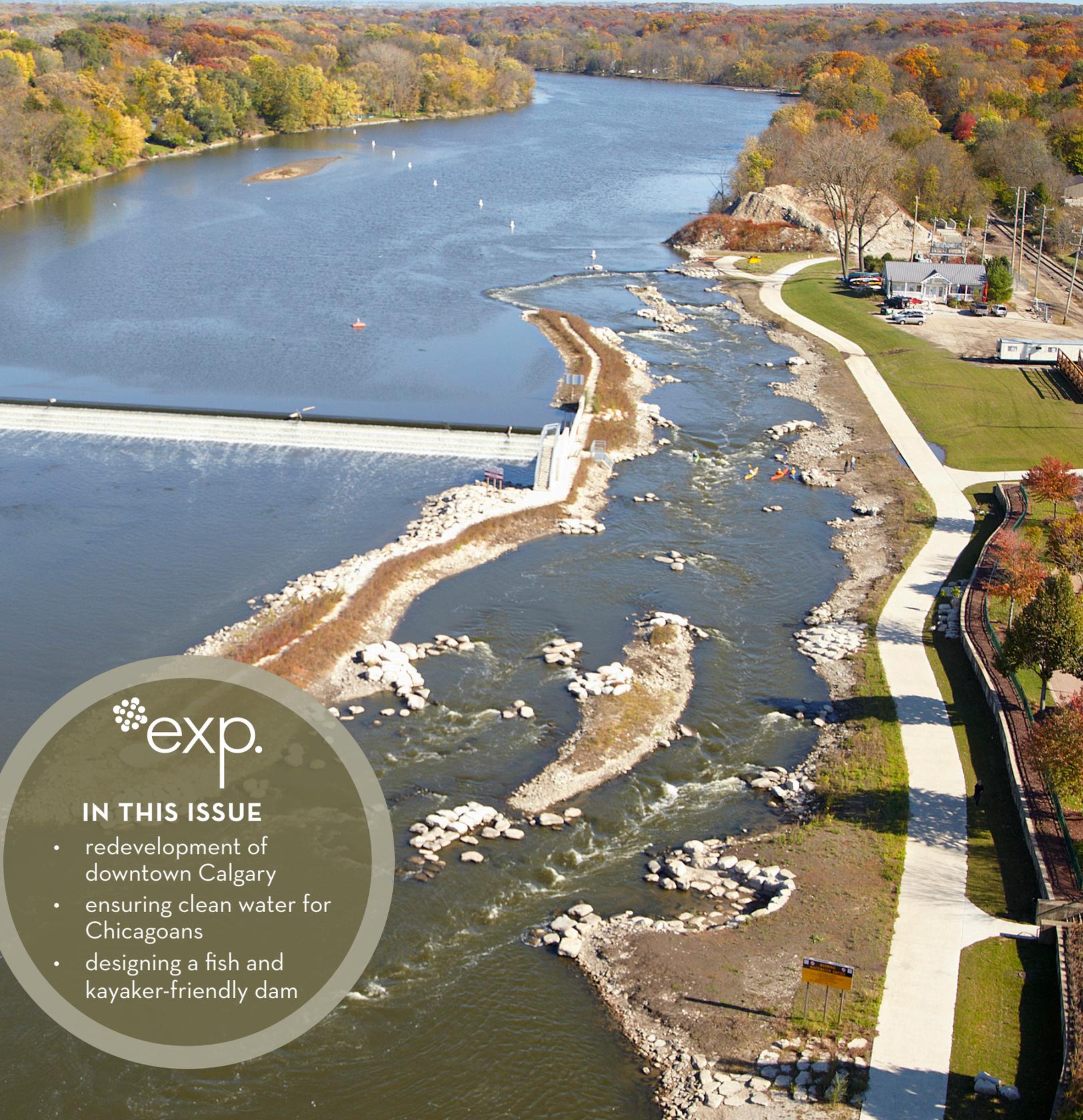


# expresso

INFRASTRUCTURE

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# when neighborhood redevelopment and cultural identity go hand in hand

## MONTREAL'S CHINATOWN DISTRICT, QUEBEC

In 2014, Montreal city authorities launched a project for the revitalization Chinatown district, located in the city's downtown area, close to the *Palais des congrès de Montréal* convention center and to the *Place des Festivals*. The project's main objective was to redevelop the pedestrian and the commercial portions of De La Gauchetière Street, between Clark Street and Jeanne-Mance Street. Also included in this redevelopment was the Sun-Yat-Sen Square.

