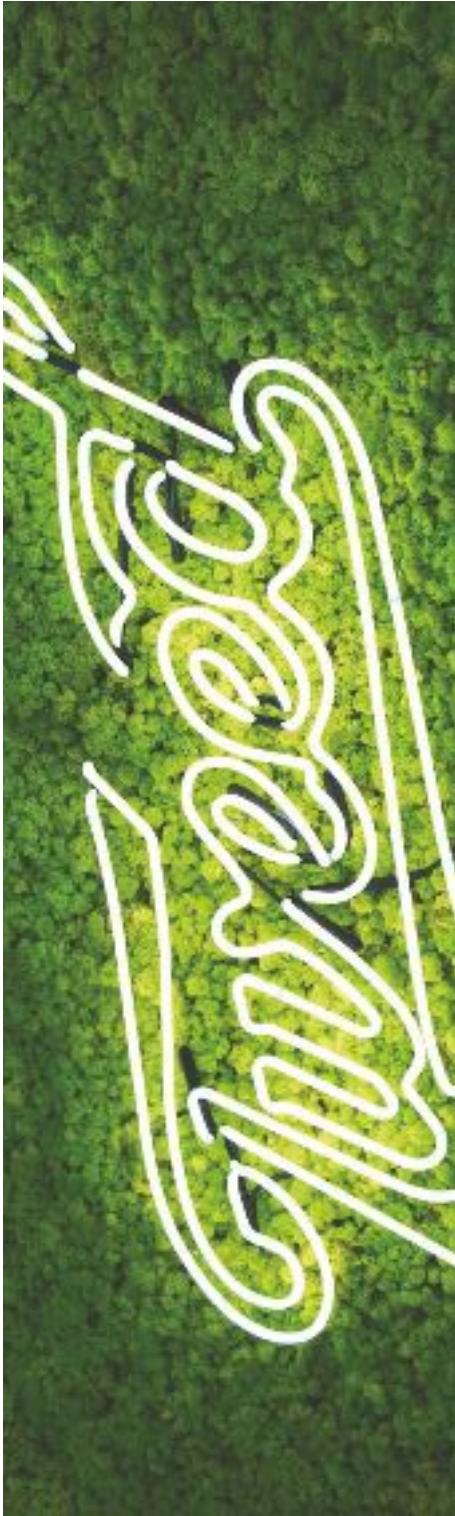




CCE Awards Phase 3

Canopy Growth Corp. | Tweed Facility Project





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A. INTRODUCTION

Project:	Tweed Cannabis Research, Development, and Manufacturing Facility	Construction Cost:	\$200M
Client & Owner:	Canopy Growth Corporation	Start Date:	2015
Prime Consultant:	J.L. Richards & Associates Limited	Completion Date:	2018

In 2014, Canopy Growth Corporation was an emerging leader in the field of medicinal marijuana research, development, and manufacturing. By 2015, in response to Government of Canada initiatives to improve access to medicinal marijuana and anticipated market demand for Canadian-produced recreational cannabis products, the company purchased an abandoned chocolate factory in Smiths Falls, Ontario with the goal of transforming the deserted complex into a state-of-the-art cannabis research and production hub.

It was at this time that J.L. Richards & Associates Limited (JLR) partnered with Canopy Growth Corporation (CGC), providing multidisciplinary engineering support to transform the derelict factory into a 900,000 ft² cannabis research, development, and manufacturing facility on an ultra-fast-track timeline. JLR delivered Health Canada approved, innovative facility and mechanical process designs that optimized indoor growth production, expanded post-harvest capacity, and facilitated the development of new cannabis products. This infrastructure allowed Canopy Growth Corporation to solidify its reputation as an innovator in the field, equipped with the facility and processes to support this evolving and high-demand market.

B. A PROJECT UNLIKE ANY OTHER

Today, CGC is internationally recognized as a leader in the cannabis industry and the engineering innovation housed within its Tweed facility is widely renowned. In order to fully grasp the depth of this project's success, however, it is important to understand the factors that lead to its origin.

