

DAYLIGHT DISTRIBUTION + CONTROL

The atrium and skylight bring light deeper into the building. Advanced lighting controls, such as daylight dimming, enhance the quality of the space as well as conserve energy.



ENERGY SAVINGS

The building's design and systems include energy efficient features with a predicted **41% energy cost savings** compared with a code compliant building per ASHRAE 90.1-2007 Appendix G.



WINDOW REPLACEMENT

New replacement windows and doors are installed at all exterior locations to provide superior thermal performance.

Replacement windows and doors utilize insulated glazing with low-e coatings and thermally broken frames to ensure energy savings and reduce chance of condensation. Replacement assemblies have been tested in place to ensure minimal air infiltration.



WATER USE REDUCTION

Low-flow plumbing fixtures and automatic sensor faucets installed with a predicted **34% water use reduction** when compared to the Michigan Plumbing Code.



STORMWATER MANAGEMENT

The existing courtyard area had a cistern connected to the sanitary sewer system. This was abandoned and replaced with four underground infiltration basins at the east, west, south, and southwest sides of the building. The underground infiltration beds consist of bottomless arch chambers ranging in size from 30"x51" to 60"x100". These storage and infiltration areas, along with surface permeable pavers and porous asphalt, store, infiltrate, and recharge the groundwater for rain events up to a 100-year storm event. In addition, during large rain events, the southwest infiltration basin infiltrates storm water that backs up from the Diag storm sewer system.



MATERIALS

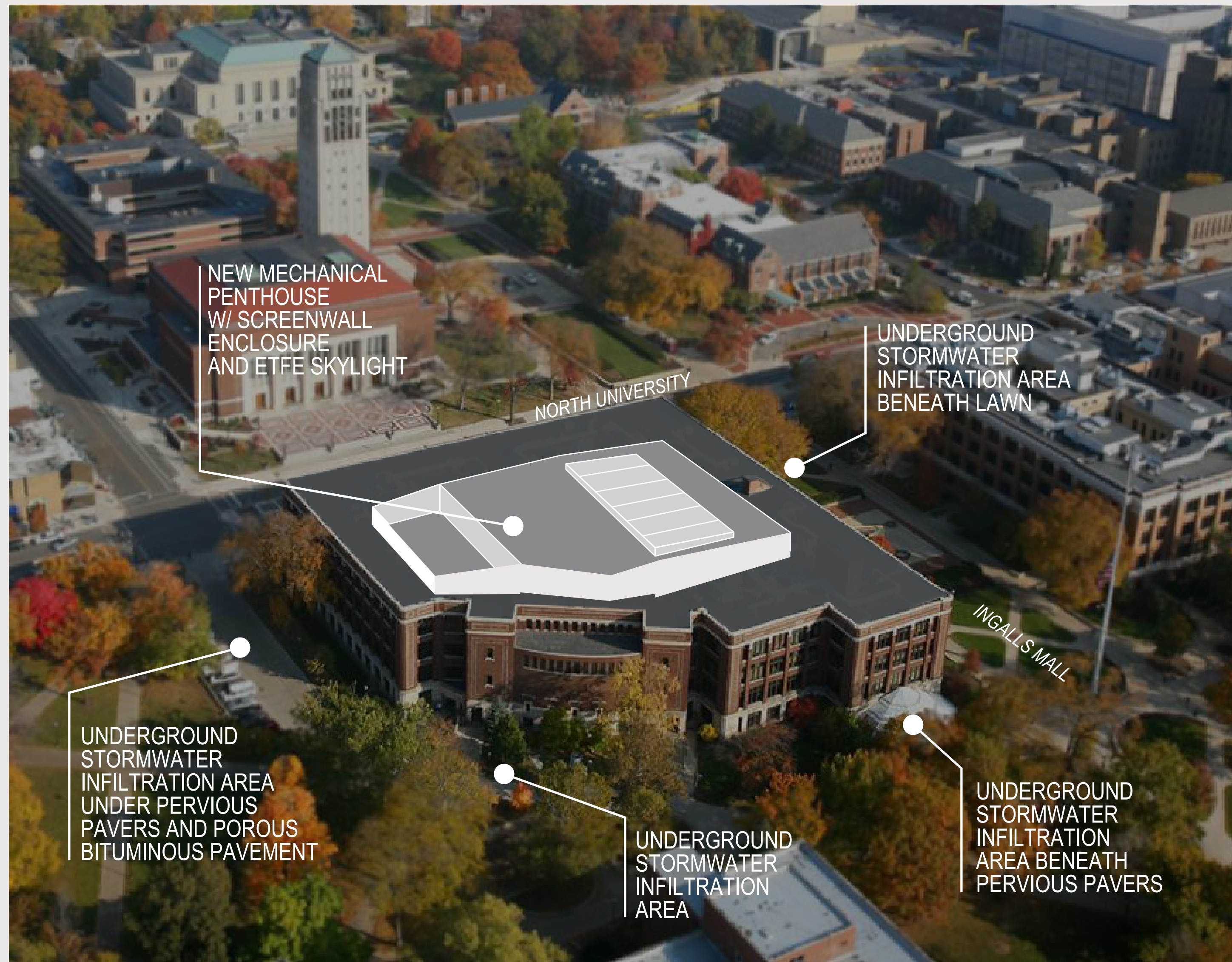
Specifying environmentally-responsible materials has a positive impact on building occupants, the building industry, and earth's natural resources.

- Steel used in new addition structural frame is 90% recycled material
- Fly ash or slag in new concrete floor slabs is recycled material
- Rubber flooring manufacturer maintains a green purchasing program that supports managed natural rubber plantations and minimizes the impact of natural resources
- New carpet, cushion and adhesive products have been tested for VOC (volatile organic compound) emission and are among the lowest emitting in the market.



