CHAPTER/REGIONAL TECHNOLOGY AWARD - SHORT FORM

1. Category - Check one and indicate New, Existing, or Existing Building Commissioning (EBCx)

☐ Commercial Buildings	☐ New	☐ Existing or	☐ EBCx
Institutional Buildings:			
☒ Educational Facilities	☒ New	☐ Existing or	☐ EBCx
☐ Other Institutional	☐ New	☐ Existing or	☐ EBCx
☐ Health Care Facilities	☐ New	☐ Existing or	☐ EBCx
☐ Industrial Facilities or Processes	☐ New	☐ Existing or	☐ EBCx
☐ Public Assembly	☐ New	☐ Existing or	☐ EBCx
☐ Residential (Single and Multi-Family)			

2. Name of building or project: Loyola University Schreiber Center (QSOB)

City/State: Chicago, Illinois

3. Project Description: New Construction - MEPFPIT

Project Study/Design Period: 02/2013 (Begin date (mm/yyyy)) to 08/2015 (End date (mm/yyyy))

Percent Occupancy at time of submission: 100%

4. Entrant (ASHRAE member with significant role in project):

a. Name: McLauchlan, Donald J. Malone, Brian M. Langille, Dustin K.
(Last / First / Middle)

Membership Number: 5062094 (DJM), 8050506 (BMM), 8155517 (DKL)

Chapter: Illinois

Region: VI

b. Address (including country): 30 N. Wolf Road, Second Floor

City	State	Zip	Country
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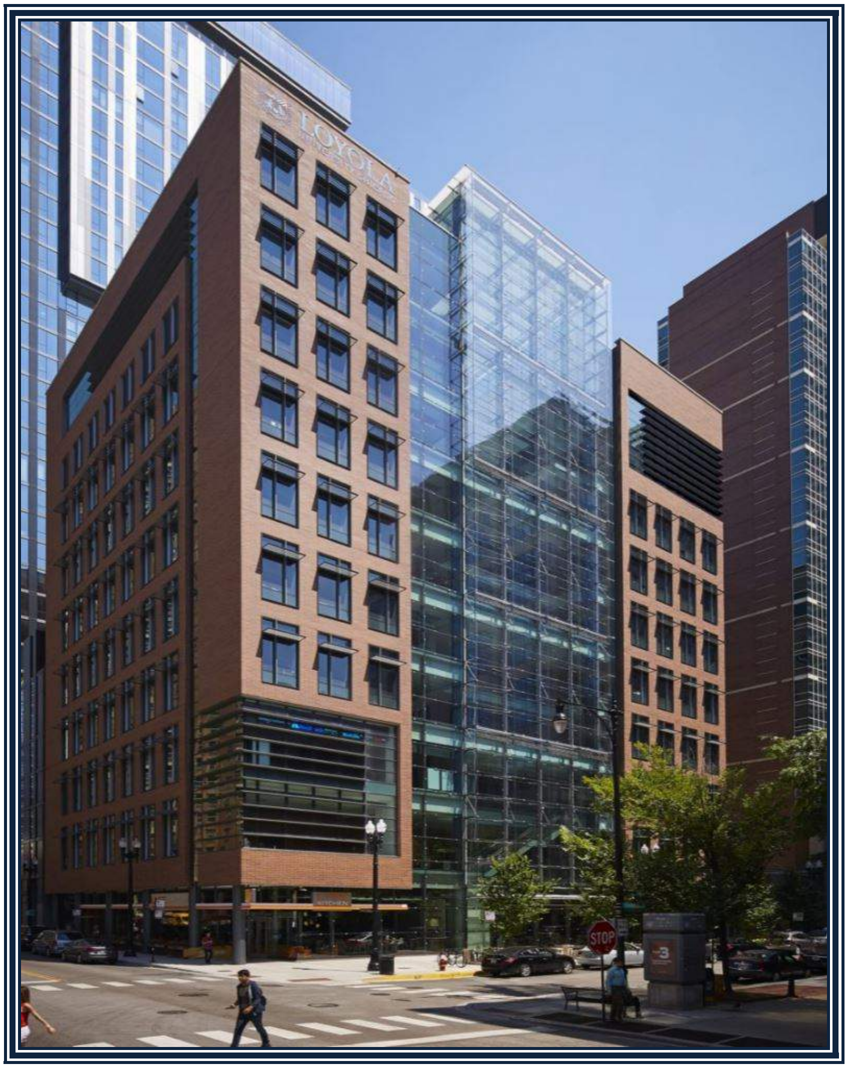
c. Telephone: (O) (708) 236-0300 d. Email: dmclauchlan@elaraeng.com

