

**STRONG  
SAFE  
AFFORDABLE  
AND  
SUSTAINABLE  
STEEL**

THE OBVIOUS CHOICE FOR  
MIDRISE CONSTRUCTION





# STEEL

Steel is a major and essential construction material, offering unique value and unmatched performance in many end uses. Steel is strong, safe, durable, versatile, resilient and cost-effective. Steel is sustainable, with the exceptional environmental advantages of being highly recycled and infinitely recyclable. Steel is tough and does not rot, spall, split or absorb moisture and is resistant to pests, unlike other building materials. And from an aesthetic or architectural viewpoint, steel structures can easily deliver creative design options and offer excellent value. Steel is the fabric of life.





# UNPARALLELED FIRE SAFETY

Life safety, and specifically fire protection, has been and will always be a primary concern of the building codes. Steel is a non-combustible material and consequently does not burn, provide an ignition source or add fuel load that would enable a fire to spread or grow into a catastrophic event. Steel does not melt at temperatures typically encountered in a building fire. Its non combustibility and assembly fire ratings do not degrade over the lifecycle of a building. This provides a reduced fire risk to workers and occupants, minimizes the impact on municipal fire services, decreases the reliance on sprinklers, and results in less property damage and collateral damage to adjacent buildings if a fire should ever occur.

■ Steel has a melting point of approximately 1500°C (2700°F). In a typical fire, such as in an office, residential or retail occupancy, the maximum temperature of a fully developed fire will not likely exceed a range of 800 to 900 °C (1,500 to 1,650 °F), though it could reach a peak of 1,100 °C (2,000 °F) for a short duration.

■ Buildings codes recognize the fact that buildings designed with non-combustible materials like steel pose less of a fire risk to the public than combustible systems, which are limited to six storeys in height in Canada and 85 feet in the US.

*“Changes in the building codes that allow combustible framing in taller and larger buildings have gone too far and it’s created a perfect storm that can quickly overwhelm the ability of the of the fire service to respond.”*

**- CHIEF STEVE LOHR, HAGERSTOWN (MD) FIRE DEPARTMENT**



## STEEL IS A NON-COMBUSTIBLE MATERIAL AND CONSEQUENTLY DOES NOT BURN,

provide an ignition source or add fuel load that would enable a fire to spread or grow into a catastrophic event.



# COST SAVINGS IN STEEL

start at the foundations, where the loads imposed by a steel frame are up to 50% less than those of a concrete alternative.





# REAL STEEL COST ADVANTAGES CONSIDER. CHOOSE. CHALLENGE.

There is evidence in the field and through third-party case studies and comparative cost studies that steel building systems offer significant cost benefits over competitive building materials when the total cost of construction is considered. Building owners, developers, contractors and design professionals are concerned with overall system construction costs from the design phase through the operational phase, and not simply the raw material costs of structural and nonstructural systems. While there are efforts to promote the affordability of a specific building material over others, there is a growing concern that the overall impact of material selection is being ignored or concealed, a result that will be costly for all stakeholders involved. It would be wise for developers, designers, building professionals, owners and other stakeholders to **CONSIDER** the case for steel and its many proven or demonstrated cost advantages such as long-term performance, **CHOOSE** the best material for the building project based on all direct and indirect economic benefits, and **CHALLENGE** the claims of competing materials industries.

■ A recent comprehensive comparative case study on a six storey office building was conducted by respected third parties in order to evaluate the impact of using steel framing versus cast-in-place (CIP) concrete on a project's entire construction cycle from concept and design to costing, construction and sustainability. The result was a net cost difference of \$81/m<sup>2</sup> (\$7.50/ft<sup>2</sup>) in favour of the steel building.

■ Cost savings in steel buildings start at the foundations, where the loads imposed by a steel frame are up to 50% less than those of a concrete alter.

■ **Time-related savings can easily amount to between 3% and 5% of the overall project value, reducing the building owner's requirements for working capital and improving cash flow.**

■ Builders risk insurance on a four storey, 400 unit hotel built over 24 months cost \$360,000 for steel framing compared with the \$1.6 million it would have cost for a policy if the project had been built with wood - a savings of \$1.3 million.



*"We supplied all the cold formed steel and connectors. We had 95% pre-cut to size to save labour and site debris. The steel's precision and straightness allowed the use of pre-engineered panels. We estimate close to a \$10.00 per 0.093m<sup>2</sup> (\$10 per sq. ft.) savings over a concrete structure."*

**- GERRY MORIN, MORIN BROS. BUILDING SUPPLIES INC.**





*"Steel is the smartest choice for the design and construction of truly sustainable buildings. The inherent strength and durability of steel products, combined with their ability to be continually recycled, means they meet the very definition of sustainability."*

**- MARK A. THIMONS - VICE PRESIDENT, SUSTAINABILITY - STEEL MARKET DEVELOPMENT INSTITUTE**

# SUSTAINABLE STEEL AND THE ENVIRONMENT

Steel is one of the most sustainable construction materials. Its strength and durability coupled with its ability to be recycled, again and again, without ever losing quality make it truly compatible with long-term sustainable development. Steel is the world's most recycled material. In 2013 alone, 81 million tonnes of steel were recycled in North America. Each year, more steel by weight is recycled in North America than paper, plastic, aluminum and glass combined.

■ The North American steel industry has continually improved its energy use and levels of greenhouse gas emissions, achieving a 32% reduction in energy intensity and a 37% reduction in GHG intensity since 1990.

■ **Through recycling, the steel industry saves the energy equivalent to power 20 million homes for one year.**

■ All North American steel products have a significant amount of recycled content, including some products with more than 90 percent.

