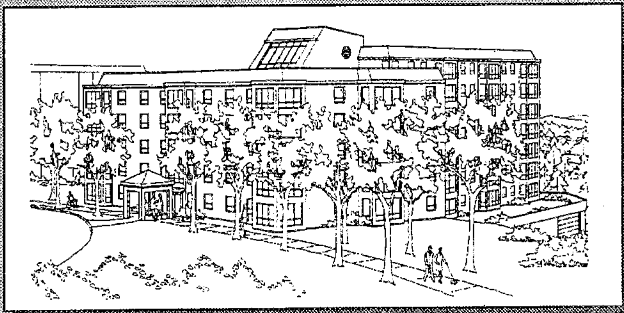
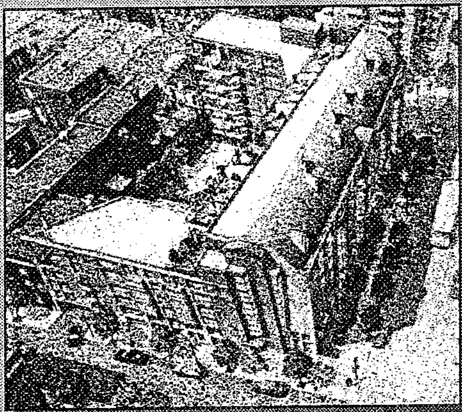
IDEAS CHALLENGE

REGIONAL • FINALISTS

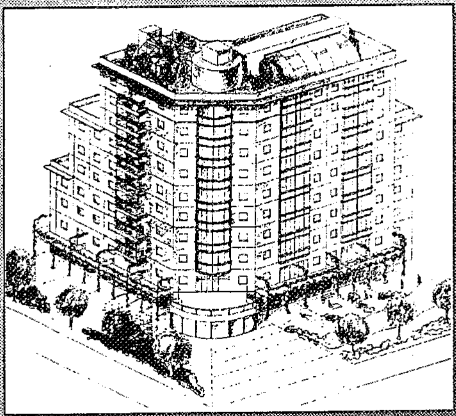
I NTEGRATED
D URABLE
E NERGY EFFICIENT
A FFORDABLE
S OLUTION



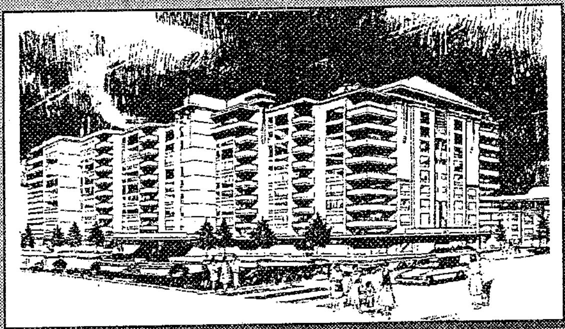
ATLANTIC FINALIST



QUÉBEC FINALIST



ONTARIO FINALIST



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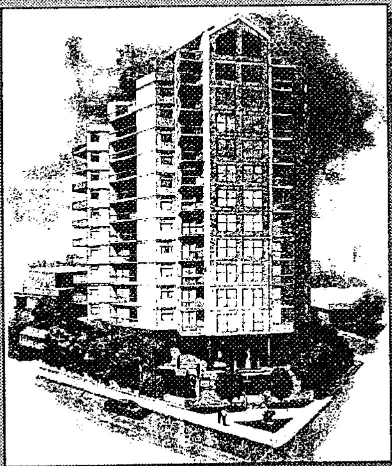

B.C. FINALIST

IDEAS CHALLENGE

CMHC SCHL
Helping to house Canadians
Question habitation, comptez sur nous

Canada

Natural Resources Canada
Ressources naturelles Canada

CANMET
C-2000

This document represents the first technology transfer initiative conducted under the banner of the **IDEAS** *Challenge*. As the projects are further developed in the coming months, and as they move into construction, the project sponsors will continue to inform the construction industry of innovations in the high-rise residential sector. For up-to-date information on the **IDEAS** *Challenge*, contact Sandra Marshall at (613) 748-2660.

CMHC SCHL
Helping to house Canadians

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Ressources naturelles Canada

CANMET
C-2000

Hydro-Québec

ONGA
ONTARIO NATURAL GAS ASSOCIATION

ONTARIO NEW HOME
WARRANTY PROGRAM

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Canada

Cette publication est aussi disponible en français.

ABOVE THE REST
High-rise Housing in Canada

For a nation that dreams of the suburban detached house, it's amazing how much we've come to depend on the high-rise.

Nearly one in ten Canadian families — 1.6 million people in all — lives in a building of five storeys or more. The 900,000 high-rise housing units across the country reflect all price levels and every sort of tenure, from low-income social housing, rental units and co-operatives through to luxury condominiums. In financial terms, high-rise buildings are a national asset worth several billion dollars.

In short, high-rises form an important part of Canada's housing infrastructure. In the last few years, however, it has become evident that there's room for improvement in the way these buildings are designed, constructed and operated.

In one recent year, for example, the Ontario New Home Warranty Corporation paid out nearly $20 million dollars for repairs to moisture related damage to high-rise condominiums. The buildings in question were less than two years old. Builders and developers across the country are being increasingly challenged in the courts by building occupants to rectify structural problems in high-rise buildings.

Improvements are justified in other aspects of high-rise buildings. Despite having fewer exposed surfaces, an average high-rise apartment unit uses more energy than a detached house of the same size. Indoor air quality in high-rise units is often poor. And despite their potential as low-cost, accessible housing for people with disabilities, most high-rise buildings aren't designed for the special needs of residents who are blind, deaf, or who use wheelchairs.

Better practices are available. Research conducted by governments and the private sector has led to the development of new products, systems and techniques that can significantly improve the durability and performance of high-rise buildings. While some of these emerging approaches may initially be more expensive than conventional practices, over the long term they can significantly reduce building operating and maintenance costs.

In most cases, however, these systems and techniques aren't being used in the design and construction of new buildings. There are a number of reasons. Adopting a new and untried technology always involves an element of risk. That risk is magnified by the high cost of high-rise construction. There's often a shortage of real-world experience with these new ideas. And even when new techniques and technologies have proven successful, many potential users aren't aware of that success.

The **IDEAS** *Challenge* seeks to change all of that. A joint initiative of Canada Mortgage and Housing Corporation (CMHC), Natural Resources Canada (NRCan) and with the support of other sponsors (Hydro Québec, Ontario Natural Gas Association and Ontario New Home Warranty Program), the *Challenge* called on design teams and developers from across the country to create proposals for high-rise buildings that meet high standards for envelope durability, energy efficiency, indoor air quality, environmental impact and accessibility.

This magazine describes the best of those designs — five finalists, one from each region of the country. What you will see on the following pages is not theoretical, experimental design, but a reflection of what can and will be built today, using materials and techniques which are already available. These projects represent what the high-rise buildings of the future — the immediate future — are going to look like.

WHAT'S INSIDE

IDEAS CHALLENGE

CHALLENGE STRUCTURE

The **IDEAS** *Challenge* has been developed to demonstrate the benefits of improved design, construction and operation of high-rise buildings. This is not merely a design competition — the sponsors and participants expect to see the finalist projects built, financed, marketed and occupied. By combining the free-thinking conceptual elements of a design competition with the pragmatic realities of constructing, financing and marketing demonstration projects, the project sponsors have presented a challenge to designers, builders and developers alike.

The *Challenge*, which was accepted by 26 teams across the country, was to design a high-performance building which met demanding performance requirements within the parameters of market realities.

Preliminary Design Briefs submitted by 26 participating project teams underwent a thorough technical review prior to evaluation by a Jury. The panel of six independent jurors included:

Dan Hanganu
Architectural Chair

Pamela Cluff, Architect
Accessibility Specialist

Ray Cole, Professor of Architecture
Environmental Specialist

David House, Developer
Addison Properties

Rick Quirouette, Architect
Building Envelope Specialist

Bob Tamblyn, P.Eng
Mechanical System Specialist

The Jury selected a finalist from each of the five regions — B.C., the Prairies, Ontario, Québec and the Atlantic Provinces. The finalists include:

➢ **Lacewood Arms**, Halifax, Nova Scotia
Clayton Developments Ltd.
Dan Goodspeed, Architect

➢ **Le Clos St-André**, Montréal, Québec
Groupe Archi Plus Inc.
Jacques Béïque, Architect

➢ **Emerald Gate**, Vaughan, Ontario
Strasser Group of Companies
Doug Pollard & Jiri Scopek, Architects

➢ **Columbus House**, Sherwood Park, Alberta
Sherwood Columbus Club
A. M. Holland, Architect

➢ **The Cosmopolitan**, Victoria, B.C.
Aral Construction Ltd.
Bradley Shuya, Architect

Each of the finalist teams receives an award of $25,000.

Stage 2 of the *Challenge* (now underway) will require the development and preparation of more detailed plans. Teams will prepare comprehensive Project Reports with accompanying plans, sections, elevations and mechanical system schematics. The Project Reports will elaborate on the building systems and the project management, commissioning and operations plans designed to optimize building performance. The Reports will also provide detail on the financing and marketing aspects of the projects..

Stage 3 of the *Challenge* will involve the construction of those projects which meet the **IDEAS** *Challenge* objectives. Financial assistance from the *Challenge* sponsors, from provincial utilities and agencies, and from manufacturers and suppliers is currently being solicited. The projects will be monitored to validate performance of the building systems in relation to the *Challenge* objectives.

CHALLENGE OBJECTIVES

Project teams were guided in the development of their projects by a set of technical requirements established by the competition sponsors. Prescriptive and performance targets were established for envelope durability, energy performance, air quality, environmental impact and accessibility.

▩ ENVELOPE DURABILITY ▩

Challenge submissions were required to be more durable and require less maintenance than conventional structures, through better control of air and moisture movement through the building envelope. Projects had to reflect the use of new technologies and systems, including improved methods of envelope airtightness, pressure-equalized rainscreen designs and improved construction quality control and commissioning procedures.

▩ ENERGY EFFICIENCY ▩

Project teams were challenged to submit designs of buildings which use less than half of the energy of a conventional building. Using computer simulations, the project teams developed designs which use no more than 55% of the purchased energy of a reference building based on ASHRAE Standard 90.1.

Techniques and systems used to meet these targets included upgraded energy efficiency of the building envelope, enhanced performance of HVAC and service water systems, and the use of efficient motors, lighting and appliances. Energy management control systems to optimize building energy performance were a base requirement.

▩ INDOOR AIR QUALITY ▩ AND MECHANICAL VENTILATION

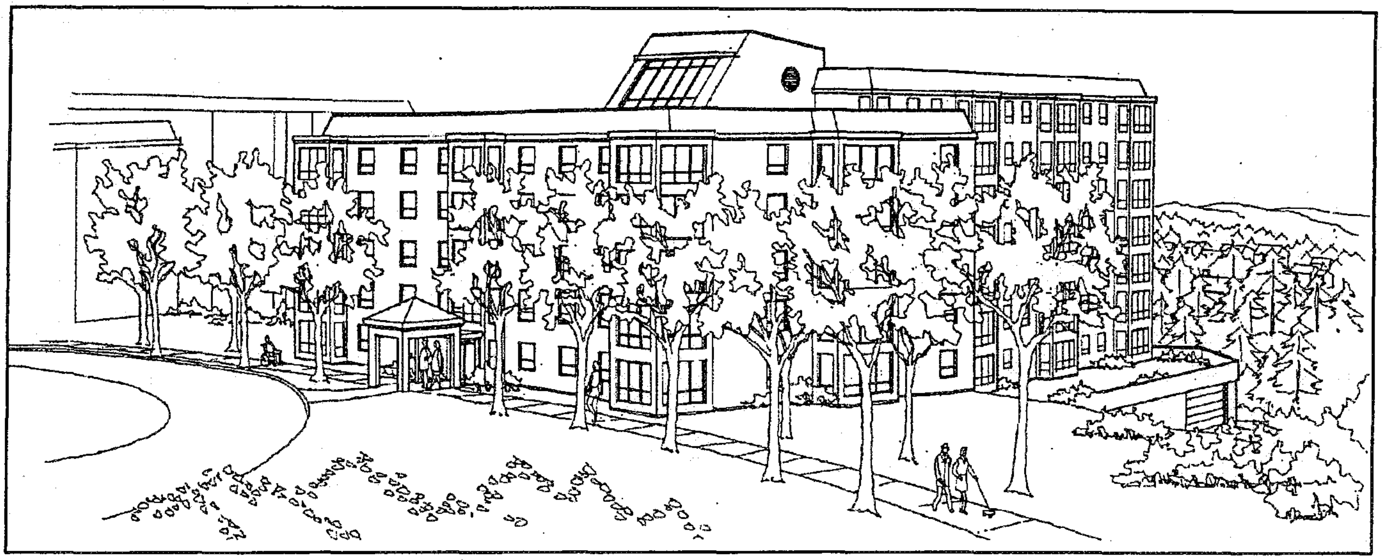
Projects were required to incorporate strategies to minimize contaminants, pollutants and irritants which affect building occupants. The design and installation of effective and efficient mechanical ventilation systems was a primary requirement of the *Challenge*. Buildings were designed to minimize the effects of wind pressures and stack effect on ventilation performance, demonstrating compliance with requirements for fresh air supply to all occupied areas of the building, and reflecting consideration of the effects of mechanical ventilation systems on building energy consumption.

