

# Lighting the Way

By Kelly Gray

Photography: Mario Palumbo



At 690,000 square feet, Manitoba Hydro's new head office is the biggest structure in downtown Winnipeg. It also offers some of the biggest changes in construction thinking the city has ever seen.

The new 22-storey, \$278 million high-rise is a showpiece for the crown corporation's drive to environmentally sustainable building options. It is also a model office space that delivers comfort and collegiality to its 1800-plus-worker cohort. Taken together, all the pieces in this award-winning structure allow Hydro to really walk its conservation talk.

Manitoba Hydro has been a strong voice for energy conservation over the past several decades. The recently opened Manitoba Hydro Place at 360 Portage Ave shows that the utility has been listening to its own advice. The result is a state-of-the-art podium and tower structure that proclaims a kindness to the earth as well as its office worker residents. But the most significant aspect of the new building is that people the world over will learn that environmental construction options can work on a massive scale as well as for individual homes and small business.

Not surprising then is the pride of President and CEO of Manitoba Hydro, Bob Brennan, who can look at the seven years of development as proof in not only their commitment to conservation, but a

watershed example of technologies and thinking that are making a vast positive contribution to global environmental and economic challenges.

Brennan reports that the planning actually went back to the 1990s and the acquisition of Centra Gas. At that time, the CEO and his team could see the need to consolidate its office space. He recalls that they had workers in updated warehouse facilities, rental units and a myriad of Hydro-owned buildings throughout Winnipeg. The other shoe dropped in 2002 when the utility acquired Winnipeg Hydro from the City. During negotiations, Mayor Glen Murray discussed using the deal to help downtown revitalization.

"We saw that a downtown location would benefit both ourselves and the city," says Brennan, adding that the timing and fit was perfect. The result is an architectural gem that has become an icon structure along the city's skyline.

## It Can Be Done

One thing Hydro's project managers were told from the outset was that much of what they wanted to accomplish was impossible. Consider the site preparation prior to construction. In a traditional building demolition job, teams arrive with their D9 Caterpillars, Drotts and Bobcats to smash existing structures and cart debris away to landfills. The team suggested a defter touch.

"We wanted to deconstruct the existing buildings on the block and donate the materials," says Tom Akerstream, a team member who was the Energy Advisor on the project and who is now the Building Manager. "We were told it couldn't be done within our budget and timeframe. In the end, the job we were told could not be done was completed for half the cost of the traditional method," he notes, adding that properties from old bank buildings to retail shops were pulled





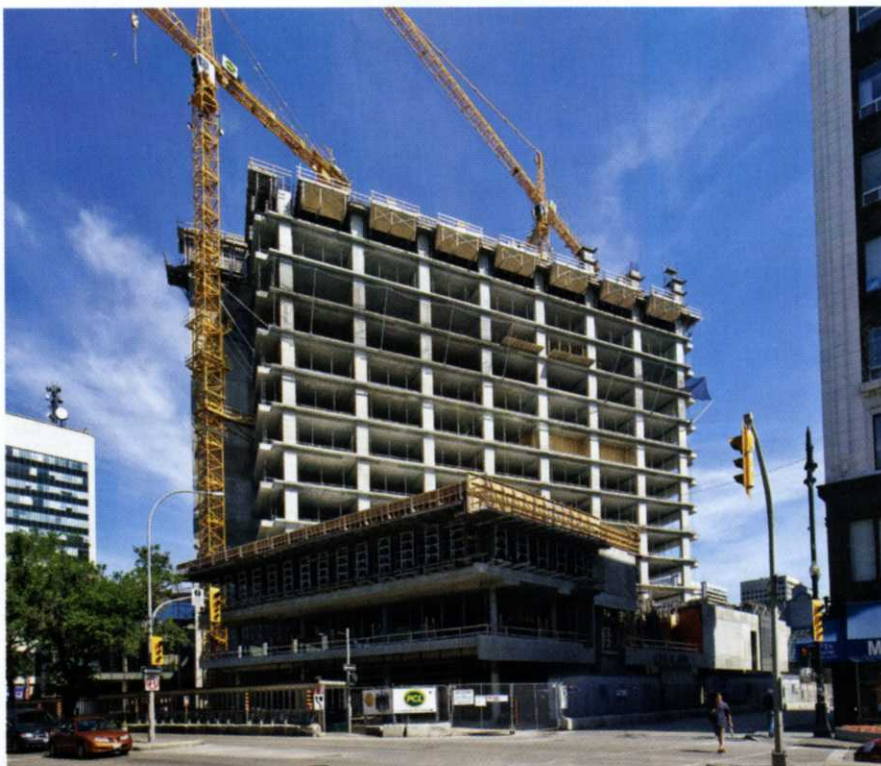
apart piece by piece saving all usable materials, like stone work, lighting fixtures and old timbers that were redirected to other projects. Indeed, 95 percent of materials on-site were reused or recycled.

