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A True Tall Tale (The Shopping Bag of Bricks)

By Luis Fernandez, P.E., Structural Engineer

Tycon Towers By Philip Johnson

It was the summer of 1982 when Jim Lewis developer of the Tycon Family of Buildings in Tysons Corner, Virginia asked me to go to New York and have an interview with his selected Architectural firm to design the project to be known as the Tycon Towers.

The Architects were interviewing several local and out of town Structural Engineering firms and wanted to ask some direct questions from the prospective Consultants.

I went to New York and met with John Burgee and the late Phillip Johnson. To tell you the truth, I had no idea what they were going to ask me. I had been shown a rendering of the proposed project (three buildings) and suspected it was probably going to be something associated with the free standing columns.

The meeting took place and Mr. Johnson carried the interview.
As all of you - who have been in business for any length of time and as any one in the related professions - know that all sorts of questions are thrown at you at meetings. And, they always expect a full and perfect answer. Thus we all become “Cowboys” - one way or another - and are expected to shoot accurately from the hip.

At any rate, I came up with the on-the-spot solution on how to design the tall columns. I explained and drew it (in colors) on a white board and got the job. The tough part came later when I had to prove that I was right the first time around.

Architectural Columns

The columns are un-braced and 168 feet tall. Plus, they had to be built in sections. They are designed as composite columns with exoskeleton being 50 (fifty) inch diameter fabricated steel tubes with concrete headed anchors welded on the inside and then filled with concrete. The fireproofing provided with a vented 4" brick veneer. A bracing erection sequence, method of column bracing, etc. was shown on the structural plans for the benefit of the Contractor. Seven lifts of twenty four (24) foot sections of the columns were to be clad on the ground with bricks which would rest on a rolled relief angle. Vertical and horizontal brick coursing lines were painted on the pipes and wire ties pre-welded at 16" o/c vertically. We even had to show the location of the lifting hooks and automatic alignment of the column to facilitate the alignment of the alignment of the brick lines as installed after erection. Three courses of brick were left out at the top of the segmental columns and three rows at the bottom. The columns were field welded after erection one lift at a time.

Flying Pre cast

But back to the "guts" of the story; everything went well, the Columns had been designed as free standing and the huge segmented precast arches at the top had been
designed to rest on Steel Girders, hinged at both the top of the columns and at the building face.

Everything went well and the project and columns were being erected when all "hell broke loose". We had computed an elongation and shortening of the columns, between winter and summer, of about 7/8 of one inch. The front of the Arches would go up or down by this amount and due to geometry the back of the double vaulted arches would also move forward or backwards by approximately the same amount. Then came the selected Skylight Manufacturer.

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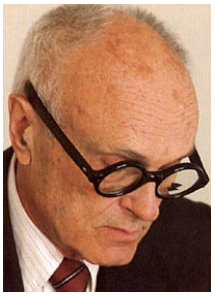
"We can not design, manufacture nor guarantee a flashing rolled expansion joint which would not leak under this kind of movement, forget it". They said.

"Luis, we have a problem." Mr. Johnson said. How can we solve this problem? I said rhetorically - again the Cowboy! "Well, let's see." I responded. How about installing a continuous 4 inch diameter pipe inside the columns being erected, prior to filling them with concrete? We will loop this pipe through the bottom of the sofit at the 3rd floor, up inside of the building, install an expansion tank on the roof, and fill the system with Glycol (antifreeze). Install step heaters on the vertical portion of the pipe on the inside of the building connected to thermostats inside of the columns and maintain the columns permanently heated to 70 degrees F. Thus, no movement (elongation or shortening) would occur.


Philip Johnson

As I was describing "my method" a grin started to appear on Mr. Johnson's face. Very politely he allowed me to end my dissertation. I even went to the white board and sketched the whole concept. Then came his "punch line". "We designed a building" (in Pittsburgh I believe he mentioned) "in which the Structural Engineer designed the building exterior columns with exposed hollow tubes, with an expansion tank on the roof and filled the system with antifreeze, more or less identical to yours, and convinced the local Fire Marshall that a fire would not hurt or diminish the column capacity."

"The pan won't melt since water boils at 212 degree Fahrenheit - and that is it." He continued. "But then something happened" he went on saying, "one day one of the columns "peed" (direct quote) across the street after developing a small crack at one of the welds and unfortunately across the street there stood this beautiful stainless steel clad building." The rusty water-glycol mix ruined the skin of our surprised neighbor's building. "Guess who had to pay?" He asked me.

Cosentini and Associates, Mechanical Engineers in New York could not guarantee the life expectancy of electrical resistor heating wires embedded in the columns. The top of the "columns" was then changed to a "slip comb" and the huge double Arches are actually resting on specially designed 48" x 52" plate girders with up to 20 inches by 4" to 5 ½" flanges.

The existing "columns" could all be removed, but the looks of course would change and there would be some feeling of apprehension looking up while entering the building. And, that is what ended the story of one of the tallest to be (at least in the Metro Area) free standing columns. Thus, ends a true tall tale.

About The Author

Mr. Fernandez is born and raised in Havana, Cuba. He attended the University of Havana where he graduated with a degree in Civil Engineering in 1965. In 1955, during his last year of High School, he received a one-year scholarship and came to the U.S. as an Exchange Student. He graduated from Jamestown Academy in Jamestown, North Dakota.

Mr. Fernandez emigrated to the U.S.A. in 1967. He attended post-graduate studies at the University of Maryland. He worked as a Structural Engineers from 1967 to 1972 for a private consulting firm in Silver Spring, Maryland. He, then, opened his own private practice in Falls Church, Virginia, where he continues to practice his profession as a Structural Engineer. He is the Principal of Fernandez & Associates Structural Engineers, P.C., in Falls Church, Virginia.