LOCAL ECONOMY BENEFITS

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- Local Aggregate and Ready Mixed Concrete Producers are used to supply the ready mixed concrete for the building frame.
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DESIGN SUPPORT SOFTWARE

- The Ontario Cast-In-Place Concrete Development Council (OCCDC), in conjunction with the Concrete Reinforcing Steel Institute (CRSI), has developed a Canadian version of the "ConSept Pro" software program.
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If you have any questions regarding the use of reinforced concrete or would like to receive a copy of the "ConSept Pro" software program, please contact us at:

Ontario Cast-In-Place Concrete Development Council (OCCDC)
365 Brunel Road, Unit #3
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CHOOSING THE BEST CONSTRUCTION MATERIAL FOR THE FRAMING SYSTEM OF A NEW BUILDING IS ONE OF THE MOST IMPORTANT DECISIONS THAT AN OWNER/DEVELOPER, ARCHITECT/ENGINEER OR DESIGN-BUILD CONTRACTOR MUST MAKE.

The construction material selected has a significant impact upon:

- **Initial Capital Costs**
- **Speed of Construction and Early Return on Investment**
- **The Amount of Rentable Space Available**
- **Attracting and Retaining Tenants**
- **Yearly Energy and Maintenance Costs**
- **Cost of Insurance**
- **Building Aesthetics and Public Image**
- **Resale Value**

### FAST-TRACK CONSTRUCTION

- **Quick Start-Up Times**: A reinforced concrete framing system does not require extensive pre-ordering of materials and fabrication lead time. Construction can begin on the foundations and lower floors prior to the structural design of the upper floors being finalized.
- **Reduced Total Construction Time**: Reinforced concrete buildings can be constructed at a rate of one floor per week (above the first few floors) and other sub-trades can begin work on completed floors earlier.

### COST SAVINGS

- **Favourable Cash Flow**: Materials and labour are expensed to the project as they are completed, unlike structural steel, where substantial down payments are required months before the material arrives on-site.
- **Standard Floor Layouts**: Repetitive flooring systems which employ flying forms, uniform forming layouts and standard reinforcing steel details lead to significant cost savings.
- **Faster Forming/Reuse**: Performance Rated Concrete (PRC) allows for faster form stripping and reuse.
- **Lower Floor to Floor Heights**: Reinforced concrete framing systems allow for the lowest floor to floor heights, minimizing exterior cladding and vertical servicing costs.
- **Zoning Height Restrictions**: Reinforced concrete framing systems allow for a greater number of floors within a given building height restriction, due to lower floor to floor heights.
- **Thermal Resistance**: The thermal mass of a reinforced concrete structure offers a lower rate of building heat gain or loss resulting in reduced building cooling/heating costs. In addition, lower floor to floor heights result in a reduced interior volume of air that must be heated or cooled by the HVAC system.
- **Fire Resistance**: Reinforced concrete structures are inherently fire resistant and do not require the expensive secondary application of coatings in order to obtain the necessary fire rating values.
- **More Floor Space**: High Performance Concrete (HPC) means smaller column sizes and more rentable floor space.
- **Minimal Maintenance**: Concrete provides a hard, durable wearing surface that resists weathering extremely well.
- **Architectural Finishes**: Reinforced concrete can act both as a structural member and an architectural finish with the use of coloured concrete and special texturing techniques.

### STRUCTURAL ADVANTAGES

- **Design Flexibility**: Structural design changes are more easily accommodated in the field with a reinforced concrete framing system due to the fact that the system is constructed on-site rather than months ahead of time at a fabricating plant.
- **Shear Wall Design**: Reinforced concrete shear walls efficiently carry the lateral and gravity loads applied to a building while also acting as interior partitions and sound dampers.
- **Structural Integrity**: Additional reinforcing steel can be used to prevent structural failure under extreme conditions (exterior or interior explosions) at a minimum of cost.
- **Maximum Vibration and Earthquake Resistance**: Reinforced concrete buildings are inherently stiffer than structural steel framing systems thereby eliminating the floor vibration associated with structural steel. Seismic considerations can also be more easily handled with a reinforced concrete framing system through the use of shear walls and reinforcing steel detailing techniques.
- **Sound Isolation**: The high mass of a reinforced concrete structure reduces sound migration from floor to floor and room to room.
- **Underground Parking**: A reinforced concrete framing system easily allows for the creation of underground parking structures, thereby maximizing land use.
- **Minimal Staging Areas**: Concrete pumping techniques allow for high-rise construction in busy downtown centres adjacent to existing structures.
- **Adaptability to Unforeseen Soil Conditions**: Reinforced concrete framing systems can be modified to meet actual site conditions without extensive project delays.

