# Biannual Sustainability Report

# Projects $5 Million and Over

**August 2013**

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# Active Projects

August 2013

## Central Power Plant Feed Water System Deaerator Upgrade

**Project Description**

The Central Power Plant (CPP) provides steam for the heating and cooling of many buildings on Central Campus, and also uses the steam produced to generate electricity. This co-generation allows for a very efficient operation and the Environmental Protection Agency has recognized our efforts in efficiency, fuel energy savings, and greenhouse gas emission reduction. The CPP's feed water system includes deaerators that remove oxygen from water as part of the steam generation process. This project will replace two 1940's deaerators with two modern deaerators meeting current industry standards. An existing decommissioned boiler will be removed, including abatement of lead and asbestos, to provide space for the new system. The new equipment will yield higher-quality water and increase boiler system efficiency, reliability, life expectancy, and redundancy. It will also result in reduced boiler corrosion, component failure, and maintenance.

**Energy Efficiency Measures**

- Reduce GHG emissions by improving plant steam-generating efficiency. The new deaerators will produce improved feedwater quality, to keep boiler surfaces clean and free from corrosion and scaling; thereby improving heat transfer; resulting in less fossil fuels used to generate the steam.
- Reduce use of water treatment chemicals. The new deaerators will use mechanical methods to improve oxygen removal from the feedwater, thereby reducing the need to use oxygen scavenger chemicals. The improved feedwater quality will also help reduce the need for use of anti-scaling chemicals.
- Improve Controls. The updated deaerator monitoring system and controls will also help plant operations maintain the highest plant performance, minimize potential inefficiencies or upsets, thereby minimizing use of fuels or production of GHGs.

**Other Sustainability Features**

- All hazardous materials that remain on or within Boiler 5 will be properly remediated and disposed of.
- The improved feedwater quality will help extend the useful life of all plant boilers, thereby reducing the amount of future materials and energy that would be used for replacement parts and system components.
- A number of the existing Boiler 5 support steel columns and beams have been incorporated into the new deaerator support system, thereby re-purposing them, and reducing the amount of waste materials that would otherwise have to be sent to a landfill or re-cycle center.

**Project Data**

- Budget: $5.75M
- Schedule: Completion scheduled for Fall 2014
- Square Feet: N/A

**Status as of August 2013**

- Project Status: Construction
- Design Complete: 100%
- Construction Complete: 15%

## Clements Library Infrastructure Improvements and Addition

**Project Description**

The comprehensive renovation will update the building infrastructure in a manner that utilizes historic preservation techniques. Infrastructure updates will include accessibility improvements; heating, ventilation and air-conditioning systems; plumbing, electrical, fire detection, suppression, and security systems; and exterior restoration to protect this legacy building. In addition, we plan to construct an underground addition of approximately 7,500 gross square feet that will house portions of the library's collection and mechanical equipment. Although there will be a temporary loss of some adjacent parking spaces during construction, there will be no permanent impact on parking from this project.

**Energy Efficiency Measures**

- Improved building envelope for renovated area including additional wall insulation on the basement level walls, additional insulation on the replacement roof, refurbished glazing systems, and new interior storm windows throughout.
- Reduced lighting power density and added occupancy sensors throughout the renovated areas.
- Lower velocity ductwork and AHU components where feasible to reduce pressure drop and fan horsepower.
- Occupancy sensor tie-in to VAV boxes where appropriate.
- Desiccant dehumidification vs. standard cool/reheat system.

**Other Sustainability Features**

- Low flow plumbing fixtures
- Material with recycled content
- Low VOC emitting materials and adhesives
- FSC Certified wood materials

**Project Data**

- Budget: $16.8 M
- Schedule: Completion scheduled for Summer 2015
- Square Feet: 7,500 gross sq. ft. addition
  17,248 gross sq. ft. renovation

**Status as of August 2013**

- Project Status: Construction Documents
- Design Complete: 56%
- Construction Complete: 0 %

## Dearborn Science Building and Computer Information Science Building Renovation

**Project Description**

The project will create updated laboratory and classroom space for the Department of Natural Sciences within the Science Building. In order to accomplish this, approximately 20,000 gross square feet will be added to the building to create state-of-the-art laboratory spaces, a new elevator, loading dock core, and mechanical penthouse. The exterior walls will be extended and constructed in an energy-efficient manner to allow the entire building project to exceed standard energy performance by more than 30 percent. In addition, the project proposes a complete renovation of the existing building (approximately 80,000 gross square feet) for laboratories and classrooms. The project will also upgrade infrastructure that is shared with the adjacent Computer Science Building. Although there will be a temporary loss of some adjacent parking spaces during construction, there will be no permanent impact on parking from this project.

**Energy Efficiency Measures**

- Mechanical/ electrical systems designed to exceed ASHRAE code by better than 30%
- Maximum insulation in foundation walls, exterior walls and roof assemblies
- Energy efficient windows/ glazing for increased thermal performance
- Occupancy sensors for the control of building lighting
- Long life, energy efficient LED light fixtures
- Increased inspections during construction to identify deficiencies in the building envelope
- Increase thermostat 'deadband' to limit equipment cycling
- Magnetic chillers reduces maintenance and improves efficiency
- Energy recovery system captures and re-uses energy and humidity that would be lost to the atmosphere
- Variable drives on equipment allows for equipment to conserve energy when demand is low
- Heat pumps use recovered heat from chillers to supplement space heating requirements

**Other Sustainability Features**

- Science Building is utilizing the existing building structure
- Science building expansion is situated on previously developed site instead of a new site
- Science Building is serviced by public and UM bus routes, encouraging use of public transportation
- No new parking provided on site
- Bike racks provided on site
- External shading devices help control heat gain
- All plumbing fixtures in the building will be low-flow fixtures and dual flush toilets
- Regional materials are used wherever possible
- Use of low-VOC materials (carpets, paints, etc.)
- Landscaping is designed to have only native & adaptive plants and minimal irrigation
- Chemical free cooling tower water treatment
- HVAC condensate used for cooling tower make-up

**Project Data**

- Budget: $51 M
- Schedule: Completion scheduled for Summer 2016
- Square Feet: 106,000 gross square feet

**Status as of August 2013**

- Project Status: Construction Documents
- Design Complete: 70%
- Construction Complete: 0 %

## William R. Murchie Science Building Renovation

**Project Description**

A revitalization of the classrooms and laboratories in the Murchie Science Building is critical to expanding programs that will better prepare K-12 science teachers as well as students for careers in science, technology, engineering, and mathematics. A renovation of approximately 85,000 gross-square-feet of space is planned that will add instructional labs for chemistry and biology and associated support spaces. The renovation will also update the building's infrastructure, including a new fire alarm system, new emergency generator, upgraded telecommunications cabling, and select mechanical, lighting, exterior envelope, and accessibility improvements.

**Energy Efficiency Measures**

The energy efficiency goal for the project is to incorporate as many systems as possible; given the building infrastructure system is not a complete replacement and approximately only half the building will be renovated.

- Replacement of operable sash weather seals on existing glazing systems throughout entire building.
- Use of energy efficient lighting fixtures.
- Occupancy sensors in areas of renovation receiving new lighting.
- Replace all existing fume hoods with more energy efficient models.
- Provide low flow toilets, urinals and lavatory faucets at renovated toilet rooms.

**Other Sustainability Features**

- New wood doors will be FSC certified.
- Use of low-VOC paint.
- Use of straw based particle board in the architectural millwork.
- Reuse of existing furniture.

**Project Data**

- Budget: $22,170,000
- Schedule: Completion scheduled for Fall 2015
- Square Feet: 85,000 gsf

**Status as of August 2013**

- Project Status: Design Development
- Design Complete: 96%
- Construction Complete: 0 %

## George Granger Brown Memorial Laboratories Mechanical Engineering Addition

**Project Description**

The 62,500 gross square feet, $46 million addition will house research laboratories and faculty and graduate student offices to support emerging research endeavors such as bio, energy and nano systems, as well as enhance the ability to realize ultra-high-resolution measurements at molecular and atomic scales. This addition will be designed to support interdisciplinary collaboration within the university and with other academic institutions and industry.

**Energy Efficiency Measures**

- This project will seek LEED Silver-level Certification.
- Maximum insulation in foundation walls, exterior walls, under slab, and roof assemblies.
- Use of increased inspections, including infrared scans during construction to identify missing insulation, gaps in the enclosure, and other wall/roof assembly deficiencies.
- Energy efficient windows/glazing for increased thermal performance.
- High efficiency lighting throughout.
- Occupancy sensors to control lighting.
- Hybrid Lab HVAC System Configuration.
- Dual Effect Energy Recovery System.
- Lab Lighting Power Density Reductions.
- Lighting Control/Space HVAC Setback.
- Solar Collectors for Domestic Hot Water Heating
- Photovoltaic Solar Array

**Other Sustainability Features**

- Use of an Erosion and Sedimentation Control Plan during construction to reduce pollution from construction by controlling soil erosion, waterway sedimentation, and airborne dust generation.
- GG Brown Laboratory sited on public and UM bus routes, encouraging use of public transit.
- No new parking provided on-site (to reduce pollution and land development impacts).
- Use of water conserving plumbing fixtures.
- Energy efficient transformers.
- Use of select sustainable materials (e.g., steel structure, terrazzo flooring).
- Use of low-VOC materials (e.g., carpets, paints).
- Use of regional and local materials where possible.
- Learning Center for Energy Consumption- provides a touchscreen public interface for display of building energy consumption and status of sustainability goals.

**Project Data**

- Budget: $46 M
- Schedule: Completion scheduled for Summer 2014
- Square Feet: 62,500 gsf

**Status as of August 2013**

- Project Status: Construction
- Design Complete: 99%
- Construction Complete: 50%

## Glenn E. Schembechler Hall Entrance and Museum Renovation

**Project Description**

The Glenn E. Schembechler Hall Entrance and Museum Renovation project will create an appropriate new entrance for the home of Michigan football integrating the museum area. The project will add approximately 7,000 gross square feet to Schembechler Hall and renovate approximately 7,000 gross square feet. The scope of this project includes the architectural, mechanical, and electrical work necessary to accomplish these improvements.

**Energy Efficiency Measures**

- Envelope inspections.
- Clerestory glazing.
- 18% more efficient thermal barrier than prescribed by ASHRAE 90.1—2007.
- Optimized occupancy schedules, HVAC system zoning, and part load HVAC system efficiency.
- Improved ventilation efficiencies.
- Low air return.
- Demand Control Ventilation.
- Bi-Polar Ionization which dramatically improves indoor air quality while significantly reducing the requirement for Outside Air thus reducing the energy associated with mechanically conditioning that air.
- Very limited use of incandescent lighting and utilization of LED site lighting.

**Other Sustainability Features**

- Adaptive reuse of existing space.
- Passive solar glazing strategies.
- Tall interior spaces coupled with clerestory glazing to optimize daylight harvesting.
- Only low-VOC materials used on interior spaces.
- 20% recycled and regional materials.
- 75% diversion rate for construction waste.
- Indoor Air Quality plan for all construction activities.

