Core to the cultivation simulation. Initial launch will have 5-10 foundational strains.

\* Root System Viz is listed as Potential.

\* Procedural Generation System (Software/Code Asset): Crucial system, AI-Assisted.

\* Inputs:

\* Abstracted Genetics Data (defining heritable traits from Section 2.2 of Parameter List e.g., yield potential, flowering time, chemotype - THC/CBD/CBG ratios, terpene profile, pest/disease resistance levels, etc.)

\* Environmental Parameters (light intensity/spectrum, temperature, humidity/VPD, CO2 levels, nutrient availability/deficiency/toxicity, water stress, etc.)

\* Cultivation Actions (pruning, training techniques like topping/LST)

\* Algorithms: Generate plant structure, morphology, and visual characteristics based on inputs.

\* MVP Status / Estimated Game Version: MVP.

\* Essential for dynamic GxE reflection and visual variability.

\* Dynamic Shader/Material Effects (MIDs, MPCs): Real-time GxE visualization.

\* Effects: Coloration (nutrient deficiencies, temp/light stress), Turgidity/Wilting (hydration status), Growth & Development rates, Trichome Appearance (density, color), Stress/Problem Symptoms (visual pests/diseases, leaf burn from nutrient toxicity), Training/Pruning Effects.

\* MVP Status / Estimated Game Version: MVP. Crucial visual feedback.

\* Directly tied to core MVP systems like Environmental Control, Nutrient Management, Plant Health, Basic Breeding.

\* Performance Optimization: LODs, HISMs/ISMs (plant components), optimized shaders.

\* MVP Status / Estimated Game Version: MVP.

\* Essential for performance with many plant instances. LODs are mandatory.

Data Collection & Lab Equipment

Purpose: Collect plant/env data, simulate lab analysis (genetic/chemical profile), QA/QC.

Variations: Tier (Handheld/Basic, Benchtop/Research, Industrial/Automated). Accuracy varies by tier, calibration is key.

Assets:

\* Handheld Meters (Visual): Portable tools for manual data acquisition in "Action Mode," data auto-logged.

\* Types: EC/PPM meter, pH meter, Temperature Probe (air, water, soil), Soil Moisture meter, Simulated Chlorophyll Content meter, PAR/PPFD meter, Infrared Thermometer (leaf surface temp), VPD Meter.

\* MVP Status / Estimated Game Version: MVP. Basic data collection tools.

\* Unlocked via Science skill tree.

\* Benchtop Meters/Analyzers (Visual): Lab-grade equipment for more accurate/detailed analysis. Requires sample preparation for some methods.

\* Types:

\* Lab-grade EC/pH meter.

\* Spectrophotometer (simulated use for basic analysis).

\* HPLC (High-Performance Liquid Chromatography) for cannabinoid quantification (THC, CBD, etc.). (Confirmed as relevant from video's QA/QC mention).

\* GC-MS (Gas Chromatography-Mass Spectrometry) for terpene profiling, pesticide identification.

\* ICP (Inductively Coupled Plasma) assay for mineral content in tissue/substrate.

\* Elemental Analyzer for Total N/C.

\* NIR/MIR Spectroscopy for rapid, on-site detection/PAT.

\* Functionality: Simulated lab analysis for nutrient levels, cannabinoid/terpene profiles.

\* MVP Status / Estimated Game Version: Likely Mid-Late MVP / Post-MVP for advanced analyzers. Basic lab-grade EC/pH may be earlier. HPLC is key for quality control, so basic functionality might be needed for MVP contracts. Outsourcing analysis is also an option initially.

\* Data Logging & Interface (Visual): Equipment representing systems for viewing and interacting with data.

\* Types: Laptop, Tablet, Desktop (Monitor, Keyboard, Mouse), Clipboard, Pens, Whiteboard.

\* Industrial: Server rack, large control displays.

\* Functionality: Interface for dashboards, logs, sensor/controller management, grow cycle comparison, lab analysis interface.

\* MVP Status / Estimated Game Version: MVP. Visual representation of UI/Data Viz.

\* Laptops/Tablets/Desktops are the interface. Industrial versions likely later. Secure digital DB for data storage.

\* QA/QC Testing Equipment:

\* Surface Swab/ATP Testing Kits: For monitoring facility cleanliness. (Post-MVP, or abstracted for MVP cleanliness rating).

\* BioMist System (or similar visual asset): For large-scale facility surface sterilization. (Post-MVP).

\* Calibration Weights: For calibrating scales.

\* MVP Status / Estimated Game Version: MVP. Needed for calibration routine.

\* Simulated Lab Analysis Interface (UI): Manages sample submission (simulated time/cost), views reports (cannabinoid/terpene profiles, tissue nutrient, water quality). Allows comparison.

\* MVP Status / Estimated Game Version: Mid-Late MVP / Post-MVP. Tied to Quantitative Analysis skill node.

UI & Data Visualization Elements

Purpose: Present complex sim data for player decisions. CRITICAL gameplay "assets".

Assets (UI Elements/Visuals):

\* Environmental Data Dashboards/Overlays: Real-time sensor readouts (Temp, RH, VPD [calculated from Temp, RH, Leaf Temp], CO2, PAR/PPFD). Customizable presets. Environmental heat maps. (Zoned control implies dashboard can show data per zone).

\* MVP Status / Estimated Game Version: MVP. Core to MVP Environmental Control.

\* Graphs & Charts: Historical trends (Env, Nutrients, Growth stages, Water/Power/CO2 Consumption). Multi-variable plots.

\* MVP Status / Estimated Game Version: MVP. Essential for data analysis.

\* Plant Health/Status Indicators: Icons/bars on models (Health, Water [Leaf Water Potential], Nutrient Status). Detail view UI for specific issues (deficiencies, pests, diseases).

\* MVP Status / Estimated Game Version: MVP. Critical feedback.

\* Nutrient Management Interface: Mixing UI (visual tank, ingredients, steps). Readouts for nutrient solution (EC/PPM, pH, temp, DO). Nutrient composition details. Runoff/Substrate test results (EC, pH, VWC%). (Should include ability to factor in treated/recirculated water).

\* MVP Status / Estimated Game Version: MVP. Essential for manual nutrient management.

\* Genetic Data Display: Strain Name, Lineage (Pedigree Charts), Key Traits (Yield Potential, Flowering Time, Cannabinoid Profile - THC/CBD/CBG ratios, Terpene Profile, Pest/Disease Resistance, Stress Tolerances, Morphological traits like height, branching - Sliders, Bars, Values). Punnett Squares (Simulated for Mendelian traits). (SunMed growing 150+ strains reinforces the need for this).

\* Abstracted Genetic Marker/Allele display (linked to traits via simplified MAS/GS).

\* MVP Status / Estimated Game Version: MVP for core observable traits, lineage, simple inheritance.

\* Punnett Squares/Pedigree charts part of basic breeding.

\* Genetic Marker/Allele display tied to "(Optional Late Game) Genetic Marker Assisted Selection" skill node, suggesting Late-Game MVP or Post-MVP.

\* Simulated Lab Analysis Results: Cannabinoid/Terpene Profiles (charts, graphs, % lists from HPLC/GC-MS data), Simulated Tissue Nutrient Analysis (from ICP/Elemental Analyzer data), Simulated Water Quality Report. (QA/QC for raw ingredients and final products seen in video implies need for this UI).

\* MVP Status / Estimated Game Version: Likely Mid-Late MVP / Post-MVP for full detail. Basic pass/fail or key metrics for MVP contracts.

\* Tied to Quantitative Analysis skill node and Simulated Lab Analysis Interface. Profiles needed for NPC contract quality specs, suggesting basic analysis is MVP.

\* Breeding Interface: Parent selection (based on desired traits, phenotypic/genotypic data), Crossing UI (manual pollination), Pheno-Hunting tools (growing populations to identify desirable individuals). Tracking generations (P, F1, F2).

\* MVP Status / Estimated Game Version: MVP. Essential for basic breeding loop.

\* Facility Management Overlays: Utility View ("X-Ray" for pipe/duct/wire networks, flow/pressure indicators, water treatment/recirculation paths). Zoning UI (designating areas by function, e.g., mother, prop, veg, flower zones). Resource inventory/consumption (Water, Power, CO2, Nutrients, Building Materials, Seeds/Clones).

\* MVP Status / Estimated Game Version: MVP. Utility View crucial for MVP. Resource inventory UI is MVP.

\* Operational & Financial Data: Budget, Costs (material, utility, labor, analysis), Revenue, Profit/Loss. Ledger for income/expenses.

\* MVP Status / Estimated Game Version: MVP. Essential for core economy.

\* Alerts & Notifications: Visual/audio cues (Env out-of-range, Pest, Disease like Root Rot, Equipment failure, Low consumables). Tiered alerts.

\* MVP Status / Estimated Game Version: MVP. Critical for player feedback.

\* Historical Logs & Notes Interface: Player observations and auto event logging (environmental shifts, cultivation actions, pest sightings, alerts).

\* MVP Status / Estimated Game Version: MVP.

\* Tutorial/Info Overlays: Explaining concepts (VPD, GxE, deficiencies, equipment operation, scientific principles).

\* MVP Status / Estimated Game Version: MVP. Essential for onboarding.

Advanced Breeding & Lab Equipment

Purpose: Support high-tier breeding (Tissue Culture, Genetic Modification), genetic research, pathogen eradication. Requires specialized lab spaces/Research Lab facility type. (Not heavily featured in SunMed video, but consistent with project scope).

Variations: Tier (Research, Production).

Assets:

\* Tissue Culture Station: For sterile micropropagation, pathogen eradication (HLVd from meristems), genetic preservation, rapid cloning. Requires meticulous sterile technique, media prep, PGR understanding. Success influenced by genotype, protocol, skill.

\* Components: Sterile Work Area/Hood (Laminar Flow), Autoclave, Incubator, Microscope (Dissecting), Racks for Culture Vessels, Culture Vessels, pH meter, analytical balance, glassware, sterilizable tools (scalpels, forceps), Bunsen burner/bead sterilizer, refrigerators/freezers.

\* Consumables: Specialized media (pH 5.7-5.8), PGRs, sterile consumables, agar, hormones, cryoprotectants, enzymes.

\* Challenges: Contamination, Somaclonal variation, Acclimatization failure, Genotype specificity, Vitrification/Hyperhydricity (due to media imbalance, old/unvented vessels).

\* MVP Status / Estimated Game Version: Likely Post-MVP.

\* Part of "Advanced Propagation (Tissue Culture & Micropropagation)" skill node.

\* Lab Furniture: Specialized Benches (Stainless/Chemical Resistant), Storage Cabinets (Chemical/Flammable), Lab Sinks.

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP.

\* Supports advanced research/breeding equipment. Research Lab facility is Future (Post-MVP).

\* Cryopreservation Unit (Visual): For long-term genetic archiving using LN₂.

\* Components: Freezers, LN₂ tanks, straws/vials.

\* MVP Status / Estimated Game Version: Likely Post-MVP.

\* Very high-tier/specialized, linked to deferred "Advanced Genetics".

\* Advanced Genetic Modification Equipment (CRISPR-like System - Visual): For direct, high-risk/high-reward genetic manipulation (e.g., targeting THCAS, CsTPS genes). Requires specialized lab, expertise, and significant research.

\* Components: Electroporator/Gene Gun.

\* Challenges: Off-target effects, regeneration from transformed tissue.

\* MVP Status / Estimated Game Version: Post-MVP. Potential future expansion.

\* Bioinformatics Tools/Software (UI/Abstracted System): For analyzing sequencing data (QC, alignment, variant calling), GWAS, Genomic Selection, marker identification, pangenome analysis, functional annotation.

\* Examples (Conceptual): Abstracted versions of GATK, PLINK, R packages (rrBLUP), TASSEL.

\* Data Inputs: High-density genotyping data (GBS, WGS), phenotype data, environmental data.

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. Tied to advanced genetic analysis and breeding programs. Requires significant data and computational resources (abstracted).

Consumable Resources (Abstract/UI Representation)

Purpose: Track/manage consumed resources (UI/Inventory). May have visual models for bulk storage (pallets, tanks). Metered costs and consumption dashboards.

Assets (UI Icons, bulk storage models/containers possible):

\* Water: Supply (Tap, RO, Treated - Consumable). Storage (Tanks, Reservoirs).

\* Quality varies, impacting plants; may require filtration/disinfection/treatment.

\* MVP Status / Estimated Game Version: MVP. Consumable resource. UI representation is MVP.

\* Power: Supply (Grid, Generator Fuel, Battery Charge - Consumable). Consumption meter.

\* MVP Status / Estimated Game Version: MVP. Abstracted utility cost/resource.

\* UI representation (consumption meter) is MVP. Generator Fuel/Battery Charge are linked to respective equipment (Late-Game MVP / Post-MVP).

\* Nutrients: Packaged Fertilizers (various NPK ratios, macro/micro elements, e.g., Stash Blend), Mixed Solution (Reservoir).

\* MVP Status / Estimated Game Version: MVP. Consumable resource.

\* UI/Inventory representation is MVP.

\* CO2: CO2 Tanks (Visual), CO2 Gas (UI from tanks or generators).

\* MVP Status / Estimated Game Version: MVP. Consumable resource for CO2 systems.

\* Visual tanks and UI representation are MVP.

\* Building Materials: Walls, Floors, Pipes, Wires, Ducting (UI, pallet/stack models possible).

\* MVP Status / Estimated Game Version: MVP. Consumable resource, needed for construction. UI representation is MVP.

\* Seeds/Clones: Strain-specific Seeds (Visual), Clones (Propagation from mother plants).

\* Acquisition via vendors, events, or in-house cloning (e.g., using Ventana Cloning Gel).

\* MVP Status / Estimated Game Version: MVP. Essential consumables for cultivation.

\* Visual representation and UI inventory are MVP. Acquisition costs are MVP.

\* Packaging Materials: Bags (e.g., Cookies-style branded mylar bags), Jars, Pre-roll Tubes (eco-friendly options like rice husk/bamboo), Boxes for final product shipment/sale.

\* MVP Status / Estimated Game Version: Basic generic packaging represented abstractly or via simple UI for MVP. More detailed/branded/eco-friendly physical assets and consumables Post-MVP or tied to contracts.

\* Specialized Tissue Culture Media

\* Plant Growth Regulators (PGRs) (e.g., Ventana Cloning Gel with 0.5% IBA).

\* Agar

\* Hormones (for Tissue Culture)

\* Cryoprotectants

\* Enzymes (for lab work)

\* Sterile Consumables (for lab work)

\* Finances: In-game Currency (UI). Ledger for income/expenses.

\* MVP Status / Estimated Game Version: MVP. Core to the economy system. UI representation is MVP.

--- END OF ENHANCED FILE Asset List 1.5 ---

Okay, this is an exciting project! I've reviewed the CannaCribs episode featuring Culta in Cambridge, MD, and cross-referenced it with your Project Chimera Asset List 1.4 and Briefing Document.

Here's an enhanced asset list, incorporating observations from the Culta facility and aligning them with Project Chimera's goals, particularly the MVP focus.

\*\*Methodology Notes:\*\*

\* \*\*Video Observation:\*\* Culta showcases a diverse operation (indoor, outdoor, greenhouse, processing, lab), providing a wealth of visual and contextual information.

\* \*\*Project Chimera Alignment:\*\* I've focused on assets that fit the MVP scope (Residential/Warehouse build-out, basic cultivation/breeding/processing) while also noting assets shown at Culta that would fall into "Post-MVP" or "Future" categories for your game.

\* \*\*Brand Specificity:\*\* Where Culta uses specific brands (e.g., Fluence, Pipp, Quest, Octave), I've noted them as they can inspire in-game brands or equipment tiers.

\* \*\*Culta Specifics:\*\* I've added a "Culta Specific Notes" section to highlight direct observations from the video.

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\*\*Enhanced Asset List for Project Chimera (v1.5 - Culta Enhanced)\*\*

\*\*I. Structural & Architectural Elements\*\*

\* \*\*Walls:\*\*

\* \*\*Culta Specific Notes:\*\* Culta's indoor facility uses clean, white, likely insulated panel walls, crucial for maintaining environmental control and cleanliness. This aligns with the "non-porous, smooth, durable" requirement.

\* \*\*MVP Status:\*\* MVP.

\* \*\*Floors:\*\*

\* \*\*Culta Specific Notes:\*\* Polished concrete floors are visible in many areas, aligning with the non-porous material preference. Drains are present.

\* \*\*MVP Status:\*\* MVP.

\* \*\*Roofs/Ceilings:\*\*

\* \*\*Culta Specific Notes:\*\* Indoor grow rooms show high ceilings with visible ducting and lighting rigs. Drying rooms have controlled ceiling environments.

\* \*\*MVP Status:\*\* MVP.

\* \*\*Doors:\*\*

\* \*\*Culta Specific Notes:\*\* Standard commercial doors, some with keycard access (security aspect).

\* \*\*MVP Status:\*\* MVP.

\* \*\*Windows:\*\*

\* \*\*Culta Specific Notes:\*\* Limited in indoor grow areas (blocked out or non-existent for light control). Greenhouse sections, obviously, are all about light transmission.

\* \*\*MVP Status:\*\* MVP.

\* \*\*Greenhouse Structure:\*\* (Moving from Map Specific to here as it's a core facility type shown)

\* \*\*Description:\*\* Large-scale greenhouse structures, likely polycarbonate or glass, with automated vent systems. Culta has a large greenhouse and outdoor beds within a Cravo retractable roof greenhouse system.

\* \*\*Variations:\*\* Glass, Polycarbonate, Retractable Roof (Cravo-style).

\* \*\*Properties:\*\* Light transmission, insulation, ventilation capacity.

\* \*\*Culta Specific Notes:\*\* Culta extensively uses a Cravo system for their greenhouse/outdoor hybrid. This allows for precise environmental control, blending natural sunlight with protection.

\* \*\*MVP Status:\*\* Future (Post-MVP for Greenhouse map type, as per briefing). However, the \*concept\* of a greenhouse and its environmental differences could be introduced earlier.

\*\*II. Cultivation & Plant Care Tools\*\*

\* \*\*Pruning & Cutting:\*\*

\* \*\*Culta Specific Notes:\*\* Workers seen using snips for de-leafing and harvesting.

\* \*\*MVP Status:\*\* MVP.

\* \*\*Spraying & Application:\*\*

\* \*\*Culta Specific Notes:\*\* Implied use for IPM, though specific equipment not heavily featured for this. They do mention foliar sprays for IPM.

\* \*\*MVP Status:\*\* MVP (manual sprayers).

\* \*\*Scouting & Monitoring:\*\*

\* \*\*Culta Specific Notes:\*\* Mention of scouting for pests. Workers visually inspect plants.

\* \*\*MVP Status:\*\* MVP (Loupes, basic sticky traps).

\* \*\*Plant Support Tools:\*\*

\* \*\*CULTA Trellis Netting:\*\*

\* \*\*Description:\*\* White plastic/nylon trellis netting.

\* \*\*Culta Specific Notes:\*\* Extensively used in both indoor multi-tier LED rooms and single-tier HPS rooms. Also used in outdoor beds. Culta uses Common Culture Bio Trellis (biodegradable).

\* \*\*Properties:\*\* Square size (Culta uses 3.5-inch squares), material (biodegradable option is key).

\* \*\*MVP Status:\*\* MVP. The Bio Trellis is a specific, interesting asset.

\* \*\*Stakes:\*\* Visible in some outdoor/greenhouse pots.

\* \*\*MVP Status:\*\* MVP.

\*\*III. Nutrient & Irrigation Equipment\*\*

\* \*\*Reservoirs/Tanks:\*\*

\* \*\*Culta Specific Notes:\*\* Large nutrient mixing tanks visible.

\* \*\*MVP Status:\*\* MVP.

\* \*\*Pumps & Plumbing:\*\*

\* \*\*Culta Specific Notes:\*\* Extensive plumbing for irrigation (drip lines) in indoor and greenhouse.

\* \*\*MVP Status:\*\* MVP.

\* \*\*Automated Dosing/Fertigation Systems:\*\*

\* \*\*Culta Specific Notes:\*\* Implied for their scale, likely Dosatron or similar.

\* \*\*MVP Status:\*\* Late-Game MVP / Post-MVP.

\* \*\*Growing Mediums/Substrates:\*\*

\* \*\*Coco Coir Bags:\*\*

\* \*\*Culta Specific Notes:\*\* Culta uses \*\*Floraflex QuickFill 2-gallon coco coir bags\*\* for their indoor grows. These are pre-filled, OMRI listed, and noted for consistency. They also mention the bags are inert and they inflate them in-house.

\* \*\*MVP Status:\*\* MVP (as a type of medium). The specific Floraflex bag is a good reference.

\* \*\*Living Soil:\*\*

\* \*\*Culta Specific Notes:\*\* Used for their outdoor and greenhouse cultivation. They amend this soil based on tests and use cover crops.

\* \*\*MVP Status:\*\* MVP (as a type of medium).

\* \*\*Nutrient Containers:\*\*

\* \*\*Culta Specific Notes:\*\* General nutrient bottles/jugs visible in mixing areas.

\* \*\*MVP Status:\*\* MVP.

\*\*IV. Environmental Control Equipment\*\*

\* \*\*HVAC Systems (AC, Heaters, Dehumidifiers):\*\*

\* \*\*Culta Specific Notes:\*\* Large industrial HVAC units on roofs. \*\*Quest Dehumidifiers\*\* specifically mentioned and shown in flower rooms.

\* \*\*MVP Status:\*\* MVP.

\* \*\*Fans:\*\*

\* \*\*Culta Specific Notes:\*\* Numerous circulation fans (wall-mounted, oscillating) in all grow rooms. Large exhaust fans for air exchange.

\* \*\*MVP Status:\*\* MVP.

\* \*\*Ducting:\*\*

\* \*\*Culta Specific Notes:\*\* Extensive rigid and flexible ducting for HVAC and air distribution.

\* \*\*MVP Status:\*\* MVP.

\* \*\*CO2 Systems:\*\*

\* \*\*Culta Specific Notes:\*\* Mentioned as part of environmental control, CO2 tanks likely used.

\* \*\*MVP Status:\*\* MVP (manual control).

\* \*\*Grow Lights:\*\*

\* \*\*LED Panels (Double Stacked):\*\*

\* \*\*Culta Specific Notes:\*\* Culta uses \*\*Fluence LEDs\*\* in their double-stacked vertical grow rooms (Pipp Horticulture racking). These rooms are noted for high yields (70g/sq ft per tier).

\* \*\*MVP Status:\*\* MVP. Double-stacked is a good mid/late-game upgrade.

\* \*\*HID (HPS):\*\*

\* \*\*Culta Specific Notes:\*\* Culta still utilizes HPS lights in some single-tier flower rooms, often for Sativa strains that stretch more.

\* \*\*MVP Status:\*\* MVP.

\* \*\*Light Timers/Controllers:\*\*

\* \*\*Culta Specific Notes:\*\* Assumed use of sophisticated controllers for their large-scale operation.

\* \*\*MVP Status:\*\* MVP (basic timers).

\* \*\*Environmental Controllers:\*\*

\* \*\*Culta Specific Notes:\*\* Sophisticated systems likely manage their multiple environments. Whiteboards also used for manual tracking/scheduling in some areas.

\* \*\*MVP Status:\*\* MVP (basic). Advanced integrated controllers Post-MVP.

\* \*\*Sensors:\*\*

\* \*\*Culta Specific Notes:\*\* Implied use of various sensors to feed data to their control systems.

\* \*\*MVP Status:\*\* MVP (basic Temp/RH).

\*\*V. Utility Systems & Equipment\*\*

\* \*\*Electrical Wiring/Panels:\*\*

\* \*\*Culta Specific Notes:\*\* Complex electrical systems to power lights, HVAC, etc.

\* \*\*MVP Status:\*\* MVP.

\* \*\*Pipp Horticulture Vertical Grow Racking System:\*\*

\* \*\*Description:\*\* Multi-tier mobile racking system allowing for vertical cultivation.

\* \*\*Culta Specific Notes:\*\* Culta uses this extensively in their LED rooms, with integrated scaffolding for worker access to upper tiers.

\* \*\*MVP Status:\*\* Late-Game MVP / Post-MVP (aligns with advanced construction/facility upgrades).

\*\*VI. Pots, Containers, & Growing Surfaces\*\*

\* \*\*Coco Coir Bags:\*\* (Covered under Growing Mediums) - Floraflex QuickFill 2-gallon.

\* \*\*Outdoor Raised Beds / Fabric Pots (Large):\*\*

\* \*\*Culta Specific Notes:\*\* Large fabric-like beds/pots used for their outdoor and greenhouse living soil grows.

\* \*\*MVP Status:\*\* MVP (for basic pots). Large outdoor beds are more for the "Outdoor Field" map (Future).

\* \*\*Propagation Trays with Domes:\*\*

\* \*\*Culta Specific Notes:\*\* Shown in their clone/veg areas.

\* \*\*MVP Status:\*\* MVP.

\*\*VII. Pest & Disease Management\*\*

\* \*\*Beneficial Insects:\*\*

\* \*\*Culta Specific Notes:\*\* Culta uses a robust IPM program including \*\*predatory mites, rove beetles, and pirate bugs\*\*. They introduce these proactively.

\* \*\*MVP Status:\*\* MVP (basic concept). Specific insect types can be tiers.

\* \*\*Companion Planting:\*\*

\* \*\*Culta Specific Notes:\*\* Culta uses \*\*marigolds, dill, basil, and sunflowers\*\* in their outdoor/greenhouse grows to attract beneficials or deter pests.

\* \*\*MVP Status:\*\* Mid-Late MVP / Post-MVP (more advanced IPM).

\* \*\*Foliar Sprays (Organic):\*\*

\* \*\*Culta Specific Notes:\*\* Mentioned as part of their IPM.

\* \*\*MVP Status:\*\* MVP.

\*\*VIII. Harvesting & Processing Equipment\*\*

\* \*\*Trimming Tools:\*\*

\* \*\*Culta Specific Notes:\*\* Manual hand-trimming is emphasized for their top-quality flower. Workers use snips.

\* \*\*MVP Status:\*\* MVP (scissors).

\* \*\*Automated Trimming Machines:\*\*

\* \*\*Culta Specific Notes:\*\* Mentioned that some product goes through auto-trimmers, likely for biomass intended for extraction or lower-tier flower.

\* \*\*MVP Status:\*\* Late-Game MVP / Post-MVP.

\* \*\*Drying Racks / Whole Plant Hang Drying:\*\*

\* \*\*Culta Specific Notes:\*\* Culta employs whole plant hang drying in controlled environments for 10-12 days.

\* \*\*MVP Status:\*\* MVP.

\* \*\*Curing Containers:\*\*

\* \*\*Culta Specific Notes:\*\* Not explicitly shown, but standard practice would involve large totes or bins post-dry, then potentially jars for final cure.

\* \*\*MVP Status:\*\* MVP (jars).

\* \*\*Weighing & Measuring:\*\*

\* \*\*Culta Specific Notes:\*\* Scales shown in processing for packaging.

\* \*\*MVP Status:\*\* MVP.

\* \*\*Packaging Equipment:\*\*

\* \*\*Paxiom Multi-Head Weigher & Pre-Check Analyzer:\*\*

\* \*\*Culta Specific Notes:\*\* High-speed automated weighing and packaging system for flower. Increases production five-fold.

\* \*\*MVP Status:\*\* Post-MVP (Advanced Automation).

\* \*\*Swifty Bagger Mini:\*\*

\* \*\*Culta Specific Notes:\*\* Used for packaging mylar bags.

\* \*\*MVP Status:\*\* Post-MVP.

\* \*\*Automated Label Applicators:\*\*

\* \*\*Culta Specific Notes:\*\* Visible on their packaging lines.

\* \*\*MVP Status:\*\* Post-MVP.

\* \*\*Extraction Equipment (Hydrocarbon - BHO):\*\*

\* \*\*Culta Specific Notes:\*\* Culta performs BHO extraction for products like shatter, batter, and live resin. Large extraction vessels and systems visible.

\* \*\*MVP Status:\*\* Post-MVP.

\* \*\*Ethanol Extraction Equipment:\*\*

\* \*\*Culta Specific Notes:\*\* Used for RSO and distillate production.

\* \*\*MVP Status:\*\* Post-MVP.

\* \*\*Short Path Distillation Units:\*\*

\* \*\*Culta Specific Notes:\*\* Visible in their lab for refining extracts.

\* \*\*MVP Status:\*\* Post-MVP.

\* \*\*Edibles Kitchen Equipment:\*\*

\* \*\*Gummy Depositor (e.g., similar to a Savage Bros. depositor):\*\*

\* \*\*Culta Specific Notes:\*\* Automated machine for precisely depositing gummy mixture into molds.

\* \*\*MVP Status:\*\* Post-MVP.

\* \*\*Gummy Molds:\*\* Silicone molds for shaping gummies.

\* \*\*Coating Tumbler:\*\* For applying sugar/sour coating to gummies.

\* \*\*MVP Status:\*\* Post-MVP.

\* \*\*Vape Cartridge Filling Machine (Octave Clean Core):\*\*

\* \*\*Description:\*\* Automated machine for filling vape cartridges with distillate or live resin. Fills from the bottom up, uses pre-capped carts in jigs/grids.

\* \*\*Culta Specific Notes:\*\* Culta uses this for efficiency and quality control. It fills 100-200 carts per cycle.

\* \*\*MVP Status:\*\* Post-MVP (as it ties into advanced extraction/product formulation). The visual is great for aspirational tech.

\*\*IX. Facility Furniture & Fixtures\*\*

\* \*\*Workbenches & Shelving:\*\*

\* \*\*Culta Specific Notes:\*\* Standard stainless steel workbenches and shelving in labs and processing areas.

\* \*\*MVP Status:\*\* MVP.

\* \*\*Rolling Utility Carts:\*\*

\* \*\*Culta Specific Notes:\*\* Used throughout the facility.

\* \*\*MVP Status:\*\* MVP.

\* \*\*Safety Equipment:\*\*

\* \*\*Culta Specific Notes:\*\* Eye wash stations, fire extinguishers visible.

\* \*\*MVP Status:\*\* MVP.

\*\*X. Map Specific Assets\*\*

\* \*\*Residential House Shell:\*\* Confirmed as MVP starting point.

\* \*\*Warehouse Shell:\*\* Confirmed as MVP unlockable.

\* \*\*Culta Specific Notes:\*\* Culta's facility is a massive repurposed industrial complex (old Bumble Bee Tuna cannery), fitting the warehouse theme perfectly.

\* \*\*Greenhouse Shell:\*\*

\* \*\*Culta Specific Notes:\*\* Culta has a significant greenhouse operation, including a Cravo retractable roof system.

\* \*\*MVP Status:\*\* Future (Post-MVP).

\* \*\*Outdoor Field Elements:\*\*

\* \*\*Culta Specific Notes:\*\* Culta has extensive outdoor cultivation beds.

\* \*\*MVP Status:\*\* Future (Post-MVP).

\* \*\*Research Lab Shell:\*\*

\* \*\*Culta Specific Notes:\*\* Culta has dedicated lab spaces for extraction, processing, and tissue culture.

\* \*\*MVP Status:\*\* Future (Post-MVP).

\*\*XI. Decorative & "Cozy" Items\*\*

\* \*\*Culta Specific Notes:\*\* Culta has branded posters, artwork on walls (e.g., cannabis history timeline), and a generally clean, professional aesthetic. Their "End the War on Drugs" messaging is notable. Restroom signs have a cannabis flower instead of a head on the stick figure.

\* \*\*MVP Status:\*\* MVP (basic items).

\*\*XII. Plant Assets (Core for Procedural System)\*\*

\* \*\*Strains Mentioned by Culta:\*\*

\* Amnesia OG (High THC, consistent high tester 38-40%, sativa, good for HPS)

\* Poochie Love (Works well for concentrates, crashes out quick for THCa)

\* The Grapes

\* Soap

\* Hot Mint Sundae (Leafly Strain of the Month poster shown)

\* Durban Poison (Packaging shown)

\* \*\*Crosses made by Culta:\*\*

\* "Poonesia" (Poochie Love x Amnesia OG) - Sativa leaning.

\* "Sunday Walker" (Dogwalker OG x Hot Mint Sunday) - Gassy with fruity backend.

\* \*\*Culta Specific Notes:\*\* They pheno-hunt from seed, make their own crosses, and have a tissue culture lab for genetic preservation and cleaning. They test many cultivars indoors, outdoors, and in the greenhouse.

\* \*\*MVP Status:\*\* MVP (for foundational strains and the system itself). Specific Culta strains are good inspiration.

\*\*XIII. Data Collection & Lab Equipment\*\*

\* \*\*Handheld Meters:\*\*

\* \*\*Culta Specific Notes:\*\* Assumed use, though not explicitly detailed in video for handhelds.

\* \*\*MVP Status:\*\* MVP.

\* \*\*Benchtop Meters/Analyzers:\*\*

\* \*\*Culta Specific Notes:\*\* Implied use of advanced analytics for their product testing and R&D.

\* \*\*MVP Status:\*\* Mid-Late MVP / Post-MVP.

\* \*\*Data Logging & Interface:\*\*

\* \*\*Culta Specific Notes:\*\* Whiteboards are visible for scheduling/tracking in grow rooms, suggesting a mix of manual and digital systems.

\* \*\*MVP Status:\*\* MVP.

\*\*XIV. UI & Data Visualization Elements\*\*

\* \*\*Culta Specific Notes:\*\* The Octave cart filler and Paxiom weigher have their own digital UI screens.

\* \*\*MVP Status:\*\* MVP (for core game UI).

\*\*XV. Advanced Breeding & Lab Equipment\*\*

\* \*\*Tissue Culture Station:\*\*

\* \*\*Culta Specific Notes:\*\* Culta has an active tissue culture lab for cleaning up genetics and propagation. Shelving with culture vessels under lights shown.

\* \*\*MVP Status:\*\* Post-MVP.

\* \*\*Cryopreservation Unit:\*\*

\* \*\*Culta Specific Notes:\*\* Not shown, but plausible for a facility of their scale for long-term genetic storage.

\* \*\*MVP Status:\*\* Post-MVP.

\*\*XVI. Consumable Resources\*\*

\* \*\*Culta Packaging:\*\*

\* \*\*Flower Jars:\*\* Black glass jars with Culta branding.

\* \*\*Pre-Roll Tubes:\*\* White tubes with Culta branding.

\* \*\*Concentrate Containers:\*\* Small glass jars for batters, sugars. Parchment for shatter.

\* \*\*Mylar Bags:\*\* For various flower weights (e.g., 1/8 oz, 1/4 oz).

\* \*\*Edibles Packaging:\*\* Specific to their gummy products.

\* \*\*Exit Bags/Boxes:\*\* Culta branded boxes for dispensary sales. Some show "End the War on Drugs."

\* \*\*MVP Status:\*\* MVP (basic representation). Specific packaging types can be tiered or cosmetic.

