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One Peachtree Office Tower, Atlanta, Georgia

Value Engineering of the Concrete Floor Framing System Allowed a Four-Day/Floor Cycle that Kept the Tower on Schedule

On July 1, 1992, the 60-story office tower was completed — just 30 months after the start of construction — a phenomenal time frame for an all-concrete frame high rise structure. One of the reasons the project was kept on schedule was due to converting to welded wire reinforcement on the majority of the floors.

The project comprises of 1.4 million square feet of floor space and 1.1 million square feet of parking structure and other amenities.

The project credits and names of key people who worked on the value engineering of the tower are:

ARCHITECT/ENGINEER
John Portman & Associates, Atlanta, GA.
John Portman, Chairman of The Portman Companies
John Nipaver, Project Architect
Housh Rahimzadeh, Chief Structural Engineer

PRIME CONTRACTOR
J.A. Jones Construction Company, Charlotte, NC.
Robert I. Douma, Project Manager
James Sears, Project Engineer
Max Martin, Construction Manager

SUBCONTRACTOR FOR POST-TENSIONING AND VALUE ENGINEERING
Continental Concrete Structures, Inc., Alpharetta, GA.
Mark Haselton, President

REINFORCING FABRICATOR
Owen of Georgia, Lawrenceville GA.
Gordon Moore, Sales Manager
Joe Patterson, Department Manager

REINFORCEMENT PLACEMENT
Rebar Erection, Inc., Marietta, GA.
Wayne Wilson, President

MECHANICAL & ELECTRICAL ENGINEERING
Newcomb & Boyd, Atlanta, GA.
Warren Shiver, Partner

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Here are quotations from some of the people that helped make this Atlanta tower project a success:

Mr. Douma said, *"they did more value engineering on this project than any others they've done . . . probably 50% more."*

Mr. Nipaver said, *"we did an extensive value engineering process on this project, but the real success was realized through the efforts of J.A. Jones, their subcontractors and our design engineers working together."*

Mr. Rahimzadeh said, *"the concrete structure was constructed in just 30 months. An all-steel alternative would have taken three months less time but would have cost $12 million more."*

Mr. Haselton said, "*by substituting welded wire reinforcement for the top and bottom steel in 35 floors (from 8 to 42) they were able to keep the project on schedule . . . an average of 25,000 square feet per floor every four days."*

Mr. Wilson liked putting welded wire reinforcement down. *"It's ideal to use sheets of wire reinforcing."* He said, *"we suggested substituting the WWR sheets to the contractors to help them save time"*

Mr. Douma said, *"Jones approved the welded wire reinforcement alternative for the slab reinforcing . . . it helped us get through the winter months."*

Mr. O'Hern said, *"by standardizing on the styles and sheet sizes of welded wire reinforcement, we were able to manufacture and ship the reinforcement quickly to help keep the project on schedule"*

MORE ABOUT ONE PEACHTREE CENTER

- The design called for sloping exterior columns to create large column-free spaces within the tower between the core and the building skin. Some columns slope 2.5 inches inward on each floor, others slope 3.6 inches. In addition, the tower contains 36 corner offices per floor, creating a highly articulated exterior.
- Continental Concrete Structures performed a value engineering redesign for J.A. Jones of the horizontal floor framing system. This redesign permitted a faster construction schedule through simplifying the framing system and dividing each floor into four equal quadrants. The redesign also established a requirement of one complete floor of formwork. Construction crews were then able to organize and complete their work so that a floor was constructed in four working days. A very efficient, cost-effective, and fast construction schedule for an all concrete structure of this height.
- The value engineering changes produced almost $4 million in savings on an overall prime contract of $135 million and allowed the project to stay on budget and on schedule for a July 1, 1992 opening. As a result, the speed of construction was comparable to the construction time commonly associated with steel-framed structures.
- Several steel, steel and concrete and all concrete schemes were considered. The combined concrete frame, shear wall bracing scheme and high-strength concrete of up to 12,000 psi was found to be the most economical.

MORE ABOUT WELDED WIRE REINFORCEMENT

- Structural welded wire reinforcement used on a tower ranged in style sizes from 6 x 8 to 16 x 9; wire sizes are D4 (.04 in^2) up to D9.8 (.098 in^2); and sheet sizes from 5'4" x 15'0" to 7'6" x 14'4." Specification: ASTM A 497, minimum yield strength (f_y) of 70,000 psi.
- The floors for the tower are designed as flat plates and have sheets of structural welded wire reinforcement placed on chair supports for top reinforcing over supports and the bottom sheets are placed on slab bolsters and extend from beam to beam. By using the welded wire reinforcement, placing time was reduced, thus thousands of dollars per day was avoided by helping to keep the project on schedule.

- Welded wire reinforcement has long been used for slab reinforcement. ACI 318, Section 7.12 specifies a shrinkage and temperature ratio, A_s/A_g of 0.0018 for 60 ksi yield strength WWR and a reduced shrinkage and temperature reinforcement ratio for reinforcing with a yield strength exceeding 60 ksi, but not to be less than 0.0014. It also specifies that reinforcing members shall not be spaced farther apart than five times the slab thickness nor 18 inches. Sheets for temperature/shrinkage and crack width control may be curved from a point near the bottom of the slab at midspan with required cover (see ACI 318, Section 7.5.3) or remain in a flat position 1/3 distance from the top of the slab but not lower than the center of the slab.

BENEFITS OF USING HIGH STRENGTH WELDED WIRE REINFORCEMENT

- It is advantageous for engineers to utilize the inherent high strength welded wire reinforcement. Cold working increases the yield strength of low carbon steel rod. ACI 318 allows the use of high-strength reinforcement when tests show that the specified yield strength (usually 70, 72.5, 75 and 80 ksi) is developed at 0.35 strain.
- Welded wire reinforcement cages can be used for diagonal shear reinforcement in beams as well as confinement reinforcement in columns. Consult your structural engineer for specific designs on your next project.

For more information, call, write or check our web site.