**Project Data**

- Budget: $9 M
- Schedule: Completion scheduled for Winter 2014
- Square Feet: 7,000 gsf

**Status as of August 2013**

- Project Status: Construction
- Design Complete: 100%
- Construction Complete: 30%

## Institute for Social Research Addition

**Project Description**

The Institute for Social Research (ISR) is the oldest and largest academic survey and social research organization in the world. Expansion of the ISR's facilities on Thompson Street will increase the capacity of the institute's research facilities to support its large and growing externally-funded research programs. Expansion will also enhance research effectiveness by integrating research programs within a single building complex, and will provide state-of-the-art facilities for communicating with national and international research partners. A five-level addition (four levels above grade) of approximately 56,700 gross square feet to the existing Institute for Social Research building is proposed. The expansion will create office and research spaces, collaborative meeting spaces, and secure data and bio-specimen storage. The project also involves renovations to approximately 12,800 gross square feet of the existing building where it will connect to the addition.

**Energy Efficiency Measures**

- The Institute for Social Research Addition is being designed to consume 30 per cent less energy than allowed by the 2007 edition of American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 90.1.
- This project will seek LEED certification. The Addition is being designed to attain a minimum of LEED "Silver" certification, although LEED "GOLD" is a possibility.
- Use of hydronic chilled beam terminal induction cooling devices, which transfer cooling through liquid rather than air and which eliminate fan energy for large ductwork. Distribution of cooling within rooms via induction minimizes distribution energy within rooms.
- Installation of an enthalpy energy wheel to recover waste heat.
- Cooling tower will be winterized, to allow "free cooling" when outdoor air temperature is low.
- Use of increased building envelope inspections, including infrared scans during construction to identify missing insulation and gaps in the building enclosure.
- High efficiency lighting throughout.
- Inclusion of an atrium to bring natural daylight into interior of building, which will reduce the need for artificial lighting.
- Occupancy sensors to control lighting.
- High efficiency chiller.
- Increased thermostat dead band (the gap between heating and cooling set points during which no heating/cooling is required).
- Individually controlled window shades, to minimize solar heat gain on sunny days.

**Other Sustainability Features**

- Installation of a living "green roof" to provide natural conductive roof insulation, to reduce peak storm water run-off, to utilize solar radiation, and to provide thermal inertia for the building (which minimizes peak heating and cooling loads).
- Installation of low flow plumbing fixtures to reduce water consumption 40 percent below the consumption rate of a typical building.
- Utilization of an urban building site that is convenient to UM and public transportation. No installation of parking, to further encourage use of mass transportation.
- Use of selected sustainable materials, such as terrazzo flooring.
- Use of low-VOC materials, such as carpeting and paint.
- Use of Certified Wood products in the project.
- Use of low emittance furniture in the project.
- At least 20 percent of new materials will be from local/regional sources.
- At least 20 percent of new materials will be recycled content.
- At least 10 percent of nonhazardous construction and demolition debris will be recycled and/or salvaged by implementing a construction waste management plan.
- Combined chilled water/fire suppression piping to minimize excess piping in the building.
- Consideration of translucent floor panels in the floor of the atrium, to provide natural lighting to occupied basement areas.
- Solar optimization of atrium skylight monitors via energy modeling.
- Installation of new glazing at existing offices that will now front atrium, to provide natural lighting without building envelope heat gain/loss.

**Project Data**

- Budget: $29 million
- Schedule: Completion scheduled for Winter 2014
- Square Feet: 56,700 gsf addition and 12,800 gsf renovation

**Status as of August 2013**

- Project Status: Construction
- Design Complete: 100%
- Construction Complete: 55%

## Michigan Stadium Bowl Painting

**Project Description**

Michigan Stadium, an iconic brick and concrete structure, was constructed in 1927. In 1949 and 1998 the capacity was increased with the addition of permanent steel stands, and capacity increased in 2010 with the completion of the Michigan Stadium Renovation and Expansion Project. This project will remove existing paint from the stadium bowl top and underside, repair or replace corroded steel, and repaint these areas and associated steel structure with a corrosion-resistant paint to protect the metal for many years. The project will include appropriate lead mitigation methods since much of the existing painted surface contains lead-based paint.

**Energy Efficiency Measures**

- The scope of work for this project is only the removal of the existing paint systems, repair of the steel structure where required, and application of a new paint finish to the existing steel structure. No work related to energy usage is included in this project.

**Other Sustainability Features**

- This project includes removal of existing lead based paint on steel decking and structural supports.

**Project Data**

- Budget: $6M
- Schedule: Completion scheduled for August 2014

**Project Data**

- Budget: $6 million
- Schedule: Completion scheduled for August 2014
- Square Feet: N/A

**Status as of August 2013**

- Project Status: Substantial Completion
- Design Complete: 100%
- Construction Complete: 88%

## School of Nursing New Building

**Project Description**

The School of Nursing Building/The Kingsley Building is a new structure, approximately 77,500 square feet of student learning spaces, 3 classrooms/lecture halls, skilled nursing, simulation rooms, interaction areas and office spaces. The Kingsley Building is located on the University of Michigan's North Campus on the existing North Ingalls Building (NIB) parking lot, in Ann Arbor, Michigan. The new facility will complement the existing School of Nursing, currently housed in the NIB.

The structure is divided into two areas, the two story West Wing is connected to the four story East Wing by a two story Interaction Space. There is also a Lower Level/below grade skilled nursing level. It is predominately a brick and curtain wall system structure. The curtain walls allow natural light into the building and allow for a direct connection from the south entry to the north sloping tree out cropping. The brick portion ties the building back to other parts of campus.

Mechanical Systems include the following:

- Two water-cooled chillers, three cooling towers, three variable primary chilled water pumps, two chilled beam chilled water pumps and three condenser water pumps;
- Three boilers and three heating water pumps;
- Two air handling units;
- Chilled beams, VAV and CV terminal units, series fan powered terminal units and finned tube perimeter terminal units

Electrical Systems include the following:

- The lighting system will provide lighting levels per IESNA recommendations by space type;
- Lighting control systems will allow selection of lighting levels in most spaces;
- All spaces will have automatic off, via occupancy sensors except electrical, mechanical and telecommunication spaces;
- Lighting power density will be at least 30% below ASHRAE 90.1 2007 allowable, calculated by the whole building method.

**Energy Efficiency Measures**

- Seeking LEED Silver certification
- Reduced water flow plumbing fixtures
- 30% less yearly energy cost than the ASHRAE 90.1 Standard building
- Optimized below grade wall, above grade wall and Roof Insulation;
- Interior Window Blinds/Shades;
- Lighting reduction through the use of occupancy sensors and photocells
- High Efficiency Chillers
- High Efficiency Boilers
- Chilled Beam Cooling System to reduce supply airflow requirements
- Energy Recovery to exchange heat between the outside air and exhaust air streams
- Variable air volume supply air system for some spaces
- Water side economizer to reduce hours of operation for water cooled chillers

**Other Sustainability Features**

- Native/Adaptive Plants, Shrubs and Trees.
- Highly Efficient Irrigation
- Protection of habitat
- Stormwater Management
- Recycling of Construction Waste
- High recycled content product selection
- Local/Regional material selection
- Low/no VOC product selection
- Maximize natural daylight in interior spaces
- Green Housekeeping Program
- Low Mercury Lighting Program
- Comprehensive Transportation Management Plan
- Green Roof

**Project Data**

- Budget: $ 32.2 Million
- Schedule: Project Completion Summer 2015
- Square Feet: 77,500 sf

**Status as of August 2013**

- Project Status: Bid-Award
- Design Complete: 100%
- Construction Complete: 0%

## Softball Center

**Project Description**

The University has initiated a project to create a new Softball Center adjacent to Alumni Field which will serve as the home for the players and coaches. This facility will include a multipurpose space, team lounge, locker rooms and restrooms for both players and coaching staff. The facility will also contain Athletic Medicine and Training spaces. The facility is envisioned to be approximately 10,000 gross square feet.

**Energy Efficiency Measures**

The building has been designed to be 30% better than Michigan Energy Code ASHRAE 90.1—2007 and has employed the following Energy Conservation Measures:

- Wall insulation values 72% better than ASHRAE 90.1—2007
- Roof Insulation values 23% better than ASHRAE 90.1—2007
- Window glazing performance that is 23% better than ASHRAE 90.1—2007
- Window Shades on all West-facing glazing
- Optimized occupancy schedules, HVAC system zoning, and part load HVAC system efficiency
- Improved ventilation efficiencies
- Heat Recovery
- Demand Control Ventilation
- Very limited use of incandescent lighting
- Utilization of energy-efficient LED site lighting
- Occupancy sensors tied to lighting controls to harvest daylight
- Heat Pump to recover waste heat from chilling cold hydrotherapy pool and use for heating warm hydrotherapy pool.

**Other Sustainability Features**

- Only low-VOC materials used on interior spaces
- 20% recycled and regional materials
- 75% diversion rate for construction waste
- Indoor Air Quality plan for all construction activities
- 20% reduction in potable water demand based off code requirements
- Reuse of previously developed site

**Project Data**

- Budget: $5,300,000
- Schedule: Completion scheduled for Winter 2014
- Square Feet: 10,500 gsf

**Status as of August 2013**

- Project Status: In Construction
- Design Complete: 100%
- Construction Complete: 5%

## South Quadrangle Renovation

**Project Description**

South Quadrangle Renovation will include approximately 106,700 gross square feet of space, including the ground and first floors. The renovation will provide expanded student dining facilities for the Central Campus neighborhood and updated bathrooms throughout the building. New and reorganized spaces will revitalize the residence hall and create much-needed spaces for student interaction and community development, such as group study spaces, music practice rooms, and refurbished lounges. Infrastructure improvements within the renovated areas include: new plumbing, heating, cooling, ventilation, fire detection and suppression systems; wired and wireless high-speed network access; and accessibility improvements.

**Energy Efficiency Measures**

South Quadrangle Renovation design focuses on maximizing energy efficiency by creating energy conservation measures such as:

- Improved glazing system performance
- Using occupancy sensors as lighting controls
- Utilizing VAV kitchen hood exhausts as well as partial hood makeup via transfer from community spaces
- Utilizing additional kitchen hood enclosures such as baffles and side curtains
- South façade external shading devices
- Specifying low pressure loss air handling units
- Utilizing infrared scans of building during construction

**Other Sustainability Features**

- Water conservation measures for this project include following measures to target minimum 20% water usage reduction:
    - Dual flush water closets
    - Low flow urinals
    - Low flow shower heads
- Storm water management system will be created to infiltrate runoff from the increased impervious surface
- Additional bicycle parking will be provided to encourage bicycle usage
- Porous pavers will be utilized in several areas
- Select kitchen equipment will be rehabilitated and reused
- Construction waste management will be such that at least 50% of the material will be diverted from landfills
- Building materials both regional and local have been sought wherever possible, to make up minimum of 10%
- Kitchen waste will be going through a pulper, significantly reducing the amount of solid waste from the dining facility.