Akerstream and others on the team, such as Dudley Thompson of Prairie Architects, had seen the Mountain Equipment Co-op project in Winnipeg and learned how builders could have their cake and eat it too by using recycled materials and conservation techniques to create a Class A structure that was not more expensive or more time costly to construct. Importantly, they knew the value of Integrated Design (ID) where all parties sit at the table from the beginning.

"In a typical process, the architect takes control of the project and parcels out work in sequence. What can happen is that design aspects that are high on the client's wish list can fall away as resources dwindle when a project nears completion. We did not want to compromise our goals and saw IDP as the best method to make sure all aspects were understood from the beginning by everyone, and we committed to these aspects as a group," he explains, adding that a lot of thought and time went into the placement of the IDP team.

The drive for the Integrated Design approach originated with the project's Professional Advising Architects - Prairie Architects of Winnipeg, a firm that had handled the Mountain Equipment Co-op's new building and its state-of-the-art conservation approach. The architects had utilized Integrated Design Planning on the MEC building and saw how this could benefit Manitoba Hydro Place.

"We developed the protocols on how to proceed and saw that IDP was the best way to go. We then set about hiring the team of professionals to sit around the table to create a concentrated mass of know-how to discuss and define the design according to the client's needs and available technology," says Dudley Thompson, a Principal with Prairie Architects, a company that has become the go-to group for sustainability in design in Manitoba.



Here 360 Portage Ave. Principal Architect Rick Linley of Smith Carter comments that the design took the Integrated Team a year to complete and was the result of a distilling process that saw them start with 16 schemes that boiled down to three and then one plan over a six-month period. He reports that as many as 50 people from PCL to the client to architects to construction managers all sat around the table. Architects from Smith Carter, architects of record, and Toronto-based KPMB (Kuwabara Payne McKenna Blumberg), the designers, comprised a group of 30 to 40 people alone.

"The client wanted an energy efficient building that would make a positive contribution to Winnipeg's downtown," says Linley, noting that the form of the building is the result of the integrated design process that allowed everyone to look at the project much differently than in a traditional arrangement. For example, the team's Stuttgart, Germany energy engineers, Transolar

Energietechnik GMBH, showed how the structure could use the environment rather than repel it like most buildings.

"We had many sessions as a team where we had to rethink the traditional and consider techniques that were uncommon in a project of this scale."

According to Tom Akerstream, they started by coming up with a list of everything that was an energy sustainable feature. "We then investigated all of them to see what would work here."

Similar to the site decommissioning, they were told more than a few times that their wish list was unattainable. For instance, the glass curtain that shrouds the eastern and western exteriors had been done in other climates. For Winnipeg's extreme weather, the challenge of a glass curtain wall was deemed too unrealistic. The team determined that glass could be utilized if the technique was reversed. What they did was use double panes on the exterior with single panes on the inside. The exterior walls also used low iron crystal clear glass (iron gives glass its characteristic green hue) to maximize solar gain. Problem solved.