■ Today, 97 percent of steel by-products are re-used. The overall recycling rate for steel from all industries combined is 81 percent, with some construction segments reporting values as high as 98%.

■ While other building materials can only be recycled into a lower quality product (down-cycled), steel can be recycled over and over again and remade into new products (multi-cycled) without any loss of quality. This makes it the first and only true cradle-to-cradle building material.

■ As part of a holistic approach, use of steel components can contribute to obtaining over 50 LEED points for building owners seeking certification under LEED Canada NC 2009.

■ The steel industry has superior water resource management with a 95% water recycling rate with no external discharges.

■ Every ton of steel recycled conserves 2,500 pounds of iron ore, 1,400 pounds of coal and 120 pounds of limestone.

■ The use of steel building components generates very little on-site waste, since components are manufactured to tight tolerances prior to being delivered to the building site. Any on-site steel waste generated can be readily sent for recycling or reuse.



# ACHIEVE YOUR MOST AMBITIOUS VISION

with a highly engineered, high-quality building material.





# DESIGN VERSATILITY, EASE OF INSTALLATION AND RESILIENCE

The versatility of steel gives architects and engineers the freedom to achieve their most ambitious visions, and provides contractors with a highly engineered, high-quality building material. Steel is used in everything from industrial to iconic structures, and is particularly suited to mid-rise construction, where turnkey framing solutions for virtually any type of residential or commercial building project are available. Steel offers consistently high-quality standards, precision products and guaranteed strength and durability in the most challenging environments. Steel is produced to the most exacting specifications under highly controlled conditions, eliminating the risks of on-site variability, which is an inherent disadvantage with other building materials.

■ **Steel is dimensionally stable and can be manufactured to very tight tolerances, making it easier for engineers to use in building design, unlike softwood products which are susceptible to shrinkage due to varying moisture content and structural design properties that have recently been downgraded by up to 30% due to changes in wood resource mix.**

■ Steel design benefits include longer spans, larger bays and wider frame spacing than wood or concrete construction. This allows for maximized usable floor space and large interior spaces that can be constantly adapted to cope with changing requirements of occupants.

■ Steel lends itself well to prefabrication, where the assembly of the individual steel elements takes place offsite under controlled, highly regulated and safe factory conditions where leading-edge technology delivers precision engineered components.

■ Steel structures can be erected speedily. The predictability and accuracy of steel components, in addition to just-in-time site delivery, speeds up the process and allows follow-on trades to get to work sooner, resulting in quicker building completion and earlier occupancy.

■ With consistent chemical and mechanical properties, steel behaves in a predictable manner when subjected to the structural loads imposed by high wind and seismic events.

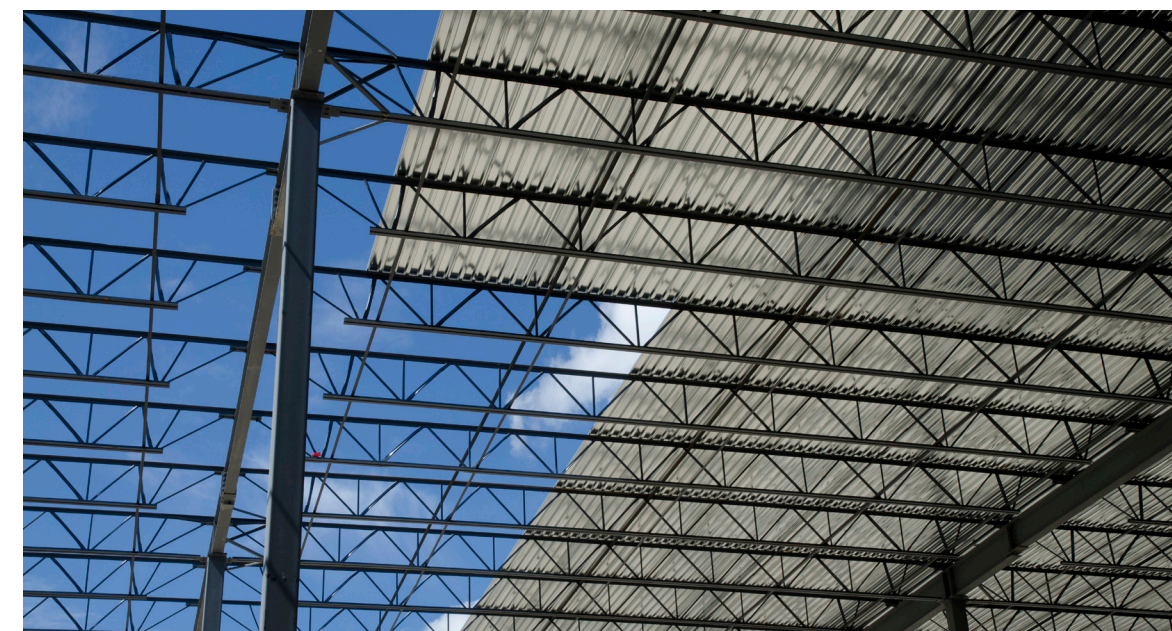
■ Steel-framed structures are inherently ductile. Structures are designed to absorb energy produced by earthquake ground movement and wind by “flexing” or “deflecting” in varying degrees, depending upon the construction materials, design of the structure, quality of construction, level of engineering, and the applicable building code requirements.

*"Besides steel's excellent strength-to-weight performance - 6 times better than wood - its design versatility enhanced the speed of construction. From red iron erection to fully enclosed - with floor, roof structure and exterior walls - took just three months."*

**- GERRY MORIN, MORIN BROS. BUILDING SUPPLIES INC.**







This brochure was created by the **Canadian Steel Construction Council** whose members include:

