



# Stantec – Supporting CEA Operators to Optimize Capital and Operating and Maintenance Costs

**Controlled Environmental Agriculture (CEA) is a technology-based approach to food production that leverages exterior growing structures and indoor systems. These systems range from simple hoop houses to high-tech greenhouses and indoor vertical farms. Growing technologies include hydroponics, aeroponics, aquaponics, and aquaculture.**

Stantec provides all the engineering and architectural skills necessary to make your project a success. For optimum efficiency, reliability, and sustainability in your facility, our engineers have the skills to find solutions to your challenges, from generating layouts that optimize productivity to finding ways to reduce product loss.

Our specialists, including safety engineers, design and improve electrical control systems and power distribution and tackle equipment specifications, instrumentation, programming, component procurement, and vendor-independent control systems.

Using innovation and solid design experience, our process engineers can lead the discussion on utility, steam, and energy issues at the earliest stage. Together, we'll arrive at solutions that conserve or reuse energy, capital, and resources for maximum farm efficiency.

## Our Services

- Water Resources planning and management.
- Irrigation system planning, design, and optimization.
- Farming operations planning and optimization.
- Management and technology consulting.
- Automation and control engineering services.
- Permitting.
- Renewable energy design services.
- GHG services (carbon accounting and management including development of natural capital enhancements).
- ESG advisory services.
- Chemical hazard evaluation and risk assessments.
- General building planning and design.
- Controlled Environment Agriculture (CEA) facility design.
- Aquaculture facility design.
- Safety audits and design services.
- Water and wastewater treatment design services.

# Our Experience

## Enterra Feed Corporation Industrial Insect Protein Production Facility

Enterra, a company focused on delivering sustainable protein for animal feed, wanted to scale up and reconfigure their operations into a 180,000 sf warehouse shell.

Stantec developed the process layout, detailed building design and utility services required for a +40-fold increase in production capacity. The new facility produced insect protein, meal and oil and was eligible to be classified as a food manufacturing facility under CFIA/USDA status.

Stantec developed process flow diagrams (PFD), process and instrumentation diagrams (P&ID), and dynamic modelling of the dual overhead materials and product handling systems. Varying room conditions were also required to accommodate different insect incubation, rearing and processing.

Blast mitigation measures were incorporated to address classified areas in processing and receiving areas. We also contributed to capital costing exercises to confirm budget compliance and performed construction administration services throughout the project.

## Mainstream Aquaculture Facility

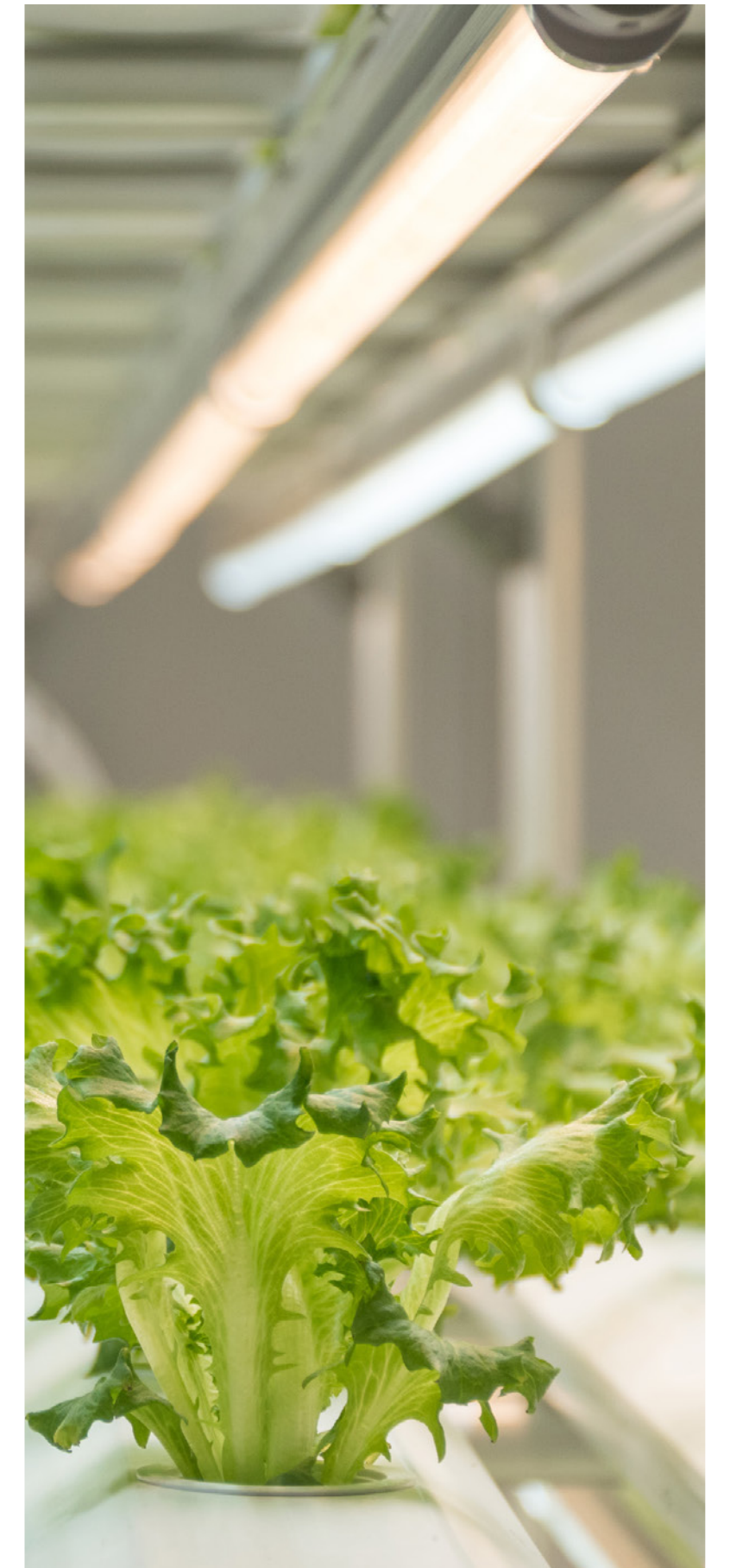
The client required a fully automated harvesting process for their Recirculating Aquaculture System for fish farming on a greenfield site. Working closely with the client to understand their specific needs, we provided the full suite of services from our Buildings group to deliver all aspects of the integrated engineering design.

