

Renovation & Expansion of Towers Hall Dormitory



Structural • Mechanical • Geotechnical

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Senior Design 2013
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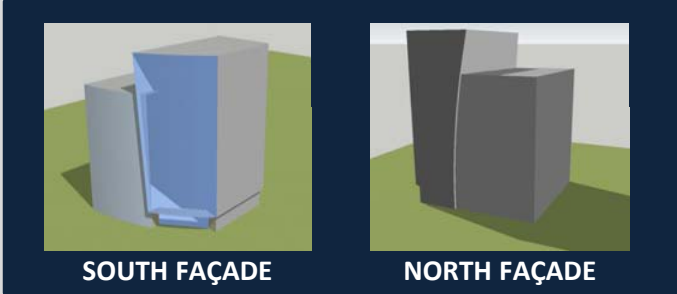
Problem Statement

A survey of Towers Dormitory's interior and exterior revealed a building that provided poor living conditions and had aesthetics inconsistent with Drexel's Strategic plan. Analysis of the University's student population and projected growth over the next decade showed that there will be a dire need for additional student housing. Our goal was to design a solution to both of these problems.

Existing Conditions



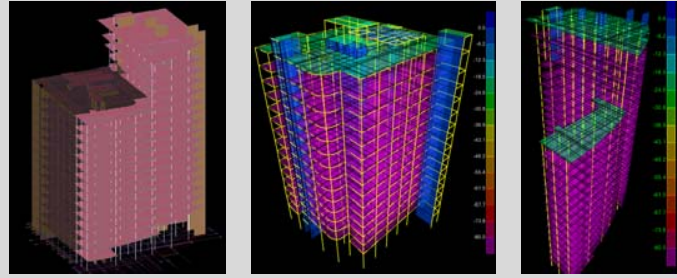
Architectural Design



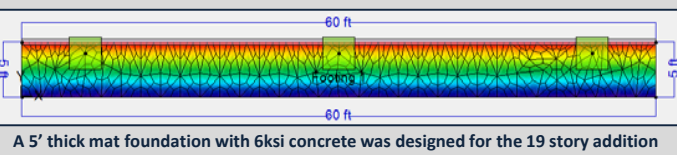
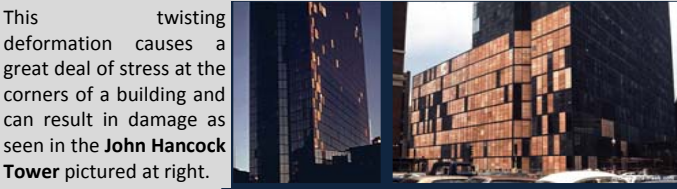
	EXISTING	PROPOSED	INCREASE
GROSS SF	127,000	260,000	105 %
EXTERIOR FACE	360 LF	500 LF	40 %
BEDS	624	1,085	74 %

Legend	Description
Blue	ROOMS
Green	BATHROOMS
Yellow	AMENITIES
Red	CIRCULATION
Purple	VERTICAL TRANSPORTATION
Orange	MECHANICAL SHAFTS

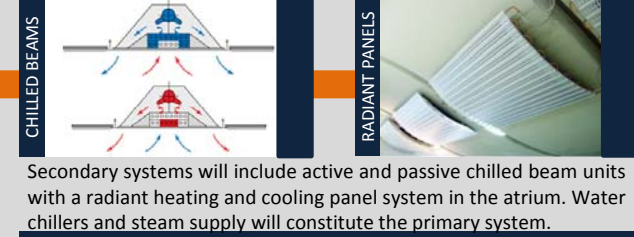
Structural Design



Due to differential stiffness, the addition was observed to deform in a twisting motion about the existing building. Walls and beams were added and removed in an iterative process until the problem was remedied.



Mechanical Design



Secondary systems will include active and passive chilled beam units with a radiant heating and cooling panel system in the atrium. Water chillers and steam supply will constitute the primary system.

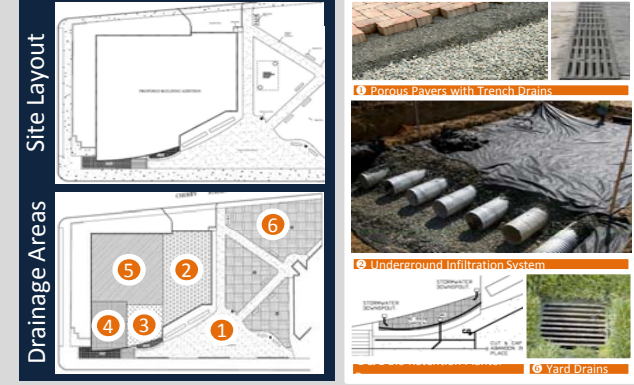
Sustainable Features

- Reduce Sunlight by up to 90%
- Reduce Solar Heat Gain - 2.5 times
- Unrestrictive View
- Zero Maintenance

Low emissivity double pane glass that has a 1/2" space between panes filled with argon gas will reduce cooling needs in summer and heating needs in winter.

TRACE 700 RESULTS	Sensible (Btu/hr)	Latent (Btu/hr)	Total (Btu/hr)	Delta (Btu/hr)	Reduction
Baseline Cooling Load ASHRAE Compliant:	4,055,000	1,550,000	5,605,000		
Proposed Cooling Load Sustainable Features:	3,000,000	1,425,000	4,425,000	1,180,000	21%

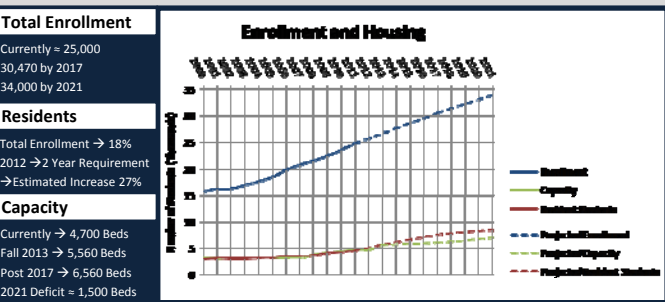
Site Design



Schedule & Budget

Task	Total Hours	Billable	Remaining
Preliminary Design	300	\$34,500	\$0
Select Systems	350	\$41,000	\$0
Design Systems	320	\$36,800	\$0
Model Systems	1000	\$115,000	\$0
Final Design	400	\$0	\$46,000
Totals	2380	\$228,000	\$46,000
Total Project Design Cost			\$274,000
Total Construction Cost			\$69,726,000
Overall Project Cost			\$70,000,000

Strategic Plan



Design Options

