

ACEC 2013 Awards Submission
April 18, 2013

ÉDIFICE SEDLEY S. BLANCHARD BUILDING

AIR MOBILITY TRAINING CENTRE

8 Wing Trenton, Trenton, Ontario





Project Description

J.L. Richards & Associates Limited (JLR) provided prime consultant and integrated multidisciplinary design, tendering and construction support services for the development of the \$60M, Air Mobility Training Centre (AMTC), dedicated as the “Édifice Sedley S. Blanchard Building”, located at CFB Trenton. The 18,000 m² facility is a global centre of excellence for the training of operators and maintainers of the fleet of CC-130J Hercules transport aircraft recently purchased for the Canadian Military (DND).

The AMTC supports training in both classroom and simulated real world environments, delivered through a wide array of state-of-the-art computerized training devices. The facility is configured to support all training requirements and includes assembly, classroom, administration and operational support spaces, as well as, several high bay areas housing full scale simulator devices. The complex building infrastructure features energy efficient HVAC and lighting systems, an advanced IT infrastructure, full standby power, a leading edge AV system and an extended building automation system.

The tender documents were completed in just 9 months through a “fast-track” Integrated Design Process (IDP) methodology, which included the integration of technical specialists from DND and the training system providers into the design team. The facility was subdivided into modules to allow the design of each operational element to be advanced independently, accelerating the design process. With the training program still in development during the design phase, supporting infrastructure was configured flexibly and “place-holder” elements were inserted where information was unavailable prior to tender.

AMTC construction was completed on-time and on-budget. The project achieved all functional objectives, including LEED certification (Gold Certification pending).

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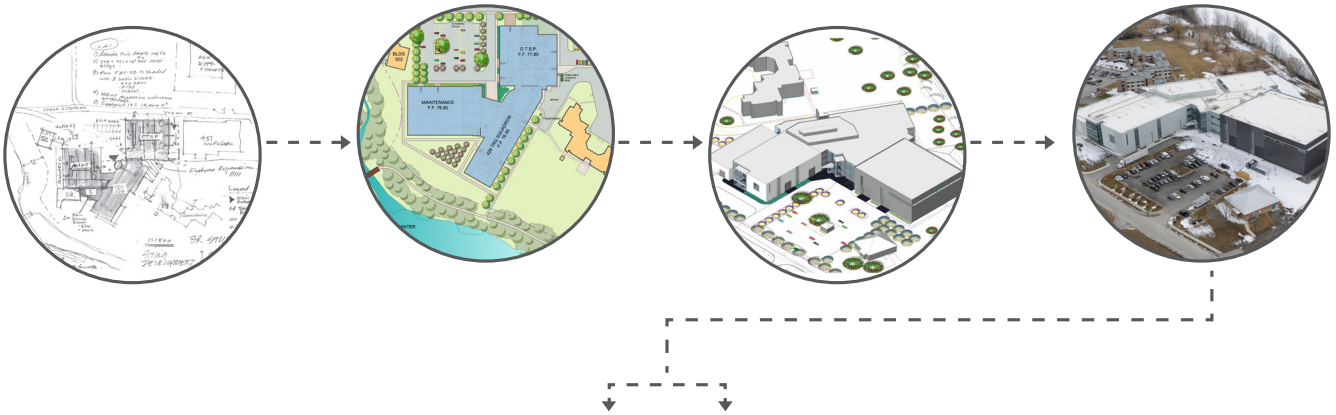
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Project Objectives, Solutions & Achievements

Objectives:

- AMTC to be ready for installation of training devices within 30 months of project initiation. This requirement was driven by military operational objectives that included support of operations in Afghanistan.
- Deliver all functional and operational program requirements within the project budget.
- Meet sustainable development objectives, including energy efficiency, reduced carbon emissions and LEED Silver Certification.

ÉDIFICE SEDLEY S. BLANCHARD BUILDING
AIR MOBILITY TRAINING CENTRE



Full motion flight simulators



Full scale fuselage for Load Master training.



Ceiling mounted acoustic panels in entrance atrium.