▩ ENVIRONMENTAL AND ▩ RESOURCE CONSERVATION

Project teams had to demonstrate that high-rise buildings can be designed, sited, constructed, operated and maintained in a manner which will significantly reduce their impact on the natural environment. Project teams demonstrated their strategies for meeting environmental impact criteria governing protection of the site's natural systems and processes, protection of the ozone layer, and conservation of water and waste.

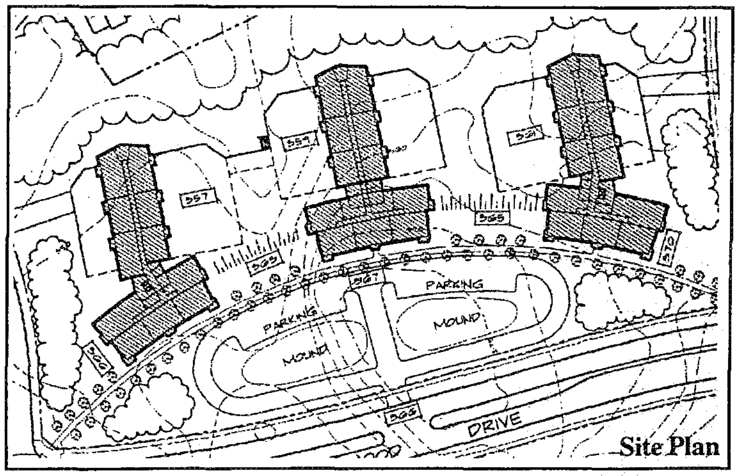
▩ ACCESSIBILITY AND ADAPTABILITY ▩

Accessibility and adaptability were primary objectives of the IDEAS *Challenge*. Projects demonstrated barrier-free access for people with disabilities (including those who use wheelchairs and those with seeing and hearing impairments), and provided for adaptability and choice as people age-in-place. Project designs reflected the objective of improving functional safety to reduce the risk of accidents when carrying out daily activities, as well as ensuring adequate emergency protection features.



LACEWOOD ARMS

A two hundred unit rental apartment development composed of three similar, seven-story buildings, each with an enclosed parking podium. The first building, the prototype, is the focus of this competition entry, while the second and third buildings offer the potential to refine and develop the innovative features.



Site Plan

SITE LOCATION

The project will occupy an eight-acre site located in phase two of Clayton Park West, the most recent expansion of the long established Clayton Park neighbourhood in the mainland north district of the City of Halifax. The site is a highly visible location immediately across from the northern boundary of the Mainland Commons, a 160-acre regional park. The siting on the highest land in the immediate area promises dramatic views, both toward the city and toward Dartmouth. As a planned mixed-use community, Clayton Park provides a wide range of cultural, commercial and recreation facilities within easy walking distance from the Lacewood Arms site.

DESIGN CONCEPT

Lacewood Arms is conceived as a prestigious residential development for the rental market. The total project is composed of two hundred spacious suites organized in three similar buildings, each incorporating an enclosed parking structure. Three 'T'-shaped structures are organized along a tree lined, barrier-free walkway connecting to the street sidewalk. Each building will contain 66 units organized in two compartments. A five-storey block abuts the walkway and generates street frontage, complementing the main entry to the Mainland Commons. This block is linked through a service component to a seven-storey block atop a single level, fully enclosed parking garage, accommodating 80 cars.

The parking structures are used to organize the north facing slope and provide a fully accessible and secure garden area. The buildings are to be finished in a brick veneer rainscreen, with punched window openings and topped by a metal-clad cornice. Large projected bay windows in each suite increase daylighting and capitalize on the impressive views from this building location.

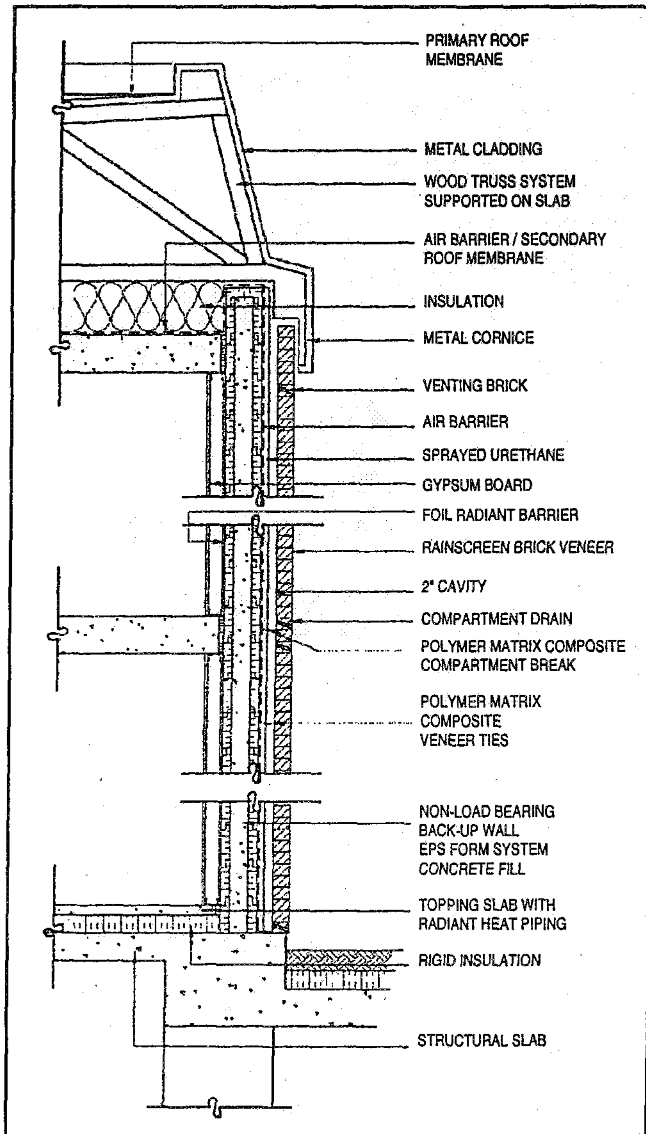
FINANCING AND MARKETING PLAN

The project is to be targeted at a mature population with a focus on aging-in-place. Spacious suites with efficient, user-friendly fittings and controls in a high profile, accessible location will appeal to the more sophisticated segment of the rental market. This target market will appreciate the leading-edge philosophy arising from this competition and the attendant publicity. In addition, a comprehensive public relations effort will be mounted locally to highlight this project. Value management and quality assurance principles applied to the entire project delivery process will ensure that maximum potential is realized.

Durable Building Envelope

The idea of forgiving design, or redundancy, is a key element in our conception of a durable building envelope. Recognizing that moisture, in its various forms, constitutes the major threat to the long-term durability of an enclosure system, redundancy is provided in the double roofing system and the fully supported and protected air barrier plane. Compartmentalization, as a strategy to counter climatic forces, will be integrated in the building plan, rainscreen detailing, and a dynamic environmental control system. New designs are proposed for a line of rainscreen brick — including special units conceived to provide cavity venting, and projecting elements to interrupt air flows across the cavity hardware to address the corrosion problems.

An EPS concrete form system incorporating fly-ash concrete is proposed for the cavity back-up wall to create an assembly with minimal thermal bridging, increased thermal mass and superior acoustic performance. Welded vinyl window frames and sashes with glazing selection based on facade orientation are proposed based on weathertightness, longevity and the practicality of the innovative features. A program of wind tunnel testing and full scale mock-up testing will be integrated in the design development process.

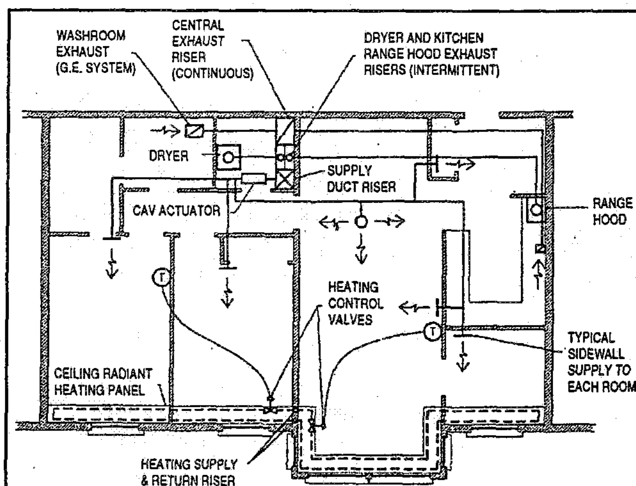


Typical Wall Section

Energy Efficiency

Practicality and simplicity are the keys to a 'sustainable' level of energy efficiency in this project. We propose to use proven technologies, applied in new and innovative ways to mechanical systems for high-rise residential buildings. A ceiling mounted radiant panel hydronic system, commonly used in office buildings, will be used for suite heating. Using the domestic hot water system to supply the perimeter radiant panels will be investigated. A grey-water heat recovery system, typically used in recreational applications, will be used to pre-heat domestic hot water. This system features a packaged heat exchanger/heat pump combination unit with an integral backwash cleaning system.

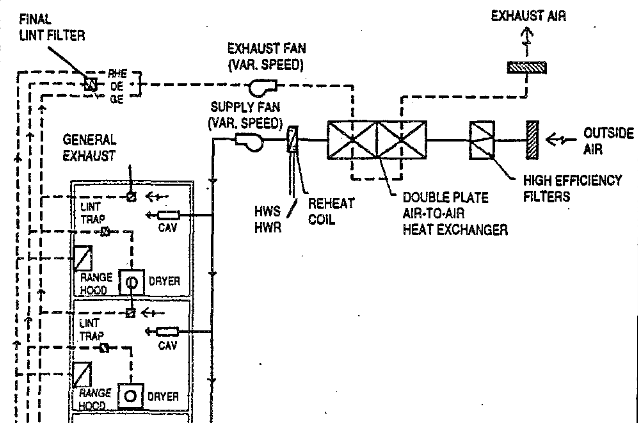
Pre-heating of ventilation air is the major energy demand of the building. To minimize this demand, we propose to use a combination of atrium solar gain and solar wall technology. The parking structure will be heated by an active solar system providing low grade heat to forced-flow unit heaters. Multiple zone outside temperature scheduling with operable window setbacks will improve system efficiency. The building planning will incorporate daylighting in all corridors, exits, and the parking garage. High efficiency light fixtures and lamps will be combined with motion sensors for common area lighting setback.



