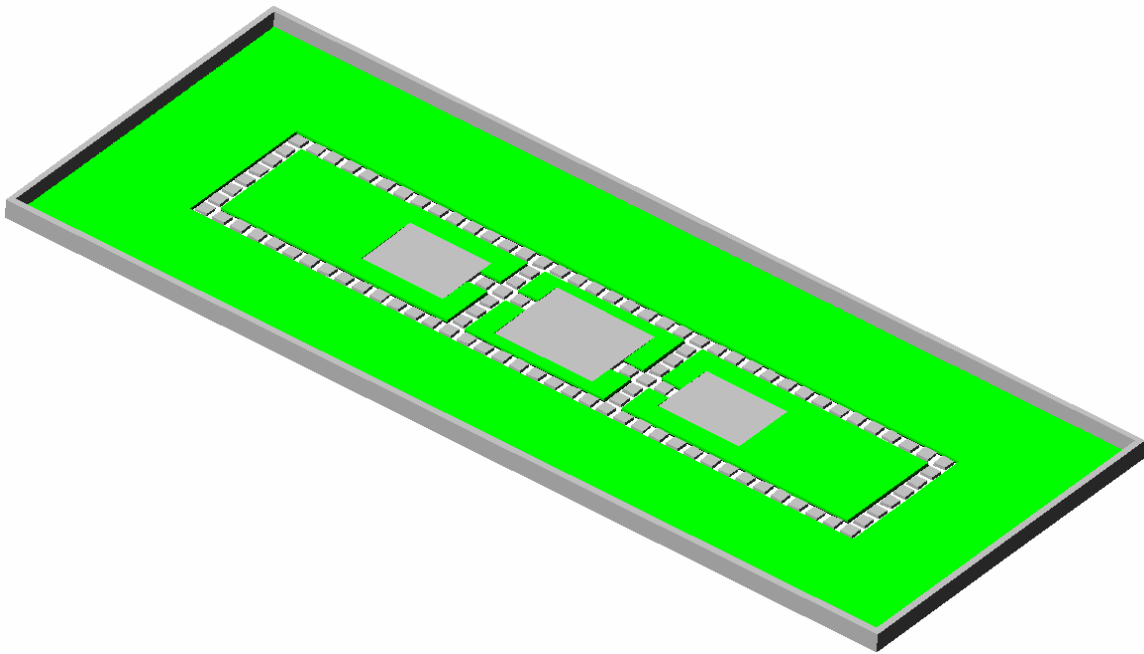


MECHANICAL SYSTEM

Two breadth topics have been chosen to enhance other aspects of the building design. They include (1) a redeveloped mechanical system with the aid of a green roof and (2) a cost analysis to compare materials, scheduling, and project delivery. These two particular research areas were desired to be incorporated with the proposed structural redesign to develop a LEED building package. The main focus is to promote a safe and sustainable building that will be beneficial to the owner, occupants and the environment.

Improved Mechanical and Plumbing System

A revamped mechanical system with the aid of a green roof will provide the owner with a more efficient HVAC system, low energy costs, and an incentive to provide a sustainable building system to the surrounding community. The focus of this redesign is the application of a green roof. There are many benefits to placing vegetation on the roof of a building. The cooling costs can be reduced from 20-70% per year, stormwater is management, and the enclosure thermal efficiency is increased. The design will have grass flats placed on the entire roof with three mechanical pads for equipment and concrete pavers for maintenance personnel to walk on roof. The structural floor system will need to be designed to support the equipment and fully saturated soil and vegetation.

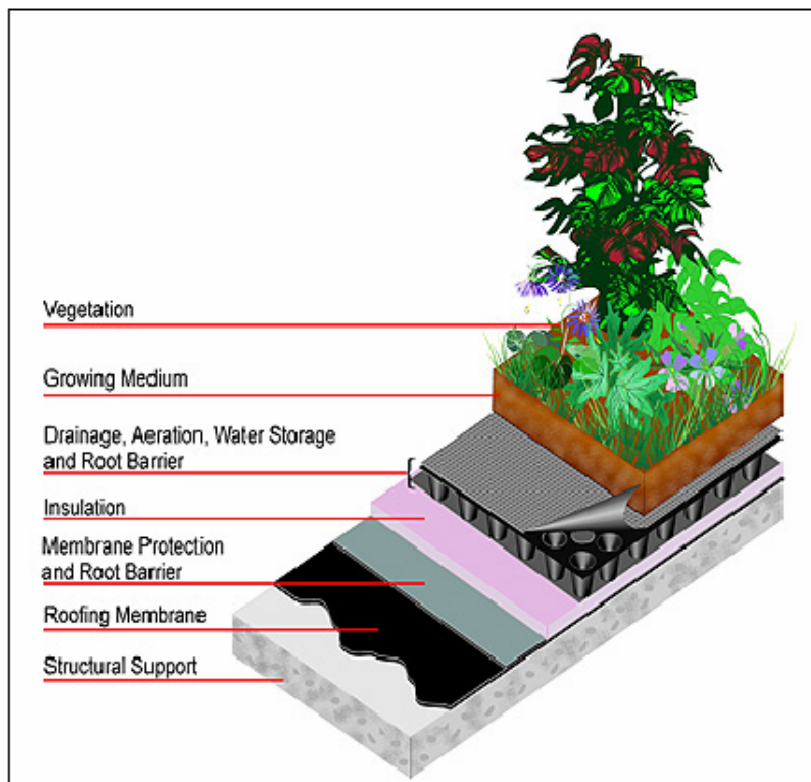


The main idea of the redesign is to collect rainwater and distribute it into the building as grey water to be used as flushing water in toilets and supply water for washing machines. The vegetation will absorb, filter, and drain the rainwater into a main

collection tank within the lower level of the structure where it can be mechanically filtered and supplied to the wash facilities in the commercial and residential spaces. Research has shown that 30% of fresh water supplied to a building is used to flush toilets and in washing devices. Since the water system will already incorporate a filtration system the fresh water that is discarded can be routed into the roof drainage lines and be recirculated back into the system. This large percent can be very efficient to the owner's water supply cost.

A benefit to the surrounding community is the stormwater management. The HUB is placed in a historic section of the city with an out dated street drainage system. By collecting the water from the building's impervious footprint the local community can reduce the amount of water running into the local streets to avoid possible flooding and pollution.

The green roof also makes the upper levels more efficient in cooling and heating months. The increased thermal performance of the roof allows the units below to maintain a stable indoor air temperature and quality that eliminates the need for constant mechanical adjustment. In effect, less energy is used in the entire building lowering costs each year and through the life span of the whole building.



Green roof cross-section
(Source: [American Wick Drain Corp.](#))