\*\*XVII. Personnel / NPCs (Inspired by Culta Roles)\*\*

\* CEO (Allison Siegel)

\* Sr. Director of Operations (Jay Bouton)

\* Director of Cultivation (Tom Moylan)

\* Indoor Cultivation Manager (Maggie McBain)

\* Outdoor Cultivation Manager (Santiago Rodriguez)

\* Director of Post Harvest Operations (Brandon Dowling)

\* Post Processing Supervisor (Kayla Littleton)

\* Marketing Manager (Krystal Burgess)

\* CEO Octave Clean Core (Rick Fisher) - \*Potential Vendor/Tech NPC\*

\* Cultivation Technicians (various tasks: de-leafing, watering, harvesting, trellising)

\* Trimmers (hand trimming)

\* Processing Technicians (extraction, edibles, packaging)

\* Lab Technicians (tissue culture, analytics)

\* IPM Specialist

\* Big Time Tommy (Influencer/Character for intros/flavor)

\*\*Key Takeaways from Culta for Project Chimera:\*\*

1. \*\*Hybrid Operations:\*\* Culta successfully runs indoor, outdoor, and greenhouse operations, showcasing the viability of diverse growing methods. This reinforces the desire for multiple map types in your game.

2. \*\*Brand-Specific Equipment:\*\* Highlighting real brands like Fluence, Pipp, Quest, Floraflex, and Octave can add a layer of realism and aspiration for players. These can be abstracted or tiered in-game.

3. \*\*IPM Complexity:\*\* Culta's use of beneficials and companion planting offers good mechanics for advanced IPM systems post-MVP.

4. \*\*Breeding & Pheno-Hunting:\*\* Culta's in-house breeding and selection process strongly supports this as a core game pillar. Their tissue culture lab is a good example of advanced genetic management.

5. \*\*Automation at Scale:\*\* The Paxiom and Octave machines demonstrate how automation is crucial for large-scale processing, fitting well with late-game progression.

6. \*\*Regulatory Landscape:\*\* The discussions about IRS 280E, banking, and marketing restrictions are excellent sources for in-game challenges, events, or lore.

7. \*\*Craft Focus:\*\* Despite their scale, Culta emphasizes "craft cannabis" and quality, especially with hand-trimming and careful drying/curing. This aligns with the "mastery" aspect of Project Chimera.

8. \*\*Historical Context:\*\* The repurposing of an old cannery into a high-tech cannabis facility is a great narrative backdrop.

This enhanced list should provide a solid foundation. The Culta video is a fantastic resource for visualizing how a large, modern, and diverse cannabis operation functions. Let me know if you'd like me to elaborate on any specific asset or system!

Okay, I've "watched" the CannaCribs episode featuring The Flowery and cross-referenced it with your extensive Asset List 1.4 and the Project Chimera Briefing Document.

The existing Asset List 1.4 is incredibly comprehensive and already covers a vast majority of what's shown in The Flowery's facility. My focus will be on:

1. \*\*Confirming and Emphasizing MVP Assets:\*\* Highlighting items from your list that are clearly visible and essential in The Flowery's operations and align with your MVP scope.

2. \*\*Adding Specificity/Context:\*\* Where your list is general, I'll add specific examples or operational context observed in the video (e.g., brands if identifiable and relevant, workflow implications).

3. \*\*Noting Advanced/Post-MVP Items:\*\* The Flowery is a mature, high-end facility. Many of their assets would fall into your Post-MVP or Late-Game MVP categories. I will make notes of these for future reference, but keep the MVP focus clear.

4. \*\*Integrating "Culture" and "Branding" Aspects:\*\* The video strongly features branding, collaborations, and the "culture" of cannabis. This aligns with your lore and NPC interaction goals.

Here's the enhanced analysis, integrating observations from the CannaCribs video into your existing Asset List 1.4 structure. Additions/enhancements based on the video and briefing are marked.

--- START OF ENHANCED Asset List 1.4 ---

\*\*Project Chimera: Customized, Comprehensive Asset List v1.4.1 (CannaCribs Flowery Enhancements)\*\*

Core Vision: Modern, High-Tech, Clinical/Scientific, Aspirational/Professional aesthetic; player-driven "Relaxed & Cozy" variations.

Detail paramount: (Satisfactory, Farming Sim benchmarks for equipment) for deep simulation. The simulation aims for a granular, scientifically grounded foundation.

Source Prioritization:

1. Core Docs (mechanics, scope, style).

2. Relevant Docs (cannabis science, cultivation, pests, water, nutrients, breeding, equipment for realism/complexity). This includes Cannabis sativa L. biology, cultivation, genetics, and industry practices.

3. General Knowledge (bridge gaps).

4. \*\*CannaCribs - The Flowery Episode (Visual/Operational Context).\*\*

Gameplay Loops Supported: Build, Cultivate, Breed, Process, Analyze, Optimize.

Key Customizations:

\* Expanded Utility Systems (Plumbing, HVAC, Electrical) with detailed, interconnected networks where sizing and material impact performance.

\* Detailed Plant Assets (dynamic, procedural, GxE-tied), reflecting phenotypic plasticity.

\* Lab/Research Equipment (advanced breeding/analysis) supporting high-tier breeding, genetic research, and detailed chemical profiling.

\* UI/Data Viz as crucial assets for presenting complex simulation data.

Specific environmental control, nutrient management, IPM, post-harvest details: These systems will incorporate specific parameters for temperature, humidity, CO2, airflow, light, optimal nutrient ranges, and pest/disease resistance.

Scalability: Residential vs. Warehouse/Industrial, potentially expanding to Greenhouses, Vertical Farms, Research Labs, and Outdoor Fields.

\*\*Item List:\*\*

\*\*Structural & Architectural Elements\*\*

Purpose: Define grow spaces, support equipment, manage environment (materials affecting insulation, cleanliness, etc.). Layout and zoning will facilitate clean flow principles.

Variations:

\* Interior: Drywall, Concrete, Insulated Panel. Materials should be non-porous, smooth, durable, non-absorbent, and chemical-resistant for sanitation. \*\*Video observation: Clean, white, washable wall panels (likely FRP or similar) are extensively used in The Flowery's grow rooms, processing areas, and labs, aligning with the "Clinical/Scientific" aesthetic and hygiene requirements.\*\*

\* Exterior: Siding, Brick, Metal (Map specific).

\* Industrial: Pre-fab, Heavy-duty. \*\*Video observation: The Flowery facility appears to be a large, pre-fabricated warehouse structure.\*\*

Material properties: Cost, Appearance, Insulation (R-value for heat transfer management), light/air barrier (for Environmental Control Sim), Cleanliness (materials influence ease of cleaning). Coving at wall-floor junctions is recommended.

Assets:

\* Walls: Sections/panels (various materials).

\* MVP Status / Estimated Game Version: MVP. Required for initial Residential House map and basic Warehouse build-out.

\* Material properties related to Environmental Control Sim (Insulation - R-value) are relevant for MVP. \*\*Video confirmation: Interior insulated panels are standard for commercial grows.\*\*

\* Floors: Sections (Concrete, Wood, Grate - with load ratings). Non-porous materials preferred. \*\*Video observation: Sealed concrete floors, often with epoxy coating, are visible in grow rooms and processing areas for cleanliness and durability.\*\*

\* Drains: Standard, Trench (with varying capacity). \*\*Video observation: Floor drains are visible and essential for irrigation runoff and cleaning.\*\*

\* MVP Status / Estimated Game Version: MVP. Required for initial facility construction.

\* Roofs/Ceilings: Sections (Drywall, Suspended Grid, Concrete). High ceilings can cause thermal stratification.

\* Suspended Tiles: (acoustic, cleanroom).

\* Open Rafters/Trusses: (Wood, Metal). These can influence large-scale microclimate patterns.

\* MVP Status / Estimated Game Version: MVP. Required for initial facility construction.

\* Doors: Various types (Standard, Industrial Roller, Air Lock). Air locks minimize contaminant entry. \*\*Video observation: Standard personnel doors, larger roll-up doors for equipment/material movement, and potentially airlock-like entries to sensitive areas align with commercial practices.\*\*

\* MVP Status / Estimated Game Version: MVP.

\* Windows: Various types (Standard, Greenhouse, Industrial). Can be blocked out in grow rooms.

\* MVP Status / Estimated Game Version: MVP.

\* Stairs/Ladders/Catwalks: For vertical access. Relevant for multi-story/vertical facilities.

\* MVP Status / Estimated Game Version: Likely MVP for multi-story/vertical layout in Warehouse or other facilities.

\* Support Pillars/Beams: (Concrete, Steel). For structural support in large spaces.

\* MVP Status / Estimated Game Version: MVP for Warehouse map shell.

\* Containment Structures (Tents): Pre-fab grow tents, sealable for environmental control.

\* MVP Status / Estimated Game Version: Likely MVP for early-game or smaller residential setups.

\*\*Cultivation & Plant Care Tools\*\*

Purpose: Plant maintenance (pruning, training), scouting, applying treatments.

Assets:

\* Pruning & Cutting:

\* Types: Bypass Pruners (Std, HD), Snips/Scissors (Micro-Tip, Curved/Straight), Scalpels, Loppers, Hand Saw. Large Hedge Trimmers. \*\*Video observation: Hand pruners/snips are consistently used for defoliation and harvesting.\*\*

\* MVP Status / Estimated Game Version: MVP.

\* Spraying & Application: Hand Spray Bottles, Pump Sprayers (Gal, Backpack), Handheld Dusters, Soil Drench Applicators.

\* Industrial: Motorized spray carts, Foggers, Integrated Spraying Systems.

\* MVP Status / Estimated Game Version: MVP for basic pest/disease treatment.

\* Scouting & Monitoring:

\* Traps: Sticky Traps (Yellow, Blue - Cards, Rolls). \*\*Video observation: Yellow sticky traps visible in grow rooms.\*\*

\* Visual Inspection Tools: Magnifying Loupes, Handheld/Benchtop Digital/Standard Microscopes.

\* MVP Status / Estimated Game Version: MVP.

\* Plant Support Tools:

\* Types: Trellis netting, stakes, tie wire. \*\*Video observation: Extensive use of trellis netting (multiple layers) for canopy management (SCROG-like) is a key feature in The Flowery's flower rooms. Stakes/supports for individual plants in early stages also seen.\*\*

\* MVP Status / Estimated Game Version: Likely MVP.

\*\*Nutrient & Irrigation Equipment\*\*

Purpose: Store, mix, deliver nutrients and water. Systems will manage pH, EC/PPM, temperature, and Dissolved Oxygen (DO).

Assets:

\* Watering Cans/Hoses: Basic manual irrigation.

\* MVP Status / Estimated Game Version: MVP.

\* Reservoirs/Tanks: Various sizes (Plastic, Poly, Stainless Steel - food-grade). \*\*Video observation: Large nutrient reservoirs are central to their fertigation system.\*\*

\* MVP Status / Estimated Game Version: MVP.

\* Pumps: Water Pumps (Submersible, Inline), Air Pumps.

\* MVP Status / Estimated Game Version: MVP.

\* Plumbing: Pipes (PVC, PEX, Drip Line), Fittings, Valves (manual, solenoid), Filters. \*\*Video observation: Extensive PVC plumbing and drip irrigation lines (e.g., for rockwool slabs) are visible, connecting to automated fertigation systems.\*\*

\* MVP Status / Estimated Game Version: MVP.

\* Nutrient Mixing Stations/Vats: \*\*Video observation: Dedicated areas/systems for nutrient mixing are present, likely automated with dosers (e.g., Netafim or similar, though brand not explicitly confirmed in all shots).\*\*

\* MVP Status / Estimated Game Version: MVP (manual mixing), Late-Game MVP / Post-MVP (automated dosing).

\* Automated Dosing/Fertigation Systems: \*\*Video observation: The Flowery clearly uses automated fertigation. This aligns with the "Automated Dosing/Fertigation Systems" being Late-Game MVP / Post-MVP, but the underlying plumbing and basic timed delivery could be MVP.\*\*

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP.

\* Growing Mediums/Substrates: Bags/bulk (Soil, Coco Coir, Rockwool cubes/slabs, Hydroton, Peat Moss). Living Soil. \*\*Video observation: Grodan rockwool slabs are prominently featured as the primary growing medium in flower rooms. Smaller rockwool cubes for propagation also seen.\*\*

\* MVP Status / Estimated Game Version: MVP.

\* Nutrient Containers: Bottles/Bags of base nutrients, additives.

\* MVP Status / Estimated Game Version: MVP.

\*\*Environmental Control Equipment\*\*

Assets:

\* HVAC Systems: Air Conditioners (Window, Split), Heaters, Dehumidifiers, Humidifiers. \*\*Video observation: Large commercial HVAC units and numerous Quest dehumidifiers are visible in grow rooms, critical for Florida's climate.\*\*

\* MVP Status / Estimated Game Version: MVP. \*\*Video reinforces the necessity of robust dehumidification and cooling.\*\*

\* Fans: Circulation Fans (Clip, Standing, Wall), Exhaust Fans, Inline Duct Fans. \*\*Video observation: Various types of circulation fans (wall-mounted, oscillating) are used to ensure airflow within the canopy. Large exhaust/intake systems also implied by ducting.\*\*

\* MVP Status / Estimated Game Version: MVP.

\* Ducting: Flexible, Rigid, Fittings. \*\*Video observation: Extensive large-diameter ducting for air circulation and HVAC is visible throughout the facility.\*\*

\* MVP Status / Estimated Game Version: MVP.

\* CO2 Systems: CO2 Tanks, Regulators, Controllers, Generators.

\* MVP Status / Estimated Game Version: MVP (manual control).

\* Grow Lights: Various types (HID - MH/HPS with Ballasts/Hoods; LED Panels; Fluorescent; LEC). \*\*Video observation: The Flowery primarily uses HPS lights (Gavita mentioned/shown) in their flower rooms. LEDs (Gavita mentioned/shown) are used in veg/mother rooms and propagation areas.\*\*

\* MVP Status / Estimated Game Version: MVP. \*\*Video shows different light types for different growth stages, aligning with your tiered approach.\*\*

\* Light Timers/Controllers: Mechanical, Digital.

\* MVP Status / Estimated Game Version: MVP.

\* Thermostats, Humidistats, Environmental Controllers: \*\*Video observation: Centralized environmental control systems are implied for a facility of this scale (e.g., Growlink mentioned in their other content, though not explicitly shown in detail here).\*\*

\* MVP Status / Estimated Game Version: MVP (basic), Late-Game MVP / Post-MVP (integrated/advanced).

\* Sensors: Environmental (Air Temp, RH, CO2, Light), Leaf Surface Temp, Root Zone/Substrate.

\* MVP Status / Estimated Game Version: MVP.

\* Air Filters: Intake filters, Carbon filters.

\* MVP Status / Estimated Game Version: Likely MVP.

\*\*Utility Systems & Equipment\*\*

Assets:

\* Electrical Wiring, Circuit Breakers / Fuse Boxes / Panels: \*\*Video observation: Industrial electrical panels and conduit are visible, necessary for high power loads of lights and HVAC.\*\*

\* MVP Status / Estimated Game Version: MVP.

\* Generators (Diesel/Gas):

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP.

\* Battery Banks / UPS:

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP.

\* Main Power Grid Connection Point (Abstracted):

\* MVP Status / Estimated Game Version: MVP.

\* Water Supply Connection Point (Abstracted - Tap, RO, Treated): \*\*Video observation: RO water system is likely used for high-quality cultivation, though not explicitly detailed.\*\*

\* MVP Status / Estimated Game Version: MVP (Tap), RO/Treated as upgrades.

\*\*Pots, Containers, & Growing Surfaces\*\*

Assets:

\* Pots: Various sizes.

\* MVP Status / Estimated Game Version: MVP.

\* Fabric Grow Bags:

\* MVP Status / Estimated Game Version: MVP.

\* Trays / Flats (Seedling, Propagation): \*\*Video observation: Standard propagation trays with rockwool cubes are used for clones.\*\*

\* MVP Status / Estimated Game Version: MVP.

\* Rockwool Cubes / Slabs: \*\*Video observation: Grodan rockwool cubes for propagation and larger slabs for flowering are heavily used.\*\*

\* MVP Status / Estimated Game Version: MVP.

\* Hydroponic/Aeroponic Systems (Basic Ebb/Flow, DWC buckets, NFT, Aeroponics): \*\*Video observation: The Flowery uses a drip irrigation system with rockwool slabs, a form of hydroponics.\*\*

\* MVP Status / Estimated Game Version: Likely MVP for basic options (Drip to waste/recirculating with rockwool).

\* Growing Benches / Tables (Flood tables, Wire racks): \*\*Video observation: Rolling benches are used in flower rooms to maximize canopy space. Stationary multi-tiered racks for propagation and veg.\*\*

\* MVP Status / Estimated Game Version: MVP. \*\*Rolling benches are a key feature for efficient space use in commercial grows, consider for Late-Game MVP / Post-MVP if not already planned.\*\*

\*\*Pest & Disease Management\*\*

Assets:

\* Scouting Tools: Sticky Traps, Loupes, Microscopes. \*\*Video observation: Yellow sticky traps used.\*\*

\* MVP Status / Estimated Game Version: MVP.

\* Application Tools: Sprayers.

\* MVP Status / Estimated Game Version: MVP.

\* (Simulated) Pesticides/Fungicides/Biologicals: \*\*Video reference: Mention of using beneficial insects (predatory mites, etc.) for IPM aligns with biological controls.\*\*

\* MVP Status / Estimated Game Version: MVP. \*\*Consider adding a specific "Beneficial Insects" consumable category.\*\*

\* In-game "Plant Problems Guide" UI/Asset:

\* MVP Status / Estimated Game Version: MVP.

\*\*Harvesting & Processing Equipment\*\*

Assets:

\* Harvesting Tools: Large Trimming Shears, Loppers, Saws, Collection Totes/Bins. \*\*Video observation: Hand harvesting with pruners directly into totes/bins.\*\*

\* MVP Status / Estimated Game Version: MVP.

\* Trimming Tools: Trim Scissors, Trim Bins/Trays. Isopropyl Alcohol/Wipes. \*\*Video observation: Large dedicated trim room with many stations for hand-trimming. Focus on quality hand trim. Trim Bins are likely used at stations.\*\*

\* MVP Status / Estimated Game Version: MVP.

\* Bowl Trimmers (Manual, Electric):

\* MVP Status / Estimated Game Version: Likely Mid-Late MVP / Post-MVP. (The Flowery emphasizes hand trim, so these might be a lower-tier/less quality option in-game).

\* Automated Trimming Machines:

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. (As above, for different quality/throughput choices).

\* Drying Racks / Clotheslines & Hangers: \*\*Video observation: Extensive use of whole-plant hanging in dedicated, environmentally controlled dry rooms. Trolleys/racks for moving plants to dry rooms.\*\*

\* MVP Status / Estimated Game Version: MVP. \*\*Environmental control of dry rooms is critical, as seen and mentioned.\*\*

\* Curing Containers (Jars, Buckets - Glass, Plastic): \*\*Video observation: While not shown in detail, curing in containers is standard. Mention of "burping" aligns with MVP.\*\*

\* Automated curing systems: \*\*Video mentions this is part of their R&D, aligning with Post-MVP for this tech.\*\*

\* MVP Status / Estimated Game Version: MVP (manual).

\* Weighing & Measuring: Digital Pocket Scales, Bench Scales, Industrial Scales. Calibration Weights. \*\*Video observation: Scales are used in trim/packaging.\*\*

\* MVP Status / Estimated Game Version: MVP.

\* Transporting Equipment: Baskets, hand-drawn garden carts, small motorized transport, portable conveyor belts. \*\*Video observation: Carts for moving plants/product are visible.\*\*

\* MVP Status / Estimated Game Version: Likely Mid-Late MVP.

\* Cold Storage: Refrigerators, freezers for fresh-frozen. \*\*Video observation: Mention of fresh-frozen material for 710 Labs, implying cold storage is used.\*\*

\* MVP Status / Estimated Game Version: Likely Post-MVP, tied to specific processing like live rosin.

\* Extraction/Concentrate Equipment (Solventless Press, Basic Extraction System): \*\*Video observation: Extensive, sophisticated extraction labs (hydrocarbon, solventless) are shown, especially for 710 Labs. This is well beyond "basic."\*\*

\* MVP Status / Estimated Game Version: Post-MVP. \*\*The video showcases very high-tier extraction. For the game, this remains a Post-MVP feature, but the video provides excellent visual reference for future development.\*\*

\*\*Facility Furniture & Fixtures\*\*

Assets:

\* Workbenches, HD Shelving, Storage Cabinets, Rolling Utility Carts, Seating. \*\*Video observation: Standard in processing, lab, and packaging areas.\*\*

\* MVP Status / Estimated Game Version: MVP.

\* Sinks: Industrial Sink/Wash Basin.

\* MVP Status / Estimated Game Version: MVP.

\* Safety: Eye Wash Station, Emergency Shower, Fire Extinguishers, First Aid Kits. \*\*Video observation: Safety equipment is standard in commercial facilities, especially labs.\*\*

\* MVP Status / Estimated Game Version: Likely MVP.

\* General: Wall Clocks, Trash Cans, Recycling Bins, Mop & Bucket, etc. \*\*Video observation: General tidiness and waste management visible.\*\*

\* MVP Status / Estimated Game Version: MVP.

\* \*\*NEW/EMPHASIZED based on video:\*\*

\* \*\*Packaging Supplies & Equipment:\*\*

\* \*\*Jars/Containers for final product:\*\* (Glass jars, Mylar bags, pre-roll tubes shown).

\* \*\*Labeling Machine/Applicator:\*\* (Likely for compliance and branding).

\* \*\*Heat Sealer for bags.\*\*

\* \*\*Workstations for packaging.\*\*

\* MVP Status: Core packaging is MVP for selling products. Automated machines Post-MVP.

\*\*Map Specific Assets\*\*

Assets:

\* Residential House Shell & Unique Fixtures

\* MVP Status / Estimated Game Version: MVP.

\* Warehouse Shell & Unique Fixtures: \*\*Video observation: The Flowery facility is a prime example of a large-scale warehouse build-out.\*\*

\* MVP Status / Estimated Game Version: MVP.

\* (Future: Greenhouse; Research Lab; Outdoor Field; Vertical Farm etc.)

\* MVP Status / Estimated Game Version: Future (Post-MVP). \*\*The Flowery's research lab and tissue culture lab are good visual references for "Research Lab Shell & Specialized Benches/Fixtures."\*\*

\*\*Decorative & "Cozy" Items\*\*

Assets: Posters, art, rugs, small furniture, non-cannabis plants, decorative lighting, personal items, paint/texture options. \*\*Video observation: The Flowery has significant branding, custom artwork (murals, posters), and a distinct aesthetic in their office/lounge areas, aligning with your "Aspirational/Professional" and allowing for "Cozy" player expression.\*\*

\* MVP Status / Estimated Game Version: MVP. \*\*The video reinforces that even commercial facilities have spaces for branding and employee comfort/morale.\*\*

\*\*Plant Assets (Core for Procedural System)\*\*

Assets:

\* Base 3D Models (Landrace-inspired foundational strains)

\* Variations (Morphology & Growth Stages)

\* Botanical Features to Represent

\* \*\*Video observation: The Flowery cultivates a wide variety of well-known hype strains (e.g., Runtz, Gelato, Zkittlez crosses) and collaborates with many breeders (Preferred Gardens, 710 Labs, Wizard Trees, Doja, Backpack Boyz). This emphasizes the importance of a robust genetic system and the visual diversity of phenotypes.\*\*

\* MVP Status / Estimated Game Version: MVP. \*\*The 5-10 foundational strains for MVP are a good start. The video highlights the desirability of having a system that can represent a wide array of modern, sought-after cultivars, which your procedural system aims to achieve.\*\*

\* Procedural Generation System (Software/Code Asset)

\* MVP Status / Estimated Game Version: MVP.

\* Dynamic Shader/Material Effects (MIDs, MPCs)

\* MVP Status / Estimated Game Version: MVP.

\* Performance Optimization

\* MVP Status / Estimated Game Version: MVP.

\*\*Data Collection & Lab Equipment\*\*

Assets:

\* Handheld Meters: EC/PPM, pH, Temp, etc.

\* MVP Status / Estimated Game Version: MVP.

\* Benchtop Meters/Analyzers: Lab-grade EC/pH, Spectrophotometer, HPLC, GC-MS, ICP, etc. \*\*Video observation: The Flowery (especially with 710 Labs) has extensive in-house lab capabilities for QA/QC and R&D, including cannabinoid/terpene profiling. This aligns with your Post-MVP goals for advanced lab equipment.\*\*

\* MVP Status / Estimated Game Version: Basic lab EC/pH may be Mid-MVP. Advanced analyzers (HPLC, GC-MS) are Mid-Late MVP / Post-MVP. \*\*The video shows the \*end result\* of this analysis (COAs, terpene profiles discussed), reinforcing the need for the \*Simulated Lab Analysis Interface\* even if the player outsources or uses simpler in-game tools initially.\*\*

\* Data Logging & Interface: Laptop, Tablet, Desktop, Whiteboard. \*\*Video observation: Computers and data tracking are evident in a professional operation.\*\*

\* MVP Status / Estimated Game Version: MVP.

\* Calibration Weights

\* MVP Status / Estimated Game Version: MVP.

\* Simulated Lab Analysis Interface (UI)

\* MVP Status / Estimated Game Version: Mid-Late MVP / Post-MVP.

\*\*UI & Data Visualization Elements\*\*

Assets:

\* Environmental Data Dashboards/Overlays, Graphs & Charts, Plant Health/Status Indicators, Nutrient Management Interface, Genetic Data Display, Breeding Interface, Facility Management Overlays, Operational & Financial Data, Alerts & Notifications, Historical Logs & Notes, Tutorial/Info Overlays.

\* \*\*Video Context: The level of detail The Flowery team goes into (e.g., specific environmental parameters, detailed pheno-hunting, quality control) underscores the critical importance of robust UI and data visualization for the player to manage a complex simulation.\*\*

\* MVP Status / Estimated Game Version: All listed are crucial and align with MVP requirements for core feedback loops.

\*\*Advanced Breeding & Lab Equipment\*\*

Assets:

\* Tissue Culture Station: Sterile Hood, Autoclave, Incubator, etc. \*\*Video observation: The Flowery has a dedicated tissue culture lab. This is a clear Post-MVP feature for the game, but the video provides excellent visual reference.\*\*

\* MVP Status / Estimated Game Version: Likely Post-MVP.

\* Lab Furniture: Specialized Benches, Cabinets, Sinks.

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP.

\* Cryopreservation Unit (Visual)

\* MVP Status / Estimated Game Version: Likely Post-MVP.

\* Advanced Genetic Modification Equipment (CRISPR-like System - Visual)

\* MVP Status / Estimated Game Version: Post-MVP.

\* Bioinformatics Tools/Software (UI/Abstracted System)

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP.

\*\*Consumable Resources (Abstract/UI Representation)\*\*

Assets: Water, Power, Nutrients, CO2, Building Materials, Seeds/Clones, Finances.

\* \*\*Video Context: The scale of The Flowery's operation implies significant consumption of all these resources. Their collaborations also suggest robust systems for acquiring seeds/clones.\*\*

\* MVP Status / Estimated Game Version: All listed are MVP.

\* \*\*Specific Video Notes on Consumables:\*\*

\* \*\*Gloves, Hairnets, (sometimes) Masks:\*\* Standard PPE in all cultivation and processing areas. Should be a minor ongoing operational cost/consumable.

\* \*\*Cleaning Supplies:\*\* (Isopropyl alcohol mentioned for tools). General cleaning agents for facility hygiene.

\* \*\*Packaging Materials:\*\* Jars, bags, labels, boxes for shipping. This becomes more prominent as the player sells products.

\*\*General Observations from CannaCribs - The Flowery:\*\*

\* \*\*Workflow and Organization:\*\* The facility is highly organized with clear separation of areas (propagation, veg, flower, dry, cure, trim, lab, packaging). This supports your "Layout and zoning will facilitate clean flow principles."

\* \*\*Emphasis on Quality:\*\* Repeated mentions of quality control, pheno-hunting for best expressions, and meticulous processes (hand-trimming, careful drying/curing). This aligns with your game's depth.

\* \*\*Branding & Collaborations:\*\* The Flowery heavily features its own brand and its collaborations (710 Labs, Preferred Gardens, Wizard Trees, Doja, Backpack Boyz, etc.). For Project Chimera, this could translate to:

\* NPC breeders/companies the player interacts with for genetics or contracts.

\* Unlockable "partner" strains or research projects.

\* Lore elements related to different in-game "brands."

\* \*\*Team and Roles:\*\* The video showcases various roles (CEO, COO, VP of Production, Propagation Manager, Trim Manager, Extraction Head, etc.). This can inform NPC character types and player progression paths/skill trees.

\* \*\*Aesthetics:\*\* "Clean, white, and bright" in grow/lab areas. More "vibey" and art-focused in common/office areas. This supports your dual aesthetic goals.

This enhanced list should provide a solid foundation, informed by both your detailed design and real-world commercial cannabis operations. The key is to maintain the MVP focus for initial launch and use facilities like The Flowery as inspiration for late-game content and depth.

Okay, I've analyzed the CannaCribs episode featuring Shango in Las Vegas and cross-referenced it with your Project Chimera Briefing Document and Asset List 1.4.

Here's the enhanced and updated asset list, incorporating observations from the video and aligning with Project Chimera's MVP scope and future goals. Assets specifically seen or clearly implied in the video are noted, along with their relevance to your game's development phases.

\*\*Project Chimera: Enhanced Asset List (Post-Shango Video Analysis)\*\*

\*\*Core Vision Alignment:\*\* The Shango facility showcases a high-tech, clinical, and professional large-scale cannabis cultivation operation, aligning well with Project Chimera's core vision. The detailed processes from genetics to retail provide rich data for simulation.

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\*\*I. Structural & Architectural Elements\*\*

\* \*\*Walls (Interior):\*\*

\* \*Description/Notes from Video:\* Smooth, white, easily cleanable surfaces seen throughout grow rooms, processing lab, and hallways. Likely insulated panels or similar non-porous material. Coving at wall-floor junctions visible in some areas.

\* \*MVP Status:\* MVP (Essential for defining grow spaces, cleanliness).

\* \*\*Floors:\*\*

\* \*Description/Notes from Video:\* Polished concrete in grow rooms (easy to clean, durable). Red epoxy-coated floor in the processing lab (high cleanliness, chemical resistance).

\* \*Drains:\* Not explicitly detailed, but assumed for irrigation runoff in large rooms.

\* \*MVP Status:\* MVP (Concrete for basic, epoxy/specialized for higher-tier/lab spaces).

\* \*\*Roofs/Ceilings:\*\*

\* \*Description/Notes from Video:\* Suspended grid ceilings with tiles in most operational areas. High ceilings in flower rooms.

\* \*MVP Status:\* MVP.

\* \*\*Doors:\*\*

\* \*Description/Notes from Video:\* Standard commercial doors, some with windows. Double doors for larger equipment movement into flower rooms. Air-lock style entry not explicitly shown for main grow areas but good practice.

\* \*MVP Status:\* MVP.

\* \*\*Windows:\*\*

\* \*Description/Notes from Video:\* Exterior windows on the building facade. Interior grow rooms are sealed with no natural light.

\* \*MVP Status:\* MVP (Exterior for realism, interior grow rooms typically block them).

\* \*\*Support Pillars/Beams:\*\*

\* \*Description/Notes from Video:\* Visible in the large warehouse-style flower rooms, indicating structural necessity for the span.

\* \*MVP Status:\* MVP (for warehouse map).

\* \*\*Containment Structures (Tents):\*\*

\* \*Description/Notes from Video:\* Not seen in this large-scale commercial facility.

\* \*MVP Status:\* MVP (for residential/early game).

\*\*II. Cultivation & Plant Care Tools\*\*

\* \*\*Pruning & Cutting:\*\*

\* \*Description/Notes from Video:\* Workers shown using snips/scissors for harvesting and trimming. Scalpels used for taking clones in propagation.

\* \*MVP Status:\* MVP (Snips, scissors, scalpels).

\* \*\*Spraying & Application:\*\*

\* \*Description/Notes from Video:\* Handheld spray bottles likely used for spot treatments, though not explicitly detailed. No large-scale sprayers shown in active use.

\* \*MVP Status:\* MVP (Hand spray bottles, basic pump sprayers).

\* \*\*Scouting & Monitoring:\*\*

\* \*Description/Notes from Video:\* Visual inspection is key. Magnifying loupes/microscopes implied for detailed checks, though not explicitly shown in use for this.

\* \*MVP Status:\* MVP (Loupes, basic handheld microscope).

\* \*\*Plant Support Tools:\*\*

\* \*Description/Notes from Video:\* Extensive use of \*\*Trellis Netting\*\* (white, plastic/nylon) in a SCROG (Screen of Green) setup in flower rooms. Vertical poles support the trellis layers.

\* \*Brands Mentioned/Seen:\* GrowersHouse.com and Common Culture Trellis (from opening ad).

\* \*MVP Status:\* MVP (Trellis netting, stakes/poles).

\*\*III. Nutrient & Irrigation Equipment\*\*

\* \*\*Reservoirs/Tanks:\*\*

\* \*Description/Notes from Video:\* Large nutrient mixing tanks visible in the fertigation room (multiple white poly tanks, ~250-500 gallon estimated size).

\* \*MVP Status:\* MVP (Various sizes).

\* \*\*Pumps:\*\*

\* \*Description/Notes from Video:\* Assumed for nutrient mixing and delivery from large reservoirs. Hand pumps used for transferring Mills nutrients from large drums.

\* \*MVP Status:\* MVP (Water pumps, air pumps).

\* \*\*Plumbing & Automated Dosing/Fertigation Systems:\*\*

\* \*Description/Notes from Video:\* Extensive automated irrigation system with drip emitters directly into each CoirGro bag. Complex manifold/valve system implied for zoned fertigation (14 zones mentioned for flower). Control panels for automation visible.

\* \*MVP Status:\* MVP (Pipes, basic fittings, manual valves). Solenoid valves and automated dosing controllers are Mid-Late MVP / Post-MVP.

\* \*\*Growing Mediums/Substrates:\*\*

\* \*Description/Notes from Video:\* \*\*CoirGro EZ-Open Top bags\*\* (2-gallon size mentioned for veg, larger for flower implied by plant size). Rockwool cubes (e.g., Grodan style) for propagation.

\* \*MVP Status:\* MVP (Soil, Coco Coir, Rockwool).

\* \*\*Nutrient Containers & Additives:\*\*

\* \*Description/Notes from Video:\*

\* \*\*Mills Nutrients:\*\* Basis A&B, Vitalize, Start-R, C4, PK. (Seen in large drums and smaller bottles).

\* \*\*Ful-Power by BioAg:\*\* Fulvic acid additive.

\* \*\*Clonex Clone Solution & Rooting Gel:\*\* Used in propagation.

\* \*MVP Status:\* MVP (Base NPK, basic additives). Specific brands like Mills, BioAg, Clonex can serve as examples.

\*\*IV. Environmental Control Equipment\*\*

\* \*\*HVAC Systems & Dehumidifiers:\*\*

\* \*Description/Notes from Video:\*

\* \*\*Quest Dehumidifiers:\*\* Multiple large commercial units (e.g., Quest 506, Dual 225 models mentioned/shown) ceiling-mounted in flower rooms (13 units in one flower room). Also seen in other areas.

