

3.0 Project Proposal

3.1 Goal

The stated goal of this project is to improve the efficiency of certain aspects of the structural system.

3.2 Depth Analysis

The depth analysis for this project will primarily investigate the new design options for structural system components. I hope to streamline the lateral force resisting system through a reduction in the number of braced frames necessary to resist the calculated environmental loads. I will also explore an alternative foundation system of concrete caissons drilled into rock. In addition, I will attempt to design an alternative system to replace the Vierendeel truss.

3.3 Breadth Analyses

The two breadth analyses will focus on assessing the impact of the depth analysis results on construction management, architectural integrity, and mechanical systems. The streamlined lateral force resisting system and the alternative foundation system will be evaluated based on raw material quantities and cost impact using RS Means 2006. The truss replacement will be assessed additionally for its architectural and mechanical impact on the building.

3.4 Task Breakdown & Methodology

Lateral Force Resisting System Efficiency Evaluation/Alteration

- Develop improved structural models of the existing braced frames using SAP 2000 computer software. Create new models as necessary for any altered/new braced frame configurations.
- Create Excel spreadsheets to analyze the efficiency of the existing and altered systems.
- Determine foundation requirements for the altered system using hand calculations and Excel spreadsheets.

Foundation Systems

- Research the design of drilled caisson foundations.
- Redesign the current foundations to include any changes made to the lateral system using hand calculations, Excel spreadsheets, and my foundations textbook.

Spanning the Lecture Hall - Vierendeel Truss Options

- Research the origin and use of Vierendeel trusses.
- Explore potential options including, but not limited to, long span steel joists and triangular trusses.

Constructability Management

- Determine quantities of steel, concrete, and excavation material from the depth analyses.
- Calculate cost impact using R.S. Means 2006.
- Research general construction issues related to the existing and new designs.
- Compare the existing and new designs.

Architectural/Mechanical Impact

- Create AutoCAD drawings of the exterior façade that is impacted by the Vierendeel truss and the alternative options.
- Assess the impacts to the both interior and exterior appearances.