

MILLENNIUM SCIENCE COMPLEX - UNIVERSITY PARK, PA

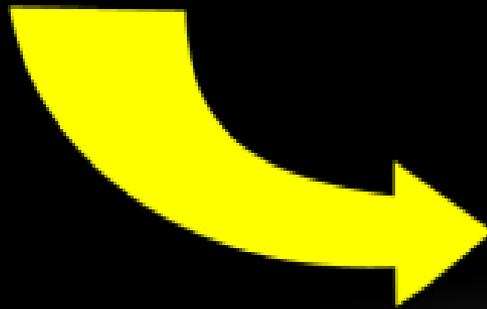
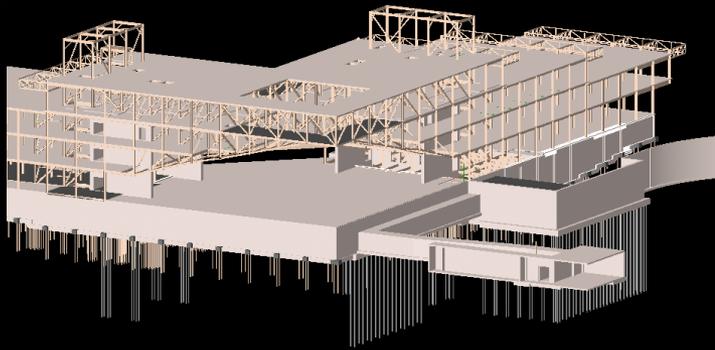


THESIS PROPOSAL REVIEW MILLENNIUM SCIENCE COMPLEX

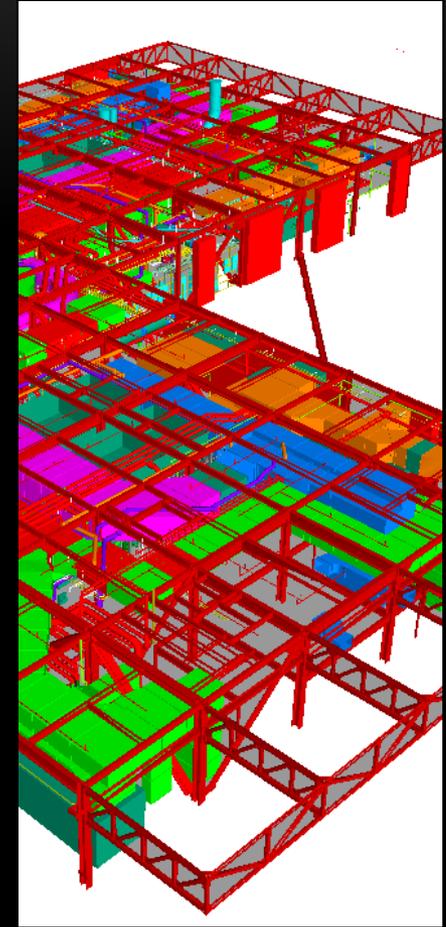
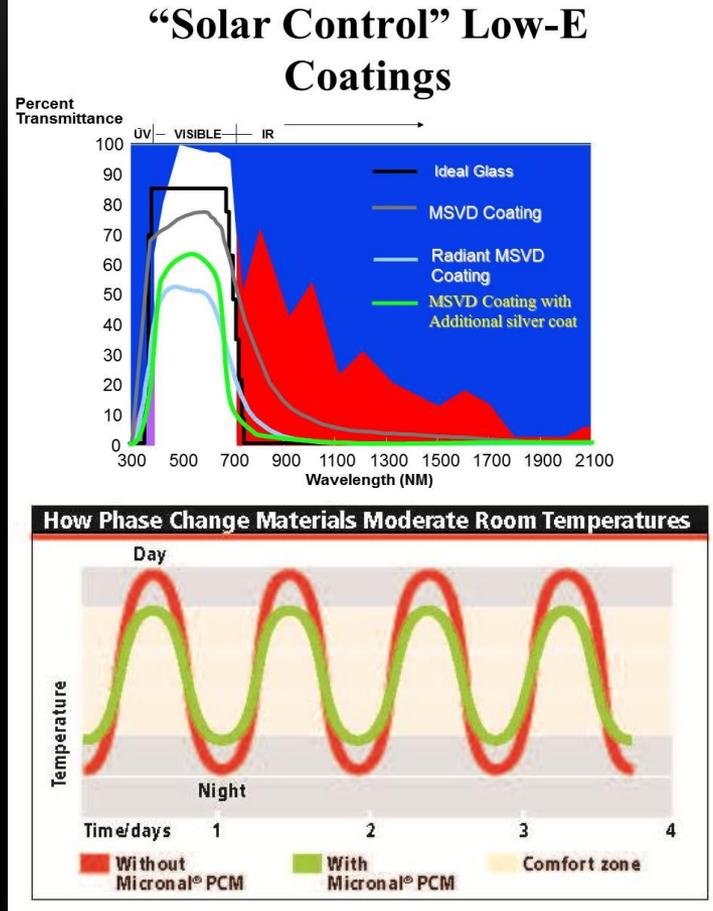
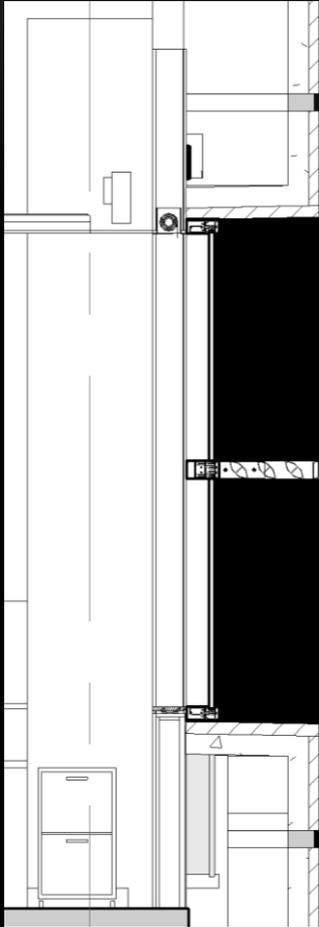
Developed By:



Design investigations will focus on a more economical structural design, improving energy efficiency, and analyzing the cost effect of design changes.



