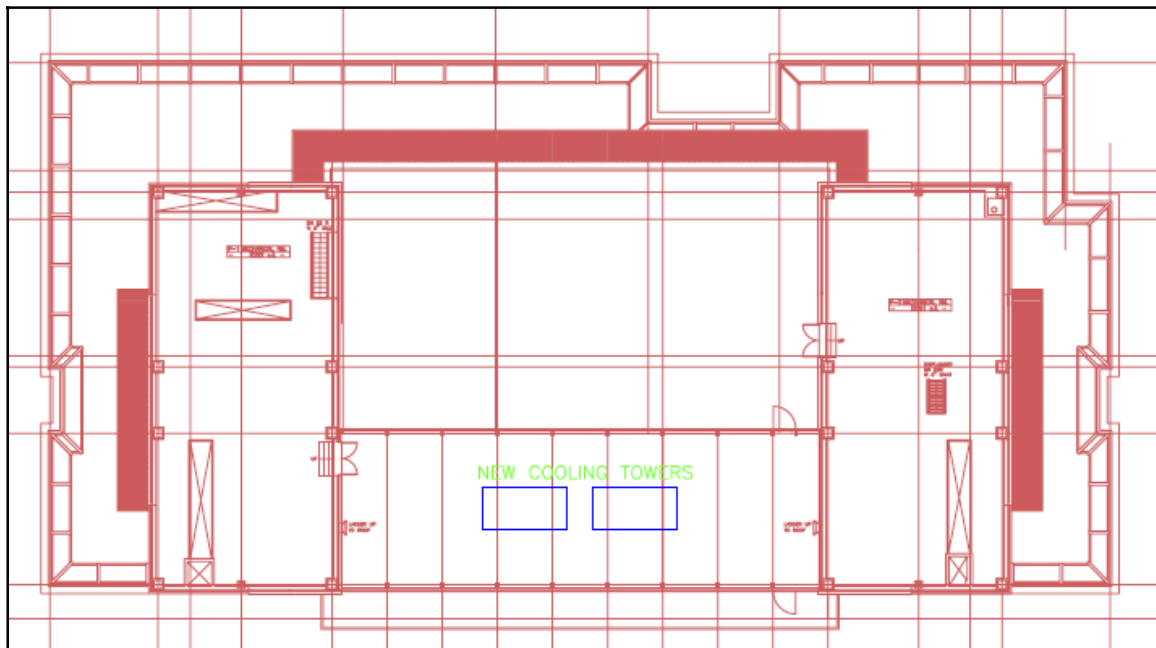

7.0 STRUCTURAL ANALYSIS

In analyzing any new system the impact on other building systems has to be evaluated. In this analysis of thermal storage cooling towers had to be added to the roof. The original design specified air cool condensing units on the roof. However, by adding thermal storage the air cooled units would no longer be needed and the space could be used for the cooling towers. Figure 14 illustrates the cooling tower location. The only problem was that the cooling towers operating weight was greater than the air cooled condensing units. Therefore, an analysis was completed to determine if the current beams, HSS 10 x 6 x 3/8, would be able to support the additional weight, 1000 lbs. per tower. The complete set of calculations can be seen in Appendix C. It was determined that the current HSS beams did indeed have enough capacity to hold the new cooling towers.

Figure 14: New Location for Cooling Towers



Another analysis that was considered was the placement of the ice thermal storage tanks. There were a few options including placing the tanks on top of the roof. However, after some preliminary analysis it was determined that the majority of the roof system would have had to be redesigned to accommodate the weight of the storage tanks. The conclusion for the location of the storage tanks was to take a portion of the small parking lot behind the building. The drawback to this approach was that the chillers were located up in the mechanical penthouse and the chilled water pipes would then have to run from the top building to the bottom to store ice and the storage tanks would then have to pump

the water back up to the mechanical penthouse to serve the cooling coils, also located in the mechanical penthouse. However, based on the economics purchasing extra piping was cheaper than purchasing larger beams.

Another structural element that was not explored but considered was because the addition of cold air distribution the duct sizes became smaller. Reducing the duct sizes may have allowed the floor-to-floor height to be reduced. However, because the building is only six stories tall the overall reduction may have been minimal but in large high-rise building the cost savings could have been greater.