



Construction Management

Constructability Issues

Besides the issues mentioned previously, the River Tower's original concrete construction adds potentially reducible installation costs and can result in a longer erection process when compared to the proposed staggered truss system. This lies mostly in the placing of forms, and the simple fact that concrete needs at least seven days to cure enough to continue construction. The existing system's reliance on the speed of the wet trades, and the appropriateness of their weather-related working conditions, is the cause of its relative lengthy construction process. However, the proposed system is not without its share of complexities. Most notably, steel construction for such a towering structure requires the use of large cranes to hoist these wide trusses up to the various floors of the high-rise condominium tower. The width of the trusses, 73'-6", is another consideration, as this width requires the need for splicing of the trusses for assembly on site and during erection. Finally, the complexity of the structural design of this system does not afford much leeway in the installed location of these trusses. This does not afford much flexibility in the field, where unforeseen erection issues can arise.

Cost Analysis

The costs of both structural systems were estimated using primarily R.S. Means Unit Cost data, reflective for the River Tower's location in Wilmington, DE. These prices were used to gain a rough estimate of local values for the bare material, labor, and equipment costs for these two very distinctive systems. The steel system was calculated based on steel tonnage from the *ETABS* results but adjusted to account for the member sizes determined through hand calculations. This results in a rough estimate of a reduction of approximately \$2.6 Million, based on steel tonnage. These costs contain a 5% waste factor estimation, and the steel costs contain an additional 10% factor to account for the expense of moment connections and prefabrication of the steel trusses.

River Tower at Christina Landing – Joseph Bednarz
Senior Thesis Report:
Feasibility and Consequences of Staggered Truss Construction



The staggered truss system was determined to be approximately \$181,650 more expensive than the existing post-tensioned flat plate system with the adjusted figures. Ordinarily, staggered truss systems provide a cost savings when compared to concrete flat plate systems. This change in expectation can be explained by several factors. Smaller cities like Wilmington, DE, do not have the proliferation of concrete contractors that larger cities in the region, such as Philadelphia, PA, and Washington, DC, have. There is not a premium for concrete in Wilmington but rather a premium for steel, which has seen rising costs in recent years due to material shortages. The moment connections required by the proposed system are very expensive and complicated to carry out in the field on any size building, not to mention a large high-rise. Finally, this immense height of the River Tower necessitates crane usage, as mentioned previously. The erection of steel on such a large structure, and its obligatory equipment, introduces this cost premium. Despite the rough estimate of the steel design, the very fact that this comparison is not overwhelmingly in the staggered truss system's favor indicates that the proposed design is not maximized in this particular application. The cost and difficulties of steel construction on a high-rise building negate the potential benefits brought about by staggered truss construction.