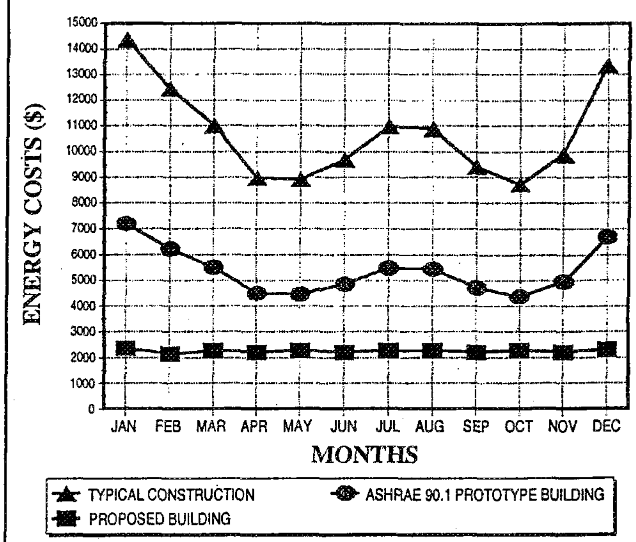
Typical Unit — Heating and Ventilation

IAQ, Ventilation and Occupant Comfort

To address the issues of indoor air quality, ventilation, and occupant comfort, our strategies include a combination of source control and intelligent building technology. Material specifications will be vetted against a standardized material selection checklist to identify and minimize potential IAQ problems. Static pressure monitoring and CO_2 tracer gas monitoring will allow the ventilation system to respond to IAQ dynamics. Central high efficiency filtering of ventilation air will be supplemented by additional in-line filtering in the individual suite. A terminal controller in each suite will allow control flexibility, while compartmentalization of the building will enable an expanded control logic. Direct monitoring of air flow to each unit will be combined with individual constant volume controllers to provide measured air delivery. "Star" configuration wiring in each suite will be used to maximize future potential for communication and building automation. A demonstration 'smart apartment' equipped with a "Totalhome" automation package is being considered.



Central Ventilation System

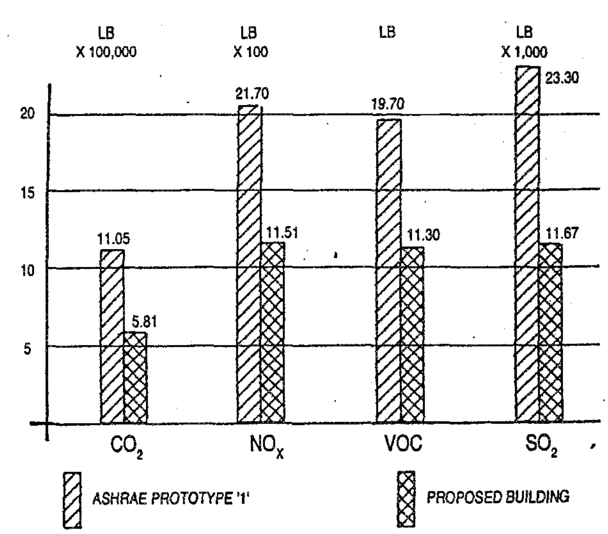


Comparative Energy Performance

Environmental and Resource Conservation

To be effective, environmental and resource conservation principles must be integrated within all design decisions. As part of a comprehensive Environmental Management Plan, the material selection checklist system will also be used to provide a basis for an environmental sensitivity assessment of all principal components. This assessment will include issues of reuse potential, sustainability, recycled content, embodied energy, and packaging waste in the value management process. Materials with a high recycled content, such as fly ash concrete and fibre reinforced gypsum board, will be preferred.

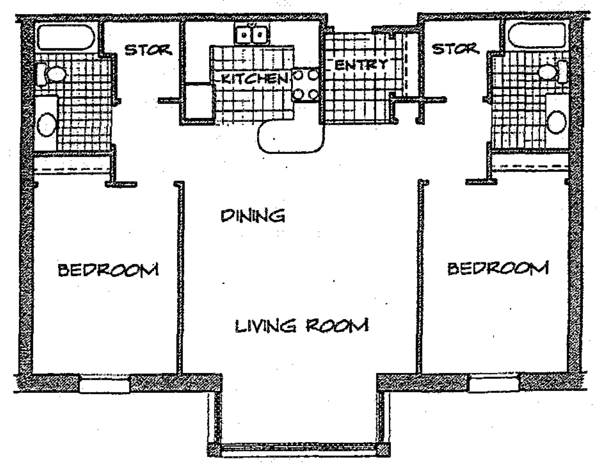
Incorporation of the environmental management strategies into the Tenant Manual (part of the O&M documentation to be produced by the design team) will foster understanding and participation of the end users in an on-going program. A dedicated waste reduction room will generate an organized approach to recycling household materials. An on-site, in-vessel rotating composting system is proposed to accommodate organic waste. The site planning will minimize disruption of the natural drainage patterns of the area, provide lawn areas and maximize opportunities for use of native plant materials.



Building Emissions Forecast

Accessibility/Adaptability

To the greatest degree possible, the principles of universal design will be applied throughout this project. The site plan features a barrier-free access path as a major organizing element. An atrium ramp linking the entry level with the podium level will increase the number of units accessible without using the elevator. The landscaped parking podium provides an opportunity to create a safe and secure outdoor garden/recreation area. Interior design of the common areas will acknowledge potential tenant disabilities through various means, including signage. All units will be designed to meet barrier-free standards and incorporate provisions for adaptable cabinetry and fixtures. In recognition of the trend toward a wider variety of group living situations, a special apartment type will be included in the floor layout.



Group Living Apartment

PROJECT TEAM

Project Manager
Richard Miller, Clayton Developments Ltd.

Project Coordinator
Dale Eastman, Clayton Developments Ltd.

Architect/Technical Coordinator
Dan Goodspeed, Kassner/Goodspeed Architects

Mechanical Engineer
Peter Healy, All Energy Engineering

Electrical Engineer
Richard Rout, Rout Engineering Ltd.

Structural Engineer
Malcolm Pinto, M. Pinto Engineering

Building Envelope
Austin Parsons, Building Science Associates

Value Management
Arthur Maw, Hanscomb Consultants

Environmentalist
Robert Federico, Jacques Whitford Assoc.

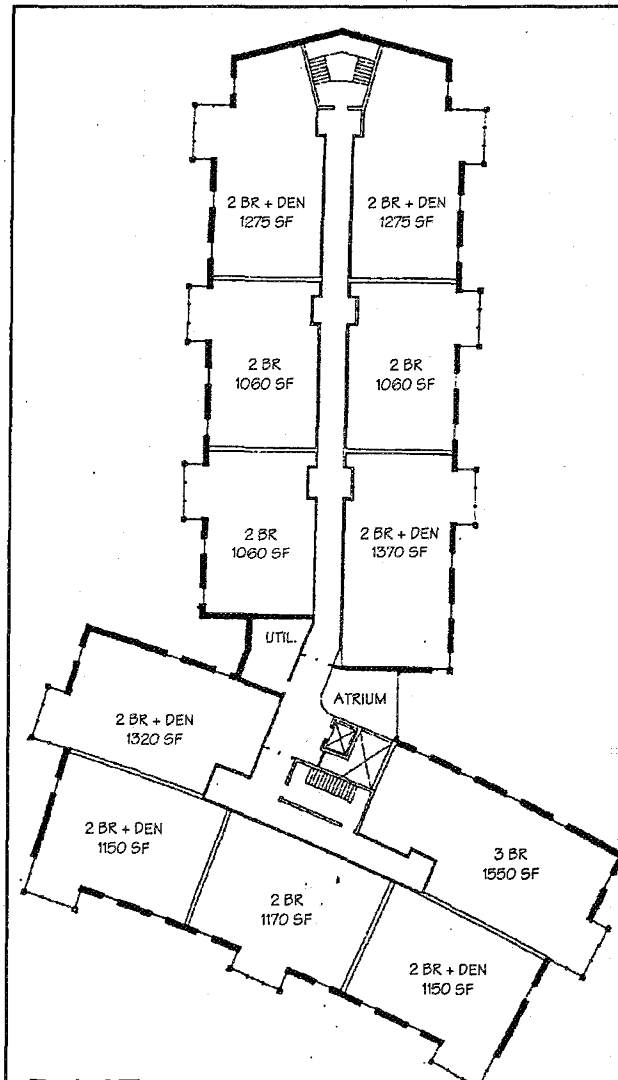
Interiors/Accessibility
Linda Rodie, LKR Design Works

Landscape Architect
Cary Vollinck, R.L. Petersman Landscape

Solar Consultant
Peter Allen, Thermodynamics Ltd.

Building Automation
Allan Maitland, Honeywell Inc.

Team Resource
Len Williams, I.R.A.P.
George Foote, N.S. Dept. of Natural Resources

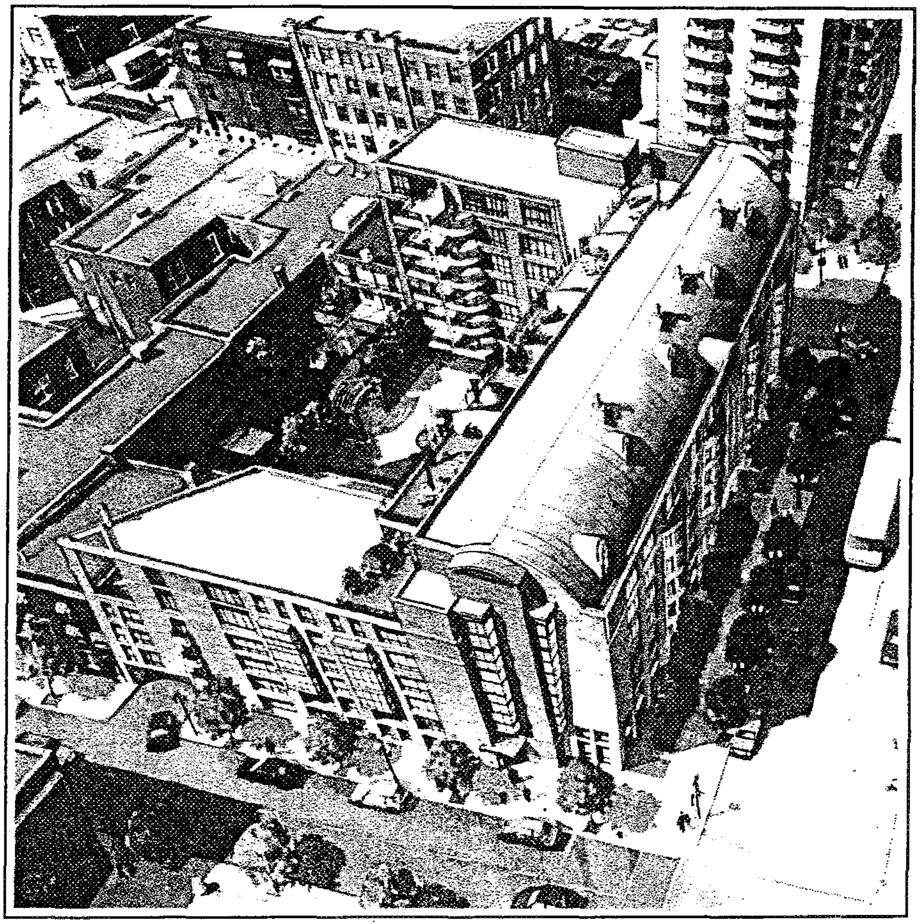


Typical Floor Plan

LE CLOS ST-ANDRÉ

Le Clos St-André is an 8-storey building located on Boulevard René-Lévesque in Montreal. The project consists of:

- 78 condominium units;
- Commercial spaces on the ground floor with access to the street;
- 40 underground parking spaces; and
- An inside courtyard for the residents.



The project site comprises an area of 18,650 sq. ft. fronting on 3 different streets: Rue St-André on the East, Boul. René-Lévesque on the South and Rue St-Christophe on the West. To the North, two 3-storey residential buildings are separated by a common wall and a backyard. The fireproof building features concrete poured on-site and exterior stone walls.

SITE LOCATION

Le Clos St-André is in the central core, Ville-Marie district, an area being redeveloped by the City of Montreal for its 350th anniversary. The project is only a few steps from the Berri-UQAM subway station and Place Berri.

DESIGN CONCEPT

The project consists of a high quality residential complex for clients of modest income in this section of the city. It complies with the new zoning by-laws adopted by the City of Montreal for its downtown area (Ville-Marie district) at the end of 1993.

The architectural concept includes revitalizing this section of Boulevard René-Lévesque with a building with a strong residential flavour. The project, in a commercial area of the city, will restore a residential character to the neighbourhood, as authorized by the new zoning by-laws in the downtown section.

While maintaining a modern outlook, the project draws on an architectural vocabulary from apartment houses of the turn of the century (Sherbrooke St., St-Hubert St., Carré St-Louis). Elements such as bow-windows, "la porte cochère", a properly laid out backyard, and the high vertical windows reflect these older buildings. The building form changes to enhance its relationship to the street. On Boul. René-Lévesque, the building has 8 storeys with no balconies. On Rue St-André, there are 7 storeys with enclosed balconies, and on Rue St-Christophe, 5 storeys is more in keeping with the streetscape. Balconies open onto the back courtyard from all sides.