The State of Smiths Falls

Smiths Falls, Ontario is a community of approximately 9,000 residents located less than an hour southwest of Ottawa. For many years, the local economy of this small town had been supported by a variety of major manufacturing operations. The most notable of these was the extensive Hershey chocolate factory complex, which employed 400 individuals at the height of its operations and had a significant impact on the local tourism industry.

In 2008, the Hershey factory in Smiths Falls officially closed. This was followed by the closure of several other large manufacturing outfits and major employers in the area. The community was economically ravaged by these events, experiencing a loss of approximately 1,500 jobs and a significant downturn in local tourism by 2014.

An Innovative Owner

It was in this local economic climate that this project first originated. In 2014, CGC was a budding medicinal marijuana manufacturing company in Smiths Falls searching for the right space to house its growing operation. The company purchased the abandoned Hershey chocolate factory and set its sights on converting the abandoned complex into a state-of-the-art, Health Canada approved medicinal cannabis research, development, and manufacturing facility. In addition, CGC identified the need for this facility to be adaptable and have capacity to expand into diverse areas of recreational marijuana product manufacturing in the event of legalization. In order to execute this extensive renovation and process engineering project, CGC retained JLR as Prime Consultant in 2015.



Major Mandates

CGC's core goal in this project was to successfully and economically retrofit this former chocolate factory. However, in the early stages of JLR's involvement in this project, several additional project mandates were identified. It was important to the client that the design team consider and address specific concerns related to facility security, sanitation, staff wellness, branding and aesthetics, energy efficiency, space planning, facility adaptability, and crop health. Finally, due to unprecedented demand for cannabis research and affordable access to medicinal marijuana products, it was necessary that JLR complete this project within strict budgetary constraints and on an extremely tight timeline.

Extensive Scope

As Prime Consultant, JLR provided structural, civil, electrical, and mechanical engineering services for this facility renovation, as well as architectural design, land use and space planning, and project management support. In addition to work completed on the facility itself, JLR provided innovative mechanical process engineering services, guiding CGC in the development of its manufacturing process planning. JLR supplied pioneering new strategies and designs that now form the basis of CGC's proprietary indoor cannabis production, harvesting, and processing methods.

Collaborative Company Advantage

CGC partnered with JLR on the development of its Smiths Falls facility because, as a multidisciplinary engineering, architecture, planning, and project management firm, JLR had the resources in-house to support this project from conception to completion. In addition, the JLR team has built a reputation for successful collaboration on large-scale, long-term projects—a company trait that worked to CGC's advantage on this project.





C. IMPORTANT INNOVATIONS

At the outset of this project, the growth and production of cannabis was illegal for recreational purposes in Canada and marijuana was still at an early stage as an approved medicinal product. This meant that developing this facility and the process engineering infrastructure within it was an unparalleled opportunity for engineering innovation for both CGC and JLR.

Innovative Project Delivery

As a collaborative company by nature, JLR saw the advantage of adopting a cooperative approach early on in this project. The firm proposed adopting an Integrated Project Delivery (IPD) process. This innovative methodology allowed the design team to coordinate directly with the construction manager, contractors, and owners simultaneously. The adoption of the IPD method not only ensured JLR could liaise with all stakeholders at once and understand each of their perspectives fully, it also allowed the team to expedite the design and construction process and remain on schedule and within budget, even as the project schedule accelerated.

Adapting Experience

The cannabis industry was still in its infancy when this project first began. As a result, very few standards and guidelines existed for facilities of this kind. The design team simply did not have the industry resources available to consult. What the team did have, however, was experience in other diverse sectors and an innovative attitude. By thinking outside the box, JLR was able to draw upon its experience with large-scale retrofits, agriculture, industrial manufacturing, healthcare projects, research and analytical laboratories, clean rooms, and administrative facilities, using this knowledge to develop logical, constructible designs that met CGC's diverse needs.