**Project Data**

- Budget: $60 million
- Schedule: Completion Schedule for Summer 2014
- Square Feet: 106,700 gross sq. ft.

**Status as of August 2013**

- Project Status: Construction
- Design Complete: 100%
- Construction Complete: 6%

## University of Michigan Hospitals and Health Centers A. Alfred Taubman Health Care Center Levels 1

## and 2 Backfill Renovations

**Project Description**

The opening of the clinics in the C. S. Mott Children's and VonVoigtlander Women's Hospitals resulted in approximately 35,000 square feet of vacated space on the first and second floors of the A. Alfred Taubman Health Care Center. The newly available space has allowed Ambulatory Care to reevaluate the services currently offered onsite and provide the ability to offer multi-specialty services conveniently located for patients. This project will create a multidisciplinary transplant clinic, an outpatient non-cancer infusion center, and a same-day pre-op clinic. Neurology, Neurosurgery, Otolaryngology, and Radiology clinical services will be expanded, and the outpatient pharmacy will be relocated and expanded into a shared retail space with MedEQUIP.

**Energy Efficiency Measures**

- Within the renovated areas, new HVAC and electrical systems are designed to optimize efficiency.
- Utilized Variable Air Volume system.
- Use of digital controls for new VAV Boxes.
- Energy efficient lighting fixtures.
- Provided multi-level switching and dimming of lights.
- Occupancy sensors used to control lighting in offices and other support spaces.

**Other Sustainability Features**

- Use of low VOC Interior Finishes such as sheet flooring, paints and wall coverings.

**Project Data**

- Budget: $13 million
- Schedule: Completion Schedule for Summer 2013
- Square Feet: 35,000 gross sq. ft.

**Status as of August 2013**

- Project Status: Substantial Completion
- Design Complete: 100%
- Construction Complete: 100%

## University of Michigan Hospitals and Health Centers A. Alfred Taubman Health Care Center Internal Medicine Renovation

**Project Description**

The A. Alfred Taubman Health Care Center opened in 1986 and houses multi-specialty clinics, diagnostic and treatment services, and offices. The outpatient clinics and administrative areas for Internal Medicine that occupy the third floor of the facility have remained essentially unchanged since 1986. With anticipated continued growth in clinical activity, the University of Michigan Hospitals and Health Centers propose to renovate 27,500 gross square feet of space on the third floor to improve appearance, function, and use for ongoing patient care needs. This project will permit the creation of new and improved patient clinic settings in Gastroenterology, Pulmonary, Renal, Infectious Diseases, Rheumatology, Medical Genetics and General Medicine.

**Energy Efficiency Measures**

- Within the Renovated Areas, new HVAC and Electrical Systems are designed to optimize efficiency.
- Utilized Variable Air Volume system.
- Use of digital controls for new VAV Boxes.
- Energy Efficient Lighting fixtures
- Provided multi-level switching and dimming of lights.
- Occupancy sensors used to control lighting in offices and other support spaces.

**Other Sustainability Features**

- Use of low VOC Interior Finishes such as sheet flooring, paints and wall coverings.

**Project Data**

- Budget: $7,500,000
- Schedule: Completion Scheduled Fall 2013
- Square Feet: 27,500 sq. ft.

**Status as of August 2013**

- Project Status: Construction
- Design Complete: 100%
- Construction Complete: 75%

## Wall Street East Parking Structure

**Project Description**

Construction of the new parking structure will add 530 net vehicle spaces to the university's parking system near the medical campus. The project will provide for an attractive gateway to the Wall Street area and medical center campus with environmentally-sustainable features. We envision an architecturally-detailed façade with open space at each end of the structure that will contain park-like landscaping.

**Energy Efficiency Measures**

- The Wall Street East Parking Structure is being designed to incorporate best sustainability practices for a building of this use type. US Green Building Council project criteria do not allow the Wall Street East Parking Structure to be considered for Leadership in Energy and Environmental Design (LEED) certification.
- Efficient fluorescent and LED light fixtures will be installed throughout.
- Interior light fixtures will be controlled by occupancy sensors and photocells to minimize energy use and to increase security.
- The completed parking structure will consume energy at a rate that is 30% less than established by ASHRAE Standard 90.1-2007.

**Other Sustainability Features**

- The Wall Street Parking Structure will be designed as an open parking structure, thereby avoiding the need for powered ventilation.
- Infrastructure will be installed for electric vehicle charging stations.
- Native and adapted plant materials that minimize the need for irrigation will be planted.
- Landscaped areas will be maximized and porous pavements will be installed to reduce storm water runoff.
- Storm water will be mechanically and environmentally cleaned on-site prior to discharge.
- A large rain garden will be constructed in the east front yard of the parking structure to collect surface storm water runoff and to maximize on-site infiltration. Replenishing ground water on-site minimizes the potential for downstream flooding.
- An integral covered bus stop will encourage park and ride use, minimizing motor vehicles on campus.

**Project Data**

- Budget: $34 M
- Schedule: Completion scheduled for Winter 2014
- Square Feet: 530 Net Vehicle Spaces

**Status as of August 2013**

- Project Status: Construction
- Design Complete: 100%
- Construction Complete: 10%

## Complete Projects

August 2013

## Alice Croker Lloyd Hall Renovation

**Project Description**

Alice Crocker Lloyd Hall is a 176,000 gross-square-footage residence hall housing approximately 560 students. The renovation will update infrastructure, including: new plumbing, heating, cooling, ventilation, fire detection and suppression systems, wired and wireless high-speed network access, renovated bath facilities and accessibility improvements. New spaces will be created in the vacated dining areas that are no longer needed since the Hill Dining Center became operational. New and reorganized spaces within the facility will revitalize the old residence hall and create much needed spaces for living-learning and academically- related activities, dance practice and multipurpose space, art studio, music practice rooms and spaces for student interaction and community development

**Energy Efficiency Measures**

- Insulating all existing exterior walls that are not currently insulated.
- Utilizing the chilled water from the Mechanical Services Building adjacent to Mosher-Jordan Residence Hall as the cooling sources for the resident rooms in lieu of DX units.
- Reducing the lighting power density for the first and second floor common areas.
- Utilizing space occupancy sensors on the first and second floor common spaces to reduce run hours for the central station air handling units.
- Using increased inspections, including infrared scans, during construction to identify missing insulation, gaps in the enclosure, and other wall/roof assembly deficiencies.
- Using an enthalpy wheel in the mechanical system as a means of energy recovery to utilize the lost heat from the toilet room exhaust system.
- Approved for Designed to Earn the ENERGY STAR® certification.
- Designed to comply with the goal of ASHRAE +30.

**Other Sustainability Features**

- Alice Crocker Lloyd Hall is being renovated on its current site with over 75% of the existing walls, floors, and roof being re-used as well as 50% of the interior non-structural elements are being re-used.
- Access is being improved, thus encouraging the use of UM and public transportation.
- Bike racks will be installed to encourage the use of bicycles for transportation.
- No new parking will be provided on site (to reduce pollution and land development impacts).
- The use of water conserving plumbing fixtures including low flow toilets, urinals and shower heads will reduce water consumption by over 30%.
- Use of regional and local materials used where possible (not less than 10%).
- Use of low VOC materials including adhesives, sealants, paints, coatings, carpet systems, composite wood and agrifiber products.
- During construction, the demolition contractor is separating and recycling metal and brick.

**Project Data**

- Budget: $56 M
- Schedule: Completed scheduled for Summer 2012
- Square Feet:  176,000 gsf

## Chemistry Building and Willard H. Dow Laboratory Chiller Replacement

**Project Description**

The chiller plant that serves the Chemistry Building and Willard H. Dow Laboratory is located on the ground floor of the Chemistry Building and was constructed in 1988. One of the plant's three steam absorption chillers failed and was replaced with an electric chiller in 2010. This project will replace the two remaining absorption chillers and associated infrastructure with new electric chillers, pumps, piping, controls, cooling towers, and a new electrical substation. Based on the present costs for steam and electricity, the two new chillers will result in an estimated $600,000 annual savings compared with the existing chillers.

**Energy Efficiency Measures**

- Replace less efficient steam driven absorbers to electric centrifugal chillers.
- Convert constant flow primary chilled water system to variable flow.
- Adding or upgrading variable speed drives.

**Other Sustainability Features**

- Reusing pumps and piping where feasible.
- Reduction in city water makeup use due to replacing absorption chillers with electric chillers.

**Project Data**

- Budget: $7M
- Schedule: Completion scheduled for May 2013

## UMHHC Children's and Women's Hospital Replacement Project

**Project Description**

The key goal for the C. S. Mott Children's Hospital and Von Voigtlander Women's Hospital is to provide a new, state-of-the-art inpatient and outpatient facility for children and women. The 1,100,000 gross square foot facility consists of a clinic building of 9 floors and an inpatient building of 12 floors plus a helipad on the easternmost roof. The building includes inpatient space, clinic and office space, and programmed shelled space. It is connected to the existing Taubman Health Center via a link as well as an elevated walkway to the Simpson Parking Structure. Site Improvements include utility reconfigurations, roadway reconfigurations, landscaping, steam tunnel and ductbank extensions, and storm water detention.

**Energy Efficiency Measures**

- LEED certified.
- Designed to ASHRAE Standard 90.1 including building envelop and glazing efficiencies.
- Energy modeling was performed to determine optimum system selections with maximum efficiencies.
- Energy efficient equipment is provided such as chillers, pumps and fans.
- Reduction of lighting power densities through the use of energy efficient compact fluorescent and LED fixtures.
- Reduction of lighting power usage through occupancy sensors throughout the building and daylight harvesting controls for the main lobbies and clinic corridors.
- Sophisticated Building Management System controls to optimize fan speeds and system performance.

**Other Sustainability Features**

- Vegetative roof to reduce storm water run-off, reduce heat island effect, and create a natural habitat.
- Storm water infrastructure (collection) and management to minimize run-off and avoid impact to neighboring Nichols Arboretum.
- Landscape Plan uses native plants and plant varieties acclimated to the Ann Arbor climate zone.
- Landscaping will be irrigated by 100% non-potable water collected in the underground storage basins.
- Use of Best Management Practices and Erosion and Sedimentation control measures during construction to minimize and prevent pollution, soil erosion, waterway sedimentation, and airborne dust generation.
- Recycling approximately 75% of construction waste.
- Building materials utilizing a high amount of recycled content.
- Very low amount of volatile organic compounds (VOC) utilized in building components.

**Project Data**

- Budget: $754 M
- Schedule: Completion scheduled for Spring 2012
- Square Feet: 1,100,000 gsf

## Couzens Hall Renovation

**Project Description**

Constructed in 1925, with a large addition added in 1956, Couzens Hall is an approximately 180,000-gross-square-foot residence hall housing 526 students. The renovation will repair and update infrastructure, including: new plumbing, heating, ventilation, fire detection and suppression systems, wired and wireless high- speed network access, renovated bath facilities and accessibility improvements. In addition, air-conditioning will be provided throughout the renovated building. New community and program spaces will be created in the dining areas that became vacant with the opening of the Hill Dining Center in the fall of 2008. New and reorganized spaces within the facility will revitalize the old residence hall and create spaces for living-learning and academic initiatives, student interaction, and creation of community. The energy performance of the overall building will be brought up to our current design guidelines by a number of energy conservation measures.

