



BREADTH TOPICS

As a senior thesis requirement to fulfill the Penn State Architectural Engineering BAE program, the following topics will investigate into two other disciplines within the AE Department that have been studied over the course of the AE Major.

STRUCTURAL BREADTH: Contributes to Technical Analysis 3

The current roof of the new Children's Hospital consists of a (2" deep, 20 gage composite metal deck with a 4-1/2" thick topping slab reinforced with 6x6 W2.1XW2.1 WWF). As per contract there will be no equipment housed on the roof structure due to aesthetic reasons. The remainder of the superstructure consists of a structural steel framing system with elevated deck slabs and a deep foundation system.

Technical Analysis 3 proposes a new sustainable source of energy i.e. Photovoltaic Panels. With the addition of numerous panels on the roof of the Children's Hospital, it is necessary to evaluate the structural system of the facility to ensure the applied loads can be sustained without causing catastrophic structural failures. The slabs will be evaluated to determine the whether or not the entire system can be securely tied down. The structural steel beams and columns will also be evaluated in order to verify if the new dead loads can be supported. In the case the structural system fails to support the added loads, an analysis will follow with the required member sizes to safely support the new system.

ELECTRICAL BREADTH: Contributes to Technical Analysis 3

In order to determine the savings and benefits of implementing a photovoltaic system, it is essential to be able to calculate some parameters. The main goal will be to determine whether or not it is possible to eliminate at least one diesel generator. Research will be done to select the optimum batteries and solar panels via a load calculation of the power produced by the diesel generators. The amount of solar panels will be calculated based on the product data given by the solar panel manufacturer. In the case that a diesel generator is not able to be eliminated due to insufficient roof space, an investigation will be conducted to determine a system utilizing high electric loads to be solely powered by solar panels. Finally, the cost implications of installing this system will be analyzed to determine if it is feasible and cost effective system to be added on the Children's Hospital.