Revolutionary Room Design

JLR worked closely with CGC to develop never-before-seen room designs for each stage of the cannabis growth and preparation process. These include customized potting rooms, mother plant rooms, vegetative plant rooms, flowering rooms, trimming rooms, drying rooms, packaging rooms, and storage rooms.

In addition to purpose-built room designs and unique processing equipment, each of these spaces required highly customized mechanical and instrumentation systems that afforded the client complete control over temperature, lighting, air quality, and humidity.

Aesthetic Advantage

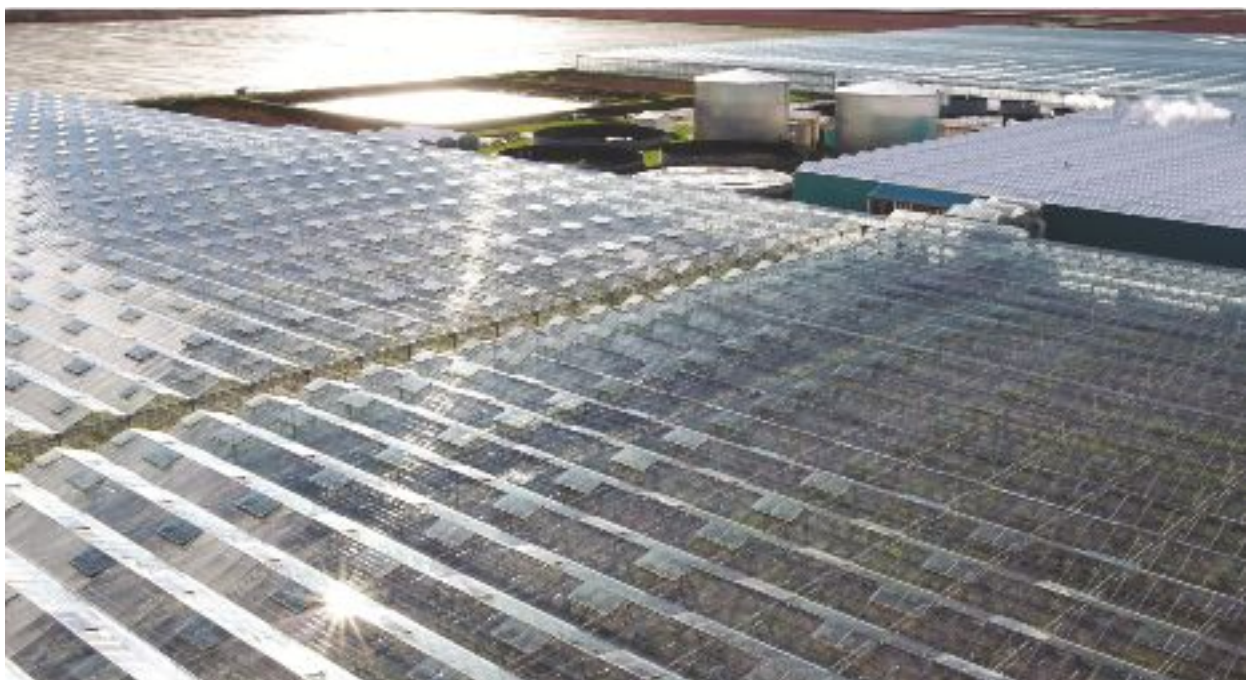
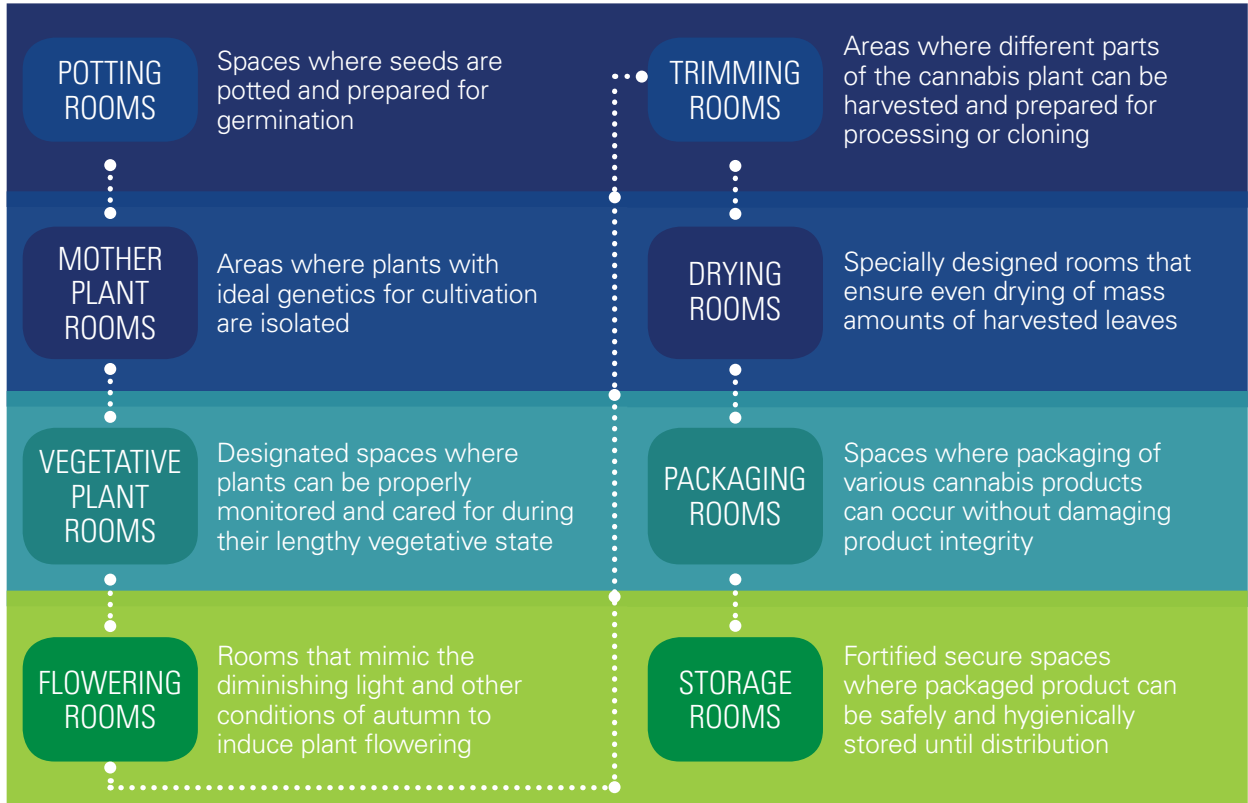
After sitting vacant for four years, CGC's Tweed facility was in need of significant aesthetic changes, in addition to renovation and retrofitting to enhance efficiency and modernize existing systems. By selecting a new, high-performance building envelope and stylized industrial finishes, JLR was able to create spaces that better reflected the CGC brand while also extending the life of the facility.

