

WE'RE NOT AFRAID OF HEIGHTS: *HIGH-RISE BUILDING CHALLENGES*

Engineering high-rise buildings presents unique challenges due to the scale and complexity of the building type. Below are several primary concerns faced in mechanical, electrical, plumbing, fire protection, and structural engineering for high-rise structures.

MECHANICAL

HVAC, plumbing equipment, and piping are subject to higher pressures than standard design. Designing systems that minimize the exposure to these pressures allows more of the HVAC and plumbing equipment to be purchased cost-effectively. There is also often limited space available for equipment, so designing the optimal layout that efficiently uses space, including vertical areas, is vital.

FIRE SAFETY/SMOKE CONTROL

Fire safety and smoke control are critical elements with unique design challenges. A top priority is to design a smoke control and emergency power system that safely allows the occupants to exit upon alarm. Tall atriums and lobby spaces can also impact the design of smoke control systems, requiring careful selection of fire suppression systems and smoke control measures. Ventilation systems must accommodate provisions to minimize stack and chimney effects. Improperly designed systems can cause unwanted pressure imbalances, leading to negative pressurizations in spaces and moisture intrusion.



ELECTRICAL

With the extensive power demands of high-rise buildings, it is important to design the configuration of electrical systems and their components efficiently. Conducting a load analysis to properly locate the electrical rooms, space for feeder routing, and using the correct low/medium voltages for the electrical service is vital. Another key consideration is creating floor clusters based on building height and load density using campus electrical distribution (5 - 15 KV, substations, stack vaults, or busways) and repeating the design approach for each cluster as needed.

STRUCTURAL

Structural and MEP systems integration is the foundation for success. The taller the building, the more challenging this integration becomes. Careful coordination is essential to accommodating conduits, ductwork, and risers without compromising structural integrity.

Dynamics and vibrations are another key consideration for structural engineering. Tall buildings are frequently affected by various factors, such as wind and mechanical equipment. Through solid structural design, careful analysis is conducted to predict potential vibrations and prevent vibrations from occurring.

Having an experienced (MEP/S) team that has worked together to solve these challenges on many projects facilitates a smoother process for the entire project team. The result is a well-designed, high-performance building for the building owner and users. Our expertise and knowledge give us an edge in providing outstanding consulting engineering services for high-rise building structures.

