Executive Summary

The Multipurpose Health Science Center (MHSC) is a new, state of the art medical facility within the heart of Philadelphia. The great urban location comes with a primary shortcoming: lack of space, which has prompted the owner to express need for a significant program expansion including the addition of green space; thereby requesting an in-depth architectural, green roof, and structural investigation.

Architectural Breath

By analyzing the existing architectural conditions, a building mass, typical floor plans and framing layouts were created which successfully met the 126,000 sf program requirement at 83% efficiency. Finally, an egress checked insured that the adequate size and number of exits were present to insure the safety of the building's 6,000 potential occupants.

Green Roof Breath

The green roof will be a dual intensive and extensive system with a 1400sf accessible garden above the library, with an extensive green roof system covering the remaining 4800 sf of roof. This breadth will show that the $49,871 cost for the intensive roof is only 0.03% of the total $150 million budget. It becomes clear that the green roof is a very feasible addition to the budget, especially when long term cost reductions in storm water treatment and energy consumption are considered.

Structural Depth

The structural system had to not only meet the strength and serviceability requirements of the new design, but to do so as efficiently as possible. Extensive computer modeling of the lateral and gravity system was used to meet these design criteria, which was verified by even more extensive manual checks.

One element of the lateral system design was an attempt at creating a more efficient system by eliminating existing moment frames and replacing them with braces frames. After dozens of design iterations in RAM, a check using STAAD, and multiple hand calculations, a finalized design was made which not only met the 8.8" drift limit and resisted the 2300kip wind load, but also decreased the frame cost relative to the square footage by 6%.

In-depth hand checks of the gravity system verified the computer modeling data, provided further evidence of the design's effectiveness in addressing the program requirements.

Lastly, a vibration analysis for sensitive equipment was made, which demonstrated that the floor system is adequate for less sensitive equipment and procedures, such as microscopes with 100x magnification and surgery. This may meet the university's needs; however, a redesign would be required to accommodate more sensitive equipment.