Biannual Sustainability Report

Projects $5 Million and Over

March 2018

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Biological Science Building

Project Description

A new Biological Science Building of approximately 300,000 gross square feet with a connection to the Life Sciences Institute (LSI) Building to increase the utilization of its dock and vivarium functions. A small renovation to LSI will also be necessary for vivarium and related support activities. The new building will house research laboratories, associated support functions, offices, classrooms, vivarium services, and four museums - Anthropology, Natural History, Paleontology and Zoology museums. The laboratories will be constructed in an open plan to allow for much greater collaboration than what can be achieved in the existing buildings, increased flexibility, space utilization and better management. The proposed site of the BSB is adjacent to LSI where both North Hall and the Museums Annex currently exist.

Energy Efficiency Measures

- The building's design and systems include a number of energy efficient features that will allow for an estimated 30% energy savings compared with an energy code compliant building as defined in ASHRAE 90.1-2007 Appendix G
- Exterior envelope rain screen wall system to minimize air leakage even under the negative pressurization required for laboratories
- Frit and high performance coatings on the glazing reduce solar heat gain
- Occupancy sensors to turn off lights when spaces are un-occupied
- Chilled beams for conditioning spaces
- Preheated outside air with process cooling water to provide precondition makeup air
- Return air from offices and classrooms utilized as makeup air to laboratories
- Conditioned open lab air used to help cool lab equipment spaces
- Energy recovery at fume hoods
- Chillers and heaters to utilize heat recovery to efficiently provide simultaneous heating and cooling

Other Sustainability Features

- This project is registered under the LEED® green building certification program with the certification goal of LEED Silver. This project will use the LEED for New Construction v2009 rating system.
- Project site located near public and U-M bus routes to encourage use of public transit
- Close proximity to basic services such as banks, theaters and restaurants to encourage building occupants to walk instead of drive
- Stormwater management design to reduce post development site runoff by 41% for the two-year, 24 -hour design storm
- Centrally controlled irrigation management system to ensure proper watering through monitoring of flow rates and weather
- Designed to reduce water consumption by a minimum of 20% beyond Michigan Plumbing Code; savings obtained through the use of low flow bathroom fixtures
- Construction waste to be diverted from landfills when possible
- Low-VOC adhesives and sealants, paints and coatings, flooring systems, and composite wood and agrifiber products
- Materials and products used to be extracted and manufactured within 500 miles of the project site when possible
- Materials used to contain recycled content when possible

Biological Science Building

Project Data

- Budget: $261 M
- Schedule: Completion Scheduled for Summer 2018
- Square Feet: 312,000 gross sq. ft.

Status as of March 2018

- Project Status: Construction
- Design Complete: 100%
- Construction Complete: 98%

Dearborn Engineering Lab Building Replacement

Project Description

The project will consist of approximately 57,000 gross square feet of renovation and 66,000 gross square feet of new building construction. The project will include classrooms, research and teaching laboratories, faculty offices, student support spaces, and regional boiler and electrical distribution equipment replacement. The new facility will provide an active learning studio approach to facilitate entrepreneurial problem solving to complement the more product development-oriented laboratories of industry partners, encourage multidisciplinary collaboration in the context of 21st century engineering, and offer academic pathways to exceptional careers for decades to come.

Energy Efficiency Measures

- The building's design and systems include a number of energy efficient features that will target an estimated 30% energy savings compared with an energy code compliant building as defined in ASHRAE 90.1-2007 - Appendix G
- Exterior envelope rain screen wall system to minimize thermal bridging and air leakage, even under the negative pressurization required for laboratories
- Improved air-conditioning system efficiency through the use of chilled beams and dedicated outside air systems
- Return air from offices and classrooms utilized as makeup air to laboratories
- Energy recovery wheels in the dedicated outside systems to reduce energy consumption
- Occupancy sensors to turn off lights when spaces are un-occupied

Other Sustainability Features

- This project is registered under the LEED® green building certification program with the certification goal of LEED Silver. This project will use the LEED for New Construction v2009 rating system.
- Project site located near public bus routes to encourage use of public transit.
- Close proximity to basic services such as banks, theaters and restaurants to encourage building occupants to walk instead of drive
- Native and drought tolerant plantings will be used on site to reduce irrigation water use by at least 50%
- Storm water management system that limits increased (post-construction) runoff levels of storm water into the existing storm water system
- Low-flow fixtures reduce water consumption by a minimum of 20% beyond Michigan Plumbing Code; savings obtained through the use of low flow bathroom fixtures.
- Construction waste to be diverted from landfills when possible
- Low-VOC adhesives and sealants, paints and coatings, flooring systems, and composite wood and agrifiber products
- Regional materials specified whenever possible to reduce negative environmental impacts associated with transportation
- Materials with recycled content specified whenever possible to reduce use of virgin materials
- Use low-impact refrigerants minimizing contributions to climate change

Project Data

- Budget: $90 M
- Schedule: Completion Scheduled for Summer 2020
- Square Feet: 57,000 gross sq. ft. renovation
  66,000 gross sq. ft. addition

Status as of March 2018

- Project Status: Schematic Design
- Design Complete: 95%
- Construction Complete: 0%

Flint Wm R Murchie Science Bldg Expansion

Project Description

The University of Michigan-Flint is proposing a project to construct an approximately 65,000-gross-square-foot addition to the William R. Murchie Science Building. The purpose of this addition is to address immediate space limitations; meet growing demand for instructional, research, and collaborative spaces for the science, technology, engineering, and math (STEM) disciplines; and create engineering-specific instructional and research laboratories. As regional, state, and national labor markets call for greater numbers of qualified STEM graduates, the proposed expansion will enable the University of Michigan-Flint to deliver the highest-quality education to ever-increasing numbers of students pursuing degrees in STEM disciplines.

Energy Efficiency Measures

- The building's design and systems will include a number of energy efficient features that will allow for an estimated 30% energy savings compared with an energy code compliant building as defined in ASHRAE 90.1-2007 Appendix G
- Active chilled beams to reduce overall building energy consumption used to condition the interior of the building
- High Efficiency Condensing Boilers to reduce hot water heating costs and building heating costs
- High Efficiency Air Cooled Chillers used to reduce costs of air conditioning
- Energy Recovery Wheel
- Energy Recovery Run-A Round loop
- Increased R-Value of roof insulation
- Increased R-Value of wall insulation
- Improved exterior glazing system performance
- Reduced watts per square foot dedicated to lighting
- LED lighting will be used throughout the facility, LED lamps are significantly more efficient than florescent lamps

Other Sustainability Features

- This project is registered under the LEED® green building certification program with the certification goal of LEED Silver. This project will use the LEED for New Construction v2009 rating system.
- The location of the building on an existing urban campus promotes development density and community connectivity
- Public Transportation Access - the building's location allows users and occupants to utilize public transportation, which reduces single use vehicles on campus
- Storm water collected from the roof of the building will be directed to a new rain garden to which will naturally filter storm water
- Designed to reduce water consumption by a minimum of 20% beyond Michigan Plumbing Code; savings obtained through the use of low-flow plumbing fixtures
- No new parking will be added as part of this project
- Construction Waste Management, more than half the waste generated during construction will be diverted from landfills and either salvaged for reuse, or recycled.
- Use of materials with recycled content
- Use of regional materials
- Use of Low-Emitting Paints and Coatings

Flint Wm R Murchie Science Bldg Expansion

- Use of Low-Emitting Adhesives and Sealants
- Enhanced commissioning
  Enhanced refrigerant management

Project Data

- Budget: $39 M
- Schedule: Completion Scheduled for Winter 2020
- Square Feet: 65,000 gross sq. ft.