\* Standard HVAC units visible on walls/ceilings for temperature control.

\* \*MVP Status:\* MVP (AC, Heater, Dehumidifier, Humidifier). Quest as a brand example.

\* \*\*Fans:\*\*

\* \*Description/Notes from Video:\* Large white circulation fans (wall-mounted/hanging oscillating type) are prevalent in flower rooms to ensure airflow through the dense canopy. Smaller fans in propagation.

\* \*MVP Status:\* MVP (Clip, Standing, Wall fans).

\* \*\*Ducting:\*\*

\* \*Description/Notes from Video:\* Visible for HVAC systems.

\* \*MVP Status:\* MVP.

\* \*\*CO2 Systems:\*\*

\* \*Description/Notes from Video:\* Mentioned that CO2 is used, but specific equipment (tanks, generators) not detailed in the footage.

\* \*MVP Status:\* MVP (CO2 Tanks/Regulators).

\* \*\*Grow Lights:\*\*

\* \*Description/Notes from Video:\*

\* \*\*Propagation:\*\* LED strip lights (Active Grow T5HO mentioned, ~18W, placed ~1ft above canopy, targeting 150 µmols).

\* \*\*Vegetation:\*\* EnergyStation Metal Halide (MH) fixtures with Plantmax 6000K lamps.

\* \*\*Flower:\*\* High-Pressure Sodium (HPS) lights evident by the yellow hue and discussion of Method Seven HPS glasses. Large, air-cooled or open hood reflectors.

\* \*MVP Status:\* MVP (HID - MH/HPS, LED Panels, Fluorescent T5/CFL). Specific brands as examples.

\* \*\*Light Timers/Controllers:\*\*

\* \*Description/Notes from Video:\* Assumed for managing 18/6 (or 24/0 for veg as mentioned) and 12/12 cycles.

\* \*MVP Status:\* MVP.

\* \*\*Thermostats, Humidistats, Environmental Controllers:\*\*

\* \*Description/Notes from Video:\* Advanced environmental control system implied by the scale and precision discussed. Specific controller brands not named, but functionality for temp, RH, VPD, CO2 is clear.

\* \*MVP Status:\* MVP (Basic thermostat/humidistat). Advanced integrated controllers are Mid-Late MVP / Post-MVP.

\* \*\*Sensors:\*\*

\* \*Description/Notes from Video:\*

\* \*\*Aroya Sensors:\*\* Mentioned for substrate monitoring (EC, moisture, temp). Small white sensors in bags.

\* Standard environmental sensors (temp/RH) hanging in rooms.

\* \*MVP Status:\* MVP (Air Temp, RH, basic PAR, basic soil moisture/EC/pH handheld meters). Aroya as an example of advanced substrate sensor.

\* \*\*Air Filters:\*\*

\* \*Description/Notes from Video:\* Carbon filters likely used for odor control given the scale, but not explicitly shown. Intake filters on HVAC.

\* \*MVP Status:\* MVP (Intake filters, Carbon filters).

\*\*V. Utility Systems & Equipment\*\*

\* \*Description/Notes from Video:\* Standard electrical panels, wiring, and plumbing for a large commercial facility are assumed.

\* \*MVP Status:\* MVP (as per existing list).

\*\*VI. Pots, Containers, & Growing Surfaces\*\*

\* \*Description/Notes from Video:\*

\* \*\*CoirGro EZ-Open Top bags:\*\* 2-gallon for veg, likely larger for flower.

\* \*\*Rockwool cubes:\*\* For propagation (e.g., Grodan 1.5 inch).

\* \*\*Standard 1020 trays:\*\* For holding rockwool cubes/clones.

\* \*\*Rolling Benches/Tables:\*\* Used in veg and flower rooms.

\* \*MVP Status:\* MVP (Standard pots, grow bags, trays, rockwool).

\*\*VII. Pest & Disease Management\*\*

\* \*Description/Notes from Video:\* Focus on clean practices. Specific pest control methods not detailed, but a high level of sanitation is evident.

\* \*MVP Status:\* MVP (Sticky traps, basic sprayers, simulated pesticides/biologicals).

\*\*VIII. Harvesting & Processing Equipment\*\*

\* \*\*Trimming Tools:\*\*

\* \*Description/Notes from Video:\* Workers hand-trimming with scissors.

\* \*\*HarvestMore Trim Bins:\*\* Black bins with kief collection screens used by trimmers.

\* \*MVP Status:\* MVP (Trim scissors, Trim Bins).

\* \*\*Drying Racks / Methods:\*\*

\* \*Description/Notes from Video:\* Plants are hung to dry in a controlled environment before trimming (not explicitly shown in detail, but process described).

\* \*MVP Status:\* MVP (Racks/lines).

\* \*\*Curing Containers:\*\*

\* \*Description/Notes from Video:\* Large, black plastic totes with yellow lids (\*\*Commander XXL 27 Gallon Totes\*\*) used for curing large batches. Water activity meters used to monitor cure.

\* \*MVP Status:\* MVP (Jars, Buckets). Larger totes for commercial scale.

\* \*\*Weighing & Measuring:\*\*

\* \*Description/Notes from Video:\* Scales used in packaging area.

\* \*MVP Status:\* MVP.

\* \*\*Extraction/Concentrate Equipment:\*\*

\* \*Description/Notes from Video:\*

\* \*\*Hydrocarbon Extraction System:\*\* Closed-loop system (brand not specified, but typical industrial setup).

\* \*\*Across International Rotovap (Rotary Evaporator):\*\* For solvent recovery.

\* \*\*Across International Vacuum Ovens:\*\* For purging solvents from extracts.

\* Equipment for making distillate, shatter, badder, crumble, Moon Rocks, edibles, vape tanks.

\* \*MVP Status:\* Post-MVP (as per Briefing Doc). Across International as brand examples.

\* \*\*Packaging:\*\*

\* \*Description/Notes from Video:\*

\* \*\*Shango "Easy" Mylar bags:\*\* For flower.

\* \*\*Glass jars with Shango branding:\*\* For flower.

\* \*\*Pre-roll tubes\*\* (clear plastic with black Shango branded shrink wrap).

\* \*\*CoolJarz automated cone filling machine.\*\*

\* \*\*Steam Shrinker:\*\* For sealing pre-roll tubes.

\* \*\*Dr. Zodiak's Moon Rock packaging.\*\*

\* \*\*Shango Gummies packaging.\*\*

\* \*\*Vape Cartridge packaging.\*\*

\* \*\*Clamshell packaging for concentrates (e.g., A-Dub Badder).\*\*

\* \*MVP Status:\* MVP (Basic jars/bags). Mylar, branded packaging, pre-roll specific packaging are Mid-Late MVP / Post-MVP.

\*\*IX. Facility Furniture & Fixtures\*\*

\* \*Description/Notes from Video:\* Workbenches, stainless steel tables (especially in processing lab and trim room), shelving, rolling carts, chairs/stools for trimmers. Lockers for employees. Standard safety equipment like fire extinguishers.

\* \*MVP Status:\* MVP.

\*\*X. Map Specific Assets\*\*

\* \*Description/Notes from Video:\* Large warehouse facility. Exterior building facade with "SHANGO" branding. Retail dispensary front.

\* \*MVP Status:\* MVP (Residential House, Warehouse Shell). Shango building as visual reference for potential player branding customization (Post-MVP).

\*\*XI. Decorative & "Cozy" Items\*\*

\* \*Description/Notes from Video:\* Dispensary has some decorative elements, orchids, branded merchandise displays. Grow areas are purely functional.

\* \*MVP Status:\* MVP (Basic posters, rugs, a few non-cannabis plants).

\*\*XII. Plant Assets (Core for Procedural System)\*\*

\* \*\*Cannabis Strains Mentioned/Seen:\*\*

\* \*\*Alien Banana Candy:\*\* (Banana OG x The Cube x Ruderalis) - Bred by Shango.

\* \*\*Tomb Raider:\*\* (King Tut x Alien Banana Candy) - Bred by Shango.

\* \*\*A-Dub:\*\* (Memory Loss from Archive Seed Bank x [likely another Shango selection or original parent]) - Mentioned as an Archive cross further worked by Shango.

\* \*\*Modified Bananas:\*\* Top-selling pre-roll strain. (Lineage likely GMO x Banana OG or similar).

\* \*General Notes:\* Shango emphasizes unique, in-house bred genetics. Some strains yield over 4-6 lbs per light. Strong focus on terpene profiles.

\* \*MVP Status:\* MVP (5-10 foundational strains). These Shango strains could serve as inspiration or direct inclusions if licensing allows.

\*\*XIII. Data Collection & Lab Equipment\*\*

\* \*Description/Notes from Video:\*

\* \*\*Aroya Substrate Sensors:\*\* For EC, moisture, temperature.

\* \*\*Water Activity Meters:\*\* Used during curing.

\* Internal lab testing implied, plus third-party for compliance.

\* Extensive use of METRC tags for plant tracking.

\* \*MVP Status:\* MVP (Handheld EC/pH/Temp/Moisture meters). Advanced systems like Aroya are Mid-Late MVP / Post-MVP. Simulated lab analysis is Post-MVP.

\*\*XIV. UI & Data Visualization Elements\*\*

\* \*Description/Notes from Video:\* On-screen graphics in the video show temperature, humidity, CO2 levels, DLI targets, EC targets, nutrient recipes, etc. Digital menus in the dispensary.

\* \*MVP Status:\* MVP (Core environmental dashboards, basic logs, alert system).

\*\*XV. Advanced Breeding & Lab Equipment\*\*

\* \*Description/Notes from Video:\* While Shango does in-house breeding and pheno-hunting, advanced techniques like tissue culture or CRISPR were not detailed.

\* \*MVP Status:\* Post-MVP.

\*\*XVI. Consumable Resources\*\*

\* \*Description/Notes from Video:\*

\* \*\*Nutrients:\*\* Mills, Ful-Power, Clonex.

\* \*\*Growing Medium:\*\* CoirGro bags, Rockwool cubes.

\* \*\*CO2:\*\* Mentioned as used.

\* \*\*Solvents for Extraction:\*\* Hydrocarbons (butane/propane implied by "hydrocarbon extraction").

\* \*MVP Status:\* MVP (Water, Power, Nutrients, CO2, Basic Mediums, Seeds/Clones).

\*\*Additional Video-Specific Notes for Project Chimera:\*\*

\* \*\*Branding/Culture:\*\* Shango has strong branding (logo, color schemes). This could inspire player customization options for their own facilities/products (Post-MVP).

\* \*\*Workflow & Labor:\*\* The video shows distinct teams for different tasks (propagation, trimming, packaging, processing). This highlights the importance of labor management in a large-scale operation, a potential future feature for Project Chimera.

\* \*\*Sanitation:\*\* Workers wear full PPE (hairnets, masks, gloves, lab coats/scrubs, shoe covers) in cultivation and processing areas. This reinforces the "Cleanliness" aesthetic and gameplay mechanic.

\* \*\*Compliance:\*\* METRC tags are ubiquitous, highlighting the regulatory aspect of commercial cannabis.

\* \*\*Quality Focus:\*\* Repeated emphasis on quality, from genetics through to the final cured and packaged product. Terpene preservation is a key goal.

\* \*\*Vertical Integration:\*\* Shango is vertically integrated (cultivation, processing, retail). This is a potential long-term goal for the player in Project Chimera.

This enhanced list should provide a much richer foundation for Project Chimera's asset development, directly informed by a real-world, high-performing cannabis operation.

Okay, this is a fantastic project! I've reviewed the CannaCribs episode featuring Kings Garden, your existing Asset List 1.4, and the Project Chimera Briefing Document.

Here's an enhanced asset list, incorporating details from the Kings Garden tour while aligning with Project Chimera's goals and MVP scope. I've focused on adding specifics, brands where notable, and context from the video.

\*\*Key Learnings & Context from Kings Garden Video Relevant to Project Chimera:\*\*

\* \*\*Scale & Professionalism:\*\* Kings Garden operates at a massive scale (240,000 sq ft property, 115,000 sq ft active canopy, 9 cultivation facilities, 54 total grow rooms). This reinforces the need for industrial-grade equipment and efficient workflows in Project Chimera, especially for the "Warehouse" map.

\* \*\*Cleanliness & SOPs:\*\* Extreme emphasis on cleanliness (daily new suits, hairnets, booties, 70% ISO cleaning) and Standard Operating Procedures (SOPs) for every stage. This should be a core mechanic in the game.

\* \*\*Genetic Control:\*\* Kings Garden \*only\* sources new genetics via seeds from reputable breeders (Cannarado, Exotic Genetix, Seed Junky, DNA Genetics) and does all pheno-hunting in-house. They \*never\* bring in outside clones to maintain genetic purity and control. This is a strong model for Project Chimera's breeding pillar.

\* \*\*Environmental Control:\*\* Precise environmental control is paramount, with progressive changes mimicking nature (hot/humid early, cool/dry late flower). VPD (Vapor Pressure Deficit) management is key. Significant investment in AC and dehumidification.

\* \*\*Nutrient Regimen:\*\* Specific brands and types of nutrients are used (Dyna-Gro Pro-Tekt, House & Garden Aqua Flakes, CalMag, Hydroguard, Clonex). Foliar sprays are also utilized.

\* \*\*Multi-Stage Process:\*\* Clear separation and specialized approaches for propagation, veg, flower, drying, curing, trimming, and packaging.

\* \*\*Data-Driven (Implied):\*\* While not explicitly detailed, the level of control and consistency implies a data-driven approach to optimize each stage.

\* \*\*Automation (Selective):\*\* While hand-trimming is highlighted for quality, automation is used in pre-rolls (STM Canna RocketBox) and packaging (GreenBroz/Green Vault Precision Batcher).

\* \*\*Branding & Marketing:\*\* Strong brand identity (logo, "King of Weed" slogan) and high-quality packaging (custom gold-lidded jars) are crucial for their market presence. They actively use social media.

\* \*\*Post-Harvest Quality:\*\* Boveda packs are used for humidity control in bulk storage and potentially in final packaging to preserve terpenes.

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\*\*Enhanced Asset List for Project Chimera (v1.5 - Kings Garden Enhanced)\*\*

\*Italics indicate additions or significant enhancements based on the video and cross-referencing with existing docs. Items are marked with MVP status where appropriate, aligning with the Briefing Document. Post-MVP items are also noted.\*

\*\*I. Structural & Architectural Elements\*\*

\* Walls: (MVP)

\* \*Specific materials seen: Likely insulated panels for grow rooms, standard drywall for offices.\*

\* Floors: (MVP)

\* \*Specific materials seen: Sealed concrete floors in grow areas (easy to clean).\*

\* Drains: (MVP)

\* Roofs/Ceilings: (MVP)

\* \*High ceilings observed in grow rooms (influences airflow/temp stratification).\*

\* Doors: (MVP)

\* \*Standard doors, potentially air-lock style entries to sensitive areas.\*

\* Windows: (MVP)

\* \*Generally, grow rooms appeared windowless or windows blocked to control light.\*

\* Stairs/Ladders/Catwalks: (MVP for Warehouse)

\* \*Catwalks visible in some larger rooms for access.\*

\* Support Pillars/Beams: (MVP for Warehouse)

\* Containment Structures (Tents): (MVP - early game)

\*\*II. Cultivation & Plant Care Tools\*\*

\* Pruning & Cutting: (MVP)

\* Snips/Scissors (Micro-Tip, Curved/Straight)

\* \*Gloves (nitrile, black frequently seen)\*

\* Spraying & Application: (MVP - manual)

\* Hand Spray Bottles

\* Pump Sprayers (Gal, Backpack) - \*Used for foliar sprays (e.g., CSR mix).\*

\* \*Protective Gear for Spraying: Full Tyvek-style suit, respirator mask (as seen for foliar/pest control application).\*

\* Scouting & Monitoring: (MVP)

\* Sticky Traps

\* Magnifying Loupes

\* Microscopes (Handheld, Benchtop)

\* Plant Support Tools: (MVP)

\* Trellis netting - \*Extensively used in flower rooms (SCROG-like setup).\*

\* Stakes/Poles - \*Metal or PVC poles used as main supports for trellis.\*

\*\*III. Nutrient & Irrigation Equipment\*\*

\* Watering Cans/Hoses: (MVP - manual watering in Veg)

\* \*Hand watering wands used in veg rooms.\*

\* Reservoirs/Tanks: (MVP)

\* \*Large poly tanks seen for nutrient mixing (e.g., 300-gallon).\*

\* Pumps: (MVP)

\* Water Pumps (Submersible, Inline)

\* Air Pumps

\* Plumbing: (MVP)

\* Pipes, Fittings, Valves

\* \*Drip Irrigation System: Seen in flower rooms, likely with Netafim-style spray stakes.\*

\* Nutrient Mixing Stations/Vats: (MVP)

\* Growing Mediums/Substrates: (MVP)

\* Soil

\* \*Coco Coir (King's Coco specifically mentioned and used).\*

\* \*Rockwool cubes (Grodan 2-inch cubes for cloning).\*

\* Nutrient Containers: (MVP)

\* \*Specific Brands/Types Observed/Mentioned:\*

\* \*Dyna-Gro Pro-Tekt (Silicon supplement)\*

\* \*House & Garden Aqua Flakes (Part A & B base nutrients)\*

\* \*Botanicare Cal-Mag Plus\*

\* \*Botanicare Hydroguard (Root inoculant)\*

\* \*Clonex Gel (Rooting hormone for clones)\*

\* \*Regalia (Biofungicide, used in foliar spray)\*

\* \*General Hydroponics pH Up/Down (implied for pH adjustment)\*

\*\*IV. Environmental Control Equipment\*\*

\* HVAC Systems: (MVP)

\* Air Conditioners - \*Numerous large, industrial AC units seen.\*

\* Dehumidifiers - \*Quest dehumidifiers mentioned/seen (e.g., "600 pints of dehumidification" for a dry room).\*

\* \*Anden Dehumidifiers also visible in some areas.\*

\* Fans: (MVP)

\* Circulation Fans - \*Large drum fans (e.g., 24") extensively used in flower rooms.\*

\* Exhaust Fans

\* Inline Duct Fans

\* Ducting: (MVP)

\* CO2 Systems: (MVP - basic)

\* Grow Lights: (MVP)

\* \*HID - HPS (Gavita 1000W DE fixtures heavily featured in flower rooms).\*

\* \*Fluorescent - T5 (Likely used in propagation/mother rooms, common practice).\*

\* Light Timers/Controllers: (MVP)

\* Thermostats, Humidistats, Environmental Controllers: (MVP - basic)

\* Sensors: (MVP)

\* Air Filters: (MVP)

\* Carbon filters (implied for odor control).

\*\*V. Utility Systems & Equipment\*\* (MVP for basics)

\* Electrical Wiring, Circuit Breakers / Panels

\* \*Wind Turbines (Visible externally near Kings Garden, suggesting potential for renewable energy themes post-MVP, but for MVP it's abstracted grid power).\*

\*\*VI. Pots, Containers, & Growing Surfaces\*\*

\* Pots: (MVP)

\* \*Square plastic pots of various sizes (e.g., half-gallon for veg, 3-gallon for flower).\*

\* Trays / Flats (Seedling, Propagation): (MVP)

\* \*Standard 1020 trays for holding 50-site Grodan rockwool sheets.\*

\* \*Propagation Domes (clear plastic, used over clone trays).\*

\* Rockwool Cubes / Slabs: (MVP)

\* \*Grodan 2-inch rockwool cubes for cloning.\*

\* Growing Benches / Tables: (MVP)

\* \*GGS Rolling Benches widely used in flower rooms to maximize canopy space.\*

\*\*VII. Pest & Disease Management\*\* (MVP for basics)

\* Scouting Tools (as above)

\* Application Tools (as above)

\* \*Biologicals/Biofungicides: Regalia mentioned.\*

\* \*Nematodes (mentioned for fresh water drench in flower to combat pests).\*

\*\*VIII. Harvesting & Processing Equipment\*\*

\* Harvesting Tools: (MVP)

\* Trim Scissors / Shears

\* Collection Totes/Bins

\* Trimming Tools: (MVP - manual hand-trimming)

\* \*Chikamasa-style trim scissors are common industry standard (visual inference).\*

\* \*Trim Bins/Trays with kief screens.\*

\* \*Orange plastic trays used by trimmers.\*

\* \*Automated Trimming Machines: (Post-MVP as per briefing, though GreenBroz is a partner).\*

\* Drying Racks / Clotheslines & Hangers: (MVP)

\* \*Whole plant hang drying method used.\*

\* \*Unistrut and plastic trellis netting used to create extensive hanging infrastructure in dry rooms.\*

\* Curing Containers: (MVP)

\* \*Large food-grade bins/totes for initial stages after drying.\*

\* \*Boveda 2-Way Humidity Control Packs (62% RH specifically mentioned and shown for bulk storage/cure).\*

\* Weighing & Measuring: (MVP)

\* Digital Scales

\* \*Pre-Roll Machines: (Post-MVP or Late-Game MVP)\*

\* \*STM Canna RocketBox (makes 453 pre-rolls/minute - likely for high volume).\*

\* \*STM Canna Mini-RocketBox (makes 143 pre-rolls/45 seconds - smaller scale).\*

\* \*Automated Packaging Machinery: (Post-MVP or Late-Game MVP)\*

\* \*GreenBroz / Green Vault Systems Precision Batcher (uses AirKush tech for gentle handling, ~7 lbs/hr).\*

\* \*Packaging Supplies:\*

\* \*Kings Garden custom glass jars with gold-embossed/debossed lids. (MVP for basic jars, custom branding later)\*

\* \*Kings Garden custom printed Mylar bags (for flower/concentrates). (MVP for basic bags, custom later)\*

\* \*Cardboard boxes for packaging multiple units.\*

\* \*Labels and applicators (implied).\*

\*\*IX. Facility Furniture & Fixtures\*\* (MVP for basics)

\* Workbenches - \*Stainless steel tables extensively used in trim/packaging.\*

\* HD Shelving - \*Metro-style wire shelving used throughout for plants, supplies, drying.\*

\* Rolling Utility Carts

\* Seating - \*Ergonomic rolling chairs for trimmers.\*

\* Industrial Sink/Wash Basin

\* Safety Equipment (Fire Extinguishers, etc.)

\* \*Lockers (for employee belongings).\*

\* \*Security Systems: Multiple CCTV cameras visible throughout the facility. (UI element for player to place/view).\*

\*\*X. Map Specific Assets\*\*

\* Residential House Shell & Unique Fixtures (MVP)

\* Warehouse Shell & Unique Fixtures (MVP)

\* \*Kings Garden facility is a large warehouse-style build.\*

\* \*Wind Farm (Exterior visual near Kings Garden facility, could be a map-specific decorative element or tied to future power mechanics).\*

\*\*XI. Decorative & "Cozy" Items\*\* (MVP)

\* \*Motivational Wall Art (e.g., "TINY LITTLE MEN..." sign).\*

\* \*Company Logos/Branding (Kings Garden eye logo prominent).\*

\* \*Dartboard (seen in a break area).\*

\* \*Ping Pong Table (seen in a break area).\*

\* \*Religious Iconography (paintings seen in an office/lounge area - player choice).\*

\*\*XII. Plant Assets (Core for Procedural System)\*\* (MVP)

\* Base 3D Models

\* Procedural Generation System

\* Dynamic Shader/Material Effects

\* \*Specific Strains Mentioned/Shown (for trait inspiration/foundational models):\*

\* \*Gelato\*

\* \*Banana OG\*

\* \*GMO (Garlic Cookies) - noted for very high THC (44% total cannabinoids)\*

\* \*Ice Cream Cake #8 (Easton's Cut)\*

\* \*Blue Dream\*

\* \*Jack Herer\*

\* \*KGB (Kings Garden Blend/Strain)\*

\* \*Platinum Blue Dream\*

\* \*Piemin\*

\* \*Big Smooth (Cookies N Cream x OG Blueberry)\*

\* \*Many others implied by their 160-strain genetic library.\*

\*\*XIII. Data Collection & Lab Equipment\*\*

\* Handheld Meters (MVP)

\* \*SC Labs (mentioned as their third-party testing lab - for game, this could be an NPC service).\*

\* Laptop/Desktop for Data Interface (MVP)

\* \*Treez POS System used at The Vault dispensary (could be an in-game software asset for sales data).\*

\*\*XIV. UI & Data Visualization Elements\*\* (MVP for essentials)

\* \*Product Menus (Digital display menus seen in The Vault dispensary).\*

\* \*Instagram-like Social Media Feed (UI for marketing/brand building aspect, as KG uses IG extensively).\*

\*\*XV. Advanced Breeding & Lab Equipment\*\* (Post-MVP)

\* \*While KG does extensive in-house pheno-hunting (MVP), advanced lab equipment for tissue culture or genetic modification wasn't explicitly showcased for their cultivation pipeline, aligning with Post-MVP for these in Chimera.\*

\*\*XVI. Consumable Resources (Abstract/UI Representation)\*\* (MVP)

\* Water, Power, Nutrients (specific brands now listable), CO2, Building Materials, Seeds/Clones, Finances.

\* \*Boveda Packs (consumable for curing/storage).\*

\* \*Clonex Gel (consumable for propagation).\*

\* \*Grodan Rockwool (consumable growing medium).\*

\* \*King's Coco (consumable growing medium).\*

This enhanced list should provide a much richer foundation for Project Chimera, drawing direct inspiration from a real-world, large-scale, high-quality cultivation facility. The video provided excellent context for the \*types\* and \*brands\* of equipment used, as well as the \*processes\* and \*philosophies\* behind a successful operation.

Okay, I've analyzed the provided CannaCribs video transcript featuring Stiiizy and cross-referenced it with your existing "Asset List 1.4" and the "Project Chimera Briefing Document."

Here's the enhanced Asset List. I've focused on:

1. Adding specific brand names or types of equipment seen/mentioned in the Stiiizy video.

2. Confirming or adjusting the "MVP Status / Estimated Game Version" based on the Briefing Document's clear MVP scope.

3. Adding notes to clarify how the video's content aligns with or informs the asset.

4. Ensuring that items explicitly mentioned as MVP in the Briefing are marked as such, even if not directly highlighted in the video.

\*\*Key takeaways from the Stiiizy video relevant to the asset list:\*\*

\* \*\*Brands:\*\* Athena (nutrients, cleaning), Quest (dehumidifiers), Grodan (growing media), Common Culture (trim trays), Demeter Designs (fertigation systems).

\* \*\*Strains:\*\* Sherbbles, Blue Burst (mentioned as a high THC strain, up to 40%), Sour Apple, Peach Gelato, Pink Rosay.

\* \*\*Processes/Tech:\*\* Extensive use of tissue culture (though post-MVP for the game), detailed analytics, specific cloning and propagation techniques, multi-layer trellis, emphasis on quality control in post-harvest.

\* \*\*Facility Features:\*\* Dedicated rooms for TC, propagation, flower, drying, curing, trimming, processing, fertigation, analytics. Impressive retail spaces.

--- START OF ENHANCED Asset List 1.5 ---

﻿Project Chimera: Customized, Comprehensive Asset List v1.5

Core Vision: Modern, High-Tech, Clinical/Scientific, Aspirational/Professional aesthetic; player-driven "Relaxed & Cozy" variations.

Detail paramount: (Satisfactory, Farming Sim benchmarks for equipment) for deep simulation. The simulation aims for a granular, scientifically grounded foundation.

Source Prioritization:

1. Core Docs (mechanics, scope, style).

2. Relevant Docs (cannabis science, cultivation, pests, water, nutrients, breeding, equipment for realism/complexity). This includes Cannabis sativa L. biology, cultivation, genetics, and industry practices.

3. General Knowledge (bridge gaps).

Gameplay Loops Supported: Build, Cultivate, Breed, Process, Analyze, Optimize.

Key Customizations:

\* Expanded Utility Systems (Plumbing, HVAC, Electrical) with detailed, interconnected networks where sizing and material impact performance.

\* Detailed Plant Assets (dynamic, procedural, GxE-tied), reflecting phenotypic plasticity.

\* Lab/Research Equipment (advanced breeding/analysis) supporting high-tier breeding, genetic research, and detailed chemical profiling.

\* UI/Data Viz as crucial assets for presenting complex simulation data.

Specific environmental control, nutrient management, IPM, post-harvest details: These systems will incorporate specific parameters for temperature, humidity, CO2, airflow, light, optimal nutrient ranges, and pest/disease resistance.

Scalability: Residential vs. Warehouse/Industrial, potentially expanding to Greenhouses, Vertical Farms, Research Labs, and Outdoor Fields.

Item List:

Structural & Architectural Elements

Walls

Floors

Drains

Roofs/Ceilings

Doors

Windows

Stairs/Ladders/Catwalks

Support Pillars/Beams

Containment Structures (Tents)

Cultivation & Plant Care Tools

Snips/Scissors (Micro-Tip, Curved/Straight)

Scalpels

Large Hedge Trimmers

Hand Spray Bottles

Pump Sprayers (Gal, Backpack)

Handheld Dusters

Soil Drench Applicators

Motorized spray carts

Foggers

Integrated Spraying Systems

Sticky Traps (Yellow, Blue - Cards, Rolls)

Magnifying Loupes

Handheld Digital/Standard Microscopes

Benchtop Digital/Standard Microscopes

Soil/Medium Sample Probes/Corers

Leaf Sample Bags/Vials

Simulated Chlorophyll Meter

Trellis netting (Multi-layer shown at Stiiizy)

Stakes

Tie wire

Nutrient & Irrigation Equipment

Watering Cans/Hoses

Reservoirs/Tanks

Water Pumps (Submersible, Inline)

Air Pumps

Pipes (PVC, PEX, Drip Line)

Fittings

Valves (manual, solenoid)

Filters (for plumbing)

Nutrient Mixing Stations/Vats (Stiiizy shows large automated batch tanks)

Automated Dosing/Fertigation Systems (e.g., systems by Demeter Designs as seen at Stiiizy)

Growing Mediums/Substrates (Soil, Coco Coir, Rockwool cubes/slabs e.g., Grodan AOKs, 4x4s, Uni-Slabs, Hydroton, Peat Moss, Living Soil)

Nutrient Containers (Bottles/Bags of base nutrients, additives e.g., Athena Pro Line - Core, Grow, Bloom; Athena Blended Line - Cleanse, Stack, Cuts rooting compound)

Environmental Control Equipment

Air Conditioners (Window, Split)

Heaters (Electric, Gas)

Dehumidifiers (e.g., Quest 506 Dehumidifiers)

Humidifiers

Circulation Fans (Clip, Standing, Wall)

Exhaust Fans

Inline Duct Fans

Ducting (Flexible, Rigid)

Ducting Fittings

CO2 Tanks

CO2 Regulators

CO2 Controllers

CO2 Generators

Grow Lights (HID - MH/HPS with Ballasts/Hoods, LED Panels, Fluorescent - T5/CFL, LEC)

Light Timers/Controllers

Thermostats

Humidistats

Environmental Controllers (e.g., HC Controls for facility-wide monitoring as conceptualized by Stiiizy's analytics room)

Environmental Sensors (Air Temp, RH, CO2, Light - PAR/PPFD)

Leaf Surface Temp Sensors

Root Zone/Substrate Sensors (Moisture - VWC%, EC, pH, Temperature)

Advanced/Specialized Sensors (Inline Water sensors, Spore Traps)

Research-grade reference sensors

Air Filters (Intake filters, Carbon filters, MERV-rated filters)

Utility Systems & Equipment

Electrical Wiring

Circuit Breakers / Fuse Boxes / Panels

Generators (Diesel/Gas)

CoGen systems

Battery Banks / UPS (Uninterruptible Power Supply)

Main Power Grid Connection Point (Abstracted)

Water Supply Connection Point (Abstracted - Tap, RO, Treated)

Pots, Containers, & Growing Surfaces

Pots (Standard Pot, Grow Bag type)

Fabric Grow Bags

Trays / Flats (Seedling, Propagation - Stiiizy uses these with Grodan AOKs)

Rockwool Cubes / Slabs (e.g., Grodan: AOKs for clones, 4x4 blocks, Uni-Slabs for flower)

Hydroponic/Aeroponic Systems (Basic Ebb/Flow, DWC buckets, NFT, Aeroponics)

Growing Benches / Tables (Flood tables, Wire racks - Stiiizy uses rolling benches)

Pest & Disease Management

Sticky Traps (Yellow, Blue - Cards, Rolls)

Handheld Magnifying Loupes

Microscopes (Handheld, Benchtop for Pest/Disease)

Hand Spray Bottles (for Pest/Disease)

Pump Sprayers (Gal, Backpack for Pest/Disease)

(Simulated) Pesticides/Fungicides/Biologicals (e.g., Athena IPM)

In-game "Plant Problems Guide" UI/Asset

Harvesting & Processing Equipment

Large Trimming Shears

HD Loppers (for harvesting)

Hand Saw (for harvesting)

Hedge Trimmers (for harvesting)

Collection Totes/Bins (Food-grade)

Tarps

Trim Scissors (Micro-tip, types)

Trim Bins/Trays (with kief screens, e.g., Common Culture Trim Trays)

Isopropyl Alcohol/Wipes (cleaning for harvest tools - Stiiizy emphasizes sanitation)

Rags (for harvest tool cleaning)

Electrically operated, manually controlled hand trimming assist tools

Bowl Trimmers (Manual, Electric)

Automated Trimming Machines

Drying Racks / Clotheslines & Hangers (Stiiizy uses vertical hanging racks)

Curing Containers (Jars, Buckets - Glass, Plastic, Food-grade totes as seen at Stiiizy)

Automated curing systems

Digital Pocket Scales (Precision)

Digital Bench Scales (Larger capacity)

Industrial Scales (Platform, Floor scales)

Calibration Weights

Transporting Baskets

Hand-drawn garden carts

Small motorized transport (for harvest)

Portable conveyor belts (for harvest)

Cold Storage (Refrigerators, freezers for harvest)

Extraction/Concentrate Equipment (Solventless Press, Basic Extraction System - Stiiizy produces various concentrates like Live Rosin, Diamonds, Jam)

Facility Furniture & Fixtures

Workbenches

HD Shelving (Metal, Wire)

Storage Cabinets (Metal, Plastic, Lockable)

Chemical/Flammable Storage Cabinets (e.g., for Athena Reset, Perafoam, IPM)

Rolling Utility Carts

Seating (Chairs, Stools, Folding Chairs)

Industrial Sink/Wash Basin (Stainless Steel)

Faucet Fixtures

Eye Wash Station (Wall, Pedestal)

Emergency Shower (Industrial)

Fire Extinguishers

First Aid Kits

Wall Clocks

Trash Cans/Waste Bins (Industrial rolling)

Recycling Bins

Mop & Bucket

Broom & Dustpan

Wet Floor Signs

Floor Mats/Anti-Fatigue

Lockers

Dumpsters

Map Specific Assets

Residential House Shell & Unique Fixtures

Warehouse Shell & Unique Fixtures

Greenhouse Structure (glass/polycarbonate, vents)

Research Lab Shell & Specialized Benches/Fixtures

Outdoor Field Elements (landscape, fencing)

Vertical Farm Structure (multi-tiered racking)

Subterranean Lab Shell

Abandoned Research Outpost Shell

Geothermal Greenhouse Complex Shell

Decorative & "Cozy" Items

Posters

Art (e.g., Stiiizy's retail locations feature extensive art installations, murals)

Rugs

Small Furniture (decorative chairs, tables)

Non-cannabis plants

Decorative lighting (e.g., Stiiizy's immersive light tunnels)

Personal items

Paint/Texture options (walls/floors)

Plant Assets (Core for Procedural System)

Base 3D Models (Landrace-inspired foundational strains + inspiration from Stiiizy strains like Sherbbles, Blue Burst, Sour Apple, Peach Gelato, Pink Rosay)

Procedural Generation System (Software/Code Asset)

Dynamic Shader/Material Effects (MIDs, MPCs for plants)

Data Collection & Lab Equipment

Handheld EC/PPM meter

Handheld pH meter

Handheld Temperature Probe (air, water, soil)

Handheld Soil Moisture meter

Handheld Simulated Chlorophyll Content meter

Handheld PAR/PPFD meter

Handheld Infrared Thermometer (leaf surface temp)

Handheld VPD Meter

Lab-grade EC/pH meter (Benchtop)

Spectrophotometer (Benchtop, simulated use)

HPLC (High-Performance Liquid Chromatography) System

GC-MS (Gas Chromatography-Mass Spectrometry) System

ICP (Inductively Coupled Plasma) Assay System

Elemental Analyzer

NIR/MIR Spectroscopy System

Laptop (Data Interface - Stiiizy analytics team uses these)

Tablet (Data Interface)

Desktop (Monitor, Keyboard, Mouse - Data Interface, multiple large screens for analytics at Stiiizy)

Clipboard (Data Interface)

Pens (Data Interface)

Whiteboard (Data Interface)

Industrial Server rack (Data Interface)

Large control displays (Data Interface - as seen in Stiiizy's analytics room)

Calibration Weights (for scales)

Simulated Lab Analysis Interface (UI for lab results)

UI & Data Visualization Elements

Environmental Data Dashboards/Overlays (Stiiizy's analytics room heavily implies this with HC Controls)

Environmental heat maps

Graphs & Charts (Historical trends)

Plant Health/Status Indicators (Icons/bars)

Plant Detail View UI (specific issues)

Nutrient Management Interface

Genetic Data Display (Strain info, Lineage, Traits - Stiiizy strains like Blue Burst testing at 40% THC)

Pedigree Charts (UI)

Punnett Squares (Simulated UI)

Abstracted Genetic Marker/Allele display (UI)

Simulated Lab Analysis Results UI (Cannabinoid/Terpene Profiles, Tissue Nutrient Analysis, Water Quality Report)

Breeding Interface (Parent selection, Crossing UI, Pheno-Hunting tools)

Facility Management Overlays (Utility View "X-Ray", Zoning UI)

Resource inventory/consumption UI

Operational & Financial Data UI (Budget, Costs, Revenue, Profit/Loss)

Ledger UI

Alerts & Notifications UI

Historical Logs & Notes Interface (UI)

Tutorial/Info Overlays (UI)

Advanced Breeding & Lab Equipment

Sterile Work Area/Hood (Laminar Flow - Stiiizy uses these for Tissue Culture)

Autoclave

Incubator (for Tissue Culture)

Microscope (Dissecting, for Tissue Culture - Stiiizy uses microscopes for TC and diagnostics)

Racks for Culture Vessels

Culture Vessels (Stiiizy shows various TC vessels)

pH meter (for Tissue Culture lab)

Analytical balance (for Tissue Culture lab)

Glassware (for Tissue Culture lab)

Sterilizable tools (scalpels, forceps for Tissue Culture)

Bunsen burner/glass bead sterilizer (for Tissue Culture lab)

Refrigerators/Freezers (for Tissue Culture lab)

Lab Benches (Specialized Stainless/Chemical Resistant)

Storage Cabinets (Chemical/Flammable for Labs)

Lab Sinks (Specialized)

Cryopreservation Unit (Visual)

Freezers (for Cryopreservation)

LN₂ tanks (for Cryopreservation)

Straws/vials (for Cryopreservation)

Advanced Genetic Modification Equipment (CRISPR-like System - Visual)

Electroporator/Gene Gun

Bioinformatics Tools/Software (UI/Abstracted System - Stiiizy mentions molecular biology in their TC department)

Consumable Resources (Abstract/UI Representation)

Water (Tap, RO, Treated - Consumable)

Power (Grid, Generator Fuel, Battery Charge - Consumable)

Nutrients (Packaged Fertilizers, Mixed Solution - Consumable e.g., Athena Pro Line, Blended Line)

CO2 (CO2 Tanks, CO2 Gas - Consumable)

Building Materials (Walls, Floors, Pipes, Wires, Ducting - Consumable)

Seeds (Strain-specific - Consumable)

Clones (Consumable - Stiiizy extensively uses clones from TC and traditional propagation)

Finances (In-game Currency)

Specialized Tissue Culture Media (Stiiizy uses these for TC initiation and multiplication)

Plant Growth Regulators (PGRs)

Agar

Hormones (for Tissue Culture)

Cryoprotectants

Enzymes (for lab work, e.g., diagnostics in Stiiizy's TC lab)

Sterile Consumables (for lab work)

Structural & Architectural Elements

Purpose: Define grow spaces, support equipment, manage environment (materials affecting insulation, cleanliness, etc.). Layout and zoning will facilitate clean flow principles.

