



The Benefits and Challenges of Daylighting Recreation Facilities

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Building Community Since 1947

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Introduction

Designers of recreation facilities embraced the LEED 2009 daylighting standards which were intended to connect building occupants with the outdoors through use of optimal daylighting techniques and technologies. In the practice of architecture, daylighting refers to the use of natural light, be it brilliant sunlight or muted overcast light, to support the visual demands of building occupants. Science has proven that daylit environments increase occupant productivity and comfort, and provide the mental and visual stimulation necessary for human health.

Given that electric lighting in buildings consumes more than 15 percent of all electricity, utilizing natural light can lead to energy savings. However, recreation facilities that have aggressive daylighting goals, but are poorly operated will use more energy and can subject users to excessive glare and thermal HVAC-R stress. Further, if the design allows natural light to penetrate directly onto the ice surface additional refrigeration costs could be realized. Well trained recreation personnel entering into a facility with a significant amount of daylighting will form an entirely different opinion than that of the general-public. To effectively manage such buildings, senior staff must first understand key terms associated with daylighting.



The creation of Canada's National Arts Centre in Ottawa was part of the explosion of pride and optimism that led to the celebration of Canada's 100th birthday in 1967. It was created to the design of the times – concrete with little natural light (reflective of many recreation facilities of the same time period). For Canada's upcoming 150th celebration the federal government has undertaken a \$110-million renovation of the building. A

significant portion of this upgrade will be the installation of a glass and metal enclosure on multiple floors around a significant portion of the existing building, creating new wings with views that represents today's user expectation.

Adding windows to any building will immediately improve the appearance of the construction. However, the placement, type and quality of the window will have a significant factor in effectiveness. There are three ways to improve the amount of light available from a window; (1) placing the window close to a light coloured wall, (2) slanting the sides of window openings so the inner opening is larger than the outer opening, or (3) using a large light coloured window-sill to project light into the room. Different types and grades of glass and different window treatments can also affect the amount of light transmission through the windows. The type of glazing is an important issue, expressed by its VT coefficient (Visual Transmittance); also known as visual light transmittance (VLT). Glazing allows significant light penetration without high impact on HVAC-R equipment thus assisting in reducing energy costs. Smart glass is the name given to a class of materials and devices that can be switched between a transparent state and a state which is translucent, reflective, or retroreflective. The switching is done by applying a voltage to the material, or by performing some simple mechanical operation.

Skylights are light transmitting windows that form all, or a portion of, the roof of a building space. An alternative to a skylight is a roof lantern. These installations must be given careful consideration in different geographical locations. Areas that receive significant amounts of snow fall may wish to give careful consideration prior to installing. Regular inspection and maintenance to these installations must be added to a building's scheduled workplans. Another type of device used is the light tube, also called a tubular daylighting device (TDD), which is placed into a roof and admits light to a focused area of the interior. These somewhat resemble recessed ceiling light fixtures. They do not allow as much heat transfer as skylights because they have less surface area.



The main function of an atrium is to provide a visual experience and a degree of contact with the outside for people in the working areas. Again, a very appealing feature that must be given an annual cost to maintain. The addition of plant materials to enhance the area will often accompany these installations. Maintaining the plant, plant boxes and the regular cleaning of the leaves must be scheduled.

Recreation professionals are united in several common operational factors – not enough human or financial resources to properly maintain our buildings. Adding windows to architectural drawings gives a sense of energy efficiency and state of the art construction. However, rarely, does anyone want to talk to the added ongoing maintenance costs associated with these installations. If a daylighting program has not been executed properly, it can produce negative results. Dirty windows and ledges sends the wrong message, while poorly designed facilities will often have glaring occur during parts of the day pending the sun location of the season. Buildings that were constructed for a traditional ice rink season that expands the schedule can unintentionally have detrimental effects on quality of play and user safety. Specifically, in ice rink applications solar heat gain must also be considered. Natural lighting installations may need to consider daylighting control strategies, such as automated shades, light shelves or louvers. All which will have a hidden housekeeping and maintenance cost associated for the entire life-cycle of the installation. Blinds in recreation facilities are often a further challenge to building managers. The ongoing cleaning, repair or replacement are ongoing costs that are not always budgeted.

The proper orientation of windows and skylights can admit direct and diffused daylight, producing the best combination of light for a building while also reducing glare. The selection and placement of

windows and skylights should be determined by the amount of light needed and be based upon climate and the design of the building. Daylighting also calls for controlling the amount of heat that enters a building. If not planned properly, using natural lighting can result in undesirable heat gains.



Given the focus by the Ontario Ministry of Labour to working safely at height, facility management must carefully research OHS Regulation 859 Window Cleaning. This Regulation applies to employers, including contractors and sub-contractors, who supply window cleaning services, to workers who engage in window cleaning and to owners of buildings where a worker engaging in window cleaning may fall a vertical distance of three metres or more. Hiring of outside workers to perform these tasks has specific obligations to be met. Facility management must be aware that under section 4. (1) Every person who carries on the business of window cleaning or of supplying window cleaners shall register with a Director within thirty days of starting business while under section 8. every person who engages in window cleaning shall be at least eighteen years of age. Further, under section 7. (1) Before any worker begins window cleaning at a building for which a suspended scaffold, boatswain's chair or similar single-point suspension equipment is used, every employer, contractor and sub-contractor who proposes to carry out window cleaning at the building shall give notice of the proposed window cleaning by telephone to an inspector in the office of the Ministry of Labour that is nearest to the building. See more at:

<https://www.ontario.ca/laws/regulation/900859>

Daylighting may provide the energy saving objectives of the architect's design, but will only be a true ongoing benefit if properly maintained. Facility management must remind senior decision makers that every savings has ongoing maintenance costs that cannot be neglected.