Status as of March 2018

- Project Status: Study-Planning
- Design Complete: 5%
- Construction Complete: 0%

Ford Motor Company Robotics Laboratory

Project Description

The project was proposed to be a three-story, approximately 100,000-gross-square-foot research and teaching facility for the College of Engineering's robotics program estimated to cost $54,000,000. The College of Engineering now proposes to add a fourth story and 40,000 gross square feet to the project to accommodate space for its corporate partner Ford Motor Company that will locate collaborative research activities within the new building. The revised design for the new Robotics Laboratory is approximately 140,000 gross-square-feet with an updated budget of $75,000,000. This new state-of-the-art facility will house research and testing laboratories, associated support functions, offices and classroom space. These spaces will be constructed in an open plan to allow for greater collaboration, increased flexibility, and better space utilization. Several of the key testing labs include a robot walking lab, a flight testing lab, a rehabilitation robotics lab, and labs for electronics and software development. The original project anticipated an additional parking demand of 30 spaces. The total increased parking demand is now anticipated to be 130 parking spaces that will be met with additional parking on North Campus.

Energy Efficiency Measures

- The building’s design and systems targeting a 30% energy savings compared with an energy code compliant building as defined in ASHRAE 90.1-2007
- Use of triple glazed high performance glass at south elevation curtain wall. The south elevation curtain wall system will also have sunscreens and fritted glass to reduce solar heat gain.
- Use of insulated metal panels with limited glass area at remaining elevations maintain views and daylighting while providing overall ‘R’ values that effectively manage performance of the building envelope.
- An enthalpy energy recovery system will be used with a dedicated outside air handling unit to capture heat from the exhaust air and utilize it to pre-heat/pre-cool supply air.
- Chilled beams will be used for conditioning spaces with reheat coils.
- Occupancy sensors to turn off lights when spaces are un-occupied.

Other Sustainability Features

- This project is registered under the LEED® green building certification program with the certification goal of LEED Silver. This project will use the LEED for New Construction v2009 rating system.
- Storm water management system that limits increased (post-construction) levels of storm water into the existing storm water system.
- Building’s orientation takes advantage of natural daylighting by placing the glazed, shaded event space on the south face of the building and minimizing glazing on the west façade.
- Construction waste to be diverted from landfills when possible
- Low-VOC adhesives and sealants, paints and coatings, flooring systems, and composite wood and agrifiber products
- Materials and products used to be extracted and manufactured within 500 miles of the project site when possible
- Materials used to contain recycled content when possible

Ford Motor Company Robotics Laboratory

Project Data

- Budget: $75 M
- Schedule: Completion Scheduled for Winter 2020
- Square Feet: 139,380 gross sq. ft.

Status as of March 2018

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

Kraus Building Renovation and Addition

Project Description

This project will enable the School of Kinesiology to consolidate its programs and operations currently in the School of Kinesiology Building, the Central Campus Recreation Building, and leased space to Kraus and provide space for future growth. A deep renovation of Kraus is planned as well as construction of a 62,000-gross-square-foot infill addition within the exterior courtyard.

Energy Efficiency Measures

- The building's design and systems will include a number of energy efficient features that will allow for an estimated 31.8% energy savings compared with an energy code compliant building as defined in ASHRAE 90.1-2007 Appendix G
- Replace all windows, both glazing and frame, to improve thermal performance
- Neutral air chilled beam system with passive desiccant energy recovery wheel
- Daylight sensors at the atrium
- Energy efficient lighting
- Occupancy sensors to turn off lights when spaces are unoccupied

Other Sustainability Features

- This project is registered under the LEED® green building certification program with the certification goal of LEED Silver. This project will use the LEED for New Construction v2009 rating system.
- Chilled water is generated at high efficiency central chiller plant
- Public Transportation Access - the building's location allows users and occupants to utilize public transportation, which reduces single use vehicles on campus
- All storm water from the building and site will be directed to the new below grade infiltration structures
- All landscape to be native or adaptive as well as diversified to have the best chance of long-term survival
- Building reuse- the project will maintain existing exterior walls, floors and roof
- Low emitting materials will be specified for use whenever possible
  Local and regional materials will be specified for many parts of this building

Project Data

- Budget: $120 M
- Schedule: Completion Scheduled for Fall 2020
- Square Feet: 164,700 gross sq. ft. renovation
  57,300 gross sq. ft. addition

Status as of March 2018

- Project Status: Construction Documents
- Design Complete: 65%
- Construction Complete: 0%

Literature, Science, and the Arts Building First Floor Renovation and Addition

Project Description

The College of Literature, Science, and the Arts (LSA) proposes to renovate approximately 24,000 gross square feet of the first floor of the building and construct an addition of approximately 21,000 gross square feet that will provide space for its internship program and for an Opportunity Hub for students to explore the connection between their liberal arts education and their goals and aspirations. The LSA internship program will include all relevant student services, such as access to internships, funding, employers, and alumni to allow LSA students to engage in opportunities throughout their undergraduate experience. The space is designed to encourage interaction and be open, welcoming, vibrant, and student-focused.

Energy Efficiency Measures

- The building's design and systems include a number of energy efficient features that will allow for an estimated 20% energy savings compared with an energy code compliant building as defined in ASHRAE 90.1-2007 Appendix G.
- Triple pane glazed curtainwall with jumbo glass to better insulate and reduce thermal transfer
- Occupancy sensors for HVAC and lighting in regularly occupied spaces
- Daylighting strategies and LED lights to reduce lighting load

Other Sustainability Features

- This project is registered under the LEED® green building certification program with the certification goal of LEED Silver. This project will use the LEED for New Construction v2009 rating system.
- Project site is located near public and U-M bus routes to encourage use of public transit
- Close proximity to basic services such as restaurants, banks, and stores to encourage building occupants to walk instead of drive
- Landscaping contains native and drought tolerant plantings to reduce irrigation water use by at least 50% from baseline
- Low-flow water fixtures selected to reduce water consumption
- Construction waste to be diverted from landfills when possible
- Low-impact refrigerants to minimize contributions to climate change
- Low-VOC adhesives and sealants, paints and coatings, flooring systems, and composite wood and agrifiber products
- Materials and products used on the project to be extracted and manufactured within 500 miles of the project site when possible
- Materials used on the project to contain recycled content when possible Materials used on the project to contain recycled content when possible
- Certified wood materials to be used when possible
- A green building education platform will be used to inform building occupants and visitors

Literature, Science, and the Arts Building First Floor Renovation and Addition

Project Data

- Budget: $35 M
- Schedule: Completion Scheduled for Summer 2019
- Square Feet: 24,500 gross sq. ft. renovation
  18,000 gross sq. ft. addition

Status as of March 2018

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

Michigan Union Renovation

Project Description

This project proposes a deep renovation of this 250,000-grosssquare-foot landmark ofboth architectural and historical significance. This project will improve accessibility under the Americans with Disabilities Act; create social space on the main level by enclosing the courtyard; expand and improve informal gathering spaces; create state-of-the-art student organization and student involvement space; create appropriate spaces for counseling and student support services; and add additional meeting space near the main ballroom. The project will also address deferred maintenance, including life safety, electrical, mechanical, and plumbing system improvements; elevator replacements and upgrades; replacement of the roof and restoration and replacement of windows; interior finish upgrades on floors one through four; and restroom upgrades.

