EXECUTIVE SUMMARY

The Life Sciences Building is located in north east United States. The building is a five stories and 174,500 square feet. The geometry of building is L-shaped and considered a long-span structure. A greenhouse is located on the roof to serve as a research space. The foundation system consists of cast-in-place concrete spread and strip footings that support a system of wide flange steel columns. The building is designed as a composite steel floor system. The lateral system is designed as a structural steel braced frames, not seismically detailed. Hollow structural section steel (HSS) is used as braces with varying thicknesses based on the lateral loads resisting the members.

The existing structural system of the Life Sciences Building is adequate to meet both strength and serviceability requirements. Therefore, a scenario has been proposed that in which a college campus, which resides in a high seismic area, specifically in San Francisco, California, requests the design and construction of a building identical to the Life Sciences Building. San Francisco, California is classified as seismic design category D.

The structural depth consists of the redesigns of two different lateral force resisting systems: eccentrically braced frames and special moment frames. ETABS 2013 is used to design and analyze the proposed systems. To reduce the effective building weight, normal weight concrete slab is changed to lightweight concrete slab on the composite deck.

Two breadth topics are investigated: building enclosure breadth and construction breadth. In order to suggest an adequate lateral system to the owner, the cost estimate and the construction schedule will be compared between suggested lateral systems. Since the building has been relocated to San Francisco, CA, the building envelope will be reassessed to the new environment and redesigned as well. Compared to the climate in the existing location, climate in San Francisco, CA is less fluctuating and remained between 50 to 70F. The building envelope, especially wall assembly details is evaluated with WUFI 5. This analysis provides the presence of water condensation between wall assembly section.

Both eccentrically braced frames and special moment frames provide distinctive difference. Eccentrically braced frames would provide better performance over the moment frames. On the other hands, special moment frames would allow architectural freedom in designing. After investigation, the owner would choose the final design of lateral force resisting system based on the performance, architectural freedom, and constructibility.