



# THE POWER OF CONCRETE

THE ADVANTAGES OF  
REINFORCED CONCRETE  
BUILDING FRAMING  
SYSTEMS

ONTARIO CAST-IN-PLACE  
CONCRETE DEVELOPMENT  
COUNCIL (OCCDC)

REINFORCED CONCRETE IS THE BEST



# CHOOSING THE BEST CONSTRUCTION MATERIAL FOR IMPORTANT DECISIONS THAT AN OWNER/DEVELOPER

The construction material selected has a significant impact upon:

CHOICE FOR THE BUILDING FRAMING SYSTEM BASED UPON THE FOLLOWING ADVANTAGES:

## FAST-TRACK CONSTRUCTION

- **QUICKER 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.

# THE FRAMING SYSTEM OF A NEW BUILDING IS ONE OF THE MOST CRITICAL DECISIONS AN ARCHITECT/ENGINEER OR DESIGN-BUILD CONTRACTOR MUST MAKE.

- **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**

## 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.



# ONTARIO CAST-IN-PLACE CONCRETE DEVELOPMENT COUNCIL (OCCDC)

## FOUNDING MEMBERS

ALUMA SYSTEMS CANADA INC.

CARPENTERS DISTRICT  
COUNCIL OF ONTARIO

CONCRETE FORMING  
ASSOCIATION OF ONTARIO

IRONWORKERS DISTRICT  
COUNCIL OF ONTARIO

LIUNA - OPDC

LIUNA - LOCAL 183

LIUNA - LOCAL 506

ONTARIO CONSTRUCTION  
SECRETARIAT

ONTARIO FORMWORK  
ASSOCIATION

READY MIXED CONCRETE  
ASSOCIATION OF ONTARIO

REINFORCING STEEL  
INSTITUTE OF ONTARIO

## LOCAL ECONOMY BENEFITS

- Reinforced concrete framing systems employ the local labour force to construct the building.
- Local Aggregate and Ready Mixed Concrete Producers are used to supply the ready mixed concrete for the building frame.
- A greater portion of the economic benefit of the project is concentrated in the local economy.

## 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.
- The "CONSEPT PRO" program allows Owners, Architects, Engineers and Contractors to quickly estimate the structural framing system costs for new buildings based upon six different reinforced concrete framing options for projects based in Canada or the United States.
- The Canadian portion of the program is based upon the requirements of CSA A23.3, the Ontario Building Code and National Building Code.
- The American portion of the program is based upon the requirements of ACI-318 and the BOCA National Building Code, the Uniform Building Code and the Standard Building Code.

PROVIDED TO YOU BY:

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:

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