FINANCING AND MARKETING PLAN

Le Clos St-André team presents the *IDEAS Challenge* sponsors with a viable project for an urban marketplace. In fact, to this date:

- Over $1,000,000 has been invested by the team in the project; the land is paid for and the preliminary studies have been completed.
- A market study was completed in the Spring of '93 and the sale of the units began in the Fall of the same year.
- One third of the units have already been sold.
- Applications for financing have begun with CMHC and some banks.
- The plans comply with the new zoning by-laws for the Ville-Marie district.
- The project benefits from the tax credit program of the City of Montreal Crédit-Proprio ($10,000 per unit).
- Construction is scheduled to begin in the Fall of '94 with completion projected for the Summer of '95.

Durable Building Envelopes

- An effective thermal envelope with high levels of airtightness and control of moisture.
- An envelope requiring minimum maintenance.
- Use of durable materials.
- Resistant walls acting as an effective rainscreen allowing an interesting aesthetic treatment of the facades.
- Selection of windows and patio doors:
  - according to the orientation of the building; and
  - with a high level of thermal resistance and a superior level of airtightness.

Roof Composition	**6.886 RSI**
Stream gravel	
Geotextile membrane	
Extruded polystyrene	100 mm
EPDM membrane	1.5 mm
Felt	
Concrete slab	
Rigid fibreglass	100 mm
Polyethylene 0.20 mm	
Drywall	13 mm
Latex paint	

Wall Composition	**5.263 RSI**
Brick	100 mm
Air space	40 mm
Construction paper	
Exterior dry wall	13 mm
Sprayed polyurethane foam	50 mm
Cellulose fibre	89 mm
Textile membrane	
Polyethylene 0.20 mm	
Drywall	13 mm
Latex paint	

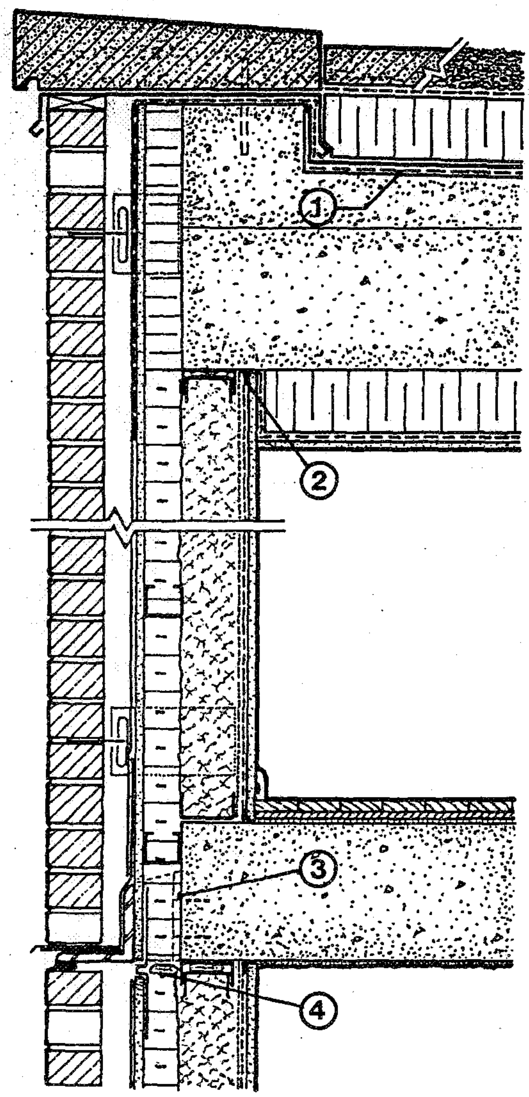
Section — Wall/Roof Junction

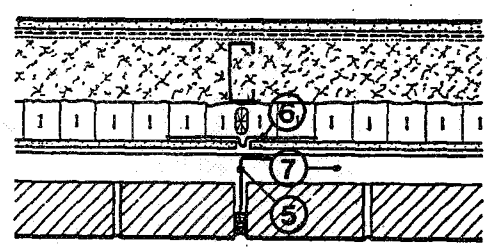
① Airtightness protected and drainage assured for outside temperatures of up to -23 °C
② Secondary air barrier through sealing of the interior dry wall
③ Protected slab end (uninterrupted insulation)
④ Elastomeric sealing strip and sealing at the urethane control joint

Detail

⑤ Air space partitioning
⑥ Elastomeric sealing strip and sealing at the urethane control joint
⑦ Air space allowing pressure balancing

Section — Wall/Roof Junction





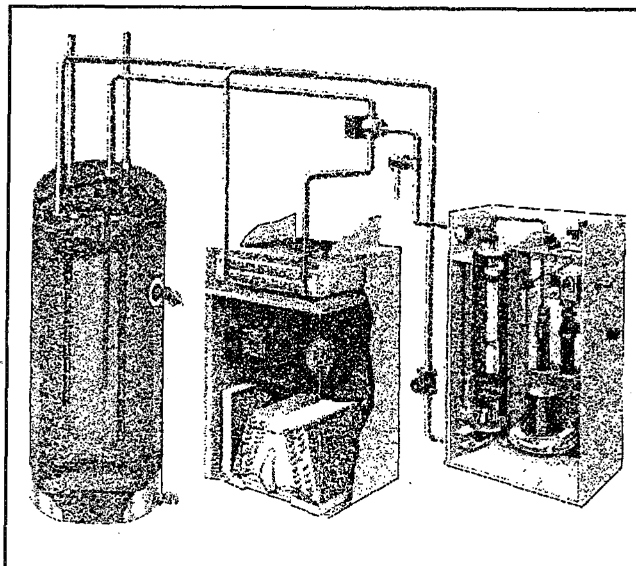
Detail in Plan

Ventilation

- The air exhausted from bathrooms, kitchen fans and dryers is filtered. Heat is recovered from the exhaust air to pre-heat the fresh air flowing into the units and hallways before it is channelled to the garage to ensure a constant dilution of carbon monoxide. The air then passes through a heat pump which pre-heats DHW, before being finally rejected outside.

- A comprehensive control system will optimize system functions based on exterior temperature.

- The other air exhaust systems, such as the garage main ventilation system (by CO_2 sensors) and the commercial space ventilation system, all have plate heat exchangers to pre-heat make-up air.



Separate Space Heating and Domestic Hot Water System
Source: GlowCore

DHW

- DHW is pre-heated in four steps allowing maximum energy efficiency. The four steps include: grey-water heat recovery from baths, showers, sinks and dishwashers; pre-heat with solar energy; heat recovery from the air exhausted through the garage (air-water heat pump); and finally, heat recovery from air-conditioning units by the water-water central cooling system.

Heating System

- Each unit has its own small, combined system, consisting of both pulse combustion air and DHW systems. These systems use natural gas and have a seasonal efficiency in excess of 90%.

Fresh Air Supply and Lighting Control

- In the units, motion detectors are used to control room lighting in the kitchen, bathroom, laundry, hallway, etc.

- An infrared/microwave sensor and a door contact allow an intelligent control of the fresh air supply. Centralization of controls will allow monitoring of temperature and humidity levels, remote control assistance, and return to the "occupied" mode in each unit with a simple telephone call.

High Efficiency Appliances

- Motors, boilers, cooling systems, fans and other central devices are maximum efficiency units controlled by microprocessors and connected to a central DDC control system.

- The lighting is high efficiency, including compact fluorescents and low-voltage halogen bulbs in the units; 3 tube, T-8 fluorescents with electronic ballast and parabolic reflectors in the offices; low-power metallic halogen bulbs in the main entrances; and high-pressure, low-voltage sodium vapour bulbs in the garage.

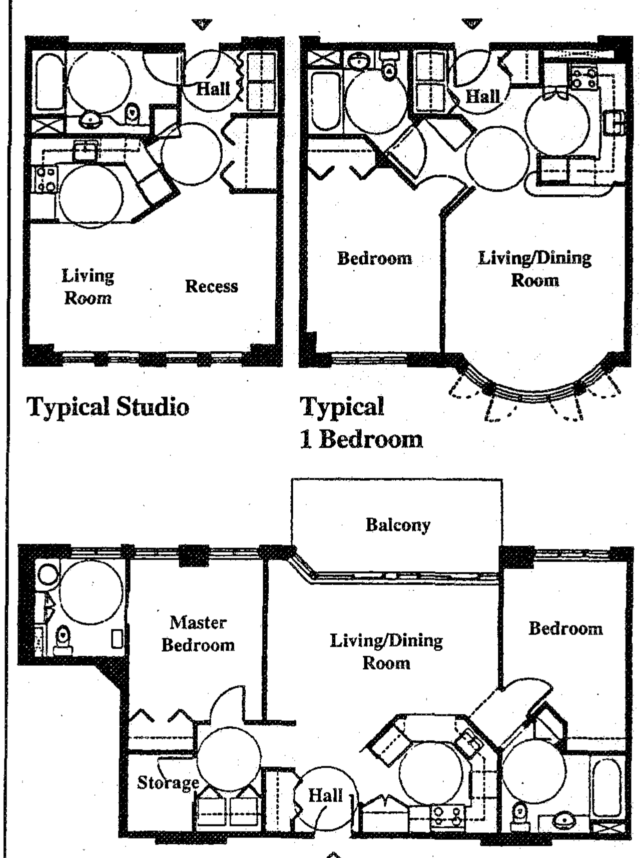
Accessibility/Adaptability

Our architectural concept is that of universal accessibility. This concept is based on criteria far exceeding the requirements of section 3.7 of the National Building Code.

In order to respond to the numerous needs of a large clientele, we intend to offer basic accessibility to all common areas in the building and to all commercial spaces and all living units. People in wheelchairs will have the extra space needed to manoeuvre and work without barriers, throughout the building.

To facilitate the installation of the special equipment required by people with disabilities or older people who are gradually losing their autonomy, the layout must be adaptable to their special needs. For instance, there will be nailing backing for the installation of grab bars, an electric outlet for the installation of ovens embedded in cupboards, an electric outlet for the installation of electronic door openers, etc.

Finally, we intend to exceed the emergency security measures prescribed by regulations by placing, on each floor, a barrier-free refuge with protected elevator and exterior egress.



Typical 2 Bedrooms

PROJECT TEAM

Developer
Groupe Archi Plus Inc.
Hélène Béïque, President

Architect
Jacques Béïque et Associés, Architects
Jacques Béïque, arch., OAQ

Structural Engineer
Martoni, Cyr et Associés
Roger Cyr, Vice-President, OIQ

Mechanical and Electrical Engineer
Denis Larivière Experts-Conseils Inc.
Denis Larivière, Ing., OIQ

Applied Building Sciences
Siricon
Dominique Derome, M.Sc.A., arch., OAQ

Operation and Maintenance
Paseo Gestion Immobilière
Gary Griffiths, President

Construction Management
Gespro S.S.T. Inc.
Ali Ettehadieh, M.Sc.A., ing., OIQ

Indoor Air Quality and Environmental Viability
Concordia University Building Studies Centre
Fariborz Haghighat, Ph.d., Professor

Energy Efficiency and Energy Simulation
Concordia University Building Studies Centre
Dino Gerbasi, ing., OIQ