The Chinatown district redevelopment project's primary focus was to meet the following objectives:

- Refresh its image and inject it with renewed liveliness;
- Enhance its touristic assets in order to keep attracting visitors and conventioners;
- Implement a new walkway showcasing its unique cultural identity;
- Create a public gathering space known for its welcoming atmosphere;
- Integrate elements that support sustainable development and that contribute to mitigating heat island effect.

The Chinatown district redevelopment project's most important goal was to serve as an integrating and unifying initiative for the community. In the end, the redevelopment needed to serve the people and families who call the neighborhood home, by providing them with a place where they

can come together, trade thoughts, stories and goods, or simply relax in an environment that's safe and that meets their needs. The Ville de Montreal trusted **exp's** highly qualified Montreal-based multidisciplinary team to conduct the electrical, civil, mechanical and structural work.

Reconstruction of De La Gauchetière Street consisted mainly in installing concrete pavers on the entire road surface with a central granite channel gutter as well as creating bioretention basins for rainwater in strategic locations. Designed to enhance some of the neighborhood's key features, such as the Chinese Church, the low reliefs of Saint-Urbain Street and the small arches, the new lighting system also includes Chinese-style lighting elements that help create a welcoming and safe atmosphere while reminding people of the area's Chinese cultural background.

The redevelopment project also included the complete restoration of the fountain located between the *Palais des congrès* conference center and the *Complexe Guy-Favreau*. It also included the partial reconstruction of Sun-Yat-Sen Square. Our landscape architecture experts implemented vegetated retention basins and designed contemporary street furniture that complements the neighborhood's cultural elements.





## Montreal's Chinatown

Montreal's Chinatown dates back to the 1860s when Chinese immigrants came to Canada to work in the mines and on the railroads. They settled mainly along De La Gauchetière Street near Saint-Laurent Boulevard. Today the district is less residential than commercial but it has kept its Asian flavour. The Chinese community continues to shop and celebrate its traditional festivals and holidays here. The narrow streets are lined with shops selling exotic foods, traditional crafts, martial arts accessories, herbs, and natural medicines. (Source: Tourisme Montréal)

# upgrading water and sewer systems in polar conditions

## RESOLUTE BAY, NUNAVUT

**E**xp's Eastern Ontario Infrastructure group is completing the second year of a three-year construction program to replace the Hamlet of Resolute Bay water and sewer systems, in Nunavut. The Eastern Ontario Infrastructure group teamed up with staff from the Eastern Canada Infrastructure group to provide engineering services to the Government of Nunavut for the entire upgrade of the installations.

The upgrade of the Hamlet's water and sewer mains involves replacing a total of 3,425 m of water main, 2,200 m of sanitary sewers, 36 prefabricated access vaults, and 91 service connections. As the water and sewer pipes are located within the permafrost, design of the systems needed to include freeze-protection measures. The water system is designed to ensure continuous recirculation and heat injection, while the sewer system incorporates water bleeds to provide a continuous flow of heated water.

The original water and sewer systems were installed in the 1970s and due to their relatively shallow depth of bury (typically 1 metre of cover), were located in the active zone (the upper layer of the soil that is submitted to the freeze-thaw cycle). Over time, the sewer system lost its profile due to the effects of the freeze-thaw cycle, which resulted in enormous amounts of water having to be used to keep the sanitary sewers from freezing. The replacement mains were designed to allow for sufficient cover (2 metres minimum of cover over the sanitary sewer) and for installation within the permafrost, thus preventing exposition to freeze-thaw cycles.

Our Eastern Ontario Infrastructure group has been working in the Far North (Nunavut) since the late 1970s. In addition to their work in Resolute Bay, they have been involved in projects completed in ten other Nunavut communities.





# designing a fish and kayaker-friendly dam

## GLEN D. PALMER DAM, YORKVILLE, ILLINOIS

**B**uilt in 1960 as a replacement of the original dam built in the early 19<sup>th</sup> century, the Glen D. Palmer Dam is a 6-foot-high structure with a 530-foot-long spillway across the Fox River, in Yorkville, Illinois. There were however, major safety issues linked to the design of the dam. It was found that turbulence-generated hydraulic conditions produced a submerged roller effect downstream, which claimed the life of a number of kayakers and canoers who drowned after being caught in the “roller”.