**Energy Efficiency Measures**

- Insulating all existing exterior walls that are not currently insulated.
- Replacing existing window framing and glazing in the west half (original) of the building and replacing glazing in the east half (newer addition) of the building to increase thermal performance.
- Utilizing the chilled water from the Mechanical Services Building adjacent to Mosher Jordan Residence Hall as the cooling source for the Resident Rooms in lieu of DX units.
- Reducing the lighting power density for the first and second floor common areas.
- Utilizing space occupancy sensors in the resident rooms to reduce lighting power density and reduce run hours for the fan coil units.
- Utilizing space occupancy sensors on the first and second floor common spaces to reduce run hours for the central station air handling units.
- Using increased inspections, including infrared scans during construction to identify missing insulation, gaps in the enclosure and other wall/roof assembly deficiencies.
- Using an enthalpy wheel in the mechanical system as a means of energy recovery to utilize the lost heat from the toilet room exhaust system.
- Approved for Designed to Earn the ENERGY STAR® certification.

**Other Sustainability Features**

- Couzens Hall is being renovated on its current site with over 95% of the existing walls floors and roof and 50% of the interior non-structural elements being reused.
- Access is being improved thus encouraging the use of UM and public transportation.
- Bike racks will be installed to encourage the use of bicycles for transportation.
- No new parking will be provided on site (to reduce pollution and land development impacts).
- The use of water conserving plumbing fixtures including low flow toilets, urinals and shower heads will reduce water consumption by over 20%.
- Daylighting and views will be provided for over 75% of the spaces in the building.
- Use of regional and local materials used where possible (not less than 10%).
- Use of low VOC materials including adhesives, sealants, paints, coatings, carpet systems, composite wood and agrifiber products.

**Project Data**

- Budget: $49 M
- Schedule: Completion scheduled for Summer 2011
- Square Feet: 180,000 gsf

## Crisler Arena Expansion

**Project Description**

Built in 1967, Crisler Arena is a multi-purpose venue used for academic, athletic, and entertainment events. In October 2010, the Board of Regents approved a renovation of the arena's core infrastructure and replacement of spectator seating, with a seating capacity of approximately 12,800. The Department of Intercollegiate Athletics now proposes to further renovate and expand Crisler Arena. New construction of approximately 63,000 gross square feet will create new spectator entrances, retail spaces, ticketing areas and a private club space. Renovation of approximately 54,000 gross square feet will accommodate accessible seats, improve circulation and egress, increase the number of restrooms and concession areas, and add other fan amenities. The scope of this project includes the architectural, mechanical, and electrical work necessary to accomplish these improvements.

**Energy Efficiency Measures**

- This project has achieved LEED Gold Certification.
- Maximum insulation in foundation walls, exterior walls, under slab, and roof assemblies.
- Use of increased inspections, including infrared scans during construction to identify missing insulation, gaps in the enclosure, and other wall/roof assembly deficiencies.
- Energy efficient windows/glazing for increased thermal performance.
- High efficiency lighting throughout with daylight sensors for spaces with fenestration.
- Occupancy sensors to control lighting.
- Demand control ventilation to reduce mechanical loads to low occupancy and empty spaces.
- High efficiency air cooled chiller.
- Increase thermostat deadbands (the gap between the heating setpoint and cooling setpoint during which no conditioning is provided).
- Increased exhaust air energy recovery.
- Automatic static pressure reset.

**Other Sustainability Features**

- Use of an Erosion and Sedimentation Control Plan during construction to reduce pollution from construction by controlling soil erosion, waterway sedimentation, and airborne dust generation.
- Reuse of existing Crisler Arena (in lieu of new facility on green-field site).
- Crisler Arena sited on public and UM bus routes, encouraging use of public transit.
- No new parking provided on-site (to reduce pollution and land development impacts).
- Use of water conserving plumbing fixtures, including low-flow shower heads low-flow lavatories, and waterless urinals.
- Energy efficient transformers.
- Use of select sustainable materials (e.g., steel structure, terrazzo flooring).
- Use of low-VOC materials (e.g., carpets, paints).
- Use of regional and local materials where possible (e.g., limestone, brick).

**Project Data**

- Budget: $53M
- Schedule: Completion scheduled for Winter 2014
- Square Feet:  63,000 New and 54,000 Renovation

## Crisler Arena Renovation

**Project Description**

Built in 1967, Crisler Arena is a multi-purpose venue with a seating capacity of approximately 13,800 used for academic, athletic, and entertainment events. The arena has received minor renovations since construction, and we now propose addressing its highest priority infrastructure needs, including life safety, mechanical and electrical. The project will include: replacement of the roof and asbestos abatement as needed; new fire detection, alarm, and suppression systems; a new smoke evacuation system; emergency egress lighting; replacement of the heating and ventilation units; and building electrical system upgrades. The project will also replace the seats in the lower and upper bowl, including the addition of seating meeting the requirements of the Americans with Disabilities Act, as well as relocate and widen aisles and add hand rails to the aisles.

**Energy Efficiency Measures**

- Increased insulation in the existing roof, in the new exterior walls and under new slabs.
- Energy efficient windows/glazing in new windows for increased thermal performance.
- High efficiency lighting throughout.
- Occupancy sensors to control lighting during unoccupied times.
- Demand control ventilation to reduce amount of outside air being heated/cooled during low occupancy.
- Increase thermostat dead bands for heating during unoccupied times.
- Supply air ductwork sized at lower velocities to reduce the static pressure and therefore less fan energy is required.

**Other Sustainability Features**

- Reuse of the existing Arena, reducing waste from demolition of the existing arena and reducing the impact from constructing an entirely new arena.
- Site is located on public and UM bus routes, encouraging use of public transit.
- No new parking provided on-site (to reduce pollution and land development impacts).
- Use of an Erosion and Sedimentation Control Plan during construction to reduce pollution from construction by controlling soil erosion, waterway sedimentation, and airborne dust generation
- Energy efficient transformers
- Use of low VOC materials for pipe connections.
- Monitoring outside air delivery to ensure during low load conditions that the correct amount of outside air is being delivered.
- Air handling systems will be designed for thermal comfort by the occupants.
- Refrigerant systems will utilize HCFC which have almost zero ozone depletion ratings.
- Use of low-VOC materials (eg carpets, paints).
- Use of regional and local materials where possible.

**Project Data**

- Budget: $23 M
- Schedule: Completion scheduled for Winter 2012
- Square Feet:  360,000 gsf

## Intercollegiate Soccer Stadium

**Project Description**

Athletics is adding spectator amenities and player support facilities to the competition field for men's and women's intercollegiate soccer. The project involves approximately 20,000 gross square feet of construction, including restrooms and concessions for spectators, a press area, two team locker rooms, and grandstand seating for approximately 1,800 spectators.

**Energy Efficiency Measures**

- Design building to meet energy efficiency and performance required by ASHRAE/IESNA 90.1-2004.
- Occupancy sensors control lighting.
- Automatic controls for exterior lighting
- High efficiency hot water heaters.
- Boilers are on a reset schedule with respect to outside air temperature to increase their efficiency.
- Roof top units on an occupancy schedule to allow temperature setting to dial back when building is not occupied.
- Thermostats are provided in each room to allow individual controls.
- Automatic sensors control water flow at lavatories.
- Tempered water is provided to lavatories thereby minimizing the use of hot water.

**Other Sustainability Features**

- Design site sediment and erosion control to best management practices.
- Project is located within 1/4 mile of 2 bus lines.
- Bicycle racks and showers are provided for building occupants.
- No new parking is provided.
- Limit site disturbance to 40' beyond the building perimeter and 5' beyond roadway curbs.
- Provide vegetated open space adjacent to the building that is at minimum equal to the building footprint.
- Post-development storm water peak discharge rate and quantity does not exceed the pre-development peak discharge rate and quantity for the one- and two-year 24-hour design storms.
- Storm water management promotes infiltration and captures and treats the storm water runoff from 90% of the average annual rainfall using acceptable.
- Maximize water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems by using low flow plumbing fixtures and waterless urinals.
- Use building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials, e.g. structural steel, carpet, athletic flooring.
- Use building materials that have been extracted and/or harvested as well as manufactured, within 500 miles of the project site, e.g. brick, structural steel.

- Use wood-based materials and products, which are certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria, for wood building components.
- Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the building to reduce IAQ problems resulting from the construction/renovation process.
- Use low VOC emitting adhesives, sealants, paints, coatings, and carpet to reduce indoor air quality problems resulting from the construction/renovation process by.
- Individual lighting controls provided for minimum 90% of the building occupants to enable adjustments to suit individual task needs and preferences.

**Project Data**

- Budget: $6M
- Schedule: Completion scheduled for Summer 2010
- Square Feet: 20,000 gsf

## East Quadrangle Renovation

**Project Description**

East Quadrangle is an approximately 300,000-gross-square-foot residence hall housing approximately 860 students and the Residential College. The renovation will update infrastructure, including: new plumbing, heating, cooling, ventilation, fire detection and suppression systems; wired and wireless high-speed network access; renovated bath facilities; and accessibility improvements. New and reorganized spaces within the facility will revitalize the old residence hall and improve dining facilities. Since its inception in 1967, the Residential College has occupied spaces within East Quadrangle not originally designed for academic use, with offices and administrative functions housed in former bedrooms and most classrooms located in the basement.

**Energy Efficiency Measures**

- Increased exterior wall insulation.
- New roof insulation.
- Improved air-conditioning system, which will retire old smaller, inefficient systems.
- Reduced lighting density throughout the building.
- Utilizing occupancy sensors in all common areas.
- Utilizing HVAC occupancy sensors in all common areas.
- Increasing thermostat dead band by 2 degrees for offices and classrooms.
- Utilizing infrared scans of building during construction.
- Inspecting exterior wall and fenestration during construction.
- Using an enthalpy wheel in the mechanical system as a means of energy recovery to utilize lost heat from the toilet room exhaust system.

**Other Sustainability Features**

- East Quad is being renovated at its current location with over 80% of the existing exterior walls, 75% of the existing windows, and a majority of the existing interior walls being refurbished.
- Additional bicycle parking will be provided to encourage bicycle usage.
- Building materials both regional and local will be used where possible; project goal is not less than 10%.
- Demolished material will be recycled and/or reused; this includes steel, brick, and block.
- Existing site lighting, poles, lamps, and globes, will be reused.
- Heritage trees throughout the site will be maintained and preserved.
- Porous pavement materials will be utilized throughout existing courtyard spaces; this will take the place of existing non-porous materials.
- Select existing kitchen equipment will be rehabilitated for optimal use.
- Composting will be utilized.
- Additional light wells and areaways will be constructed to take advantage of direct and barrowed natural light.

