



2023 Canadian Consulting Engineering Awards

## Jack Doyle Athletics and Recreation Centre, Algonquin College, Ottawa ON

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Buildings



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The Algonquin College Student's Association wanted to create a welcoming environment that would inspire students to build healthy habits and take control of their fitness. The engineering team at WSP and the architects at HOK focused on sustainability, wellness and the student experience when transforming this vision into reality. The result is the 12,000 sq.m. Jack Doyle Athletics and Recreation Centre that features an amazing variety of activities to encourage students to be active.







*The Discovery Track winds and inclines above the climbing and bouldering wall*

## Q.1 Innovation

Briefly introduce your project, i.e. what was done and why? Then explain how the project demonstrates the innovative application of engineering principles or techniques. How is it distinguishable from similar projects of its type?

Ten years ago, the Algonquin College Student's Association Board of Directors began talking with students about their expectations and wishes for athletics and leisure on campus. Their vision was to create an environment that inspires a passion for student success. These conversations, along with the support of Algonquin College, the construction expertise of PCL Construction, the project management of Colliers, the creative architecture of HOK, and the innovative engineering of WSP, led to the 12,000 sq.m. Jack Doyle Athletics and Recreation Centre (ARC). WSP provided all major engineering services for the project.

The project team designed an amazing variety of activities that inspire students to be active. These include multiple levels of free-weight and turfed cross-fit space, climbing and bouldering walls, billiards and golf simulation, yoga and studio spaces, a full-sized recreation gymnasium, and (Ottawa's only) 10 pin bowling alley. The feature attraction is a 350m "Discovery Track" that winds and inclines throughout the building, providing a bird's eye view to the varsity gymnasium that is home to the Algonquin Thunder Men's and Women's Volleyball and Basketball teams.

Each of the building's attractions required unique engineering approaches. For example, the mechanical heating and cooling systems that serve the gymnasiums monitor and swiftly react to changing space temperature and relative humidity to protect the hardwood flooring. The air distribution system was modeled using computational fluid dynamics (CFD) simulation software to provide temperature control while also maintaining lower air speeds at the players for events such as badminton. High-volume low-speed ceiling fans were designed to circulate air within the multi-level cardio and fitness areas to promote air mixing and reduce temperature gradients. This level of design complexity is unusual for typical recreation facilities.

Lighting throughout the building was designed to be welcoming and blend with the environment, while promoting visual energy. Smart lighting controls perform preset zoning based on event type. Daylight harvesting prioritizes the health and energy benefits of natural light to reduce the reliance of artificial light.

The structural engineering design was developed specifically to span and support the variety of programming requirements, including the long span steel structure above the varsity gymnasium, an enhanced seismic resisting system, the vibration sensitive support of the Discovery Track, support of the rock climbing space, and even the specific development of a rack for the support of heavy punch bags that are deployed within one of the multi-purpose room.



*Recreation gymnasium*

## **Q. 2 Complexity**

Explain any extraordinary problems and conditions that were overcome.

### **Stormwater Management**

The project's site selection was the first engineering challenge that the WSP team overcame. The site is situated in the west end of Ottawa in the Pinecrest Creek catchment area. This area is the most urbanized sub-watershed outside of the city core and is highly driven by stormwater events. WSP designed a system to reduce rainwater runoff volume and improve water quality by replicating the natural hydrology and water balance of the site. The final design solution involved localized, depressed bio-retention features in soft landscaped areas in conjunction with a large, centralized sub-surface infiltration chamber. The effectiveness of the retention and detention system exceeds the 90th percentile of rainfall events, which far exceeds similar facilities and helps to manage flooding risks associated with an urbanized development.

### **COVID-19**

This project was primarily constructed through the COVID-19 pandemic. The construction of the facility was deemed to be essential and the builder PCL Construction implemented the utmost safety protocols. The design and construction teams immediately identified interruptions to the traditional supply chains and worked together to modify design elements so that materials could be sourced from local suppliers to avoid the closing of borders to traffic and trade.



*"The new ARC is a state-of-the-art recreational facility that will be an asset to Algonquin College and our city for decades to come. The benefits of this space are twofold: it will encourage a healthy lifestyle amongst the College community while also attracting more students from out of town."*

*- Jim Watson, Former Mayor of the City of Ottawa*



*Ottawa's only 10-pin bowling alley*

### **Q. 3 Social and/or Economic Benefits**

Explain the social and economic benefits to society provided by your project. Be specific and provide qualitative and quantitative information.

#### **Economic Benefits**

The Jack Doyle Athletics and Recreation Centre is owned and operated by the Algonquin College Students' Association, a student-run not-for-profit whose mission is to create an environment that inspires passion for student success. The operation of the facility provides meaningful and relevant work experience for the student body and surrounding community.

For a more immediate economic benefit, this project was primarily constructed through the COVID-19 pandemic. The construction of the facility was deemed to be essential and the builder PCL Construction implemented the utmost safety protocols to prevent infection. Dozens of professionals and hundreds of tradespeople worked together to complete this facility on schedule.