Displays marking 426 Squadron history

Solutions

In response to the scheduling requirement, a “fast-track” design process was developed with DND to allow the design process to advance at an accelerated pace while minimizing the cost and schedule impact of any infrastructure changes implemented during construction. The fast-track design process included the following key elements:

Integrated Design Team:

Following IDP methods, the tender documents were prepared by an integrated design team composed of JLR staff and technical specialists from DND, CAE and key subconsultants. DND staff fulfilled the role of technical authority for the project. CAE, as the provider of training systems to be installed in the facility, fulfilled a key role of identifying and clarifying infrastructure (power, cooling, UPS, IT, etc.) requirements to support the installation of training devices. The participation of CAE and DND staff as an integral part of the design team improved the flow of critical design information, reducing design iterations and streamlining the document review process.

Modular Implementation:

The building was subdivided into 5 modular elements allowing the assignment of multiple teams to work in parallel on the development of the Tender documents. This facilitated the advancement of individual design elements as operational and functional information became available. Where associated infrastructure requirements were unavailable, “place-holder” elements were inserted into the design based on the best available information. This permitted the design to advance without delay, with refinements added later as information became available. The intent of this approach was to ensure that the Tender documents would contain over 95% of all infrastructure elements, minimizing the cost and schedule impact of any refinements implemented during construction.

Sustainable Development:

Key sustainability objectives related to energy use and reduction of carbon emissions were achieved largely through a combination of efficient HVAC, lighting and building envelope design including the following:

- Space heating is provided by a condensing gas fired heating plant serving low temperature radiant heating (wall and in-floor).
- Heat reclaim from ventilation exhaust and computer room cooling systems is used to supplement heating for outdoor air.
- Lighting systems are fully automated, with perimeter day-lighting and occupant sensor controls integrated into the building automation system.
- Building envelope features include a low emissivity “cool” roof membrane, enhanced insulation of perimeter walls and roof and careful attention to perimeter detailing to prevent thermal bridging.

Achievements:

- The fast track process established a new benchmark for consultant team integration and performance on DND projects.
- Tender documents were delivered on time and the overall project was completed on time and on budget.
- The AMTC meets all functional and operational requirements within a reduced building footprint, saving over \$1.5M in construction costs.
- Implementation exceeds the DND standard, achieving LEED Gold Certification (pending) within the LEED Silver budget.

Technical Excellence & Innovation

The most significant point of innovation for this project was the development of a fast-track delivery methodology for the design in response to the compressed 9 month design time frame. Complex DND design projects are generally delivered under a prescribed linear methodology involving multiple submission and review stages and requiring 18 to 24 months to complete. Facing a compressed schedule and minimal information regarding the facility functional and infrastructure requirements, it was clear that the traditional DND project delivery model would not work.

Working with DND and DCC, a novel fast-track design integrated methodology was developed that allowed the project time lines to be substantially compressed. The fast-track methodology featured the integration of DND and training systems provider technical specialists into the design team. This allowed design decisions to be made in a shared risk environment using the best available information and facilitated the insertion of “place-holder” elements into the design where information was unavailable prior to tender.

The “place holder” strategy, involving the insertion of infrastructure elements (power, cooling, ventilation, IT, etc.) based on the best available information, allowed the completion of tender documents to proceed on schedule. This strategy also ensured that changes required during construction to address updated infrastructure requirements would involve modifications, rather than the insertion of new building systems. Working with the general contractor, the construction schedule was modified where possible to allow changes to be implemented at the shop drawing stage. This approach reduced the scope and cost of changes, ensuring the completion of the construction phase within the project budget.

The advanced nature of the training to be delivered within the AMTC demanded technical excellence in all aspects of the facility. Areas of excellence that resonate most with the users are the functionality and positive learning environment provided by the building as a whole and the operational efficiency and effectiveness of the building systems.



Originally conceived as a long rectangular structure to be constructed along Highway 2, the decision to construct the AMTC on an irregular plot of land next to the Bay of Quinte necessitated the development of an angular solution for the building layout. Although this made the floor plan development process much more complex, it presented opportunities to integrate the facility with the water front to enhance the experience for the staff and students. Despite the angular nature of the layout, the final building footprint was approximately 3% smaller than the functional space program allocation developed based on strict Public Works (PWGSC) office standards. This reduced construction costs by approximately \$1.5M, while delivering a world class facility that addresses all functional, work flow, staff and student interaction, accessibility and operational requirements.

