HOW DOES CERES APPLY PRINCIPLES OF QBD?

CERES GREENHOUSE SOLUTIONS®

BUILDING MATERIALS

We use the highest quality materials constructed to withstand local year-round climates.

WORKFLOW

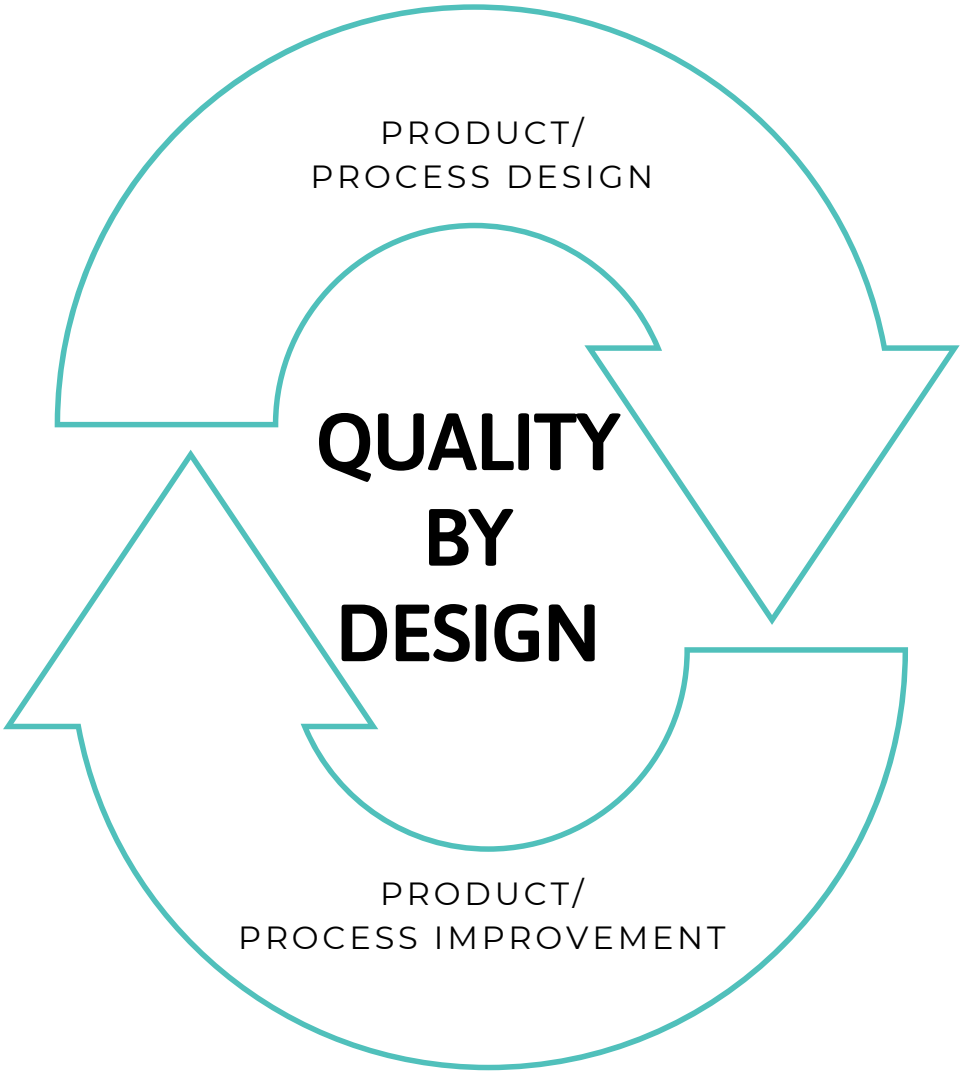
Greenhouse layout is designed to account for directional movement of plants and people, while simultaneously engineered for the flow of air and water.

DATA ANALYSIS

Controls are integrated for balancing and exact manipulation of CO_2, VPD, soil temperature, light levels, temperature and humidity, air quality, nutrient levels, etc.