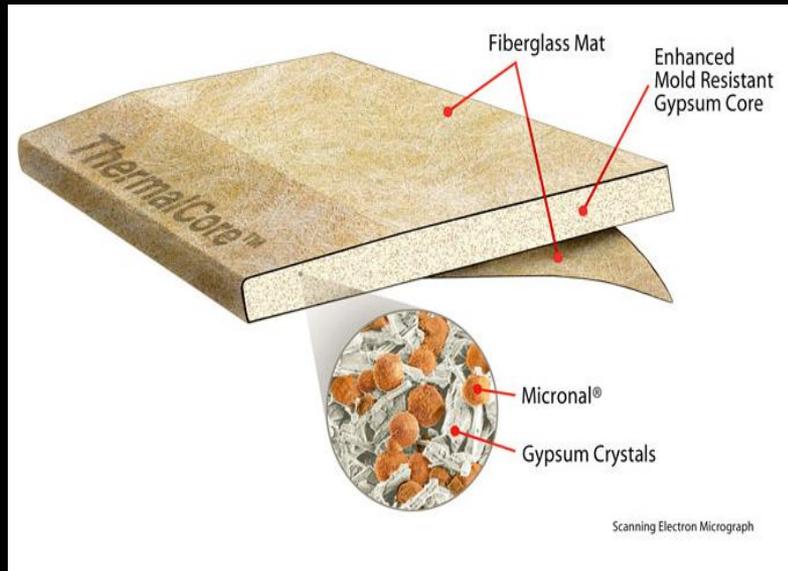
KGB Maser has three focus areas for the Millennium Science Complex – the façade, distribution optimization, and cantilever redesign.



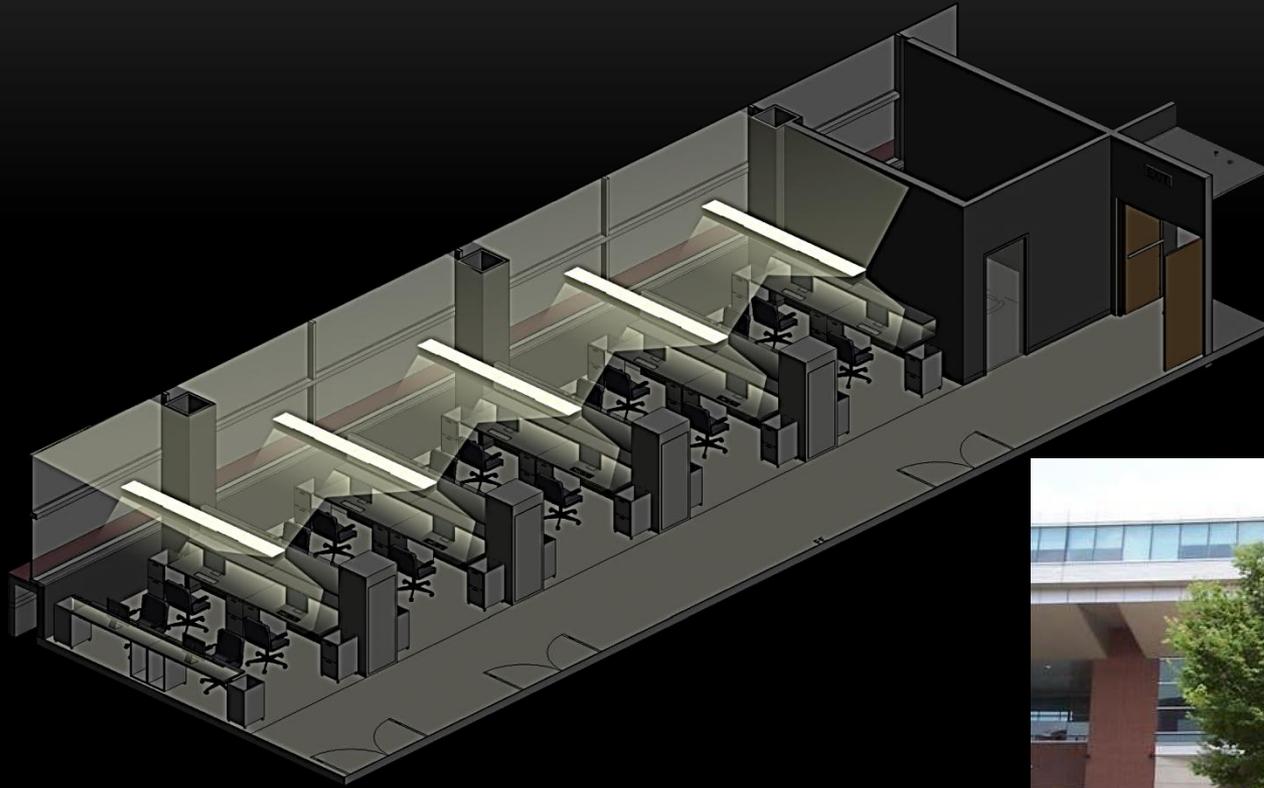
Decreasing the thickness of the façade will allow for larger surface areas to be delivered to the site and reduce dead load on the building.