e. Member's Role in Project: Principal (DJM), Project Engineer (BMM), Mechanical Engineer (DKL)

f. Member's Signature: Donald J McLauchlan

5. Engineer of Record: Donald J. McLauchlan

By affixing my signature above, I certify that the information contained in this application is accurate to the best of my knowledge. In addition, I certify that I have discussed this entry with the owner and have received permission from the owner to submit this project to the ASHRAE Technology Awards Competition.



Loyola University – Water Tower Campus
The John and Kathy Schreiber Center
Quinlan School of Business

By Elara Engineering

Located at 16 East Pearson Street on Loyola University's Water Tower Campus, the John and Kathy Schreiber Center building stands at a height of 10-stories and provides 120,000 sq. ft. for the Quinlan School of Business (QSOB). The newly constructed mid-rise building houses classrooms, faculty offices, and multipurpose rooms and gathering spaces focused around a full-height atrium at the building's center.

In 2013, Elara Engineering was called upon to design the mechanical, electrical, plumbing, fire protection and information technology (MEPFPIT) systems for the sustainable, high-performance new academic building. The basis of design for Schreiber Center includes a dual temperature loop designed around mild hydronic temperatures to maximize the efficiency of the condensing boiler plant and magnetic bearing chillers. This was achieved through the use of low mass radiant heating and cooling ceiling panels in the classrooms and chilled beams in the offices. In addition, the building utilizes a semi automated natural ventilation system and daylight harvesting with the goal of achieving a rating of LEED Gold for the building. Elara's innovative design techniques used active and passive systems to effectively provide heating, cooling and ventilation for the facility.

One of the University's goals was to optimize the new building's energy performance, despite the large south facing glass exposure and skylights which were incorporated to emphasize natural light throughout the spaces. Schreiber Center's most prominent architectural feature is the full-height atrium located centrally within the building, serving as a space of connectivity for building occupants while introducing air and light into the building's core. The solar heat gain during the cooling season was minimized by an automated motorized shading system within the ventilated double façade on the south facing glass of the atrium. When the sun is imposing a load on the south façade, the blinds are deployed to avoid direct beam radiation into the space while maximizing diffused light for daylight harvesting. The solar radiation is trapped between the two layers of energy efficient glass and naturally vented out through motorized windows at the top and bottom of the solar chimney. Any direct solar that makes it into the atrium is absorbed by the chilled slab which also acts as the primary heating for the atrium in the winter.

Schreiber Center was designed with the capability to operate in natural ventilation mode when outdoor temperature and humidity conditions are desirable. All private offices contain manually operated windows and all classrooms, public gathering spaces, the double façade, and the atrium skylights are equipped with automated motorized windows. When the building is operating in natural vent mode, all motorized windows are opened and natural cross ventilation is achieved. The atrium space was designed such that operable windows transfer air from the perimeter offices and classrooms to the central atrium where it is exhausted out of the building through skylights at the top of the atrium. In this mode, fans and mechanical cooling are shut off. A major design challenge for this project was providing smoke control in the event of fire with the large atrium. The smoke exhaust fan ties into the skylight and is equipped with a variable frequency drive (VFD) that also operates during fan-assisted natural vent mode.

Schreiber Center was designed for demand controlled ventilation (DCV) utilizing a dedicated outside air system (DOAS) with heat recovery when not in natural ventilation mode. This system utilizes three variable air volume (VAV) DOAS air handling units that are each equipped with an energy recovery wheel capable of recovering 75% of the energy from the. Each DOAS AHU supplies air to VAV boxes on each level of the building controlled by CO_2 sensors in each zone. These units are also the primary dehumidification for the building and each space is equipped with humidity sensors. The control system provides an added layer of safety by resetting the chilled water temperature if the dew point in any space approaches the supply temperature to the chilled beams and chilled ceilings to prevent condensation.

