

YORK REGIONAL POLICE INVESTIGATIVE AND SUPPORT SERVICES FACILITY

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Category A: Buildings

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YORK REGIONAL POLICE INVESTIGATIVE AND SUPPORT SERVICES FACILITY

PROJECT OWNER



PROJECT CLIENT



CONSULTANTS



MMM GROUP



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Associates Limited
engineering · environment · infrastructure



Halsall



A.W. HOOKER



Project Highlights

YORK REGIONAL POLICE INVESTIGATIVE AND SUPPORT SERVICES FACILITY

York Regional Police Investigative and Support Services Facility

Project Highlights

York Regional Police identified the goal of consolidation into a single, integrated building all of the police force's investigative and support services in the Region. Although primarily an administration building, the 230,000 square foot facility located in Aurora, Ontario will ultimately house the major crimes unit, forensic identification labs, auto-cargo, fraud, traffic, emergency task force support and canine units for the region's police force. The project owner was York Regional Police while the project client was Parkin Architects Limited.

The client's objectives for this project included reduction of costs by consolidation of services from four facilities, development of resource-efficient, sustainable building systems designs that will achieve LEED Silver certification, provision of a workplace with a quality working environment for staff and provision of a highly reliable and secure facility which will allow York Region Police to provide improved level of services to the community.

The challenge was design of a facility which would showcase York Region's focus on sustainability while addressing the need for a flexible, inviting, quality work environment in a discreet, highly secure and reliable facility. The solution to the need for multiple, diverse uses was met through the creation of building systems which were flexible enough to adapt to the building's needs while meeting the requirements of LEED Silver certification for sustainability.

MMM Group Limited applied an integrated design services model, providing mechanical, electrical, structural, and security engineering services as well as landscape architecture input to the building architect. Close coordination between all disciplines allowed for the level of complexity which would result in achievement of the project objectives.

In addressing the goal of an **environmentally sustainable, energy efficient facility**, the team designed structural systems that maximize natural light penetration deep into the building, using a soaring, column free, south-facing atrium and three storey stairwell bathed in light from skylights. Building management systems utilize occupancy light sensors for maximum energy efficiency. The Heating, Ventilating and Air Conditioning system (HVAC), typically responsible for 70% of a typical commercial building's energy consumption, has been designed to optimize energy performance, through incorporation of designs which allow for transfer of heat and humidity from exhausted building air to the incoming air, reducing the need for additional cooling in the summer and heating in the winter. Mechanical systems which utilize underfloor ventilation provide high ventilation effectiveness by preventing short-circuiting of airflow delivery and remove exhausted air through ceiling located return air grilles. The increased efficiency of the HVAC system contributed towards credits towards LEED certification.

York Regional Police Investigative and Support Services Facility

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Additional environmentally sustainable features of the facility include a green roof area over Level 1, which provides a stormwater management function and, through careful plant selection, eliminates the need for an irrigation system.

In the pursuit of a **flexible use building design, with 24/7 operations capability and secure, reliable facility characteristics**, the team deployed an integrated security system and emergency power systems which incorporate load shedding and power redundancy. Specific structural and mechanical designs achieve 'post-disaster' operational capabilities while providing flexibility in space programming, with incorporation of the raised floor system for infrastructure distribution and the large column-free spaces. Highly specialized functions such as forensics imaging are accommodated in various parts of the building through specialized lighting, HVAC, and power systems.

The challenge of developing a **high quality work environment for building occupants** was met through application of a range of innovative technologies and systems. Daylight light sensors maximize use of natural light in the building which penetrates deeply into facility's spaces in large measure related to the structural designs. Specialized highly functional lighting is utilized for specific task areas. Occupant comfort and well-being is optimized by an HVAC

system which allows for precise control of air quality, temperature, and fresh air mix while incorporating individual zone air control. An integrated security system enhances security and attractive, flexible common spaces encourage interaction between staff.

MMM Group's integrated design services approach contributed to the achievement of an environmentally responsible and resource efficient building design that enhances the social fabric of the local community and the larger York Region. The successful consolidation of many diverse police services into one high quality work environment provides a powerful showcase of engineering excellence.

The background of the entire page is a low-angle architectural rendering of a modern building. The building features a prominent grid of windows and balconies, with a mix of light blue, white, and grey tones. The perspective is looking up at the building, creating a sense of height and scale. The sky is visible through the windows, showing a clear blue color with some light clouds.