The City of Yorkville requested help from the Illinois Department of Natural Resources (IDNR) to solve this safety hazard. The IDNR then selected **exp** to provide analysis of alternatives, planning and design services.

The project included significant coordination with the local community, the Citizens Advisory Committee, as well as all environmental permitting agencies. Three major design requirements were identified in **exp**'s recommendations.

### Safe spillway configuration

A stepped spillway was implemented at the downstream face of the dam, eliminating the roller created by the old spillway.

The new stepped spillway now serves as an example for safety improvements to other low-head dams throughout Illinois.

### Fish passage system

In order to facilitate natural fish migration, a fish passage known as a Denil fish ladder was built, allowing fish to go around the barriers by swimming and leaping up a series of relatively low steps, into the waters of the upstream side of the dam.

### Canoe and kayak passage system

Our work also included the design of a bypass channel, which required the removal of a portion of the existing dam, to improve access to the waterfront and to provide novice / intermediate whitewater rafting installations for kayaks and canoes.

Reconnecting the upstream and downstream areas of the Fox River – previously cut off by the existing dam – significantly improved safety and environmental conditions along the river and increased tourism and economic activity within the community.

# biological treatment of wastewater

DONG HOI, QUANG BINH, VIETNAM

**F**unded in part by the World Bank and in line with Vietnam's national strategies on environmental protection and on waste management in cities and industrial bases, this green infrastructure project consisted in building a wastewater collection and treatment system in an urban community of about 110,000 residents.

Vietnam's economic conditions had to be taken into consideration when designing the installations, which were to be implemented in an old rice field. Given the limited availability and high cost of conventional energy in this developing country, our team opted for renewable energy-powered systems (windmill aerators and solar panels) and biological treatment processes in order to reduce operation costs and ensure uninterrupted service.

While in light of the conducted feasibility studies a conventional facility with oxidations ditches (activated sludge) was originally recommended, our team held a number of meetings with the relevant authorities and was able to demonstrate to them that going with a solution that integrates sustainable development principles would constitute a more viable option. Today, this green project, with its bioreactor, optional ponds and filtering marshes, is cited as an example in the World Bank report titled Vietnam Urban Wastewater Review. In addition to being efficient, the implemented process helps keep operational costs low, mainly by allowing for a reduction of expenses associated with the purchase of large quantities of chemicals and the purchase or replacement of mechanical parts.

## About Vietnam

Reforms have transformed Vietnam from one of the world's poorest countries 25 years ago to a lower middle-income country (MIC) (2011 per capita income of US\$1,260). The poverty headcount fell from 58 percent in the early 1990s to around 3 percent by 2015. The country has one of the strongest results records of any World Bank borrower. (Source: World Bank)





# the J.-M.-Jeanson water treatment plant: state of the art and ultra-performing

SHERBROOKE, QUEBEC

Operating since 1977, the city of Sherbrooke's J.-M.-Jeanson drinking water treatment plant has recently undergone a major rejuvenation process. When it launched, in 2006, the plant modernization project, the City tasked **exp** with conducting several preliminary engineering studies for bringing the facility up to standards. Today, the expanded and upgraded plant boasts industry-leading technology ensuring high quality drinking water for the residents of Sherbrooke.

This plant was designed in accordance with sustainable development principles, and sets an example for the successful combination of new treatment technologies. The new 96,200 m<sup>3</sup>/d capacity plant is equipped with a membrane filtration system and complex new-generation treatment chain. This microfiltration technology is combined to a very high frequency ozonation system fueled with liquid oxygen — the largest new-generation system of its kind in the province of Quebec — and to a sodium hypochlorite disinfection system. The use of membrane filtration allows for less than 0.5% of the

water entering the plant to be rejected into the sewer system and directed to the wastewater treatment facility.

The treatment system can eliminate cyanobacteria and cyanotoxins, and was designed to compensate for deteriorating raw water quality in the future. Other than chlorine — which is needed to maintain a residual in the distribution system — no chemicals or coagulants are used to treat the water, and the membrane trains only require occasional chemical washing.

The use of variable frequency drives for high capacity pumps also allowed for the optimization of the plant's energy consumption. Other major work included replacing four 350 HP vertical turbine drinking water distribution pumps and all related high voltage, layout, instrumentation and control works.