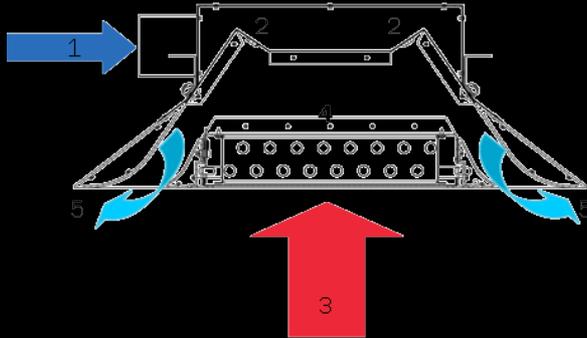
Phase change material applied within drywall and the glazing affects temperature swings and impacts daylighting in spaces.



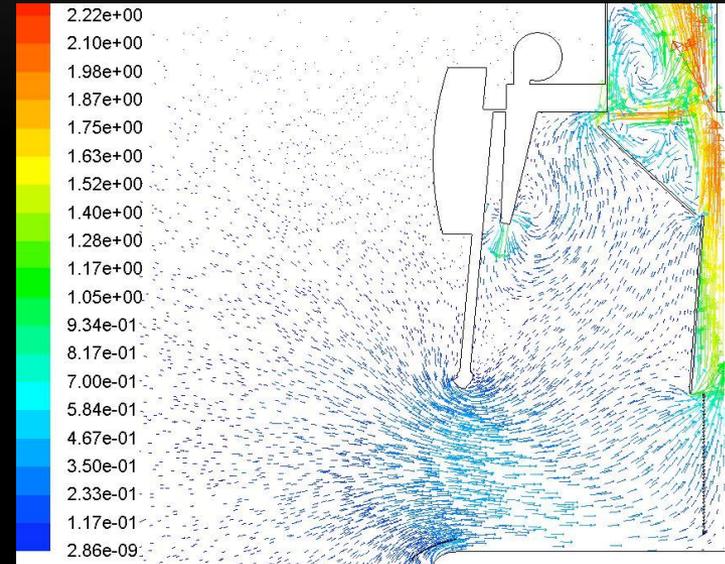
Phase change material applied within drywall and the glazing affects temperature swings and impacts daylighting in spaces.



Efforts to reduce energy consumption of the Millennium Science Complex will focus increasing efficiency of systems serving the labs.

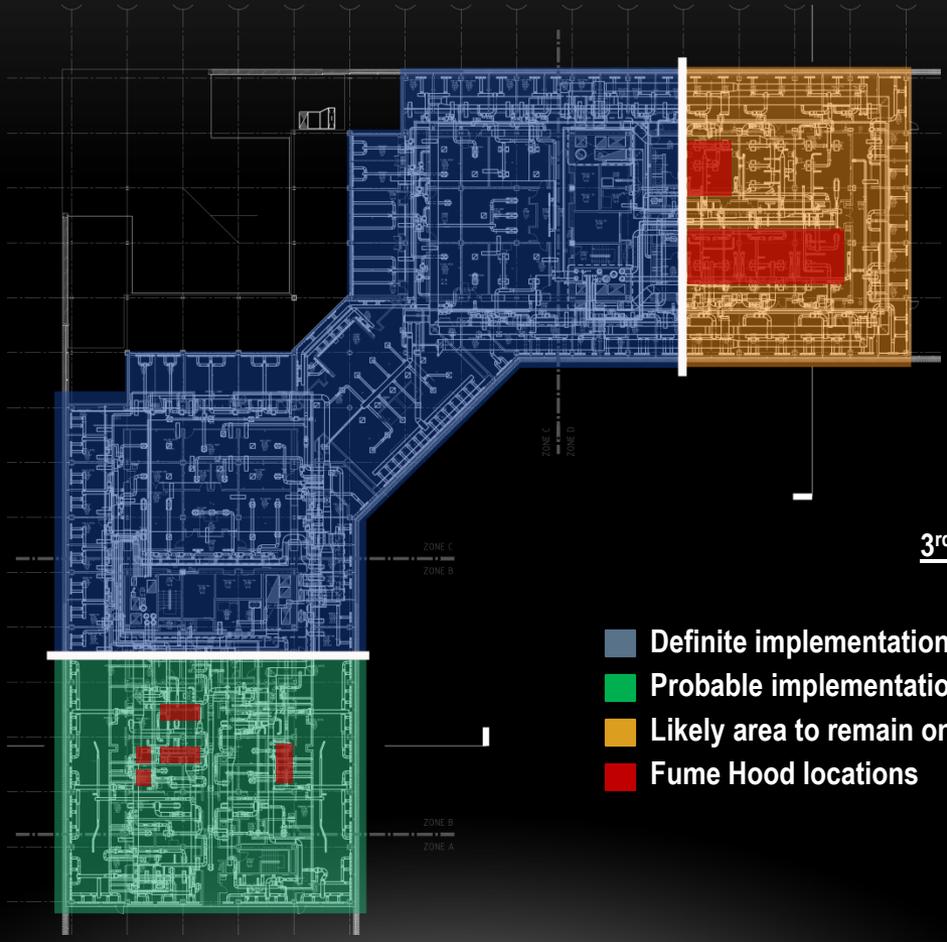


Chilled Beam Diagram



CFD Fume Hood Analysis

Chilled beams in the office core and select lab spaces will decrease overall system energy and positively impact coordination.