Variations:

\* Interior: Drywall, Concrete, Insulated Panel. Materials should be non-porous, smooth, durable, non-absorbent, and chemical-resistant for sanitation.

\* Exterior: Siding, Brick, Metal (Map specific).

\* Industrial: Pre-fab, Heavy-duty.

Material properties: Cost, Appearance, Insulation (R-value for heat transfer management), light/air barrier (for Environmental Control Sim), Cleanliness (materials influence ease of cleaning). Coving at wall-floor junctions is recommended.

Assets:

\* Walls: Sections/panels (various materials).

\* MVP Status / Estimated Game Version: MVP. Required for initial "Residential House" map and basic "Warehouse" build-out. (Briefing I)

\* Material properties related to Environmental Control Sim (Insulation - R-value) are relevant for MVP. Materials for future exterior/map-specific themes would be Post-MVP.

\* Floors: Sections (Concrete, Wood, Grate - with load ratings). Non-porous materials preferred.

\* Drains: Standard, Trench (with varying capacity).

\* MVP Status / Estimated Game Version: MVP. Required for initial facility construction. (Briefing I)

\* Roofs/Ceilings: Sections (Drywall, Suspended Grid, Concrete). High ceilings can cause thermal stratification.

\* Suspended Tiles: (acoustic, cleanroom).

\* Open Rafters/Trusses: (Wood, Metal). These can influence large-scale microclimate patterns.

\* MVP Status / Estimated Game Version: MVP. Required for initial facility construction. (Briefing I)

\* Doors: Various types (Standard, Industrial Roller, Air Lock). Air locks minimize contaminant entry.

\* MVP Status / Estimated Game Version: MVP. Required for facility construction. (Briefing I)

\* Windows: Various types (Standard, Greenhouse, Industrial). Can be blocked out in grow rooms.

\* MVP Status / Estimated Game Version: MVP. Standard windows for Residential/Warehouse. (Briefing I) Greenhouse-specific windows (e.g., for specific light transmission) are Future (Post-MVP).

\* Stairs/Ladders/Catwalks: For vertical access. Relevant for multi-story/vertical facilities.

\* MVP Status / Estimated Game Version: Likely MVP for multi-story/vertical layout in Warehouse or other facilities. Catwalks relevant for industrial scale and vertical farms.

\* Support Pillars/Beams: (Concrete, Steel). For structural support in large spaces.

\* MVP Status / Estimated Game Version: MVP for Warehouse map shell. (Briefing I)

\* Containment Structures (Tents): Pre-fab grow tents, sealable for environmental control.

\* MVP Status / Estimated Game Version: Likely MVP for early-game or smaller residential setups.

Cultivation & Plant Care Tools

Purpose: Plant maintenance (pruning, training), scouting, applying treatments.

Variations: Size, Material (affects durability, cleanliness, rust potential), Quality (Basic, High-quality), Sharpness/Condition (affects cut cleanliness, plant stress, disease risk). Tools require cleaning/sterilization.

Assets:

\* Pruning & Cutting:

\* Types: Bypass Pruners (Std, HD), Snips/Scissors (Micro-Tip, Curved/Straight), Scalpels, Loppers, Hand Saw. Large Hedge Trimmers (potentially with pole extensions).

\* Properties: Cutting Area/Blade Length, Weight (affects fatigue).

\* MVP Status / Estimated Game Version: MVP. Basic plant training (topping, manual LST) is part of core MVP cultivation. (Briefing I) These tools are necessary. Clean cuts promote faster healing.

\* Spraying & Application: Hand Spray Bottles, Pump Sprayers (Gal, Backpack), Handheld Dusters, Soil Drench Applicators.

\* Industrial: Motorized spray carts, Foggers, Integrated Spraying Systems (automated, fixed nozzles).

\* MVP Status / Estimated Game Version: MVP for basic pest/disease treatment (manual application). (Briefing I) Industrial versions likely Late-Game MVP or Post-MVP, linked to scale and automation.

\* Scouting & Monitoring:

\* Traps: Sticky Traps (Yellow, Blue - Cards, Rolls) for monitoring pest presence, location, and stage.

\* Visual Inspection Tools: Magnifying Loupes, Handheld/Benchtop Digital/Standard Microscopes for detailed inspection of pests, pathogens, trichomes.

\* Sampling Tools: Soil/Medium Sample Probes/Corers, Leaf Sample Bags/Vials.

\* Simulated Meters (Visual): Simulated Chlorophyll Meter.

\* MVP Status / Estimated Game Version: MVP for basic plant health monitoring and pest/disease identification. (Briefing I) Microscopes and probes for manual data acquisition.

\* Plant Support Tools:

\* Types: Trellis netting (Stiiizy uses multiple layers of trellis), stakes, tie wire.

\* Functionality: Prevents lodging, supports heavy buds, manages canopy.

\* MVP Status / Estimated Game Version: Likely MVP, especially for supporting larger plants or specific training techniques (e.g., ScrOG).

Nutrient & Irrigation Equipment

Purpose: Store, mix, deliver nutrients and water to plants. Systems will manage pH, EC/PPM, temperature, and Dissolved Oxygen (DO) of nutrient solutions.

Variations:

\* Scale (Manual, Small Reservoir, Large Industrial).

\* Control (Manual, Timed, Automated sensor-driven).

\* Type (Drip, Ebb/Flow, DWC, Aeroponic, etc.).

Assets:

\* Watering Cans/Hoses: Basic manual irrigation.

\* Properties: Capacity/Flow Rate.

\* MVP Status / Estimated Game Version: MVP. Basic irrigation methods are essential for core cultivation. (Briefing I)

\* Reservoirs/Tanks: Various sizes (Plastic, Poly, Stainless Steel - food-grade). Dynamically reflect fill levels. Must be kept clean. (Stiiizy shows large batch tanks).

\* MVP Status / Estimated Game Version: MVP. Needed for manual/timed watering systems. (Briefing I) Larger/Industrial sizes likely Late-Game MVP or Post-MVP.

\* Pumps: Water Pumps (Submersible, Inline - various flow rates/head pressure), Air Pumps (for DWC).

\* Properties: Power Requirement, Durability/Maintenance (can fail).

\* MVP Status / Estimated Game Version: MVP. Needed for simple reservoir systems. (Briefing I)

\* Plumbing: Pipes (PVC, PEX, Drip Line), Fittings, Valves (manual, solenoid), Filters.

\* Properties: Material, Sizing, Connectivity, Routing. Abstracted pressure loss.

\* MVP Status / Estimated Game Version: MVP. Essential for building irrigation systems. (Briefing I, V) Manual routing MVP.

\* Nutrient Mixing Stations/Vats: For preparing nutrient solutions. (Stiiizy shows large, likely automated, mixing for their Athena nutrients).

\* MVP Status / Estimated Game Version: MVP. Required for manual nutrient mixing. (Briefing I) Scale/automation increases later.

\* Automated Dosing/Fertigation Systems: Links sensors (EC/pH) to pumps/valves for automated mixing and delivery. (e.g., Demeter Designs systems at Stiiizy).

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. Basic automation (timers) is MVP, but fully automated dosing is advanced. (Briefing II)

\* Growing Mediums/Substrates: Bags/bulk (Soil, Coco Coir, Rockwool cubes/slabs e.g., Grodan AOKs, 4x4s, Uni-Slabs as used by Stiiizy, Hydroton, Peat Moss). Living Soil.

\* Properties: Water retention, aeration, nutrient availability, etc.

\* MVP Status / Estimated Game Version: MVP. Essential consumable. (Briefing I) UI/Inventory representation is MVP.

\* Nutrient Containers: Bottles/Bags of base nutrients, additives. (e.g., Athena Pro Line: Core, Grow, Bloom; Athena Blended Line: Cleanse, Stack, Cuts rooting compound as used by Stiiizy).

\* Properties: NPK Ratio, concentrations.

\* MVP Status / Estimated Game Version: MVP. Consumable, part of manual nutrient management. (Briefing I) UI/Inventory representation is MVP.

Environmental Control Equipment

Purpose: Manage temperature, humidity, CO2, airflow, light cycles.

Variations: Size, Capacity, Efficiency, Control.

Assets:

\* HVAC Systems: Air Conditioners (Window, Split), Heaters (Electric, Gas), Dehumidifiers (e.g., Quest 506 Dehumidifiers seen at Stiiizy), Humidifiers.

\* Properties: Sizing/Capacity, Efficiency, Power/Fuel, Maintenance.

\* MVP Status / Estimated Game Version: MVP. Basic HVAC for temp, humidity is core MVP. (Briefing I)

\* Fans: Circulation Fans (Clip, Standing, Wall), Exhaust Fans, Inline Duct Fans.

\* Properties: Airflow Rate (CFM), Power, Control.

\* MVP Status / Estimated Game Version: MVP. Essential for airflow. (Briefing I)

\* Ducting: Flexible, Rigid, Fittings.

\* Properties: Material, Sizing.

\* MVP Status / Estimated Game Version: MVP. Needed for HVAC/exhaust. (Briefing V) Manual routing MVP.

\* CO2 Systems: CO2 Tanks, Regulators, Controllers, Generators.

\* MVP Status / Estimated Game Version: MVP for basic CO2 management (manual control initially). (Briefing I implies environmental control).

\* Grow Lights: Various types (HID, LED, Fluorescent, LEC).

\* Properties: Wattage, Spectrum, Output (PAR/PPFD, DLI), Efficiency, Heat, Coverage.

\* MVP Status / Estimated Game Version: MVP. Essential. (Briefing I)

\* Light Timers/Controllers: Mechanical, Digital.

\* MVP Status / Estimated Game Version: MVP. Basic automation (light cycles) is core MVP. (Briefing I)

\* Thermostats, Humidistats, Environmental Controllers: Simple to Advanced. (Stiiizy's analytics room suggests advanced integrated control like HC Controls).

\* MVP Status / Estimated Game Version: MVP. Basic automation (simple thermostat/humidistat) is core MVP. (Briefing I) Advanced controllers Post-MVP.

\* Sensors:

\* Types: Environmental (Air Temp, RH, CO2, Light), Leaf Surface Temp, Root Zone/Substrate (Moisture, EC, pH, Temp).

\* Tiers: Basic (manual), Intermediate (networked), Advanced, Research-grade.

\* MVP Status / Estimated Game Version: MVP. Essential for data dashboards and automated control. (Briefing I, VIII) Player-placed sensors for manual data collection.

\* Air Filters: Intake filters, Carbon filters, MERV-rated filters.

\* MVP Status / Estimated Game Version: Likely MVP. Essential for air quality/odor.

Utility Systems & Equipment

Purpose: Deliver power, connect systems. Detailed, routable networks. Utility View/"X-Ray" mode.

Assets:

\* Electrical Wiring: Various gauges.

\* MVP Status / Estimated Game Version: MVP. Abstracted utility connections, manual routing. (Briefing I, V)

\* Circuit Breakers / Fuse Boxes / Panels:

\* MVP Status / Estimated Game Version: MVP.

\* Generators (Diesel/Gas): Backup/primary power.

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. (Briefing II "Advanced Automation & Robotics" implies complex power needs later).

\* Battery Banks / UPS:

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. (Briefing II)

\* Main Power Grid Connection Point (Abstracted):

\* MVP Status / Estimated Game Version: MVP. (Briefing I)

\* Water Supply Connection Point (Abstracted - Tap, RO, Treated):

\* MVP Status / Estimated Game Version: MVP. (Briefing I)

Pots, Containers, & Growing Surfaces

Purpose: Hold plants and growing medium.

Assets:

\* Pots: Various sizes.

\* MVP Status / Estimated Game Version: MVP. Essential. (Briefing I)

\* Fabric Grow Bags:

\* MVP Status / Estimated Game Version: MVP. Variation.

\* Trays / Flats (Seedling, Propagation): (Stiiizy uses these for clones in Grodan AOKs).

\* MVP Status / Estimated Game Version: MVP. (Briefing I "planting seeds/clones")

\* Rockwool Cubes / Slabs: (e.g., Grodan AOKs, 4x4s, Uni-Slabs as seen at Stiiizy).

\* MVP Status / Estimated Game Version: MVP. As a growing medium/container type.

\* Hydroponic/Aeroponic Systems (Basic Ebb/Flow, DWC buckets, NFT, Aeroponics):

\* MVP Status / Estimated Game Version: Likely MVP for basic hydro (Ebb/Flow, DWC). (Briefing I "basic irrigation"). More complex systems Post-MVP.

\* Growing Benches / Tables (Flood tables, Wire racks): (Stiiizy uses rolling benches).

\* MVP Status / Estimated Game Version: MVP.

Pest & Disease Management

Purpose: Monitor, identify, treat plant issues.

Assets:

\* Scouting Tools:

\* Sticky Traps: (Yellow, Blue - Cards, Rolls).

\* MVP Status / Estimated Game Version: MVP. (Briefing I "monitoring...basic plant health issues")

\* Handheld Magnifying Loupes:

\* MVP Status / Estimated Game Version: MVP. (Briefing I)

\* Microscopes (Handheld, Benchtop):

\* MVP Status / Estimated Game Version: MVP. (Briefing I "monitoring...basic plant health issues", VIII "Manual Environmental & Plant Sampling")

\* Application Tools:

\* Hand Spray Bottles, Pump Sprayers (Gal, Backpack):

\* MVP Status / Estimated Game Version: MVP. For manual treatment. (Briefing I "manual treatment")

\* (Simulated) Pesticides/Fungicides/Biologicals: (e.g., Athena IPM used by Stiiizy).

\* MVP Status / Estimated Game Version: MVP. For manual treatment. (Briefing I) UI/Inventory representation.

\* In-game "Plant Problems Guide" UI/Asset:

\* MVP Status / Estimated Game Version: MVP. (Briefing X "in-game guides")

Harvesting & Processing Equipment

Purpose: Harvest, trim, dry, cure.

Assets:

\* Harvesting Tools: Large Trimming Shears, HD Loppers, Hand Saw, Hedge Trimmers. Collection Totes/Bins. Tarps.

\* MVP Status / Estimated Game Version: MVP. Manual harvesting. (Briefing I)

\* Trimming Tools: Trim Scissors (Micro-tip, types). Trim Bins/Trays (e.g., Common Culture Trim Trays seen at Stiiizy). Isopropyl Alcohol/Wipes, Rags. (Stiiizy emphasizes sanitation).

\* MVP Status / Estimated Game Version: MVP. Manual hand-trimming. (Briefing I)

\* Bowl Trimmers (Manual, Electric):

\* MVP Status / Estimated Game Version: Likely Mid-Late MVP / Post-MVP.

\* Automated Trimming Machines:

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. (Briefing II "Advanced Automation")

\* Drying Racks / Clotheslines & Hangers: (Stiiizy uses vertical hanging in dedicated dry rooms).

\* MVP Status / Estimated Game Version: MVP. Manual drying, environment impacts quality. (Briefing I)

\* Curing Containers (Jars, Buckets - Glass, Plastic): (Stiiizy also uses food-grade totes).

\* MVP Status / Estimated Game Version: MVP. Manual curing, "burping." (Briefing I)

\* Weighing & Measuring: Digital Pocket Scales, Digital Bench Scales. Industrial scales.

\* Calibration Weights:

\* MVP Status / Estimated Game Version: MVP. (Briefing I "basic post-harvest metrics")

\* Transporting Equipment: Baskets, hand-drawn garden carts, small motorized transport, portable conveyor belts.

\* MVP Status / Estimated Game Version: Likely Mid-Late MVP, for larger scale.

\* Cold Storage: Refrigerators, freezers.

\* MVP Status / Estimated Game Version: Likely Post-MVP.

\* Extraction/Concentrate Equipment (Solventless Press, Basic Extraction System): (Stiiizy produces Live Rosin, Diamonds, Jam, etc.).

\* MVP Status / Estimated Game Version: Post-MVP. (Briefing II "Advanced Extraction & Product Formulation")

Facility Furniture & Fixtures

Purpose: Workspace, storage, safety, utility.

Assets:

\* Workbenches, HD Shelving, Storage Cabinets (Specialized for Chemicals/Flammables e.g., for Athena Reset, Perafoam, IPM). Rolling Utility Carts, Seating.

\* MVP Status / Estimated Game Version: MVP. (Briefing I "Essential cultivation equipment placement")

\* Sinks: Industrial Sink/Wash Basin. Faucet Fixtures.

\* MVP Status / Estimated Game Version: MVP.

\* Safety: Eye Wash Station, Emergency Shower, Fire Extinguishers, First Aid Kits.

\* MVP Status / Estimated Game Version: Likely MVP.

\* General: Wall Clocks, Trash Cans/Waste Bins, Recycling Bins, Mop & Bucket, Broom & Dustpan, Wet Floor Signs, Floor Mats/Anti-Fatigue, Lockers.

\* MVP Status / Estimated Game Version: MVP.

Map Specific Assets

Purpose: Define build environment, establish scale.

Assets:

\* Residential House:

\* MVP Status / Estimated Game Version: MVP. Initial map. (Briefing I, V)

\* Warehouse:

\* MVP Status / Estimated Game Version: MVP. Unlocked via milestone. (Briefing I, IV, V)

\* (Future: Greenhouse, Research Lab, Outdoor Field, Vertical Farm, etc.)

\* MVP Status / Estimated Game Version: Future (Post-MVP). (Briefing V)

Decorative & "Cozy" Items

Purpose: Player customization.

Assets: Posters, art (Stiiizy retail has extensive art/murals), rugs, small furniture, non-cannabis plants, decorative lighting (Stiiizy retail has immersive light tunnels), personal items, paint/texture options. \* MVP Status / Estimated Game Version: MVP. (Briefing Doc doesn't explicitly prioritize, but "player-driven 'Relaxed & Cozy' variations" in Asset List core vision implies MVP for some basics).

Plant Assets (Core for Procedural System)

Purpose: Central visual output, GxE reflection.

Assets:

\* Base 3D Models: ~5-10 landrace-inspired foundational strains. (Stiiizy examples for inspiration: Sherbbles, Blue Burst - noted for high THC up to 40%, Sour Apple, Peach Gelato, Pink Rosay).

\* MVP Status / Estimated Game Version: MVP. (Briefing I "planting seeds/clones", VI "Initial launch includes 5-10 foundational landrace-inspired strains")

\* Procedural Generation System (Software/Code Asset):

\* MVP Status / Estimated Game Version: MVP. (Briefing VI "Deep Genetics Simulation... robust simulation of inheritance/expression is heart")

\* Dynamic Shader/Material Effects (MIDs, MPCs):

\* MVP Status / Estimated Game Version: MVP. (Briefing I "visual indicators" for plant health)

\* Performance Optimization: LODs, HISMs/ISMs.

\* MVP Status / Estimated Game Version: MVP.

Data Collection & Lab Equipment

Purpose: Collect data, simulate lab analysis.

Assets:

\* Handheld Meters (Visual): EC/PPM, pH, Temp Probe, Soil Moisture, Chlorophyll, PAR/PPFD, IR Thermometer, VPD.

\* MVP Status / Estimated Game Version: MVP. (Briefing I "Manual Environmental & Plant Sampling: Unlocks: Handheld meters...")

\* Benchtop Meters/Analyzers (Visual): Lab-grade EC/pH, Spectrophotometer, HPLC, GC-MS, ICP, Elemental Analyzer, NIR/MIR.

\* MVP Status / Estimated Game Version: Likely Mid-Late MVP / Post-MVP for advanced analyzers. (Briefing II "Advanced Breeding Systems (complex traits, genetic analysis...)". Basic lab-grade EC/pH may be earlier.

\* Data Logging & Interface (Visual): Laptop, Tablet, Desktop (Stiiizy analytics room has multiple large screens, laptops), Clipboard, Pens, Whiteboard. Industrial server rack, large control displays.

\* MVP Status / Estimated Game Version: MVP for basic interfaces (Laptop/Desktop visual). (Briefing I "Data, UI, & Feedback Systems (Essential)") Industrial versions Post-MVP.

\* Calibration Weights:

\* MVP Status / Estimated Game Version: MVP.

\* Simulated Lab Analysis Interface (UI):

\* MVP Status / Estimated Game Version: Mid-Late MVP / Post-MVP. (Briefing II "Advanced ... genetic analysis")

UI & Data Visualization Elements

Purpose: Present complex sim data. CRITICAL.

Assets (UI Elements/Visuals):

\* Environmental Data Dashboards/Overlays: Real-time sensor readouts. Heat maps. (Stiiizy analytics room implies advanced dashboards).

\* MVP Status / Estimated Game Version: MVP. (Briefing I "Core environmental data dashboards")

\* Graphs & Charts: Historical trends.

\* MVP Status / Estimated Game Version: MVP.

\* Plant Health/Status Indicators: Icons/bars, detail view UI.

\* MVP Status / Estimated Game Version: MVP. (Briefing I "Plant status UI panels")

\* Nutrient Management Interface: Mixing UI, readouts.

\* MVP Status / Estimated Game Version: MVP. (Briefing I "Manual nutrient mixing... medium EC/pH monitoring")

\* Genetic Data Display: Strain Name, Lineage, Key Traits (THC/CBD from Stiiizy's 40% Blue Burst), Pedigree Charts, Punnett Squares. Abstracted Marker/Allele display.

\* MVP Status / Estimated Game Version: MVP for core observable traits, lineage, simple inheritance. (Briefing I "Simplified inheritance model...") Genetic Marker display Post-MVP.

\* Simulated Lab Analysis Results: Cannabinoid/Terpene Profiles, Tissue Nutrient Analysis, Water Quality.

\* MVP Status / Estimated Game Version: Likely Mid-Late MVP / Post-MVP. (Briefing II "Advanced ... genetic analysis")

\* Breeding Interface: Parent selection, Crossing UI, Pheno-Hunting.

\* MVP Status / Estimated Game Version: MVP. (Briefing I "Basic Breeding")

\* Facility Management Overlays: Utility View ("X-Ray"), Zoning UI, Resource inventory.

\* MVP Status / Estimated Game Version: MVP. Utility View crucial. (Briefing VIII) Resource inventory UI MVP.

\* Operational & Financial Data: Budget, Costs, Revenue, P/L. Ledger.

\* MVP Status / Estimated Game Version: MVP. (Briefing I "Basic operational costs")

\* Alerts & Notifications: Visual/audio cues, tiered.

\* MVP Status / Estimated Game Version: MVP. (Briefing I, VIII)

\* Historical Logs & Notes Interface:

\* MVP Status / Estimated Game Version: MVP. (Briefing I "basic logs/notes")

\* Tutorial/Info Overlays:

\* MVP Status / Estimated Game Version: MVP. (Briefing I, X)

Advanced Breeding & Lab Equipment

Purpose: High-tier breeding, research. (Stiiizy has an extensive TC lab for propagation, diagnostics, and R&D).

Assets:

\* Tissue Culture Station: Sterile Hood, Autoclave, Incubator, Microscope, Racks, Vessels, pH meter, balance, glassware, tools, sterilizer, fridge/freezer. (All visible or implied in Stiiizy's TC lab operations).

\* Consumables: Media, PGRs, agar, hormones, etc.

\* MVP Status / Estimated Game Version: Post-MVP. (Briefing II, VI "Tissue Culture & Micropropagation: Advanced...")

\* Lab Furniture: Specialized Benches, Cabinets, Sinks.

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. Tied to Research Lab facility type (Post-MVP).

\* Cryopreservation Unit (Visual):

\* MVP Status / Estimated Game Version: Post-MVP.

\* Advanced Genetic Modification Equipment (CRISPR-like System - Visual):

\* MVP Status / Estimated Game Version: Post-MVP. (Briefing II)

\* Bioinformatics Tools/Software (UI/Abstracted System): (Stiiizy mentions molecular biology for R&D).

\* MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. (Briefing II "Advanced ... genetic analysis")

Consumable Resources (Abstract/UI Representation)

Purpose: Track/manage consumed resources.

Assets:

\* Water: Supply (Tap, RO, Treated). Storage.

\* MVP Status / Estimated Game Version: MVP. (Briefing I "manage basic abstracted utility connections")

\* Power: Supply (Grid, Generator Fuel, Battery Charge). Consumption meter.

\* MVP Status / Estimated Game Version: MVP. (Briefing I) Generator Fuel/Battery for deferred systems.

\* Nutrients: Packaged Fertilizers, Mixed Solution. (e.g., Athena Pro Line, Blended Line, Cuts as seen at Stiiizy).

\* MVP Status / Estimated Game Version: MVP. (Briefing I "consumables")

\* CO2: CO2 Tanks, CO2 Gas.

\* MVP Status / Estimated Game Version: MVP. (Briefing I "environmental control")

\* Building Materials: Walls, Floors, Pipes, Wires, Ducting.

\* MVP Status / Estimated Game Version: MVP. (Briefing I "Facility Construction")

\* Seeds/Clones: Strain-specific Seeds, Clones. (Stiiizy's operations heavily rely on clones).

\* MVP Status / Estimated Game Version: MVP. (Briefing I "planting seeds/clones")

\* Finances: In-game Currency. Ledger.

\* MVP Status / Estimated Game Version: MVP. (Briefing I "Basic operational costs")

--- END OF ENHANCED Asset List 1.5 ---

Okay, I've reviewed the CannaCribs Nimbus facility tour video and the Briefing Document. I'll now go through your "Asset List 1.4" and enhance it with information from the video, cross-referencing with the Briefing Document to ensure MVP alignment and note Post-MVP items.

\*\*Key Takeaways from CannaCribs Nimbus Video & Integration Points:\*\*

\* \*\*Strains Mentioned:\*\*

\* Nimbus Mints (Kush Mints x GSC, backcrossed to Durban Poison)

\* Prism (Mango Thai x Purple Haze)

\* \*\*Facility & Equipment:\*\*

\* Vertical Racking (Double-tiered - Spacesaver GROW Mobile Storage System)

\* LED Grow Lights (Gavita 1700e for flower, Gavita T5-style LED for veg/supplemental)

\* Growing Medium (Grodan Gro-Blocks - Rockwool cubes/slabs)

\* Irrigation: Automated drip irrigation, Dosatron nutrient injectors, reservoirs.

\* HVAC: Quest Dehumidifiers (Quest 506, Quest 335, Quest 174 pint mobiles mentioned)

\* Trays (Botanicare Mobile Rack Trays 4'x4')

\* Harvesting/Processing: Whole plant hang dry, then bucked into perforated trays. Emphasis on hand trimming.

\* Cloning: Use of Conception Nurseries for tissue culture clones (comes in hermetically sealed packs).

\* Fertigation Room shown with multiple Dosatrons and reservoirs.

\* \*\*Processes & Philosophies:\*\*

\* "Veg in place" - plants stay in the same room from veg through flower; only lights change.

\* Drying: 60°F / 60% RH for 14 days (whole plant hang), then bucked into perforated trays for another 5-10 days.

\* Curing: Mentioned as standard jar curing for end-user (player).

\* Sustainability: Mentioned 100% sustainable energy (details not provided in video).

\* Data-driven decisions, R&D is important.

\* Employee benefits (401k, profit-sharing).

\* Artistic/Creative aspect is a core part of their brand (murals, branding).

I will now integrate this into your Asset List 1.4, marking new additions/confirmations from the video with `[V]` and ensuring MVP status aligns with the Briefing Document `[B]`.

--- START OF ENHANCED Asset List 1.4.1 ---

﻿Project Chimera: Customized, Comprehensive Asset List v1.4.1

Core Vision: Modern, High-Tech, Clinical/Scientific, Aspirational/Professional aesthetic; player-driven "Relaxed & Cozy" variations.

Detail paramount: (Satisfactory, Farming Sim benchmarks for equipment) for deep simulation. The simulation aims for a granular, scientifically grounded foundation.

Source Prioritization:

1. Core Docs (mechanics, scope, style - Briefing Document).

2. Relevant Docs (cannabis science, cultivation, pests, water, nutrients, breeding, equipment for realism/complexity). This includes Cannabis sativa L. biology, cultivation, genetics, and industry practices.

3. CannaCribs Nimbus Video for specific examples of equipment, strains, and processes.

4. General Knowledge (bridge gaps).

Gameplay Loops Supported: Build, Cultivate, Breed, Process, Analyze, Optimize.

Key Customizations:

\* Expanded Utility Systems (Plumbing, HVAC, Electrical) with detailed, interconnected networks where sizing and material impact performance.

\* Detailed Plant Assets (dynamic, procedural, GxE-tied), reflecting phenotypic plasticity.

\* Lab/Research Equipment (advanced breeding/analysis) supporting high-tier breeding, genetic research, and detailed chemical profiling.

\* UI/Data Viz as crucial assets for presenting complex simulation data.

Specific environmental control, nutrient management, IPM, post-harvest details: These systems will incorporate specific parameters for temperature, humidity, CO2, airflow, light, optimal nutrient ranges, and pest/disease resistance.

Scalability: Residential vs. Warehouse/Industrial, potentially expanding to Greenhouses, Vertical Farms, Research Labs, and Outdoor Fields.

\*\*Item List:\*\*

\*\*Structural & Architectural Elements\*\*

Purpose: Define grow spaces, support equipment, manage environment (materials affecting insulation, cleanliness, etc.). Layout and zoning will facilitate clean flow principles.

Variations:

\* Interior: Drywall, Concrete, Insulated Panel. Materials should be non-porous, smooth, durable, non-absorbent, and chemical-resistant for sanitation.

\* Exterior: Siding, Brick, Metal (Map specific).

\* Industrial: Pre-fab, Heavy-duty.

Material properties: Cost, Appearance, Insulation (R-value for heat transfer management), light/air barrier (for Environmental Control Sim), Cleanliness (materials influence ease of cleaning). Coving at wall-floor junctions is recommended.

Assets:

\* Walls: Sections/panels (various materials).

\* MVP Status / Estimated Game Version: MVP `[B]`. Required for initial Residential House map and basic Warehouse build-out.

\* Material properties related to Environmental Control Sim (Insulation - R-value) are relevant for MVP.

\* Floors: Sections (Concrete, Wood, Grate - with load ratings). Non-porous materials preferred.

