

**The Arts & Humanities Instructional Building
Howard Community College
Columbia, MD**

Thesis Proposal

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Executive Summary

Three analysis activities are examined for additional research. They are façade sequencing, waste management and green roof construction. The AHIB will be studied to address how the analysis of the three topics can improve the value, constructability, and schedule of the project. Specifically, the façade sequencing identifies the scheduling issues with the building envelope. The waste management analysis distinguishes individual concerns that arise when attempting to gain LEED points through recycling and waste management. The green roof construction issue raises questions regarding the practicality of constructing the AHIB with a green roof and also considers the mechanical and structural impacts of such a change.

Analysis 1 – Façade Sequencing

The concentration for this analysis area is on the sequencing of the building façade on the construction schedule. The building façade consists of three different materials: glass curtain wall, pre-finished aluminum panels, and masonry block. A milestone in any construction project is the completion of the building enclosure. It is at this benchmark in construction that the building is now completely protected from the elements and there exists thermal and moisture control of the interior spaces. Once this occurs the construction of the interior finishes may commence.

The goal of this analysis is to improve the sequencing and subsequently the entire construction schedule. To accomplish this goal the following steps have been identified.

1. Review the current construction sequence and plan
 - a. Review the current schedule
 - b. Review the site plan for logical sequencing
 - c. Identify specific areas for improvement
2. Develop a proposed sequence for the building envelope
 - a. Determine new lay down areas
 - b. Specify starting points for construction and calculate a new sequence
3. Review the impact of the proposed sequence on the building schedule
4. Construct a 4-D model, integrating the proposed schedule
5. Calculate the effects of the proposed sequence on the construction project.
 - a. Calculate general conditions savings
 - b. Calculate crane/hoist costs

Analysis 2 – Waste Management

The new AHIB project does not have any specific recycling or waste management plan in place. This analysis will focus on the managerial efforts required to obtain LEED points for a successful waste management plan.

1. Review the LEED requirements to obtain certification for waste management
2. Review the physical requirements of a waste management plan
 - a. Locate the necessary area on the jobsite for the recycling bins
 - b. Identify recycling centers in close proximity to the jobsite
3. Identify recyclable materials on the jobsite
 - a. Quantify the amount of material to be recycled through the course of the project
4. Establish the costs for recycling
 - a. Calculate the costs of the recycling bins
 - b. Calculate the costs of hauling the material
 - c. Identify costs to manage the recycling efforts

Analysis 3 – Green Roof Construction

Currently the new Arts & Humanities Instructional Building is not specifically designed to meet any sustainability requirements. With sustainability being a recurring topic in the construction industry the importance of having knowledge in the subject matter can not be overlooked. The proposed topic for research is to redesign the roof to have sustainable properties, specifically to be a green roof. Included in the research is the construction of green roofs, the practicality of green roofs in the geographic region, the mechanical impact of a green roof and finally the impact of the structural loading on the current steel frame system.

The following steps have been identified for completing the analysis of a green roof design.

5. Green Roof construction review
 - a. Geographical region requirements
 - b. Review green roof construction materials
 - c. Establish materials and design through geographic needs and latest design methods
6. Identify mechanical system impacts
 - a. Review current mechanical system
 - b. Calculate the thermal resistance of current design
 - c. Calculate the thermal resistance of new green roof
 - d. Calculate the heat loss through the green roof
 - e. Resize mechanical system for new green roof construction
 - f. Calculate the cost impacts of the new mechanical system
 - i. Determine material costs through use of RS Means
 - ii. Calculate scheduling impacts and associated costs
7. Identify structural system impacts on a representative bay
 - a. Review current steel joist structural roof system
 - b. Calculate the live and dead loads of the green roof design
 - c. Select trial member sizes to accommodate design loads
 - d. Check deflection of structural members

- e. Check shear and moment of structural members
- f. Resize members if necessary
- g. Finalize roof structural design
- h. Determine what the scheduling impacts are for constructing the new roof system
- i. Analyze the cost impacts of the new structural system
 - i. Determine material costs through use of RS Means
 - ii. Determine costs associated with longer or shorter duration

Weight Matrix

Description	Research	Value Eng.	Const. Rev	Sched Red.	Total
Façade Sequencing	5	x	10	25	40
Waste Management	10	5	10	x	25
Green Roof	15	15	5	x	35
Total	30	20	25	25	100