Full Project Details

YORK REGIONAL POLICE INVESTIGATIVE AND SUPPORT SERVICES FACILITY



Project Details



Rendering of
south facing
façade at night

Meeting and Exceeding Client's Challenging Program

Innovative, practical design solutions were required to ensure the client's objectives were met. MMM Group Limited applied an integrated design services model to the facility's engineering design, providing mechanical, electrical, structural, and security engineering services as well as landscape architecture input to the building architect. Close coordination between all disciplines allowed for the level of complexity which would result in achievement of the project objectives. All program requirements were successfully met and the first phase of building occupancy commenced in late 2010.



Raised floor system distributes HVAC, power and IT infrastructure to building areas

Technical Excellence and Innovation

MMM Group's emphasis on design of advanced energy efficient building systems ensures that the facility will reduce impacts on the environment while providing energy savings over the life of the facility. Specific building system designs enhance the quality of the work environment for building occupants and the reliability and security of the facility.

The building's mechanical system design includes a raised floor system to efficiently distribute HVAC, power and IT infrastructure to building areas, providing flexibility for changing uses of the spaces over time and easy accessibility. The under-floor air distribution system is controlled by a building automation system for accurate operation, offering superior air quality in occupied spaces and, again, providing flexibility for future program changes as diffusers at floor level can be relocated to suit the space and furniture layouts.

Distribution of mechanical services on floors with seismic restraint provision was carefully coordinated to achieve optimum ceiling space while the central plant areas were carefully selected to allow for optimized performance of the major equipment along with considerations of floating floors and acoustic performance.

With a 3.5 m ground elevation difference from north to south, the structural design incorporated the seismic forces generated in the soil and the unbalanced soil pressure on the perimeter basement wall into the foundation and basement wall design which, in addition to use of a concrete building system, successfully achieved seismic 'post disaster' facility designation.

Structurally, the facility features a column-free, three-storey atrium with a 9m canopy cantilevered from the top of the atrium. Structural framing utilizing structural steel columns with built-up tapered steel beams was incorporated to satisfy functional and aesthetic requirements. On the ground floor, development of the

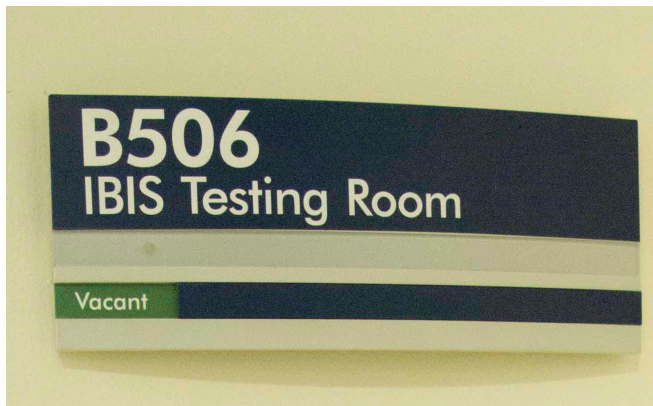
18mx18m column-free multi-purpose room was accomplished using a Vierendeel truss type concrete wall on the level above. A three-storey atrium stairway, cantilevered out from the floor framing members without supporting columns, minimizes visual obstruction.

The tall south-facing atrium allows natural light to penetrate deep into the structure, providing an inviting work environment and energy savings due to the reduction of interior lighting demand through maximum daylight harvesting. The main lighting system is a low voltage system that incorporates daylight and occupancy sensors to reduce energy usage, and lower building operating costs. Specialized lighting fixtures which simulate sunlight and daylight conditions were utilized in specific areas of the facility such as forensic imaging areas, for enhanced visual perception and evidence evaluation.

Energy efficient mechanical designs which enhance the facility's energy efficiency include use of high efficiency hydrofluorocarbons (HFC's) chillers and a high efficiency instantaneous gas fired domestic hot water heater, low flow water conserving plumbing fixtures, an outdoor air economizer which provides up to 100% free cooling during shoulder seasons, and energy recovery of exhausted air to condition incoming fresh air.



