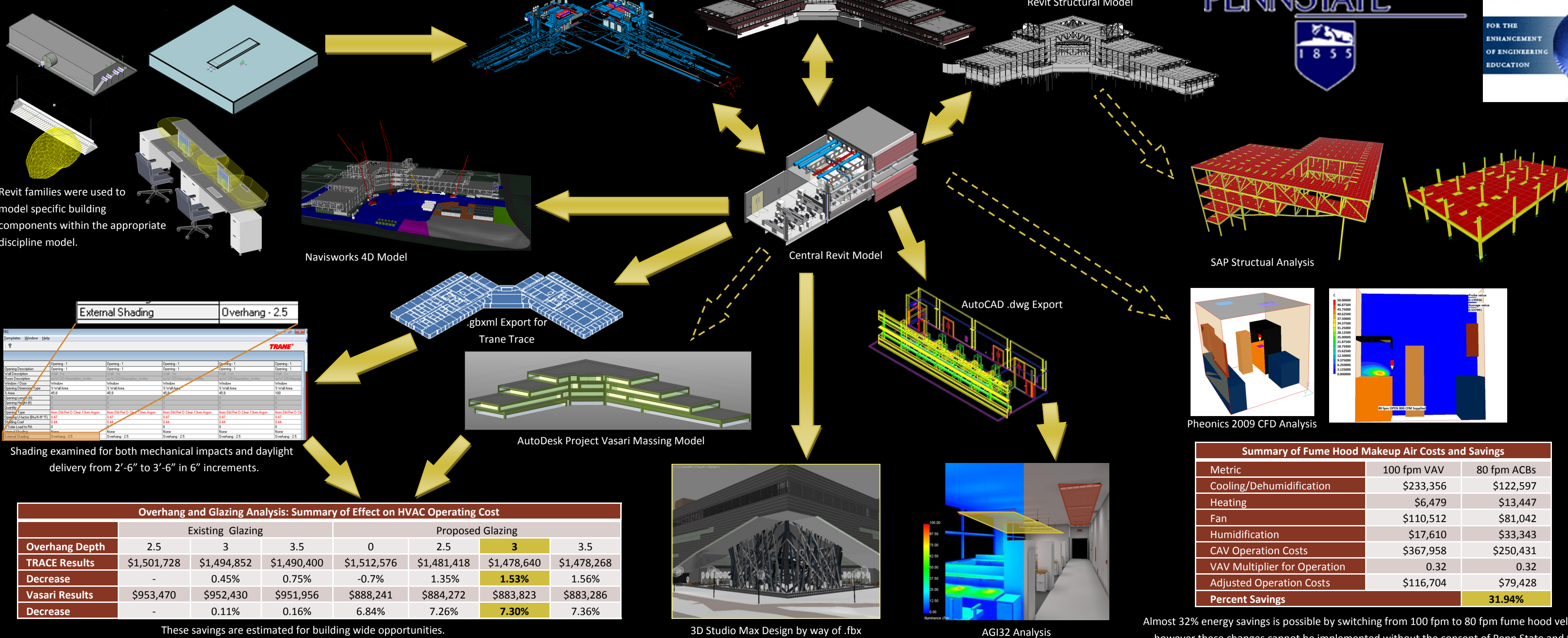
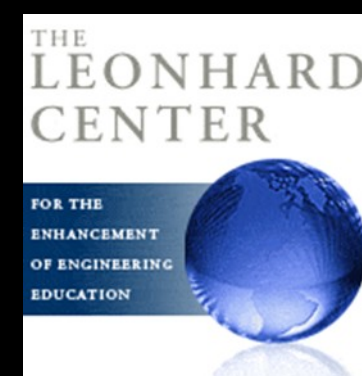


IPD/BIM Senior Thesis 2010-2011



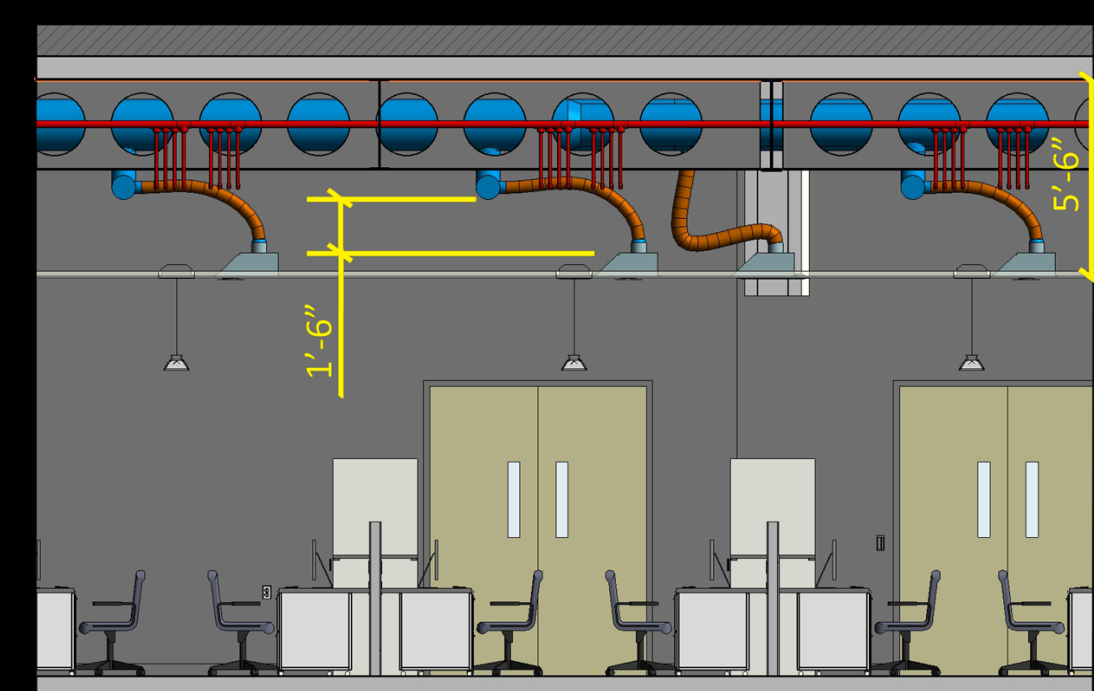
Integrated Project Delivery | Building Information Modeling

Owner | The Pennsylvania State University **Function** | Life Sciences & Material Sciences Research Facility
MEP | Flack & Kurtz **CM** | Whiting-Turner Contracting Company **Architect** | Rafael Vinoly Architects
Structural | Thornton Tomasetti **Size** | 275,600 SF



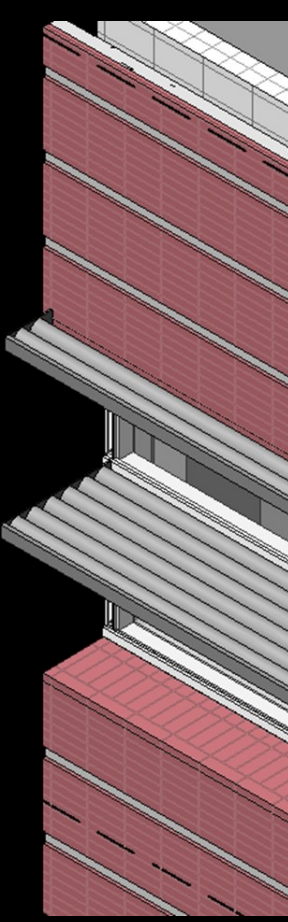
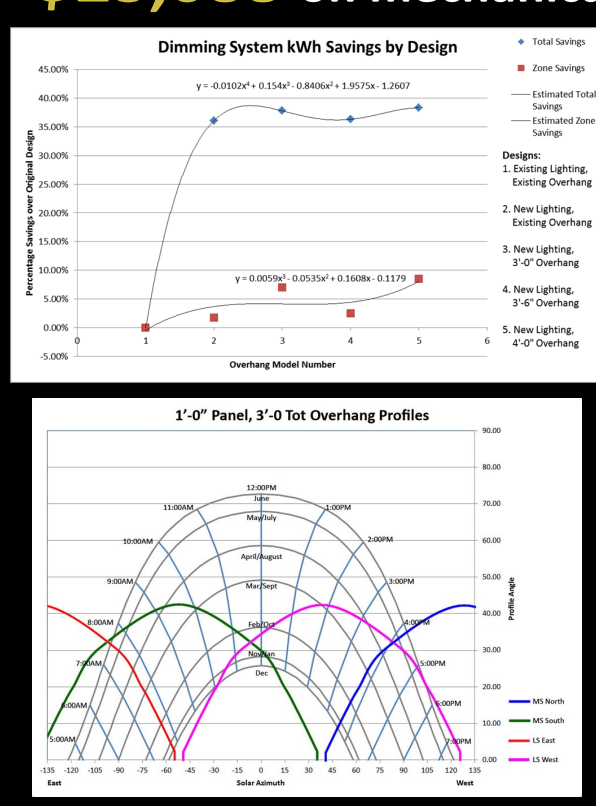
Mechanical Redesign

- GOAL: Decrease** energy consumption by **10%**
- Existing Variable Air Volume (**VAV**) was analyzed for replacement by an **active chilled beam system**
- Trox & Price** chilled beams used for the availability of **Revit** files
- The proposed chilled beam system yields and annual operating **savings of 14.1%**
- The active chilled beam system was estimated to cost **\$21,040,000**.
- The chilled beam system allowed for **coordination** with the castellated beams and **opened plenum space**



Façade Redesign

- GOAL: Modify** the façade to accommodate **multiple disciplines**
- Existing** panel **depth of 27.6"** with 2" facebrick and 6" concrete backing
- Redesign** panel **depth of 15.75"** with 1/2" facebrick and 5" concrete backing
- Reduced** the nominal **weight** of each pre cast panel
- The redesigned pre cast panels resulted in a **\$240,000 savings**
- The 3 FT overhang dimming system saved **\$46.48 per year** in lighting operational costs (6.97%) but saves in first cost with one less fixture per row of lights
- Applied building wide, the overhang saves **\$23,088** on mechanical operating costs



Structural Redesign

- GOAL: Reduce** the **size** and **cost** of the structural system
- Existing structure features a **154 FT cantilever** at the intersection of the Material and Life Sciences wings
- Labor intensive **moment connections** for cantilever were **reduced** by the redesign
- Columns inserted** beneath cantilever to provide support and to add a piece of **signature architecture**
- The **floor systems** of the Material and Life Sciences wings were replaced with **castellated beams** to **ease coordination** of the plenum space.
- Total structural system redesign **savings of \$2,300,000**