Impressively, the building uses an innovative solar chimney, an iconic 24-storey structure topped off with a black stack of tubes filled with sand, to assist in airflow and ventilation in 360's low velocity fresh air delivery system. In this building flow and ventilation is a passive system that works without massive HVAC equipment so common in today's commercial buildings. The air in Hydro's new head office is taken directly from the outside and conditioned via the south facing natural Winter Gardens and then permitted to flow under raised floor plenums to rise up to staff. Once used the air continues to rise





and is exhausted via the solar chimney. In winter once the air enters the solar chimney it is drawn down to provide all of the heat required for the underground parkade. The remaining heat is also used to preheat the incoming fresh cold air as it enters the south Winter Garden.

Division Manager of Corporate Services, Tom Gouldsbrough, the overall Project Manager, comments that in most buildings 80 to 90 per cent of air is recirculated and comes from ceiling vents well away from people. At 360 Portage Ave., all the air is fresh and is directed to people and then vented. There are also windows that can be opened, a rarity in modern buildings where air-conditioning creates something like a submarine shell that must remain closed to the environment.

Gouldsbrough remarks that for him the most significant aspect is the quality of environment for the building's residents. "This building is designed in such a way that productivity is actually enhanced. For example, workers breathe completely fresh air that is brought into the building two to three times per hour. Our staff can also reach over and open a window for additional fresh air or temperature control. Workers also enjoy natural lighting through the massive windows. Desks have individual desktop lighting sources to give still more control over personal spaces, an important aspect to workplace satisfaction. As well, people can control sunlight through manual shading by overriding the building management system."

As to the building management system, Gouldsbrough notes that much of what happens at 360 Portage Ave. is preprogrammed for efficiency. He explains that inside the structure are two weather stations as well as systems that monitor the sun's position and feed the data into the building's property management system.

"As daylight approaches, lighting begins to dim thanks to photo cells, and give over to natural sunlight," he states, remarking further that the weather stations inform systems that determine the amount of sun shading necessary to maintain ambient temperatures around 23 degrees C.

"The building is like a living entity with 20,000 control points and weather centres determining how it reacts to the environment," adds Akerstream.

Helping the building stay at the right temperature is a subterranean vault of 280 geothermal loops that extend below the building nearly 400 feet. According to Akerstream, the Manitoba Hydro building is the only structure downtown to utilize this form of heating and cooling system, which is the largest of its kind in the province. He notes that in most scenarios a geothermal ground source heat exchange is installed under lands adjacent to a structure. At 360 Portage, the system was built directly below.

"Over the course of a typical year, the geothermal system is a balanced energy exchange. This is to say that heat extracted from the ground in



the winter is replaced in the summer when the process is reversed and heat from the building is sent underground to be stored. In this way the system is highly sustainable over the long term," he says, adding that the system contributes 65 percent of the heat and all of the cooling to the facility.

Further, the building uses its considerable wealth of exposed concrete to create surfaces that provide radiant heat. The challenge to designers was to use the concrete, but do so in such a way that the aesthetics were not cold. Here KPMB used natural materials to warm up the design. Evidence of this abounds, but is perhaps nowhere more noticeable than in the main level gallery where wooden slats climb the three storeys, and cascading waterfall wall treatments splash and gurgle beside massive stands of grey concrete. The water features - there are six installations - also condition the air with humidity as it passes through the gallery and Winter Gardens on its way up to offices.

The materials used on each floor are also as eco-minded as possible. This means that paints have no volatile organic compounds (VOC's) and carpets are free from noxious backing glues. In fact, the carpeting is known as a cradle to cradle product where worn pieces can be returned to the factory where they are remade into new floor coverings.

Office areas have built-in flexibility to help make them worker friendly. Gouldsbrough reports that while Hydro does not have a lot of staff turnover, a fact that indicates a highly satisfied workforce, they do have a lot of churn. To accommodate this, all offices and meeting rooms have demountable walls. Office cubes are serviced from below through the raised plenum flooring, and according to Gouldsbrough, each unit is completely plug and play.

"This allows us to move staff around easily as new project groups form."