From the outset of the project, the design team was focused on the delivery of an energy efficient design without compromising the operational effectiveness of the facility. Energy efficiency features include:

- High efficiency condensing gas fired heating plant.
- Low temperature hot water radiant heating (wall and in-floor).
- Dedicated outside air ventilation system, incorporating exhaust and computer room cooling system heat reclaim.
- Day lighting controls, incorporating light shelf and sun shade.
- Extended building automation system operation includes HVAC, lighting, and all other energy consuming systems in the building all achieved through an open protocol and a single user interface.

Enhanced energy efficiency elements deliver operational cost savings in the order \$200,000 per year and an annual CO2 emission reduction of 1000 Tons in excess of reductions mandated by National Energy Code standards.



Level of Complexity & Project Challenges

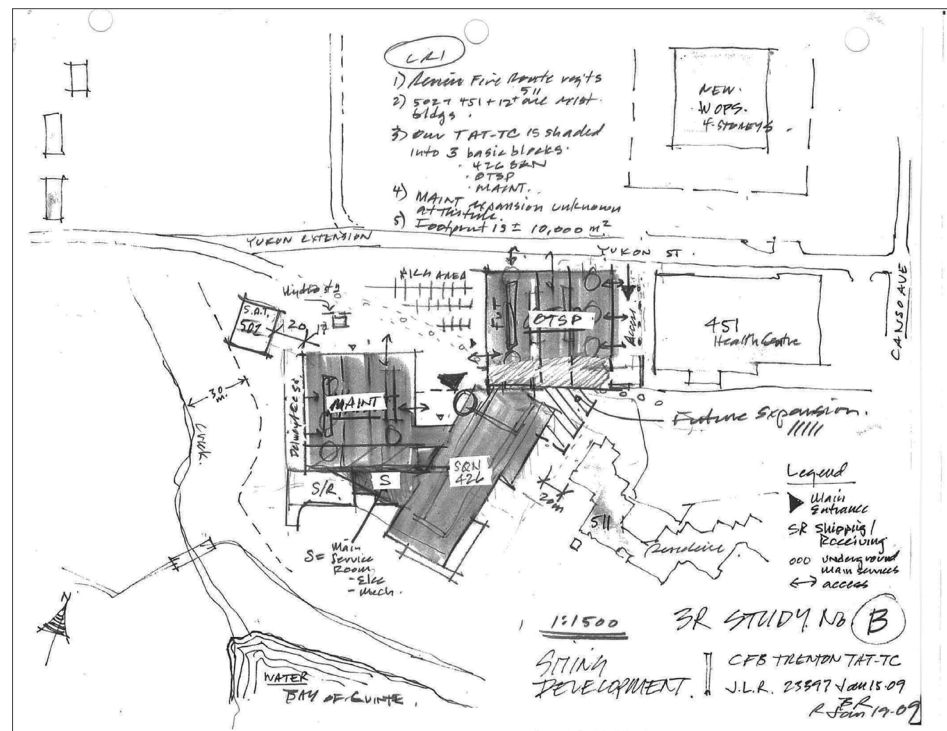
The AMTC is one of the most complex facilities of its kind in the world. It incorporates state-of-the-art training devices delivering a comprehensive computer based training program to support the operation of a leading edge military transport aircraft.