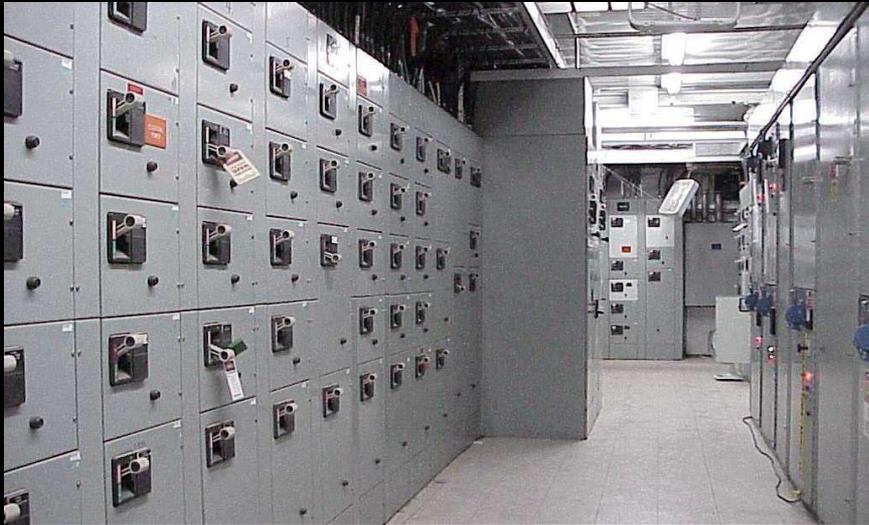
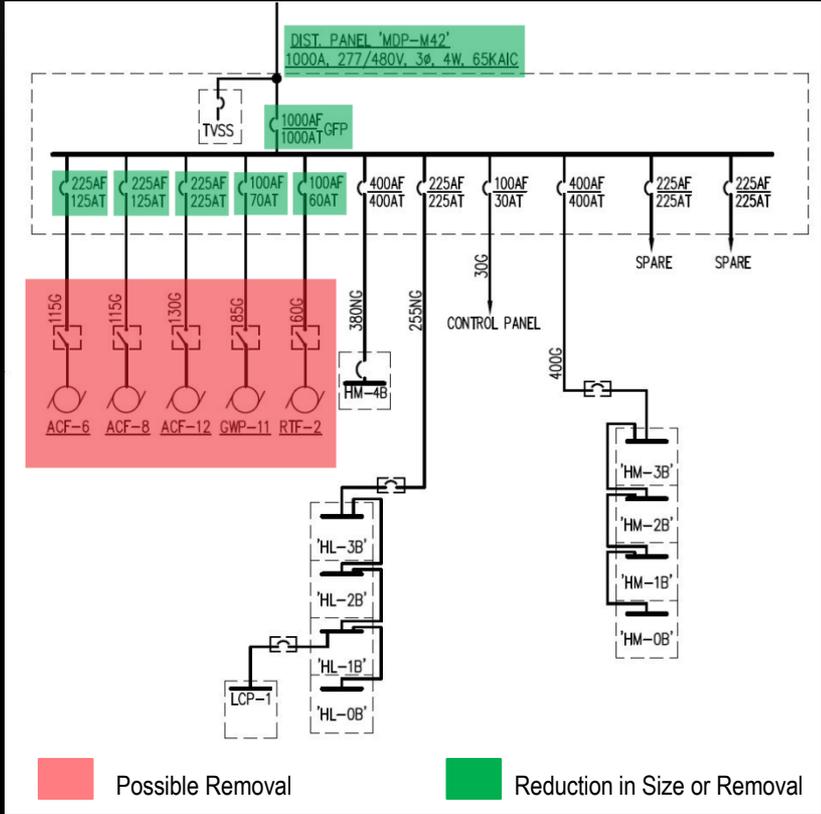
3rd Floor

- Definite implementation of Active Chilled Beams
- Probable implementation of Active Chilled Beams
- Likely area to remain on VAV system
- Fume Hood locations