SYSTEMS SELECTION & INTEGRATION

Grow systems are carefully selected for built-in quality, ease of integration, and client need.



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WHAT IS QBD?

Quality by Design (QbD) is a design approach with a focus on building quality into the original product. A product can be defined as a good, service, information, or an internal process.

CERES & QBD

Beyond just the greenhouse structure, we provide a complete grow solution, working with our partners to supply and integrate all necessary equipment. We also do all Mechanical, Electrical, and Plumbing engineering, ensuring that the facility functions as a single unit (as opposed to many individual parts).

ADVANTAGES OF USING QBD

- Product Consistency
- Risk Management / Minimal Crop Failure
- Effective Control of Change
- Return on Investment / Cost Savings
- Supports Good Manufacturing Practices Principles

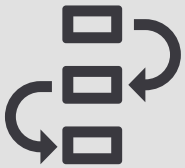
QBD DESIGN CONSIDERATIONS:

- Biosecurity
- Workflow
- Environmental consistency
- Measurability
- Manufacturing efficiency

As a turnkey solution to optimal grow-environments, we have adapted the guidelines of QbD to our design process. We believe building a better product, service, or system starts with defining the appropriate goals and carries through to the delivery of the end product. Every step of our process is thoughtfully designed for maximum quality and client satisfaction.

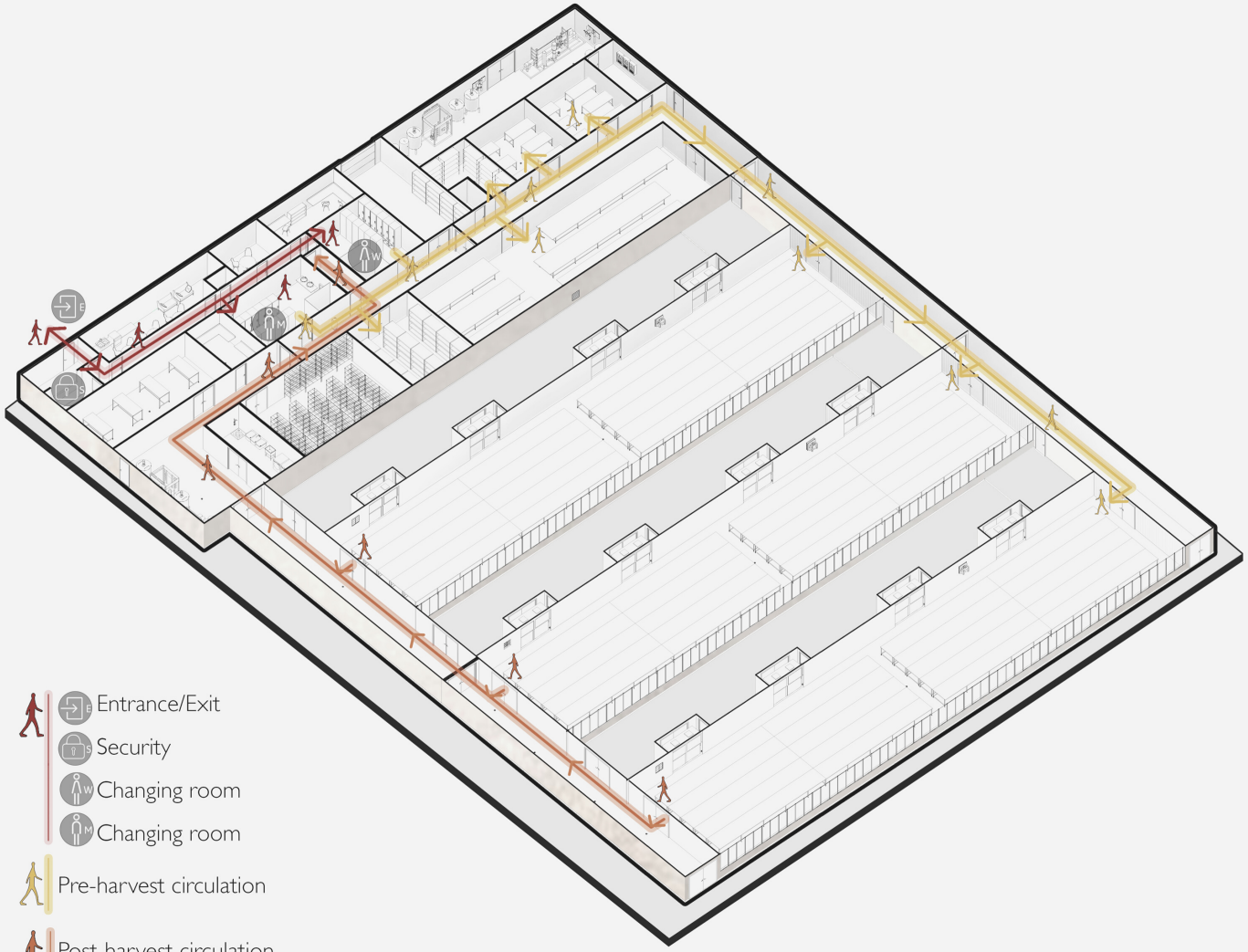
WHAT IS "WORKFLOW"?

