



Proposal

PROBLEM STATEMENT

From the analysis of The Helena's structural floor system which was conducted in Technical Assignment 2, it was apparent that the column locations were such that the only viable solution for a floor system was to use a flat plate slab. It is the purpose of this report to conduct an investigation to determine whether a re-positioning of the column locations will be beneficial to opening up new solutions for flooring systems. The new floor system will be required to carry all the superimposed loads that the existing floor system does as well as its own self-weight. The most important issue with the re-location of the columns is to make sure the new locations work within the limits of the designed architecture. After the columns have been placed, the design for the floor system can take place. Once the floor system has been designed, the columns must then be re-designed to make sure they can withstand the new loads which will be placed on them. Moving the column locations will also mean having to move the locations of the footings in the foundation. Also, the new loads in the columns will mean there are new loads being transferred into the footings. This will create the need to re-design the footings to make sure they will be able to carry these new loads. Other building systems will also be affected by the change in location of the columns and the design of the new floor system. The current routing of the mechanical ductwork is based on the current locations of the columns to ensure optimum horizontal flow and it is also governed vertically by the placement of the rebar which runs through the flat plate slab of the existing floor system. Sizing and placement for the ductwork is done to ensure the movement through the slabs will create a minimum disturbance to the floor system. To determine if the new floor system is an option which requires consideration, a cost analysis will be conducted to compare the existing floor system with the new system. This and other governing factors will be used to provide a conclusion as to whether these changes are something which would be a better option for a design for this building.

PROPOSED SOLUTION

Working off of the current column layout and within the boundaries of the architectural drawings, a new column layout will be created to produce a typical bay. The new locations will create more of a grid layout for ease and repetition of design. A pre-cast concrete plank floor system will be designed as the new floor



system. From the use of a flat plate slab and the floor-to-ceiling glass used for the building's skin, it is apparent that the plenum space and overall building height are important factors to consider during the re-design. To keep on-site fabrication time to a minimum, the planks will be designed to rest upon W-shape steel beams. After the planks are designed, the new loads that will be transmitted to the columns will be used to re-size the columns. The loads will then be followed down the columns and at the bottom of the columns, the loads will then be transferred into the footings. The footings will also need to be re-designed, not only for the new loads, but also for the new locations as determined by the new column placements. Other structural considerations will be addressed but not taken into detail as with the main components of this analysis. As for the mechanical ductwork, the designed paths for the ductwork will be reviewed to determine if the new column locations will interfere with the current placements. Also, the locations where the ductwork will travel vertically through the slab will be checked to make sure they will fit through the spaces between the reinforcement in the new pre-cast concrete plank system.