Energy Efficiency Measures

- The building's design and systems will include a number of energy efficient features that will allow for an estimated 37% energy savings compared with an energy code compliant building as defined in ASHRAE 90.1-2007 Appendix G
- Energy efficient, regional chiller plant located in South Quad will serve cooling needs of the Michigan Union
- Improved air conditioning system throughout the building
- LED lighting used in all renovated areas
- Occupancy sensors used in all renovated areas
- Daylighting controls in the courtyard

Other Sustainability Features

- Project site is located near public and U-M bus routes to encourage use of public transit
- Most of the existing trees to be preserved
- A 20% water consumption savings beyond Michigan Plumbing Code is anticipated; savings will be obtained through the use of low floor fixtures
- All exterior walls and a majority of interior walls to be reused
- Local and regional building materials will be sought wherever possible
- Finishes and furnishings will be selected with low VOCs
- Enclosed courtyard to bring natural daylight to the interior of the building thereby reducing the need for artificial lighting while providing occupants with a connection to the outdoors

Project Data

- Budget: $85.2 M
- Schedule: Completion Scheduled for Winter 2020
- Square Feet: 255,200 gross sq. ft. renovation

Status as of March 2018

- Project Status: Bid-Award
- Design Complete: 95%
- Construction Complete: 0%

MMED Brighton Health Center South

Project Description

UMHS proposes the construction of a new and larger ambulatory care presence in the Brighton market. This project will construct an approximately 297,000-gross-square-foot building on university-owned land near the existing Brighton Health Center on Challis Road. The new building will include adult and pediatric specialty care, infusion, a comprehensive musculoskeletal center, sleep lab, ambulatory diagnostic and treatment center, radiation oncology. operating rooms. medical procedure unit, pharmacy, radiology, and lab services.

Energy Efficiency Measures

- Glazing with low-e coating to reduce thermal losses in the winter and radiation gain in the summer
- LED lighting used exclusively
- Occupancy sensors throughout the building to turn off the lights when rooms are unoccupied
- HVAC setback mode for use during off hours in the OR and Procedure Rooms
- Variable frequency drives on equipment to conserve energy when demand is low
- High efficiency motors and transformers to reduce energy consumption

Other Sustainability Features

- Landscape design to include naturalized plantings to minimize maintenance and irrigation needs
- A retention pond to control stormwater quantity and quality leaving the site
- A 20% water consumption savings beyond Michigan Plumbing Code is anticipated; savings obtained through the use of low flow fixtures and dual flush toilets
- Construction waste to be diverted from landfill when possible
- Adjustable thermostats for occupant comfort
- Low-VOC interior finishes

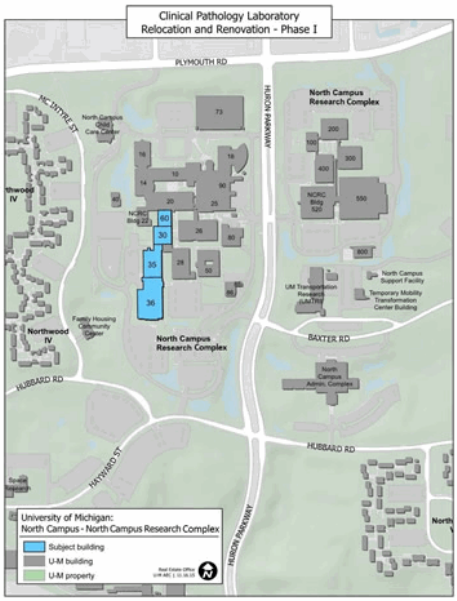
Project Data

- Budget: $175 M
- Schedule: Completion Scheduled for Summer 2018
- Square Feet: 297,000 gross sq. ft.

Status as of March 2018

- Project Status: Construction
- Design Complete: 99%
- Construction Complete: 77%

MMED North Campus Research Complex Buildings 30, 35, 36, and 60, University Hospital, and University Hospital South Clinical Pathology Laboratories Relocation and Renovation


Clinical Pathology Laboratory
Relocation and Renovation - Phase I
PLYMOUTH RD
HUBBARD RD
BAXTER RD
HUBBARD RD
HUBBARD RD
HUBBARD

MMED North Campus Research Complex Buildings 30, 35, 36, and 60, University Hospital, and University Hospital South Clinical Pathology Laboratories Relocation and Renovation

- Occupancy sensors utilized in office areas to turn off lights and reduce air quantities when spaces are un-occupied
- High-efficiency lighting specified: LED's and high-efficiency T-5 fluorescents

Other Sustainability Features

- Project site located near public and U-M bus routes to encourage use of public transit
- Close proximity to basic services such as banks and restaurants to encourage building occupants to walk instead of drive
- Campus with green space to promote interaction with the natural environment
- Changing rooms provided to promote bicycle use
- Low flow, high efficiency plumbing fixtures
- Use of low-VOC paints, flooring, adhesives and sealants
- Use of regional materials when possible
- Use of recycled materials when possible

NOTE: 186,000 gsf reflects the square footage for the entire project. Phase 1 @ NCRC approximately 145,000 gsf and Phase 2 @ UH & UH South is approximately 41,000 gsf. The Construction Complete percentage reflects the state of construction progress for Phase 1 at NCRC, while the Design Complete percentage is for Phase 2 at Uh & UH South, which is still in the design phase.

Project Data

- Budget: $160 M
- Schedule: Completion Scheduled for Summer 2019
- Square Feet: 186,000 gross sq. ft. renovation

Status as of March 2018

- Project Status: Construction
- Design Complete: 75%
- Construction Complete: 91%

North Campus Recreation Building Renovation

Project Description

The project includes renovation of the entire approximately 67,000-grosssquare-foot building, including renovated racquetball and squash courts, sauna, staff offices, and meeting rooms; expanded weight training and cardio spaces; a group exercise room; Americans with Disabilities Act-accessible locker rooms; a gender-inclusive locker room and restroom; and a resurfaced running track that removes the banked turns. The project scope will also address heating, ventilation, and air conditioning systems; replace the electrical substation and boilers; update the fire detection and alarm system; install fire suppression; replace lighting and pool equipment; reconfigure the main building entrance to improve functionality and visibility; and construct a small canopy addition.

Energy Efficiency Measures

- The building's design and systems will include a number of energy efficient features that will allow for energy savings of about 30% compared with a code energy compliant building as defined in ASHRAE 90.1-2007 Appendix G
- New Windows - utilizing insulated energy efficient units
- Enthalpy Wheel - allows return air to condition outside air which reduces heating/cooling load in the air handling unit
- HVAC Controls - designed to prevent simultaneous heating and cooling; control temperature using occupancy sensors
- Increase thermostat "deadband" to limit equipment cycling
- Variable drives on equipment allow equipment to conserve energy when demand is low
- Variable air volume HVAC systems
- Ventilation of mechanical fan room with relief air
- Chilled water is generated at high efficiency central chiller plant
- Direct digital controls
- Energy Efficient Lighting - new natatorium lighting, LED lighting
- Daylight Harvesting - switching perimeter lighting to take advantage of daylight
- Daylighting & Views - glazing has been added to increase the proportion of spaces that will have direct access to natural daylight and views to the out-of-doors
- Lighting Controls - occupancy sensors, photocells, time clocks

Other Sustainability Features

- Public Transportation Access - the building's location allows users and occupants to utilize public transportation, which reduces single use vehicles on campus. The new canopy adjacent to the bus stop encourages use
- Building Reuse - the project will maintain at least 75% of existing walls, floors, and roof
- Construction Waste Management - should achieve a high degree of success in reducing the amount of construction and waste materials being sent to landfills
- Recycle - Most of the new resilient sports flooring is planned to be procured from manufacturers who use a large quantity of recycled rubber products in the flooring systems
- Bike Share Program - The facility includes a City-owned on-site Bike Share rack
- New thermally efficient and double insulated aluminum curtain wall window systems will be installed to provide transparency into and out of the exercise spaces
- A 20% water consumption savings beyond Michigan Plumbing Code is anticipated. Savings will be obtained via use of dual flush water closets, 1/8 gallon flush urinals, and automatic sensor operated

