ARTS CENTRE EXPANSION

OWNER: Dalhousie University I ARCHITECT: Lydon Lynch /Thomas Payne I CONSULTING ENGINEERS: M&R Engineering Ltd I CONSTRUCTION MANAGEMENT: EllisDon I PROJECT MANAGER: Dalhousie University

The Arts Centre Expansion project includes a 4,310 m2. meter three-storey performing arts addition to the Seymour Street side of the 50-year-old Arts Centre. Other upgrades to the existing building include a revitalization of the existing building's systems heating and ventilation, new entrance, lighting, and landscaping.

GREEN BUILDING FEATURES

ENERGY EFFICIENCY THROUGH DESIGN AND SYSTEMS

Building Envelope: The building's envelope is more energy efficient than an equivalent code compliant commercial building. With the increased insulation and construction of the building, the HVAC and controls systems have been designed to utilize the building's mass as thermal storage, further reducing peak heating and cooling demands.

Air and water leakage can be a significant contributor to the designed performance of building envelope systems. Dalhousie has air leakage standards that are used for envelope projects. For this project, the new addition and existing building window and wall assemblies are tested with thermal imaging (Photo 1).

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Efficient Systems: Key energy efficiency measures include:

- Reduced lighting energy use using natural daylighting, occupancy sensor controls, and LED lighting.
- In-floor radiant heating is used in most of the facility to improve thermal comfort and save energy by allowing a lower air temperature.

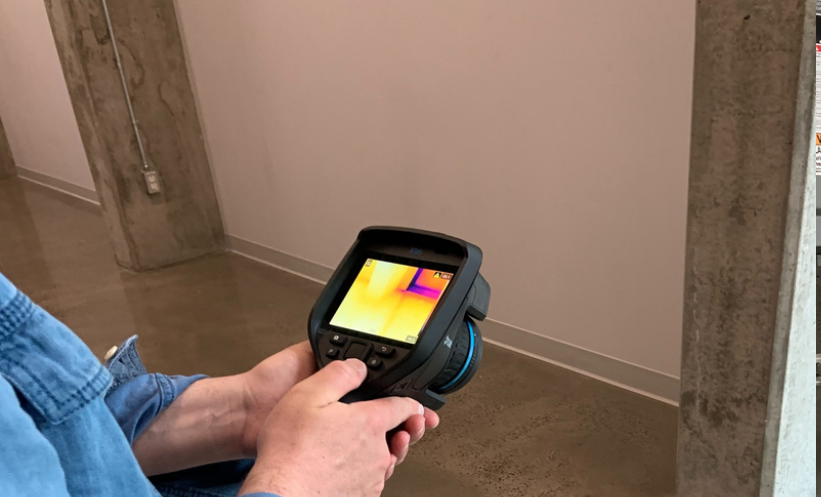

PHOTO 1. THERMAL IMAGING AT DALHOUSIE BUILDINGS

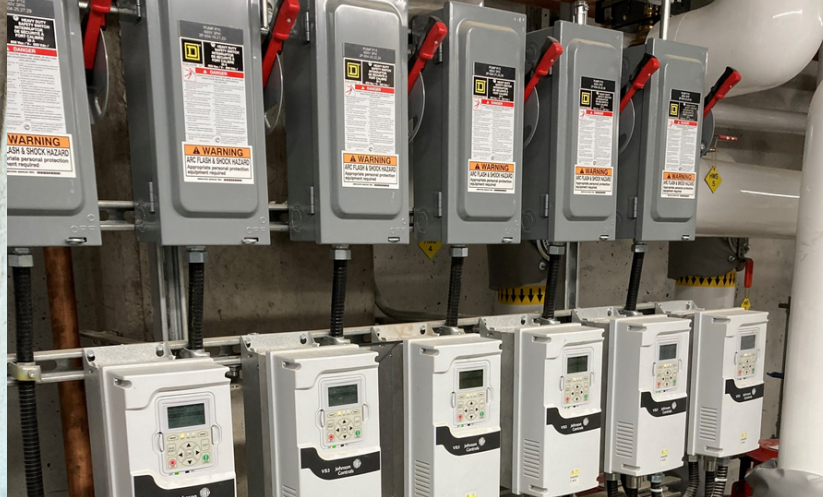

PHOTO 2.VARIABLE FREQUENCY DRIVES

- All heating/cooling pumps and all air handling unit fans are equipped with variable frequency drives (VFD's) that reduce the motor speed.
- The Recital Hall is served by an underfloor displacement ventilation system which saves energy by allowing you to only condition the lower half of the room, where the audience is located. This also improves air quality by supplying ventilation directly to the audience.
- The existing building's HVAC is being updated to be a variable air volume system.
- Enhanced commissioning is performed. This includes third-party comprehensive document review.
- Measurement and verification will be employed to evaluate and verify the performance of the building.

RENEWABLE ENERGY

Solar PV: 248 solar photovoltaics (PV) modules are mounted on the Arts Centre new addition roof converting solar light to electricity. The system has the capacity to generate 95.5 kW of DC power. The PV panels are ballasted mounted at 8º angle to maximize energy production while minimizing shading between rows of panels. Annual electricity production is anticipated at 110,360kWh. The solar PV system is connected to the building electrical system (Photo 3).

TRANSPORTATION

The Arts Centre is conveniently located near local transit with over 17 bus routes servicing stops within a 400 m distance. 28 bike parking spots are in front of the building. 14 bike parking spots are located across the street in a covered parkade. Shower facilities are available in the new addition. An on-campus car share spot is located nearby at the Student Union Building along with level 2 electric vehicle charge stations at the Dalplex. Bike lanes connect on the south and west side of the building.

