
Areas Where Teaching Structures Should Be Strengthened

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For nearly fifty years I have been pleased to provide structural consulting to architects on building projects throughout the United States and the Mideast, and in size from smaller than a house to as large as a city^b

Most of the preliminary designs an architect brings to me for structural services are pretty well thought out in terms of appropriate column spacing and allowance for beam depths, and have suitable locations to accommodate the structural frame. In subsequent discussions an appropriate framing scheme usually develops without a great deal of conflict. Sometimes, knowing what the architect is trying to achieve, a unique structural arrangement becomes obvious, and if the architect can incorporate that in his plans, a strikingly new form evolves^c.

Having said that, there are some common planning weaknesses that occur frequently. They are: 1) Building stability and lateral bracing, 2) Structural frame vertical organization, 3) Tolerances between the structural frame and the architectural finish, 4) Site considerations, and 5) Floor vibration and comfort performance.

Lateral Bracing

If he has thought about lateral forces at all, the architect will often say, "Well, I will allow you bracing in the core," as if that were the end of the matter.

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Core bracing alone makes the width or depth of the core become *the structural depth* of the building, regardless as to how wide or how long the building is. Accordingly, the core becomes a flagpole, or mast, that braces the entire building, and which may be too slender for acceptable sway performance in taller structures. In addition, lateral forces eccentric from the core may twist the building back and forth uncomfortably because the core alone cannot provide sufficient torsional stiffness. Even though the building may have sufficient *strength*, the inability of the core alone to provide sufficient *stiffness* can result in undesirable building motion, slapping of elevator cables against sidewalls, sloshing of water in toilet bowls, swinging doors, binding windows, squeaks, groans and mal-de-mer.

Another popular, but ineffective, location for lateral bracing is the exterior wall corner bays of the building, which are the worst exterior wall locations because the corner columns are the most lightly loaded and therefore have the least gravity weight to offset overturning uplift.

Vertical Alignment

Another common planning weakness is structural frame discontinuity in the vertical direction. Think of a building with

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