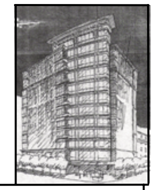


PROPOSAL

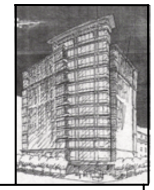
PROBLEM STATEMENT

The Executive Tower rests in the downtown area of Washington DC. As with most buildings in this district, the Executive Tower is restricted to a maximum height set by the DC zoning regulations based on the width of the adjacent street. The limiting height requirement is equivalent of 30 feet over the width of that street. These standards are put in place to insure the District of Columbia skyline does not bleed out the view of the national landmarks such as the Washington Monument and the Capitol Dome. As a result of these ordinances, building owners in the DC area requested buildings with as many rentable floors within the limits as possible. To accommodate this, most buildings in Washington are concrete structure utilizing various floor framing systems to minimize the space need in between floors. The engineers of the Executive Tower used a concrete flat slab system with drop panels to accommodate DC's ordinances.

The Executive Tower is surrounded on three sides with H, 14th and New York Ave. Adjacent, to its east, is the New York Ave Presbyterian Church. Limited to the defined area of 13,278.58 sqft, the Executive Tower built up to 128' – 4" just under its maximum height restriction of 130 ft. It is due to the high land value in Washington DC that building owners go to great lengths in order to get the maximum number of floors within their limits. In the case of the Executive Tower, the building tops out at 11 stories, 1' – 8" short of the maximum building height.

PROBLEM SOLUTION

In a city where maximum rentable floor area is ideal, designing and coordinating various systems to achieve this goal is a necessity. In Technical Report 2, alternative framing systems that could be used for the Executive Tower were studied. It was found that the two steel systems would be inefficient at meeting floor depth required to create even eleven stories under the 130' height limit, much less a 12th floor. Two concrete systems, flat plate and flat slab post tensioning, were



purposed and found to be adequate to meet height limits. However, the post tensioning system proved to provide the most advantages by decreasing the depth of the floor slab.

Complying to the DC regulations regarding height of the building, a new design of the building's framing system and other methods will be performed to trim the ceiling space in between floors in effort to construct a 12th typical floor under the 130' height restriction. The typical height per floor is currently 11' – 6". In order is reach this goal by just thinning the ceiling thickness would require each floor, including the 12th, to be a height of 10' – 8". This is equivalent to a reduction of 10 inches per floor. Three components will be analyzed and designed to achieve this goal.

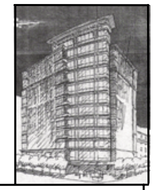
First, a conversion will take place of the framing systems from flat slab to post tension. The findings from Technical Report 2 concluded that post tensioning provided the most advantages such as a lighter structure and by reducing the ceiling space. The result from a post tensioning analysis found the slab could be trimmed by ½". Upon further review, if a post tensioning system with drop panel were used, it would result in thinner slab than the previous study. The two-way post tension slab will comply with ACI 318-05 and DC regulations. Through this analysis, it is predicted the typical slab thickness can be reduce up to 3" per floor resulting in a savings of 2' – 9" of total slab thickness throughout the total building's height.

Two additional breadth studies will be performed; both methods will contribute to thinning the ceiling space thicknesses and lowering the overall building height under the 130' height to add an additional floor.

A study of alternate MEP duct systems will reduce ceiling depths further. The first breadth study is of the mechanical system ducts used in the Executive Tower. The typical ceiling depth is 2' – 6" constructed from the 8" floor slab, MEP ducts, MEP units, recessed lighting fixtures and sprinkler systems. The MEP duct work is the controlling thickness in this space at 12 inches. In this study different MEP systems or alternative routes will be explored in efforts is reduce the heights of the MEP duct to contribute to shrinking the ceilings depths. Similar to the post tensioning, it is a goal for the total floor thickness to be reduced by 3" totaling 2' – 9" to be used to construct the 12^{th} story.

The second breadth study will involve a new design the Executive Tower's entrance into Retail 2 on the first floor at the northwest corner as seen in Figure 9-1 (following page). The architectural design of the landscape and structure on the south end of the building will focus on Retail 2 to lower the building but not inhibit this entrance. The landscaping grade slopes of the north side to the south side creating a difference of 5' – 6" (Figure 9-2, following page). The Executive Tower's height restriction is determined by using the top of slab elevation above the 11^{th} story and the ground elevation at the 1^{st} floor on the north end. By designing the building at this area to be recess, the Executive Tower can subtract up to 5' – 6" from its total height to be used in creating a 12^{th} story.

