

WESTINGHOUSE ELECTRIC COMPANY CORPORATE HEADQUARTERS CRANBERRY, PA



Thesis Proposal

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Jessica L. Laurito

Structural Option

Advisor: Dr. Linda Hanagan

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EXECUTIVE SUMMARY

The Westinghouse Electric Company Corporate Headquarters will be a three building campus with site features such as asphalt walking paths and volleyball courts on eighty-three acres in Cranberry, PA. For the purpose of the project, only Building One will be analyzed as the other two are considered a separate project by all parties involved. The truncated V-shape building has been given a look of importance with polished concrete block merging into brick stepped-out columns to accentuate the verticality of the five-story 74'-6" tall structure.

PROBLEM STATEMENT

The building was originally designed using a composite deck and beam system. Due to the bay sizes ($L_2/L_1 > 2$), the building leads itself to a one way slab. The lateral system of all moment connections in the existing building does not seem as efficient as it could be. The lateral system in a concrete building could be explored without changing the exterior as much as a braced frame would change a steel building. The owners want the building to be a LEED certified building, so maintaining efficiency is a must.

SOLUTION

The current column layout dictates a one way concrete slab. Changing the building to a one way concrete slab with beams system will allow for an in-depth analysis of cost and schedule efficiency compared to the existing composite system. The lateral system will be optimized, determining where shear walls would be effective and where concrete moment connections are necessary. Adding a green roof will help to integrate the building with the site and add to the green building concept. The foundations will have to be resized for the new loads, since it is a new material with new weights. The building will be designed using a combination of hand calculations and an ETABS model.

SUSTAINABLE ARCHITECTURE BREADTH

Since the building has a LEED certified requirement, changing the building to sustainable concrete will be a challenge. Sustainable concrete is possible by adding more fly ash and recycled materials and can be greener than steel. The sustainable concrete will need to be carefully researched and implemented. Adding a green roof will help this corporate headquarters building stand out from others even more and still be integrated into the environment. Achieving a LEED silver rating would be ideal if the methods to earn the extra points do not compromise the integrity of the building.

CONSTRUCTION MANAGEMENT BREADTH

The building will be changed so drastically, therefore in order to make a well-informed decision on which is more effective, a cost estimate and schedule must be generated and compared. Since the material changes, there will be a cost impact and a schedule impact.

BREADTH TOPICS

CONSTRUCTION MANAGEMENT BREADTH STUDY

Before a final response to the building once the proposed changes can be made, cost and schedule must be taken into consideration. Since the material is changing, there will definitely be a cost impact. Also, concrete takes more time to erect than steel due to the formwork, and thus creates a schedule impact. Concrete requires less lead time than steel, so the building construction would not be delayed. A construction schedule will be created and analyzed in addition to a cost analysis in order to obtain more thorough conclusion on the effectiveness of the new system.

SUSTAINABLE ARCHITECTURE BREADTH STUDY

The Westinghouse Electric Company also wants the building to be LEED certified. There are ways to make concrete buildings sustainable and even to earn LEED points for the concrete. By changing the admixtures in the concrete, such as adding more fly ash and more recycled material, the concrete has the potential to be greener than a steel alternative. The use of more sustainable concrete will be carefully researched and implemented. Also, as this building is the corporate headquarters, it should stand out. Creating a green roof would incorporate the building into the campus and surroundings. Achieving a LEED Silver rating rather than just certified would be ideal. This thesis project will explore ways to gain these points without compromising the integrity of the building will be explored.