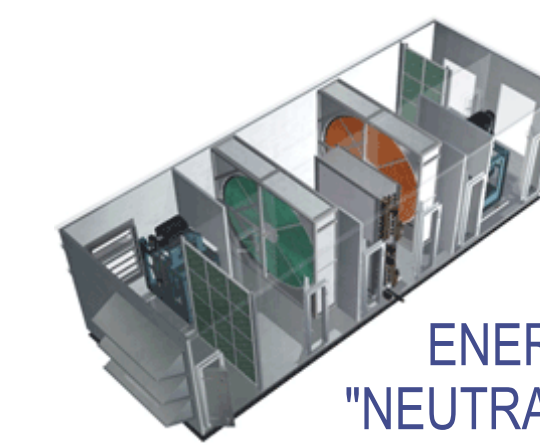
LIGHTING REPLACEMENT

LED lighting with occupancy sensors throughout the building, and daylight controls help reduce the building's electrical energy usage. Existing entrances will feature historic fixtures retrofitted with LED lamps. Existing fluorescent and incandescent fixtures will be replaced with new LED fixtures / lamps.



HIGH PERFORMANCE HEATING, VENTILATION + AIR CONDITIONING

Heating will account for roughly 35-40% of the building's anticipated energy use, while lighting and equipment combined account for another 35-40%.

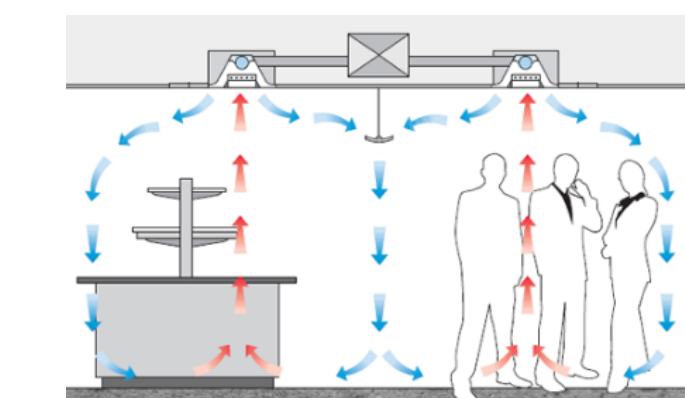
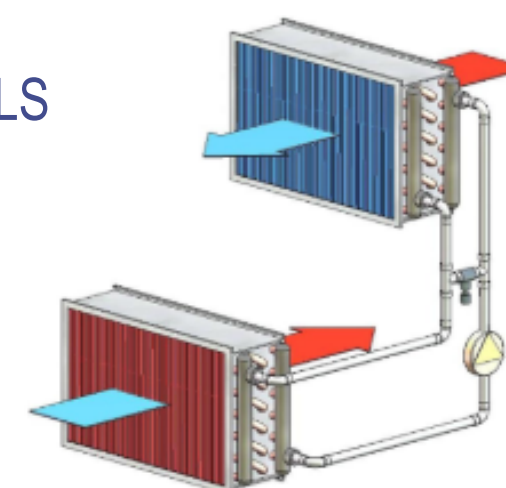


DUAL-WHEEL ENERGY RECOVERY: "NEUTRAL AIR"

- Energy wheels transfer heat and moisture between outdoor and building air streams limiting the need for energy-intensive mechanical conditioning, while maintaining acceptable indoor air quality.
- Reduces heating energy by 50% compared to a standard HVAC System by drastically reducing "reheat" energy.
- Reduces airflow requirements by nearly 60% as compared to a standard HVAC System.

ENERGY RECOVERY COILS

- Recovers heat from laboratory fume hood exhaust and vivarium exhaust and pre-heats or pre-cools outdoor air serving the vivarium.



CHILLED BEAMS

- Chilled beams are room air recirculation devices that transfer sensible heat to and from the space using water. The air terminal is equipped with a modulated flow cooling coil and allows for both supply air from connected ductwork and induced air from the space to pass over the cooling coil and provide efficient temperature control of the space.
- When coupled with the neutral air system, inefficient space reheat is eliminated.

Sustainability Facts

Edward Henry Kraus Building / Renovation + Addition	
Building Use	School of Kinesiology Building
Location	Ann Arbor, Michigan
Size	218,750 SF
Number of Occupants	3,242
LEED version	v2009
LEED certification level	Gold
ASHRAE 90.1 version	2007
Energy cost savings compared to ASHRAE baseline	41%
Total energy savings	\$288,131 / year
Total electrical savings	1,339,547 KWh / year
Total gas savings	218,715 Therms / year
CO2 emissions avoided	2,104 metric tons / year
Water fixture baseline	2012 Michigan Plumbing Code
Total water savings	34%
Insulation (R-Value)*	Project
Penthouse Wall assembly - above grade	22
Wall assembly - below grade	n/a
Roof assembly	25 minimum
Glazing - Storefront System	
U-value**	0.40
Solar Heat Gain Coefficient (SHGC)**	0.39
Glazing - Fixed assembly	
U-value**	0.40
Solar Heat Gain Coefficient (SHGC)**	0.39
Glazing - Visible Light Transmittance (VT)***	70
Project Team	
Owner	University of Michigan
Architect	Ballinger / TMP
Engineer	Ballinger / Beckett & Raeder
Construction Manager	Wallbridge
Commissioning Authority	UM AEC
Project Management	U-M AEC
Design Period: 2016-2018	
Construction Period: 2018-2020	
* The higher the R-value the better the insulating quality	
** The lower the U-value and SHGC the more energy efficient the window	
*** The higher the VT value the more daylight in the space. VT is measured between 0 and 1	