The J.-M.-Jeanson drinking water treatment plant is the largest membrane filtration plant in the province of Quebec (+/- 100 000 m<sup>3</sup>/d), and is among the province's most performant and best automated high flowrate plants.



# ensuring clean water for Chicagoans

CHICAGO DEPARTMENT OF WATER MANAGEMENT, CHICAGO, ILLINOIS

The Chicago Department of Water Management (DWM) works around the clock to provide clean water to Chicago's 2.7 million residents. It operates the two largest capacity conventional water treatment plants in the world, processing almost a billion gallons of water every day.

## Chicago Capital Improvement Program

Since 2007, CTR — a program-specific joint venture team named after the three initial firms involved (CH2M Hill, Teng (now **exp**) and Rise (now Arcadis U.S., Inc.) — has been providing program management services for DWM's daily operations under the Chicago Capital Improvement Program.

At the start of our contract, the Capital Improvement Program (CIP) goal was to replace 40 miles of water main annually. Then, in 2012, the City established an aggressive schedule to replace at least 880 miles of water main in the 10 following years, to align with the mayor's new city-wide infrastructure initiative.

Automation of design and enhanced estimating tools, combined to the use of uniform standards and communication software, increased the installation rate of the water main to 150% in 2015.

CTR's program management services include management of planning, design and construction; program controls leadership, IT and GIS services; and management of the MeterSave project. Pleased by CTR's successful support of its 2007-2012 capital improvement projects, the DWM extended the team's contract until 2017.

## MeterSave program

Through the MeterSave program, the City of Chicago's Department of Water Management, invited Chicago homeowners whose water consumption was not already metered, to voluntarily install smart meters that would help them save water and money. Since 2007, **exp** acts as project manager for the program, under which 270,000 smart meters have been installed to this day — out of a possibility of 500,000 — and 230,000 more meters are expected to be installed by 2024.

By working with the Chicago DWM in replacing century-old water mains and in implementing the MeterSave program, **exp's** team is helping the City reach its goal of reducing water use by 2% annually and delivering quality water to its residents. These actions are part of the vision of making Chicago the most livable, competitive, and sustainable city in the 21<sup>st</sup> century.<sup>1</sup>

<sup>1</sup> *Sustainable Chicago 2015 Action Agenda*

## Sustainable Chicago Water Statistics

- \$ 0.8 billion spent on water annually
- 56 miles of riverbank
- 770 million gallons per day from Lake Michigan for Chicago region
- 26 miles of public lakefront



An award-winning  
project

2008 Canadian Urban  
Institute Brownie Finalist

2010 Consulting Engineers of  
Alberta Award of Excellence,  
Community Development

# redevelopment of downtown Calgary

## EAST VILLAGE PROJECT, CALGARY, ALBERTA

**T**he East Village redevelopment spans 49 acres between Fort Calgary and the downtown business core of Calgary, along the banks of the Bow River, which makes it a highly desirable piece of real estate. East Village is also the founding location of the city of Calgary, the place where it all began. Over time, though, East Village deteriorated and became well known for its vacant lots and neglected buildings.

**Exp** has been the lead engineering consultant for redevelopment of the East Village, since the comprehensive planning phase led to an approved Area Redevelopment Plan (ARP), in 2005. Plans for the unique and sustainable community included the construction of a storm water wetland to remove sediment from the existing urban catchment area, the implementation of major infrastructure upgrades, the integration of open spaces such as the river front, Fort Calgary, and two new park areas, the design of pedestrian-friendly streets, and the preservation of heritage buildings.



### A storm pond that serves as public amenity

Construction of the East Village storm pond represented the first phase of the required infrastructure upgrades for the whole area. Given the area's prime location at the confluence of the Bow and Elbow rivers, the wetland now serves as both a public amenity, complete with pathways, lookout points and interpretive features, and as a functioning storm water treatment facility improving quality of storm water discharged into the Bow River.

### 100-year-old infrastructures with many challenges

Redevelopment of the area presented many challenges, including upgrading 100-year-old public infrastructure, raising the area to the 1:100 year flood level for the Bow River, remediation of soils and groundwater impacted by past industrial and commercial uses, and maintaining existing traffic flows and services (for both the local and adjacent downtown areas) throughout the construction period which spanned several years.