North Campus Recreation Building Renovation

faucets

- New Athletic Wood Flooring for this facility will be manufactured from Certified Wood and will be procured within a 500 mile radius of the site
- Low emitting materials will be specified for use whenever possible
- Local and regional materials are being specified for many parts of this building

Project Data

- Budget: $17.4 M
- Schedule: Completion Scheduled for Fall 2018
- Square Feet: 66,800 gross sq. ft. renovation

Status as of March 2018

- Project Status: Construction
- Design Complete: 100%
- Construction Complete: 60%

North Campus Research Complex Buildings 20 and 25 Laboratory Renovation

Project Description

This project will renovate approximately 158,000 gross square feet of space within both buildings to accommodate the Medical School's wet laboratory research growth over the next decade. A 6,900-gross-square-foot infill addition will be constructed to improve connectivity between the buildings and throughout the complex. The project will also address deferred maintenance in both buildings, including heating, ventilation, air conditioning, electrical, and life safety system upgrades, as well as code related items; and provide accessibility improvements and new finishes in public spaces.

Energy Efficiency Measures

- The building's design and systems targeting a 30% energy savings compared with an energy code compliant building as defined in ASHRAE 90.1-2007.
- The exterior glazing for the connector addition will include high performance low-e coating and frit coatings for energy savings.
- New EPDM roof membrane and polyisocyanurate insulation will help conserve energy.
- An enthalpy energy recovery system will be used with a dedicated outside air handling unit to capture heat from the exhaust air and utilize it to pre-heat/pre-cool supply air.
- Chilled beams will be used for conditioning spaces with reheat coils.
- Occupancy sensors to turn off lights when spaces are un-occupied.
- New LED fixtures to be provided throughout the project.
- Daylight sensors and dimming LED drivers to allow for daylight harvesting.

Other Sustainability Features

- Construction waste to be diverted from landfills when possible.
- Low-VOC adhesives and sealants, paints and coatings, flooring systems, and composite wood and agrifiber products will be used.
- Materials and products used to be extracted and manufactured within 500 miles of the project site when possible.
- Materials used to contain recycled content when possible.
- Majority or proposed casework for this project will be re-purposed from another NCRC facility.
- Low flow water use fixtures will be used where possible.
- Innovation in Design features will be incorporated where possible.

Project Data

- Budget: $78.5 M
- Schedule: Completion Scheduled for Fall 2019
- Square Feet: 157,927 gross sq. ft. renovation
  6,901 gross sq. ft. addition

Status as of March 2018

- Project Status: Design Development
- Design Complete: 95%
- Construction Complete: 0%

Oosterbaan Field House Football Performance Center and Infrastructure Improvements

The approximately 78,000-gross-square-foot Bennie Oosterbaan Field House was constructed in 1980, serves as the indoor playing field for lacrosse, and is also used for indoor practice of a variety of both intercollegiate and intramural and club sports. The Department of Intercollegiate Athletics proposes a project to construct a 32,000-gross-square-foot weight room, including a 5,000-gross-square-foot mezzanine level, within the existing building for strength and conditioning training for the intercollegiate football program. The project will also address infrastructure and life safety needs, including replacement of the existing roof, installation of new fire alarm and suppression systems, and upgrades to the heating, ventilation, air conditioning, and lighting systems throughout the building.

Schembechler Glenn E Hall Football Performance Center

The Department of Intercollegiate Athletics proposes a project to create a performance center at Glenn E. Schembechler Hall for the intercollegiate football program. A renovation of approximately 24,000 gross square feet and construction of additions totaling approximately 8,000 gross square feet (see attached map) is planned that will create state-of-the art spaces for training, recovery, and nutrition; as well as team meeting rooms, administrative space, and support staff locker areas.

Energy Efficiency Measures

Oosterbaan Field House Football Performance Center:

- Added wall insulation upper (framed) portion of N & S walls to meet ASHRAE 90.1-2007
- Added roof insulation to meet ASHRAE 90.1-2007
- Insulated glazing units in new storefront and roll-up doors
- High efficiency HVAC equipment including energy recovery wheel
- LED light fixtures with occupancy sensors
- High volume / low speed (HVLS) recirculating fans
- Light colored metal roof (minimizes heat gain and heat island effect)

Schembechler Glenn E Hall Football Performance Center:

- The building's design and systems will include a number of energy efficient features that will allow for an estimated 3% energy savings compared with an energy code compliant building as defined in ASHRAE 90.1-2007 Appendix G
- High performance glazing and increased insulation values in exterior wall assemblies for improved thermal performance
- Variable speed compressors allow for peak efficiency in low load conditions and avoid short cycling of equipment
- LED lighting
- Occupancy sensors turn off lights when spaces are unoccupied
- Pool water heating through use of building heating hot water
- Pool water heat recovery through use of heat pump chiller

Other Sustainability Features

Oosterbaan Field House Football Performance Center:

- Renovation and Reuse of existing building (minimizes landfill)
- Construction waste to be diverted from landfill whenever possible
- Designed to reduce water consumption by a minimum of 20% beyond Michigan Plumbing Code per U-M Design Guidelines by utilizing low flow plumbing fixtures.
- Added skylights and glazing to admit more natural light
- Light colored walls and ceilings to maximize ambient light

Schembechler Glenn E Hall Football Performance Center:

- Built on a previously developed site to reduce impact on environment
- Impervious surface area reduction to reduce storm water runoff
- Project site located near public and U-M bus routes to encourage use of public transit
- A 31.8% water consumption savings beyond Michigan Plumbing Code is anticipated ; savings obtained through the use of low flow bathroom fixtures
- Bottle refill station provided on electric water cooler(s) to promote use of reusable water bottles
- Construction and demolition waste to be diverted from landfills when possible
- Use of low-VOC flooring, adhesives and sealants
- Materials and products used to be extracted and manufactured within 500 miles of the project site when possible
- Materials used to contain recycled content when possible

Oosterbaan Field House Football Performance Center and Infrastructure Improvements

Project Data

- Budget: $21 M
- Schedule: Completion Scheduled for Winter 2018
- Square Feet: 32,215 gross sq. ft. renovation

Status as of March 2018

- Project Status: Construction
- Design Complete: 100%
- Construction Complete: 99%

Schembechler Glenn E Hall Football Performance Center

Project Data

- Budget: $14.8 M
- Schedule: Completion Scheduled for Winter 2019
- Square Feet: 20,000 gross sq. ft. renovation
  5,000 gross sq. ft. addition

Status as of March 2018

- Project Status: Design Development
- Design Complete: 50%
- Construction Complete: 0%

Trotter William Monroe Multicultural Center

Project Description

The proposed William Monroe Trotter Multicultural Center is a result of extensive outreach and input from a variety of constituents. Engagement included four town halls, eight focus group sessions, benchmarking to other university multicultural centers, and a survey of students. The new building is proposed to be approximately 20,000 gross square feet to accommodate replacement spaces from the current facility along with a multipurpose room that will be able to accommodate approximately 300 people in both banquet-style seating for conferences and events and an active learning configuration that will accommodate more than 100 students.