Modernized Manufacturing

Throughout this project, JLR worked closely with CGC to engineer entirely new cannabis processing methods, designing many industry firsts. CGC now has a visually stunning facility that is equipped with the tools and purpose-built spaces needed for cannabis roasting, oil extraction, encapsulation, edible research, product analysis, and safe material destruction. The facility designs and mechanical process engineering developed for this project form the backbone of CGC's growth and manufacturing capabilities.



C. IMPORTANT INNOVATIONS *CON'T*





D. THE COMPLEXITY OF CANNABIS

There were several challenges that affected this project and required a measure of ingenuity on the part of our team to overcome effectively.

Ensuring Security

Due to the status of cannabis as a controlled substance, it was imperative to ensure that all growth, production, and research areas within this facility were highly secure. Administrative spaces also needed to be well secured as these areas housed confidential data related to medicinal clients. Finally, it was in the best interest of CGC to ensure the confidentiality of the advanced proprietary processing methods that were developed as part of this project. To address these challenges, JLR incorporated enhanced security infrastructure and secure building elements at key junctures throughout the facility.

Enhanced Sanitation

While dedicated manufacturing spaces were already present in the existing facility, these areas had not been constructed to the standards of a Health Canada approved pharmaceutical production operation. Exposed ductwork and outdated mechanical and electrical infrastructure posed a risk to the cleanliness and sanitation of growth and processing areas. JLR addressed this challenge by replacing this equipment with new, high-performance alternatives, which were installed in covered areas to eliminate any risk of contamination.

Medicinal Market Needs

In order to grow and process cannabis for medicinal applications, the facility was required to adhere stringently to Health Canada standards for security, sanitation, and processing methodology that were still being refined as the project progressed. This required JLR to take steps to ensure our complete understanding of established standards, and to keep the entire design team informed about developing policy in anticipation of new requirements.

In addition to meeting Health Canada requirements, the facility was required to comply with federal Good Manufacturing Practices for drug products. By working closely with CGC and conducting extensive research prior to embarking on preliminary design, our team was able to ensure compliance with these regulations without affecting the project's tight timeline.

Ready for Recreation

Though cannabis legalization was not assured when this project first took shape, CGC knew that it was a likely possibility. The company needed its Tweed facility to be equipped with adaptable spaces that could be quickly repurposed to meet recreational demand if and when legalization occurred. JLR supported CGC in staying ahead of market trends by designing flexible growth, research, and manufacturing areas that could be quickly used to expand production and processing capacity when needed.

Developing Research

As a forward-thinking company with a vested interest in new avenues for marijuana manufacturing, CGC needed this facility to be well-equipped to pursue diverse research streams related to potential future products. While this presented an additional challenge, JLR was able to rely on CGC's understanding of developing market trends to provide designs for experimental processes, testing areas, and laboratories that could be used to explore new cannabis products for both medicinal and recreational markets.

Cantankerous Cannabis

An additional challenge that affected this project was the nature of cannabis as a famously fickle plant. It is extremely challenging for industrial scale cannabis manufacturers to not only consistently produce high yields from these volatile plants, but also produce yields that are consistent in quality. Temperature, light levels, light timing, air quality, soil moisture, and humidity are all factors that can profoundly influence plant development. In order to ensure CGC's cultivation teams had the control needed to adjust these factors as needed, we provided mechanical systems and building features that were supported by carefully designed redundancies and highly customized controls systems.



E. SOCIAL AND ECONOMIC IMPACT

In a very short time, the social and economic impacts of this project have proven to be profound.

Caring for the Community

Taking over Hershey's former space, this facility has proven instrumental to revitalizing the social and economic development of the community. It has generated over 800 jobs, a significant number of which are in key fields that many local residents already had ample training in, namely manufacturing and customer service. This project has had such a profound impact on the local community that Smiths Falls has been dubbed "the little town that marijuana saved."

Putting Staff Wellness First

The renovations made to this facility as part of this project have resulted in improved conditions for CGC staff working within the Tweed facility. Strengthened security, additional sanitary measures, and updates to the mechanical and electrical systems, building envelope, layout, lighting, and building programming have contributed significantly to the development of a work environment that puts staff wellness first.

Enhancing Access to Medicinal Marijuana

The quality of this facility has helped to establish CGC as an international leader in the cannabis industry. By pioneering new manufacturing and processing methods, this project has ensured that Canadians who rely on medicinal cannabis to ensure their continued health and wellness have consistent access to the pharmaceutical cannabis products they need.