Every aspect of Schreiber Center was developed under the primary design philosophy of connectivity. This is exemplified in the atrium with the incorporation of the Gorman Great Stairs, a dynamic space on the ground floor where students can congregate for a multitude of purposes. To optimize comfort, every stair contains a dual temperature radiant slab and utilizes a displacement air system with air delivered via a plenum under the stairs. This also takes advantage and promotes the mild hydronic temperatures of the dual temperature loop.

Schreiber Center utilizes two different systems to provide mechanical space conditioning building – active chilled beams and radiant ceiling panels. Active chilled beams installed in offices rely on high efficiency induction nozzles to induce room air through secondary coils. The chilled beams operate with a low static pressure requirement that allows for relatively smaller sized air distribution equipment. Additionally, multiple offices with similar exposures are grouped into zones and provided a primary air VAV box to shut off airflow when the zone is in natural ventilation mode.

Dual temperature radiant ceilings covering 80% of the ceiling surface are utilized in all classroom and multipurpose spaces. The radiant panels use the same variable speed two-pipe distribution system utilized by the chilled beams. The radiant ceiling cooling capacity is supplemented by supplying the ventilation/dehumidification air at cold temperatures. This has the added benefit of eliminating the need for reheat at the DOAS units. Radiant panels provide enhanced thermal comfort because a significant aspect of comfort is related to radiant energy exchange. The radiant panels allow occupants to feel comfortable at lower temperatures in heating and higher temperatures in cooling than in traditional air systems. By this same energy efficient design strategy, the first floor lobby and each floor of the atrium area are heated using a radiant slab. In addition to the energy savings resulting from greater allowable space temperatures, energy is also saved as a result of the marked decrease in transportation energy present when utilizing water as a transfer primary medium in lieu of air.

The Building Automation System (BAS) needed to be very robust to integrate all systems into an intelligent, smooth and functioning system. Schreiber Center uses a direct digital control (DDC) system to actively monitor and control all mechanical systems throughout the building. This system also controls the motorized blinds and windows in coordination with the mechanical systems. Thermostats notify occupants when windows are to be opened for natural ventilation mode by changing color.

Energy Efficiency: The use of high-efficiency equipment coupled with sustainable design and smart control contributes to a highly efficient building design. The incorporation of natural ventilation for “free cooling” during optimal periods, the use of radiant panels and chilled beam units to meet sensible loads and a DCV system with energy recovery represent additional energy savings.

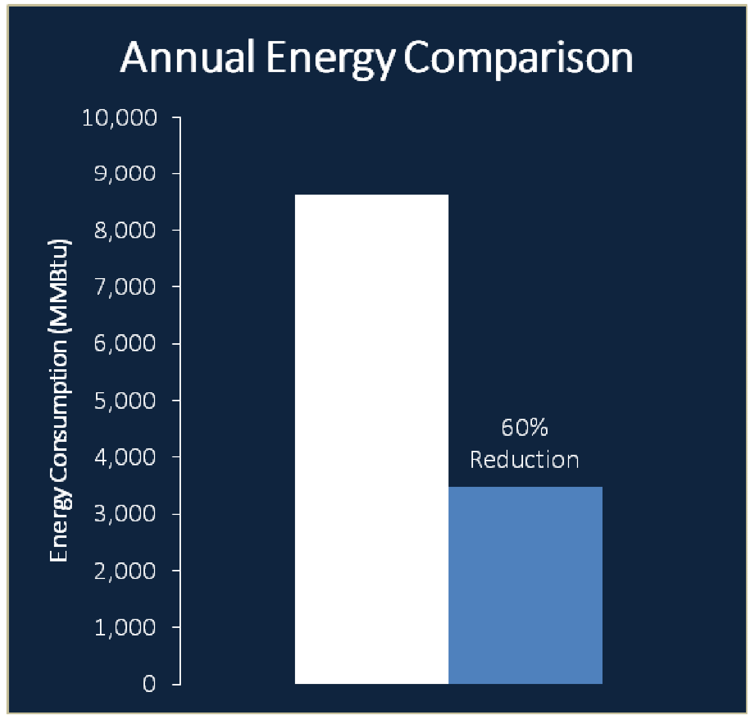
Indoor Air Quality: Natural ventilation and both occupant-controlled and automated operable windows maximized the ventilation effectiveness and indoor air quality throughout the facility. The atrium fresh air supply and motorized windows help to induce stack effect and actively ventilate the proper amount of air to maintain a comfortable building pressure and temperature. Schreiber Center meets ASHRAE 62.1 standards for IAQ and the City of Chicago ventilation code in all spaces by the aforementioned DCV system supplied by air handling units equipped with MERV 13 filters. The ability to consistently control building conditions also helps to maintain the façade and prevent infiltration while keeping occupants comfortable. The BAS also provides enhanced control of outdoor air and thermal comfort.