The extensive upgrade and replacement of both deep (water, sanitary and storm sewer) and shallow utilities (power, gas, telephone, cable and district energy) throughout the East Village area was a major design, scheduling, and coordination challenge. The East Village area included some

of Calgary's oldest and most congested infrastructures, for which record data was very limited and proved to be both inaccurate and incomplete. As such, design and construction of new horizontal and vertical alignments of utilities called for innovative solutions and continuous coordination with stakeholders and authorizing agencies.

### Innovative streetscapes for a neighborhood

New and innovative streetscapes, the most significant element of public open spaces in a sustainable, vibrant, and humanly scaled neighborhood, were implemented in the East Village, including surface treatments such as distinctive street lighting, raised or flush intersections, separate raised parking lanes, brick streets and sidewalks. Specific barrier-free design features unique to East Village included the implementation of tactile pavers at each crosswalk — paving units that bear a distinctive, raised surface profile that can be detected by both the sighted and visually impaired pedestrians.

In this mixed-use development project, **exp** teams provided a full array of services including preliminary engineering, detailed design, tendering, construction, contract administration and post construction. A multidisciplinary team of experts in project management, storm water management, landscape architecture, environmental remediation and civil engineering participated in and executed the many phases of this project.



An aerial photograph showing a dam structure across a waterway, with surrounding greenery and some buildings visible on the banks.

# heritage dam safety assessment and detailed design

## BOLSOVER, ONTARIO

Lock 37 and Bolsover Dam are located on the Trent-Severn Waterway, in Bolsover, Ontario. Built at the turn of the 20<sup>th</sup> century and designated as a National Historic Site of Canada in 1929, the Trent-Severn Waterway links the Georgian Bay to Lake Ontario by a series of locks, canal cuts, a marine railway and two lift locks across a chain of inland lakes and rivers. Built in 1902-1903 to regulate water level for navigation, the Bolsover Dam is a Level 1 cultural resource. Today, the Waterway and its locks are operated by Parks Canada and used by tourists and vacationers travelling by boat to the upper Great Lakes cottage country, between May and October. Last year, there were close to 100,000 lock operations.

A recapitalization assessment process allowed us to develop alternatives for the dam's rehabilitation/reconstruction. The preferred alternative involved replacing the dam at its existing location, while respecting the site's cultural and historical character and maintaining the full navigational functionality of the lock. Cofferdams were implemented in the navigation channel, upstream and downstream of the dam, to allow construction in dry conditions.

Since 2013, time at which the construction project contract was awarded by Public Works and Government Services Canada (PWGSC), **exp** has been performing contract administration and quality assurance functions (safety, materials, water quality, environmental impact, and structure/embankment stability monitoring) for PWGSC. The project is slated for completion in 2016.

# reinventing our neighborhoods

## THROUGH SMART AND SUSTAINABLE URBAN PLANNING

Urban development projects integrating the principles of sustainable development are growing in number on North American soil. Major urban centers, like moderate size cities, are undertaking or looking to undertake projects aimed at developing or redeveloping built environments intended to become green or sustainable neighborhoods.

This approach adds to our Infrastructure and Buildings service offer, but mostly, it allows us to promote our multidisciplinary services with a focus on the development of smart and sustainable neighborhoods. The main focal points of smart and sustainable urban planning include:

- Connectivity and smart transportation — making it easier for citizens to get to their daily activities and enhancing smart transportation access and systems to reduce car dependency;
- Mixed-use neighborhoods — offering diversified and accessible housing, local commerce, public gathering spaces and recreational activities;