Here Glen Klym, an architect with Smith Carter who was the Project Manager for the design team, points out that a criteria was to create a design that facilitated a three-floor department movement. In this scenario, workers with commonality can develop community through incidental meeting.

Klym mentions that the building features the largest green roof in Winnipeg. A green roof is one that is completely or partially covered with vegetation or soil. The design at 360 Portage Ave. offers three roof terraces to which workers can look out from above the third floor.

"The green roof on the podium provides storm water management as well as reducing the heat island effect in the downtown," says Klym, adding that it also makes a positive contribution to the local ecology by offering a habitat for birds.

## Human Scale

On street level, the new centre also helps make downtown more habitable for people who find small shops and businesses a good place to roost. According to Klym, the group's idea has been to enhance the human aspects on a pedestrian scale with individual retail and foodservice units tucked into units on the main drag.

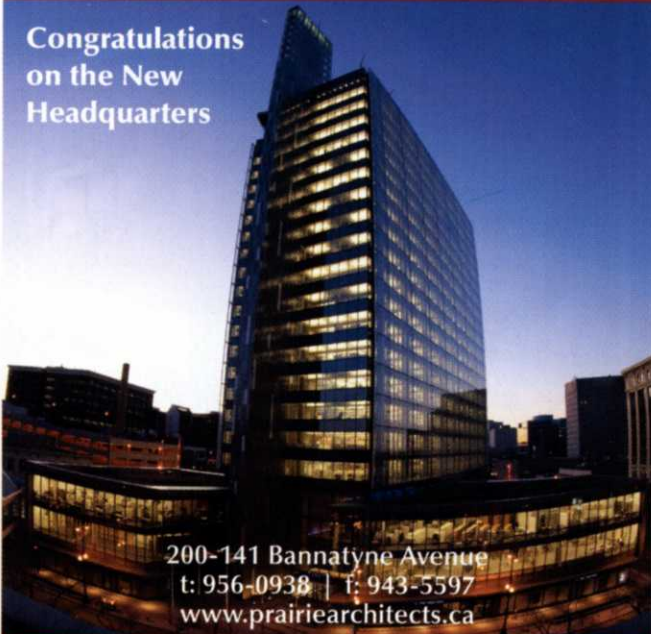
"In most large cities, tall buildings extend from the ground level upward without a human dimension. Just look at Portage and Main and you can see what I mean."

With the human scale in mind, Manitoba Hydro Place features a three-storey podium that houses a massive gallery that extends between Portage Ave. and Graham Ave. Klym sees the gallery as a 'city room' or public area that leads to the



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outside plaza on Graham. On the Portage Ave. face, there is room for a number of shops as well as banking to create an approachable feel to what might otherwise be viewed as an imposing office tower.

To further soften the imposing nature of Winnipeg's largest office tower, Hydro has worked with Manitoba artists to fill the building with a very impressive collection of contemporary works. Under the guidance of Hydro's Leona Herzog and architectural design consultant Ben Wasylshen, the building now houses more than 200 recently acquired pieces from some 80 local artists.

"Our idea was to deal directly with the artists," says Herzog, who reports that she and Wasylshen traveled the province visiting studios to obtain the right mix of art for the space. "We looked at works from the 1970s to 2009, and have included many of the leading practitioners in our collection, which will continue to grow."

Artists include Bruce Head, William Pura, Tony Tascona, and Ewa Tarsia to name just a few. The challenge was to find art works that would not be overshadowed by the dramatic building design. According to Herzog, the structure was not created to house art, and as such, they had to alter lighting in some hallways and find ways to hang items without placing fasteners in concrete walls.

"We have been able to turn long hallways into galleries and offer unique vistas with artwork as a focus. Some items, such as the ground level Bruce Head and the office level Aliana Au have come with controversy, but we have been able to use this as an opportunity to discuss the work with building staff, who have been wonderfully onboard with the process and the selection."

The collection is augmented by the corporation's existing store of art that Herzog moved over from other Hydro offices. "The acquisition of art for a facility such as this will continue as a work in progress," she says, remarking that they are currently looking at a large sculpture placement for the main floor space that will come as a loan from the Winnipeg Art Gallery.