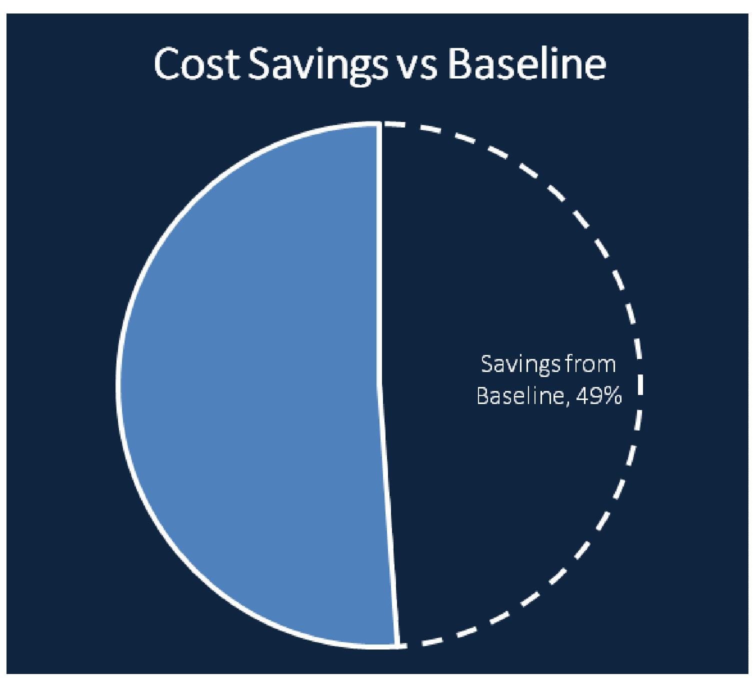
Innovation: The project used innovative sustainable design methods to create a building whose purpose was to cultivate connectivity with large, open, comfortable spaces while maintaining various methods of energy efficient mechanical design strategies.

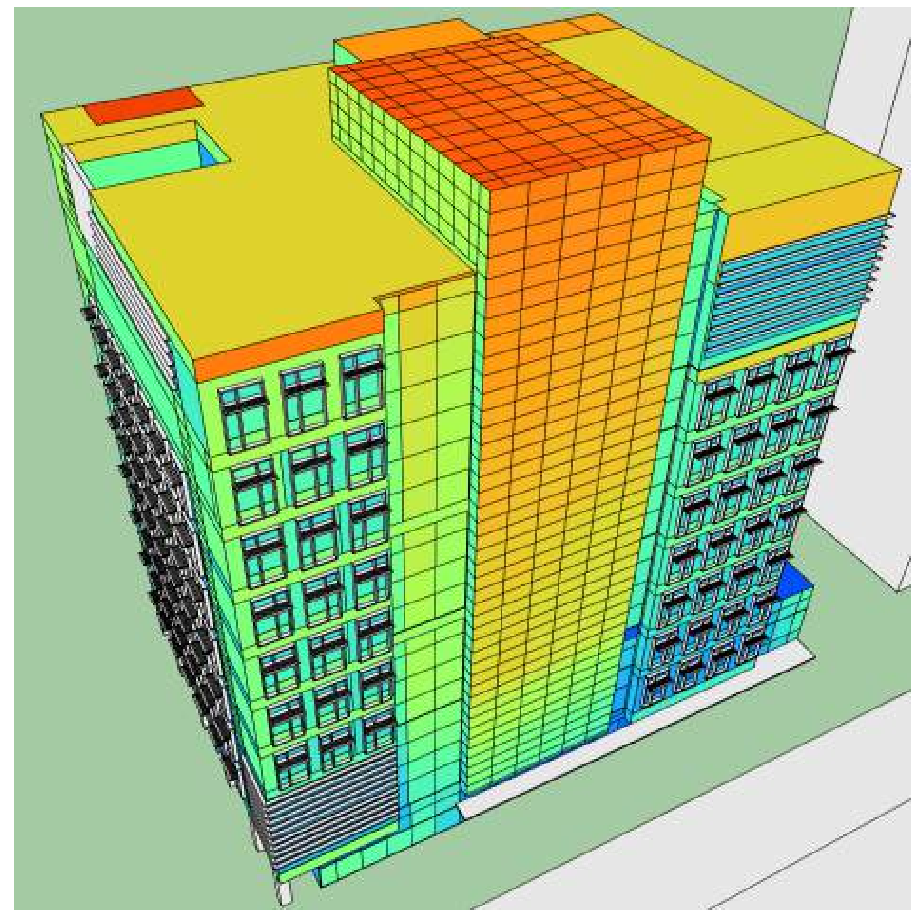
Operation and Maintenance: The installation of energy efficient equipment with automated control and active central monitoring contributes to enhanced operation, maintenance and reliability. The remote BAS monitoring system provides the ability to monitor and vary the output of mechanical systems in real-time. Chilled beams allow for passive recirculation of room air to avoid the need to maintain fans local to each zone. Similarly, the tight envelope construction and building pressurization control along with natural ventilation slows the process of deterioration to the building façade minimizing potential maintenance.