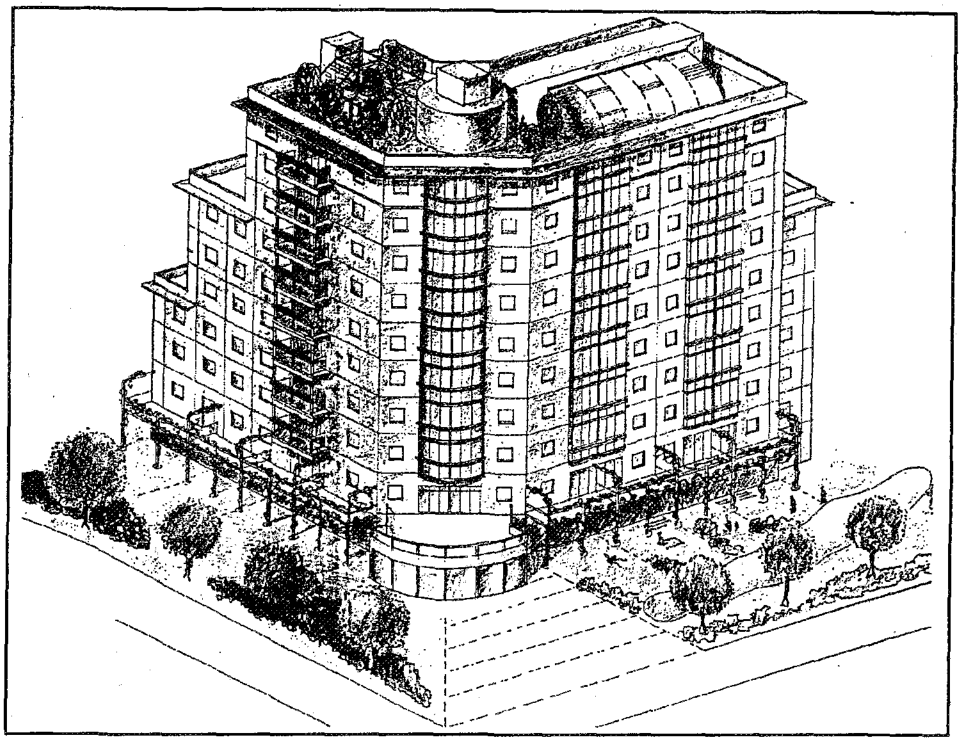
Marketing Analyst
Centre d'Analyse du Marché Immobilier (Cami)
Alban Dufresne, President, E.A., AACI

Accessibility
Société Logique
Pierre Richard, arch., OAQ
Patricia Falta, M.arch., Associate Professor, U. of M

Urban Design
Daniel Arbour et Associés
Louis Sauer, Director of Urban Design

"Open Building Approach"
Marymount University
Stephen Kendall, Associate Professor

EMERALD GATE



The candidate project is a 130-unit, 10-storey residential building, whose building envelope has already been determined by the planning process. It is one of two buildings with similar massing proposed for the site. This L-shaped, double-loaded corridor building is typical of a majority of high-rise housing solutions being built today. Any innovations we can implement with this form of building can therefore have an immediate and wide impact on the building industry. The advantage of the project is the availability of the second "standard" building as a base building for comparison of design solutions and performance.

SITE LOCATION

The 0.5 hectare site, located on the northeast corner of Steeles Ave. and Emerald Lane in the town of Vaughan is in a high-rise and townhouse residential zone.

DESIGN CONCEPT

The practical application and economic viability of new, environmentally benign, energy efficient, and healthy building technologies are demonstrated by this design. The project will include a durable, airtight and moisture resistant building envelope, enhanced building and ventilation systems, as well as plans for resource and waste management.

The "builder friendly" design suggests possibilities for the incremental application of these building technologies. It offers a synergy of mechanical solutions and environmental input based on a responsiveness of the building fabric to natural sustainability.

The design is operationally adaptive, serving residents with varying degrees of independence, such as families, seniors and disabled persons.

Using the dwelling unit as the basic incremental element, the design aims at the spatial integration of the dwelling unit with other units to create a sense of community, with several common areas such as a two-storey entrance atrium, meeting facilities, and a roof garden.

The inherent beauty and delight of a well designed structure have not been compromised in the application of technologies which maximize environmental benefits and minimize externalities on- and off-site.

FINANCING AND MARKETING PLAN

At present, STRASSER, as owner and developer of both sites, is committed to working with a resource group that has already submitted an application to the Ministry of Housing for an allocation of funds to have the easterly tower constructed as a non-profit residential housing project. The building envelope and site plan layout adopted by the Vaughan Planning Department are based on the requirements of this resource group.

STRASSER has also been approached by another group to develop the westerly site under a similar arrangement. STRASSER elected to use this westerly site for this proposal, as the timing of their application for an allocation would be more in keeping with those dates proposed by this competition, although the criteria contained herein could be utilized for either building. In fact, if both buildings were constructed, one in keeping with current codes, requirements and technology, and the other to the standards proposed in this competition, an exact comparison of both capital costs and operating expenses could be obtained by carefully monitoring both buildings. It would be our team's goal in this competition to prove that a high-quality building with low operating expenses, can be constructed for only a marginal increase in the capital cost.

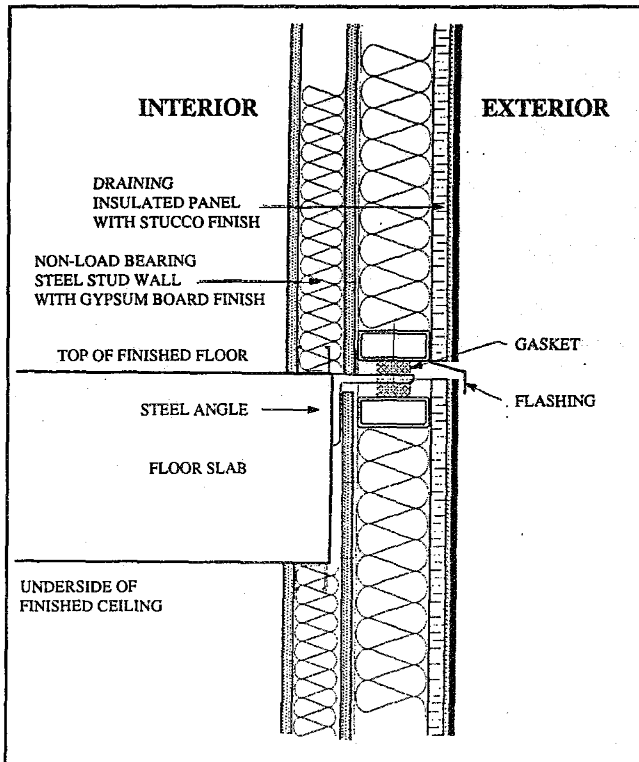
Co-operative housing, either conducted by the developer, or through a housing resource group supported by funding incentives, tax credits and low interest loans to future owners, is a viable and financially acceptable market consideration for this project.

Durable Building Envelope

Our extensive experience with large panellized construction projects, fully wicking rainscreen cavity construction and Dryvit, will ensure that the building envelope is assembled appropriately. Openings (joints) will be minimized by construction with panels consisting of light hollow steel sections faced with a rigid sheathing and integral air and vapour barrier beneath self-draining insulation. Vertical, horizontal, and window joints will be treated appropriately to ensure pressure equalization. A reliance on caulking will be reduced by the use of gaskets on the air barrier plane.

Acrylic stucco, metal and glass, all available locally, have been selected as outer skin materials, for their appearance, response to varying climatic conditions, impermeability, lack of capillary action, light weight, thermal efficiency, non-combustibility, proven durability, and minimal use of joints.

Walls will be compartmentalized with rigid dividers and flashings to control differential pressures across the face.



Wall Section

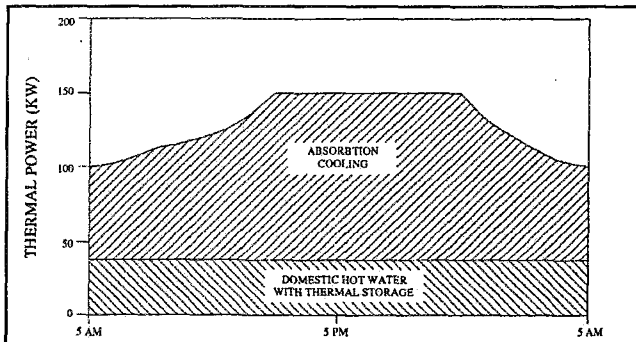
Energy Efficiency

Minimum energy costs of the building will be achieved by maximizing energy efficiency associated with construction, operation, and the lifestyle which the building promotes.

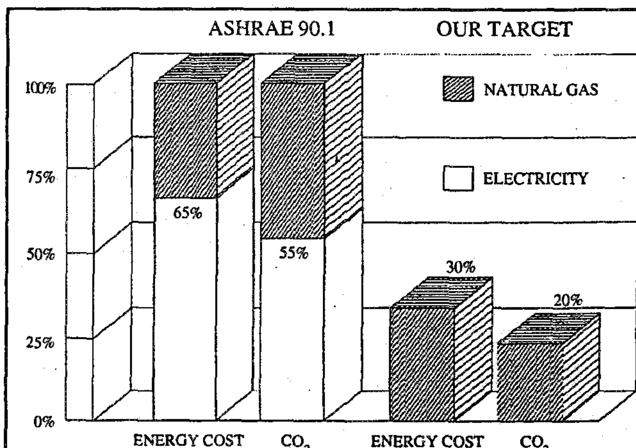
Strategies for minimizing energy of construction include selecting materials with low values of embodied energy, with preference given to recycled materials; implementing innovative building systems and practices; and through the development of a construction waste management plan.

Strategies for minimizing purchased energy of operation include a high-performance thermal envelope, energy efficient lighting and appliances, high-efficiency heat recovery ventilators, passive solar systems, renewable electrical supply using photovoltaics to power (electric) cooling equipment, and greening of the site and roof for shading and insulation. Gas fired co-generation will provide the majority of the electrical, heating, and cooling via absorption requirements of the project. Detailed performance simulations will be used to validate energy targets.

Strategies for promoting a lifestyle which conserves energy include alternatives to the automobile, provision for responsible waste management, permaculture, individual metering of thermal and electrical use and a building design which fosters a sense of community support.



Cogeneration Waste Heat Utilization Profile
(150 Units, Typ. Summer Day)



Comparative Energy Performance

IAQ, Ventilation and Occupant Comfort

Indoor air quality will be achieved by a reduction of contaminants at the source, and through the provision of mechanical ventilation.

Reduction of air contaminants from building materials and home furnishings will be minimal, as alternatives such as tile, water-based finishes, parquet, etc., will replace the use of off-gassing materials such as particleboard, certain grades of plywood, and broadloom.

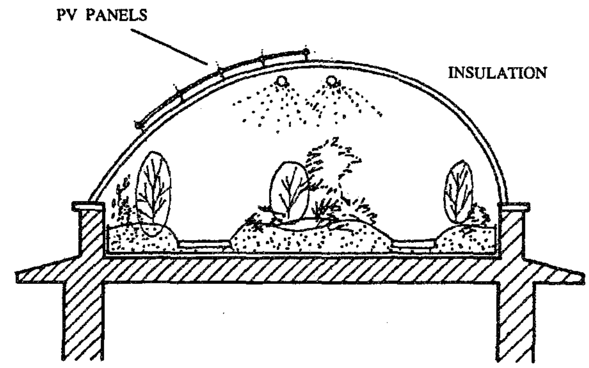
Mechanical ventilation will feature balanced floor-by-floor air handlers (HRVs) with supply and exhaust via corridor ceiling plenum for distribution to suites and corridors. Heating and cooling supply is via hydronic heating and cooling coils in the ventilation air stream (to avoid additional air and recirculation). Ventilation supply will employ high-performance filtration.

Occupant comfort will be achieved by providing individual control of the environment: draft-free, positive ventilation; noise control features; and comfortable lighting. Individuals will be able to control temperature and ventilation rate in their units. High wall supply will ensure draft-free, low-flow ventilation and space heating/cooling. The space cooling strategy makes use of the building thermal flywheel to stay within acceptable comfort limits, while downsizing the reduced cooling design capacity by another 2/3. Remote fans and acoustical treatment will result in quiet suites.

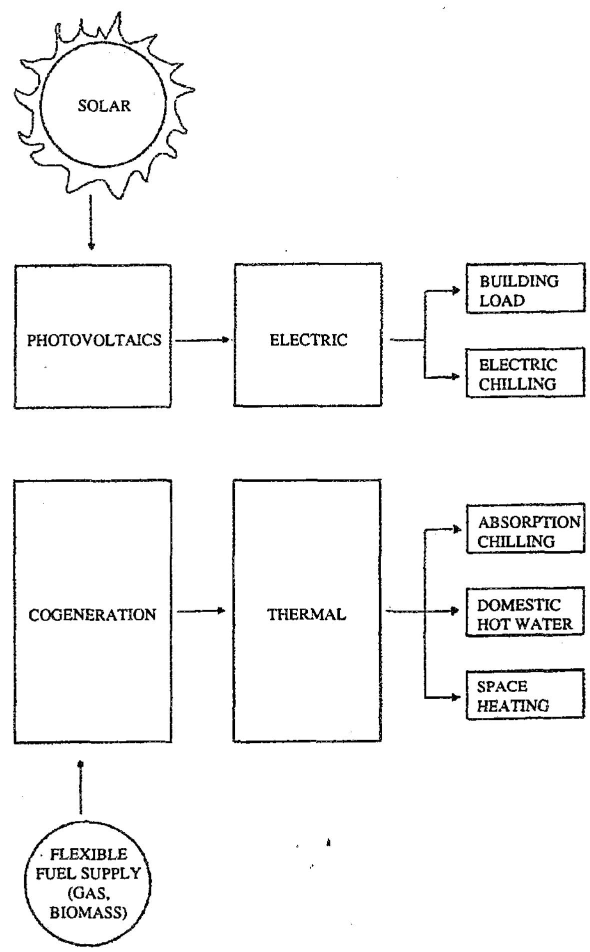
Environmental and Resource Conservation

At the local level, our project will result in an enhancement of the area rather than protection, since suburban sprawl has already affected the area surrounding the site. Water run-off will be minimized by storage for evaporative cooling, reuse of rainwater for landscaping, and large, permeable, unpaved areas. The site will be enhanced through planting of native vegetation, which will generate a more complex ecosystem.