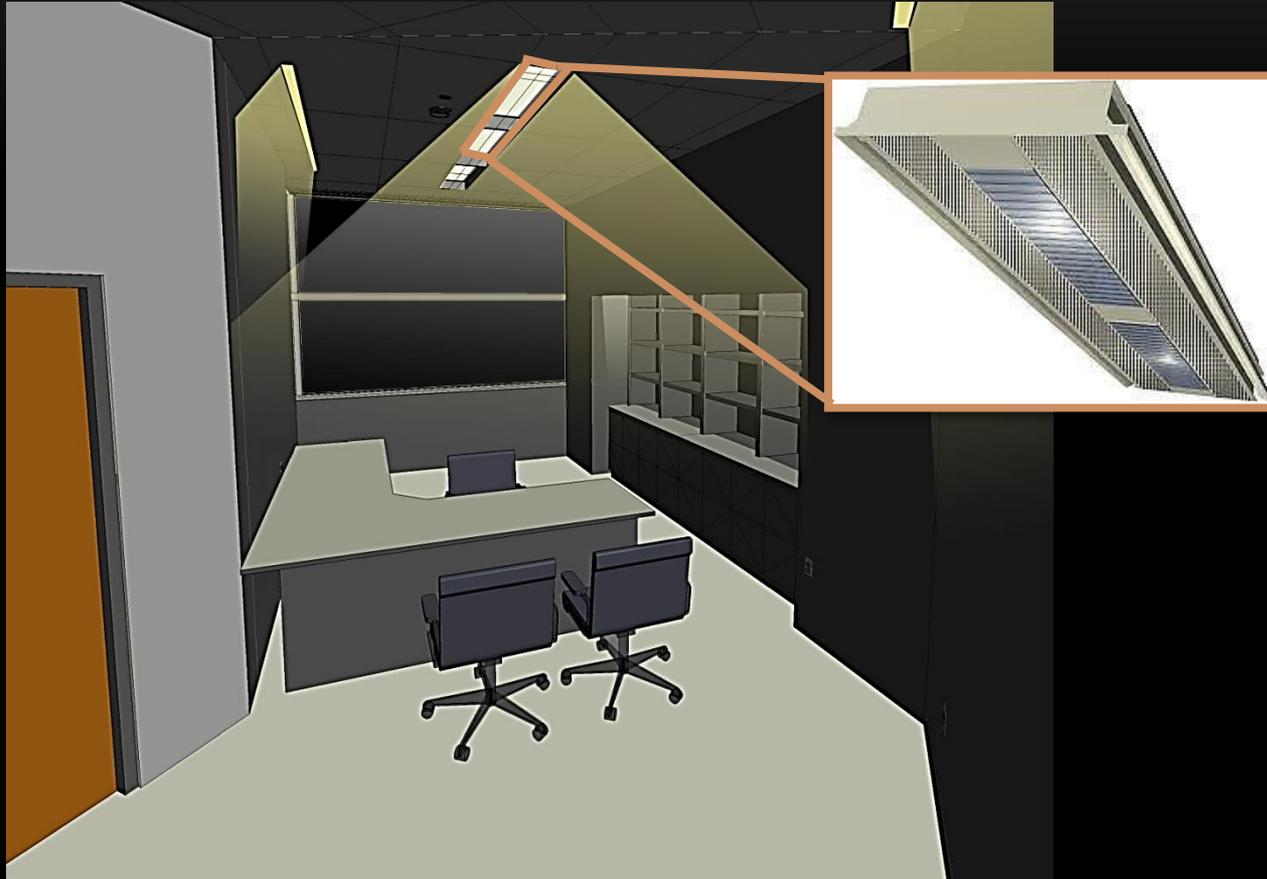
MSC energy demands are driven by fume hoods. Analyzing more efficient face velocities can decrease supply air, fan power, and ductwork sizes.

Fume Hood Size	Face Velocity	Exhaust Required	Exhaust Ductwork Size
6 feet	125 fpm	1125 CFM	14"
6 feet	100 fpm	900 CFM	12"
6 feet	80 fpm	720 CFM	12"
6 feet	60 fpm	540 CFM	10"
4 feet	125 fpm	750 CFM	12"
4 feet	100 fpm	600 CFM	10"
4 feet	80 fpm	480 CFM	10"
4 feet	60 fpm	360 CFM	8"

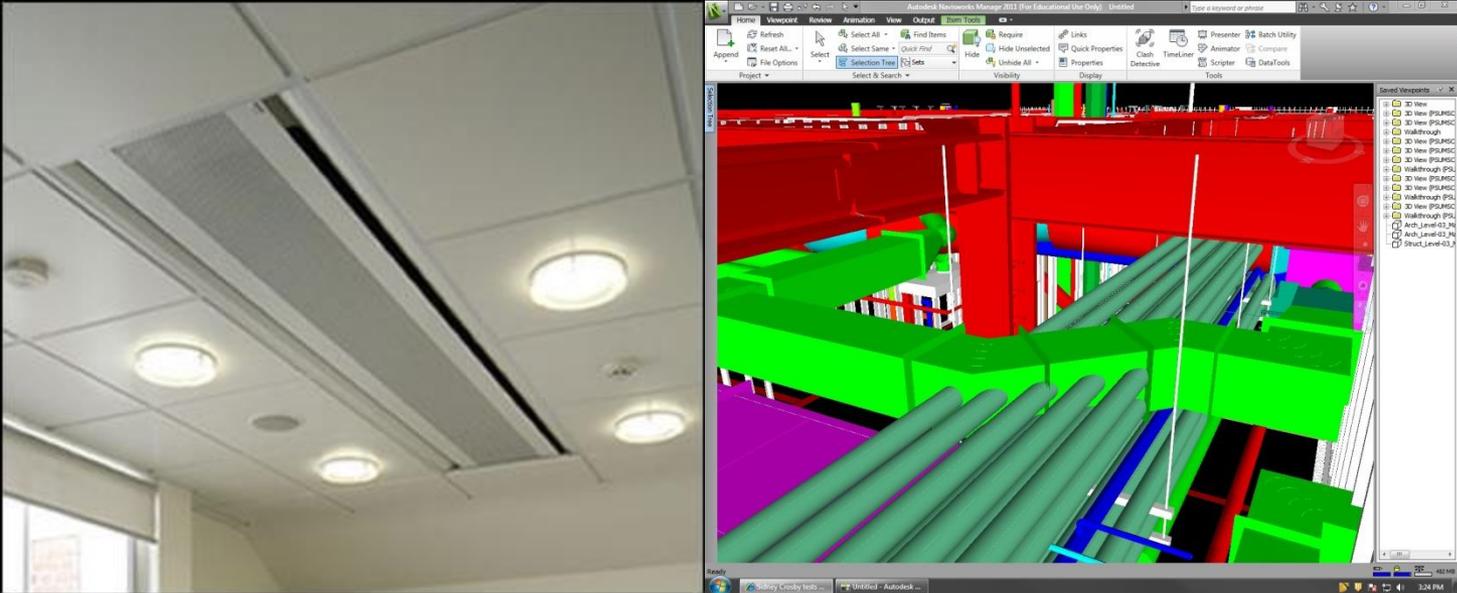
Downsizing mechanical elements allows for downsizing and consolidation of electrical equipment.