Energy Efficiency Measures

- The building's design and systems will include a number of energy efficient features that will allow for an estimated 37% energy savings compared with an energy code compliant building as defined in ASHRAE 90.1-2007 Appendix G
- Increased insulation value in wall assemblies for improved thermal performance
- High performance glazing assemblies for increased thermal performance
- Variable Refrigerant Flow heating and cooling equipment for increased energy efficiency
- Energy recovery function of Variable Refrigerant Flow heating and cooling system
- Energy recovery of exhaust air
- Energy efficient LED lighting throughout
- Use of occupancy sensors as lighting controls

Other Sustainability Features

- A 20% water consumption savings beyond Michigan Plumbing Code is anticipated; savings will be obtained through the use of low flow bathroom fixtures
- Project site located near public and U-M bus routes to encourage use of public transit
- Storm water management system will be created to infiltrate runoff from the increased impervious surface
- Porous pavers will be utilized in multiple areas
- Bicycle parking in front of the building to encourage bicycle usage

Project Data

- Budget: $10 M
- Schedule: Completion Scheduled for Winter 2019
- Square Feet: 20,000 gross sq. ft.

Status as of March 2018

- Project Status: Construction
- Design Complete: 100%
- Construction Complete: 24%

A. Alfred Taubman Health Sciences Library Renovation

Project Description

A renovation of approximately 137,000 gross square feet of space to create a smaller library collection, increased health sciences instructional space including a clinical skills and simulation suite, and spaces for computing, study, and faculty and student services. A 6,000-gross-square-foot addition will be constructed to improve vertical circulation

Energy Efficiency Measures

- The building's design and systems include a number of energy efficient features that allow for an estimated energy savings of 30% when compared with a code energy compliant building as defined in ASHRAE 90.1-2007 Appendix G
- High Performing Envelope including glazing with low-e coatings to reduce thermal losses in the winter and radiation gain in the summer
- Exterior sun-shading devices on the south facing elevation to minimize solar heat gain on sunny days
- Enthalpy Wheel allows return air to condition outside air which reduces heating/cooling load in the air handling unit
- Chilled Beams use chilled water as a cooling medium which reduces ductwork, shafts, and air handling unit size
- HVAC controls prevent simultaneous heating and cooling and occupancy sensors control temperature
- Efficient light fixtures and occupancy sensors reduce energy use

Other Sustainability Features

- This project is LEED® certified to the Gold level and achieved 67 points under the LEED for New Construction v2009 rating system.
- Project site located near public and U-M bus routes to encourage use of public transit
- Close proximity to basic services such as banks and restaurants to encourage building occupants to walk instead of drive
- Landscaping is made of native and adaptive plantings and does not require permanent irrigation
- Designed for a 38% water consumption savings beyond Michigan Plumbing Code; savings will be obtained via use of dual flush water closets, 1/8 gallon flush urinals, and automatic sensor operated faucets
- Building reuse of approximately 90% of existing walls, floors and roof
- Over 25% of materials used contain recycled content
- Over 35% of materials used were extracted and manufactured within 500 miles of the project site
- Low-VOC paints, flooring, composite wood, adhesives and sealants
- 88% of demolition and construction waste diverted from landfill

Project Data

- Budget: $55 M
- Schedule: Completion Scheduled for Fall 2015
- Square Feet: 137,000 gross sq. ft. renovation
  6,000 gross sq. ft. addition

Substantially Complete: June 2015

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

Alice Crocker Lloyd Residence 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. The scope of this project includes the architectural, mechanical, and electrical work necessary to accomplish these improvements.

Energy Efficiency Measures

- The building's design and systems include a number of energy efficient features that allow for an estimated 30% energy savings compared with an energy code compliant building as defined in ASHRAE 90.1-2007 Appendix G
- This project has been approved for the Designed to Earn ENERGY STAR® certification which recognizes that the design has met Environmental Protection Agency (EPA) criteria for energy efficiency
- Improved building envelope performance including wall insulation in existing exterior walls
- Chilled water utilized from Mechanical Services Building adjacent to Mosher-Jordan Residence Hall as the cooling sources for the resident rooms in lieu of DX units
- Enthalpy wheel in the mechanical system used to recover energy and utilize lost heat from the toilet room exhaust system
- Lighting power density reduced for the first and second floor common areas
- Occupancy sensors on first and second floor common spaces reduce run hours for the central station air handling units
- Increased inspections, including infrared scans, during construction performed to identify missing insulation, gaps in the enclosure, and other wall/roof assembly deficiencies and ensure an air tight envelope

Other Sustainability Features

- Project site located near public and U-M bus routes to encourage use of public transit
- Bike racks installed to encourage the use of bicycles for transportation
- No new parking provided on site (to reduce pollution and land development impacts)
- A 30% water consumption savings beyond Michigan Plumbing Code; savings obtained through the use of low flow bathroom fixtures
- Over 75% of the existing walls, floors, and roof re-used
- 50% of the interior non-structural elements re-used.
- Approximately 10% of materials from regional suppliers
- Low-VOC adhesives, sealants, paints, coatings, carpet systems, composite wood and agrifiber products
- Metal and brick from demolished portion of building diverted from landfill

Alice Crocker Lloyd Residence Hall Renovation

Project Data

- Budget: $56 M
- Schedule: Completion Scheduled for Summer 2012
- Square Feet: 176,000 gross sq. ft. renovation

Substantially Complete: August 2012

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

Art and Architecture Building A. Alfred Taubman Wing Project

Project Description

The wing will consist of 37,000 gross square feet and include new studio space, faculty offices, a new classroom, student support spaces and multipurpose space for the presentation of academic projects and for events. Approximately 11,000 gross square feet of space will be renovated in the existing building, expanding studio space on the third floor and locating faculty offices adjacent to the studio space, along with updating finishes in select areas.

Energy Efficiency Measures

- The building's design and systems include a number of energy efficient features that allow for an estimated 37% energy savings compared with an energy code compliant building as defined in ASHRAE 90.1-2007 Appendix G
- High performance glazing and increased insulation values in exterior wall assemblies for improved thermal performance
- Task lighting, energy efficient light fixtures, and the integration of natural daylight to reduce the building's electrical load
- Overall lighting power density designed to be 30% less than maximum allowable level mandated by ASHRAE standard 90.1-2007
- Occupancy sensors throughout the addition to turn off lights and HVAC when spaces are un-occupied
- Photo sensing to dim lighting in areas where ambient lighting is provided through skylights
- Displacement Ventilation to provide ventilation air to the occupant breathing zone more efficiently than typical HVAC systems

Other Sustainability Features

- This project is LEED® certified to the Gold level and achieved 65 points under the LEED for New Construction v2009 rating system.
- Project site located near public and U-M bus routes to encourage use of public transit
- Close proximity to basic services such as banks, theaters and restaurants to encourage building occupants to walk instead of drive
- Landscaping consists of native and adaptive plantings and does not require permanent irrigation
- Designed to reduce water consumption by 40% beyond Michigan Plumbing Code; savings obtained through the use of low flow bathroom fixtures
- 79% construction waste diverted from landfill
- Low-VOC adhesives and sealants, paints and coatings, flooring systems, and composite wood and agrifiber products used inside the building
- 30% of the total building material content was extracted and manufactured within 500 miles of the project site
- 37% of the total building materials contain recycled content
- 79% wood-based building products are certified by the Forest Stewardship Council (FSC)
- 94% of all regularly occupied spaces have a direct line of sight to the outside

Art and Architecture Building A. Alfred Taubman Wing Project

Project Data

- Budget: $28.5 M
- Schedule: Completion Scheduled for Fall 2017
- Square Feet: 10,600 gross sq. ft. renovation
  37,158 gross sq. ft. addition

Substantially Complete: July 2017

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

Central Power Plant Feed Water System Deaerator Upgrade

Project Description

Revised to assist with the expedited removal of a generator for repair and reinstallation. All financial obligations for the project were finalized Jul-16.