Cost Effectiveness: Schreiber Center’s equipment selection was centered on sustainable design and high energy performance. Cost savings are realized in the annual energy reductions reflected in building operation. Because this is a newly constructed facility, the design intent was to install systems and features that would outperform conventional measures in both efficiency and service life.

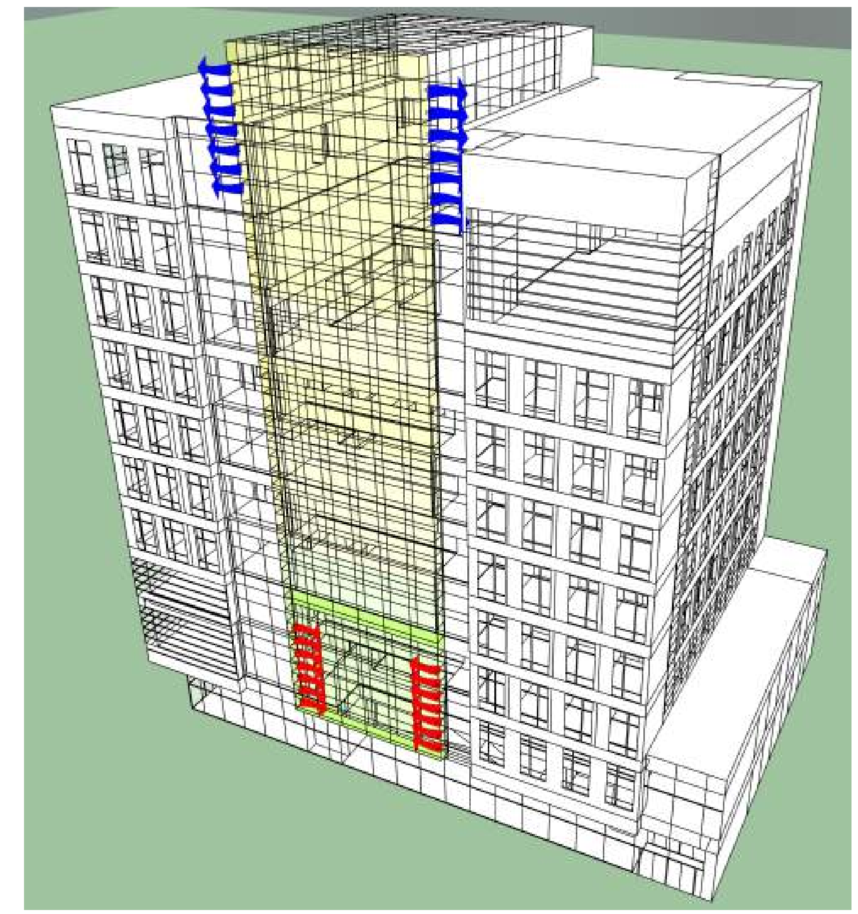
Environmental Impact: The selection of high efficiency equipment and sustainable systems minimized the overall utility input to the building. The operational abilities of the discussed mechanical systems significantly minimized energy costs that would otherwise be present in a conventional HVAC system. This translated into a clear reduction in the amount of harmful emissions expelled into the atmosphere.







Energy Model – Solar Loads



Energy Model – Atrium Natural Ventilation