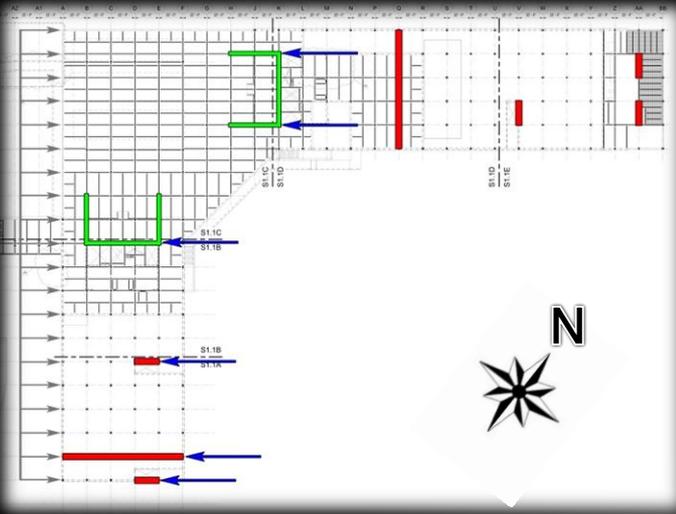
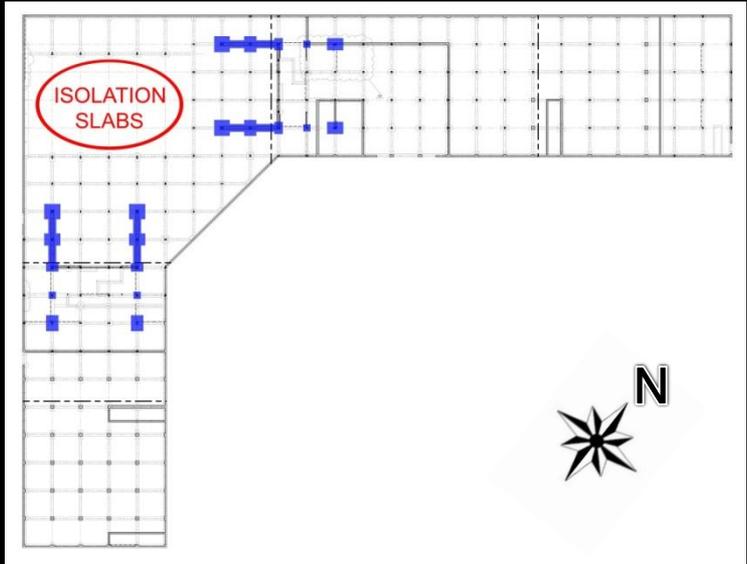
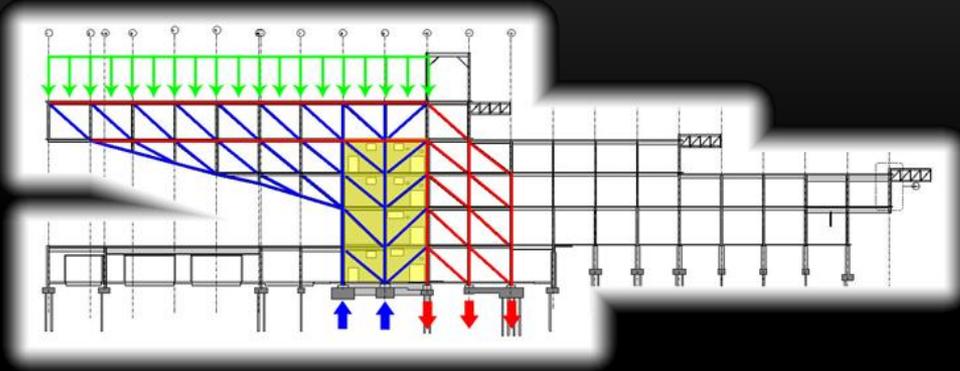
Integration between mechanical system delivery and lighting delivery can be achieved through active chilled beams.