WATER EFFICIENCY

Water: Low-Flow Fixtures and Fountain
This facility utilizes low-flow faucets (1.9 liters per minute) and low-flow dual-flush toilets (4.2/6 Litres per flush)(Photo 4). A retrofit of the bathrooms in the existing buildings added 4.2/6 litre upgrades and low flow aerators. Refillable bottle stations and fountains are prominently displayed to reduce single use bottle usage .

MATERIALS & WASTE MANAGEMENT

Construction and Demolition (C&D) Waste and Site Remediation: On the project, including construction and demolition (C&D), over 90% (more than 330 tonnes) of C&D materials were diverted from landfills.

PHOTO 3. SOLAR PV ON ARTS CENTRE ADDITION

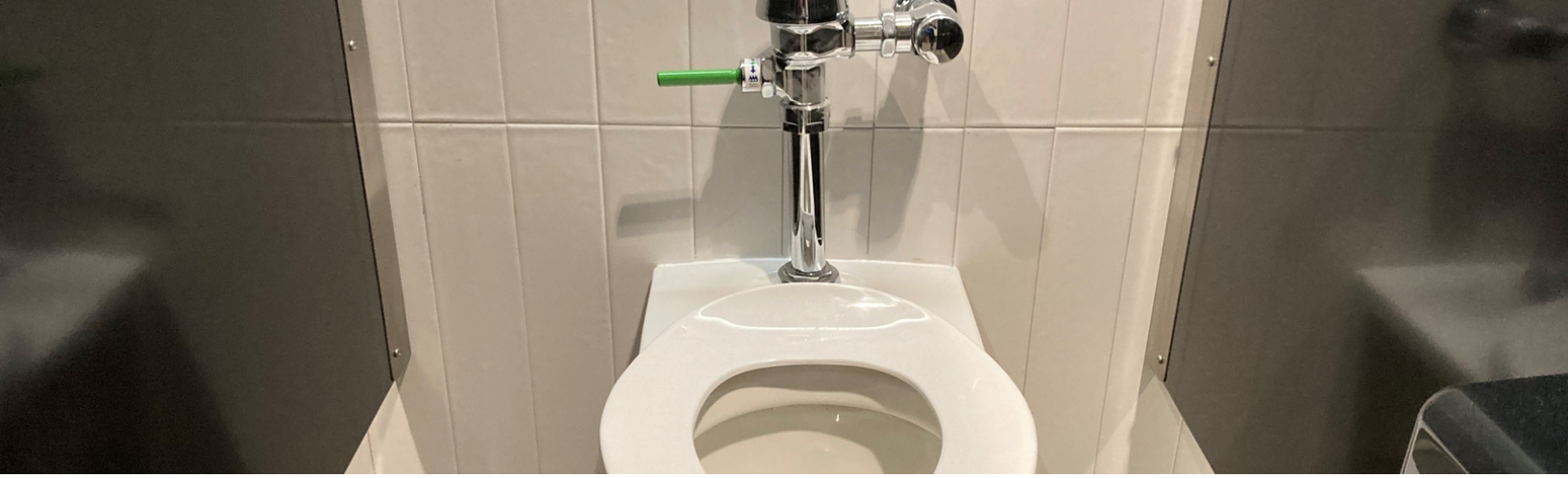

PHOTO 4: LOW FLOW FIXTURES

This includes aggregates, wood, metals, cardboard, glass, and salvaged building components. These materials were delivered to local recycling facilities.

Green Cleaning and Waste Management: Green cleaning products and practices outlined in Dalhousie's green cleaning policy are used in the building. A move to blue cleaning on our properties sees an increase use in ozonated water for cleaning. Four-bin waste management systems are used throughout the building (paper, recyclables, organics, and waste).

Finishes: Most building finishes have zero or low emissions. These materials reduce the release of significant pollutants, such as volatile organic compounds (VOCs), into the indoor environment. As well, all manufactured wood products are produced with no added urea formaldehyde (NAUF). These measures make for a healthier indoor environment.

BIODIVERSITY

Dalhousie has a Natural Environment Plan that requires biomass replacement. All trees that come down for Arts Centre expansion project are being replaced with an equal amount of biomass planted onsite or on Dalhousie campuses.

On-site native and adapted plants have been selected with consideration of planting area micro-climate and enhancement of biodiversity.

EDUCATION

The central and subsystems of the building and the outdoor environments are used for operations, research and teaching purposes.

Key features incorporated include:

- Sensors, meters, gauges have been installed to monitor electrical, water, heating, cooling, and solar pv. The data from sensors and meters are integrated into building automation software that can be accessible to researchers and students in enough resolution for research.

- Green building tours are provided for members of the Dalhousie and the community including campus tours, Dalhousie students, faculty and staff, building professionals, school groups and community organizations. Tour stops include:

    - The front entrance of the new addition: Highlight the building envelope enhancements, air leakage standards, and provide thermal equipment in some cases for demonstration. Outline public and sustainable transportation amenities.
    - Move inside the building: first floor: Highlight HVAC and efficiency, water bottle fill stations, materials including discussion of air quality and measure used to reduce contaminants.
    - Roof: highlight solar pv system, production, type, angles, and metering
    - Transition to existing building: Talk about the connection between the two and energy synergy with one less outside wall, new upgrades including HVAC variable air volume systems, lighting, controls systems.
    - Outside: Talk about the biomass replacement policy, new vegetation more biodiverse plantings and species types.