CASE STUDY

MUSGRAVE AGENCIES OFFICE BUILDING

The Musgrave Agencies office building was designed to maximize occupant comfort while fully leveraging the performance advantages of BuildBlock ICF construction. Through a high-performance building envelope—including an R-40 roof system, underslab insulation, triple-glazed windows, and hydronic radiant in-floor heating—the project achieves exceptional thermal stability, reduced energy demand, and consistent indoor comfort year-round. Extensive natural daylighting and passive solar strategies further support efficiency, creating a welcoming workspace that performs reliably even in Alberta's extreme climate conditions.

About

Location: Lloydminster, AB, CA
Project Type: Office Building
Project Start Date: September 2012
Project Finish Date: December 2013
ICF Installation Duration: 120 Days

Owner: Brian Robinson, Musgrave Agencies
Architect: Brian Robinson, Musgrave Agencies
Engineering: Dan Cyr, Bar Engineering
CG: Brian Robinson, Musgrave Agencies
ICF Installer: Carson Butterwick, Butterwick Brothers
Time Saved with ICFs: 6 Weeks

Size: 24,000 sq ft
Cost: $4,000,000 ($5.8 adjusted 2026 inflation)
ICF Wall Square Footage: 9,573 (100% of exterior walls)
Floor Joist: Elk Point Truss
Bracing: Plumwall
Exterior Finish: AMCE Brick
Bucking: Treated Lumber

Highlights

- **Extreme-climate performance:** High-performance BuildBlock ICF walls, an R-40 roof system, triple-glazed windows, and hydronic radiant floor heating deliver exceptional thermal stability and energy efficiency in northern Alberta's harsh winter conditions.
- **Architectural flexibility with expansive glazing:** Nearly as much glass as wall area—including window openings up to 16 feet tall—was achieved through the structural strength of ICF construction while maintaining envelope performance.
- **Engineered for enhanced structural capacity:** The building was designed to support 100 lbs/ft² floor loading—double typical office standards, with engineered trusses integrated directly into the ICF walls for a unified, high-strength structural system.

Sustainability

The Musgrave Agencies office building was designed to maximize both occupant comfort and the performance advantages of BuildBlock ICFs. From the outset, the goal was to create a space that feels less like a traditional office and more like a warm, welcoming home—an environment aligned with the company's work in residential real estate and land development.

The building incorporates a comprehensive range of sustainable design strategies. High-performance envelope components include an R-40 roof system—well above the regional norm of R-20 to R-30—and full underslab foam insulation. Triple-glazed windows throughout the structure significantly reduce heat transfer while supporting passive solar gain, a key consideration in the design.

Hydronic radiant in-floor heating is installed on both levels, delivering consistent and energy-efficient comfort. The building's thermal performance is so effective that, despite being engineered with excess cooling capacity, the mechanical systems operate minimally. The interior temperature remains remarkably stable regardless of extreme outdoor conditions.

Natural lighting plays a major role in reducing energy consumption. Large-format windows and an open floor plan allow daylight to penetrate deep into the building, meaning only approximately half of the LED lighting system is required during normal operation. Together, these features result in reduced operational costs and a highly energy-efficient building envelope that fully leverages the benefits of ICF construction.

Complexity & Creativity

The project presented significant engineering and construction challenges, particularly due to the scale and number of large window openings combined with substantial wall heights reaching 32 feet across 400 linear feet of ICF wall.

Structural requirements added further complexity. The building was engineered to support 100 lbs/ft²—double the load capacity of a typical office—to accommodate heavy filing systems and equipment. This necessitated the integration of engineered floor trusses directly into the ICF walls using embedded J-bolts, creating a robust and unified structural system.

Architectural detailing introduced additional challenges. The design incorporated both 6-inch and 8-inch ICF blocks within the same wall planes to create varied brick depths, requiring precise coordination to ensure a seamless concrete pour. Numerous beam pockets, floor breaks, and complex transitions—such as the parapet wall shift from 8-inch to 6-inch forms—demanded careful planning and execution.

Enhanced waterproofing strategies were also implemented around the extensive window systems. Meanwhile, the second floor combined insulated trusses with a hydronic radiant heating system embedded in a Gypcrete topping, further demonstrating the project's layered complexity and innovative approach.

Construction & Site Considerations

Construction took place under extreme winter conditions typical of northern Alberta, with temperatures ranging from -5°C to -30°C and frequent high winds. These conditions posed significant challenges for concrete placement and curing.

ICF construction proved especially advantageous in this environment. Following concrete placement, batt insulation was temporarily installed at the top of the forms to retain heat. This approach successfully maintained internal wall temperatures at approximately 5°C during curing, ensuring proper concrete performance despite the harsh climate.

The building's numerous corners and closely spaced window openings required precise installation and bracing, particularly given the high winds and persistent snow. Despite these challenges, the project was completed on time and within budget—a notable achievement given the weather constraints.

Project Success & Recognition

The project was completed on time and on budget, exceeding expectations in both construction quality and performance. The owners report a high level of satisfaction, particularly with the building's comfort, efficiency, and durability.

Construction quality was exceptional, with wall straightness maintained within less than ½ inch variance across the entire structure—surpassing typical standards for conventional framing.

Beyond its functional success, the building has become a powerful marketing and educational tool. It stands as a real-world example of ICF construction's value, especially in extreme climates, and continues to influence building practices in the region.

The End Result

The Musgrave Agencies office building demonstrates how BuildBlock ICFs deliver a powerful combination of structural strength, energy efficiency, and design flexibility. From maintaining consistent indoor comfort in extreme climates to enabling expansive glazing and complex architectural features, the system proved superior to conventional construction methods. The project highlights how BuildBlock ICFs not only reduce operational costs and enhance durability but also simplify construction under challenging conditions—making them an ideal solution for high-performance commercial buildings seeking long-term value and resilience.