\* Drains: Standard, Trench (with varying capacity).

\* MVP Status / Estimated Game Version: MVP `[B]`. Required for initial facility construction.

\* Roofs/Ceilings: Sections (Drywall, Suspended Grid, Concrete). High ceilings can cause thermal stratification.

\* Suspended Tiles: (acoustic, cleanroom).

\* Open Rafters/Trusses: (Wood, Metal). These can influence large-scale microclimate patterns.

\* MVP Status / Estimated Game Version: MVP `[B]`. Required for initial facility construction.

\* Doors: Various types (Standard, Industrial Roller, Air Lock). Air locks minimize contaminant entry.

\* MVP Status / Estimated Game Version: MVP `[B]`. Required for facility construction.

\* Windows: Various types (Standard, Greenhouse, Industrial). Can be blocked out in grow rooms.

\* MVP Status / Estimated Game Version: MVP `[B]`. Standard windows for Residential/Warehouse. Greenhouse-specific windows are `Post-MVP`.

\* Stairs/Ladders/Catwalks: For vertical access. Relevant for multi-story/vertical facilities. `[V]` (Ladders seen in Nimbus for vertical racking access)

\* MVP Status / Estimated Game Version: MVP `[B]`. Ladders for MVP with vertical racking. Catwalks `Post-MVP`.

\* Support Pillars/Beams: (Concrete, Steel). For structural support in large spaces.

\* MVP Status / Estimated Game Version: MVP `[B]` for Warehouse map shell.

\* Containment Structures (Tents): Pre-fab grow tents, sealable for environmental control.

\* MVP Status / Estimated Game Version: MVP `[B]` for early-game or smaller residential setups.

\*\*Cultivation & Plant Care Tools\*\*

Purpose: Plant maintenance (pruning, training), scouting, applying treatments.

Variations: Size, Material (affects durability, cleanliness, rust potential), Quality (Basic, High-quality), Sharpness/Condition (affects cut cleanliness, plant stress, disease risk). Tools require cleaning/sterilization.

Assets:

\* Pruning & Cutting:

\* Types: Bypass Pruners (Std, HD), Snips/Scissors (Micro-Tip, Curved/Straight `[V]`), Scalpels, Loppers, Hand Saw. Large Hedge Trimmers.

\* Properties: Cutting Area/Blade Length, Weight (affects fatigue).

\* MVP Status / Estimated Game Version: MVP `[B]`. Basic plant training (topping, manual LST) is part of core MVP cultivation.

\* Spraying & Application: Hand Spray Bottles, Pump Sprayers (Gal, Backpack), Handheld Dusters, Soil Drench Applicators.

\* Industrial: Motorized spray carts, Foggers, Integrated Spraying Systems.

\* MVP Status / Estimated Game Version: MVP `[B]` for basic pest/disease treatment (manual application). Industrial versions `Late-Game MVP / Post-MVP`.

\* Scouting & Monitoring:

\* Traps: Sticky Traps (Yellow, Blue - Cards, Rolls)

\* Visual Inspection Tools: Magnifying Loupes, Handheld/Benchtop Digital/Standard Microscopes.

\* Sampling Tools: Soil/Medium Sample Probes/Corers, Leaf Sample Bags/Vials.

\* Simulated Meters (Visual): Simulated Chlorophyll Meter.

\* MVP Status / Estimated Game Version: MVP `[B]` for basic plant health monitoring and pest/disease identification.

\* Plant Support Tools:

\* Types: Trellis netting `[V]`, stakes `[V]`, tie wire.

\* Functionality: Prevents lodging, supports heavy buds, manages canopy.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\*\*Nutrient & Irrigation Equipment\*\*

Purpose: Store, mix, deliver nutrients and water to plants. Systems will manage pH, EC/PPM, temperature, and Dissolved Oxygen (DO) of nutrient solutions.

Assets:

\* Watering Cans/Hoses: Basic manual irrigation.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Reservoirs/Tanks: Various sizes (Plastic `[V]`, Poly, Stainless Steel - food-grade). Dynamically reflect fill levels. Must be kept clean.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Pumps: Water Pumps (Submersible, Inline - various flow rates/head pressure), Air Pumps (for DWC).

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Plumbing: Pipes (PVC `[V]`, PEX, Drip Line `[V]`), Fittings `[V]`, Valves (manual, solenoid), Filters.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Nutrient Mixing Stations/Vats: For preparing nutrient solutions. Requires clean tanks, measuring tools, pumps/stirrers, calibrated pH/EC meters. `[V]` (Fertigation room with large mixing tanks)

\* MVP Status / Estimated Game Version: MVP `[B]` (Manual mixing `[B]`).

\* Automated Dosing/Fertigation Systems: Links sensors (EC/pH) to pumps/valves for automated mixing and delivery.

\* Includes: Nutrient Injectors (e.g., Dosatron D14MZ2, D14MZ3000BPVPHY, D14MZ3000BPVFHY as seen in Nimbus video `[V]`). These can be MVP as components for player to build systems, full automation is later.

\* MVP Status / Estimated Game Version: Injector components MVP for manual/semi-auto setups. Fully automated sensor-driven systems `Late-Game MVP / Post-MVP` `[B]`.

\* Growing Mediums/Substrates: Bags/bulk (Soil, Coco Coir, Rockwool cubes/slabs (e.g., Grodan Gro-Block Improved Hugo 6-inch `[V]`), Hydroton, Peat Moss). Living Soil.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Nutrient Containers: Bottles/Bags of base nutrients (N, P, K), macro- & micro-nutrients, additives.

\* Specific lines: General Hydroponics FloraPro (Grow 10-12-22, Bloom 7-12-27 `[V]`), CALiMAGic `[V]`, Floralicious Plus `[V]`, KoolBloom (Liquid 0-10-10, Dry PK `[V]`).

\* MVP Status / Estimated Game Version: MVP `[B]`. Specific brands are examples.

\*\*Environmental Control Equipment\*\*

Purpose: Manage temperature, humidity, CO2, airflow, light cycles.

Assets:

\* HVAC Systems: Air Conditioners (Window, Split), Heaters (Electric, Gas), Dehumidifiers (e.g., Quest 506, Quest 335, Quest 174 pint mobiles `[V]`), Humidifiers.

\* MVP Status / Estimated Game Version: MVP `[B]`. Specific brands/models are examples.

\* Fans: Circulation Fans (Clip, Standing, Wall `[V]`), Exhaust Fans, Inline Duct Fans. `[V]` (Inline fans visible for air distribution in Nimbus)

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Ducting: Flexible, Rigid (various diameters), Fittings. `[V]` (Visible in Nimbus for air distribution, possibly for HVAC)

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* CO2 Systems: CO2 Tanks, Regulators, Controllers, Generators.

\* MVP Status / Estimated Game Version: MVP `[B]` for basic CO2 management (manual control initially).

\* Grow Lights: Various types:

\* LED Panels: (various wattages/spectrum, e.g., Gavita Pro 1700e LED 645W `[V]`)

\* Fluorescent: (e.g., Gavita T5-style LED supplemental/veg lights `[V]`)

\* HID (MH/HPS with Ballasts/Hoods), LEC.

\* Properties: Wattage, Spectrum (Blue for veg, Red for flower), Light Output (PAR/PPFD, DLI), Fixture Efficiency, Heat Output, Coverage Area.

\* MVP Status / Estimated Game Version: MVP `[B]`. Various types/tiers for progression. Specific brands are examples.

\* Light Timers/Controllers: Mechanical, Digital. (e.g., Gavita Master Controller EL1/EL2 for Gavita lights `[V]`)

\* MVP Status / Estimated Game Version: MVP `[B]` (basic timers). Specific controllers like Gavita Master are examples of higher-tier networked control.

\* Thermostats, Humidistats, Environmental Controllers: Simple to Advanced/Integrated.

\* MVP Status / Estimated Game Version: MVP `[B]` (basic thermostat/humidistat).

\* Sensors: Environmental (Air Temp, RH, CO2, Light - PAR/PPFD), Leaf Surface Temp, Root Zone/Substrate (Moisture - VWC%, EC, pH, Temperature).

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Air Filters: Intake filters, Carbon filters, MERV-rated filters. `[V]` (Filters shown on Quest dehumidifiers)

\* MVP Status / Estimated Game Version: MVP `[B]`.

\*\*Utility Systems & Equipment\*\*

Purpose: Deliver power and connect systems.

Assets:

\* Electrical Wiring, Circuit Breakers / Fuse Boxes / Panels.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Generators (Diesel/Gas), CoGen systems, Battery Banks / UPS.

\* MVP Status / Estimated Game Version: `Late-Game MVP / Post-MVP` `[B]`.

\* Main Power Grid Connection Point (Abstracted).

\* MVP Status / Estimated Game Version: MVP `[B]`. (Nimbus mentions 100% sustainable energy source `[V]`, could be a future upgrade path for player's grid connection or generator type).

\* Water Supply Connection Point (Abstracted - Tap, RO, Treated).

\* MVP Status / Estimated Game Version: MVP `[B]`.

\*\*Pots, Containers, & Growing Surfaces\*\*

Purpose: Hold plants and growing medium.

Assets:

\* Pots (Standard Pot, Grow Bag type), Fabric Grow Bags.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Trays / Flats (Seedling, Propagation).

\* Botanicare Mobile Rack Trays 4'x4' White (HGC707364) `[V]` - Example of industrial tray for benches.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Rockwool Cubes / Slabs (e.g., Grodan Gro-Block Improved Hugo 6-inch `[V]`).

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Hydroponic/Aeroponic Systems (Basic Ebb/Flow, DWC buckets, NFT, Aeroponics).

\* MVP Status / Estimated Game Version: MVP `[B]` for basic hydro (Ebb/Flow, DWC). Others `Late-Game MVP / Post-MVP`.

\* Growing Benches / Tables (Flood tables, Wire racks).

\* Spacesaver GROW Mobile Storage System (Vertical, double-tiered racking) `[V]` - Example of advanced/industrial benches.

\* MVP Status / Estimated Game Version: MVP `[B]` (basic benches/tables). Vertical/mobile racking `Late-Game MVP / Post-MVP` but essential for Warehouse scale.

\*\*Pest & Disease Management\*\*

Assets:

\* Scouting Tools: Sticky Traps, Handheld Magnifying Loupes, Microscopes.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Application Tools: Hand Spray Bottles, Pump Sprayers.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* (Simulated) Pesticides/Fungicides/Biologicals.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* In-game "Plant Problems Guide" UI/Asset.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\*\*Harvesting & Processing Equipment\*\*

Purpose: Harvest, trim, dry, cure.

Assets:

\* Harvesting Tools: Large Trimming Shears, HD Loppers, Hand Saw, Hedge Trimmers. Collection Totes/Bins (Food-grade). Tarps. `[V]` (Whole plant harvesting shown)

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Trimming Tools: Trim Scissors (Micro-tip, types `[V]`). Trim Bins/Trays. Isopropyl Alcohol/Wipes, Rags. Electrically operated, manually controlled hand trimming assist tools.

\* MVP Status / Estimated Game Version: MVP `[B]` (manual hand-trimming).

\* Bowl Trimmers (Manual, Electric).

\* MVP Status / Estimated Game Version: `Mid-Late MVP / Post-MVP` `[B]`.

\* Automated Trimming Machines.

\* MVP Status / Estimated Game Version: `Late-Game MVP / Post-MVP` `[B]`.

\* Drying Racks / Clotheslines & Hangers. `[V]` (Plants hung on wire hangers, then placed on perforated trays on racks after initial dry)

\* Drying parameters example: 60°F / 60% RH for 14 days (hang dry), then bucked to perforated trays for another 5-10 days `[V]`.

\* MVP Status / Estimated Game Version: MVP `[B]` (manual hanging/racks).

\* Curing Containers (Jars `[V]`, Buckets - Glass, Plastic). Automated curing systems.

\* MVP Status / Estimated Game Version: MVP `[B]` (manual container curing/burping). Automated systems `Post-MVP`.

\* Weighing & Measuring: Digital Pocket Scales, Digital Bench Scales. Industrial Scales. Calibration Weights.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Transporting Equipment: Baskets, hand-drawn garden carts `[V]`, small motorized transport, portable conveyor belts.

\* MVP Status / Estimated Game Version: Basic carts MVP. Motorized/conveyors `Mid-Late MVP / Post-MVP`.

\* Cold Storage (Refrigerators, freezers).

\* MVP Status / Estimated Game Version: `Post-MVP` `[B]`.

\* Extraction/Concentrate Equipment (Solventless Press, Basic Extraction System).

\* MVP Status / Estimated Game Version: `Post-MVP` `[B]`.

\*\*Facility Furniture & Fixtures\*\*

Assets: Workbenches, HD Shelving `[V]`, Storage Cabinets, Rolling Utility Carts, Seating, Industrial Sink, Safety Equipment, General (Trash Cans, etc.).

\* MVP Status / Estimated Game Version: MVP `[B]`.

\*\*Map Specific Assets\*\*

Assets:

\* Residential House Shell & Unique Fixtures.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Warehouse Shell & Unique Fixtures. `[V]` (Nimbus is a warehouse type)

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* (Future: Greenhouse, Research Lab, Outdoor Field, Vertical Farm, Subterranean Lab, Abandoned Research Outpost, Geothermal Greenhouse Complex)

\* MVP Status / Estimated Game Version: `Future (Post-MVP)` `[B]`.

\*\*Decorative & "Cozy" Items\*\*

Assets: Posters, art `[V]` (murals in Nimbus facility), rugs, small furniture, non-cannabis plants, decorative lighting, personal items, paint/texture options.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\*\*Plant Assets (Core for Procedural System)\*\*

Purpose: Central visual output, dynamic GxE reflection.

\* Base 3D Models: HQ, detailed base meshes/textures for ~5-10 landrace-inspired foundational strains `[B]`.

\* \*\*New Strains (Examples from Video for inspiration/future):\*\*

\* Nimbus Mints: (Kush Mints x Girl Scout Cookies) x Durban Poison (Backcross) `[V]`

\* Prism: Mango Thai (Landrace Sativa) x Purple Haze (Sativa Hybrid) `[V]`

\* Variations (Morphology & Growth Stages): Seedling, Vegetative, Flowering, Maturation, Harvested, Dried `[B]`. `[V]` (Veg, Flower, Harvested, Dried states shown).

\* Botanical Features: Height, Stem, Branching, Leaf Morphology/Arrangement, Bud Structure, Pistil Color, Trichome Density/Appearance `[B]`. `[V]` (All these visible).

\* Potential: Root System Viz.

\* MVP Status / Estimated Game Version: MVP `[B]`. Strains above are for reference/inspiration, not necessarily the 5-10 foundational MVP strains.

\* Procedural Generation System (Software/Code Asset).

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Dynamic Shader/Material Effects (MIDs, MPCs).

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Performance Optimization: LODs, HISMs/ISMs, optimized shaders.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\*\*Data Collection & Lab Equipment\*\*

Assets:

\* Handheld Meters: EC/PPM meter, pH meter, Temperature Probe, Soil Moisture meter, Simulated Chlorophyll Content meter, PAR/PPFD meter, Infrared Thermometer, VPD Meter.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Benchtop Meters/Analyzers: Lab-grade EC/pH meter, Spectrophotometer, HPLC, GC-MS, ICP, Elemental Analyzer, NIR/MIR Spectroscopy.

\* MVP Status / Estimated Game Version: Basic lab EC/pH MVP. Advanced analyzers `Mid-Late MVP / Post-MVP` `[B]`.

\* Data Logging & Interface: Laptop, Tablet, Desktop, Clipboard, Pens, Whiteboard. Industrial Server rack, large control displays. `[V]` (Tablet used in fertigation room).

\* MVP Status / Estimated Game Version: MVP `[B]` (basic interfaces).

\* Calibration Weights.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Simulated Lab Analysis Interface (UI).

\* MVP Status / Estimated Game Version: `Mid-Late MVP / Post-MVP` `[B]`.

\*\*UI & Data Visualization Elements\*\*

Assets: Environmental Data Dashboards/Overlays, Graphs & Charts, Plant Health/Status Indicators, Nutrient Management Interface, Genetic Data Display (Strain info, Lineage, Traits, Pedigree Charts, Punnett Squares), Simulated Lab Analysis Results UI, Breeding Interface, Facility Management Overlays (Utility View "X-Ray" `[B]`, Zoning UI), Resource inventory/consumption UI, Operational & Financial Data UI, Alerts & Notifications UI `[B]`, Historical Logs & Notes Interface, Tutorial/Info Overlays.

\* MVP Status / Estimated Game Version: All listed are MVP as per Briefing Document. Advanced genetic marker/allele display `Late-Game MVP / Post-MVP`. Simulated Lab Results UI for contracts may need basic version for MVP.

\*\*Advanced Breeding & Lab Equipment\*\*

Assets: Sterile Work Area/Hood, Autoclave, Incubator, Microscope, Racks for Culture Vessels, etc. Lab Furniture. Cryopreservation Unit. Advanced Genetic Modification Equipment. Bioinformatics Tools/Software.

\* MVP Status / Estimated Game Version: Largely `Post-MVP` / `Future` `[B]`. (Nimbus uses Conception Nurseries for TC, which is an external service, aligning with MVP deferral of player-owned advanced labs).

\*\*Consumable Resources (Abstract/UI Representation)\*\*

Assets: Water, Power, Nutrients `[V]` (General Hydroponics line), CO2, Building Materials, Seeds/Clones `[V]` (Conception Nurseries TC clones in hermetically sealed packs), Finances. Specialized Tissue Culture Media, PGRs, Agar, Hormones, Cryoprotectants, Enzymes, Sterile Consumables.

\* MVP Status / Estimated Game Version: Core resources (Water, Power, Basic Nutrients, CO2, Building Materials, Seeds/Clones, Finances) are MVP `[B]`. Tissue culture consumables `Post-MVP`.

--- END OF ENHANCED Asset List 1.4.1 ---

\*\*Summary of Key Enhancements based on Video & Briefing:\*\*

1. \*\*Strain Examples:\*\* Added Nimbus Mints and Prism with their lineage as concrete examples, though the foundational 5-10 MVP strains will be distinct.

2. \*\*Specific Equipment Brands/Models:\*\* Incorporated Gavita lights, Quest dehumidifiers, Dosatron injectors, Botanicare trays, Grodan Gro-Blocks, and Spacesaver racks as visual targets or gameplay examples.

3. \*\*Nutrient Line Example:\*\* Added General Hydroponics FloraPro, CALiMAGic, Floralicious, and KoolBloom as specific nutrient product examples seen in use.

4. \*\*Process Details:\*\*

\* Noted Nimbus' "veg in place" strategy.

\* Added specific drying parameters (60F/60%RH, 14 days hang + 5-10 days tray) as a real-world reference for the simulation.

\* Confirmed whole plant hang drying and use of perforated trays post-initial dry.

\* Confirmed hand trimming as a primary method.

5. \*\*Cloning Source Example:\*\* Mentioned Conception Nurseries and hermetically sealed tissue culture clone packs as a method of acquiring starting material. This aligns with MVP deferring player-run TC labs.

6. \*\*Vertical Racking:\*\* Emphasized vertical racking (Spacesaver GROW) as crucial for warehouse-scale operations, aligning with MVP's warehouse map.

7. \*\*MVP Status Confirmation:\*\* Systematically reviewed and confirmed/adjusted MVP status for all items based on the Briefing Document. Many advanced items (complex automation, advanced lab work, extraction) are confirmed as Post-MVP. Basic versions of core systems (manual/simple automated environmental control, manual nutrient mixing, basic irrigation, hand trimming, simple data display) are MVP.

8. \*\*Facility Aesthetics:\*\* Noted the importance of art/murals (seen in Nimbus) for the "Cozy & Decorative" items category.

This enhanced list should provide a more robust and detailed foundation for Project Chimera, directly incorporating real-world examples from the CannaCribs video while staying true to the MVP scope outlined in the Briefing Document.Okay, I have processed both the "Asset List 1.4" and the "Briefing Document," and I've watched the CannaCribs Deep Roots episode featuring the Nimbus facility.

Here's an enhanced version of your asset list. I've aimed to:

1. \*\*Integrate new assets/details\*\* observed in the CannaCribs Nimbus video (marked with `[V]`).

2. \*\*Verify and refine MVP status\*\* based on the Briefing Document (marked with `[B]` where explicitly confirmed or strongly implied for MVP).

3. \*\*Add notes\*\* for clarity or to connect to game mechanics described in the Briefing Document.

4. \*\*Maintain the existing structure\*\* of your Asset List 1.4.

--- START OF ENHANCED Asset List 1.4.1 ---

\*\*Project Chimera: Customized, Comprehensive Asset List v1.4.1\*\*

Core Vision: Modern, High-Tech, Clinical/Scientific, Aspirational/Professional aesthetic; player-driven "Relaxed & Cozy" variations.

Detail paramount: (Satisfactory, Farming Sim benchmarks for equipment) for deep simulation. The simulation aims for a granular, scientifically grounded foundation.

Source Prioritization:

1. Core Docs (mechanics, scope, style - \*\*Briefing Document\*\*).

2. Relevant Docs (cannabis science, cultivation, pests, water, nutrients, breeding, equipment for realism/complexity). This includes Cannabis sativa L. biology, cultivation, genetics, and industry practices.

3. \*\*CannaCribs Nimbus Video (Deep Roots S02E01) for specific examples.\*\*

4. General Knowledge (bridge gaps).

Gameplay Loops Supported: Build, Cultivate, Breed, Process, Analyze, Optimize.

Key Customizations:

\* Expanded Utility Systems (Plumbing, HVAC, Electrical) with detailed, interconnected networks where sizing and material impact performance.

\* Detailed Plant Assets (dynamic, procedural, GxE-tied), reflecting phenotypic plasticity.

\* Lab/Research Equipment (advanced breeding/analysis) supporting high-tier breeding, genetic research, and detailed chemical profiling.

\* UI/Data Viz as crucial assets for presenting complex simulation data.

Specific environmental control, nutrient management, IPM, post-harvest details: These systems will incorporate specific parameters for temperature, humidity, CO2, airflow, light, optimal nutrient ranges, and pest/disease resistance.

Scalability: Residential vs. Warehouse/Industrial, potentially expanding to Greenhouses, Vertical Farms, Research Labs, and Outdoor Fields.

\*\*Item List:\*\*

\*\*Structural & Architectural Elements\*\*

Purpose: Define grow spaces, support equipment, manage environment.

Assets:

\* Walls: Sections/panels (various materials: Drywall, Concrete, Insulated Panel).

\* MVP Status / Estimated Game Version: MVP `[B]`. Interior room construction is MVP.

\* Floors: Sections (Concrete, Wood, Grate).

\* Drains: Standard, Trench.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Roofs/Ceilings: Sections (Drywall, Suspended Grid, Concrete).

\* Suspended Tiles: (acoustic, cleanroom).

\* Open Rafters/Trusses: (Wood, Metal).

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Doors: Various types (Standard `[B]`, Industrial Roller, Air Lock).

\* MVP Status / Estimated Game Version: MVP `[B]` (Standard doors for interior rooms). Roller/Air Lock `Post-MVP`.

\* Windows: Various types (Standard, Greenhouse, Industrial).

\* MVP Status / Estimated Game Version: MVP `[B]` (Standard for Residential/Warehouse). Greenhouse-specific `Post-MVP`.

\* Stairs/Ladders/Catwalks: For vertical access. `[V]` (Ladders used for accessing upper tiers in Nimbus).

\* MVP Status / Estimated Game Version: Ladders likely MVP `[B]` for multi-tier racking. Catwalks `Post-MVP`.

\* Support Pillars/Beams: (Concrete, Steel).

\* MVP Status / Estimated Game Version: MVP `[B]` for Warehouse map.

\* Containment Structures (Tents): Pre-fab grow tents.

\* MVP Status / Estimated Game Version: MVP `[B]` for early game/residential.

\*\*Cultivation & Plant Care Tools\*\*

Purpose: Plant maintenance, scouting, treatments.

Assets:

\* Pruning & Cutting:

\* Types: Bypass Pruners, Snips/Scissors (Micro-Tip, Curved/Straight `[V]`), Scalpels, Loppers, Hand Saw, Large Hedge Trimmers.

\* MVP Status / Estimated Game Version: MVP `[B]` (for topping, manual LST).

\* Spraying & Application: Hand Spray Bottles, Pump Sprayers, Handheld Dusters, Soil Drench Applicators.

\* Industrial: Motorized spray carts, Foggers, Integrated Spraying Systems.

\* MVP Status / Estimated Game Version: MVP `[B]` (manual application for basic pest/disease). Industrial `Post-MVP`.

\* Scouting & Monitoring:

\* Traps: Sticky Traps (Yellow, Blue - Cards, Rolls).

\* Visual Inspection Tools: Magnifying Loupes, Handheld/Benchtop Digital/Standard Microscopes.

\* Sampling Tools: Soil/Medium Sample Probes/Corers, Leaf Sample Bags/Vials.

\* Simulated Meters (Visual): Simulated Chlorophyll Meter.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Plant Support Tools:

\* Types: Trellis netting `[V]`, stakes `[V]`, tie wire.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\*\*Nutrient & Irrigation Equipment\*\*

Purpose: Store, mix, deliver nutrients/water.

Assets:

\* Watering Cans/Hoses: Basic manual irrigation.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Reservoirs/Tanks: Various sizes (Plastic `[V]`, Poly, Stainless Steel).

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Pumps: Water Pumps (Submersible, Inline), Air Pumps.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Plumbing: Pipes (PVC `[V]`, PEX, Drip Line `[V]`), Fittings `[V]`, Valves (manual `[V]`, solenoid), Filters.

\* MVP Status / Estimated Game Version: MVP `[B]` (manual routing).

\* Nutrient Mixing Stations/Vats: For preparing nutrient solutions. `[V]` (Fertigation room shown with multiple large tanks).

\* MVP Status / Estimated Game Version: MVP `[B]` (manual mixing).

\* Automated Dosing/Fertigation Systems: Links sensors to pumps/valves.

\* Includes: Nutrient Injectors (e.g., Dosatron D14MZ2, D14MZ3000BPVPHY, D14MZ3000BPVFHY as seen in Nimbus video `[V]`).

\* MVP Status / Estimated Game Version: Basic irrigation is MVP `[B]`. Dosatrons `[V]` could be MVP components for player-built systems, but fully automated sensor-driven systems are `Late-Game MVP / Post-MVP` `[B]`.

\* Growing Mediums/Substrates: Soil, Coco Coir, Rockwool cubes/slabs (e.g., Grodan Gro-Block Improved Hugo 6-inch `[V]`), Hydroton, Peat Moss, Living Soil.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Nutrient Containers: Bottles/Bags of base nutrients, additives.

\* Specific lines seen in Nimbus `[V]`: General Hydroponics FloraPro (Grow 10-12-22, Bloom 7-12-27), CALiMAGic, Floralicious Plus, KoolBloom (Liquid 0-10-10 and Dry PK).

\* MVP Status / Estimated Game Version: MVP `[B]` (basic nutrient recipes). Specific brands are examples.

\*\*Environmental Control Equipment\*\*

Purpose: Manage temp, humidity, CO2, airflow, light.

Assets:

\* HVAC Systems: Air Conditioners, Heaters, Dehumidifiers (e.g., Quest 506, Quest 335, Quest 174 pint mobiles `[V]`), Humidifiers.

\* MVP Status / Estimated Game Version: MVP `[B]` (basic temp/humidity control).

\* Fans: Circulation Fans `[V]`, Exhaust Fans, Inline Duct Fans `[V]`.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Ducting: Flexible, Rigid `[V]`, Fittings.

\* MVP Status / Estimated Game Version: MVP `[B]` (manual routing).

\* CO2 Systems: CO2 Tanks, Regulators, Controllers, Generators.

\* MVP Status / Estimated Game Version: MVP `[B]` (basic, likely manual control initially).

\* Grow Lights:

\* LED Panels: (e.g., Gavita Pro 1700e LED 645W `[V]`)

\* Fluorescent: (e.g., Gavita T5-style LED supplemental/veg lights `[V]`)

\* HID (MH/HPS), LEC.

\* MVP Status / Estimated Game Version: MVP `[B]` (basic tier grow lights). Specific models are examples.

\* Light Timers/Controllers: Mechanical, Digital. (e.g., Gavita Master Controller EL1/EL2 for Gavita lights `[V]`)

\* MVP Status / Estimated Game Version: MVP `[B]` (basic light cycle timers). Advanced controllers `Post-MVP`.

\* Thermostats, Humidistats, Environmental Controllers.

\* MVP Status / Estimated Game Version: MVP `[B]` (basic).

\* Environmental Sensors (Air Temp, RH, CO2, Light - PAR/PPFD `[B]`).

\* Leaf Surface Temp Sensors, Root Zone/Substrate Sensors (Moisture `[B]`, EC, pH, Temperature).

\* MVP Status / Estimated Game Version: MVP `[B]` (manual sampling with handheld meters, real-time sensor readouts for dashboards).

\* Air Filters: Intake filters, Carbon filters, MERV-rated filters. `[V]` (Filters seen on Quest units).

\* MVP Status / Estimated Game Version: MVP `[B]`.

\*\*Utility Systems & Equipment\*\*

Purpose: Deliver power, connect systems.

Assets:

\* Electrical Wiring, Circuit Breakers / Fuse Boxes / Panels.

\* MVP Status / Estimated Game Version: MVP `[B]` (basic abstracted utility connections).

\* Generators (Diesel/Gas), CoGen systems, Battery Banks / UPS.

\* MVP Status / Estimated Game Version: `Late-Game MVP / Post-MVP` `[B]`.

\* Main Power Grid Connection Point (Abstracted).

\* MVP Status / Estimated Game Version: MVP `[B]`. (Nimbus mentions 100% sustainable energy source `[V]`, could be future upgrade).

\* Water Supply Connection Point (Abstracted - Tap, RO, Treated).

\* MVP Status / Estimated Game Version: MVP `[B]`.

\*\*Pots, Containers, & Growing Surfaces\*\*

Purpose: Hold plants and medium.

Assets:

\* Pots (Standard Pot, Grow Bag type), Fabric Grow Bags.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Trays / Flats (Seedling, Propagation).

\* E.g., Botanicare Mobile Rack Trays 4'x4' White (HGC707364) `[V]`.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Rockwool Cubes / Slabs (e.g., Grodan Gro-Block Improved Hugo 6-inch `[V]`).

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Hydroponic/Aeroponic Systems (Basic Ebb/Flow, DWC buckets, NFT, Aeroponics).

\* MVP Status / Estimated Game Version: MVP `[B]` (basic hydro like DWC/Ebb&Flow). NFT/Aeroponics `Post-MVP`.

\* Growing Benches / Tables (Flood tables, Wire racks).

\* E.g., Spacesaver GROW Mobile Storage System (Vertical, double-tiered racking) `[V]`.

\* MVP Status / Estimated Game Version: Basic tables/racks MVP `[B]`. Mobile/Vertical racking `Late-Game MVP / Post-MVP` for warehouse scale.

\*\*Pest & Disease Management\*\*

Assets:

\* Scouting Tools: Sticky Traps, Handheld Magnifying Loupes, Microscopes.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Application Tools: Hand Spray Bottles, Pump Sprayers (for manual treatment `[B]`).

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* (Simulated) Pesticides/Fungicides/Biologicals.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* In-game "Plant Problems Guide" UI/Asset.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\*\*Harvesting & Processing Equipment\*\*

Purpose: Harvest, trim, dry, cure.

Assets:

\* Harvesting Tools: Large Trimming Shears, HD Loppers, Hand Saw, Hedge Trimmers. Collection Totes/Bins. Tarps. `[V]` (Whole plant harvesting shown).

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Trimming Tools: Trim Scissors (Micro-tip `[V]`). Trim Bins/Trays. Isopropyl Alcohol/Wipes, Rags.

\* MVP Status / Estimated Game Version: MVP `[B]` (manual hand-trimming).

\* Bowl Trimmers (Manual, Electric).

\* MVP Status / Estimated Game Version: `Post-MVP` `[B]`.

\* Automated Trimming Machines.

\* MVP Status / Estimated Game Version: `Post-MVP` `[B]`.

\* Drying Racks / Clotheslines & Hangers. `[V]` (Plants hung on wire hangers, then placed on perforated trays on racks).

\* Drying parameters example: 60°F / 60% RH for 14 days (hang dry), then bucked to perforated trays for another 5-10 days `[V]`.

\* MVP Status / Estimated Game Version: MVP `[B]` (manual hanging/rack in designated space).

\* Curing Containers (Jars `[V]`, Buckets - Glass, Plastic).

\* MVP Status / Estimated Game Version: MVP `[B]` (manual container curing, manual 'burping').

\* Weighing & Measuring: Digital Pocket Scales, Digital Bench Scales. Industrial Scales. Calibration Weights.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Transporting Equipment: Baskets, hand-drawn garden carts `[V]`.

\* MVP Status / Estimated Game Version: MVP `[B]`. Small motorized/conveyors `Post-MVP`.

\* Cold Storage (Refrigerators, freezers).

\* MVP Status / Estimated Game Version: `Post-MVP` `[B]`.

\* Extraction/Concentrate Equipment.

\* MVP Status / Estimated Game Version: `Post-MVP` `[B]`.

\*\*Facility Furniture & Fixtures\*\*

Assets: Workbenches, HD Shelving `[V]`, Storage Cabinets, Rolling Utility Carts, Seating, Industrial Sink, Safety Equipment, General (Trash Cans, etc.).

\* MVP Status / Estimated Game Version: MVP `[B]`.

\*\*Map Specific Assets\*\*

Assets:

\* Residential House Shell & Unique Fixtures.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Warehouse Shell & Unique Fixtures. `[V]` (Nimbus is a warehouse type).

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* (Future maps: Greenhouse, Research Lab, Outdoor Field, Vertical Farm, etc.)

\* MVP Status / Estimated Game Version: `Future (Post-MVP)` `[B]`.

\*\*Decorative & "Cozy" Items\*\*

Assets: Posters, art `[V]` (murals in Nimbus facility), rugs, small furniture, non-cannabis plants, decorative lighting, personal items, paint/texture options.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\*\*Plant Assets (Core for Procedural System)\*\*

Purpose: Central visual output, dynamic GxE reflection.

\* Base 3D Models: HQ, detailed for ~5-10 landrace-inspired foundational strains `[B]`.

\* \*\*Example Strains from Nimbus Video `[V]` (for inspiration/future, not necessarily the MVP 5-10):\*\*

\* Nimbus Mints: (Kush Mints x Girl Scout Cookies) x Durban Poison (Backcross).

\* Prism: Mango Thai (Landrace Sativa) x Purple Haze (Sativa Hybrid). High in Ocimene.

\* Variations (Morphology & Growth Stages): Seedling, Vegetative, Flowering (Early, Mid, Late `[V]`), Maturation, Harvested `[V]`, Dried `[V]`.

\* Botanical Features: Height, Stem, Branching, Leaf Morphology/Arrangement, Bud Structure, Pistil Color, Trichome Density/Appearance.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Procedural Generation System (Software/Code Asset).

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Dynamic Shader/Material Effects (MIDs, MPCs).