Directional flow through the greenhouse



WORKFLOW: PEOPLE FLOW

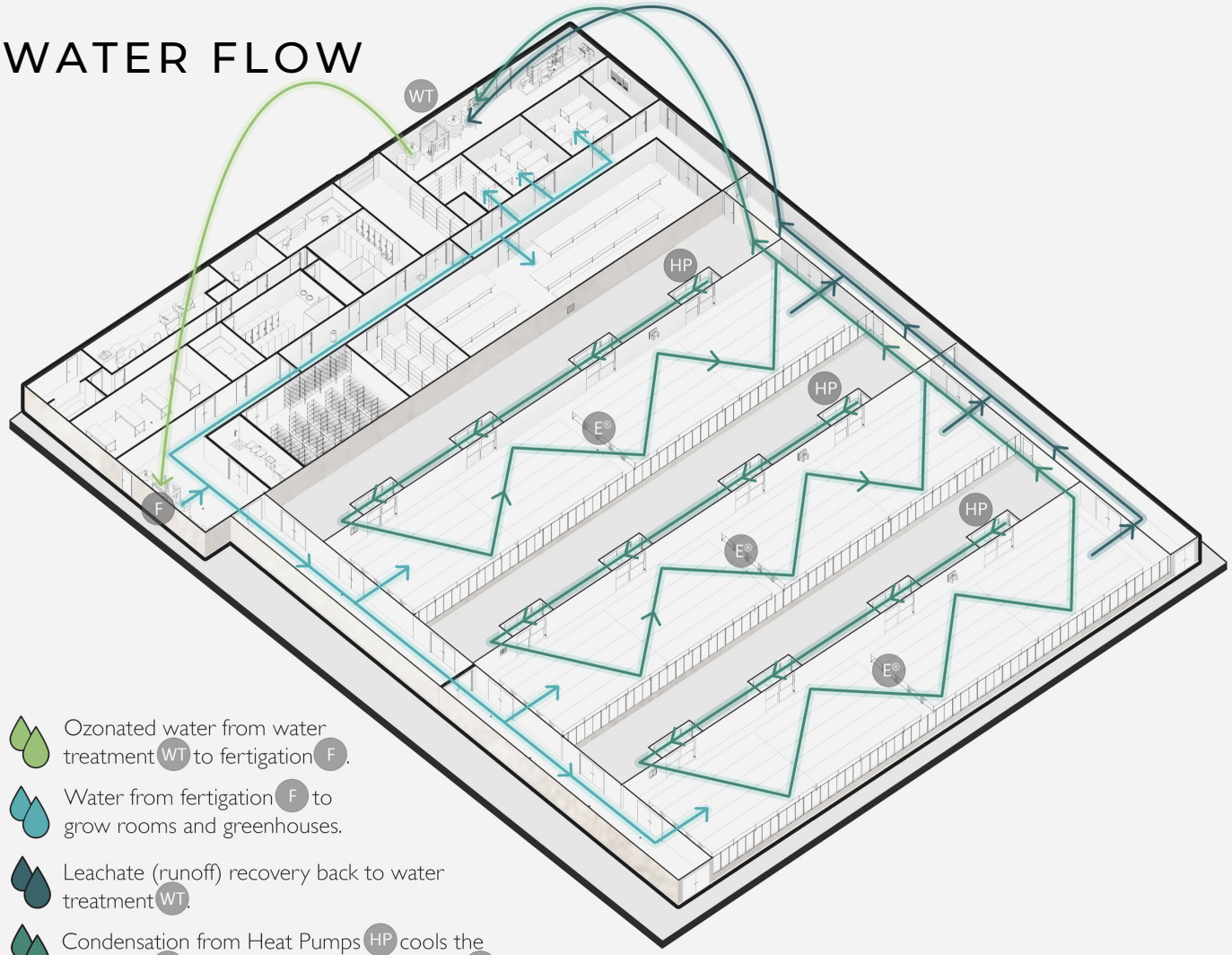
Entering from the main entrance one may either move directly to an office or conference room, or if heading to a grow room one must enter the changing room/bathroom.