Global effects will result from judicious material selection based on low embodied energies, preferably recycled, or from sustainable sources; a 50% reduction waste management plan for both in the construction and operation of the building; and the use of ozone-friendly materials which have no CFCs and HCFCs.



Roof Garden



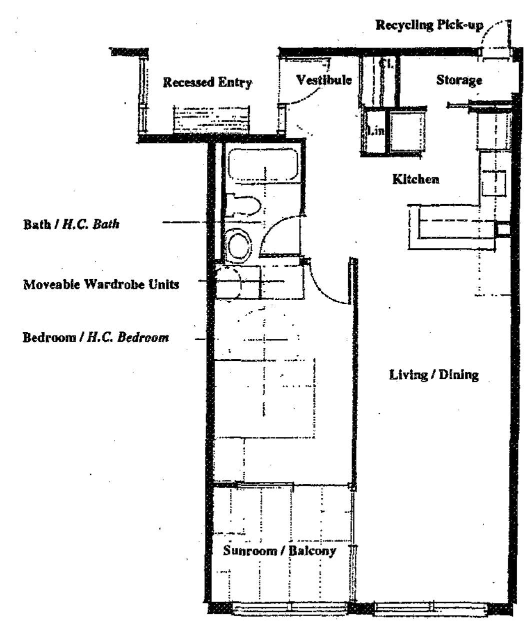
Energy Conversion System

Accessibility/Adaptability

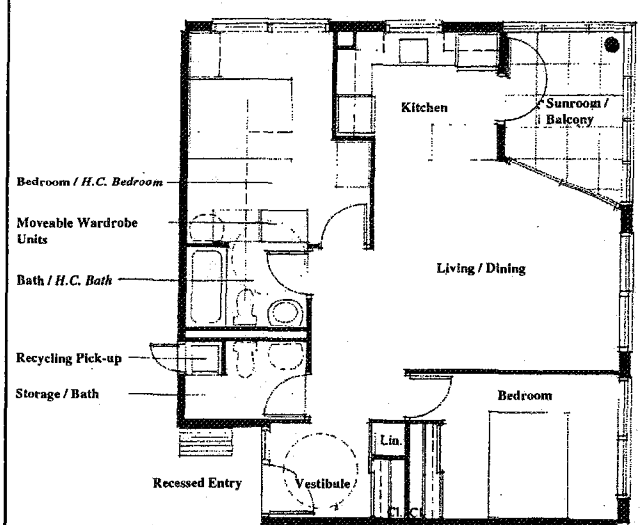
The building is fully accessible in its public and private spaces to persons of all varying physical abilities. By implementing solutions which are integral to the natural building fabric and of intrinsic delight to all users, we avoid the stigma of "institutional solutions". Independent participation and movement is facilitated by appropriate dimensioning of all components, use of textures that define changes of direction and plane, and colours that direct and subtly define hazards.

In addition to its accessibility, the building has numerous design features which permit adaptability to an ever aging population as the need increases. These include suite plans and a number of types of common spaces that can be adapted to allow life style changes without the relocation of partitions. In addition, a number of unseen adaptive electrical and mechanical support features are incorporated into the building fabric. These can be accessed as the need arises without damage to the fabric or the discard of materials.

The built environment can celebrate our understanding and respect for our personal and global environment. As understanding grows, we hope not only to address the effects of the energy, natural resources, and air quality, but to achieve an illuminated and convivial architectonic space. Based on its extensive theoretical and practical background, our team has thus widened the scope of this competition to achieve a comprehensive view which underscores the interdependence of manmade systems, social, and cultural patterns, with the natural environment.



Typical One Bedroom /*Handicapped*



Typical Two Bedroom /*Handicapped*

PROJECT TEAM

Building Developer

Group of Strasser Companies

Project Architects

Doug Pollard, Architect
Jiri Skopek, Architect

Environmental Engineering

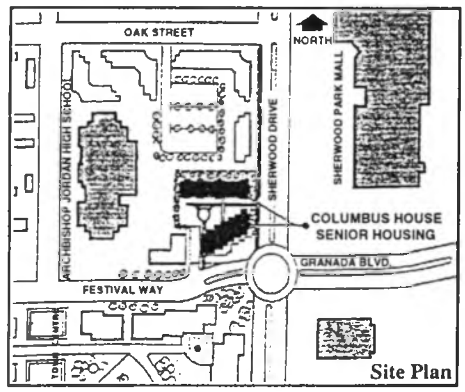
Allen Associates
Greg Allen, BA.Sc., P.Eng.
Mario Kani, P.Eng.

Construction Materials

Ed Lowans
Environmental Consultant

COLUMBUS HOUSE

Columbus House is a 175-unit high-rise complex designed to provide "affordable" housing for the seniors within the Hamlet of Sherwood Park.



Site Plan

SITE LOCATION

The site of the Columbus House Seniors Housing Complex is located ideally in the "Centre in the Park". Residents within the complex will have ready access to all community services, all of which are within a four-block radius of the complex.

DESIGN CONCEPT

The basic design concept for Columbus House is to provide an alternate and affordable form of housing for the aging population in "Sherwood Park" and surrounding area.

Seniors within the complex will be given the opportunity to interact with each other and with the community at large. Accessibility to all community facilities will be a primary design criteria.

The complex will be aesthetically pleasing, reflecting a human scale throughout the project. Exterior finishes of the building will relate to those on nearby, existing major structures which are mainly brick. Building technologies will be selected so as to enhance the comforts of the residents.

Although many sophisticated and innovative building systems will be incorporated within this complex, the project will first and foremost respond to the comfort needs of its residents. Indoor air quality will be maintained at a high standard throughout all occupied areas. The project will provide a safe and secure environment for the seniors, making provisions within tenant suites for future adaptability which will enable seniors to age-in-place.

FINANCING AND MARKETING PLAN

The Sherwood Columbus Club (Knights of Columbus) has assembled a development team to construct a $16-million residential complex for seniors on a two acre parcel of land in the heart of Sherwood Park. The complex consists of two separate buildings: a 91-unit high-rise condominium complex, and an 84-unit rental property. The Columbus Club expects to redirect some of the profits generated through the sale of the condominum units to the construction of the rental units, thereby lowering monthly rental costs.

The project will be market-driven and will cater to the rapidly growing seniors market which is expected to double within the next 15 years. Initial response to the marketing of a seniors housing complex which is designed to high levels of comfort, durability and energy efficiency, within the framework of affordability, has been outstanding.

Durable Building Envelope

The proposed building envelope will incorporate the latest innovations in building envelope technology including pressure equalized rainscreen, continuous air barrier and moisture protection principles.

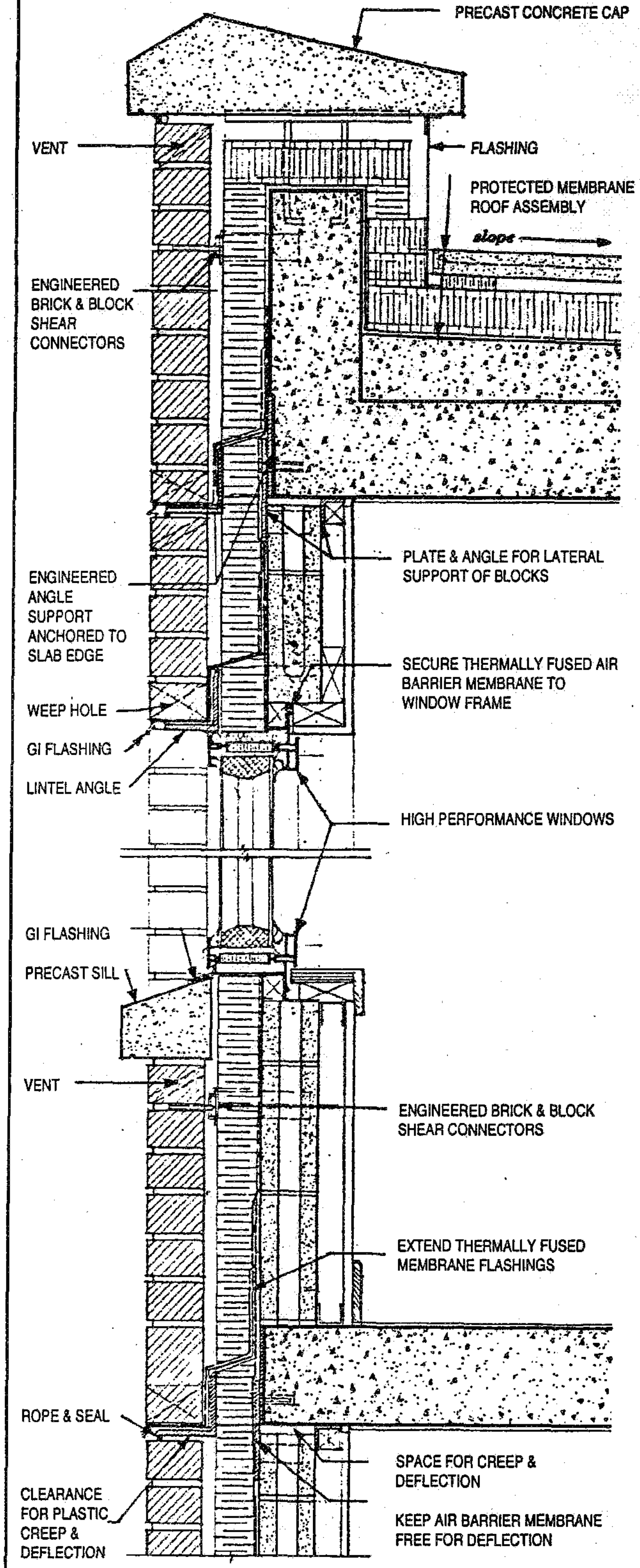
The basic building materials in the proposed complex — reinforced concrete, precast concrete, bricks and concrete blocks are essentially durable in nature, when assembled in a proper manner. The use of a "Shear Truss" Cavity Wall System will reduce deflection and minimize cracking. Comprehensive detailing and extensive inspection by knowledgeable consultants will ensure the success of a well-performing and long-lasting building envelope requiring minimal maintenance.

The structural air barrier on this project will be reinforced/ modified bituminous membrane — thermally fused on the concrete block. The air barrier will be continuous and uninterrupted, with careful attention shown to sealing at windows and joints.

Moisture protection features include carefully detailed and installed flashings, precast caps and sills and a protected membrane roof system.

Energy Efficiency

Computer simulation will be used to optimize thermal insulation levels for exterior walls, windows and roofs. The project team is considering the use of mass storage of energy in the building skin to reduce peak demands on the heating and cooling system. Central building heating, cooling and electrical systems will incorporate reliable leading-edge technologies to maximize the energy performance of the building to 55% of the levels prescribed by ASHRAE 90.1. Technologies will include: Energy Management and Control System, microprocessor controlled power metering systems, high energy efficient motors, compact fluorescent luminaires, photoelectric lighting controls and "Energuide" labelled appliances.



