



# CASE STUDY: SALESFORCE TOWER

CHICAGO, ILLINOIS, USA

Standing at a towering height of 850 feet (260 meters), the 60-story Salesforce Tower in Chicago commands a prominent presence in the city's skyline. At 1.2 million square feet, this architectural marvel incorporates innovative concrete technologies, featuring lightweight concrete decks supported by steel pans connected to a central core designed with a specified modulus of elasticity of 6.6 Mpsi (45,505 MPa).

Notably, Salesforce Tower was a trailblazer in Chicago, becoming the first high-rise building to mandate third-party verified Environmental Product Declarations (EPDs) for all its concrete designs to ensure certification of its carbon impact. This forward-thinking approach was achieved by replacing portland cement with a combination of portland-limestone cement (PLC), slag cement, fly ash, and silica fume resulting in a substantial reduction in carbon emissions compared to industry standards.

The use of slag cement was widespread in various aspects of the structure's construction. For instance, it played a crucial role in managing the heat generated during the hydration process. Slag cement was employed in the construction of the large core structure, massive base elements, as well as caissons, grade beams, and the mat foundation. This strategic utilization contributed to controlling heat and promoted long-term strength gain while minimizing carbon impact. Furthermore, slag cement was instrumental in achieving several key objectives, including long-term strength development for mixtures exceeding 10,000 psi (70 MPa), maintaining mixture consistency even at high slump levels to meet the building's pumping requirements, increasing paste density to comply with local aggregate specifications, and ensuring exposed concrete finishes with consistent aesthetic quality.

Salesforce Tower is a sustainable building that prioritizes energy efficiency, water conservation, indoor environmental quality, and waste reduction. The tower's LEED Platinum certification and implementation of numerous sustainable strategies make it a leader in sustainable building design and an inspiration for future sustainable construction projects.



This iconic skyscraper is a testament to cutting-edge construction practices and environmental responsibility. Through the extensive use of PLC, slag cement, other supplementary cementitious materials, and innovative concrete technologies, Salesforce Tower has not only left a significant mark on the city's skyline but has also set a commendable example for sustainable and eco-conscious building practices in the urban landscape.

### **FACTS**

**Height:** 850 feet tall (260 meter), 60-story, high-rise building

**Project size:** 1.2 million square feet

**EPDs:** 3rd-party-verified EPDs specified for all concrete mixtures

**Maximum strength:** More than 10,000 psi (70 MPa)

**Completion date:** December 2022

**Construction work duration:** 36 months

### **ENVIRONMENTAL IMPACT**

Substantial reduction of carbon emissions from industry baselines.

### **PRODUCTS USED**

The project used 15 concrete mixes, including straight PLC mixes, binary, ternary, and quaternary mixes.

<b>Portland Limestone Cement</b>	50%-100% (project average 73%)
<b>Slag Cement Replacement</b>	19%-30% (project average 19%)
<b>Fly Ash</b>	10%-27% (project average 6%)
<b>Silica Fume</b>	2%-4% (project average 2%)

### **PROJECT TEAM**

**Owner:** Hines, the Kennedy Family, AFL-CIO Building Investment Trust

**Contractor:** Walsh Construction

**Architect:** Pelli Clark Pelli

**Engineer:** Magnusson Klemencic Associates

**Concrete:** Prairie Materials

**Slag cement:** St Marys Cement

### **AWARDS**

- 2022 Slag Cement Association's Lower Carbon Concrete Award
- 1st place - High-Rise Structures - 2023 ACI Excellence in Concrete Construction Awards

*Information courtesy of Slag Cement Association and Master Builders Solutions Construction Products*