Here, one will change clothes (i.e. uniform, hairnet, footnet, beard-net) according to particular facility requirements. Once changed, one may enter the first grow hallway of the headhouse. From here, one will have access to mother rooms, clone room, veg rooms and greenhouses (from the east side). People flow in the same direction as the plants, that way if there is a pathogen in a flowering greenhouse it can not travel back to the mothers, clones, or veg. The entrance to each greenhouses is located on the east side of the greenhouse. This is the pre harvest circulation. Exits are located on the west side, as dictated by post harvest circulation. Exiting through the west corridor one may access the curing and trimming rooms. Exits from these rooms lead one back through the bathrooms to either exit the facility or re enter again after another cleaning and changing.

WORKFLOW: WATER FLOW

Upon first commissioning the greenhouse, the water tanks will be filled from the specified source (well or municipal). From the tank the water moves into ozone treatment (or another requested filtration), which contains a filter to remove solid particles before the ozone kills all biological elements from the water. Treated water is available in holding tanks. Next, the fertigation system mixes the precise recipe and once ready sends it off to the plants in a particular room or greenhouse. If there is any effluent (leachate) or runoff from the watering process then it is recaptured and pumped back to the headhouse. As the plants transpire in the grow rooms dehumidifiers are used, capturing up to 90% of the recovered transpired water. This dehumidified water is very cold and very pure. *In Ecoloop® applications the cold water is pumped from the dehumidifiers (heat pumps) through the soil to cool the soil, which assists the Ecolop® with cooling (increasing efficiency by allowing the heat pumps to work less).



Ozonated water from water treatment WT to fertigation F.

Water from fertigation F to grow rooms and greenhouses.

Leachate (runoff) recovery back to water treatment WT.

Condensation from Heat Pumps HP cools the Ecoloop® E® on the way back to treatment WT.

From the dehumidifiers (or the soil under the greenhouse if using an Ecoloop®) the water is pumped back to the headhouse. All recaptured water is run through the ozone water treatment again to clean it of biologicals. Because the nutrients are not stripped out of the water less nutrients are needed in the fertigation system.

WORKFLOW: PLANT FLOW

Starting with Mothers, cut clones move into the cloning room, which has a fogging system in order to keep humidification levels balanced for rooting plants. Once the clones are rooted they are moved to the veg room. When the plants are large enough for the greenhouse they move down the east hallway. The veg room plants exit the east side directly into the clean greenhouse supply corridor. When the flowers are mature in approx 8 weeks, plants are harvested and exit the greenhouse on the west side through the post harvest corridor. They are hung in the dry/cure room for around a week, at which point they are taken to the trim room for processing into sellable flower. From there they move into secure storage. The plants move in only one direction (the same as the people), for general efficiency.

Directional flow further reduces the likelihood that pests and pathogens will not infect what is directionally behind them, making potential outbreaks more manageable.