Exterior Wall

IAQ, Ventilation and Occupant Comfort

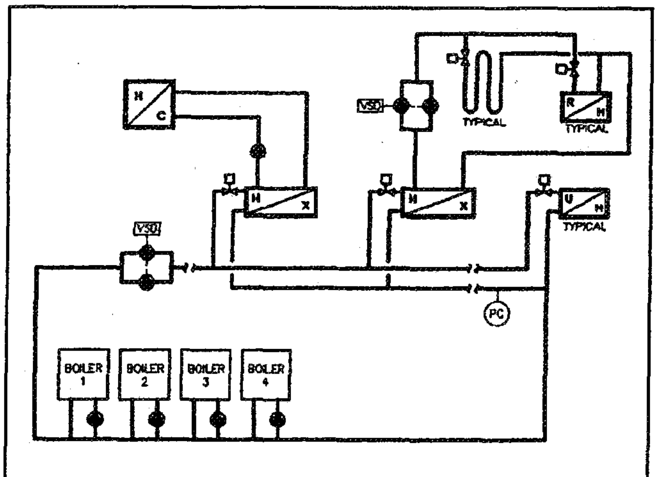
Central supply air and exhaust systems with heat recovery capability will be utilized with two-stage filtration to meet performance guidelines. Localized exhausts in each suite will provide effective source control of air contaminants. Fresh air intake will be situated to minimize the chance of contamination.

The central ventilation system will consist of an air handling unit at roof level and will be used in conjunction with compartmental fan units on each floor to provide suite air distribution. Variable frequency drives on fans will be used to provide an energy and operating cost saving. Supply air temperature will be reset based on room demands. Air will be provided into each enclosed room of the suite and exhausted from room grilles and hoods in bathrooms and kitchens respectively.

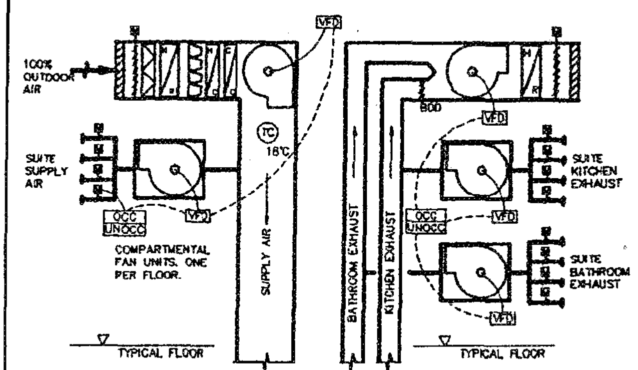
Colour improved fluorescent sources in indirect lighting applications will be incorporated to provide a minimum of direct and reflected glare for senior tenants while maintaining required energy consumption requirements.

Sound Transmission Class and Impact Insulation Class ratings for walls, floors and ceilings, in conjunction with specific installation details for the building mechanical systems, will minimize noise transmission to tenant suites.

Room control of heating and ventilation systems operating temperatures, also connected to the EMCS, will maximize occupant comfort and control.



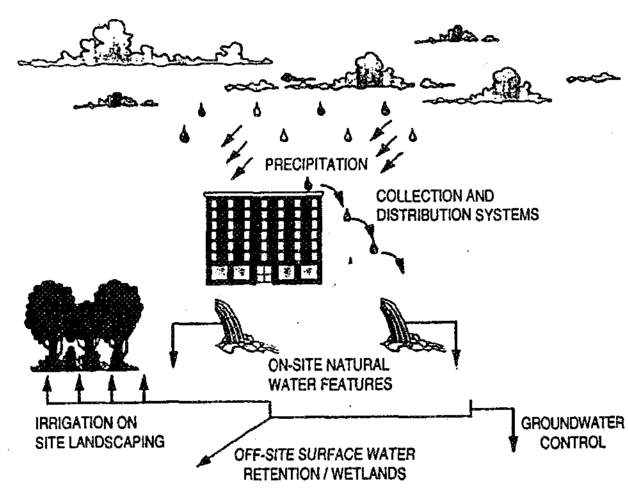
Heating Water System



Ventilation System

Environmental and Resource Conservation

The site development has been planned with a view to preserving and enhancing natural ecosystems. To minimize water use and wastewater treatment, domestic water pressure controls, domestic hot water piping heat tracing, low-flow water closets, showerheads and faucet aerators will be incorporated into the plumbing system design. HCFC-based refrigeration and fire protection equipment will be avoided where technically and environmentally possible. The contract manager and design team will minimize the waste of building material with the goal of a 50% waste reduction when compared to conventional construction practices. Building emissions and remotely generated emissions from power and processing plants will be minimized through the combination of the measures presented above.

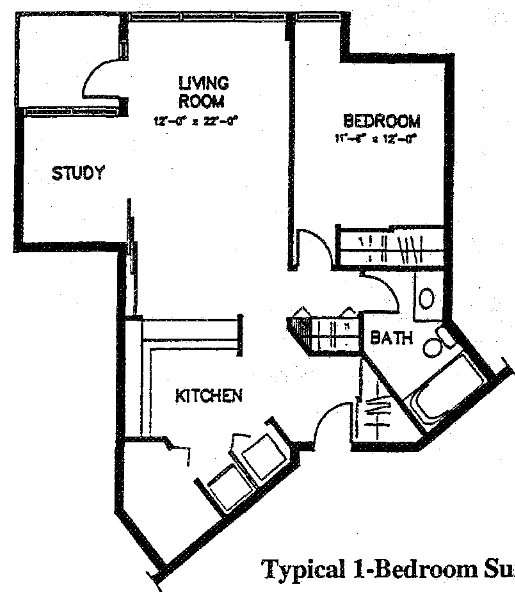


Accessibility/Adaptability

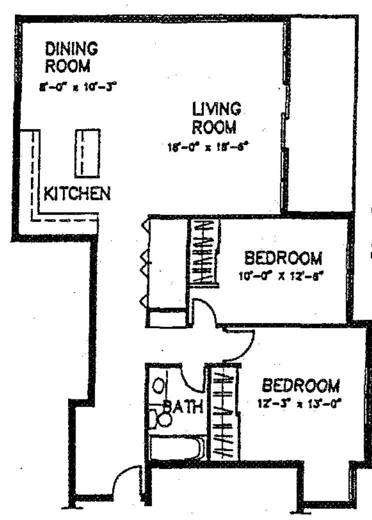
Throughout the site, barrier-free access to all common areas will be achieved by means of elevators serving all levels plus level corridors or walkways. A "Barrier-Free Concept" will be adopted throughout the complex, making all areas available to residents who are handicapped.

In order to ensure functional safety of the residents in the complex, numerous small details have been considered including enhanced lighting, non-slip flooring, and elimination of sharp edges on counters. A personalized radio communication system integrated into the telephone system will be made available to residents who wish to have 24-hour protection.

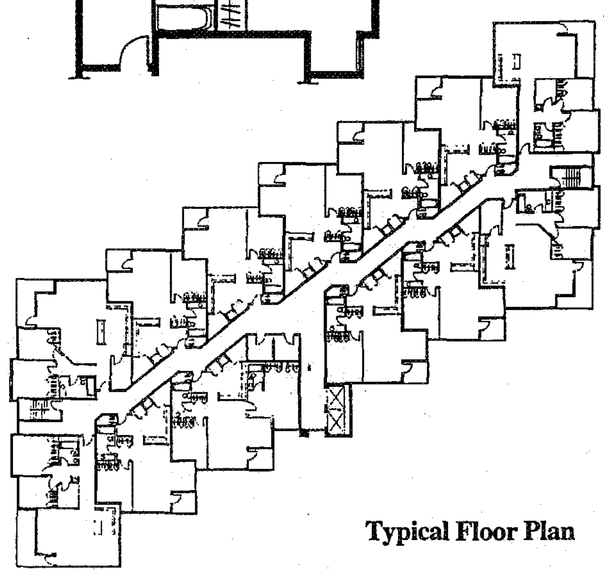
Provisions in all dwelling units will be made to accommodate the possible future needs of the resident. Adjustable counter tops, adjustable shelving, blocking for future grab bars and wheelchair door widths are only a few of the adaptability considerations that the team will be incorporating into the design.



Typical 1-Bedroom Suite



Typical 2-Bedroom Suite



Typical Floor Plan

PROJECT TEAM

Developer Team	*Sherwood Columbus Club* *Dr. G.R. (Gus) Rozycki*
Consultant Teams	
Architects	*Holland & Associates Architects & Planners*
Building Scientist	*C.J. Perreault*
Structural Consultant	*Jacobson Hage*
Mechanical Consultant	*Reid Crowther & Partners*
Energy Consultant	*Nova Engineering Ltd.*
Electrical Consultant	*Reid Crowther & Partners*
Environmental Consultant	*Reid Crowther & Partners*
Municipal Engineers & Landscape Architects	*Butler Krebes*
Contract Manager	*Ircan Construction Inc.*
Financial Advisor	*Renaissance Development Corporation*

THE COSMOPOLITAN

The Cosmopolitan is the first residential component of a major mixed use redevelopment currently underway for a city block within downtown Victoria, British Columbia. The proposed development is a thirteen (13) storey, seventy-one (71) unit high-rise residential tower.

SITE LOCATION

The project is located at the intersection of Vancouver and View Streets in downtown Victoria, B.C. The compact property is 1010.00 m^2 in area. Within a five-minute walk from the downtown core, the Cosmopolitan is part of a growing residential neighbourhood.

DESIGN CONCEPT

Our design objectives for the *IDEAS Challenge* focus on innovation in planning and architectural concept; durability of construction components; building envelopes and efficiency of building infrastructure, including structural, mechanical, and electrical components. The intent of our team is to address the above elements and yet maintain economy of construction to ensure the project can be built and marketed successfully. The broad target market for occupancy includes young couples and families as well as the retired/elderly population.

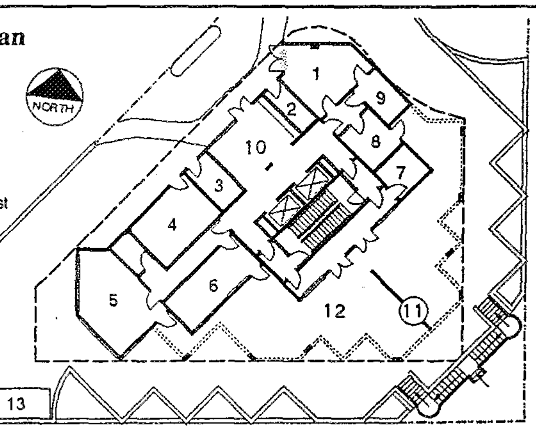
The underlying theme is the integration of those with and without disabilities. It is our philosophy that the plaza level facilities, such as the neighbourhood room and public terraces, will be shared by residents of the building with the surrounding community. Facilities such as recycling, composting, and outdoor garden spaces will facilitate an environment of a caring, working community.

The architectural "composition" originates from the street experience of landscaped public spaces and extends to the social garden on the main plaza level. The residential units begin above the plaza level and roof top patios have been included in the design. The creation of these varying levels of experience serves to lessen the impact of the high-rise development.

Our typical floor plate is comprised of six suites ranging in size from 46 m^2 to 93 m^2. The limited number of suites per floor coupled with their exterior wall juxtaposition allows a configuration that takes advantage of natural cross ventilation and a variety of natural daylight exposures.

Plaza Level Plan

1. Garbage Room
2. Mail Room
3. Electrical Room
4. Bike Storage
5. Community Room
6. Laundry Room
7. Janitor Room
8. Organic Waste Compost
9. Recycle Room
10. Lobby
11. Water Feature
12. Plaza
13. Greenhouse



FINANCING AND MARKETING PLAN

Victoria has recently experienced strong economic growth. Net in-migration has resulted in a strong demand for residential properties. The feasibility of this project for either rental or condo sale is greatly enhanced by the fact that the land is currently being held in reserve and does not require purchase or payment during the development period.

The Victoria condominium market has recently absorbed virtually all of the product constructed, particularly smaller, more affordable units (less than $140,000). Recently, smaller units in similar high-rise buildings have attracted both investor and first-time buyer attention.

Durable Building Envelopes

Selection and development of durable, rainscreen building envelope detailing for this project was guided by three interrelated design parameters: buildability, seismic resistance and financial feasibility.