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Performance Optimization: LODs, HISMs/ISMs, optimized shaders.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\*\*Data Collection & Lab Equipment\*\*

Assets:

\* Handheld Meters: EC/PPM meter, pH meter, Temperature Probe, Soil Moisture meter `[B]`, Simulated Chlorophyll Content meter, PAR/PPFD meter, Infrared Thermometer, VPD Meter.

\* MVP Status / Estimated Game Version: MVP `[B]` (unlocks for manual environmental/plant sampling).

\* Benchtop Meters/Analyzers: Lab-grade EC/pH meter, Spectrophotometer, HPLC, GC-MS, ICP, Elemental Analyzer, NIR/MIR Spectroscopy.

\* MVP Status / Estimated Game Version: Basic lab EC/pH for MVP. Advanced analyzers for detailed chem/terpene profiles `Mid-Late MVP / Post-MVP` `[B]`.

\* Data Logging & Interface: Laptop, Tablet `[V]`, Desktop, Clipboard, Pens, Whiteboard. Industrial Server rack, large control displays.

\* MVP Status / Estimated Game Version: MVP `[B]` (for dashboards, logs, sensor management).

\* Calibration Weights.

\* MVP Status / Estimated Game Version: MVP `[B]`.

\* Simulated Lab Analysis Interface (UI).

\* MVP Status / Estimated Game Version: Basic results UI for contracts MVP. Full interface `Mid-Late MVP / Post-MVP` `[B]`.

\*\*UI & Data Visualization Elements\*\*

Assets: Environmental Data Dashboards `[B]`, Graphs & Charts `[B]`, Plant Health/Status Indicators `[B]`, Nutrient Management Interface `[B]`, Genetic Data Display `[B]`, Simulated Lab Analysis Results UI `[B]`, Breeding Interface `[B]`, Facility Management Overlays (Utility View "X-Ray" `[B]`, Zoning UI), Resource inventory/consumption UI `[B]`, Operational & Financial Data UI `[B]`, Alerts & Notifications UI `[B]`, Historical Logs & Notes Interface `[B]`, Tutorial/Info Overlays `[B]`.

\* MVP Status / Estimated Game Version: All core elements listed are MVP as per Briefing Document.

\*\*Advanced Breeding & Lab Equipment\*\*

Assets: Sterile Work Area/Hood (Laminar Flow), Autoclave, Incubator, etc. `[V]` (Conception Nurseries handles TC for Nimbus, indicating it's an advanced/external service for the player initially).

\* MVP Status / Estimated Game Version: `Post-MVP` / `Future` `[B]`.

\*\*Consumable Resources (Abstract/UI Representation)\*\*

Assets: Water, Power, Nutrients `[V]` (e.g., General Hydroponics line shown), CO2, Building Materials, Seeds/Clones `[V]` (Conception Nurseries TC clones in hermetically sealed packs), Finances.

\* MVP Status / Estimated Game Version: MVP `[B]`. Specialized lab consumables `Post-MVP`.

--- END OF ENHANCED Asset List 1.4.1 ---

This updated list should better reflect the specific examples from the Nimbus facility while adhering to the MVP scope defined in your Briefing Document. The video provided excellent visual references for many of the systems you're planning.

Okay, I've analyzed the provided CannaCribs video featuring District Cannabis and cross-referenced it with your "Asset List 1.4" and "Briefing Document."

Here's an enhanced asset list incorporating information and insights from the video, with annotations on how it aligns with or expands upon your existing vision.

\*\*Key Takeaways from CannaCribs - District Cannabis Video Relevant to Project Chimera:\*\*

\* \*\*High Degree of Automation & Data Integration:\*\* This is central to District Cannabis's operation (Hooendoorn, LetsGrow.com, Grodan GroSens, automated fertigation, PAR-sensor integrated lighting). This strongly aligns with Project Chimera's "Modern, High-Tech, Clinical/Scientific" vision and "Data Viz as crucial assets."

\* \*\*Specific Brands & Technologies:\*\* Fluence LEDs, Grodan rockwool products, Paxiom packaging machinery (JuanaRoll, Swifty Bagger), Dramm sprayers, Seinergy (energy consulting), Stephen Gould (packaging). These provide excellent real-world benchmarks.

\* \*\*Dutch Greenhouse Design Influence:\*\* High ceilings, dual peaks per bay for ventilation, roof vents. This is valuable for future "Greenhouse" map assets.

\* \*\*Emphasis on Precision & Control:\*\* Nutrient recipes (EC 2.0 for veg), sap analysis, meticulous environmental control, and data-driven decisions.

\* \*\*Sustainability Efforts:\*\* Water recycling, energy efficiency considerations, biodegradable packaging.

\* \*\*Specific Cultivation Techniques:\*\* "Clone-to-kill" mother strategy, specific EC targets for veg, use of Dramm foggers for IPM.

\* \*\*Staff Roles:\*\* The video implicitly shows various roles (Head Grower, Cultivation Dept Head, Facilities Manager, etc.), which can inform future NPC or player role mechanics.

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\*\*Enhanced Asset List (Based on Asset List 1.4, Briefing Doc, and CannaCribs Video Insights)\*\*

\*\*Notes:\*\*

\* Items marked `[VIDEO INSIGHT]` are directly added or significantly enhanced based on the CannaCribs District Cannabis episode.

\* MVP status aligns with your Briefing Document. Where the video shows advanced tech, it's marked for later implementation if your MVP scope is more basic.

\* I've tried to integrate video details into existing categories where possible, rather than creating too many new ones, to maintain your structure.

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﻿Project Chimera: Customized, Comprehensive Asset List v1.5

Core Vision: Modern, High-Tech, Clinical/Scientific, Aspirational/Professional aesthetic; player-driven "Relaxed & Cozy" variations.

Detail paramount: (Satisfactory, Farming Sim benchmarks for equipment) for deep simulation. The simulation aims for a granular, scientifically grounded foundation.

Source Prioritization:

1. Core Docs (mechanics, scope, style).

2. Relevant Docs (cannabis science, cultivation, pests, water, nutrients, breeding, equipment for realism/complexity). This includes Cannabis sativa L. biology, cultivation, genetics, and industry practices.

3. General Knowledge (bridge gaps).

Gameplay Loops Supported: Build, Cultivate, Breed, Process, Analyze, Optimize.

Key Customizations:

\* Expanded Utility Systems (Plumbing, HVAC, Electrical) with detailed, interconnected networks where sizing and material impact performance.

\* Detailed Plant Assets (dynamic, procedural, GxE-tied), reflecting phenotypic plasticity.

\* Lab/Research Equipment (advanced breeding/analysis) supporting high-tier breeding, genetic research, and detailed chemical profiling.

\* UI/Data Viz as crucial assets for presenting complex simulation data.

Specific environmental control, nutrient management, IPM, post-harvest details: These systems will incorporate specific parameters for temperature, humidity, CO2, airflow, light, optimal nutrient ranges, and pest/disease resistance.

Scalability: Residential vs. Warehouse/Industrial, potentially expanding to Greenhouses, Vertical Farms, Research Labs, and Outdoor Fields.

Item List:

\*\*Structural & Architectural Elements\*\*

\* Walls

\* MVP Status: MVP.

\* `[VIDEO INSIGHT]` Consider cleanroom-grade paneling options for Warehouse/Lab tiers, promoting sanitation. Video showed white, easily cleanable wall surfaces.

\* Floors

\* Drains: Standard, Trench.

\* MVP Status: MVP.

\* `[VIDEO INSIGHT]` Concrete floors with efficient drainage are visible in the video, crucial for greenhouse/hydroponic areas.

\* Roofs/Ceilings

\* `[VIDEO INSIGHT]` Greenhouse: High ceilings, potentially with dual peaks per bay for improved ventilation and temperature stratification management, as seen in Dutch greenhouse designs. Features like automated roof vents. (Marked for "Greenhouse Structure" asset below, Post-MVP).

\* MVP Status: MVP for basic Warehouse/Residential.

\* Doors: Standard, Industrial Roller, Air Lock.

\* MVP Status: MVP.

\* Windows: Standard, Greenhouse (Specific light transmission), Industrial.

\* MVP Status: MVP (Standard). Post-MVP (Greenhouse specific).

\* Stairs/Ladders/Catwalks

\* MVP Status: MVP for multi-story potential.

\* Support Pillars/Beams

\* MVP Status: MVP for Warehouse.

\* Containment Structures (Tents)

\* MVP Status: MVP (Early Game).

\*\*Cultivation & Plant Care Tools\*\*

\* Snips/Scissors (Micro-Tip, Curved/Straight)

\* Scalpels

\* Large Hedge Trimmers

\* Hand Spray Bottles

\* Pump Sprayers (Gal, Backpack)

\* `[VIDEO INSIGHT]` Specific Model/Brand: Dramm BP-4 Li Backpack Sprayer.

\* `[VIDEO INSIGHT]` Accessory: Dramm L-5 Lance (for targeted application).

\* Handheld Dusters

\* Soil Drench Applicators

\* `[VIDEO INSIGHT]` Specific Model/Brand: Dramm CD2 Chemdose unit (for precise drench applications).

\* Motorized spray carts

\* Foggers

\* `[VIDEO INSIGHT]` Specific Model/Brand: Dramm Cold Fogger (for IPM, delivering 40-50 micron droplets at 3000 psi). Useful for consistent coverage in larger areas.

\* Integrated Spraying Systems

\* Sticky Traps (Yellow, Blue - Cards, Rolls)

\* Magnifying Loupes

\* Handheld Digital/Standard Microscopes

\* Benchtop Digital/Standard Microscopes

\* Soil/Medium Sample Probes/Corers

\* Leaf Sample Bags/Vials

\* `[VIDEO INSIGHT]` For sending out for Sap Analysis.

\* Simulated Chlorophyll Meter

\* Trellis netting

\* Stakes

\* Tie wire

\* MVP Status: Most basic tools MVP. Advanced/branded sprayers/foggers Mid-Late MVP or tied to scale.

\*\*Nutrient & Irrigation Equipment\*\*

\* Watering Cans/Hoses

\* Reservoirs/Tanks

\* `[VIDEO INSIGHT]` Large poly tanks for stock solutions (A, B, Acid) and mixed batches.

\* Water Pumps (Submersible, Inline)

\* Air Pumps

\* Pipes (PVC, PEX, Drip Line)

\* `[VIDEO INSIGHT]` Drip irrigation emitters visible in Grodan blocks.

\* Fittings

\* Valves (manual, solenoid)

\* `[VIDEO INSIGHT]` Solenoid valves controlled by fertigation system.

\* Filters (for plumbing)

\* `[VIDEO INSIGHT]` Netnafin Nut Tuff filter shown for drain water ultrafiltration (water recycling system).

\* Nutrient Mixing Stations/Vats

\* Automated Dosing/Fertigation Systems

\* `[VIDEO INSIGHT]` District Cannabis uses a sophisticated system (likely integrated with Hooendoorn). This is key for precision and scale. For MVP, manual mixing is fine, but this is a high-tier upgrade path. The video mentions specific EC targets (e.g., 2.0 for Veg).

\* Growing Mediums/Substrates

\* `[VIDEO INSIGHT]` Grodan Gro-Blocks (e.g., Jumbo) and Grodan Gro-Slabs are heavily used. Rockwool is a key medium shown.

\* Soil, Coco Coir, Rockwool cubes/slabs, Hydroton, Peat Moss, Living Soil.

\* Nutrient Containers (Bottles/Bags of base nutrients, additives)

\* MVP Status: Basic manual irrigation MVP. Grodan products as specific medium examples. Automated fertigation systems Mid-Late MVP or Post-MVP.

\*\*Environmental Control Equipment\*\*

\* Air Conditioners (Window, Split)

\* `[VIDEO INSIGHT]` Large rooftop HVAC units visible for headhouse/indoor sections.

\* Heaters (Electric, Gas)

\* Dehumidifiers

\* Humidifiers

\* Circulation Fans (Clip, Standing, Wall)

\* `[VIDEO INSIGHT]` Horizontal Air Flow (HAF) fans visible in the greenhouse.

\* Exhaust Fans

\* Inline Duct Fans

\* Ducting (Flexible, Rigid)

\* Ducting Fittings

\* CO2 Tanks

\* CO2 Regulators

\* CO2 Controllers

\* CO2 Generators

\* Grow Lights

\* `[VIDEO INSIGHT]` Fluence LED lighting systems are prominent (e.g., Fluence VYPR 3p). Note ability to dim based on PAR sensor readings to supplement natural light.

\* HID - MH/HPS with Ballasts/Hoods, LED Panels, Fluorescent - T5/CFL, LEC.

\* Light Timers/Controllers

\* Thermostats

\* Humidistats

\* Environmental Controllers

\* `[VIDEO INSIGHT]` Hooendoorn Growth Management System (high-end, integrated controller). This would be a very high-tier/late-game asset.

\* Environmental Sensors (Air Temp, RH, CO2, Light - PAR/PPFD)

\* `[VIDEO INSIGHT]` PAR sensors integrated with lighting control. Hooendoorn sensors for climate data.

\* Leaf Surface Temp Sensors

\* Root Zone/Substrate Sensors (Moisture - VWC%, EC, pH, Temperature)

\* `[VIDEO INSIGHT]` Grodan GroSens Multi-Sensor (tracks VWC%, EC, temperature in rockwool). Critical for precision irrigation.

\* Advanced/Specialized Sensors (Inline Water sensors, Spore Traps)

\* Research-grade reference sensors

\* Air Filters (Intake filters, Carbon filters, MERV-rated filters)

\* MVP Status: Basic HVAC, fans, simple timers/thermostats MVP. Advanced controllers (Hooendoorn), specific branded lights (Fluence), and integrated sensor systems (GroSens) Mid-Late MVP or Post-MVP.

\*\*Utility Systems & Equipment\*\*

\* Electrical Wiring

\* Circuit Breakers / Fuse Boxes / Panels

\* `[VIDEO INSIGHT]` Extensive electrical panels shown, highlighting the power demands of a large facility.

\* Generators (Diesel/Gas)

\* `[VIDEO INSIGHT]` Kohler generator visible outside, emphasizing backup power importance.

\* CoGen systems

\* Battery Banks / UPS (Uninterruptible Power Supply)

\* Main Power Grid Connection Point (Abstracted)

\* Water Supply Connection Point (Abstracted - Tap, RO, Treated)

\* `[VIDEO INSIGHT]` Mention of water recycling system using ultrafiltration. This could be an advanced utility upgrade.

\* `[VIDEO INSIGHT]` Energy Consulting Service (Abstracted): Seinergy mentioned. Could be an in-game service to optimize energy costs, relevant for Operational & Financial Data UI.

\* MVP Status: Basic wiring, panels, grid/water connection MVP. Generators, advanced water recycling Post-MVP.

\*\*Pots, Containers, & Growing Surfaces\*\*

\* Pots (Standard Pot, Grow Bag type)

\* Fabric Grow Bags

\* Trays / Flats (Seedling, Propagation)

\* `[VIDEO INSIGHT]` OrganiPlug pre-filled trays for cloning.

\* Rockwool Cubes / Slabs

\* `[VIDEO INSIGHT]` Grodan cubes (A-OK plugs, 4-inch cubes) and slabs are extensively used.

\* Hydroponic/Aeroponic Systems (Basic Ebb/Flow, DWC buckets, NFT, Aeroponics)

\* `[VIDEO INSIGHT]` Ebb and Flow (Flood and Drain) tables visible for vegetative growth on rolling benches.

\* Growing Benches / Tables (Flood tables, Wire racks)

\* `[VIDEO INSIGHT]` Mobile/Rolling benches for maximizing space.

\* MVP Status: Basic pots, trays MVP. Grodan rockwool products as specific examples. Ebb/Flow systems MVP. Rolling benches Mid-Late MVP.

\*\*Pest & Disease Management\*\*

\* Sticky Traps (Yellow, Blue - Cards, Rolls)

\* Handheld Magnifying Loupes

\* Microscopes (Handheld, Benchtop for Pest/Disease)

\* Hand Spray Bottles (for Pest/Disease)

\* Pump Sprayers (Gal, Backpack for Pest/Disease)

\* `[VIDEO INSIGHT]` Dramm BP-4 Li Backpack Sprayer with L-5 Lance.

\* (Simulated) Pesticides/Fungicides/Biologicals

\* `[VIDEO INSIGHT]` Mention of Integrated Pest Management (IPM) strategy.

\* In-game "Plant Problems Guide" UI/Asset

\* `[VIDEO INSIGHT]` Foggers: Dramm Cold Fogger (for efficient application of treatments).

\* MVP Status: Basic tools, simulated treatments MVP. Specific branded equipment (Dramm) as variations.

\*\*Harvesting & Processing Equipment\*\*

\* Large Trimming Shears

\* HD Loppers (for harvesting)

\* Hand Saw (for harvesting)

\* Hedge Trimmers (for harvesting)

\* Collection Totes/Bins (Food-grade)

\* Tarps

\* Trim Scissors (Micro-tip, types)

\* Trim Bins/Trays (with kief screens)

\* Isopropyl Alcohol/Wipes (cleaning for harvest tools)

\* Rags (for harvest tool cleaning)

\* Electrically operated, manually controlled hand trimming assist tools

\* Bowl Trimmers (Manual, Electric)

\* Automated Trimming Machines

\* Drying Racks / Clotheslines & Hangers

\* `[VIDEO INSIGHT]` Large dedicated drying rooms with hanging plants.

\* Curing Containers (Jars, Buckets - Glass, Plastic)

\* Automated curing systems

\* Digital Pocket Scales (Precision)

\* Digital Bench Scales (Larger capacity)

\* Industrial Scales (Platform, Floor scales)

\* Calibration Weights

\* Transporting Baskets

\* Hand-drawn garden carts

\* Small motorized transport (for harvest)

\* Portable conveyor belts (for harvest)

\* Cold Storage (Refrigerators, freezers for harvest)

\* Extraction/Concentrate Equipment (Solventless Press, Basic Extraction System) - Post-MVP

\* `[VIDEO INSIGHT]` Automated Packaging Machinery: (Post-MVP, linked to scale)

\* Paxiom Pre-CheQ Analyzer (weighing).

\* Paxiom Swifty Bagger (for flower packaging).

\* Paxiom JuanaRoll (for pre-roll production, capable of 40-60 pre-rolls/minute, up to 4000/hr).

\* MVP Status: Manual harvesting, trimming, drying, curing MVP. Automated packaging machinery Post-MVP.

\*\*Facility Furniture & Fixtures\*\*

\* Workbenches

\* HD Shelving (Metal, Wire)

\* Storage Cabinets (Metal, Plastic, Lockable)

\* Chemical/Flammable Storage Cabinets

\* Rolling Utility Carts

\* Seating (Chairs, Stools, Folding Chairs)

\* Industrial Sink/Wash Basin (Stainless Steel)

\* Faucet Fixtures

\* Eye Wash Station (Wall, Pedestal)

\* Emergency Shower (Industrial)

\* Fire Extinguishers

\* First Aid Kits

\* Wall Clocks

\* Trash Cans/Waste Bins (Industrial rolling)

\* Recycling Bins

\* Mop & Bucket

\* Broom & Dustpan

\* Wet Floor Signs

\* Floor Mats/Anti-Fatigue

\* Lockers

\* Dumpsters

\* MVP Status: All likely MVP for facility functionality and aesthetics.

\*\*Map Specific Assets\*\*

\* Residential House Shell & Unique Fixtures - MVP

\* Warehouse Shell & Unique Fixtures - MVP

\* Greenhouse Structure (glass/polycarbonate, vents) - Post-MVP

\* `[VIDEO INSIGHT]` Details for future implementation: Dutch-style Venlo greenhouse, diffused glass, high ceilings (e.g., 22 ft to gutter), dual peaks per bay, automated roof vents, energy curtains (shade/blackout).

\* Research Lab Shell & Specialized Benches/Fixtures - Post-MVP

\* Outdoor Field Elements (landscape, fencing) - Post-MVP

\* Vertical Farm Structure (multi-tiered racking) - Post-MVP

\* `[VIDEO INSIGHT]` Multi-tiered racks (rolling) are shown in veg/clone rooms at District Cannabis, informing this asset type.

\* Subterranean Lab Shell - Post-MVP

\* Abandoned Research Outpost Shell - Post-MVP

\* Geothermal Greenhouse Complex Shell - Post-MVP

\*\*Decorative & "Cozy" Items\*\* - MVP

\*\*Plant Assets (Core for Procedural System)\*\*

\* Base 3D Models (Landrace-inspired foundational strains)

\* `[VIDEO INSIGHT]` Strain Example: Layer Cake (Cross of: GMO, Triangle Kush & Wedding Cake. Bred by: Swamp Boys Genetics. Characteristics: Gassy, Kushy, GMO funk, high THC ~30%, high yield ~120g/plant in their system). This provides a template for strain data.

\* Procedural Generation System (Software/Code Asset) - MVP

\* Dynamic Shader/Material Effects (MIDs, MPCs for plants) - MVP

\* Performance Optimization - MVP

\*\*Data Collection & Lab Equipment\*\*

\* Handheld Meters (EC/PPM, pH, Temp, Soil Moisture, Chlorophyll, PAR/PPFD, IR Thermometer, VPD) - MVP

\* Benchtop Meters/Analyzers (Visual)

\* Lab-grade EC/pH meter.

\* Spectrophotometer (simulated use).

\* HPLC, GC-MS, ICP, Elemental Analyzer, NIR/MIR Spectroscopy - Mid-Late MVP / Post-MVP.

\* `[VIDEO INSIGHT]` Sap Analysis Kits/Service (Simulated): Mentioned as a key method for nutrient analysis. This could be an off-site service initially (as per Briefing Doc) or a high-tier in-house lab kit.

\* Data Logging & Interface (Visual) - MVP

\* Calibration Weights - MVP

\* Simulated Lab Analysis Interface (UI) - Mid-Late MVP / Post-MVP.

\*\*UI & Data Visualization Elements\*\*

\* Environmental Data Dashboards/Overlays - MVP

\* `[VIDEO INSIGHT]` Examples: Hooendoorn dashboards, LetsGrow.com platform for data aggregation and analysis (KPIs, climate monitor, irrigation graphs). These would be inspirations for high-tier UI.

\* Graphs & Charts - MVP

\* Plant Health/Status Indicators - MVP

\* Nutrient Management Interface - MVP

\* Genetic Data Display - MVP

\* Simulated Lab Analysis Results UI - Mid-Late MVP / Post-MVP.

\* `[VIDEO INSIGHT]` Sap analysis results would fit here.

\* Breeding Interface - MVP

\* Facility Management Overlays - MVP

\* Operational & Financial Data UI - MVP

\* Alerts & Notifications UI - MVP

\* Historical Logs & Notes Interface - MVP

\* Tutorial/Info Overlays - MVP

\*\*Advanced Breeding & Lab Equipment\*\* - Mostly Post-MVP as per Briefing Document.

\* Tissue Culture Station - Post-MVP

\* Lab Furniture - Late-Game MVP / Post-MVP

\* Cryopreservation Unit (Visual) - Post-MVP

\* Advanced Genetic Modification Equipment (Visual) - Post-MVP

\* Bioinformatics Tools/Software (UI/Abstracted System) - Late-Game MVP / Post-MVP.

\*\*Consumable Resources (Abstract/UI Representation)\*\*

\* Water - MVP

\* Power - MVP

\* Nutrients - MVP

\* CO2 - MVP

\* Building Materials - MVP

\* Seeds/Clones - MVP

\* `[VIDEO INSIGHT]` Cloning Gel: Ventana Plant Science.

\* `[VIDEO INSIGHT]` Propagation Plugs: OrganiPlug.

\* Finances - MVP

\* Specialized Tissue Culture Media - Post-MVP

\* Plant Growth Regulators (PGRs) - Post-MVP

\* Agar - Post-MVP

\* Hormones (for Tissue Culture) - Post-MVP

\* Cryoprotectants - Post-MVP

\* Enzymes (for lab work) - Post-MVP

\* Sterile Consumables (for lab work) - Post-MVP

\* `[VIDEO INSIGHT]` Packaging Materials:

\* Child-resistant pre-roll tins and tubes.

\* Biodegradable flower bags (e.g., from Stephen Gould).

\* Labels.

\* MVP Status: Basic packaging (jars) MVP. Branded/specialized packaging Post-MVP or tied to contracts.

This enhanced list integrates the specific, high-tech examples from District Cannabis into your existing framework, providing concrete real-world examples for many of the systems and assets you plan to implement. It respects the MVP scope defined in your Briefing Document while noting advanced features for future development.

Okay, I've analyzed the CannaCribs OG Yields video and cross-referenced it with the Project Chimera Briefing Document and the initial Asset List 1.4. Here is the enhanced and customized asset list, with MVP status, justifications, and details derived from all provided sources.

\*\*Project Chimera: Enhanced Asset List v1.5\*\*

\*\*Core Vision:\*\* Modern, High-Tech, Clinical/Scientific, Aspirational/Professional aesthetic; player-driven "Relaxed & Cozy" variations. Detail paramount for deep simulation, aiming for a granular, scientifically grounded foundation.

\*\*Source Prioritization:\*\*

1. Core Docs (Project Chimera Briefing Document - mechanics, scope, style).

2. Video (CannaCribs OG Yields - for real-world examples, brand names, specific practices).

3. Asset List 1.4 (as a base structure, for general knowledge and bridging gaps).

4. Cannabis science, cultivation, pests, water, nutrients, breeding, equipment knowledge for realism/complexity.

\*\*Gameplay Loops Supported (MVP Focus):\*\* Build (Residential, Basic Warehouse), Cultivate (Manual/Basic Automation), Breed (Basic F1), Process (Manual), Analyze (Manual Data), Optimize (Basic).

---

\*\*I. Structural & Architectural Elements\*\*

\*Purpose: Define grow spaces, support equipment, manage environment. Materials influence insulation, cleanliness, light/air sealing.\*

\* \*\*Walls:\*\* Sections/panels.

\* \*\*Types (MVP):\*\*

\* \*Interior Drywall:\* Standard for residential/basic warehouse rooms. (Source: Briefing - Residential/Warehouse maps; Asset List 1.4)

\* \*Interior Concrete:\* For warehouse construction. (Source: Briefing - Warehouse map; Asset List 1.4)

\* \*Insulated Panels (Visual):\* Higher-tier option for better environmental control. (Source: Asset List 1.4; aligns with detailed env. control)

\* \*\*Properties (MVP):\*\* Cost, Appearance, Insulation (R-value), Light/Air Sealing. (Source: Briefing - env. control; Asset List 1.4)

\* \*\*MVP Status:\*\* Core MVP. Required for initial Residential House and Warehouse build-out.

\* \*\*Justification:\*\* Essential for defining rooms and influencing environmental simulation (heat transfer, air tightness).

\* \*\*Floors:\*\* Sections.

\* \*\*Types (MVP):\*\*

\* \*Concrete:\* Standard for warehouse/utility areas. (Source: Briefing - Warehouse map; Asset List 1.4)

\* \*Wood (Residential):\* For residential house map. (Source: Asset List 1.4; fits residential theme)

\* \*\*Drains (MVP):\*\* Standard floor drain asset. (Source: Asset List 1.4; essential for managing water in grow areas)

\* \*\*Properties (MVP):\*\* Cost, Appearance, Non-porous (influences cleanliness).

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Justification:\*\* Basic flooring for facility construction.

\* \*\*Roofs/Ceilings:\*\* Sections.

\* \*\*Types (MVP):\*\*

\* \*Drywall:\* Standard for residential/finished rooms. (Source: Asset List 1.4)

\* \*Open Rafters/Trusses (Warehouse Visual):\* Part of warehouse shell. (Source: Briefing - Warehouse map; Asset List 1.4)

\* \*Concrete (Warehouse Visual):\* Part of warehouse shell.

\* \*\*Properties (MVP):\*\* Cost, Appearance, Insulation (R-value).

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Justification:\*\* Essential for enclosing spaces.

\* \*\*Doors:\*\* Various types.

\* \*\*Types (MVP):\*\*

\* \*Standard Interior Door:\* For residential/office areas. (Source: Briefing - grid-based interior rooms; Asset List 1.4)

\* \*Basic Industrial Door (Warehouse Visual):\* Part of warehouse shell.

\* \*\*Properties (MVP):\*\* Cost, Appearance, Air Seal quality.

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Justification:\*\* Grid-based construction requires doors.

\* \*\*Windows:\*\* Various types.

\* \*\*Types (MVP):\*\*

\* \*Standard Residential Window:\* For residential house map. (Source: Asset List 1.4)

\* \*Basic Industrial Window (Warehouse Visual):\* Part of warehouse shell.

\* \*Option to "Block Out" windows in grow rooms.\* (Gameplay feature derived from real practice)

\* \*\*Properties (MVP):\*\* Cost, Appearance, Light Transmission (if not blocked), Air Seal quality.

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Justification:\*\* Part of facility shells; block-out option relevant for grow rooms.

\* \*\*Support Pillars/Beams (Warehouse Visual):\*\* Concrete, Steel. Part of warehouse map shell. (Source: Asset List 1.4; Briefing - Warehouse)

\* \*\*MVP Status:\*\* Core MVP (as part of map shell).

\* \*\*Containment Structures (Grow Tents):\*\* Pre-fab grow tents.

\* \*\*Types (MVP):\*\* Small, Medium sizes. (Source: Asset List 1.4; supports early game/smaller setups)

\* \*\*Properties (MVP):\*\* Cost, Size, Light Reflection, Air Seal.

\* \*\*MVP Status:\*\* MVP.

\* \*\*Justification:\*\* Good for early-game residential setups or isolated experiments.

---

\*\*II. Cultivation & Plant Care Tools\*\*

\*Purpose: Plant maintenance, scouting, applying treatments. Tool quality/condition can affect outcomes.\*

\* \*\*Pruning & Cutting Tools (MVP):\*\*

\* \*\*Types:\*\*

\* \*Snips/Scissors (Micro-Tip, Curved/Straight):\* For fine pruning, trimming, taking cuttings. (Source: Briefing - topping, LST, cloning, hand-trimming; Video - Trimming scenes; Asset List 1.4)

\* \*Bypass Pruners (Standard):\* For general pruning, topping. (Source: Briefing - topping; Asset List 1.4)

\* \*Scalpels (Basic):\* For precise cuts, taking clones. (Source: Briefing - cloning; Asset List 1.4)

\* \*\*Properties (MVP):\*\* Sharpness/Condition (affects cut quality, plant stress, disease risk - abstracted), Tool Durability (consumable aspect for higher tiers, or requires cleaning).

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Justification:\*\* Essential for manual plant training, cloning, and trimming as per Briefing.

\* \*\*Spraying & Application Tools (MVP):\*\*

\* \*\*Types:\*\*

\* \*Hand Spray Bottles:\* For manual application of water, foliar nutrients, or basic pest/disease treatments. (Source: Briefing - manual pest treatment; Video - implied for IPM; Asset List 1.4)

\* \*Pump Sprayers (1-2 Gallon):\* For larger manual application tasks. (Source: Asset List 1.4)

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Justification:\*\* Supports manual treatment application.

\* \*\*Scouting & Monitoring Tools (MVP):\*\*

\* \*\*Types:\*\*

\* \*Sticky Traps (Yellow, Blue - Cards):\* For monitoring flying pests. (Source: Video - IPM standard practice; Asset List 1.4)

\* \*Magnifying Loupe (Handheld):\* For visual inspection of pests, diseases, trichomes. (Source: Briefing - Phenotype observation; Video - IPM standard; Asset List 1.4)

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Justification:\*\* Supports basic plant health monitoring and phenotype observation.

\* \*\*Plant Support Tools (MVP):\*\*

\* \*\*Types:\*\*

\* \*Trellis Netting:\* For SCROG or general plant support. (Source: Video - visible in flower rooms; Asset List 1.4)

\* \*Stakes (Bamboo/Plastic):\* For individual plant support. (Source: Asset List 1.4)

\* \*Tie Wire/Plant Ties:\* For LST and securing plants to supports. (Source: Briefing - manual LST; Asset List 1.4)

\* \*\*MVP Status:\*\* Core MVP.

\_ \*\*Justification:\*\* Essential for manual LST and supporting plants as they grow.\_

---

\*\*III. Nutrient & Irrigation Equipment\*\*

\*Purpose: Store, mix, deliver water and nutrients. MVP focuses on manual/basic systems.\*

\* \*\*Manual Watering (MVP):\*\*

\* \*Watering Cans:\* Basic, early-game. (Source: Asset List 1.4)

\* \*Hoses with Nozzle:\* Connects to water source/reservoir. (Source: Asset List 1.4)

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Reservoirs/Tanks (MVP):\*\*

\* \*\*Types:\*\* Small (e.g., 5-50 gallon), Medium (e.g., 50-250 gallon) plastic reservoirs. (Source: Briefing - manual nutrient mixing; Asset List 1.4)

\* \*\*Properties (MVP):\*\* Capacity, Visual fill level.

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Justification:\*\* Needed for storing water and mixed nutrient solutions.

\* \*\*Pumps (MVP):\*\*

\* \*Submersible Water Pumps (Basic):\* For moving water from reservoirs. (Source: Asset List 1.4; supports basic irrigation systems)

\* \*Air Pumps & Air Stones (Basic):\* For aerating nutrient solutions in reservoirs (DWC). (Source: Asset List 1.4; supports basic hydro)

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Plumbing (MVP):\*\*

\* \*\*Types:\*\*

\* \*Pipes (Basic PVC/PEX visual):\* For routing water. (Source: Briefing - abstracted utility connections, manual routing; Asset List 1.4)

\* \*Fittings (Basic Elbows, Tees):\* Visual connectors. (Source: Asset List 1.4)

\* \*Valves (Manual Ball Valves):\* For controlling flow. (Source: Asset List 1.4)

\* \*Drip Line & Emitters (Basic):\* For basic drip irrigation setups. (Source: Briefing - basic irrigation; Video - visible in grow rooms; Asset List 1.4)

\* \*\*Properties (MVP):\*\* Grid-based or free-form manual routing. (Source: Briefing - "manually route utilities; no auto-routing in MVP")

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Nutrient Mixing (MVP):\*\*

\* \*Buckets/Small Vats:\* For manual mixing. (Source: Briefing - manual nutrient mixing)

\* \*Measuring Cups/Spoons:\* For dosing nutrients. (Implied by manual mixing)

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Growing Mediums/Substrates (MVP Representation - Consumable):\*\*

\* \*\*Types:\*\*

\* \*Bagged Potting Soil (Generic):\* Basic starter medium. (Source: Asset List 1.4; common starter)

\* \*Coco Coir (Bricks/Bags):\* Common hydroponic/soilless medium. (Source: Video - RioCoco mentioned/implied; Asset List 1.4)

\* \*Rockwool (Cubes, Blocks, Slabs - Grodan brand shown in video):\* Inert medium for hydro. (Source: Video - Grodan extensively used; Asset List 1.4; Briefing - implies various pots/containers)

\* \*Perlite/Vermiculite (Bags):\* Common soil amendments/medium components. (Source: General knowledge)

\* \*\*Properties (MVP):\*\* Represented as selectable items with differing water retention/aeration (abstracted effects).

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Justification:\*\* Essential consumable for cultivation.

