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Rethinking Bexley Hall

Background:

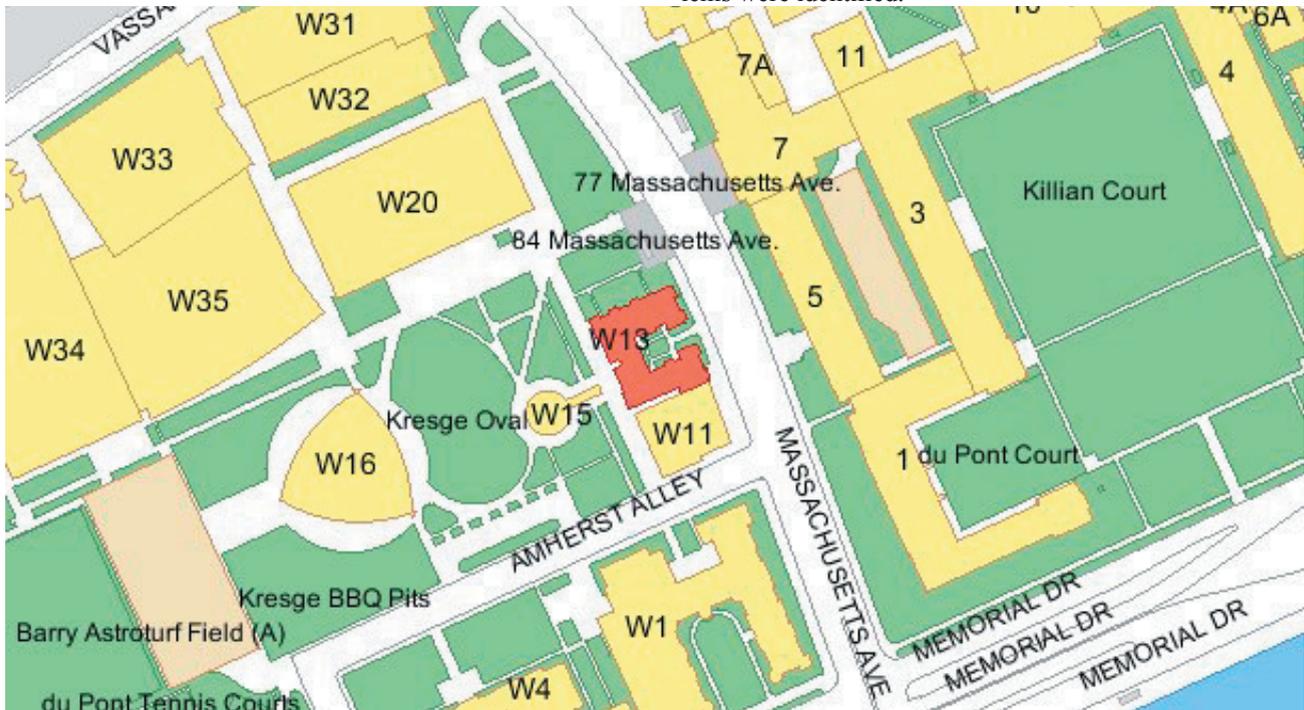
In 1939, MIT purchased an apartment building on Massachusetts Avenue and renamed it Bexley Hall. Today, Bexley is home to about 120 residents organized in to suites of 2 to 4 people. While renovations have occurred over the years, certain comfort problems still persist in the dorm. The goal of this paper is to propose design solutions that could be easily and economically retrofitted into an old building.



The site:

Bexley Hall is located at 50 Massachusetts Avenue. The room that I have concentrated on is a third floor, west facing room.

After a series of informal interviews with students, the house manager and housing staff, several common problems were identified.





Radiators:

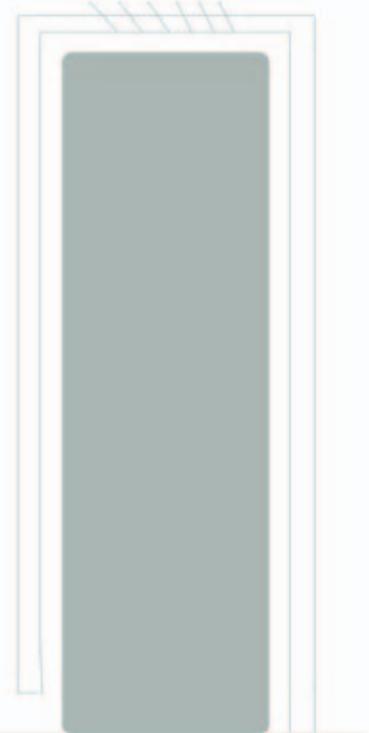
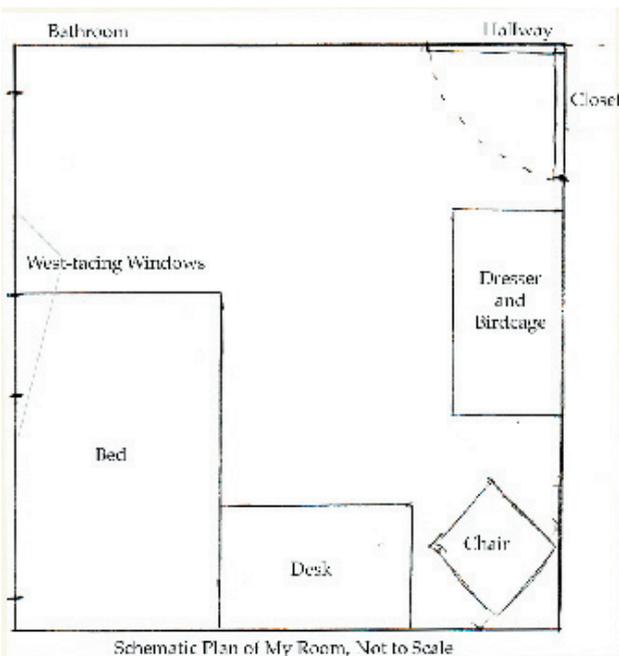
Steam powered radiators heat Bexley. The radiators can only be set to high or off. Anything in between leads to significant leakage and ceiling damage. While the building is too cold to leave the radiators off, the high setting is far too warm. As a solution, most residents leave the heaters on high with their windows open. Rough calculations show that the radiators are providing about 10 times as much heat as needed.