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 replaced two 1940's deaerators with two modem deaerators meeting current industry standards. Each deaerator weighs approximately 140,000 pounds when filled, measuring 18 feet in diameter and 20 feet in length. An existing decommissioned boiler was 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

- GHG emissions reduced by improving steam-generating efficiency
- New deaerators improve the quality of feedwater 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
- Updated deaerator monitoring system and controls minimize potential inefficiencies or upsets, thereby minimizing use of fuels or production of GHGs

Other Sustainability Features

- Hazardous materials on or within Boiler 5 properly remediated and disposed
- Reuse of existing Boiler 5 support steel columns in new deaerator support system
- Reduced use of water treatment chemicals by improving oxygen removal from feedwater, thereby reducing the need to use oxygen scavenger and anti-scaling chemicals

Project Data

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

Substantially Complete: October 2014

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

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, 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

- Electric centrifugal chillers installed to replace less efficient steam driven absorbers
- Constant flow primary chilled water system converted to variable flow
- Variable speed drives upgraded

Other Sustainability Features

- Reuse of pumps and piping
- Reduction in city water makeup use due to replacement of absorption chillers with electric chillers

Project Data

- Budget: $7 M
- Schedule: Completion Scheduled for Fall 2013
- Square Feet: 18,000 gross sq. ft. renovation

Substantially Complete: June 2013

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

Couzens Hall Renovation

Project Description

Couzens Hall is an approximately 180,000-gross-square-foot residence hall housing approximately 560 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. 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 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: adding insulation to exterior walls where feasible, replacing most of the glazing and/or window systems, adding occupancy sensors for ventilation and lighting system control, and providing energy-efficient heating and air conditioning systems, as well as other energy conservation measures. Although the building will be more energy-efficient and meet our current design guidelines, the addition of air conditioning throughout the building will increase overall energy consumption. The scope of this project includes the architectural, mechanical, and electrical work necessary to accomplish these improvements.

Energy Efficiency Measures

- This project has been approved for the Designed to Earn ENERGY STAR® certification. This certification recognizes that this design project has met Environmental Protection Agency (EPA) criteria for energy efficiency
- Insulation added to existing exterior walls to improve thermal performance of building envelope
- Replacement of existing window framing and glazing in the west half (original) of the building and replacement of glazing in the east half (newer addition) of the building to increase thermal performance
- Chilled water utilized from the Mechanical Services Building adjacent to Mosher Jordan Residence Hall as the cooling source for the Resident Rooms in lieu of DX units
- Enthalpy wheel in the mechanical system used as a means of energy recovery to utilize lost heat from the toilet room exhaust system
- Occupancy sensors on the first and second floor common spaces reduce run hours for the central station air handling units
- Lighting power density reduction for the first and second floor common areas
- Occupancy sensors in the resident rooms reduce lighting power density and reduce run hours for the fan coil units
- Increased inspections, including infrared scans during construction completed to identify missing insulation, gaps in the enclosure and other wall/roof assembly deficiencies

Other Sustainability Features

- Project site located near public and U-M bus routes to encourage use of public transit
- Bike racks installed to encourage the use of bicycles for transportation
- No new parking provided on site to reduce pollution and land development impacts

Couzens Hall Renovation

- Water conserving plumbing fixtures including low flow toilets, urinals and shower heads installed to reduce water consumption by over 20%
- Renovated with over 95% of the existing walls floors and roof and 50% of the interior non-structural elements reused
- Regional and local materials used where possible (not less than 10%)
- Low-VOC materials including adhesives, sealants, paints, coatings, carpet systems, composite wood and agrifiber products
- Daylighting and views provided for over 75% of the spaces in the building

Project Data

- Budget: $49 M
- Schedule: Completion Scheduled for Summer 2011
- Square Feet: 180,000 gross sq. ft. renovation

Substantially Complete: July 2011

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

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 will now 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

- The building's design and systems include a number of energy efficient features that allow for an estimated 38% energy savings compared with an energy code compliant building as defined in ASHRAE 90.1-2007- Appendix G
- Maximum insulation in foundation walls, exterior walls, under slab, 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
- Demand control ventilation 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
- High efficiency lighting throughout with daylight sensors for spaces with fenestration.
- Occupancy sensors to control lighting
- Energy efficient transformers

Other Sustainability Features

- This project is LEED® Gold certified and achieved 67 points under the LEED for New Construction v2009 rating system.
- Sited on public and U-M bus routes, encouraging use of public transit
- No new parking provided on-site (to reduce pollution and land development impacts)
- Erosion and Sedimentation Control Plan during construction to reduce pollution from construction by controlling soil erosion, waterway sedimentation, and airborne dust generation
- A 36% water consumption savings beyond Michigan Plumbing Code is anticipated through the use of low flow plumbing fixtures
- Building reuse of approximately 88% of existing exterior walls, floors and roof
- Materials reuse of approximately 68% of existing interior, flooring and ceilings.
- 35% of materials used contain recycled content
- 43% of materials used were extracted and manufactured within 500 miles of the project site
- Low-VOC paints, flooring, composite wood, adhesives and sealants
- 75% of demolition and construction waste diverted from landfill

Crisler Arena Expansion

Project Data

- Budget: $52 M
- Schedule: Completion Scheduled for Winter 2014
- Square Feet: 54,000 gross sq. ft. renovation
  63,000 gross sq. ft. addition

Substantially Complete: December 2012

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

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 includes complete seating replacement, and 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. The scope of this project includes the architectural, mechanical, and electrical work necessary to accomplish these improvements.

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
- Increased 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 U-M 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
- Outside air delivery monitoring to ensure during low load conditions that the correct amount of outside air is delivered
- Air handling systems designed for thermal comfort by the occupants
- Refrigerant systems utilize HCFC which have almost zero ozone depletion ratings
- Use of low-VOC materials (e.g. carpets, paints)
- Use of regional and local materials where possible

Crisler Arena Renovation

Project Data

- Budget: $23 M
- Schedule: Completion Scheduled for Winter 2012
- Square Feet: 195,110 gross sq. ft. renovation

Substantially Complete: September 2011

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

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

- The building's design and systems include a number of energy efficient features that allow for an estimated 40% energy savings compared with an energy code compliant building as defined in ASHRAE 90.1-2007 Appendix G
- Increased insulation in foundation walls, exterior walls and roof assemblies
- High-performance glazing for increased thermal performance
- External shading devices to limit heat gain
- 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
- Long life, energy efficient LED light fixtures
- Occupancy sensors to turn off lights when spaces are un-occupied
- Increased inspections during construction to identify deficiencies in the building envelope

Other Sustainability Features

- Utilization of the existing building structure
- Expansion situated on previously developed site
- Project site located near public and U-M bus routes to encourage use of public transit
- No new parking provided on site to encourage use of alternative transportation
- Bike racks provided on site to encourage use of alternative transportation
- Landscaping is designed to have only native & adaptive plants and minimal irrigation
- Plumbing fixtures in the building to be low-flow fixtures and dual flush toilets
- Chemical free cooling tower water treatment
- HVAC condensate used for cooling tower make-up
- Regional materials used wherever possible
- The use of low-VOC paints, flooring, adhesives and sealants

Dearborn Science Building and Computer Information Science Building Renovation

Project Data

- Budget: $51 M
- Schedule: Completion Scheduled for Summer 2016
- Square Feet: 80,000 gross sq. ft. renovation
  20,000 gross sq. ft. addition

Substantially Complete: August 2016

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

Department of Intercollegiate Athletics Operations Center

Project Description

Revised due to bids coming in higher than the CD estimate.