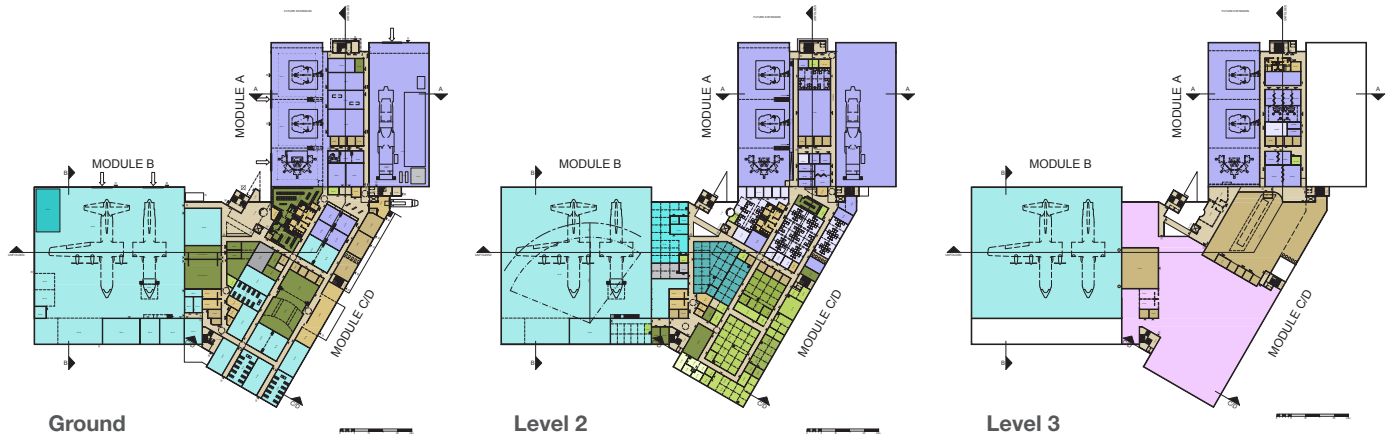
The design process involved the integration of all of the diverse functional requirements and infrastructure elements to support this advanced training program. These elements included:

- Large span, high-bay structures to house full scale training devices
- Extensive IT infrastructure to support the distribution of computer based training throughout the facility.
- Dedicated process cooling systems to address cooling requirements in distributed computer rooms, class rooms and IT/server rooms.
- Layout of all programmed spaces within a reduced footprint (3% less than FSP), saving \$1.5M in construction cost.

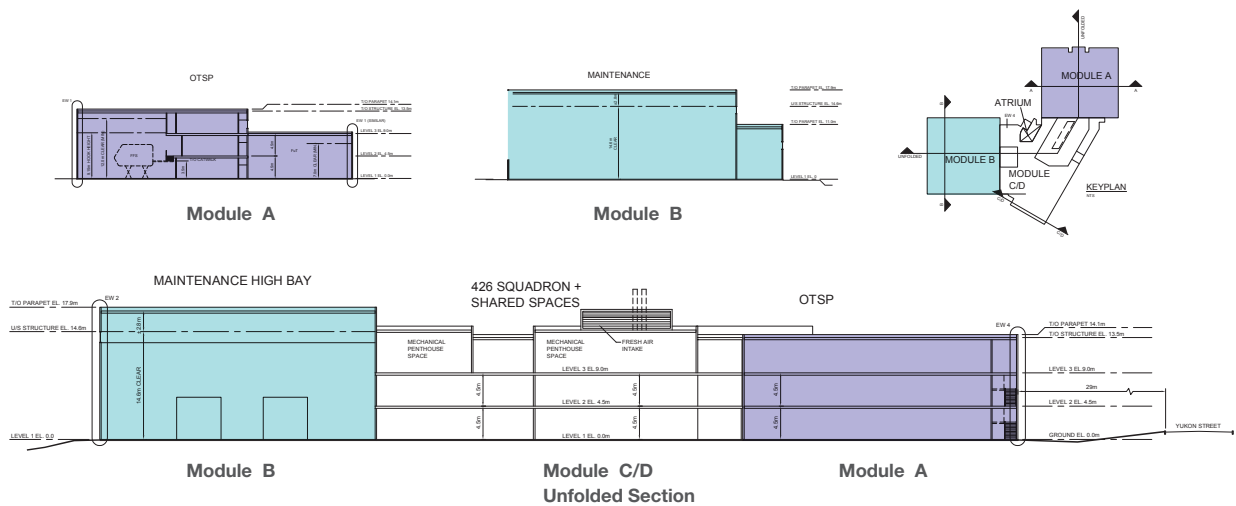
One of the greatest challenges facing the project team was designing the facility without having all of the infrastructure requirements fully defined until after the Tender documents were completed. Despite this significant constraint, the facility was completed on time and on budget and incorporates all of the required functional and operational elements through the successful application of integrated project delivery methodologies.

