

U.S. (Murrah) Federal Office Building

Oklahoma City, OK



Team

Owner:

U.S. General Services Administration,
Region 7, Fort Worth, TX

Architect:

Ross Barney+Jankowski Inc., Chicago, IL

Engineer:

The Benham Cos., Oklahoma City, OK

Blast Designer:

Weidinger Associates, New York City, NY

General Contractor:

Flintco Inc., Oklahoma City, OK

Construction Manager:

Heery International, Dallas, TX

Reinforcing Bar Fabricator:

Hearon Steel Co., Oklahoma City, OK

Total Project Cost:

\$34.4 million

Total Project Size:

181 sq ft

STRUCTURAL FRAMING SYSTEM

Rebuilding the Murrah Federal Office Building in Oklahoma City, Okla., after it was destroyed by a truck bomb in 1995, required more than replacing the structure's functional capabilities. Officials also had to restore trust in the building's ability to provide safety to employees and visitors. This goal led to a cast-in-place reinforced concrete structure that is resistant to progressive collapse and creates a safe and secure working environment.

Nearly seven years elapsed between the bombing and completion of the new campus-like facility. The final design featured 1-foot-thick exterior walls constructed of exposed, cast-in-place reinforced concrete that offers aesthetics and high levels of protection.

The building's exterior walls are designed to be free-standing and load-bearing across the entire façade rather than just at column locations. As a result, removal or collapse of any major structural member will not cause the rest of the columns to fail and create vertical propagation that would collapse the entire structure, also known as progressive collapse.

UNIQUE DESIGN FEATURES

The blast-protection requirements resulted in adding more steel reinforcing bars (rebar) to certain structural components of the building. These required only conventional designs because the use of site-cast reinforced concrete allowed any needed adaptations to be made easily. To ensure smooth construction, the contractor elected to use a concrete mix with 3/8-inch maximum-size aggregates to ensure concrete would flow through and around the additional steel reinforcing bars.

Interior columns were made of reinforced concrete cast in circular forms either 16 or 20 inches in diameter, spaced 30 feet apart on center. Interior floors consist of 10-inch-thick, two-way slabs with drop panels at the columns. This design minimized the floor thickness to 10 inches for most of the building, as no beams are used. That allowed the design team to create 11-foot ceilings to allow more natural light to penetrate the spaces.

The building's street-level perimeter incorporates reinforced concrete protective bollards, which in some places were unobtrusively designed into a ceremonial gateway to the site.

REASONS FOR CHOOSING REINFORCED CONCRETE

The massive reinforced concrete structural walls not only provided the desired blast protection, but they also aided with energy savings due to the high thermal mass of the concrete. The result was the first new federal building built in the previous 10 years other than a courthouse, and one that provides an attractive, functional, safe and secure facility for employees and all citizens..

Increased blast protection provided with additional reinforcement to certain sections of the building.

CRSI Concrete Reinforcing
Steel Institute

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