



BREADTH TOPICS

In order to fulfill the AE Department's senior thesis requirements the following topics (identified below) will take a closer look into the other disciplines within the AE program that I have studied over the past four years.

STRUCTURAL BREADTH: *Contributes to Technical Analysis 1 and 3*

Re-designing the foundation system of the Support Services Building from a micropile foundation system to a different system will require the understanding of the column loads, lateral bracing, load transfer to the earth, and settlement requirements. A re-design may include some means of soil improvement. Elimination of the battered piles will result in a change in the lateral stability of structure. Shear walls may need to be added in order to provide lateral stability for the building. Eliminating the micropiles will also alter the pile caps to larger spread footings and could possibly be utilized in conjunction with a structural slab on grade.

The addition of a photovoltaic array to the roof as proposed in technical analysis 3 will require a structural analysis in order to determine loading conditions and support conditions of the roof members and columns.

RENEWABLE ENERGY/ELECTRICAL/MECHANICAL BREADTH: *Contributes to Technical Analysis 3*

In order to design a preliminary photovoltaic array to make the Support Services Building Penn State's first net-zero energy building will require an understanding of the electrical loads/requirements of the building. It will also require an understanding of the heating/cooling loads in order to determine the amount of energy required to heat/cool the building. Incorporating technology such as solar hot water heaters and possibly a geothermal system will help add to the net-zero effect of the building. It will also require replacing/altering the gas-fired mechanical equipment to accept hot water and/or electric power heat/cool the air.