### ENVIRONMENTAL CONSIDERATIONS

- **Recycled Materials**: Recycled materials are used in the production of reinforcing steel. As well, supplementary cementing materials are waste by-products from other industrial processes that, in the production of ready mixed concrete, improve the performance characteristics of the cast-in-place concrete.
- **Transportation Considerations**: Since reinforced concrete involves a greater use of local materials, the overall environmental costs associated with transportation are reduced.
- **Low Energy Intensity**: While the production of cement is very energy intensive, concrete only contains 9% - 15% cement. Concrete’s other major components, aggregates and water, make concrete a very low energy building material.
Reinforced concrete is the best choice for the building framing system based upon the following advantages:

**ENVIRONMENTAL CONSIDERATIONS**
- Low Emissions: Concrete is considered a low-emissions building material, with a lower carbon footprint than other construction materials.
- Recycled Materials: Recycled concrete materials are used in the production of reinforcing steel, reducing the need for new raw materials.
- Reduced Water Consumption: Concrete requires less water than other building materials, reducing its environmental impact.
- Sustainable Source: Concrete is sourced from local materials, reducing transportation emissions and costs.

**STRENGTH AND DIMENSIONS**
- Maximum Tensile and Bending Resistance: Reinforced concrete structures are inherently stronger than structural steel framing systems, which can withstand extreme conditions and contribute to the overall strength of the building.
- Greater Size: Reinforced concrete structures can be built in a single piece, eliminating the need for multiple pieces and reducing labor costs.
- Cost-Savings: Building with reinforced concrete provides more rentable floor space, reducing the need for additional floors.

**DESIGN FLEXIBILITY**
- Structural Design Changes: Reinforced concrete structures can be easily modified in the field, allowing for changes in design as needed.
- Quick-Track Construction: Reinforced concrete framing systems allow for the lowest floor to floor heights, enabling faster construction timelines.

**CONSTRUCTION ADVANTAGES**
- Fast-Track Construction: Reinforced concrete framing systems allow for the lowest floor to floor heights, enabling faster construction timelines.
- Lower Floor to Floor Heights: Reinforced concrete framing systems allow for the lowest floor to floor heights, enabling faster construction timelines.
- Minimal Staging Areas: Reinforced concrete framing systems allow for the lowest floor to floor heights, enabling faster construction timelines.

**FINANCIAL ADVANTAGES**
- Initial Costs: Reinforced concrete framing systems are typically less expensive than other framing systems, reducing the initial cost of construction.
- Yearly Energy and Maintenance: Reinforced concrete structures provide a significant reduction in energy consumption, resulting in lower maintenance costs.
- Cost of Insurance: Reinforced concrete structures provide a natural fire resistance, reducing the cost of insurance.

**ARCHITECTURAL FINISHES**
- Architectural Finishes: Colored concrete and special texturing techniques can be used to create unique finishes, adding visual interest to the building.

**LOW ENERGY INTENSITY**
- Reinforced concrete: A naturally fire-resistant building material, reducing the need for additional fire protection.
- Transportation Considerations: Reinforced concrete requires less transportation, reducing its environmental impact.

**FAVOURABLE CASH FLOW**
- Direct benefits: Reduced construction timelines and lower costs can be realized immediately.
- Indirect benefits: Increased productivity and reduced labor costs can also be realized.

**THE CONSTRUCTION MATERIAL SELECTED HAS A SIGNIFICANT IMPACT UPON:**
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- Speed of Construction and Early Return on Investment
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