#### **Social Connections**

The ARC was built to create a welcoming environment where students of all backgrounds, cultures and abilities can safely learn to own their health. This is achieved for example through the thoughtful design and curvature of the Discovery Track to promote accessibility. In addition, all washrooms in the building are all-gender.

College campuses are not immune to the experience of loneliness and social isolation. Access to the recreation facility is included as part of Algonquin College student fees. Students are encouraged to come together and share in one of the many experiences that the building offers. Yoga, bowling, or simply sharing a meal at the building's Wolves Den Restaurant can reduce stress and encourage connectedness. Buildings like the ARC are the centerpieces for the modern post-secondary campus and are the breeding grounds for tomorrow's leaders.



*Varsity gymnasium home to the Algonquin College Thunder Volleyball and Basketball teams*

## **Q. 4 Environmental Benefits**

Explain how your project addresses environmental/sustainability issues.

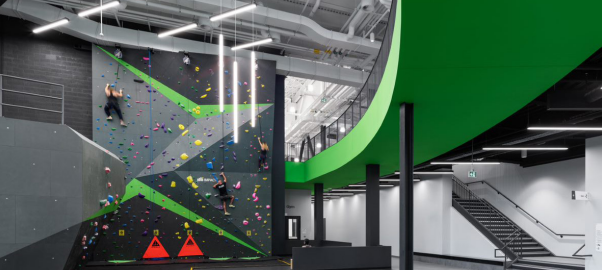
The Algonquin College Students' Association prioritizes environmental stewardship and wanted to build a facility that celebrated sustainability. The WSP engineering team carried this inspiration throughout the design in a number of ways.

The electricity service to the building utilizes a transformer with dielectric fluid made from biodegradable and non-toxic vegetable oils, such as soybean or rapeseed oil. This technology provides enhanced safety, efficiency, and longevity in comparison to traditional oil-based dielectric fluids in transformers.

Significant design effort went into selecting the building's mechanical heating, cooling and ventilation systems. The WSP team followed the ambitious ASHRAE Standard 209 modeling process which requires eleven modeling cycles to be performed to ensure that the optimal system design is selected, built and commissioned. The final HVAC system consists of centralized air handlers with energy recovery technology to deliver outdoor ventilation to terminal fan-coil units for space level temperature control. Occupancy/vacancy and carbon dioxide sensors control the flow of outdoor air to ensure that ventilation is directed to only spaces that need it. This system design is best suited for buildings with varying occupancy levels such as the ARC. Heating and cooling equipment was right-sized to ensure that it operates at its highest efficiency during the majority of the year.

Plumbing fixtures were selected to reduce indoor water use 40% below the LEED baseline, and kitchen/laundry equipment was selected to be ENERGY STAR certified. Landscaping plants were selected to be drought resistant.





## Q. 5 Meeting Client's Needs

Explain the client's main project goals and how you met them.

The Algonquin College Student's Association wanted to create a welcoming environment that would inspire students to build healthy habits and take control of their fitness. The project team achieved this vision by designing an amazing variety of experiences, highlighted by the 350m accessibly designed Discovery Track that is suspended high above the cardio/fitness spaces and provides a bird's eye view of the varsity team events.

Sustainable design practices were utilized throughout. Mechanical heating and cooling systems are tuned to address specialty requirements such as the varsity gymnasium, while also being flexible for changing space uses by the College. The electrical and technology systems were designed to be future-ready with a focus on the user experience (eg. phone, tablet and laptop chargers). Electrical power layouts were designed to be modular to provide the owner with the flexibility to reconfigure fitness equipment without renovations. The structural design throughout the facility involved unique solutions to accommodate the diverse needs of each of the spaces, including long span roof structure, robust floor structures and vibration control suspended structures.

The Jack Doyle Athletics and Recreation Centre is a model for other post-secondary institutions wishing to build a state-of-the-art recreation facility that inspires the student population to become active participants in their health and fitness. The Algonquin Students' Association created the following video which is perhaps the best testament to the success of this project: <https://www.youtube.com/watch?v=xPOw443nlzk>





WSP is one of the world's leading engineering professional services consulting firms, bringing together talented people from around the globe. We are technical experts who design and provide strategic advice on sustainable solutions and engineering projects that will help societies grow for lifetimes to come. With an intimate sense of local realities, there is no challenge in the built and natural environment that our experts won't see as a possibility. From the tallest towers to the deepest stations, we plan, design and deliver value for our clients and a sustainable future for the planet. As a company with deep roots coast-to-coast-to-coast in Canada, WSP aims to be at the forefront of the transition to a more equitable, inclusive, and low-carbon world. Both in our own activities and in the work we undertake for our clients. As a world-class professional services firm, our reputation depends on our ability to value our people and be outstanding professionals. Acting with honesty, integrity and transparency in our daily dealings with colleagues, clients and other business partners.



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