Feature Stairway –
Column free design
with daylight
penetration



The highly integrated building system supports the forensic laboratory work in concert to coordinate the mechanical, structural, electrical and security components of the high tech facility





Complex Challenges

Close coordination between the mechanical, structural, electrical and security disciplines allowed for the level of complexity required for the range of specialized services housed in the facility.

Mechanical systems supporting the forensic laboratory provide an example of the level of building system complexity. The supply air system delivers air with a directional flow pattern for personnel protection and to ensure that a large volume of air enters the room without mixing with the contaminated room air. The exhaust system for fume hoods and biosafety cabinets incorporate state-of-the-art controls and monitoring, emergency power supplies and alarm systems. Negative pressure is maintained and monitored in the laboratory area to satisfy the relative room pressurization requirements. Incorporation of two air handling units serving the basement level provides redundancy and allows the laboratories to remain operational at reduced capacity in case of equipment failure or maintenance.

Since the facility has various functional programs in which the occupant activity levels are dramatically different, carbon dioxide monitoring is undertaken at numerous sampling locations to provide feedback to the HVAC system.

Indoor concentrations of CO₂ are compared to those outdoor and a determination is made of the differential point at which ventilation rates should be adjusted. This aspect of the HVAC system ensures optimized indoor air quality and long-term occupant comfort and well-being.



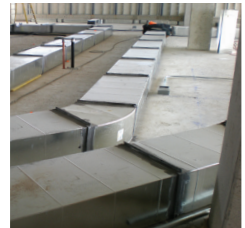
Atrium space with radiant floor heating, daylight sensors and column free design

con't Complex Challenges

Complex electrical systems were similarly designed to provide a quality work environment for building occupants while meeting LEED Silver efficiency targets and maintaining a high level of reliability. The emergency power generating system, for example, provides fully synchronized emergency power to all building services for a 72 hour period in the event of loss of power to the facility. In the event of failure to one of the generators, the generator control system will automatically transfer essential or critical building services to one of the generators and load-shed the remaining non-essential building services from the system.

As with mechanical and electrical systems, the security system incorporates a high level of complexity to support the facility's functions while being minimally intrusive to the ongoing building operations. Various security sub-systems such as access control, closed circuit television and intercom are integrated into a cohesive, seamless system which is maintained as a critical building service in the event of power failure.

Displacement ventilation system installation





Outdoor site lighting design minimizes or eliminates light trespass onto the adjacent properties



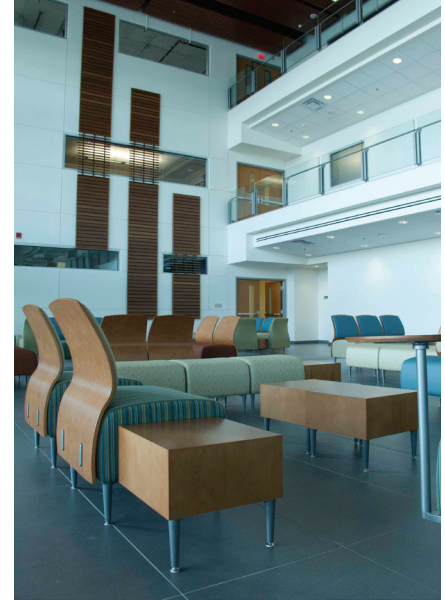
Exterior view
of south facing
atrium façade

Economic and Social Benefits/ Environmental Impacts

The facility's structural, mechanical, electrical, security systems and landscape architecture were designed to provide a quality work environment for building occupants and to facilitate a positive relationship with the surrounding community.

The state-of-the-art facility allows York Regional Police to provide a high level of policing services to the surrounding community while minimizing impacts on local infrastructure. Outdoor site lighting design minimizes or eliminates light trespass onto the adjacent properties while incorporation of drought tolerant plant materials into the landscaping eliminates the need for a permanent irrigation system and provides stormwater management benefits to the community.

The three-storey column-free atrium and glazing curtain wall provides aesthetically pleasing and flexible spaces for social interaction between employees. Development of the roof garden over the ground level spaces adjacent to the atrium provides employees and visitors with an inviting natural environment and additional amenity spaces for public and private functions.