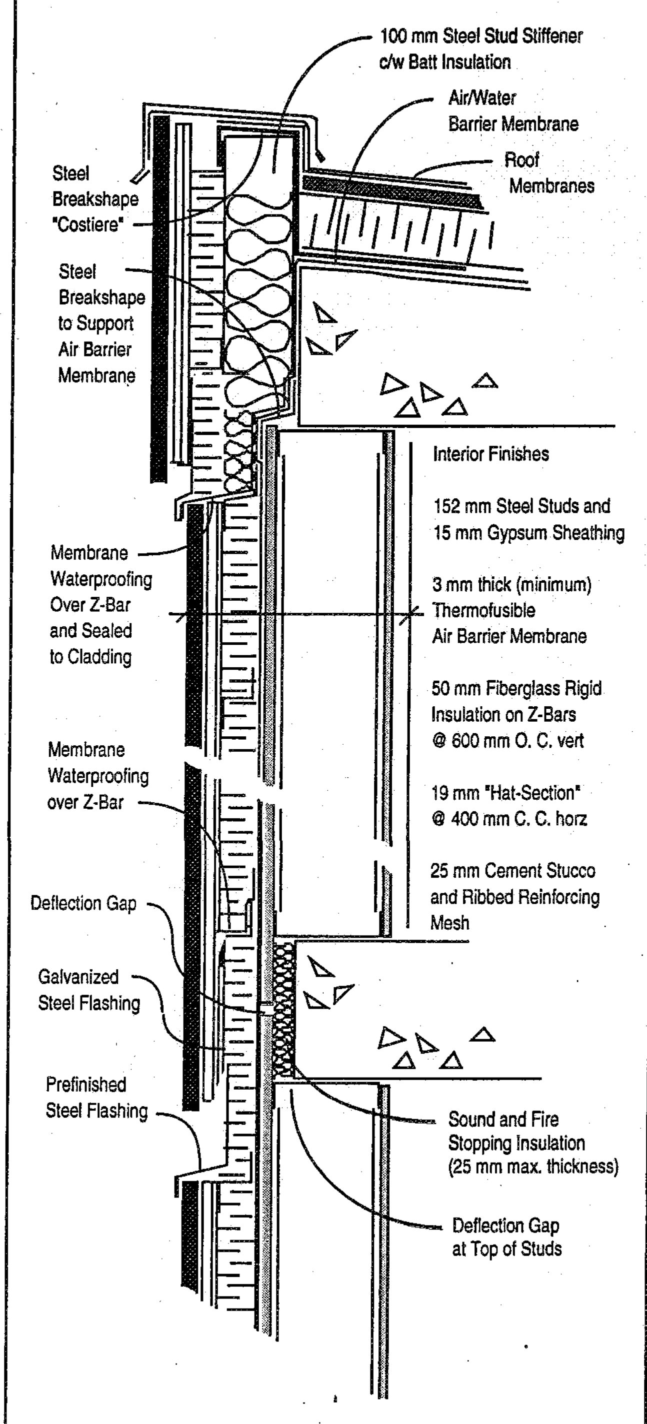
The design parameters were met by selecting a light-weight wall system, using familiar construction materials and components. In response to the seismic considerations for Vancouver Island, a lighter weight 'exterior membrane' system will constitute the building envelope utilizing acrylic stucco in combination with metal cladding as required to achieve an aesthetic balance.

The envelope air barrier proposed is a thermofusible, modified bitumen membrane. A pressure equalized rainscreen will be achieved using a vertical, light gauge steel furring channel to separate the acrylic stucco cladding from the rigid insulation boards. The air space between cladding and insulation would be vertically compartmentalized at each floor level by metal clad movement control joints and flashing. These joints will also serve as horizontal accent banding to be integrated into the facade patterning.

Energy Efficiency

High performance, thermal insulating, window technology will be utilized. In addition, the building will be pressurized to offset stack effect, and minimize infiltration. Heating will be provided by a low temperature, hot water radiant heating system, with individual thermostats for each unit. Solar heating panels and thermal storage systems will supplement the heating systems and service water heating. A central grey-water heat exchanger will be utilized on sinks, dishwashers and shower drains to pre-heat domestic hot water. A storage tank at the parkade level will retain grey-water during peak usage periods. This grey-water will in turn be used for landscaping irrigation.

In addition to "PowerSmart" lighting design as endorsed by B.C. Hydro, photovoltaics will be utilized to supplement long duration lighting sources such as corridor and parkade lighting. The entire building mechanical system will be controlled by an EMCS (DDC) system, with features such as humidity and CO_2 sensors monitoring the ventilation system. Occupancy sensors will be utilized to automatically setback the space temperature after an adjustable unoccupied period.



Conceptual Roof and Wall Section

IAQ, Ventilation and Occupant Comfort

Specifications for the project will include products with low emissive components. The building will be purged in order to minimize the effect on the future occupant.

A central variable-air-volume ventilation/exhaust system is proposed, with DDC controlled variable frequency drives and high efficiency motors. The DDC control system will provide user-friendly and efficient control of the heating and ventilation systems. The capability to adjust temperature setpoints and ventilation system parameters remotely from the work place will be an important feature. The supply air will be tempered in the winter by the heating water system, and supplied directly to each occupied room, utilizing "noiseless" diffusers.

The exterior building areas will have security lighting on photocell on/off switches and interior lighting will be controlled by occupancy sensors to be activated only when the space is in use. In addition, daylighting reflection shelves at exterior windows will provide natural solar illumination to limit the need for artificial lighting.

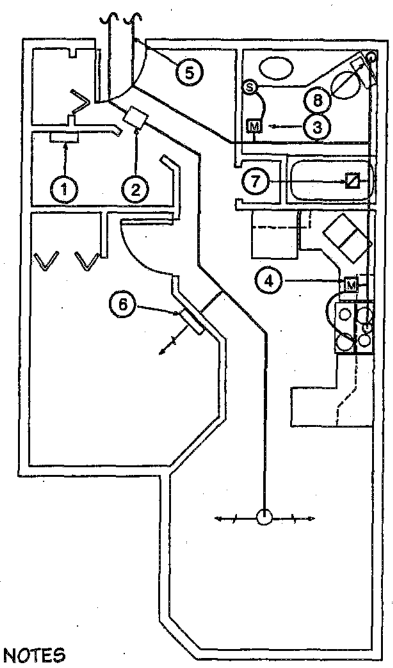
Special consideration will be given to both internal and external noise sources, and maximum acoustical separation will be provided to ensure a suitably quiet environment for both the building occupants and neighbouring buildings.

Environmental and Resource Conservation

Our design goal will be a 60% reduction in water use compared to an equivalent building. Low water consumption plumbing fixtures will be utilized.

This building will be one of the first buildings on Vancouver Island with a large scale recycling program that will encompass the majority of refuse produced by its tenants, including tin, glass, paper, and organic waste. A standard compost unit located by the plaza level green house will compost the organic materials from the site. A vermicomposting program will also be studied to supplement the composting program. An accessible recycling and composting room will be available to store organic compost and various recycling containers.

Central heating and service water systems will be clean burning, natural-gas fired. High efficiency boilers will emit minimum levels of combustion products to the atmosphere. Emissions will be further limited by use of solar heating panels to supplement the heating system.



DRAWING NOTES

① DDC CONTROL MODULE WITH CO_2 SENSOR, HUMIDITY SENSOR, DIFFERENTIAL PRESSURE SENSOR, AND TIME SCHEDULE PROGRAM

② VARIABLE VOLUME SUPPLY DAMPER MODULE

③ TWO-POSITION WASHROOM EXHAUST DAMPER MODULE

④ RANGEHOOD DAMPER INTERLOCKED WITH RANGE

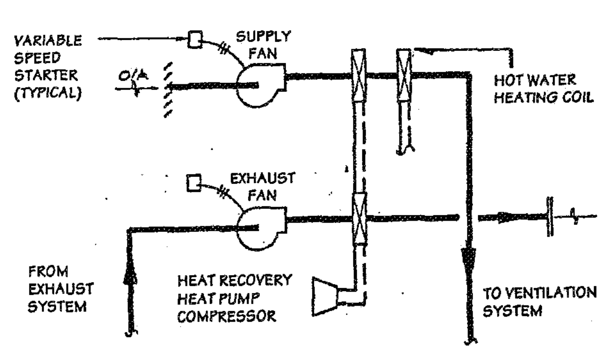
⑤ FROM CENTRAL SUPPLY AND EXHAUST VENTILATION SYSTEM

⑥ SUPPLY DIFFUSER (TYPICAL)

⑦ SHOWER EXHAUST GRILLE

⑧ LOW LEVEL TOILET EXHAUST GRILLE

Typical Suite Ventilation System Schematic



Central Ventilation System Schematic

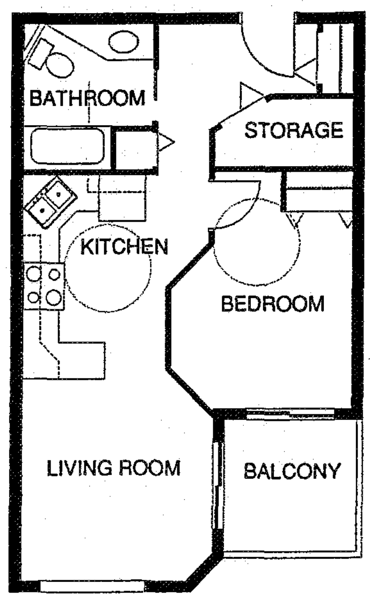
Accessibility/Adaptability

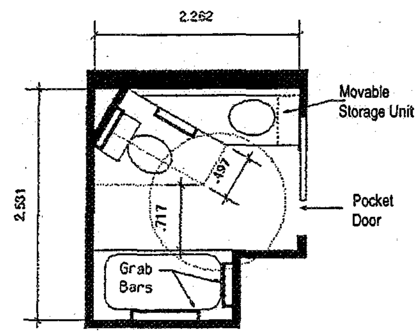
Requirements for wheelchair accessibility as well as accessibility for the sight and hearing impaired have been considered in all the common areas. Some specific areas of consideration within suites include an accessible intercom system, task lighting, indirect non-glare lighting, firm floor finishes with tactile surfaces such as a combination of ceramic tile and carpet, accessible thresholds at all doorways, hand rails, grab bars, and colour and contrast considerations.

Our target is for seventy-five percent of the suites to be fully handicapped-accessible. In addition, multiple cue alarm systems incorporating light and sound signals can be provided. Movable and pull-out storage units in the washroom and kitchen will provide work surfaces as required as well as allow flexibility. Pocket doors will be considered in areas such as washrooms to increase accessibility. Thermostats will be located at accessible heights complete with magnifying strips. Lever type handles will be provided for all faucets and thermostatic control provided for the bathtub/shower.

Additional storage space will be provided on the plaza level for storage of motorized scooters and other accessibility equipment. Lower exterior windows will allow for a view from a seated position within the suites. Balconies will accommodate features such as an accessible threshold and a glass railing which will allow for views through the balconies from a seated position.

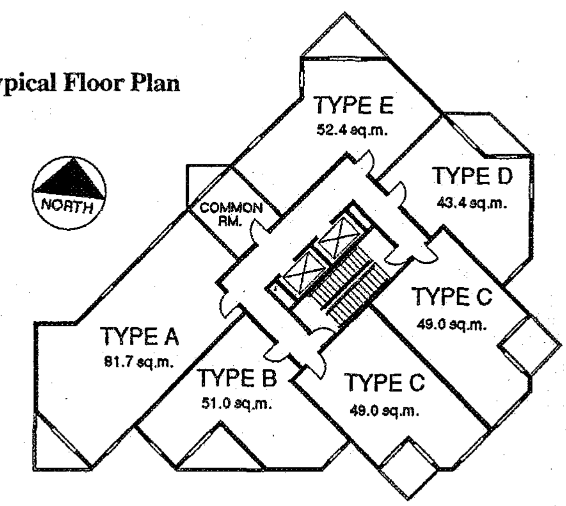
Typical Unit 'C'
49.0 m²





H/C Accessible Bathroom

Typical Floor Plan



PROJECT TEAM

Developer
Aral Construction Ltd., Garry Gilchrist, P.Eng.

Prime Consultants
Advanced Architecture Inc.
Bradley Shuya, MAIBC, MRAIC
and Leanne Soligo, B.E.S., M.Arch.

Structural Consultants
Graeme & Murray Consultants Ltd.
Anthony Horlor, P.Eng.

Mechanical Consultants
E & M Consultants Inc., Mark Burrowes, P.Eng.

Electrical Consultants
F. N. Fenger & Associates Ltd., Nick Fenger, P.Eng.

Building Envelope Consultants
MHP Building Consultants Ltd.
Thomas Morstead, B.Sc., M.E.Des.(Arch)

Landscape Consultants
Arne McRadu, BCSLA, CSLA, Landscape Architect