**Project Data**

- Budget: $116M
- Schedule: Completion scheduled for Summer 2013
- Square Feet:  300,000 gsf

## Law School Academic Building and Hutchins Hall Student Commons Addition

**Project Description**

The project includes a new academic building located south of Monroe Street, an addition between Hutchins Hall and the William W. Cook Legal Research Library for a new Law School commons, and renovations within both Hutchins Hall and the Cook Library. The new academic building will be approximately 100,000 gross square feet that will house classrooms, multi-purpose spaces, clinic work spaces, and offices for Law School faculty and administrators. The Law School commons project of approximately 16,000 gross square feet will provide needed student study, interaction, and support spaces. Additionally, the project will include life safety upgrades to Hutchins Hall and the Cook Library and the addition of an electrical substation and chilled water plant. The project will also replace the metal siding on the connection between the Law Quad buildings and the Cook Library stacks wing with a masonry façade.

**Energy Efficiency Measures**

- LEED-NC Gold Certification.
- Designed to surpass code required energy efficiency by 30%.
- Maximum insulation in foundation walls, exterior walls, and roof assemblies
- Energy efficient windows/glazing for increased thermal performance
- Occupancy sensors for the shutdown of VAV boxes
- Increase of “deadband” in the thermostat controls for all academic spaces
- Use of increased inspections, including infrared scans during construction to identify missing insulation, gaps in the enclosure, and other wall/roof assembly deficiencies
- Daylighting controls for perimeter spaces
- Reduction of lighting levels through use of occupancy sensors
- More efficient mechanical cooling achieved with the use of high efficiency chillers
- Domestic hot water reduction by using low flow fixtures
- Mechanical room airflow reduction achieved by ventilating the mechanical room based on occupancy
- Free cooling achieved by using dry coolers and getting energy savings associated with not running the air conditioning unit compressors

**Other Sustainability Features**

- Law School new academic building is situated on a previously developed site instead of a new site and has no threatened or endangered plants or animal species that inhabit this space
- New building is sited on public and UM bus routes, encouraging use of public transit
- Bike racks and shower facilities are provided, encouraging alternative transportation
- No new parking provided on the site
- Landscaping is designed to have only native and adaptive plants and no lawns, therefore reducing the need for mowing and using invasive fertilizers
- Storm water management incorporates a detention tank that will significantly reduce the quantity of storm water
- Storm water quality will be controlled with the use of hydrodynamic separators
- Light colored hardscape surfaces will be installed to help the heat island effect
- All plumbing fixtures within the building will be low-flow fixtures and dual flush toilets

- At least 50% of construction waste will be diverted from disposal
- Regional materials are used wherever possible, as well as certified wood
- Use of low-VOC materials (carpets, paints)
- Use of grating mats and exhaust systems with filters to improve indoor chemical and pollutant source control

**Project Data**

- Budget: $102 M
- Schedule: Completion scheduled for Fall 2011
- Square Feet:  116,000 gsf

## The Lawyers' Club Building and John P. Cook Building Renovation

**Project Description**

The Charles T. Munger Residences in the Lawyers' Club and the John P. Cook Building renovation project is a comprehensive renovation updating key infrastructure in the club wing of The Lawyers' Club Building. The renovation of the dormitory areas, approximately 92,000 gross square feet of space, will address infrastructure needs including new plumbing, heating, ventilation, fire detection and suppression systems, wired and wireless high-speed network access, and accessibility improvements. Although air conditioning will be added, we will target overall energy performance to exceed national energy efficiency standards by more than 30 percent. The renovation will preserve the historic exterior of the buildings, and the existing "townhouse-style" entries to resident rooms will be replaced with an interior connecting corridor within each building that will increase safety, accessibility, and sense of community for the residents. In the club wing of The Lawyers' Club Building, approximately 67,000 gross square feet, we will update key infrastructure items integral with the dormitory wing, including new fire detection and suppression systems, and tuck-pointing of exterior masonry surfaces.

**Energy Efficiency Measures**

- Water conserving toilets, showers and lavatory faucets.
- Heat recovery devices on air handling units.
- Insulation added to the attic.
- Electronic room thermostats which allow students to put their room in standby heating/cooling mode when they leave.

**Other Sustainability Features**

- Slate roof replacement will utilize the existing solid slates, reducing the need for new slate.
- Existing structure to remain, eliminating much construction demolition materials from landfill. Also eliminates the need to construct a new building.
- Offsite modular prefabrication of toilet rooms allows for higher quality control, expedites schedule and reduces costs.

**Project Data**

- Budget: $39 M
- Schedule: Completion scheduled for Summer 2013
- Square Feet: 159,000 gsf

## Michigan Memorial Phoenix Laboratory Addition and Second Floor Renovation

**Project Description**

The Michigan Memorial Phoenix Laboratory Addition and Second Floor Renovation project will create modern research laboratory space to support the Michigan Memorial Phoenix Energy Institute. A renovation of approximately 10,000 gross square feet is planned that will create state-of-the-art laboratory spaces for energy-related research, as well as construction of an addition of approximately 10,000 gross square feet for the institute's administrative functions. As part of this project, the building's electrical substation, which has exceeded its useful life, will be replaced.

**Energy Efficiency Measures**

- This project will seek LEED Silver-level Certification.
- Insulating existing exterior walls impacted by the project that are not currently insulated.
- Utilizing space occupancy sensors on the ground and upper floor common spaces to reduce run hours for the central station air handling units.
- Maximum insulation in foundation walls, exterior walls, under slab, and roof assemblies.
- Use of increased inspections, including infrared scans during construction to identify missing insulation, gaps in the enclosure, and other wall/roof assembly deficiencies.
- Energy efficient windows/glazing for increased thermal performance.
- External shading of curtain wall glazing.
- High efficiency lighting throughout with daylight sensors for spaces with fenestration.
- Occupancy sensors to control lighting in offices, bathrooms, corridors, and conference rooms.
- Increase thermostat deadbands (the gap between the heating setpoint and cooling setpoint during which no conditioning is provided).

**Other Sustainability Features**

- No new parking will be provided on site (to reduce pollution and land development impacts).
- The use of water conserving plumbing fixtures including low flow toilets, urinals and shower heads will reduce water consumption by over 20%.
- Daylighting and views will be provided for over 75% of the spaces in the building.
- Use of low VOC materials including adhesives, sealants, paints, coatings, and carpet systems.
- Use of an Erosion and Sedimentation Control Plan during construction to reduce pollution from construction by controlling soil erosion, waterway sedimentation, and airborne dust generation.
- The addition is constructed on a previously developed site in lieu of a green field site.
- The project is sited on public and UM bus routes, encouraging use of public transit.
- Energy efficient transformers.
- Use of select sustainable materials (eg steel structure, terrazzo flooring).
- Use of regional and local materials where possible (eg stone and brick).

**Project Data**

- Budget: $11.1 M
- Schedule: Completion scheduled for Spring 2013
- Square Feet: 10,000 gsf addition and 10,000 gsf renovation

## Michigan Stadium Renovation and Addition Project

**Project Description**

The 400,000-square-foot addition includes two multi-story masonry structures on both the east and west sides of the stadium; the end zones will remain open. The structures, which will stand 10 feet higher than the current scoreboards at their highest point, include 83 suites and over 3,000 club seats. When the renovations are complete, the capacity of the Big House will top 108,000. The plans call for buildings to be constructed on the concourse at the north and south end zones. These buildings will house additional restrooms and concessions, and support functions such as first-aid, police/security and will-call. The structures will be covered in the same brickwork as the new sideline buildings. Stadium improvements will include an increase in the number and quality of restrooms; more concession stands with a greater variety of fare; wider aisles; handrails; additional entry and exit points for improved crowd circulation and safety; and additional dedicated seating for fans with impaired mobility. Construction work will be phased over a period of three years in order not to interrupt home football games. It is expected to be completed prior to the 2010 fall football season.

**Energy Efficiency Measures**

- Design building to meet energy efficiency and performance required by ASHRAE/IESNA 90.1-1999 with the exception of the glazing at suites and club areas.
- Air handling units on occupancy schedule allowing lower winter set point for heating and higher summer set point for cooling when the building is unoccupied.
- Individual controls for air handling units allow heating and cooling to specific areas as needed.
- Automatic sensors at lavatories control water flow.
- Tempered water is provided to lavatories minimizing the use of hot water.
- Thermostat controls in each suite allows for individual control.
- Use low flow toilet fixtures and waterless urinals.

**Other Sustainability Features**

- Design site sediment and erosion control to best management practices.
- Stadium is located on bus routes.
- No new parking is provided on site.
- No net increase in storm water runoff.
- ENERGY STAR roof for all new roof surfaces.
- Reduce the use of municipally provided portable water through the use of waterless urinals and low flow fixtures.
- Zero use of CFC-Based refrigerants.
- Use regional and local material where possible, (e.g. brick).
- Ventilation meets ASHRAE 62-1999 Indoor Air Quality requirements.
- Use low-VOC materials, (e.g. adhesives, sealants, paints, coatings, and carpet).
- Use building materials that have been extracted and/or harvested as well as manufactured, within 500 miles of the project site, e.g. brick,
- Operable windows and lighting controls provided for occupied spaces on building perimeter.
- Comply with ASHRAE Standard 55-1992 for thermal control standards.
- Day lighting provided to all interior spaces thereby reducing the use of electrical lights.

**Project Data**

- Budget: $226M
- Schedule: Completion scheduled for Summer 2010
- Square Feet: 400,000 gsf

## North Campus Chiller Plant Expansion

**Project Description**

The North Campus Chiller Plant (NCCP) was completed in 2005 to provide chilled water to North Campus. The NCCP, when compared with individual building chillers, has resulted in energy savings, reduced operation and maintenance costs, increased redundancy and reliability, and reduced proliferation of cooling towers and the associated noise. In fiscal year 2009, the estimated annual operating cost savings due to the NCCP was approx. $200,000, with the majority of savings achieved by increased energy performance. Now we are increasing the size of the facility by 8,500 square feet and adding two 1,300 ton chillers, increasing the total capacity to 6,500 tons. In addition to the expansion of the NCCP, underground connections will be extended to provide chilled water to the Earl V. Moore Building, Space Research Laboratory, and Naval Architecture and Marine Engineering Building (NAME). The increased overall capacity of the plant will allow the elimination of the existing building chillers at the Francois-Xavier Bagnoud, Electrical Engineering and Computer Science, and George Granger Brown Memorial Laboratories (G. G. Brown) buildings, as well as provide cooling for the planned additions to G. G. Brown and the Michigan Memorial Phoenix Laboratory. The estimated incremental annual operating cost savings will be approx. $100,000 as based on today's cost, with the majority of savings achieved with increased energy performance. In addition, we will replace the steam and condensate interconnection between the Aerospace Propulsion Lab and NAME buildings to eliminate the need for one boiler.