The goals set forth by this proposal are just estimation of what is ideal. Assuming these three studies are successful, six inches of the ceiling depth per floor combine from both the slab and MEP duct thickness plus a reduction of five and half feet from the total building height. These number summed is equivalent to 138 inches or 11' – 6". The total building height should then be 129' – 6" which is six inches lower than the DC height restrictions.



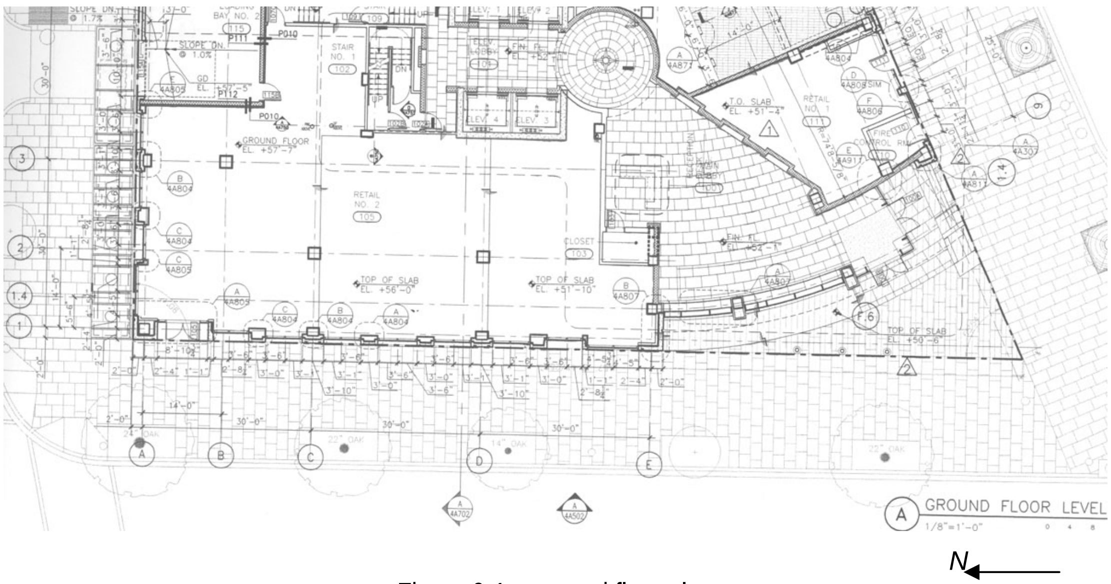


Figure 9-1 – ground floor plan

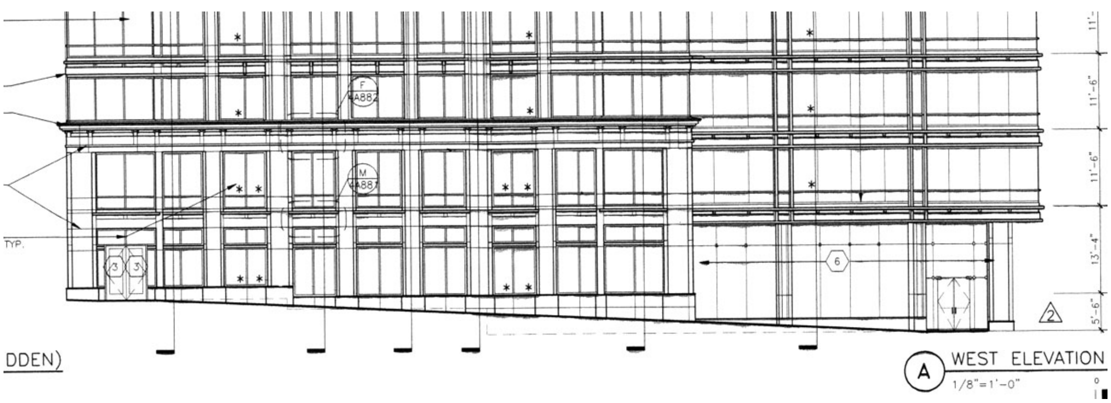


Figure 9-2 – west elevation of floor 1-3