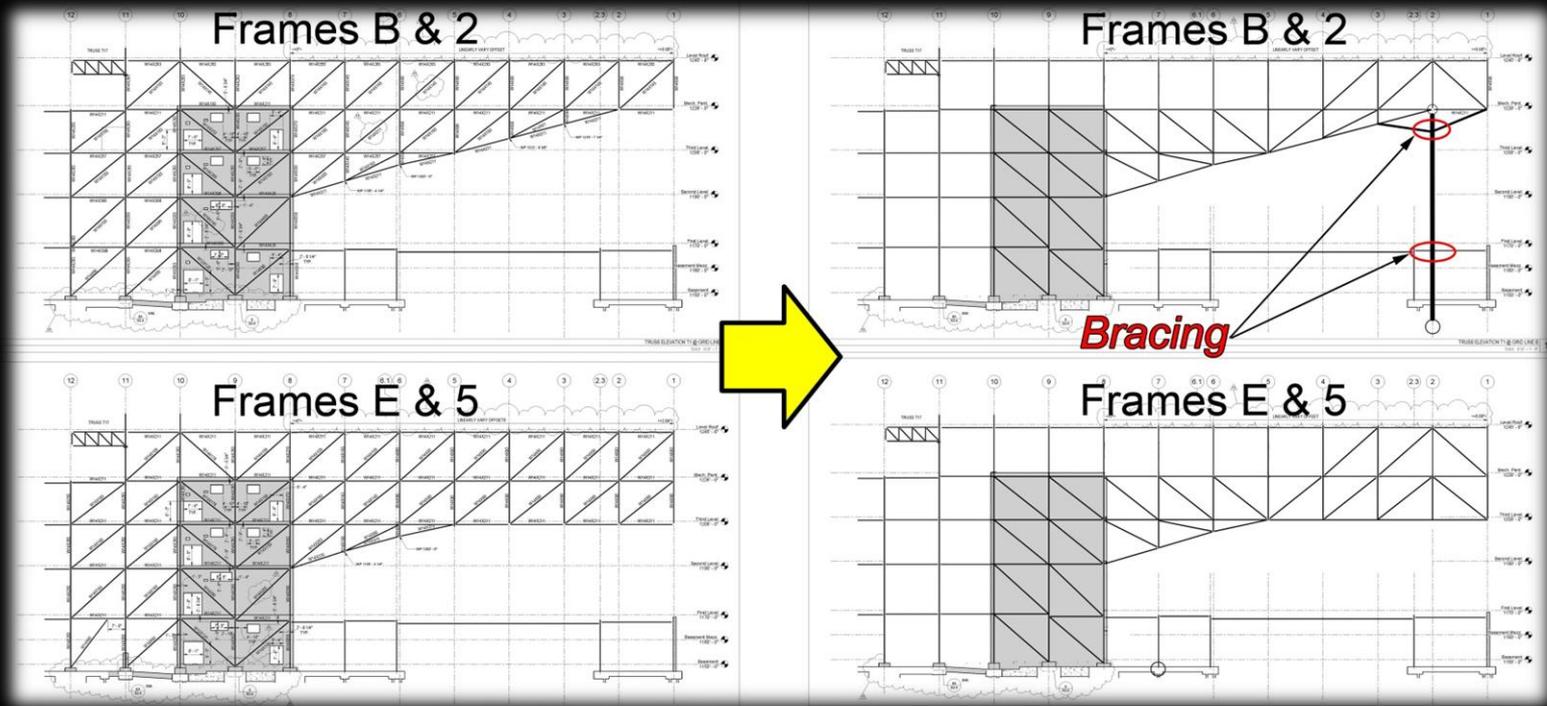
The energy focused redesign of the mechanical system will benefit the constructability of Millennium Science Complex.



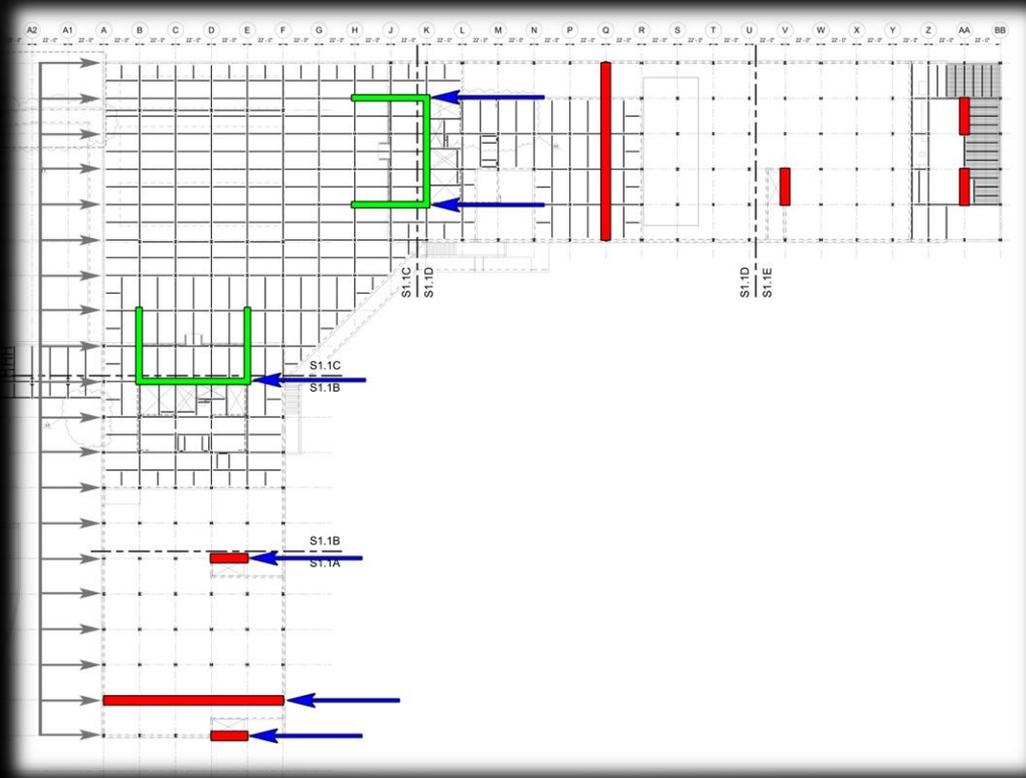
The existing structure can be divided into 3 systems: the gravity system, lateral system, and special systems.