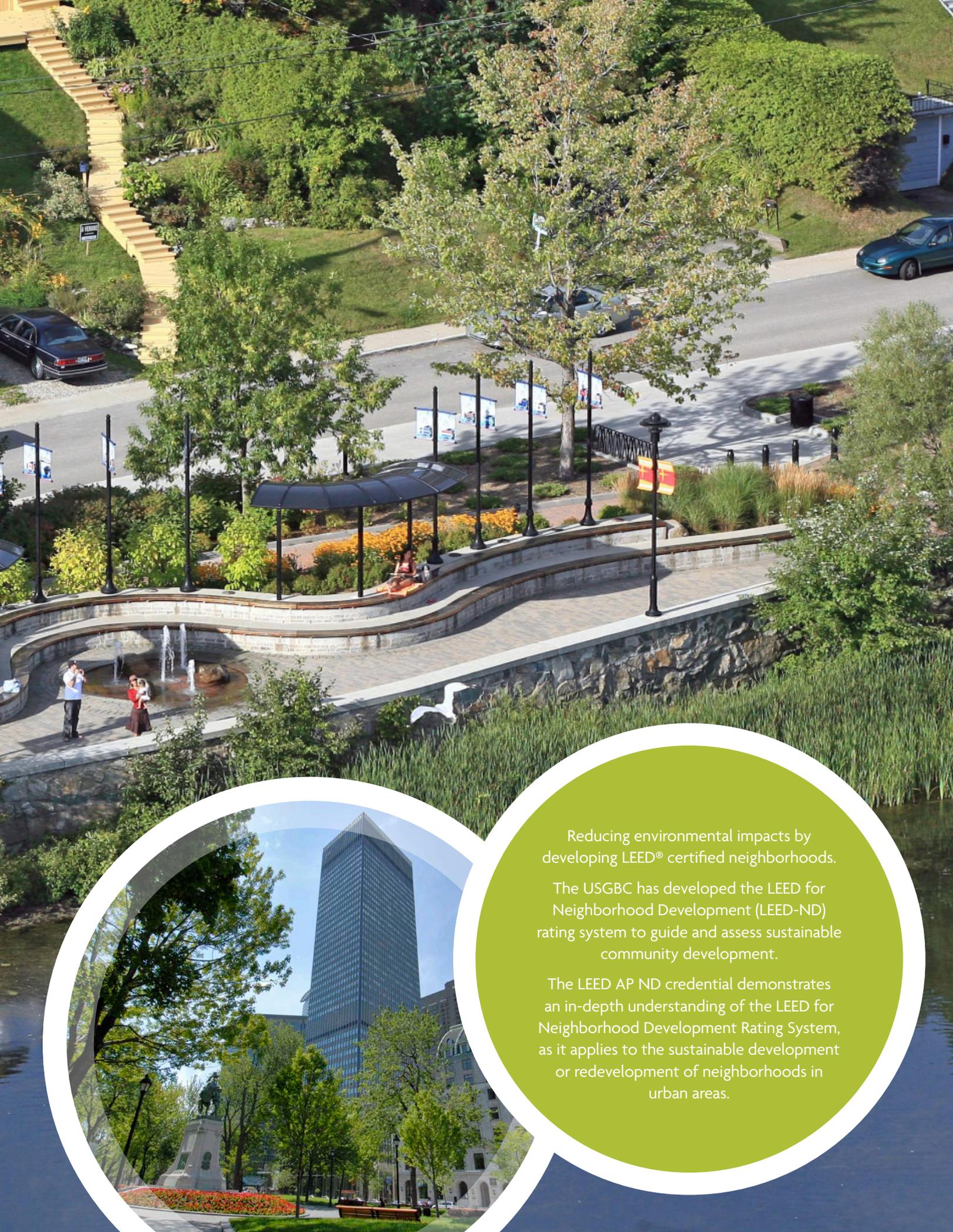
- Design and upgrade of green infrastructure and buildings — preserving green spaces, optimizing energy performance, and ensuring sustainability of materials, surrounding resources and existing infrastructure (such as roads and schools).

Leveraging the unique expertise of our Green building team, which includes professionals who have been awarded the LEED® AP ND credential, we can act as consulting experts for communities looking to develop a going green plan.

For information regarding new land development or redevelopment projects or mixed-use neighborhoods (residential, commercial, community, and cultural), please contact:

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Reducing environmental impacts by developing LEED® certified neighborhoods.

The USGBC has developed the LEED for Neighborhood Development (LEED-ND) rating system to guide and assess sustainable community development.

The LEED AP ND credential demonstrates an in-depth understanding of the LEED for Neighborhood Development Rating System, as it applies to the sustainable development or redevelopment of neighborhoods in urban areas.



J.-M.-Jeanson Water Treatment Plant, Sherbrooke, Quebec  
Cover Photo: Glen D. Palmer Dam, Yorkville, Illinois

With a mission to understand, innovate, partner and deliver, **exp** provide professional, technical and strategic services to the world's built and natural environments in six key practice areas: Buildings, Earth & Environment, Energy, Industrial, Infrastructure, and Sustainability. Our heritage dates back to 1906, when the earliest of **exp's** predecessor companies started its engineering infrastructure practice in northern Ontario.

Today, close to 3,000 creative **exp** professionals across North America and around the globe provide the expertise and experience needed to deliver successful projects for clients.

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