

## Executive Summary

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This proposal serves as an outline for the research and analyses proposed for spring semester thesis. After brainstorming some initial ideas, research has been focused on a few key concepts. Initial investigations were performed to determine the feasibility of this proposal. The analysis descriptions will highlight three main topics which will be the focus of the spring semester thesis with a consistent theme of energy and the environment.

Analysis One will include a survey of teachers at LEED certified and traditional K-12 schools to determine first hand the perceived benefits of green schools. Results from this survey will be compiled and distributed locally to school boards who have not passed resolutions requiring new school construction to achieve LEED certification.

Analysis Two will use Revit and IES to calculate required loads and redesign the mechanical system. The current VAV system will be analyzed in comparison to a dedicated outdoor air chilled beam system. This will incorporate a mechanical breadth and satisfy the M.A.E. requirement.

Analysis Three will investigate an alternative façade system and the effects that it will have on the structural system. Additionally, daylighting will be investigated to improve natural light in the learning environments.

A weight matrix is provided to show how much emphasis will be placed on the core areas of research, value engineering, constructability, and schedule acceleration. A detailed explanation of the breadth studies can be found in Appendix A. The purpose of the breadth is to show proficiency in at least two option areas outside of construction. Breadths will be performed in the areas of mechanical, structural, and lighting.

## **Breadth Studies**

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### ***Breadth One: Mechanical***

Using Revit and Integrated Environmental Solutions, loads will be calculated for the redesign of the mechanical system. The system will then be designed as a chilled beam system. Equipment will be sized, and a life cycle cost analysis will be performed and compared with the current VAV system. Constructability issues such as impact on the coordination process, planning and lead times will be stressed. Indoor air quality, consistency with LEED credits, durability and long term maintenance will also be taken into account.

### ***Breadth Two: Structural***

An alternative façade material will be suggested in an attempt to accelerate the schedule and lower construction costs. The structural implications of the new building envelope will be evaluated and an acceptable solution to alter the structural system and add the necessary connections will be proposed.

### ***Breadth Three: Lighting***

With the design of a new façade system, an increase in natural lighting will be a priority. IES will be used to evaluate daylighting conditions with the new façade system versus the current hand-laid brick and punch window system. Occupancy and daylighting sensors will be addressed.