The Department of Intercollegiate Athletics will construct a new building to centralize and increase operational efficiency for functions currently undersized and housed in various locations across the Stephen M. Ross Athletic Campus. An approximately 18,000 gross square feet building located south of Stadium Boulevard on State Street will accommodate maintenance shops, offices, laundry, shipping and receiving, and equipment storage.

Energy Efficiency Measures

- High efficiency building envelope
- Variable air volume HVAC systems, including Laundry and Maintenance Shop
- High efficiency boiler and water heater
- All equipment connected to digital controls system
- Night setback on all HVAC systems including recirculation modes on Laundry and Maintenance Shop
- High efficiency interior and exterior lighting
- Occupancy sensors to control lighting

Other Sustainability Features

- Use of low flow plumbing fixtures to reduce water consumption

Project Data

- Budget: $6 M
- Schedule: Completion Scheduled for Fall 2015
- Square Feet: 18,000 gross sq. ft.

Substantially Complete: August 2015

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

Donald R. Shepherd Softball Center

Project Description

The approximately 10,200-gross-square-foot Softball Center will include locker rooms for players and coaches, staff offices, a team meeting room, athletic medicine and fitness spaces, hydrotherapy pools, and support space. The project will also include site restoration including the plaza and extension of a water main loop through that area for increased fire protection.

Energy Efficiency Measures

- The building's design and systems include a number of energy efficient features that allow for an estimated energy savings of 30% when compared with a code energy compliant building as defined in ASHRAE 90.1-2007 Appendix G
- 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
- Improved ventilation efficiencies
- Heat Recovery
- Demand Control Ventilation
- Heat Pump to recover waste heat from chilling cold hydrotherapy pool and use for heating warm hydrotherapy pool.
- Optimized occupancy schedules, HVAC system zoning, and part load HVAC system efficiency
- Very limited use of incandescent lighting
- Utilization of energy-efficient LED site lighting
- Occupancy sensors tied to lighting controls to harvest daylight

Other Sustainability Features

- 20% reduction in potable water demand based off Michigan Plumbing Code
- Reuse of previously developed site
- 20% recycled and regional materials
- 75% diversion rate for construction waste
- Only low-VOC materials used on interior spaces

Project Data

- Budget: $5.3 M
- Schedule: Completion Scheduled for Winter 2014
- Square Feet: 10,200 gross sq. ft.

Substantially Complete: February 2014

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

Earl V. Moore Building Renovation and Brehm Pavilion

Project Description

The project includes new construction of approximately 34,000 gross square feet of space including shelled space, and a renovation of approximately 28,000 gross square feet within the existing building. The School of Music, Theatre & Dance has since received additional gifts for the project and would like to increase scope. Approximately 4,000 net square feet of shelled space will be finished to create a high-performance music laboratory for both research and for teaching about the uses of technology in creating, recording, and disseminating music. An additional renovation of space will create a student commons with meeting and study space, and the revised project will also include additional furniture and equipment.

Energy Efficiency Measures

- The building's design and systems include a number of energy efficient features that allow for an estimated 40% energy savings compared with an energy code compliant building as defined in ASHRAE 90.1-2007 - Appendix G
- Above code-minimum insulation for exterior walls and roofs to improve the building envelope performance
- Above code-minimum thermal properties for windows to reduce thermal losses in the winter and radiation gain in the summer
- Energy Efficient HVAC system to reduce energy usage
- Ventilation of mechanical room with relief air installed to reduce energy usage
- Displacement ventilation in the Rehearsal Hall installed to reduce energy usage
- Reduction of lighting power density to reduce energy usage
- Occupancy sensors for lighting control to reduce energy usage
- Increased inspection of exterior wall insulation and fenestration performed to ensure integrity and performance of the building envelope
- Infrared scans of building envelope performed during construction to verify the integrity and performance of the building envelope

Other Sustainability Features

- This project is LEED® certified to the Gold level and achieved 63 points under the LEED for New Construction v2009 rating system
- Minimized project disturbance area to protect adjacent woodland
- Chipper byproduct from site clearing operations used for erosion control during construction
- Native/adaptive vegetation and a centrally controlled irrigation management system designed to reduce potable water consumption by 73%
- A 39% water consumption savings beyond Michigan Plumbing Code; savings obtained through the use of low flow bathroom fixtures
- Low-VOC paints, coatings, sealants, adhesives, flooring and composite materials
- 10% of materials used contain recycled content
- 15% of materials used were extracted and manufactured within 500 miles of the project site
- 50% of demolition and construction waste diverted from landfill

Earl V. Moore Building Renovation and Brehm Pavilion

Project Data

- Budget: $29.5 M
- Schedule: Completion Scheduled for Fall 2015
- Square Feet: 28,000 gross sq. ft. renovation
  34,000 gross sq. ft. addition

Substantially Complete: August 2015

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

East Quadrangle Renovation

Project Description

Originally constructed in 1940 with additions in 1948 and 1969, East Quadrangle is an approximately 300,000-gross-square-foot residence hall housing approximately 860 students and the Residential College. Consistent with the overall Residential Life Initiatives presented to the Board of Regents in September 2004, we propose a deep renovation of East Quadrangle. 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 create much-needed spaces for academically-related facilities, as well as improved 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. This project will renovate the Residential College to current academic standards.

Energy Efficiency Measures

- This project has been approved for the Designed to Earn ENERGY STAR® certification. This certification recognizes that this design project has met Environmental Protection Agency (EPA) criteria for energy efficiency
- The building's design and systems include energy efficient features that allow for an estimated 30% energy savings compared with an energy code compliant building as defined in ASHRAE 90.1-2007 - Appendix G
- Increased exterior wall insulation
- New roof insulation
- Improved air-conditioning system, which will retire old smaller, inefficient systems
- HVAC occupancy sensors in all common areas
- Increased thermostat dead band by 2 degrees for offices and classrooms
- Enthalpy wheel in the mechanical system as a means of energy recovery utilizes lost heat from the toilet room exhaust system
- Reduced lighting density throughout the building
- Occupancy sensors to control lighting in all common areas
- Air-infiltration minimized due to infrared scans of building during construction
- Air-infiltration minimized due to inspections of exterior wall and fenestration during construction

Other Sustainability Features

- Additional bicycle parking provided to encourage bicycle usage
- Building materials both regional and local used; not less than 10%
- Heritage trees throughout the site maintained and preserved
- Porous pavement materials utilized throughout existing courtyard spaces taking the place of existing non-porous materials
- Existing site lighting, poles, lamps, and globes, reused
- Over 80% of the existing exterior walls, 75% of the existing windows, and a majority of the existing interior walls refurbished for reuse
- Select existing kitchen equipment rehabilitated for optimal use

East Quadrangle Renovation

- Demolished material recycled and/or reused; including steel, brick, and block
- Additional light wells and areaways constructed to take advantage of direct and borrowed natural light

Project Data

- Budget: $116 M
- Schedule: Completion Scheduled for Summer 2013
- Square Feet: 300,000 gross sq. ft. renovation

Substantially Complete: July 2013

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

Eda U. Gerstacker Grove

Project Description

The North Campus central open lawn area serves as the outdoor civic space for the North Campus community and visitors. Covering approximately four acres, the Eda U. Gerstacker Grove project will greatly improve the quality of this outdoor space, creating more vitality and activity within the North Campus core, and providing more opportunities for interaction. Some of the new program improvements include creating a new central plaza that can serve as an informal amphitheater, new walkways, integrated seating throughout, additional trees, improved lighting, and electric and water infrastructure to support outdoor activities, events, and displays.

