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Structural Option  
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University of Rochester  
**BME/Optics Building**

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## **Thesis Proposal**

### Executive Summary

#### ***Building Description***

The University of Rochester BME / Optics Building provides laboratory, research facility, office, classroom, and lecture spaces for the acclaimed Institute of Optics and emerging Biomedical Engineering Department. It is a 100,000 sq. ft. facility, standing five stories with an additional mechanical penthouse and partial basement.

The structure of the BME / Optics Building consists of composite steel beams and girders on W12 steel columns. The column layout of the building is based on the irregular footprint and the spatial uses of the building. As a result, the layout consists of square bays with relatively short spans. For lateral stability, concentrically braced frames in the short, east-west direction and moment frames in the long, north-south direction are used.

#### ***Proposal***

The current structural system of the building was found in previous reports to be well-designed and well-suited to meet all of the unique demands of this building. However, exploring an alternative, concrete structural system in depth will help develop an understanding of what type of advantages can be gained. This report proposes a thesis project involving structural redesign.

#### ***Depth Topics***

First, the layout and geometry of the steel system will be considered, since composite beams tend to be inefficient in short spans. Then, a complete structural redesign using concrete is being proposed. The new floor system will be a cast-in-place concrete flat slab, using drop panels and edge beams. The lateral system will utilize the edge beams as a moment frame in one direction, but will also use a number of shear walls to resist lateral load. Detailed floor vibration analysis will be performed for laboratory spaces.

#### ***Breadth Topics***

1. Cost and Scheduling Impact – to determine the effects the new system will have on meeting or exceeding budget and time constraints
2. LEED Rating (Option) – to design one or more specific ways, unique to this building, that will make it more environmentally friendly
3. Atrium Space Analysis (Option) – acoustics, lighting, or innovative mechanical system