F. ENVIRONMENTAL ADVANTAGE

As an indoor agricultural and manufacturing complex, CGC's Tweed facility was at risk of becoming profoundly energy intensive. It was important to ensure that environmentally conscious and sustainable features were incorporated into the facility and process designs where possible. While this was a challenging endeavour due to the age of the existing infrastructure, careful evaluation of existing building elements and CGC's production processes revealed avenues to enhance efficiency.

Breathing New Life into Existing Infrastructure

Due to JLR's experience with large-scale retrofit projects, the firm was able to identify key opportunities to improve existing systems within the complex and adapt existing facilities to new uses. One such opportunity was contained within the building's heating and cooling systems. When CGC took possession of the facility, these systems were outdated and inefficient. JLR incorporated new systems and features, including high-efficiency boilers, high-efficiency pumps and fans with variable frequency drives, free cooling systems, and a sophisticated controls system to improve energy efficiency. In addition, updates were made to the building envelope to assist in reducing both the facility's carbon footprint and its capital operating costs.

Enhancing Efficiency

Aided by CGC, JLR was able to identify methods for optimizing indoor growth and expediting post-harvest activities that represented a reduction in energy usage. The team was able to reimagine how functional space was utilized in storage, trimming, and flowering rooms to maximize capacity and minimize the facility's footprint. In addition, the team pioneered new cannabis drying methods that resulted in a dramatic improvement in the consistency of the drying process and its energy efficiency.

G. ADDRESSING OWNER'S NEEDS

Though CGC identified several key goals for this facility, there were two specific needs that it was imperative JLR address in order for the client to consider the project to be a success: the timeline and adaptability.

Tight Timeline

In order for CGC to meet ever-increasing market demand, this facility needed to be completed on an ultra-fast-track timeline. Prior to JLR's involvement in this project, the pace of the ultra-fast-track schedule often isolated construction to solely vacant spaces. JLR proposed a master planning process for each phase of the project, allowing CGC to better anticipate its space planning needs. This resulted in the development of an intelligent construction sequence that allowed renovations to progress swiftly while also eliminating spacing issues while work was ongoing.

Easily Adaptable

This facility needed to be highly adaptable in order to ensure CGC's preparedness to launch new product streams. This mandate was established in anticipation of initial and second wave cannabis legalization. JLR ensured that CGC would be prepared for these events by developing manufacturing and processing areas that could be used for product research prior to legalization, and then repurposed into growth and production spaces later. This allowed CGC to be prepared for a sudden surge in recreational demand following legalization, while still maintaining its medicinal manufacturing operations and ensuring patient access to much-needed medicinal marijuana products.

H. CONCLUSION

Ultimately, all phases of this project were completed on time, on budget, and to the complete satisfaction of all stakeholders. The success of this facility has allowed CGC to achieve its greater goal of providing capacity to meet the needs of Canadians in need of medicinal cannabis, while also serving recreational markets.



OTTAWA

864 Lady Ellen Place
Ottawa ON Canada
K1Z 5M2
Tel: 613 728-3571
ottawa@jlrichards.ca

KINGSTON

203-863 Princess Street
Kingston ON Canada
K7L 5N4
Tel: 613 544-1424
kingston@jlrichards.ca

SUDBURY

314 Countryside Drive
Sudbury ON Canada
P3E 6G2
Tel: 705 522-8174
sudbury@jlrichards.ca

TIMMINS

834 Mountjoy Street S, PO Box 10
Timmins ON Canada
P4N 7C5
Tel: 705 360-1899
timmins@jlrichards.ca

NORTH BAY

200-175 Progress Road
North Bay ON Canada
P1A 0B8
Tel: 705 495-7597
northbay@jlrichards.ca

HAWKESBURY

372 Bertha Street
Hawkesbury ON Canada
K6A 2A8
Tel: 613 632-0287
hawkesbury@jlrichards.ca

GUELPH

107-450 Speedvale Ave. W
Guelph ON Canada
N1H 7Y6
Tel: 519 763-0713
guelph@jlrichards.ca



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