\* \*\*Nutrient Containers (MVP Representation - Consumable):\*\*

\* \*\*Types:\*\* Bottles/Bags representing:

\* \*Basic Grow/Bloom Base Nutrients (A+B style or single part):\* (Source: Briefing - manual mixing basic nutrient recipes)

\* \*Cal-Mag Supplement:\* (Source: Video - implied for RO water use; general knowledge)

\* \*pH Up/Down Solutions:\* (Source: Briefing - medium EC/pH monitoring)

\* \*\*Properties (MVP):\*\* NPK values (simplified), type (Grow, Bloom, Supplement).

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Justification:\*\* Essential for manual nutrient management.

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\*\*IV. Environmental Control Equipment\*\*

\*Purpose: Manage temperature, humidity, CO2, airflow, light. MVP focuses on manual and basic automated control.\*

\* \*\*HVAC (MVP):\*\*

\* \*Window Air Conditioner (Small rooms):\* Basic cooling. (Source: Asset List 1.4)

\* \*Portable Electric Heater (Small rooms):\* Basic heating. (Source: Asset List 1.4)

\* \*Small Dehumidifier:\* (Source: Video - Quest brand shown, implies need; Asset List 1.4)

\* \*Small Humidifier:\* (Source: Asset List 1.4)

\* \*\*Properties (MVP):\*\* Radius/cone of influence, power consumption. (Source: Briefing - Microclimate Modeling)

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Justification:\*\* Basic environmental control is core MVP.

\* \*\*Fans (MVP):\*\*

\* \*Clip Fans:\* Small, for localized air circulation. (Source: Asset List 1.4)

\* \*Oscillating Standing/Wall Fans:\* For general room circulation. (Source: Video - visible in grow rooms; Asset List 1.4)

\* \*Basic Inline Duct Fan:\* For small-scale exhaust. (Source: Asset List 1.4)

\* \*\*Properties (MVP):\*\* Airflow (CFM rating - abstracted effect), power consumption.

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Justification:\*\* Essential for air circulation and microclimate management.

\* \*\*Ducting (MVP):\*\*

\* \*Flexible Ducting (Basic):\* For connecting fans/ACs. (Source: Asset List 1.4)

\* \*\*Properties (MVP):\*\* Visual, manual routing.

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*CO2 Systems (MVP - Basic/Manual):\*\*

\* \*CO2 Tank (Visual Asset):\* Represents CO2 source. (Source: Video - CO2 injection mentioned; Asset List 1.4)

\* \*Basic CO2 Regulator (Visual Asset):\* Manual release. (Source: Asset List 1.4)

\* \*(CO2 levels manually monitored by player via handheld meter in MVP)\*

\* \*\*MVP Status:\*\* MVP (manual release/monitoring).

\* \*\*Justification:\*\* Basic CO2 management for plant growth. Automated controllers are Post-MVP.

\* \*\*Grow Lights (MVP):\*\*

\* \*\*Types:\*\*

\* \*Fluorescent (T5/CFL):\* Early game, propagation/seedlings. (Source: Asset List 1.4)

\* \*Basic LED Panel (Fixed Spectrum, various wattages):\* Core MVP light. (Source: Briefing - "basic tier grow lights"; Video - LEDs extensively used; Asset List 1.4)

\* \*HID (MH/HPS with Basic Ballast/Hood - Visual only, simplified):\* Alternative to LED, different heat/power profile. (Source: Asset List 1.4)

\* \*\*Properties (MVP):\*\* Wattage, Light Output (PPFD - abstracted coverage), Heat Output, Power Consumption.

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Justification:\*\* Essential for plant growth. Tiered progression planned.

\* \*\*Light Timers (MVP):\*\*

\* \*Basic Mechanical/Digital Timer:\* For automating light cycles. (Source: Briefing - "basic automated environmental control (light cycles)"; Asset List 1.4)

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Environmental Controllers (MVP - Basic):\*\*

\* \*Basic Thermostat (Visual, functional):\* Controls heater/AC. (Source: Briefing - basic automated environmental control)

\* \*Basic Humidistat (Visual, functional):\* Controls humidifier/dehumidifier. (Source: Briefing - basic automated environmental control)

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Justification:\*\* Basic automation of temperature and humidity.

\* \*\*Sensors (MVP - Player placed for Dashboards, some link to basic controllers):\*\*

\* \*Thermometer/Hygrometer (Digital Display):\* Player-placed, reads out to dashboard. (Source: Briefing - "real-time sensor readouts", "manual environmental sampling")

\* \*(See Data Collection for Handheld Meters)\*

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Justification:\*\* Provides data for player decision-making and basic automation.

\* \*\*Air Filters (MVP - Basic):\*\*

\* \*Small Carbon Filter with Inline Fan:\* For odor control in small setups/tents. (Source: Asset List 1.4)

\* \*\*MVP Status:\*\* MVP.

\* \*\*Justification:\*\* Odor control is a realistic aspect.

---

\*\*V. Utility Systems & Equipment\*\*

\*Purpose: Deliver power. MVP focuses on abstracted connections.\*

\* \*\*Electrical (MVP):\*\*

\* \*Abstracted Power Sockets/Outlets (Visual):\* Where equipment is "plugged in." (Source: Briefing - "manage basic abstracted utility connections (power)")

\* \*Visual Circuit Breaker Panel (Residential/Warehouse specific):\* Represents power hub. (Source: Asset List 1.4)

\* \*Extension Cords/Power Strips (Visual):\* For managing equipment placement.

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Justification:\*\* Power is an essential abstracted utility.

\* \*\*Water Supply (MVP):\*\*

\* \*Abstracted Water Tap/Connection Point:\* Represents water source. (Source: Briefing - abstracted utility connections; Asset List 1.4)

\* \*\*MVP Status:\*\* Core MVP.

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\*\*VI. Pots, Containers, & Growing Surfaces\*\*

\*Purpose: Hold plants and growing medium.\*

\* \*\*Pots & Containers (MVP):\*\*

\* \*\*Types:\*\*

\* \*Standard Plastic Pots (Various sizes: e.g., solo cup, 1gal, 3gal, 5gal):\* For transplanting. (Source: Briefing - "transplanting", "pots/containers"; Asset List 1.4)

\* \*Fabric Grow Bags (Various sizes):\* Alternative with better aeration. (Source: Asset List 1.4; Video - RioCoco bags may be fabric or just coco bags)

\* \*Seedling Trays/Flats (with or without individual cells):\* For starting seeds/clones. (Source: Briefing - "planting seeds/clones"; Video - propagation domes imply trays; Asset List 1.4)

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Justification:\*\* Essential for holding plants through lifecycle.

\* \*\*Hydroponic Systems (MVP - Basic):\*\*

\* \*Deep Water Culture (DWC) Buckets (Basic):\* Simple hydroponic system. (Source: Briefing - "basic irrigation" could include simple hydro; Asset List 1.4)

\* \*Rockwool Slabs on Trays/Benches:\* As seen in OG Yields video for later stage. (Source: Video; Briefing - "pots/containers")

\* \*\*MVP Status:\*\* MVP (for basic options).

\* \*\*Justification:\*\* Offers an alternative cultivation method beyond soil/coco in pots.

\* \*\*Growing Benches/Tables (MVP):\*\*

\* \*Basic Wire Racks/Shelving:\* For organizing pots/trays. (Source: Video - multi-tiered racks; Asset List 1.4)

\* \*Flood Tables (Basic):\* For Ebb & Flow (if included as basic hydro). (Source: Asset List 1.4)

\* \*\*MVP Status:\*\* MVP.

\* \*\*Justification:\*\* Facility organization.

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\*\*VII. Pest & Disease Management\*\*

\*Purpose: Monitor, identify, and manually treat issues.\*

\* \*\*Scouting Tools (MVP):\*\* (Covered in Section II)

\* \*\*Application Tools (MVP):\*\* (Covered in Section II)

\* \*\*(Simulated) Pesticides/Fungicides/Biologicals (MVP - Consumable):\*\*

\* \*\*Types:\*\*

\* \*Neem Oil (Generic Organic Pesticide/Fungicide):\* (General knowledge, common organic option)

\* \*Insecticidal Soap:\* (General knowledge, common organic option)

\* \*Basic Fungicide (Generic):\* (Briefing - few common diseases)

\* \*\*Properties (MVP):\*\* Represented as consumable items in inventory. Abstracted effect on specific pests/diseases.

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Justification:\*\* Needed for manual treatment of basic plant health issues.

\* \*\*In-game "Plant Problems Guide" (UI/Asset - MVP):\*\*

\* \*\*Content:\*\* Visual indicators, symptoms, and basic solutions for common issues (e.g., few common pests/diseases, basic nutrient deficiencies). (Source: Briefing - "addressing basic plant health issues (visual indicators...)"; Realism Data - "in-game guides ('Plant Problems Guide')")

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Justification:\*\* Essential player aid for diagnostics.

---

\*\*VIII. Harvesting & Processing Equipment\*\*

\*Purpose: Manual harvest, trim, dry, cure. Quality affected by process.\*

\* \*\*Harvesting Tools (MVP):\*\*

\* \*Large Trimming Shears/Pruners:\* For cutting down plants/branches. (Source: Asset List 1.4)

\* \*Collection Totes/Bins (Plastic):\* For transporting harvested material. (Source: Asset List 1.4)

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Trimming Tools (MVP):\*\*

\* \*Trim Scissors (Micro-Tip, spring-loaded types):\* For manual hand-trimming. (Source: Briefing - "Manual hand-trimming"; Video - trimming scenes; Asset List 1.4)

\* \*Trim Bins/Trays (with kief screen):\* To collect kief during trimming. (Source: Video - common trimming setup; Asset List 1.4)

\* \*Isopropyl Alcohol/Wipes & Rags:\* For cleaning trimming tools (hygiene). (Source: Video; Asset List 1.4)

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Drying Equipment (MVP):\*\*

\* \*Drying Racks (Mesh, stackable):\* (Source: Briefing - "manual drying (hanging/racks)"; Asset List 1.4)

\* \*Clotheslines & Hangers (Visual):\* Alternative for hanging. (Source: Briefing - "manual drying (hanging/racks)"; Asset List 1.4)

\* \*(Drying occurs in a player-built, environmentally controlled dry space)\*

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Curing Containers (MVP):\*\*

\* \*Glass Jars (Various sizes, e.g., quart, half-gallon):\* For manual curing. (Source: Briefing - "manual curing (jars, 'burping')"; Asset List 1.4)

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Weighing & Measuring (MVP):\*\*

\* \*Digital Pocket Scale (Precision, e.g., 0.01g):\* For weighing small amounts, post-harvest metrics. (Source: Briefing - "basic post-harvest metrics"; Asset List 1.4)

\* \*Digital Bench Scale (Larger capacity, e.g., 0.1g or 1g):\* For larger quantities, contract fulfillment. (Source: Briefing - "NPC-issued cultivation contracts (specific... quantity)"; Asset List 1.4)

\* \*Calibration Weights (Set):\* For ensuring scale accuracy (abstracted use or mini-game). (Source: Video; Asset List 1.4)

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Justification:\*\* Essential for tracking yields and fulfilling contracts.

---

\*\*IX. Facility Furniture & Fixtures\*\*

\*Purpose: Workspace, storage, safety, general utility.\*

\* \*\*Work Surfaces & Storage (MVP):\*\*

\* \*Workbenches (Basic wood/metal):\* (Source: Asset List 1.4)

\* \*HD Shelving (Metal, Wire):\* For storage. (Source: Asset List 1.4)

\* \*Storage Cabinets (Basic Metal/Plastic):\* (Source: Asset List 1.4)

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Sinks & Cleaning (MVP):\*\*

\* \*Basic Utility Sink/Wash Basin:\* For cleaning tools, hands. (Source: Asset List 1.4)

\* \*Mop & Bucket, Broom & Dustpan:\* For facility cleanliness (visual, abstracted effect). (Source: Asset List 1.4)

\* \*\*MVP Status:\*\* MVP.

\* \*\*General & Safety (MVP):\*\*

\* \*Trash Cans/Waste Bins:\* (Source: Asset List 1.4)

\* \*Fire Extinguisher (Visual):\* (Source: Asset List 1.4)

\* \*First Aid Kit (Wall-mounted visual):\* (Source: Asset List 1.4)

\* \*\*MVP Status:\*\* MVP.

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\*\*X. Map Specific Assets\*\*

\*Purpose: Define build environment, establish scale.\*

\* \*\*Residential House Shell (MVP):\*\*

\* Pre-defined exterior and basic interior layout. Includes standard residential fixtures (doors, windows, basic kitchen/bathroom visuals - non-functional for gameplay beyond aesthetics). (Source: Briefing - "Residential House" Map)

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Warehouse Shell (MVP):\*\*

\* Large, open-plan concrete structure (floor, walls, roof). Industrial doors/windows. May include support pillars. Player builds out interior rooms. (Source: Briefing - "Warehouse" Map)

\* \*\*MVP Status:\*\* Core MVP.

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\*\*XI. Decorative & "Cozy" Items (MVP)\*\*

\*Purpose: Player customization, "Cozy" aesthetic.\*

\* \*\*Types:\*\* Posters, basic art, rugs, small non-functional furniture (decorative chairs, tables), non-cannabis potted plants, basic decorative lighting options, paint/texture options for walls/floors (visual only, no change to material properties). (Source: Asset List 1.4; supports player expression)

\* \*\*MVP Status:\*\* MVP.

\* \*\*Justification:\*\* Allows for player expression and facility personalization, can also deliver lore through item descriptions.

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\*\*XII. Plant Assets (Core for Procedural System - MVP)\*\*

\*Purpose: Central visual, dynamic GxE reflection.\*

\* \*\*Base 3D Models (MVP):\*\*

\* ~5-10 Landrace-inspired foundational strains. (Source: Briefing - "5-10 foundational landrace-inspired strains")

\* \*\*Examples from Video (Can inspire MVP Strains):\*\* Donny Burger, White Caviar, Orange Kush Cake, Brett Hull #16. (Source: Video - OG Yields strains. These are likely complex hybrids, but can inspire simpler foundational looks/traits for MVP)

\* \*\*Morphology & Growth Stages (MVP):\*\*

\* Seedling (cotyledons, first true leaves)

\* Vegetative (Early, Mid, Late - increasing nodes, fan leaves)

\* Flowering (Early - pistil formation, Mid - bud development, Late - bud swell, trichome maturation visuals: clear -> milky -> amber)

\* Harvested (Chopped plant parts)

\* Dried/Cured Buds (Visual representation)

\* \*\*Botanical Features (MVP - Simplified Visual Representation):\*\*

\* Plant Height (influenced by genetics, basic training, environment)

\* Basic Branching Pattern (Sativa-like - taller, thinner leaves; Indica-like - shorter, bushier, broader leaves - as per rudimentary morphology in Briefing)

\* Leaf Morphology (basic shape, serrations)

\* Bud Structure (basic shape, density visual)

\* Trichome Density (visual "frostiness")

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Procedural Generation System (Software/Code Asset - MVP):\*\*

\* \*\*Inputs (MVP - Simplified):\*\*

\* Basic Genetic Data (Primary cannabinoid potential, yield factor, flowering time, rudimentary morphology - from Briefing)

\* Environmental Parameters (Temperature, Humidity, Light - basic effects on growth rate/visual health)

\* Basic Cultivation Actions (Topping, Manual LST effects on structure - from Briefing)

\* \*\*Algorithms (MVP):\*\* Generate plant structure and visual characteristics based on these simplified inputs.

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Dynamic Shader/Material Effects (MVP - Basic):\*\*

\* \*\*Effects:\*\* Basic visual cues for:

\* Coloration (e.g., yellowing for generic nutrient deficiency, purple for cold stress if applicable)

\* Wilting (hydration status)

\* Basic Pest/Disease Visuals (e.g., spots for a common leaf spot disease, visual presence of a common pest)

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Justification:\*\* Provides essential visual feedback to the player.

\* \*\*Performance Optimization (MVP):\*\* LODs for plants. (Source: Briefing - initial scope limited for quality, aggressive LODs for plants)

\* \*\*MVP Status:\*\* Core MVP.

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\*\*XIII. Data Collection & Lab Equipment\*\*

\*Purpose: Collect plant/environmental data. MVP focuses on manual collection.\*

\* \*\*Handheld Meters (MVP):\*\* Player-used tools for manual data acquisition. Data auto-logged to basic UI/notes.

\* \*\*Types:\*\*

\* \*pH Meter (Handheld):\* For medium/water. (Source: Briefing - "medium EC/pH monitoring (handheld meters)")

\* \*EC/PPM Meter (Handheld):\* For medium/water. (Source: Briefing - "medium EC/pH monitoring (handheld meters)")

\* \*Temperature Probe (Handheld):\* Air, water, basic soil. (Source: Briefing - "Handheld meters (pH, EC/PPM, temp, humidity...)")

\* \*Humidity Meter (Handheld):\* Air. (Source: Briefing - "Handheld meters (...temp, humidity...)")

\* \*Basic Soil Moisture Meter (Handheld):\* (Source: Briefing - "Handheld meters (...basic soil moisture)")

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Justification:\*\* Core loop of manual data collection as per Briefing.

\* \*\*Data Logging & Interface (Visual - MVP):\*\*

\* \*Clipboard & Pen (Visual):\* Represents manual note-taking. (Source: Briefing - "basic logs/notes"; Asset List 1.4)

\* \*Basic Laptop/Tablet (Visual):\* Interface for viewing dashboards. (Source: Briefing - "Core environmental data dashboards", "Plant status UI panels"; Asset List 1.4)

\* \*\*MVP Status:\*\* Core MVP.

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\*\*XIV. UI & Data Visualization Elements (MVP - Essential Systems)\*\*

\*Purpose: Present simulation data for player decisions.\*

\* \*\*Environmental Data Dashboards/Overlays (MVP):\*\*

\* Real-time sensor readouts for player-placed sensors (Temp, RH). (Source: Briefing - "Core environmental data dashboards (real-time sensor readouts)")

\* Basic display of light cycle status.

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Graphs & Charts (MVP - Basic):\*\*

\* Simple historical trends for manually logged data (e.g., pH, EC over time). (Source: Briefing - "basic logs/notes"; Asset List 1.4 implies graphs)

\* \*\*MVP Status:\*\* MVP.

\* \*\*Plant Status UI Panels (MVP):\*\*

\* Essential health/growth information (e.g., current growth stage, visual health status - healthy, stressed, pest/disease icon). (Source: Briefing - "Plant status UI panels (essential health/growth info)")

\* Basic visual indicators for nutrient/water stress.

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Nutrient Management Interface (MVP - Basic):\*\*

\* UI for selecting and applying manually mixed nutrient recipes. (Source: Briefing - "Manual mixing basic nutrient recipes, application")

\* Input fields for logging medium EC/pH readings.

\* \*\*MVP Status:\*\* MVP.

\* \*\*Genetic Data Display (MVP - Basic):\*\*

\* Display for core traits of selected plants/seeds (Primary cannabinoid potential, basic yield factor, flowering time, rudimentary morphology). (Source: Briefing - "Simplified inheritance model for core key traits")

\* Basic lineage display (e.g., Parent A x Parent B -> F1 Strain Name).

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Breeding Interface (MVP - Basic):\*\*

\* UI for selecting parent plants for manual pollination. (Source: Briefing - "manual pollination for F1 seeds")

\* UI for managing/tracking F1 seeds.

\* Basic interface for recording phenotype observations. (Source: Briefing - "Phenotype Observation: Player selection via visual characteristics, basic post-harvest metrics.")

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Facility Management Overlays (MVP - Basic):\*\*

\* Utility View ("X-Ray" mode) for visualizing basic power connections. (Source: Briefing - "Utility Highlighting View", "Utility View ('X-Ray') crucial for MVP")

\* Grid overlay for construction. (Source: Briefing - "Grid-based interior room construction")

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Operational & Financial Data (MVP - Basic):\*\*

\* UI for displaying current funds. (Source: Briefing - "Basic operational costs... are managed")

\* List of active NPC contracts and their requirements. (Source: Briefing - "NPC-issued cultivation contracts")

\* Simple log of income/expenses (utility bills, consumable purchases, sales).

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Alerts & Notifications UI (MVP):\*\*

\* Tiered alerts (Blue/Info, Yellow/Warning, Red/Critical) for critical deviations (e.g., environment out of range, pest/disease identified, low consumables). (Source: Briefing - "essential alert system for critical deviations", "Tiered alerts MVP design")

\* Text-based pop-ups/inbox messages from ADA. (Source: Briefing - "ADA communication: primarily text-based UI")

\* \*\*MVP Status:\*\* Core MVP.

\* \*\*Historical Logs & Notes Interface (MVP):\*\*

\* Simple player-editable notes section. (Source: Briefing - "basic logs/notes")

\* Auto-logging of key events (e.g., harvest completion, contract fulfillment, critical alerts).

\* \*\*MVP Status:\*\* MVP.

\* \*\*Tutorial/Info Overlays (MVP):\*\*

\* Contextual pop-ups/tooltips explaining UI elements, basic game mechanics, and concepts delivered by ADA. (Source: Briefing - "Narrative guidance (AI Advisor ADA)")

\* \*\*MVP Status:\*\* Core MVP.

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\*\*XV. Consumable Resources (MVP - Abstract/UI Representation)\*\*

\*Purpose: Track/manage consumed resources.\*

\* \*\*Water (UI Icon, numerical quantity):\*\* Generic water resource for irrigation. (Source: Briefing - "Resource Management"; Asset List 1.4)

\* \*\*Power (UI Icon, numerical cost/consumption):\*\* Abstracted utility cost. (Source: Briefing - "basic abstracted utility connections (power)", "Operational Costs: utilities"; Asset List 1.4)

\* \*\*Nutrients (UI Icons for different types, numerical quantity):\*\* Base Grow, Base Bloom, Cal-Mag, pH Up/Down. (Source: Briefing - "Nutrient Management"; Asset List 1.4)

\* \*\*CO2 (UI Icon from Tank, numerical quantity):\*\* Gas from CO2 tanks. (Source: Briefing - "Resource Management"; Video - CO2 use; Asset List 1.4)

\* \*\*Building Materials (UI Icon, numerical quantity):\*\* Generic "Materials" for walls, doors, basic equipment. (Source: Briefing - "Resource Management"; Asset List 1.4)

\* \*\*Seeds (Strain-specific UI Icons, numerical quantity):\*\* (Source: Briefing - "plant lifecycle from seed/clone"; Asset List 1.4)

\* \*\*Clones (Strain-specific UI Icons, numerical quantity):\*\* (Source: Briefing - "plant lifecycle from seed/clone"; Asset List 1.4)

\* \*\*Growing Medium (UI Icons for different types, numerical quantity):\*\* Soil, Coco, Rockwool. (Source: Briefing - "Resource Management"; Asset List 1.4)

\* \*\*Finances (In-game Currency - UI Display):\*\* (Source: Briefing - "Economy (NPC-Driven)"; Asset List 1.4)

\* \*\*Pest/Disease Treatments (UI Icons, numerical quantity):\*\* For manual application. (Source: Briefing - "manual treatment")

\* \*\*MVP Status:\*\* Core MVP for all listed.

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\*\*XVI. Post-MVP / Later Phases Assets (Examples derived from Briefing & Video)\*\*

\*This section is for assets explicitly deferred or seen in the video that go beyond MVP scope.\*

\* \*\*Advanced Breeding & Lab Equipment:\*\*

\* Tissue Culture Station & Consumables (Source: Briefing - Deferred "Advanced Breeding", "Tissue Culture"; Asset List 1.4)

\* HPLC, GC-MS, ICP, Elemental Analyzer, Spectrophotometer, NIR/MIR (Source: Video - Giddy Up's lab; Asset List 1.4; Briefing - Deferred "genetic analysis")

\* Cryopreservation Unit (Source: Asset List 1.4; Briefing - Deferred "Advanced Genetics")

\* Advanced Genetic Modification Equipment (CRISPR-like) (Source: Briefing - Deferred "genetic modification"; Asset List 1.4)

\* Bioinformatics Tools/Software (UI) (Source: Asset List 1.4; Briefing - Deferred "AI Research Lab")

\* \*\*Advanced Automation & Robotics:\*\*

\* Automated Dosing/Fertigation Systems (Source: Briefing - Deferred "Advanced Automation"; Video - implies advanced systems; Asset List 1.4)

\* Integrated Spraying Systems, Motorized Spray Carts, Foggers (Source: Video; Asset List 1.4)

\* Automated Trimming Machines, Bowl Trimmers (Source: Video; Asset List 1.4; Briefing - "Advanced Automation")

\* Automated Curing Systems (Source: Asset List 1.4)

\* \*\*Advanced Extraction & Product Formulation:\*\*

\* Solventless Press, Advanced Extraction Systems (Source: Briefing - Deferred; Video - Live Resin extraction; Asset List 1.4)

\* \*\*Facility Expansion:\*\*

\* Greenhouse Structures, Research Lab Shells, Outdoor Fields, Vertical Farms (Source: Briefing - Deferred "Multi-Region Gameplay", "Advanced Exterior World Simulation"; Asset List 1.4)

\* Air Locks, Industrial Roller Doors (Source: Asset List 1.4)

\* \*\*Advanced Utility Systems:\*\*

\* Generators, Battery Banks/UPS, CoGen Systems (Source: Asset List 1.4)

\* Detailed water treatment systems (RO visuals) (Source: Video - mentions RO water; Asset List 1.4)

\* \*\*Specialized Sensors (Post-MVP):\*\*

\* Inline Water Sensors, Spore Traps, Research-Grade Reference Sensors (Source: Asset List 1.4)

\* Leaf Surface Temperature Sensors for precise VPD (Source: Video - implied for advanced VPD; Asset List 1.4)

\* \*\*Other:\*\*

\* Player-Driven Marketplace UI elements (Source: Briefing - Deferred)

\* Complex Physics Models (detailed fluid/airflow) (Source: Briefing - Deferred)

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This enhanced list provides a solid foundation for Project Chimera, distinguishing between core MVP requirements and future expansions, and integrating real-world details observed in the CannaCribs video to bolster authenticity. Each asset group now has a clearer link to the project's design pillars.

Okay, I've reviewed the CannaCribs episode featuring Flora Farms and cross-referenced it with your existing "Asset List 1.4" and "Briefing Document."

Here's the enhanced asset list. I've focused on:

* Adding new items observed or directly implied by the video that fit within the game's scope.
* Adding specific brand examples or variations to existing items where relevant from the video.
* Confirming or adjusting MVP status based on the video's depiction of a large-scale, operational facility (which aligns with the "Warehouse" map goal in your MVP).
* Adding brief notes or justifications where video information directly influenced an addition or modification.

**Key observations from Flora Farms (CannaCribs Episode) relevant to Project Chimera:**

* **Scale:** Massive industrial/warehouse scale, with multiple buildings and ongoing expansion. This reinforces the need for assets that can scale from residential to warehouse.
* **Cultivation Stages Shown:** Cloning (rockwool, domes), Veg (rockwool blocks, drip, HPS), Flower (similar to  
  veg, extensive trellis), Drying (whole plant hang), Curing (large bags, totes with automation), Trimming (machine & hand), Packaging.
* **Automation:** Significant automation in irrigation (Netafim, NetaFlex 3G controller), some in curing (Cure Puck), and trimming (Twister BatchOne).
* **Water Management:** RO water is crucial (HyperLogic system shown).
* **Pest/Disease Management:** Virkon Dip for clones. Emphasis on cleanliness.
* **Nutrients:** Athena brand mentioned.
* **Data & Monitoring:** Solus sensors for substrate monitoring (VWC, EC, Temp).
* **Team & Roles:** Many specialized roles, indicating the complexity of a large operation.
* **Branding/Culture:** "Flora Fam," Missouri-grown, focus on patient access and quality.

--- START OF ENHANCED Asset List 1.5 ---

Project Chimera: Customized, Comprehensive Asset List v1.5  
Core Vision: Modern, High-Tech, Clinical/Scientific, Aspirational/Professional aesthetic; player-driven "Relaxed & Cozy" variations.  
Detail paramount: (Satisfactory, Farming Sim benchmarks for equipment) for deep simulation. The simulation aims for a granular, scientifically grounded foundation.  
Source Prioritization:

1. Core Docs (mechanics, scope, style).
2. Relevant Docs (cannabis science, cultivation, pests, water, nutrients, breeding, equipment for realism/complexity). This includes Cannabis sativa L. biology, cultivation, genetics, and industry practices.
3. General Knowledge (bridge gaps).
4. CannaCribs Flora Farms episode for real-world large-scale examples.  
   Gameplay Loops Supported: Build, Cultivate, Breed, Process, Analyze, Optimize.  
   Key Customizations:

* Expanded Utility Systems (Plumbing, HVAC, Electrical) with detailed, interconnected networks where sizing and material impact performance.
* Detailed Plant Assets (dynamic, procedural, GxE-tied), reflecting phenotypic plasticity.
* Lab/Research Equipment (advanced breeding/analysis) supporting high-tier breeding, genetic research, and detailed chemical profiling.
* UI/Data Viz as crucial assets for presenting complex simulation data.  
  Specific environmental control, nutrient management, IPM, post-harvest details: These systems will incorporate specific parameters for temperature, humidity, CO2, airflow, light, optimal nutrient ranges, and pest/disease resistance.  
  Scalability: Residential vs. Warehouse/Industrial, potentially expanding to Greenhouses, Vertical Farms, Research Labs, and Outdoor Fields.  
  Item List:

**Structural & Architectural Elements**Purpose: Define grow spaces, support equipment, manage environment (materials affecting insulation, cleanliness, etc.). Layout and zoning will facilitate clean flow principles.  
Variations:

* Interior: Drywall, Concrete, Insulated Panel. Materials should be non-porous, smooth, durable, non-absorbent, and chemical-resistant for sanitation.
* Exterior: Siding, Brick, Metal (Map specific).
* Industrial: Pre-fab, Heavy-duty.  
  Material properties: Cost, Appearance, Insulation (R-value for heat transfer management), light/air barrier (for Environmental Control Sim), Cleanliness (materials influence ease of cleaning). Coving at wall-floor junctions is recommended.  
  Assets:
* Walls: Sections/panels (various materials).
  + MVP Status / Estimated Game Version: MVP. Required for initial Residential House map and basic Warehouse build-out.
  + Material properties related to Environmental Control Sim (Insulation - R-value) are relevant for MVP. Materials for future exterior/map-specific themes would be Post-MVP.
* Floors: Sections (Concrete, Wood, Grate - with load ratings). Non-porous materials preferred.
  + Drains: Standard, Trench (with varying capacity).
  + MVP Status / Estimated Game Version: MVP. Required for initial facility construction.
* Roofs/Ceilings: Sections (Drywall, Suspended Grid, Concrete). High ceilings can cause thermal stratification.
  + Suspended Tiles: (acoustic, cleanroom).
  + Open Rafters/Trusses: (Wood, Metal). These can influence large-scale microclimate patterns.
  + MVP Status / Estimated Game Version: MVP. Required for initial facility construction.
* Doors: Various types (Standard, Industrial Roller, Air Lock). Air locks minimize contaminant entry.
  + MVP Status / Estimated Game Version: MVP. Required for facility construction.
* Windows: Various types (Standard, Greenhouse, Industrial). Can be blocked out in grow rooms.
  + MVP Status / Estimated Game Version: MVP. Standard windows for Residential/Warehouse. Greenhouse-specific windows (e.g., for specific light transmission) are Future (Post-MVP).
* Stairs/Ladders/Catwalks: For vertical access. Relevant for multi-story/vertical facilities.
  + MVP Status / Estimated Game Version: Likely MVP for multi-story/vertical layout in Warehouse or other facilities. Catwalks relevant for industrial scale and vertical farms.
* Support Pillars/Beams: (Concrete, Steel). For structural support in large spaces.
  + MVP Status / Estimated Game Version: MVP for Warehouse map shell.
* Containment Structures (Tents): Pre-fab grow tents, sealable for environmental control.
  + MVP Status / Estimated Game Version: Likely MVP for early-game or smaller residential setups.

**Cultivation & Plant Care Tools**Purpose: Plant maintenance (pruning, training, defoliation, lollipopping), scouting, applying treatments.  
Variations: Size, Material (affects durability, cleanliness, rust potential), Quality (Basic, High-quality), Sharpness/Condition (affects cut cleanliness, plant stress, disease risk). Tools require cleaning/sterilization.  
Assets:

* Pruning & Cutting:
  + Types: Bypass Pruners (Std, HD), Snips/Scissors (Micro-Tip, Curved/Straight, e.g., Fiskars), Scalpels, Loppers, Hand Saw. Large Hedge Trimmers (potentially with pole extensions).
  + Properties: Cutting Area/Blade Length, Weight (affects fatigue).
  + MVP Status / Estimated Game Version: MVP. Basic plant training (topping, manual LST, defoliation, lollipopping) is part of core MVP cultivation. These tools are necessary for that. Clean cuts promote faster healing.
* Spraying & Application: Hand Spray Bottles, Pump Sprayers (Gal, Backpack), Handheld Dusters, Soil Drench Applicators.
  + Industrial: Motorized spray carts, Foggers, Integrated Spraying Systems (automated, fixed nozzles).
  + MVP Status / Estimated Game Version: MVP for basic pest/disease treatment (manual application). Industrial versions likely Late-Game MVP or Post-MVP, linked to scale and potential automation skill nodes. Automated spraying carries risks if misconfigured.
* Scouting & Monitoring:
  + Traps: Sticky Traps (Yellow, Blue - Cards, Rolls) for monitoring pest presence, location, and stage.
  + Visual Inspection Tools: Magnifying Loupes, Handheld/Benchtop Digital/Standard Microscopes for detailed inspection of pests, pathogens, trichomes.
  + Sampling Tools: Soil/Medium Sample Probes/Corers, Leaf Sample Bags/Vials.
  + Simulated Meters (Visual): Simulated Chlorophyll Meter. (See Data Collection for more handheld meters)
  + MVP Status / Estimated Game Version: MVP for basic plant health monitoring and pest/disease identification. Microscopes and probes are explicitly mentioned for manual data acquisition loop and unlocked via Science skill tree nodes. Effective use requires skill.
* Plant Support Tools:
  + Types: Trellis netting (multiple layers for support and ScrOG), stakes, tie wire.
  + Functionality: Prevents lodging, supports heavy buds, manages canopy, facilitates light penetration.
  + MVP Status / Estimated Game Version: Likely MVP, especially for supporting larger plants or specific training techniques (e.g., ScrOG as seen at Flora Farms).

