

**[Appendix A]**  
BREADTH TOPICS AND MAE REQUIREMENTS

**BREADTH Topics:**

The following breadths involve research and investigation within other technical disciplines within the Architectural Engineering major. Each topic pertains to the analyses previously mentioned within this proposal.

**Structural Breadth:** Contributes to Technical Analysis #2 and Technical Analysis #3

The erection of the Office Renovation Building's Electrical Equipment Enclosure is the only new construction to take place during phase 2. The structure is currently designated to be composed of steel columns and beams and will include three levels of elevated concrete slabs on metal decking

Substituting cast in place floor slabs as described in *Technical Analysis #2* will have some structural impacts on the facility's current design. The structural steel design and connection details originally applied to the structure's design will be impacted with the proposed alternate system. Furthermore, the application of a Photovoltaic System on the roof of the Office Renovation Building will require design checks for applicable loads. If the roof structure requires redesign work, it will be performed accordingly.

**Renewable Energy/Electrical Breadth:** Contributes to Technical Analysis #3

The building electric service is primarily 208V and is supplied through various transformers and switchgear that have been modified over the years. Most of the electrical work is comprised within the construction of the structure's new Electrical Equipment Enclosure. Four (4) 13.8 KV feeders from PEPco Power, an electric and natural gas utility subsidiary of The Exelon Corporation, will be provided will to (4) Medium Voltage (MV) switchgear. Also, MV power will be distributed to (4) transformer vaults. The entire electrical system will be backed up by three (3) emergency generators each rated at 2000Kw.

Incorporating renewable energy from a PV energy system into the existing design of the Electrical Equipment Enclosure will be analyzed to determine the electrical equipment and connection requirements. Research will be done in regards to how the new renewable energy system will alter the existing design and how it will be connected to provide power to the facility. The Photovoltaic system will be designed to tie into the Electrical Equipment Enclosure's lighting system. Feasibility studies and constructability reviews will be executed to analyze what energy contributions the new system will make to the facility.

## MAE Requirements

The knowledge gained from an array of 500 level MAE courses will be applied to each of the technical analyses proposed. Research and references from *AE 597G: BIM Execution and Planning* will be applied to the implementation of *BIM Project Planning and Execution*. Furthermore, the conceptual foundation and methodologies of *AE 570: Production Management* will be applied to effectively accelerate construction of the Electrical Equipment Enclosure and its *Prefabricated* components. Also, the topics discussed in *AE 598C: Sustainable Building Methods* will be used to optimize the design and implementation of a *Photovoltaic Energy System*.

- AE 597G: BIM Execution and Planning
- AE 570: Production Management
- AE 598C: Sustainable Building Methods