### LEEDing the Way

"At the outset we had five goals," says Tom Gouldsborough. "We needed to address our business needs, create a signature piece of architecture, and it had to be energy efficient and sustainable. We also wanted to make a positive impact on downtown and have a project that made financial sense," he says, commenting further that an energy efficient building can require five to seven percent more capital up front, but these buildings then require less to operate over the long haul.

Consider that a typical office tower costs about 500 kilowatt hours (kWh) per meter of space to energize. An energy efficient building costs owners a lot less. In fact, a PowerSmart tower can run costs down to 200 kWh per meter. The new Hydro facility goes a step further with costs that are even lower in the range of 90 kWh.

According to Tom Akerstream, there are efficiencies everywhere you look. "The green roof contributes a 20 to 25 percent reduction in energy that would have gone to air-conditioning in a typical building," he says, injecting that the design for the structure was rotated 15 degrees on its block of land to maximize the southern solar input and give a proper orientation to the Legislative building.

Even the concrete used in the structure offers a conservation aspect. Handled by Crosier Kilgour Partners, the structural engineers for the project, concrete was made using 30 percent fly ash.

"Cement is a product with a huge carbon footprint. By using less we can help the building with its demand for sustainability and conservation," says Crosier Kilgour's Tom Malkiewicz, the Lead Structural Engineer. "Our challenge was to determine the right percentage for the mix. Too much and the setting time would increase beyond acceptable limits for PCL's construction schedule. We found 30 percent to be the optimum level," he reports, noting that in the end workers poured enough concrete in the building to construct 39 kilometers of roadway.





To obtain the best from the sun and provide ambient heat for this concrete, Hydro's team turned to industry leaders like Winnipeg's Border Glass, a local company with decades of experience and valuable expertise in the construction of glass curtain walls. As mentioned, 360 Portage Ave is clad in a glass skin that is comprised of a double-walled outer layer and a single pane interior wall.

According to David Borys of Border Glass, there is in excess of 350,000 square feet of window product surrounding the structure. Border Glass completed the interior glass wall in a portion that saw them install 130,000 square feet of single pane glass around the building, and another 9000 square feet of triple glazed, argon filled, low iron glass units on the main level

"What makes the glass unique is the low iron content. This makes it more conductive by allowing more solar energy to pass through to the building, a major aspect in the heating. It also contributes to the quality of the sunlight. With low iron glass, there is just more natural light coming into the building. Yes, it costs more

up front, but the payback is made over the long term with lower heating bills, not to mention a better quality of life for workers who can enjoy more natural lighting, as well as fresh air from the operable windows in the curtain wall," says Borys.

Taken together these innovations have earned Manitoba Hydro considerable kudos from the design and energy conservation sectors. Manitoba Hydro Place was recognized by the Council on Tall Buildings and Urban Habitat as the number one office tower in the Americas with regard to design, quality of space, urbanism, sustainability and energy efficiency. It was one of only four buildings in four geographic regions selected in the Best Tall Building awards for 2009, sharing recognition with outstanding tall buildings in Beijing, London and Doha (Qatar).

The property also walked away with Gold for its excellence in building development at this year's Brownfield Awards in Vancouver. The project is targeting LEED (Leadership in Energy and Environmental Design) Platinum, and has extensive use of passive and natural ventilation, geothermal systems and heat recovery, day

lighting, building automation, and hi-performance envelopes.

According to Akerstream and Gouldsbrough, the new building has achieved the necessary 60 percent reduction in energy use from buildings that conform to the national building code requirements.

"We will likely go beyond 65 percent as we move forward and the building systems find their groove," says Akerstream.

"As a provincial utility it is important for us to show the way in energy conservation. It is also important for us to show how costs can be removed and business can benefit by being sensitive to the environment. This building will provide significant savings in greenhouse gasses as well as operational expenses," says President and CEO Bob Brennan, who concludes by pointing out that with this saving and leadership comes a heavy injection of pride for Manitobans in a new Winnipeg landmark.