Initial Sketch Concept

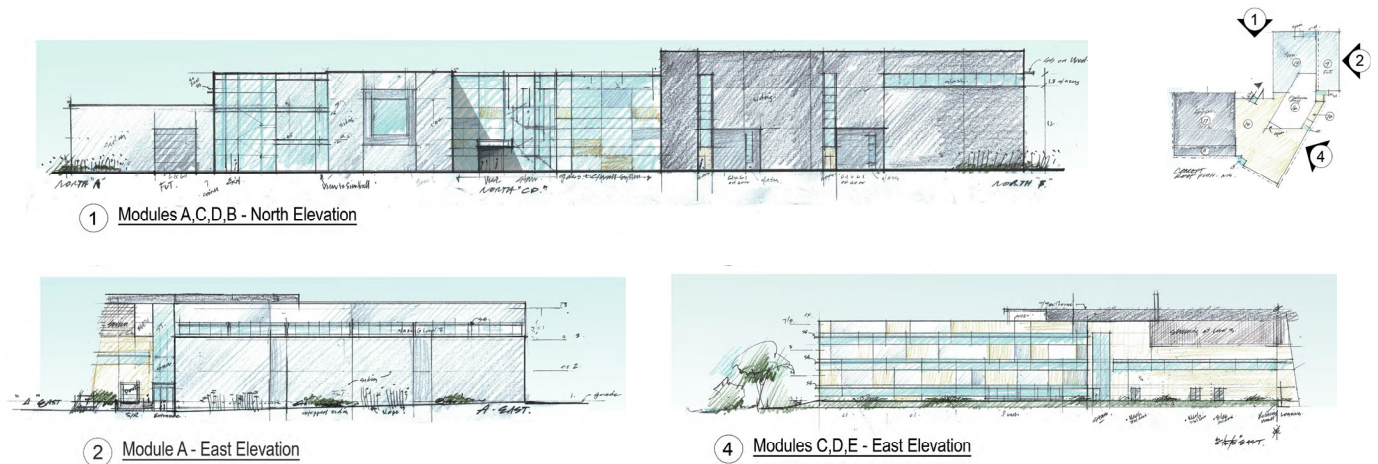




Concept Plans



Concept Sections



Concept Elevations



Contribution to Economic, Social and/or Environmental Quality of Life

Economic:

The AMTC provides a cost effective alternative to the standard practice of developing multiple facilities to deliver the complete training program. This single facility incorporates all shared resource areas that would have been replicated in three separate buildings. This approach reduced construction costs by more than \$10M and will generate ongoing operational cost savings for the Canadian tax payer.

Social:

The deployment of the new CC-130J aircraft represents a significant advancement in operational support capability for the Canadian military. The delivery of the Air Mobility Training Centre will measurably improve the “in-theatre” support provided to Canadian troops serving in combat, peace keeping and humanitarian missions around the world.

Environmental:

Contributions to environmental quality of life include the following:

- The building was constructed on a contaminated site. All contaminated soil was removed as part of the construction process.
- The construction program exceeded LEED certification objectives for waste diversion, use of local materials, use of recycled materials and use of sustainable wood products.
- The project exceeded the DND objective of achieving LEED Silver certification for all new buildings, achieving a LEED Gold standard (certification pending), with a focus on reducing energy consumption and CO2 emissions.

A Tangible Link to Our History

The Air Mobility Training Centre, is home to the 426 Transport Training Squadron, originally formed as the 426 Bomber Squadron in 1942 in Dishforth, England. The AMTC was recently dedicated as the “Édifce Sedley S. Blanchard Building” in honour of the first commanding officer of the 426 Bomber Squadron who was killed in action in 1943. His Grand daughter, Ms. Tracy Schuhart, was present at the dedication ceremony which took place in the AMTC Atrium in September of 2012.



W/C Sedley S. Blanchard
CO 426 Squadron
15 Oct 1942-14 Feb 1943 (KIA)



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