

## **APPENDIX A – BREADTH TOPICS**

## BREADTH TOPICS

Each breadth topic corresponds to a previously mentioned technical analysis that is indicated accordingly. The breadths are subjected to individual analysis to test substantial knowledge of specific architectural engineering options that have been acquired over an academic career period.

### STRUCTURAL BREADTH

**\*Corresponds to Technical Analysis Number One, Two, Three, and Four.**

#### Technical Analysis Number One

Designing a prefabricated floor plank system to substitute the existing cast-in-place concrete flooring system will require a detailed loading examination. Each plank will have to be tested for strength durability and loading in relation to exhibiting drilled holes for floor placement activities. With expected supplementary support systems to be added to accommodate for proper floor plank connections, internal and external loading will be utilized for these components by hand calculations and software devices. An expected structural analysis will be conducted of the durability and strength for welding additional components to bisect the average 30'x28' bay.

#### Technical Analysis Number Two

Switching from a concrete configuration structural system to a steel system will require loading calculations of steel members. Bracing methods to offset dead and live loads must be employed since a steel member acts differently under same loading conditions as a concrete member.

#### Technical Analysis Number Three

The integration of a Green Roof to both flat roof systems will contribute to dead loads of this product and live loads for product maintenance. The concrete columns and beams must be analyzed to see if they can resist buckling, shear, and tension loading that will be presented.

#### Technical Analysis Number Four

Depending on sizing and weight requirements, the PV system may impose a greater applied force to the structure of the building. Influences of weather and climate could impact this system's force by accumulating over a period of time which affects the steel trussed and is transferred all the way down to grounding mechanisms.

## **MECHANICAL BREADTH**

### **\*Corresponds to Technical Analysis Number Three**

An analytical mechanical test must be performed in order to evaluate energy conservation predicted from the Green Roof system. First, a test has to be led to note what energy performance values that the existing equipment exhibits. Second, a performance test must be obtained from the Green Roof to display a comparison of savings. Using mechanical energy software, a demonstration of thermal characteristics will be explored to see if sustainable expectations can be met.

## **ELECTRICAL BREADTH**

### **\*Corresponds to Technical Analysis Number Four**

The current primary electrical system consists of four utility transformers at 2500kVA which is supplied from the J.E.A. Utility Service on the public power grid. A comprehensive look at the electrical component requirements of the equipment will be needed for the analysis. New energy savings from the photovoltaic system will be studied to compare the cost efficiencies over its life cycle. Additional power for resale back to the company will also be taken into account for distribution as a lifetime going profit under constant conditions.