Design Challenge:

The building is too old to warrant installing a new system. How can residents gain more heating control to maintain comfort while saving energy at the same time?

Solution:

An insulated enclosure of one inch thick high density fiber glass could be built around the radiator. An opening at the bottom and adjustable vents at the top would allow personal heating control.



Right: Insulated heater. Adjustable vents provide personal heating control while an opening at the bottom allows air flow.



Windows:

Two 3x6 feet windows are located on the west wall. The windows provide enough light during that day, so that artificial lighting is rarely needed. However, bright afternoon sun causes glare on monitors. So, a shading device that allows sufficient day lighting while blocking glare is desired. However, at night, shade is needed to block out the lights from Kresge, while allowing air flow for natural ventilation.

Solution:

1. Removable window film: If this were installed on the top half of the bed window, it would decrease afternoon glare on the computer screen while maintaining day views.
2. Knitted all-weather polyethylene fabric: This material blocks 90% of UV light, while allowing diffuse lighting and ventilation. However, this material would be able to provide suitable shading at night.
3. Hybrid shade: The top half would be a polyethylene shade, while the bottom half would be the current opaque white shade. This would solve the night shading problem, but would decrease ventilation and lack flexibility.
4. Double layer shade system: This design would block light while allowing ventilation. Materials could vary by need for shading and ventilation. An accordion style shade would also increase flexibility.



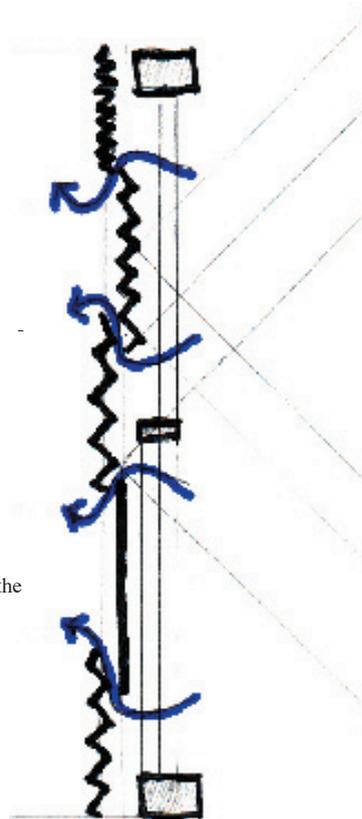


Lighting Fixtures:

A single fluorescent light is currently installed in the center of the ceiling of each room. Lighting fixtures that are pleasing, yet efficient with direct task lighting and improved indirect lighting design is desired.

Solution:

Fluorescent lights are generally about 20% efficient as opposed to incandescent's 5% efficiency. There are three basic types of fluorescent lights. In preheat fluorescents, there is a significant delay between turning on the circuit and light production. Instant-starts provide sufficient voltage to the cathode to produce immediate light. Rapid-start fluorescents continuously heat a low-resistance cathode. As a result, light is produced in 1 to 2 seconds. The latter is the most commonly used and a good choice for our purposes.



Right: Double layer design blocks light while allowing ventilation.

Accordion-style, segmented shades introduced greater flexibility.

Varying the transparency levels of the material also enhances flexibility.

For task lighting, direct lighting is preferred to indirect lighting. To reduce glare problems, blocking direct site lines is desirable. Installing small desk lamps or mounting lighting fixtures under shelves are both good solutions. Indirect lighting can be used for general ambient lighting. Again, blocking direct views to reduce glare improves comfort levels.

Other Design Challenges:

Natural Ventilation:

Attention has already been given to bringing air in through the windows. When the door is open, cross ventilation provides pleasant airflow, sufficient enough to cool the room on most warm days. However, when the door is closed (most often during sleeping hours), the room is significantly less comfortable. A possible solution would be to install a vent above the door. However, this vent would probably need to be acoustically treated since there is significant noise level in the hallway at most hours.

There are also several other acoustical problems. The room borders a hallway and bathroom, along with the alley—where there is trash collection every morning. Most residents interviewed would like to have lower noise levels, but would not trade outdoor views. If acoustical paneling were installed in the room, this would decrease the reverberation time in the room, which would also increase the noise reduction. Additionally, white noise machines could be installed.

Conclusion:

On a campus where construction projects are big, and the architects bigger, it is still possible to make fixes that are simple, economic and sustainable.

Future steps for this project should include an in depth analysis of the cost of materials and installation compared to the financial savings resulting from the renovations.

Additionally, more formal interviews could be conducted to prioritize the renovation needs. With this information, a test room should be started.