

# Trump International Hotel and Tower

Chicago, IL



## Team

### Owner:

The Trump Organization, New York, NY

### Architect:

Skidmore, Owings & Merrill LLP, Chicago, IL

### Engineer:

Skidmore, Owings & Merrill LLP, Chicago, IL

### General Contractor:

Bovis Lend Lease Inc., Chicago, IL

### Reinforcing Bar Fabricator:

Ambassador Steel, Auburn, IN and  
Ambassador Steel, Rochelle, IL

### Total Project Cost:

\$847 million

### Total Project Size:

2,600,000 sq ft

### Award:

2010 CRSI Design Award Winner –  
Residential Buildings Category

### Photography:

Tom Rossiter Photography

## STRUCTURAL FRAMING SYSTEM

Chicago's Trump International Hotel & Tower takes reinforced concrete to new heights—literally. The 92-story structure consists entirely of reinforced cast-in-place concrete, with typical residential floors consisting of 9"-thick reinforced concrete flat-plate construction.

Using reinforced concrete minimized the floors' structural depth, creating higher ceilings. Residential floors also feature open spans up to 30 feet without requiring perimeter spandrel elements. At the lowest level of three building setbacks (level 16), transfer girders created column-free space within the 10 parking levels. In all, 26,000 tons of recycled steel reinforcement was used along with 194,000 cubic yards of concrete.

## UNIQUE DESIGN FEATURES

The three designed setbacks eliminated any column lines with a centerline running the length of the building. This created tremendous stress at the setbacks. To overcome this, a system of shear walls, outriggers and belt walls on these floors transfer loads from columns above each setback to those below, equalizing column loads along the perimeter. These elements also provide resistance to overturning due to wind.

Heavily reinforced concrete strengthens each transition floor. The three-story 29th floor alone required 3,000 tons of reinforcement, with each beam containing 120 rods of high-strength, steel. With this degree of congestion, high-strength, self-consolidating concrete was specified for the transition floors: 12,000 psi compressive strength for the 16th floor and 16,000 psi for the two higher levels. These floors used Grade 75 #11 reinforcing bar, ranging in length 34 to 63'. Typical gravity framing was accomplished with 5,000 psi concrete.

The tower foundation consists of a 10-foot-thick reinforced concrete mat supported on rock caissons. The tower's 5,000-cubic-yard mat foundation pour is said to be the largest single self-consolidating concrete placement in North America.

Innovative concrete forms helped ensure speed and safety, regardless of the weather conditions. Core walls were cast using self-jacking forms while floors, columns and outrigger walls used a system created specifically for the project. A specialized underground concrete pump, connected to the construction boom by a system of tubes, delivered 6,000lbs of specially mixed concrete in a single minute to higher levels.

## REASONS FOR CHOOSING REINFORCED CONCRETE

Using high-performance concrete limited the size of vertical load-resisting elements, reduced the weight of the building and resulted in residential units with smaller vertical obstructions. The result of this close attention to concrete engineering was a dramatic addition to Chicago's skyline that offers concrete evidence of the advances underway in construction technology.



Concrete Reinforcing  
Steel Institute

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