Three-storey atrium, skylight, and glazing curtain wall provides aesthetically pleasing and flexible spaces for social interaction between employees



Vents in raised floor ventilation system act to optimize the indoor air environment



Forensics Imaging Laboratories – Radial air flow arrangement with space pressure control and monitoring



can't Economic and Social Benefits/Environmental Impacts

Introduction of the raised floor mechanical system in conjunction with air quality monitoring and intricate zone control optimizes the building's indoor air environment. Air is introduced into the room at floor level while hot air is removed from the room through the return air grilles located on the ceiling. Working with the natural buoyancy of the air, a portion of the heat gain from the occupants,

lights and office equipment is removed from the space before it adversely affects the temperature of the occupied zone. This system provides high ventilation effectiveness by preventing short-circuiting of airflow delivery. Similarly, incorporation of an HVAC enthalpy wheel, which transfers heat and humidity from the exhaust air to the incoming outdoor air, reduces the need for additional cooling in the summer and heating in the winter, contributing significantly to energy conservation and to earned credits towards LEED certification.

Raised floor system distributes HVAC, power and IT infrastructure to building areas



Original rendering and photo of finished facility interior with daylight harvesting

con't Economic and Social Benefits/ Environmental Impacts

Light penetration deep into the building as a result of the atrium design combined with daylight sensors results in effective daylight harvesting and maximizes the natural light environment. As the facility is operational 24/7, consideration was given to outdoor lighting visible from within the facility and 'dark sky' friendly exterior wall mounted and pole luminaires were utilized. With the deployment of a fully integrated security system and with back-up power systems for critical building systems, occupants of the building are able to enjoy work in a safe and secure environment.

The overall achievement of MMM Group's integrated design services approach, providing key engineering design services for the facility, has been an environmentally responsible and resource efficient building design that enhances the social fabric of York Region. The showcase facility consolidates a range of diverse police services into one state of the art facility, while providing a high quality safe and secure work environment for building occupants and contributing a high level of services to the immediate community and the wider York Region population.

YORK REGIONAL POLICE INVESTIGATIVE AND SUPPORT SERVICES FACILITY

CATEGORY A: BUILDINGS



SUSTAINABLE FACILITY

PROGRAM OBJECTIVES

- » Energy efficiency and reduced operational costs
- » LEED Silver certification

SOLUTIONS

- Structural design maximizes natural light penetration
- Occupancy sensors in building management system
- HVAC system energy capture to condition makeup air
- HVAC system incorporating individual zone air control
- Green roof enhances community stormwater management
- Green roof plant selection eliminates irrigation system

QUALITY WORK ENVIRONMENT

PROGRAM OBJECTIVES

- » Attractive facility, with common spaces to facilitate building occupant interaction
- » Optimum air and lighting quality
- » Safe, secure work environment
- » Flexible space programming

SOLUTIONS

- Inviting common spaces for occupants
 - column-free, south facing atrium
 - stairway / lightwell with minimal visual obstruction
 - green roof garden area
- Atrium and lightwell maximize natural light penetration into facility
- Daylight sensors maximize natural light
- Specialized lighting for specific task areas
- ‘Dark sky’ friendly exterior
- HVAC system incorporates individual zone air control
- HVAC precise control of air quality, temperature and fresh air mix
- Integrated security system enhances security
- Mechanical/ Electrical systems for efficient space programming



FIT-FOR-PURPOSE DESIGN

PROGRAM OBJECTIVES

- » Efficiencies inherent in consolidation into one police services facility
- » Flexible space programming for future uses
- » Discreet, secure, reliable facility
- » Post-disaster operations capable
- » 24/7 operations
- » Design to address specialized requirements

SOLUTIONS

- Building systems provide flexibility in space programming
 - Raised floor system for HVAC, power and IT infrastructure distribution
 - Large column-free spaces
- Design for specialized functions such as forensics imaging
 - Lighting/ air quality and ventilation/ emergency power
- Structural/ Mechanical/ Electrical systems achieve seismic ‘post-disaster’ operational capabilities
- Emergency power system incorporates load shedding and redundancy
- Integrated security system provides secure facility 24/7



GOOD NEIGHBOUR

PROGRAM OBJECTIVES

- » Facility design that will make a contribution to neighbouring community

SOLUTIONS

- Building services designs which result in showcase facility for York Regional Police
- Outdoor lighting design minimizes light trespass onto adjacent properties
- Green roof enhances community stormwater management