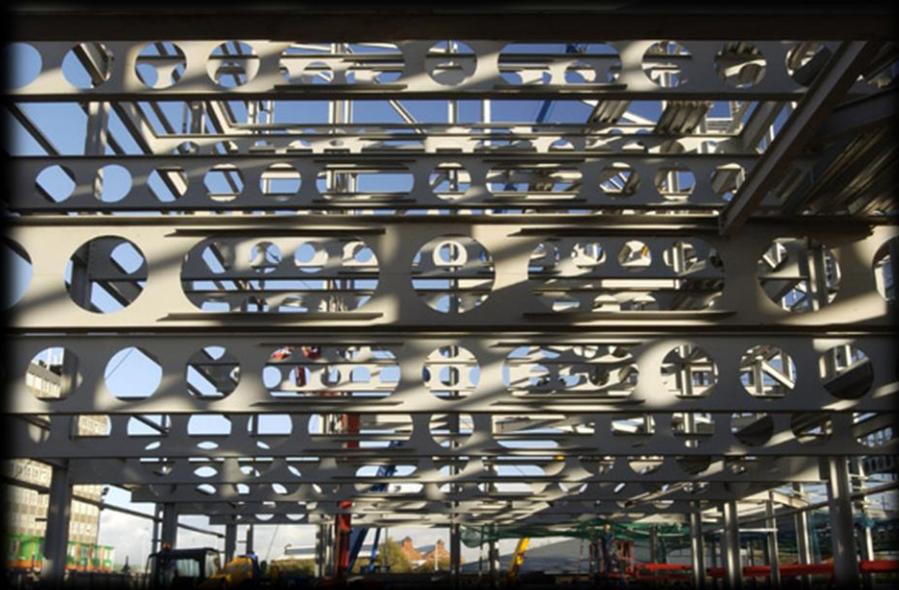
Splitting the load between two points in the cantilevered truss reduces force in its members requiring less steel and saving money.



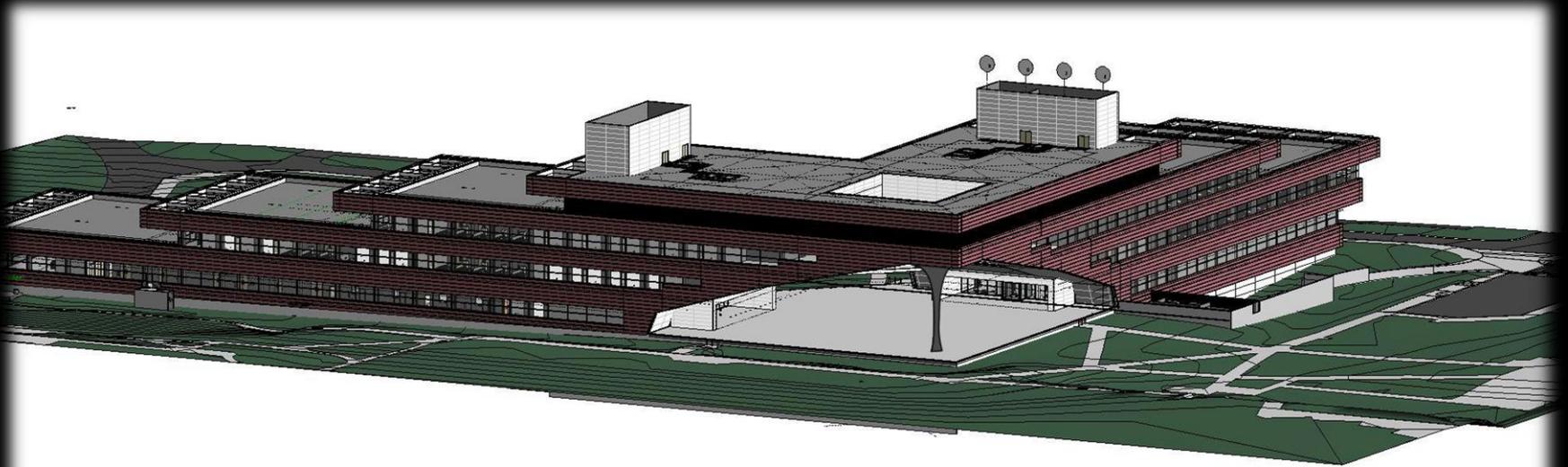
Distributing lateral forces over the entire length of each wing will reduce localized stresses in the diaphragm and prevent large drifts.



Vibrations are controlled by mass and stiffness. If stiffness is fixed, then mass must change to improve efficiency.



Inserting a column in the midst of the cantilever would provide a cost effective design while fulfilling the architectural vision.

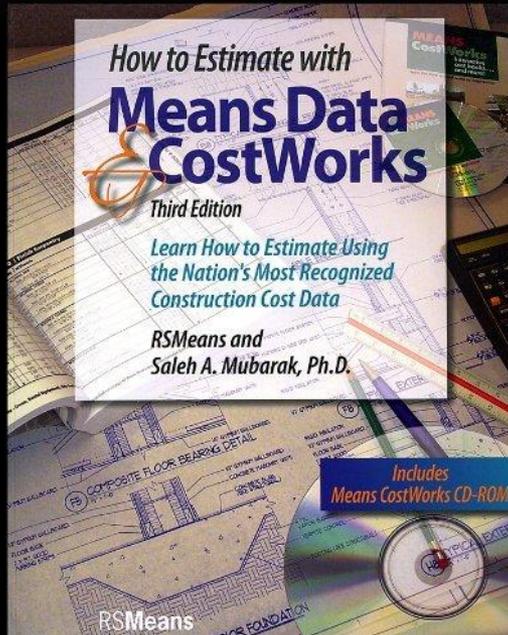


Alternative support systems for the cantilever and floor systems will benefit the constructability of Millennium Science Complex.



The cost and schedule implications of each of our design proposals will be calculated to different levels.

General



Detailed



Questions?