**Energy Efficiency Measures**

- Selecting chillers based on lowest life cycle cost, which is largely dictated by highest energy efficiency.
- Turning off the new substation during winter operation and just using the existing substation.
- Reducing the energy usage of general lighting by nearly 50% as a result of utilizing energy efficient High Bay Fluorescent light fixtures in place of less efficient Metal Halide lamped light fixtures.
- Daylight harvesting through the glass curtain wall and thus lowering energy usage of general lighting.
- Insulating all exterior walls.

**Other Sustainability Features**

- Salvaging the existing acoustical screen-wall panels on the east end of the building and re-installing them in the same relative location on the new east wall of the NCCP.
- Salvaging the existing glass curtain wall on the east end of the building and re-installing it in the same relative location on the new east wall of the NCCP.
- Underground piping extended to satellite buildings was installed by directional boring piping in select areas, to minimize disruption of trees and other surface elements.
- The bentonite slurry from the directional boring will be mixed with the top soil and compose at the North Campus Grounds Facility to improve moisture retention in lieu of going to a landfill.

**Project Data**

- Budget: $8.7 M
- Schedule: Completion scheduled for Fall 2011
- Square Feet:  8,500 gsf

## North Campus Research Complex Building 16 Renovation for Health Services Research

**Project Description**

A renovation of the North Campus Research Complex Building 16 is planned to co-locate several health service research groups currently dispersed throughout the University. The five above-grade levels will be renovated to promote collaboration amongst groups and consolidate redundant resources to create a more efficient and cost-effective research environment. Conference space and a fitness center located in the below grade level will be renovated for general NCRC use. The project will also update the building's infrastructure, including heating, cooling, technology, code and accessibility improvements.

**Energy Efficiency Measures**

- The new floor plan design will open up work space to draw natural daylight further into the facility.
- Life cycle analysis is being evaluated for converting from existing electric heating panels to a new perimeter hydronic fin tube design solution.
- New low flow fixtures will be provided in toilet rooms to reduce water consumption.
- The level of renovation was reduced by preserving, reusing and/or repurposing approximately 60% of the current floor plan layout.
- Almost all of the existing furniture within the 120,000 gsf facility will be reused in the renovated space.
- New energy efficient lighting fixtures with electronic ballasts will be used.
- New occupancy sensors are being provided for more energy efficient lighting controls in offices, conference rooms and support spaces.
- New timer light switching will be provided in janitor closets and storage rooms that have infrequent use.
- The existing carpeting will be recycled as part of the renovation.
- Low VOC and recycled content will be used where possible.

**Project Data**

- Budget: $13,700,000
- Schedule: Substantial Completion Spring 2012
- Square Feet: 120,000 gsf

## North Quad Residential and Academic Complex

**Project Description**

Combining sophisticated classroom and academic space with residence space for 460 students, the North Quad Residential and Academic Complex will provide classrooms, studios and offices for five information and communications-related university programs. The result will be an environment in which lively interactions among students and faculty spill seamlessly from classrooms to hallways to faculty offices to living quarters—all under the same roof. North Quad's design draws on the classic features of academic architecture. On the ground level, the brick and stone building encloses one continuous interior. Above ground, the complex appears as two separate buildings, an L-shaped seven-story academic tower and a 10-story residential tower arranged around interlocking courtyards, and connected by a cloister evocative of the Law Quad.

**Energy Efficiency Measures**

- Maximum insulation in foundation walls, exterior walls, and roof assemblies
- Energy efficient windows/glazing for increased thermal performance
- Use of increased inspections, including infrared scans during construction to identify missing insulation, gaps in the enclosure, and other wall/roof assembly deficiencies
- Reduction of lighting levels through use of occupancy sensors in residential bathrooms, corridors, and classrooms
- Variable water flow controls in lieu of constant volume controls on resident room fan coil units
- Controls to shut down air flow to conference rooms when rooms unoccupied
- Use of occupancy sensors to reset space temperatures to allow wider temperature swings when rooms are unoccupied (included in 26 major spaces such as classrooms)
- Increase thermostat deadbands (the gap between the heating setpoint and cooling setpoint during which no conditioning is provided)
- Use of controls to optimize fan speeds supplying air to VAV (variable air volume) boxes
- Variable flow exhaust hoods in kitchen
- Exhaust heat recovery (from residential bathroom exhaust)

**Other Sustainability Features**

- Use of an Erosion and Sedimentation Control Plan during construction to reduce pollution from construction by controlling soil erosion, waterway sedimentation, and airborne dust generation
- North Quad constructed on a previously developed site (former Frieze Building site) in lieu of a greenfield site
- North Quad sited on public and UM bus routes, encouraging use of public transit
- Installation of bike racks to encourage use of bicycles for transportation
- No new parking provided on-site (to reduce pollution and land development impacts)
- Use of water conserving plumbing fixtures, including low-flow shower heads, low-flow urinals, and dual-flush toilets
- The plaza/courtyard is a Green roof that covers a significant portion of the lower level
- Natural daylighting provided to underground spaces via sunken courtyards
- No increase in the amount of impervious surface– no stormwater run-off increase
- Use of select sustainable materials (eg terrazzo flooring, linoleum and cork flooring)
- Use of low-VOC materials (eg carpets, paints)

- Use of regional and local materials where possible (eg limestone, brick)
- Water-efficient landscaping

**Project Data**

- Budget: $175M
- Schedule: Completion scheduled for Summer 2010
- Square Feet: 360,000 gsf

## Northwood Apartments I, II, and III Fire Alarm and Boiler Upgrades

**Project Description**

Constructed between 1955 and 1958, the Northwood Apartments I, II, and III are an approximately 419,000-gross-square-foot, 58-building complex on North Campus with 686 units housing student families. The existing stand-alone smoke detectors will be upgraded with a new central fire alarm system to meet current life safety standards. The project will also replace the hot water boilers to improve operating efficiency, reduce energy use, and provide increased reliability for the heating system.

**Energy Efficiency Measures**

- The existing heating hot water boilers will be replaced with noticeably more efficient condensing units.
- The expected efficiency improvement will increase from an existing thermal efficiency likely no greater than 75%, to a minimum efficiency of 85; and to values exceeding 95% in the spring and fall when milder outdoor temperatures allow lower HWHS temperatures to be used.
- The new boilers will be furnished with modern controls to perform the lead/lag function automatically. This will insure only the required number of boilers are operating for any given load, ramping up and down seasonally, daily and hourly to reflect the varying outdoor temperatures throughout the year. The new controls will insure that the best combination of boilers are running under any given load, with a continued focus on condensing whenever possible.
- A key control function provided with each boiler group is monitoring of the Outside Air Temperature (OAT) at all times. Milder temperatures result in less heat loss from the buildings. This lower heat demand can be met by circulating lower temperature HWH. Lower HWH temperatures allow the condensing boilers to operate in the highly efficient condensing mode.
- The automatic lead/lag boiler operation, along with the OAT continuous reset of the HWH supply temperature insures that only the required amount of natural gas is used under all of the varying system loads.
- The boiler burner controls will be specified with a 5:1 turndown which allows each boiler to remain in efficient operation down to 20% of full load. Additionally, the design specifies that one of the three boilers will be half the size of the other two. This boiler group configuration creates the ability for each of the five sites to turn down to 10% of full load. The composite 10:1 turndown means that only at seasonal loads less than 10% would require the smallest boiler to go into an on/off cycling mode; saving additional energy.
- The existing heating hot water system distribution pumps will be replaced with units driven by variable speed drives (VSDs), which represents electric power savings, as this feature would allow the system to circulate only the minimum amount of water necessary to meet the load.

**Project Data**

- Budget: $7.5 M
- Schedule: Completion scheduled for Summer 2013
- Square Feet: 419,000 gsf

## Palmer Drive Development

**Project Description**

The Palmer Drive Development at the University of Michigan consists of a complex of buildings at the southwest corner of Washtenaw Avenue and Huron Street. The new buildings included in this development are:

- Life Sciences Institute Building
- Palmer Drive Parking Structure
- Commons Building
- Undergraduate Science Building

The **Life Sciences Institute Building** (LSI) consists of six floors and a mechanical penthouse to provide "wet" research laboratory and support spaces, core laboratory areas, principal investigators offices, interaction spaces, administrative offices for the Life Sciences Institute, a combination gallery/lobby space, and a small library. The 235,000 gross square feet building houses 325 to 375 people. The **Palmer Drive Parking Structure** accommodates approximately 1,000 parking spaces. The **Commons Building** provides conference space and dining facilities. A Department of Public Safety neighborhood office is located here, as well as academic offices. The building is 99,000 gross square feet. The **Undergraduate Science Building** (USB) is located on top of the Palmer Drive Parking Structure. The four-story building houses instructional space and laboratories for undergraduates particularly in the sciences. All of these buildings are tied together with a new walkway and plaza. This provides a safe, direct circulation path between Central Campus and the Medical Campus.

**Energy Efficiency Measures**

- The LSI Building and USB initiated UM efforts to deploy energy-saving strategies specifically tailored to laboratory buildings.
- LSI was both a local and regional ASHRAE Technology Award winner and received national Honorable Mention for its design innovations.
- LSI's vivarium animal cages are directly connected to the building HVAC system, with VAV boxes controlling the supply and exhaust air. This system minimizes the quantities of air required in the animal holding spaces, allows for maintenance access from outside the holding areas, maximizes the space utilization within the rooms, and provides for lighter, more movable animal holding racks. It also provides better isolation between room air and the air in the animal cages, which should result in a cleaner, more odor-free environment. It is believed that this is one of the first operational "house air" systems in the country for vivariums.
- A heat recovery system in LSI, significantly reduces the amount of heat loss while also meeting the laboratory safety criterion of passing through the building only once.
- All air handlers are variable air volume units. Also, motors and pumps are operated through variable speed drives.
- LSI has two separately pumped perimeter heat systems which divide the building into north and south zones and control the temperature as appropriate for each exposure.
- Walls and roof are insulated above code requirements.
- Insulated low-E energy efficient glazing is used throughout the buildings.
- Occupancy sensors are used to turn down lighting during periods when spaces are unoccupied.

- Extremely efficient open plan laboratory design minimizes the amount of circulation space required in the building. The open plan will also accommodate changes in laboratory uses with less construction waste and disruption than traditional closed laboratory spaces.
- Carbon dioxide ($CO_2$) monitoring in many areas of the LSI building reduces the amount of outside air when spaces are unoccupied, thus saving the energy to heat and cool the outside air.