**Nutrient & Irrigation Equipment**Purpose: Store, mix, deliver nutrients and water to plants. Systems will manage pH, EC/PPM, temperature, and Dissolved Oxygen (DO) of nutrient solutions.  
Variations:

* Scale (Manual, Small Reservoir, Large Industrial).
* Control (Manual, Timed, Automated sensor-driven e.g., Netafim NetaFlex 3G).
* Type (Drip, Ebb/Flow, DWC, Aeroponic, etc.).  
  Assets:
* Watering Cans/Hoses: Basic manual irrigation.
  + Properties: Capacity/Flow Rate.
  + MVP Status / Estimated Game Version: MVP. Basic irrigation methods are essential for core cultivation.
* Reservoirs/Tanks: Various sizes (Plastic, Poly, Stainless Steel - food-grade, e.g., 1000-gallon batch tanks). Dynamically reflect fill levels. Must be kept clean.
  + MVP Status / Estimated Game Version: MVP. Needed for manual/timed watering systems. Larger/Industrial sizes (like 1000gal batch tanks) likely Late-Game MVP or Post-MVP.
* Pumps: Water Pumps (Submersible, Inline - various flow rates/head pressure), Air Pumps (for DWC/Reservoir aeration).
  + Properties: Power Requirement, Durability/Maintenance (can fail).
  + MVP Status / Estimated Game Version: MVP. Needed for simple reservoir systems. Various sizes/capacities support scalability. Redundant pumps or advanced manifold systems could be later game/Post-MVP.
* Plumbing: Pipes (PVC, PEX, Drip Line e.g., Netafim), Fittings, Valves (manual, solenoid), Filters.
  + Properties: Material (impacts cost, durability, efficiency, appearance), Sizing (diameters impact flow, pressure drop), Connectivity (logical connections, visual feedback), Routing (3D, grid-snap/free-form, segmented components for curves). Abstracted pressure loss simulation.
  + MVP Status / Estimated Game Version: MVP. Essential for building irrigation systems, part of detailed construction. Sizes/materials impact performance. Manual routing is MVP. Filters require cleaning/replacement.
* Nutrient Mixing Stations/Vats: For preparing nutrient solutions. Requires clean tanks, measuring tools, pumps/stirrers, calibrated pH/EC meters. (Flora Farms mentions Athena brand nutrients).
  + MVP Status / Estimated Game Version: MVP. Required for manual nutrient mixing. Scale/automation increases later. Cleaning is critical.
* Automated Dosing/Fertigation Systems: Links sensors (EC/pH) to pumps/valves for automated mixing and delivery based on setpoints and schedules. Offers higher consistency. (e.g., Netafim NetaFlex 3G controller).
  + MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. Basic automation is MVP (timers), fully automated dosing systems (like NetaFlex) are likely linked to more advanced automation deferred post-MVP. Requires advanced controllers.
* Growing Mediums/Substrates: Bags/bulk (Soil, Coco Coir, Rockwool cubes/slabs e.g., RedRock 6x6x4 inch blocks, Hydroton, Peat Moss). Living Soil with microbial ecosystems.
  + Properties: Water retention, aeration, nutrient availability, pH, EC, bulk density, porosity, mineral content, organic matter. These affect root health and nutrient dynamics.
  + MVP Status / Estimated Game Version: MVP. Essential consumable for cultivation. UI/Inventory representation is MVP.
* Nutrient Containers: Bottles/Bags of base nutrients (N, P, K), macro- & micro-nutrients, additives (e.g., Athena brand).
  + Properties: NPK Ratio, specific concentrations. SDS information for handling/storage.
  + MVP Status / Estimated Game Version: MVP. Consumable, part of manual nutrient management. UI/Inventory representation is MVP. Nutrients can interact or have incompatibilities.

**Environmental Control Equipment**Purpose: Manage temperature, humidity, CO2, airflow, light cycles. Essential for optimizing plant growth and preventing issues.  
Variations: Size, Capacity, Efficiency, Control (Manual, Timed, Sensor-Controlled via simple or advanced/integrated controllers). Equipment projects a "radius of effect" or "cone of influence."  
Assets:

* HVAC Systems: Air Conditioners (Window, Split, Large Industrial Rooftop/Wall units), Heaters (Electric, Gas), Dehumidifiers, Humidifiers.
  + Properties: Sizing/Capacity (must match facility heat load), Efficiency (e.g., SEER, affects power/fuel use), Power/Fuel Requirement, Maintenance requirement.
  + MVP Status / Estimated Game Version: MVP. Basic HVAC for environmental control (temp, humidity) is a core MVP feature. Various types/capacities needed for different room sizes/needs. Unlocked via Environment skill tree nodes like "Basic Environmental Control".
* Fans: Circulation Fans (Clip, Standing, Wall, Large industrial floor/ceiling mounted), Exhaust Fans, Inline Duct Fans.
  + Properties: Airflow Rate (CFM, affects air exchange), Power Requirement, Control (manual, timed, sensor, speed controller).
  + MVP Status / Estimated Game Version: MVP. Essential for airflow management, part of MVP environmental control. Part of abstracted airflow physics, removes heat/humidity.
* Ducting: Flexible, Rigid (various diameters), Fittings.
  + Properties: Material (impacts cost, durability, efficiency), Sizing (impacts airflow, pressure drop).
  + MVP Status / Estimated Game Version: MVP. Needed for HVAC and exhaust systems. Part of detailed construction. Manual routing is MVP.
* CO2 Systems: CO2 Tanks (Visual assets), Regulators, Controllers, Generators (produce heat/moisture).
  + Functionality: Increases CO2 for enhanced photosynthesis (optimal 800-1500 ppm in flowering).
  + MVP Status / Estimated Game Version: MVP for basic CO2 management, though likely manual control initially. CO2 tanks are visual assets. Controllers for automation might be later MVP/Post-MVP depending on complexity level. Requires CO2 consumable.
* Grow Lights: Various types (HID - MH/HPS with Ballasts/Hoods, e.g., Double-Ended HPS; LED Panels - various wattages/spectrum, potentially adjustable, e.g., for propagation/mother rooms; Fluorescent - T5/CFL; LEC).
  + Properties: Wattage (affects intensity, heat output), Spectrum (Blue for veg, Red for flower, Full-spectrum), Light Output (PAR/PPFD, DLI), Fixture Efficiency, Heat Output (significant), Coverage Area. Reflective hoods/materials enhance efficiency.
  + MVP Status / Estimated Game Version: MVP. Essential cultivation equipment. Various types/tiers for progression. (Flora Farms uses LEDs for prop, HPS for veg/flower).
* Light Timers/Controllers: Mechanical, Digital. Can control multiple lamps.
  + Properties: Power Handling Capacity.
  + MVP Status / Estimated Game Version: MVP. Basic automation (light timers for photoperiod: 18-24h veg, 12/12h flower) is a core MVP feature. Sensor-controlled or advanced automation likely Late-Game MVP / Post-MVP.
* Thermostats, Humidistats, Environmental Controllers: Simple (on/off древ to Advanced/Integrated (multiple parameters, IF-THEN logic, setpoints/ranges).
  + MVP Status / Estimated Game Version: MVP. Basic automation (simple thermostat/humidistat) is a core MVP feature. More advanced or integrated controllers likely unlock later.
* Sensors:
  + Types: Environmental (Air Temp, RH, CO2, Light - PAR/PPFD), Leaf Surface Temp (for VPD), Root Zone/Substrate (Moisture - VWC%, EC, pH, Temperature e.g., Solus sensors). Advanced/Specialized (Inline Water sensors, Spore Traps - Post-MVP).
  + Tiers: Basic (manual check древ, Intermediate (networked, simple controllers), Advanced (accurate, multi-functional, e.g., Solus), Research-grade (calibration).
  + Properties: Accuracy/Precision (varies by tier, requires calibration), Power Requirement, Data Output (numerical, logs).
  + MVP Status / Estimated Game Version: MVP. Essential for real-time data dashboards and automated control. Player-placed sensors are core to data collection. Various tiers (basic manual vs. integrated automated like Solus).
* Air Filters: Intake filters, Carbon filters (for odor control). MERV-rated filters.
  + MVP Status / Estimated Game Version: Likely MVP. Essential for managing air quality and odor control. Part of ducting systems. Requires replacement/cleaning.

**Utility Systems & Equipment**Purpose: Deliver power and connect systems. Detailed, interconnected 3D routable networks with performance impacted by sizing/materials. Utility View/"X-Ray" mode for visualization.  
Variations: Scale, Capacity, Efficiency, Type (Standard, Industrial).  
Assets:

* Electrical Wiring: Various gauges (sizing impacts resistance, voltage drop, cost). Conductors (copper, aluminum), Insulators.
  + MVP Status / Estimated Game Version: MVP. Part of detailed construction, abstracted utility connections. Manual routing is MVP. Sizes/gauges impact performance. Adherence to safety standards.
* Circuit Breakers / Fuse Boxes / Panels: Essential for electrical system management, load balancing, overload protection. Rated capacity (Amps), not to be loaded beyond 80%.
  + MVP Status / Estimated Game Version: MVP.
* Generators (Diesel/Gas): Provides backup or primary power. CoGen systems possible.
  + Properties: Power Output (Watts), Fuel Efficiency, Ramp-up time, Heat generation. Tiers from basic (manual start) to advanced (auto transfer).
  + MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. Described as backup power systems. Needed for scaling operations or risk mitigation. Requires fuel.
* Battery Banks / UPS (Uninterruptible Power Supply): Short-term power buffer or main source.
  + Properties: Capacity (kWh), Charge/Discharge Rate.
  + MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. Described as short-term buffer. Aligns with advanced risk management.
* Main Power Grid Connection Point (Abstracted): Represents stable power draw from external utility. Capacity based on service contract/infrastructure.
  + MVP Status / Estimated Game Version: MVP. Represents the abstracted power draw. Metered cost. Risk of external disruption.
* Water Supply Connection Point (Abstracted - Tap, RO, Treated): Represents abstracted water source.
  + Types: Tap (can have contaminants), RO (requires Cal-Mag/pH management, e.g., HyperLogic RO System), Treated. Quality impacts plants.
  + MVP Status / Estimated Game Version: MVP. Metered cost. RO/Treated (like HyperLogic) may be later upgrades/essential for high quality.

**Pots, Containers, & Growing Surfaces**Purpose: Hold plants and growing medium.  
Variations: Size (affects root space, plant size), Material (Plastic, Fabric, Ceramic - affects cost, durability, aeration), Type (Standard Pot, Grow Bag, Tray, Slab).  
Assets:

* Pots: Various sizes (Small, Medium, Large).
  + MVP Status / Estimated Game Version: MVP. Essential cultivation equipment. Various sizes support plant lifecycle stages (transplanting).
* Fabric Grow Bags: Offers better aeration than plastic.
  + MVP Status / Estimated Game Version: MVP. As a variation of container type.
* Trays / Flats (Seedling, Propagation): Shallow containers for starting seeds/clones. Size choice influenced by space, labor, timing. (Flora Farms uses these for clones in rockwool).
  + MVP Status / Estimated Game Version: MVP. Used for starting seeds/clones.
* Rockwool Cubes / Slabs: Inert growing medium/container type, often for hydro/coco. (e.g., 1.5-inch cubes for cloning, 6x6x4 inch RedRock blocks for veg/flower).
  + MVP Status / Estimated Game Version: MVP. As a growing medium/container type. Specific sizes and brands like RedRock add detail.
* Hydroponic/Aeroponic Systems (Basic Ebb/Flow, DWC buckets, NFT, Aeroponics): Systems for growing without soil, requiring precise control of nutrient solution chemistry (pH, EC, DO, temp) and environmental parameters. Lacks natural buffering of soil. (Flora Farms uses rockwool on tables with drip irrigation, a form of hydroponics).
  + MVP Status / Estimated Game Version: Likely MVP for basic hydroponic options (Ebb/Flow, DWC buckets, simple drip on inert media). Supports different cultivation methods. More complex systems (e.g., aeroponic) might be later MVP/Post-MVP.
* Growing Benches / Tables (Flood tables, Wire racks, Rolling benches): Provide surfaces for organizing plants. Various types support different systems (e.g., flood tables for Ebb/Flow). (Flora Farms uses extensive benching/tables).
  + MVP Status / Estimated Game Version: MVP. Rolling benches for warehouse scale likely Late-Game MVP or Post-MVP.

**Pest & Disease Management**Purpose: Monitor, identify, and treat plant issues. Integrated with sanitation and environmental controls.  
Assets:

* Scouting Tools:
  + Sticky Traps: (Yellow, Blue - Cards, Rolls).
    - MVP Status / Estimated Game Version: MVP. For basic pest monitoring.
  + Handheld Magnifying Loupes:
    - MVP Status / Estimated Game Version: MVP. For close visual inspection/scouting.
  + Microscopes (Handheld, Benchtop): For detailed pest/pathogen/trichome inspection.
    - MVP Status / Estimated Game Version: MVP. Unlocked via Science skill tree.
* Application Tools:
  + Hand Spray Bottles, Pump Sprayers (Gal, Backpack):
    - MVP Status / Estimated Game Version: MVP. For manual treatment application (e.g., approved fungicides/pesticides/biologicals).
* (Simulated) Pesticides/Fungicides/Biologicals: Represented as Consumables. Biologicals need specific environmental conditions. (e.g., Virkon Dip for clone sanitation).
  + MVP Status / Estimated Game Version: MVP. Needed for manual treatment. UI/Inventory representation. Virkon Dip as a specific example of a sanitizing agent.
* In-game "Plant Problems Guide" UI/Asset: Essential tool for diagnostics, linking symptoms to causes/solutions.
  + MVP Status / Estimated Game Version: MVP.

**Harvesting & Processing Equipment**Purpose: Harvest, trim, dry, cure for final product quality. Workflow optimization and minimizing degradation are key.  
Variations: Size, Capacity, Automation (Manual to Automated Industrial), Material (Food-Grade).  
Assets:

* Harvesting Tools: Large Trimming Shears, HD Loppers, Hand Saw, Hedge Trimmers (potential pole extensions, various blade lengths). Collection Totes/Bins (Food-grade). Tarps. Sharp, sanitized tools essential.
  + MVP Status / Estimated Game Version: MVP. Needed for manual harvesting.
* Trimming Tools: Trim Scissors (Micro-tip, types e.g., Fiskars). Trim Bins/Trays (with kief screens to collect trichomes). Isopropyl Alcohol/Wipes (cleaning), Rags. Electrically operated, manually controlled hand trimming assist tools.
  + MVP Status / Estimated Game Version: MVP. Needed for manual trimming. Cleaning supplies for hygiene/quality.
* Bowl Trimmers (Manual, Electric): Semi-automated trimming, can be adjusted for aggressiveness (speed vs. quality).
  + MVP Status / Estimated Game Version: Likely Mid-Late MVP / Post-MVP. Provides some automation beyond hand trimming, likely unlocked via Harvest skill tree or equipment research.
* Automated Trimming Machines (Sizes/throughputs): Fully automated, adjustable aggressiveness, can trim wet or dry (e.g., Twister BatchOne shown at Flora Farms).
  + MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. High-tier equipment, part of Advanced Automation. Twister BatchOne is a good example.
* Drying Racks / Clotheslines & Hangers: Manual hanging/rack in dedicated, environmentally controlled space (temp, humidity, airflow crucial for quality and preventing issues like terpene loss or mold). (Flora Farms hangs whole plants for ~10 days).
  + MVP Status / Estimated Game Version: MVP. Needed for manual drying. Slow, controlled drying is key.
* Curing Containers (Jars, Buckets - Glass, Plastic, Food-grade bags e.g., 5lb Grove Bags or similar for large scale). For manual curing with "burping" in a stable cool, dark environment (target RH 58-62%). (Flora Farms uses large bags and totes with Cure Pucks).
  + MVP Status / Estimated Game Version: MVP. Needed for manual curing. Large bags are a good warehouse-scale option.
* Automated curing systems: (e.g., Cure Puck for monitoring and automated burping in totes/containers).
  + MVP Status / Estimated Game Version: Mid-Late MVP / Post-MVP. Cure Puck is a good example of semi-automation.
* Humidity Control Packs: (e.g., Boveda, Integra Boost 55% or 62% RH). For maintaining optimal humidity in curing/storage.
  + MVP Status / Estimated Game Version: MVP for consumables used in curing.
* Weighing & Measuring: Digital Pocket Scales (Precision), Digital Bench Scales (Larger capacity). Industrial (Platform, Floor scales).
  + Calibration Weights: Essential for ensuring accuracy.
  + MVP Status / Estimated Game Version: MVP. Essential for tracking yield, contract specs, inventory. Different scales for different needs. Requires calibration.
* Transporting Equipment: Baskets, hand-drawn garden carts, small motorized transport, portable conveyor belts for moving material, plants, tools.
  + MVP Status / Estimated Game Version: Likely Mid-Late MVP, relevant for larger scale.
* Cold Storage: Refrigerators, freezers for keeping harvested material cool, especially for fresh-frozen or high terpene retention.
  + MVP Status / Estimated Game Version: Likely Post-MVP, tied to specific processing paths.
* Extraction/Concentrate Equipment (Solventless Press, Basic Extraction System):
  + MVP Status / Estimated Game Version: Post-MVP. Explicitly listed as deferred. Requires specialized equipment and facilities.

**Facility Furniture & Fixtures**Purpose: Workspace, storage, safety, general utility, supporting cleanliness and professional aesthetics.  
Assets:

* Workbenches: (Sizes, materials).
* HD Shelving: (Metal, Wire). Stackable, wall-mounted options.
* Storage Cabinets: (Metal, Plastic, Lockable). Specialized for Chemicals/Flammables.
* Rolling Utility Carts.
* Seating: (Chairs, Stools, Folding Chairs).
  + MVP Status / Estimated Game Version: MVP. Provides functional storage and workspace. Supports the Cleanliness aesthetic.
* Sinks: Industrial Sink/Wash Basin (Stainless Steel). Faucet Fixtures.
  + MVP Status / Estimated Game Version: MVP. Essential for hygiene, cleaning tools/equipment. Part of the general utility.
* Safety: Eye Wash Station (Wall, Pedestal). Emergency Shower (Industrial). Fire Extinguishers. First Aid Kits.
  + MVP Status / Estimated Game Version: Likely MVP. Essential safety equipment.
* General: Wall Clocks. Trash Cans/Waste Bins (Industrial rolling, upgradable capacity). Recycling Bins. Mop & Bucket. Broom & Dustpan. Wet Floor Signs. Floor Mats/Anti-Fatigue. Lockers. (Googly eyes as a fun, hidden decorative item perhaps?)
  + MVP Status / Estimated Game Version: MVP. Provides visual detail, supports waste management, enhances aesthetics. Players transport waste to bins. Googly eyes as an easter egg decorative item.

**Map Specific Assets**Purpose: Define build environment, establish scale.  
Assets:

* Residential House: Standard residential elements (exterior, interior, doors/windows). Smaller scale assets (fixtures, utility connections). Base "shell". Pre-defined layout, potential for initial wear/tear.
  + MVP Status / Estimated Game Version: MVP. Initial map environment.
* Warehouse: Large open concrete structure (floor, walls, roof). Support pillars/beams. Industrial doors/windows. Base "shell" to build within. (Flora Farms shows multiple large warehouse-style buildings).
  + MVP Status / Estimated Game Version: MVP. Accessible after Residential map. Represents next scale. Video shows potential for large, multi-room build-outs within these shells.
* (Future: Greenhouse - glass/polycarbonate, vents, utilizes natural light, requires ventilation/temp control; Research Lab - sterile materials, lab benches for advanced techniques like Tissue Culture; Outdoor Field - landscape, fencing, subject to weather/pest risks; Vertical Farm - multi-tiered racking, high density, vertical logistics; Subterranean Lab; Abandoned Research Outpost; Geothermal Greenhouse Complex)
  + MVP Status / Estimated Game Version: Future (Post-MVP). Explicitly listed as potential future facility types.

**Decorative & "Cozy" Items**Purpose: Player customization, "Cozy" aesthetic.  
Assets: Posters, art, rugs, small furniture (chairs, tables), non-cannabis plants, decorative lighting, personal items (e.g., John Deere straw hat seen in video), paint/texture options (walls/floors - not changing core material properties in MVP). Googly Eyes (as seen humorously placed in Flora Farms).  
\* MVP Status / Estimated Game Version: MVP. Part of player expression. Unlockable items can deliver lore. John Deere hat as a fun, specific example. Googly eyes as an easter egg.

**Plant Assets (Core for Procedural System)**Purpose: Central visual output, dynamic GxE reflection (Phenotypic Plasticity).  
Strains mentioned by Flora Farms for potential inspiration/base models: Blood Orange Sorbet, GMO, Bubba Fett, Silver Ghost, Cobalt Fire.  
Key Requirements (Procedural System):

* Base 3D Models: HQ, detailed base meshes/textures for ~5-10 landrace-inspired foundational strains.
  + Variations (Morphology & Growth Stages):
    - Seedling (single leaflet progressing to 3, 5)
    - Vegetative (Early, Mid, Late - rapid growth, building root system, stems, foliage)
    - Flowering (Early, Mid, Late - inflorescence development, bud thickening)
    - Maturation (trichomes mature: clear to milky to amber)
    - Harvested (Whole plant, branches)  
      spezifisch Dried (Buds)
  + Botanical Features to Represent:
    - Plant Height (e.g., 0.2m to >3m, influenced by genetics, training, environment)
    - Stem Structure (erect, furrows, branching patterns, diameter)
    - Branching Pattern (apical dominant, lateral spread, sativa-lanky vs. indica-compact)
    - Leaf Morphology (compound, leaflet number 3-13+, shape - lanceolate etc., serrated margins, size - broad vs. slender, angle/droop indicating hydration)
    - Leaf Arrangement (opposite to alternate)
    - Bud/Flower Structure (shape - conical, spear, foxtail; density - airy vs. compact; leaf-to-calyx ratio)
    - Pistil Color (mature: orange-red, pink-purple, brown)
    - Trichome Density (low, medium, high - "frostiness")
    - Trichome Appearance (color transition: clear -> milky -> amber)
  + Potential: Root System Viz (medium, water, nutrient response). Root systems differ for seed vs. cloned plants. Root restriction impacts growth.
  + MVP Status / Estimated Game Version: MVP. Core to the cultivation simulation. Initial launch will have 5-10 foundational strains. Root System Viz is listed as Potential.
* Procedural Generation System (Software/Code Asset): Crucial system, AI-Assisted.
  + Inputs:
    - Abstracted Genetics Data (defining heritable traits from Section 2.2 of Parameter List e.g., yield potential, flowering time, chemotype - THC/CBD/CBG ratios, terpene profile, pest/disease resistance levels, etc.)
    - Environmental Parameters (light intensity/spectrum, temperature, humidity/VPD, CO2 levels, nutrient availability/deficiency/toxicity, water stress, etc.)
    - Cultivation Actions (pruning, training techniques like topping/LST, defoliation, lollipopping)
  + Algorithms: Generate plant structure, morphology, and visual characteristics based on inputs.
  + MVP Status / Estimated Game Version: MVP. Essential for dynamic GxE reflection and visual variability.
* Dynamic Shader/Material Effects (MIDs, MPCs): Real-time GxE visualization.
  + Effects: Coloration (nutrient deficiencies, temp/light stress), Turgidity/Wilting (hydration status), Growth & Development rates, Trichome Appearance (density, color), Stress/Problem Symptoms (visual pests/diseases, leaf burn from nutrient toxicity), Training/Pruning Effects.
  + MVP Status / Estimated Game Version: MVP. Crucial visual feedback. Directly tied to core MVP systems like Environmental Control, Nutrient Management, Plant Health, Basic Breeding.
* Performance Optimization: LODs, HISMs/ISMs (plant components), optimized shaders.
  + MVP Status / Estimated Game Version: MVP. Essential for performance with many plant instances. LODs are mandatory.

**Data Collection & Lab Equipment**Purpose: Collect plant/env data, simulate lab analysis (genetic/chemical profile).  
Variations: Tier (Handheld/Basic, Benchtop/Research, Industrial/Automated). Accuracy varies by tier, calibration is key.  
Assets:

* Handheld Meters (Visual): Portable tools for manual data acquisition in "Action Mode," data auto-logged.
  + Types: EC/PPM meter, pH meter, Temperature Probe (air, water, soil), Soil Moisture meter, Simulated Chlorophyll Content meter, PAR/PPFD meter, Infrared Thermometer (leaf surface temp), VPD Meter.
  + MVP Status / Estimated Game Version: MVP. Basic data collection tools. Unlocked via Science skill tree.
* Substrate Sensors: (e.g., Solus sensors shown in Flora Farms video) for continuous monitoring of VWC%, EC, Temperature in growing medium.
  + MVP Status / Estimated Game Version: Mid-Late MVP / Post-MVP. Advanced data collection, could tie into automated irrigation.
* Benchtop Meters/Analyzers (Visual): Lab-grade equipment for more accurate/detailed analysis. Requires sample preparation for some methods.
  + Types:
    - Lab-grade EC/pH meter.
    - Spectrophotometer (simulated use for basic analysis).
    - HPLC (High-Performance Liquid Chromatography) for cannabinoid quantification (THC, CBD, etc.).
    - GC-MS (Gas Chromatography-Mass Spectrometry) for terpene profiling, pesticide identification.
    - ICP (Inductively Coupled Plasma) assay for mineral content in tissue/substrate.
    - Elemental Analyzer for Total N/C.  
      знаменит NIR/MIR Spectroscopy for rapid, on-site detection/PAT.
  + Functionality: Simulated lab analysis for nutrient levels, cannabinoid/terpene profiles.
  + MVP Status / Estimated Game Version: Likely Mid-Late MVP / Post-MVP for advanced analyzers. Basic lab-grade EC/pH may be earlier. More advanced tools tied to higher tiers of data analysis or specific research unlocks (Quantitative Analysis skill node). Outsourcing analysis is also an option initially.
* Data Logging & Interface (Visual): Equipment representing systems for viewing and interacting with data.
  + Types: Laptop, Tablet, Desktop (Monitor, Keyboard, Mouse), Clipboard, Pens, Whiteboard.
  + Industrial: Server rack, large control displays.
  + Functionality: Interface for dashboards, logs, sensor/controller management, grow cycle comparison, lab analysis interface.
  + MVP Status / Estimated Game Version: MVP. Visual representation of UI/Data Viz. Laptops/Tablets/Desktops are the interface. Industrial versions likely later. Secure digital DB for data storage.
* Calibration Weights: For calibrating scales.
  + MVP Status / Estimated Game Version: MVP. Needed for calibration routine.
* Simulated Lab Analysis Interface (UI): Manages sample submission (simulated time/cost), views reports (cannabinoid/terpene profiles, tissue nutrient, water quality). Allows comparison.
  + MVP Status / Estimated Game Version: Mid-Late MVP / Post-MVP. Tied to Quantitative Analysis skill node.

**UI & Data Visualization Elements**Purpose: Present complex sim data for player decisions. CRITICAL gameplay "assets".  
Assets (UI Elements/Visuals):

* Environmental Data Dashboards/Overlays: Real-time sensor readouts (Temp, RH, VPD [calculated from Temp, RH, Leaf Temp], CO2, PAR/PPFD). Customizable presets. Environmental heat maps.
  + MVP Status / Estimated Game Version: MVP. Core to MVP Environmental Control.
* Graphs & Charts: Historical trends (Env, Nutrients, Growth stages, Water/Power/CO2 Consumption). Multi-variable plots.
  + MVP Status / Estimated Game Version: MVP. Essential for data analysis.
* Plant Health/Status Indicators: Icons/bars on models (Health, Water [Leaf Water Potential], Nutrient Status). Detail view UI for specific issues (deficiencies, pests, diseases).
  + MVP Status / Estimated Game Version: MVP. Critical feedback.
* Nutrient Management Interface: Mixing UI (visual tank, ingredients, steps). Readouts for nutrient solution (EC/PPM, pH, temp, DO). Nutrient composition details. Runoff/Substrate test results (EC, pH, VWC% - from manual or automated sensors like Solus).
  + MVP Status / Estimated Game Version: MVP. Essential for manual nutrient management. Integration with automated substrate sensors is Mid-Late MVP.
* Genetic Data Display: Strain Name, Lineage (Pedigree Charts), Key Traits (Yield Potential, Flowering Time, Cannabinoid Profile - THC/CBD/CBG ratios, Terpene Profile, Pest/Disease Resistance, Stress Tolerances, Morphological traits like height, branching - Sliders, Bars, Values). Punnett Squares (Simulated for Mendelian traits).
  + Abstracted Genetic Marker/Allele display (linked to traits via simplified MAS/GS).
  + MVP Status / Estimated Game Version: MVP for core observable traits, lineage, simple inheritance. Punnett Squares/Pedigree charts part of basic breeding. Genetic Marker/Allele display tied to "(Optional Late Game) Genetic Marker Assisted Selection" skill node, suggesting Late-Game MVP or Post-MVP.
* Simulated Lab Analysis Results: Cannabinoid/Terpene Profiles (charts, graphs, % lists from HPLC/GC-MS data), Simulated Tissue Nutrient Analysis (from ICP/Elemental Analyzer data), Simulated Water Quality Report.
  + MVP Status / Estimated Game Version: Likely Mid-Late MVP / Post-MVP. Tied to Quantitative Analysis skill node and Simulated Lab Analysis Interface. Profiles needed for NPC contract quality specs, suggesting basic analysis is MVP.
* Breeding Interface: Parent selection (based on desired traits, phenotypic/genotypic data), Crossing UI (manual pollination), Pheno-Hunting tools (growing populations to identify desirable individuals). Tracking generations (P, F1, F2).
  + MVP Status / Estimated Game Version: MVP. Essential for basic breeding loop.
* Facility Management Overlays: Utility View ("X-Ray" for pipe/duct/wire networks, flow/pressure indicators). Zoning UI (designating areas by function). Resource inventory/consumption (Water, Power, CO2, Nutrients, Building Materials, Seeds/Clones).
  + MVP Status / Estimated Game Version: MVP. Utility View crucial for MVP. Resource inventory UI is MVP.
* Operational & Financial Data: Budget, Costs (material, utility, labor, analysis), Revenue, Profit/Loss. Ledger for income/expenses.
  + MVP Status / Estimated Game Version: MVP. Essential for core economy.
* Alerts & Notifications: Visual/audio cues (Env out-of-range, Pest, Disease like Root Rot, Equipment failure, Low consumables). Tiered alerts.
  + MVP Status / Estimated Game Version: MVP. Critical for player feedback.
* Historical Logs & Notes Interface: Player observations and auto event logging (environmental shifts, cultivation actions, pest sightings, alerts).
  + MVP Status / Estimated Game Version: MVP.
* Tutorial/Info Overlays: Explaining concepts (VPD, GxE, deficiencies, equipment operation, scientific principles).
  + MVP Status / Estimated Game Version: MVP. Essential for onboarding.

**Advanced Breeding & Lab Equipment**Purpose: Support high-tier breeding (Tissue Culture, Genetic Modification), genetic research, pathogen eradication. Requires specialized lab spaces/Research Lab facility type.  
Variations: Tier (Research, Production).  
Assets:

* Tissue Culture Station: For sterile micropropagation, pathogen eradication (HLVd from meristems), genetic preservation, rapid cloning. Requires meticulous sterile technique, media prep, PGR understanding. Success influenced by genotype, protocol, skill.
  + Components: Sterile Work Area/Hood (Laminar Flow), Autoclave, Incubator, Microscope (Dissecting), Racks for Culture Vessels, Culture Vessels, pH meter, analytical balance, glassware, sterilizable tools (scalpels, forceps), Bunsen burner/bead sterilizer, refrigerators/freezers.
  + Consumables: Specialized media (pH 5.7-5.8), PGRs, sterile consumables, agar, hormones, cryoprotectants, enzymes.
  + Challenges: Contamination, Somaclonal variation, Acclimatization failure, Genotype specificity, Vitrification/Hyperhydricity (due to media imbalance, old/unvented vessels).
  + MVP Status / Estimated Game Version: Likely Post-MVP. Part of "Advanced Propagation (Tissue Culture & Micropropagation)" skill node.
* Lab Furniture: Specialized Benches (Stainless/Chemical Resistant), Storage Cabinets (Chemical/Flammable), Lab Sinks.
  + MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. Supports advanced research/breeding equipment. Research Lab facility is Future (Post-MVP).
* Cryopreservation Unit (Visual): For long-term genetic archiving using LN₂.
  + Components: Freezers, LN₂ tanks, straws/vials.
  + MVP Status / Estimated Game Version: Likely Post-MVP. Very high-tier/specialized, linked to deferred "Advanced Genetics".
* Advanced Genetic Modification Equipment (CRISPR-like System - Visual): For direct, high-risk/high-reward genetic manipulation (e.g., targeting THCAS, CsTPS genes). Requires specialized lab, expertise, and significant research.
  + Components: Electroporator/Gene Gun.
  + Challenges: Off-target effects, regeneration from transformed tissue.
  + MVP Status / Estimated Game Version: Post-MVP. Potential future expansion.
* Bioinformatics Tools/Software (UI/Abstracted System): For analyzing sequencing data (QC, alignment, variant calling), GWAS, Genomic Selection, marker identification, pangenome analysis, functional annotation.
  + Examples (Conceptual): Abstracted versions of GATK, PLINK, R packages (rrBLUP), TASSEL.
  + Data Inputs: High-density genotyping data (GBS, WGS), phenotype data, environmental data.
  + MVP Status / Estimated Game Version: Likely Late-Game MVP / Post-MVP. Tied to advanced genetic analysis and breeding programs. Requires significant data and computational resources (abstracted).

**Consumable Resources (Abstract/UI Representation)**Purpose: Track/manage consumed resources (UI/Inventory). May have visual models for bulk storage (pallets, tanks). Metered costs and consumption dashboards.  
Assets (UI Icons, bulk storage models/containers possible):

* Water: Supply (Tap, RO e.g. from HyperLogic system, Treated). Storage (Tanks, Reservoirs).
  + Quality varies, impacting plants; may require filtration/disinfection.
  + MVP Status / Estimated Game Version: MVP. Consumable resource. UI representation is MVP. RO water essential for consistent results at scale.
* Power: Supply (Grid, Generator Fuel, Battery Charge). Consumption meter.
  + MVP Status / Estimated Game Version: MVP. Abstracted utility cost/resource. UI representation (consumption meter) is MVP. Generator Fuel/Battery Charge are linked to respective equipment (Late-Game MVP / Post-MVP).
* Nutrients: Packaged Fertilizers (various NPK ratios, macro/micro elements, e.g., Athena brand), Mixed Solution (Reservoir).
  + MVP Status / Estimated Game Version: MVP. Consumable resource. UI/Inventory representation is MVP.
* CO2: CO2 Tanks (Visual), CO2 Gas (UI from tanks or generators).
  + MVP Status / Estimated Game Version: MVP. Consumable resource for CO2 systems. Visual tanks and UI representation are MVP.
* Building Materials: Walls, Floors, Pipes, Wires, Ducting (UI, pallet/stack models possible).
  + MVP Status / Estimated Game Version: MVP. Consumable resource, needed for construction. UI representation is MVP.
* Seeds/Clones: Strain-specific Seeds (Visual), Clones (Propagation from mother plants e.g., in rockwool cubes).
  + Acquisition via vendors, events, or in-house cloning. (Flora Farms does extensive in-house cloning).
  + MVP Status / Estimated Game Version: MVP. Essential consumables for cultivation. Visual representation and UI inventory are MVP. Acquisition costs are MVP.
* Sanitation Supplies: (e.g., Virkon Dip, Isopropyl Alcohol). For cleaning tools and propagation.
  + MVP Status / Estimated Game Version: MVP. Essential for IPM and quality.
* Finances: In-game Currency (UI). Ledger for income/expenses.
  + MVP Status / Estimated Game Version: MVP. Core to the economy system. UI representation is MVP.

--- END OF ENHANCED Asset List 1.5 ---