Our civil and structural teams coordinated the works associated with eight x 600 m<sup>3</sup> tanks, pumping sumps and gravity return channels, and the design accommodated the spatial and services needs of the client's specific equipment. Comprehensive power and lighting systems included backup power generation to support system resilience for 24/7 reliability, and PLC process control systems enable efficient and automated functionality of the facility. We designed the 3,500 l/s system water circulation system, process ventilation and heat injection systems, and integrated the bulk oxygen system with the new oxygenation systems.

## Vertical Farming Basis of Design Document

A confidential global vertical farming entity engaged Stantec to develop a Basis of Design (BOD) Booklet to assist in their market expansion in North America. The Specification type document forms the foundation for future project delivery by assisting the design team in identifying key aspects of the facility, primary use adjacencies, and integration of the client's templated drawings and equipment standards into the site-specific facility.

Our team utilized a collaborative design charrette style approach to perform an analysis of the client's existing drawings, which allowed us to define the goal and function of the BOD upon completion to best support the client's objectives and ensure that site-specific solutions are fully compliant with applicable building standards and codes. Stantec's integrated design team was responsible for the architecture, building engineering, fire protection, and IT/AV/Security design.





## Educational Science Building, Greenhouse

This plant sciences facility houses a comprehensive suite of climate-controlled growth chambers and state-of-the-art greenhouse space suitable for research investigations. The space includes seed storage, seed collection area, dry plant storage, a clean room for tissue culture, clean spaces for microscopy/crossing, dedicated space for autoclaving, waste disposal, potting, soil and chemical storage, and office spaces for computerized monitoring of plant lab spaces.

Exterior vertical walls consist of light-diffusing, low iron, tempered insulated glass units. The roof is a single layer of light-diffusing, low iron, tempered laminated glass. The climate within the greenhouse compartments is controlled individually by the greenhouse computer control system. The integrated inputs are the zone temperature and humidity, the outside ambient temperature, humidity, light levels, soil temperature, hot water heating supply temperature, vent position, trend of temperature, and presence of wind and rain.

## GoodLeaf Vertical Farm in Saint-Bruno

With just over 96,000 square feet, and over a million cubic feet of growing space, GoodLeaf's second indoor vertical farm uses innovative technology to grow two million pounds of fresh produce annually, operating no matter the season.

Stantec's electrical team designed the electrical systems required to sustain the farm, including the medium to low voltage distribution systems, motor controls and variable frequency drives, process equipment power connections, interior and exterior lighting with controls, fire alarm and building safety systems, centralized battery-powered emergency lighting, harmonic mitigation, and telecom and security access controls. The building was also designed to be expandable to eventually double the square footage of the farm.

Stantec's electrical team also collaborated with GoodLeaf in the design and construction of its third vertical farm located in Calgary, Alberta.



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