**Other Sustainability Features**

- Day lighting is well distributed throughout the buildings. The exterior walls contain large windows, and the ceiling heights are tall enough to admit a large amount of daylight. In LSI most workstations are located within the first 10 feet from the exterior wall providing natural daylight for the lab researchers that are in the labs all day.
- Sustainable growth wood is used for much of the project's woodwork, including the extensive wainscoting in virtually all of the public areas.
- This project is located within a rehabilitated brown field site, formerly occupied by an underdeveloped impervious surface parking area.
- A one million gallon storm water detention system, located below the parking garage, alleviates the persistent flooding problems in the area and allows for controlled release of storm water.
- The numerous exhaust fans on the roof were designed to function without increasing perceptible noise to the 4000 occupants of the residence halls located within 500 feet.
- The site, containing both an old glacial lake and a 35-foot elevation change, was one of the last underdeveloped areas on Central Campus because of its challenging topography. The siting and planning of this complex takes advantage of the development density already present in the area rather than promoting remote development that would contribute to traffic congestion, vehicular pollution and less efficient distribution of services and utilities
- Bike racks are provided throughout the complex and shower rooms were included in LSI.
- LSI and USB utilize a pollution prevention approach to reduce the amount of chemicals being used and disposed of as waste.

**Project Data**

- Budget: $220M
- Schedule: 2003 completion for LSI and the Parking Structure, 2004 for the Commons Building and 2005 for USB.
- Square Feet:
    - **Life Sciences Institute** 235,000 gsf
    - **Commons Building** 100,000 gsf ; includes 3,000 ton chiller plant
    - **Undergraduate Science Building** 140,000 gsf
    - **Other Project Components:** 1,000 car parking structure; one million gallon storm water detention structure; pedestrian bridge across Washtenaw Ave.; and plaza which connects the buildings contained within the complex.

## Player Development Center for Intercollegiate Basketball

**Project Description**

The Player Development Center for men's and women's varsity basketball will provide approximately 57,000 gross square feet of support space, including two full basketball practice courts, locker rooms for men's and women's players and coaches, training, and hydrotherapy. The second floor will accommodate men's and women's coaching staff and administrative support functions, as well as film-viewing rooms and strength and conditioning space. The building will also provide a new accessible entry to Crisler Arena and a dramatic Hall of Fame at the entry lobby. The thirty-six foot tall glass oval is a dramatic focal point for the public entry and interpretive/historical functions in the Hall of Fame, and provides a distinct, contemporary identity for the basketball program, while drawing on traditional oval forms from Crisler and Michigan Stadium.

**Energy Efficiency Measures**

- Maximum insulation in foundation walls, exterior walls, under slab, and roof assemblies.
- Use of increased inspections, including infrared scans during construction to identify missing insulation, gaps in the enclosure, and other wall/roof assembly deficiencies.
- Energy efficient windows/glazing for increased thermal performance.
- External shading glazing for Hall of Fame curtain wall.
- Use of translucent glazing to add daylighting to practice gym.
- High efficiency lighting throughout with daylight sensors for spaces with fenestration.
- Occupancy sensors to control lighting in offices, bathrooms, corridors, and conference rooms.
- Demand control ventilation to reduce mechanical loads to low occupancy and empty spaces.
- High efficiency air cooled chiller.
- Increase thermostat deadbands (the gap between the heating setpoint and cooling setpoint during which no conditioning is provided).
- Increased exhaust air energy recovery.
- Automatic static pressure reset.

**Other Sustainability Features**

- Use of an Erosion and Sedimentation Control Plan during construction to reduce pollution from construction by controlling soil erosion, waterway sedimentation, and airborne dust generation.
- Player Development Center constructed on a previously developed site between Crisler Arena and the parking lot (in lieu of a greenfield site).
- Player Development Center sited on public and UM bus routes, encouraging use of public transit.
- No new parking provided on-site (to reduce pollution and land development impacts).
- Use of water conserving plumbing fixtures, including low-flow shower heads low-flow lavatories, and waterless urinals.
- Energy efficient transformers.
- Use of select sustainable materials (e.g. steel structure, terrazzo flooring).
- Use of low-VOC materials (e.g. carpets, paints).
- Use of regional and local materials where possible (e.g. limestone, brick).

**Project Data**

- Budget: $23.2M Project Cost
- Schedule: Completion scheduled for Fall 2011
- Square Feet: 57,000 gsf

## Stephen M. Ross School of Business Facilities Enhancement Project

**Project Description**

The Stephen M. Ross School of Business Facilities Enhancement Project (RSB) is an approximately 270,000-gross-square-foot building with seven floors housing twelve state-of-the-art classrooms, an auditorium and colloquium, faculty offices, student service activities space, and a central gathering space that will provide seating areas and a food court. The heart of this project is a town square that will facilitate the spontaneous gathering together of the entire business school community. Programmatic components of the school such as auditorium, classrooms, and faculty offices have been composed around this central room in the form of an ascending spiral. The geometric properties of this rectangular spiral allow it to extend itself outward, joining the existing parts of the business school to its new parts through a series of unifying elements designed to create an intimate linkage between past, present, and future. The project has achieved formal LEED Silver Certification.

**Energy Efficiency Measures**

- Green roofs and roofing with a high Solar Reflectance Index to reduce heat island impact
- Energy savings through the implementation of individual room thermostats, and providing low temperature set-points during winter months, and high temperature set-points during summer months, for non-occupied spaces.
- Use of occupancy sensors in all rooms and offices, and automated variable light levels in the skylight Winter Garden through zoned photo sensor metering and lighting controls
- Use of enhanced commissioning to verify that the building's energy related systems are installed, calibrated and perform according to the owner's project requirements, basis of design, and construction documents

**Other Sustainability Features**

- Storm water management practices involving storm water detention (underground tanks and green roofs), storm drainage percolation areas, porous concrete pavement, and vortex manhole sedimentation separator
- Use of an Erosion and Sedimentation Control Plan during construction to reduce pollution from construction by controlling soil erosion, waterway sedimentation, and airborne dust generation
- Constructed on a previously developed site in lieu of a greenfield site
- Provided on-site bike storage and a shower facility
- No new parking provided on-site (to reduce pollution and land development impacts)
- Sited on public and UM bus routes, encouraging use of public transit
- Limited use of potable water by planting native vegetation and using highly efficient drip irrigation
- Maximized water efficiency within buildings though the use of waterless urinals, dual-flush toilets, and faucets with aerators and motion sensors
- Selected refrigerants and HVAC equipment that minimize the emission of compounds that contribute to ozone depletion and global warming
- Construction activities diverted more than 75% of the construction waste from this project away from landfills and incinerators and instead redirected the waste back into the manufacturing process as recovered resources
- Helped to increase the market demand for recycled content materials by utilizing products and materials made from recycled content that make up more than 10% of the total value of the materials or the project
- Helped to increase demand for building materials and products extracted and manufactured within 500 miles of the building site by utilizing materials from the region that make up more than 20% of the total value of materials .
- Developed and implemented an Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the building to help sustain the comfort and well-being of construction workers and building occupants

- Reduced the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants

**Project Data**

- Budget: $145M
- Schedule: Completed Fall 2008
- Square Feet: 270,000 gsf

## Thompson Street Parking Structure Addition

**Project Description**

The addition to the Thompson Street Parking Structure is an integral part of the University's Parking and Transportation strategic plan to provide parking for anticipated incremental growth in demand, and to replace parking lost on central campus due to various construction projects, including Joan and Sanford Weill Hall and the Perry Building addition. The project involves a 365-space parking structure addition to the west side of the Thompson Street Parking Structure, and 9,000 gross square feet of office and support space for the departments of Parking and Transportation Services and the Office of Budget and Planning. The existing structure and parking lots within the development zone currently provide 776 parking spaces. When construction is complete, the structure will accommodate 1,049 vehicles, for a net increase of 273 parking spaces.

**Energy Efficiency Measures**

- Electrical systems, including lighting, are designed to conform to requirements of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 90.1-1999.
- Parking Structure Addition mechanical systems conform to requirements of ASHRAE 90.1-1999.
- The office building envelope has been designed to exceed the requirements of ASHRAE 90.1-1999.
- Exhaust fans at underground parking are controlled by a CO2 monitoring system, in order to minimize unnecessary operation.
- Parking structure lighting controls are being installed to turn off lights near the exterior when daylight is adequate.
- Lighting in public and infrequently used areas of the office building are controlled by occupancy sensors.
- Energy efficient windows/glazing will be installed for increased thermal efficiency.

**Other Sustainability Features**

- By utilizing features of the adjacent existing parking structure, the Addition adds required new function with a minimum of new construction.
- Covered parking for motorcycles and secured and open parking for bicycles, which will increase the use of these low energy modes of transportation.
- Installation of a 7,800 cubic feet storm water detention tank, to minimize peak storm water run-off.
- Designed for a 75 year life, to minimize reconstruction costs.
- Oil/sand separators are being installed on existing sanitary and storm water effluents in order to improve the quality of water leaving the site.
- Low flow toilet flush mechanisms and position-actuated faucets are being installed to minimize water consumption.
- Natural daylighting is provided to all office spaces.

**Project Data**

- Budget: $ 15.7M
- Schedule: Completion scheduled for Fall 2010
- Square Feet: 9,000 gross sq. ft. of office space and 365 parking spaces

## Towlsey Center for Children

**Project Description**

The new Center will replace the existing facility with an approximately 22,000 gross square foot building on the same site. The facility will have two stories above a partial basement, and include an option for future expansion space. Approximately 14,000 net square feet will provide capacity for 142 children within the new Towsley Center, approximately double its current capacity.

**Energy Efficiency Measures**

- Increased insulation in foundation walls, exterior walls, and roof assemblies
- Energy efficient windows/glazing for increased thermal performance
- Reduction of lighting levels through use of occupancy sensors
- Controls to shut down air flow to specific spaces when they are unoccupied
- Use of occupancy sensors to reset space temperatures to allow wider temperature swings when rooms are unoccupied
- Increase thermostat deadbands (the gap between the heating setpoint and cooling setpoint during which no conditioning is provided)
- Use of controls to optimize fan speeds supplying air to VAV (variable air volume) boxes

**Other Sustainability Features**

- Use of an Erosion and Sedimentation Control Plan during construction to reduce pollution from construction by controlling soil erosion, waterway sedimentation, and airborne dust generation
- Towsley Center for Children is constructed on the site of the original center in lieu of a greenfield site
- Center is sited on public and UM bus routes, encouraging use of public transit
- Original area of the site designated and developed for parking was significantly reduced (to lessen pollution and land development impacts)
- Reclaimed selected elements from the original center for re-use as interior windows and millwork accents.
- Use of water conserving plumbing fixtures.
- Use of select sustainable materials (eg synthetic slate roofing ,PVC-free flooring tile and carpets)
- Use of low-VOC materials (eg carpets, paints)
- Use of regional and local materials where possible (eg, brick)
- Water-efficient landscaping

**Project Data**

- Budget: $8M
- Schedule: Completion scheduled for Fall 2009
- Square Feet: 22,000 gsf

## UMHHC Parkview Medical Center and Scott and Amy Prudden Turner Memorial Clinic Building Demolition Project

**Project Description**

The University of Michigan Hospitals and Health Centers (UMHHC) propose to demolish the Parkview Medical Center and Scott and Amy Prudden Turner Memorial Clinic buildings. The demolition of these buildings has been in our master plan for several years and is possible because the clinical functions are now housed in the W. K. Kellogg Eye Center and Brehm Tower. The buildings no longer meet the needs of the UMHHC and are not conducive to reuse for clinical or office functions. This project will demolish both buildings, renovate the existing easterly portion of the W. K. Kellogg Eye Center that connects to these buildings, including a new point of entry, and expand the parking lot. The scope of this project includes the architectural, mechanical and electrical work necessary to accomplish these improvements. Although there will be a temporary loss of the spaces in the adjacent parking lot during construction, at project completion there will be a net increase of approximately 75 parking spaces.

