

## **PROPOSED SOLUTION**

Optimization of floor-to-floor height presents an opportunity to greatly improve the amount of residential space by adding at least one floor to the building without exceeding zoning height limitations. A completely new floor system will be implemented in order to achieve a more reasonable floor thickness. The system will include designing and placing columns on a more regular column grid and at a larger spacing to improve constructability and create a more open floor plan. A two-way post-tensioned flat plate concrete slab system will then be designed in order to decrease the floor thickness. The existing floor system and proposed floor system will then be compared and analyzed based on cost, constructability, and possible revenue generated. However, decreasing the floor thickness alone will not allow for another story without increasing the overall building height. As a result, a breadth study on the mechanical system and possible redesign will be conducted. In order to completely eliminate the ceiling cavity, individual HVAC units for each apartment, like that in a hotel, will be studied. It is anticipated that the individual units will be able to handle the heating, cooling and ventilation loads of the building.

Lateral system efficiency will be addressed next. In order to create more freedom with the architectural floor plan and use less material, shear wall lengths will be studied and optimized. The effects of an extra floor on the lateral system will also be studied. The existing and proposed lateral system will then be compared and analyzed based on cost, constructability, and floor plan optimization. As a second breadth study, a redesign of the architectural floor plan and façade will be incorporated in order to integrate structure and architecture. It is expected that the redesign of the key structural, mechanical, and architectural elements will decrease overall costs of the building while still allowing for a functioning floor plan.