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# PRINCIPAL EXPERIENCE - CASE HISTORY

## CENTURA OFFICE BUILDING
### *A Square Peg?*

The new Centura Office Tower at the corner of the Tollway and Valley View Lane in Dallas received a significant amount of attention from observers during its construction due to the perceived unusual construction types that were being implemented. It seemed, at the time, the majority of the mid-rise buildings in Dallas were being constructed of cast-place-concrete; even the ones across the street from the Centura project which were being built by the same contractor.

Some of Centura's characteristics which had been the most eye-catching were the 16 story concrete core (which was strikingly different from anything else that was around), the structural steel framing, the closely spaced small perimeter columns and resulting small perimeter spandrels, and the speed at which the structural framing was proceeding.

The framing scheme for this project was essentially decided on by an evolution of steps that involved the core processes of providing innovative options and value engineering.


On the Centura project, the owner was very experienced in construction and was able to provide valuable input concerning his goals for the building. With input from the owner, a preliminary pricing package was prepared that included a concrete scheme, a steel scheme, and a composite of steel and concrete framing system scheme.

Three general contractors were interviewed, and each contractor selected a different scheme. One said "concrete," one said "steel," and one said "composite steel and concrete." They each had their convincing reasons for why the system they selected was the most economical. This illustrates that each contractor had a different comfort level with each system and a different perception of market conditions at the time.

It was felt that the scheme of a composite of steel and concrete best responded to the market conditions at the time. Therefore, the contractor that identified this system as the most economical was selected for the project.

The market conditions at the time were such that there were increasingly long delivery times associated with structural steel. As a result, many of the Dallas area midrise and smaller buildings were going with cast-in-place concrete to avoid long steel delays. This was increasing the demand and price of

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concrete and was decreasing the availability of standard forming methods and quality concrete subcontractors. On the other hand, delays in steel delivery were not acceptable in the competitive leasing market; however, there are advantages to steel construction in a building type such as Centura. Through the value engineering process it was determined that the composite steel and concrete scheme best optimized the current construction and leasing market conditions at the time. The goal for the Centura project was to implement concrete construction with less standard forming methods in a way that would reduce the end structural steel cost and allow the contractor to make significant progress on some of the major components of the structural system while structural steel was being ordered, detailed, fabricated and delivered.

The elevator core of Centura was constructed totally of cast-in-place concrete and was formed with the jump-form system. The walls around the elevator core performed triple duty. They provided the required functional walls, fireproofing, and structural elements of the building. All of the wind bracing of the building was provided by the concrete core which further reduced the end structural steel cost.

The floor beams and perimeter columns were the only elements built of structural steel. The structural steel beams are mated to the concrete slab poured on metal deck which creates another composite element in the building. The economy of this system is due to the use of cast-in-place concrete where concrete is economical, i.e., walls and slabs, and the use of steel where steel is economical, i.e., beams and columns.

The basement level of the building was at the top of the firm unweathered limestone which meant shallow and economical foundation elements could be implemented. This provided an opportunity to place light steel columns at 10'-0" around the perimeter of the building. The steel floor beams at each level were also spaced at 10'-0", and the exterior precast facade is on a 10'-0" module. This allowed the use of relatively small exterior steel columns and essentially eliminated the need for a large stiff perimeter beam at each level that would have been required to support the precast facade and floor system. Not only was considerable steel tonnage saved with this scheme, it allowed the small perimeter columns to be detailed so that they did not intrude in to the lease space.

The owner wanted the following functional flexibility in the building for his tenants which was more economically and practically implemented in the "composite steel and concrete" system.

- More column free space (the span of the floor from the core to the perimeter was set at 44'-0").
- More load capacity (the floors are designed for 80 psf + 20 psf instead of the usual 50 psf + 20 psf).
- Flexibility for tenants to install intra-floor stairs.
- Flexibility for tenants to strengthen the floors for high density filing systems in the future.

The effect of avoiding preconceived notions and providing innovative optional schemes that can be properly value engineered resulted in a Centura project that, unlike the proverbial square peg in the round hole, perfectly fits both the owner's goals and requirements as well as the construction market conditions at the time.