**Energy Efficiency Measures**

- Use of Energy Star products or products listed as Federal Energy Management Program (FEMP).
- Provision for task lighting to reduce amount of general lighting required.
- Use of occupancy sensors to reduce lighting energy usage when rooms are unoccupied.
- Use of energy saving lamps and electronic ballasts in lighting fixtures with a minimum power factor of 0.90.
- Photoelectric controls and/or timers for site lighting to control daily illumination hours.
- Use of split system heat pump units for new conference room area.
- All motors larger than 0.75 HP to be 'premium efficient' rating.
- Use of battery powered sensor faucets in toilet rooms.
- A swirl concentration device will be used to improve the quality of the storm water leaving the site. This device will remove more than 80% of the total suspended solids in the storm water runoff.

**Demolition Phase Sustainable Features**

- Abate asbestos containing materials and proper handling and disposal of lead containing materials.
- Proper disposal of regulated building waste such as; mercury containing articles, batteries, smoke detectors, and electronic waste, among other building articles.
- All non-hazardous contaminates soils are brought to a Class ll landfill.
- Provide Toxicity Characteristic Leaching Procedure (TLCP) testing on select materials to determine whether hazardous chemicals will leach from waste material.
- Material is then disposed as either hazardous or non-hazardous material.
- No vehicular idling allowed on site and all diesel equipment is fueled by biodiesel fuel B-20.
- All diesel equipment utilizes exhaust after treatment devices to reduce emission from diesel engines.
- UM maintenance shops shall have the opportunity to salvage and reuse building components. Maintain best practices for soil erosion and sediment control procedures.

**Project Data**

- Budget: $5M
- Schedule: Completion scheduled for Fall 2012
- Square Feet: 69,000 gsf

## University Hospitals Central Sterile Supply Expansion

**Project Description**

Surgical procedure activity in the University Hospital operating rooms has increased by 30 percent since 1995. The volume of instrumentation requiring sterilization has exceeded the capacity of the current processing facilities. To achieve improvements in space, equipment, and work process, an expansion of the central sterile supply area on level B2 of University Hospital is proposed. A renovation of approximately 16,000 gross square feet of space will consolidate surgical instrument processing, assembly, sterilization and storage operations. The scope of the project includes the architectural, mechanical, and electrical work necessary to accomplish these improvements.

**Energy Efficiency Measures:**

- Variable air volume control used where there are nonessential air pressure relationships including offices, locker rooms, break room, etc.
- Limited use of incandescent lighting.
- Occupancy sensors used where appropriate.
- Low consumption urinals, lavatory faucets, and shower heads used.
- Premium efficiency motors were used on all new motor driven equipment.

**Other Sustainability Features**

- NA

**Project Data**

- Budget: $ 6,900,000 Total
- Scheduled Completion: Winter 2012
  (actual completion Fall 2011)
- Square Feet: 16,000 gsf

## University Hospitals Emergency Department Expansion

**Project Description**

A multi-phase renovation of approximately 22,500 gross square feet on level B1 of University Hospital will create 27 treatment bays, 6 triage rooms, 2 family consultation rooms, as well as expanded and improved patient reception areas for the Emergency Department. This renovation also includes the relocation and expansion of the Psychiatry Emergency Service to space adjacent to the Emergency Department. The scope of this project includes the architectural, mechanical and electrical work necessary to accomplish these improvements.

**Energy Efficiency Measures:**

- The entry vestibule design is such that direct heating and cooling loses are minimized including insulated panels and glazing.
- Variable air volume control used where there are nonessential air pressure relationships including offices, locker rooms, break room, etc.
- Limited use of incandescent lighting.
- Occupancy sensors used where appropriate.
- Low consumption urinals, lavatory faucets, and shower heads used.
- Premium efficiency motors were used on all new motor driven equipment.

**Other Sustainability Features**

- NA

**Project Data**

- Budget: $ 13,900,000
- Scheduled Winter 2012
- Square Feet: 22,500 gsf

## University Hospital Kitchen Renovations for Room Service Protocol

**Project Description**

The patient food kitchen on level B2 in University Hospital opened in 1986 and utilizes the “cook-chill-reheat” food production method. This process has been replaced in many hospitals with an on-demand “room service” approach to nutrition that enables patients to have more control of their environment. This process is already in place for pediatric patients in C. S. Mott Children’s Hospital and will be utilized in the new C. S. Mott Children’s and Von Voigtlander Women’s Hospitals currently under construction. This project will renovate approximately 13,000 gross square feet on level B2 of University Hospital to allow the shift of Food and Nutrition Services for adult patients at University Hospital and the Cardiovascular Center from cook-chill-reheat production to the room service method. Food service operations will be relocated to the North Campus Research Complex during construction.

**Energy Efficiency Measures**

- Use occupancy sensors to control lighting in office and other support spaces.
- Use of energy efficient lighting fixtures.
- High efficiency refrigeration coolers and freezers.
- Energy efficient kitchen equipment.
- Premium efficiency motors throughout.

**Other Sustainability Features**

- Recycling/reuse of construction waste and kitchen equipment.
- Use of selected sustainable materials such as quarry tile flooring.
- Use of Low-VOC materials such as sheet flooring, adhesives, sealants, coatings and paints.
- Use of regional and local materials where possible.
- Enhanced commissioning, construction to improve Indoor Air Quality management and thermal comfort improvements.

**Project Data**

- Budget: $8.5 M
- Schedule: Completion scheduled for Fall 2012
- Square Feet:  13,000 gsf

## University Hospital Medical Procedure Unit Expansion

**Project Description**

This project will expand the MPU space by approximately 4,000 gross square feet into the exterior courtyard on level 2 adjacent to the MPU, and renovate 2,200 gross square feet of existing space. The expansion will create additional prep/recovery bays, procedure rooms, and storage space, and expand the patient and family reception and waiting room. The project will also include networking upgrades that will accommodate newer technology for endoscopic procedures. The estimated cost of the project is $6,000,000.

**Energy Efficiency Measures**

The project utilizes existing central HVAC equipment but the goal was to utilize energy efficient methods and strategies for the new construction wherever possible.

- Utilized variable air volume system.
- Installed energy efficient VFD and premium efficiency motors on existing central equipment supply and return fans serving space.
- Revised controls sequence for supply and return fans.
- Provided digital controls for new VAV boxes.
- Incorporated occupancy sensors to automatically shutoff lights where appropriate.
- Used high efficiency fluorescent lighting in all general spaces.
- Use ultra-high efficiency LED exit lights, night lights and down lights in procedure rooms.
- Provided multi-level switching and dimming of lights.
- Maximized insulation in new roof assembly, exceeding min energy code requirements.
- Low VOC interior finishes (Paints, Flooring, Wall coverings, etc).

**Other Sustainability Features**

- High level of air quality in spaces.
- Infill of exterior courtyard, reuse of existing wall construction.

**Project Data**

- Budget: $6 M
- Schedule: Completion scheduled for Spring 2012
- Square Feet:  4,000 gsf addition and 2,200 gsf renovation

## Wolverine Tower Renovations for Business and Finance

**Project Description**

Constructed in 1973, the eleven-story, approximately 225,000-gross-square-foot Wolverine Tower building was purchased by the University in 1992 and houses administrative units. A renovation of approximately 61,000 gross square feet on seven levels will consolidate units currently spread across several floors, move all staff workstations out of the basement, and accommodate the relocation of MHealthy into Wolverine Tower, resulting in more efficient use of office space and increased cross-departmental sharing of both administrative staff and of common areas, such as conference and training rooms, kitchens and lunch rooms. The project will also address life safety and accessibility concerns and add a common lunch room, wellness area and showers, and a personal room.

**Energy Efficiency Measures and Other Sustainability Features**

- New lighting fixtures exceed ASHRAE+30% and will save an estimated 36,000 watts, which equates to approximately $36,000 worth of electricity savings per year.
- There will be additional savings from the installation of occupancy sensor and time controls in offices and conference rooms.
- New variable air volume (vav) boxes will be installed to replace original building vavs, which will be more efficient in controlling temperature.

**Project Data**

- Budget: $6.1 M
- Schedule: Completion scheduled for Fall 2011
- Square Feet:  61,000 gsf

## Vera Baits II Renewal

**Project Description**

Constructed in 1967, the approximately 175,000-gross-square-foot, five-building Vera B. Baits II complex (Baits II) provides housing for approximately 550 students. The renovation will update infrastructure, including: new fire detection, alarm, and suppression systems; wireless high-speed network access; new energy-efficient windows and roof systems; and new interior finishes and furnishings. Community spaces will be reorganized or repurposed to create spaces for academic activities, student interaction, and opportunities for creating a sense of community.

**Energy Efficiency Measures**

- New roofing complying with ASHRAE 90.1-2007 standards, with insulating values between R21 and R40.
- New aluminum windows with 1-inch, double-pane insulated glazing, thermal breaks, and special coatings.
- New energy-efficient light fixtures complying with ASHRAE 90.1-2007 standards, with occupancy sensors.
- New toilet fixtures with water-saving 1.6 gallons-per-flush and dual-action flush valves (0.6 gpf for liquids).
- New plumbing faucets and shower heads with water-saving features.
- New energy-efficient and paper-saving electric hand dryers.
- New energy-efficient kitchen appliances and computers.

**Other Sustainability Features**

- Use of salvaged existing student furniture from other U-M dormitories instead of new furniture.
- Use of new flooring with recycled content, low-VOC emissions, and regionally-produced material.

**Project Data**

- Budget: $11.95M
- Schedule: Completion scheduled for Summer 2012.
  Regent completion is September 30, 2013.
- Square Feet: 175,000 gsf

## Yost Ice Arena Seating Replacement and Fan Amenities Improvement


**Project Description**

This project will replace the spectator seating on the east, south and west sides of the rink, improving accessibility as well as emergency egress. The project also includes improvements to the east and west concourses, conversion of the level four west side media balcony into a series of loge boxes, a new level five on the west side for media, as well as new corner and stair platforms for additional seating. Infrastructure improvements will be made, including upgrading the existing fire alarm system, extending the existing fire suppression system to areas which are not currently protected, and replacing the exterior windows.

**Energy Efficiency Measures**

- The project will comply with ASHRAE Standards 90.1-2007.
- Replacing existing single pane window with high performance glazing system.
- Where mechanical units are replaced they will be replaced with high efficiency units.

**Other Sustainability Features**

- We are renovating an existing building instead of tearing it down and/or building a new building.
- During construction best management practices to control sedimentation and erosion will be used.

**Project Data**

- Budget: $14 M
- Schedule: Completion scheduled for Fall 2012