Energy Efficiency Measures

- Use of LED lighting
- Luminaires have been designed to achieve required light levels and eliminate light trespass

Other Sustainability Features

- Increase variety of native trees and plants to improve biodiversity and reduce irrigation requirements
- Drought tolerant no-mow grass species on the landforms
- Infiltration gardens designed to reduce surface runoff by capturing and holding stormwater so that it infiltrates into the soil
- Swirl concentrator chambers designed to treat runoff and ensure the removal of 80 % Total Suspended Solids
- Site storm water that does not infiltrate into the gardens, flows to an underground detention and infiltration open bottom chamber system with an outlet control structure
- Total site infiltrating runoff volume exceeds the U-M NPDES post construction storm water management requirements
- The scoring pattern for the concrete paving designed to minimize cracking and ensure durability and longevity of the surface
- Transportation of earthen materials to be reduced by balancing cut and fill quantities of site grading whenever possible
- Reuse of excavated material to fill proposed landforms
- Pre-cast concrete benches and curbs contain recycled glass
- Regional materials to be used whenever possible

Eda U. Gerstacker Grove

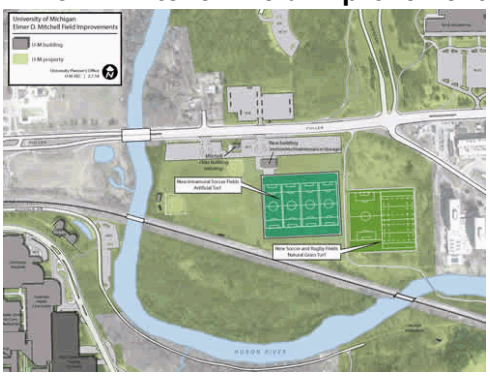
Project Data

- Budget: $6.9 M
- Schedule: Completion Scheduled for Summer 2016
- Square Feet: N/A

Substantially Complete: August 2016

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

Elmer D. Mitchell Field Improvements



Project Description

Improvements to Mitchell field to increase usage flexibility of the fields for various intramural and club sports, increase capacity, and extend the operating hours and operating season for Mitchell. Four softball fields will be repurposed into four artificial-turf soccer/multi-purpose intramural sports fields that will allow for much longer hours of operation and spring use because artificial turf will be well drained and not subject to closure due to rain and muddy conditions that can destroy natural turf. The fields will be enclosed with fencing to control access, protect turf, and to keep balls contained. Lighting will be installed with shields to keep light on the field with minimal spill-over onto adjacent non-university property or into the night sky. Existing multi-purpose fields will be improved for use for intramural sports team practices as well as games for sports that prefer natural turf (e.g., rugby). The existing lighting for these east fields will be upgraded with more energy-efficient fixtures that will also be shielded to prevent light spill-over. The two existing softball fields on the west side of Mitchell Field will remain. Other site work will include drainage improvements, on-site storm water management, and underground utilities. The existing Mitchell Field Building will be renovated for use as storage and a 3,200-square-foot building will be constructed to improve bathroom facilities and to provide for on-site maintenance, storage, and operational support.

Energy Efficiency Measures

- Storm water infiltration area, or “rain garden” receives stormwater runoff from the building roof and is used to support robust, local plant species
- Exterior canopy shades south facing window and building façade to minimize heat gain
- Standalone HVAC units individually heat/cool spaces and increase energy efficiency
- Energy efficient Air Conditioning units
- Natural Ventilation
- Exterior LED Fixtures use less energy than incandescent/fluorescent fixtures
- Occupancy sensors automatically shut off lights after pre-set time of inactivity, thereby saving energy
- Photocell / time clock turns off exterior building fixtures when no longer needed
- Interior spaces, except for restrooms, are exposed and have no ceilings, thus a reduction of material waste
- Low VOC Paints used throughout to improve indoor air quality

Project Data

- Budget: $8 M
- Schedule: Completion Scheduled for Spring 2015
- Square Feet: 1,600 gross sq. ft. renovation
  3,200 gross sq. ft. addition

Substantially Complete: May 2015

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

Flint William R Murchie Science Building Renovation

Project Description

The project will upgrade various building infrastructure components as well as revitalize the classrooms and laboratories within the building to expand its programs in order to better prepare K-12 science teachers, excite younger students about science programs, and better prepare students for careers in science, technology, engineering, and mathematics. The project will renovate approximately 85,000 gross square feet. 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

- Replacement of operable sash weather seals on existing glazing systems throughout entire building
- Replace all existing fume hoods with more energy efficient models
- Use of energy efficient lighting fixtures
- Occupancy sensors in areas of renovation receiving new lighting

Other Sustainability Features

- Provide low flow toilets, urinals and lavatory faucets at renovated toilet rooms
- Reuse of existing furniture
- Use of straw based particle board in the architectural millwork
- New wood doors will be FSC certified
- Use of low-VOC paint

Project Data

- Budget: $22.17 M
- Schedule: Completion Scheduled for Fall 2015
- Square Feet: 85,000 gross sq. ft. renovation

Substantially Complete: August 2015

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

George Granger Brown Memorial Laboratories Mechanical Engineering Addition

Project Description

The approximately 220,000 gross square foot George Granger Brown Memorial Laboratories (G. G. Brown) was constructed in 1958 and houses the Department of Mechanical Engineering, which has evolved to include emerging research areas such as bio-systems, energy systems, and nano-systems. The College of Engineering proposes an approximately 62,500 gross square foot addition to G. G. Brown. The addition will house research laboratories and faculty and graduate student offices to support these emerging research endeavors, as well as spaces that will enhance the ability to realize ultra-high-resolution measurements at molecular and atomic scales.

Energy Efficiency Measures

- The building's design and systems include energy efficient features that allow for an estimated 43% energy savings compared with a code energy compliant building as defined in ASHRAE 90.1-2007 Appendix G
- Maximum insulation in foundation walls, exterior walls, under slab, and roof assemblies
- Energy efficient windows/glazing for increased thermal performance
- Hybrid Lab HVAC System Configuration
- Dual Effect Energy Recovery System
- Solar Collectors for Domestic Hot Water Heating and a photovoltaic Solar Array offset over 2% of the addition's total energy costs
- Energy efficient transformers.
- Lab Lighting Power Density Reductions
- High efficiency lighting throughout
- Occupancy sensors to control lighting
- Lighting Control/Space HVAC Setback.
- Use of increased inspections, including infrared scans during construction to identify missing insulation, gaps in the enclosure, and other wall/roof assembly deficiencies

Other Sustainability Features

- This project is LEED® Gold certified and achieved 65 points under the LEED for New Construction v2009 rating system.
- Sited on public and U-M bus routes, to encourage use of public transit.
- No new parking provided on-site (to reduce pollution and land development impacts)
- Erosion and Sedimentation Control Plan during construction reduced pollution from construction by controlling soil erosion, waterway sedimentation, and airborne dust generation
- Stormwater management implemented such that the post development site runoff is reduced by 33% for the two-year, 24-hour design storm
- Centrally controlled irrigation management system to ensure proper watering through monitoring of flow rates and weather.
- A 30% water consumption savings beyond Michigan Plumbing Code is anticipated; savings will be obtained through the use of low flow bathroom fixtures
- Use of select sustainable materials (e.g., steel structure, terrazzo flooring).
- 15% of materials contain recycled content

George Granger Brown Memorial Laboratories Mechanical Engineering Addition

- 15% of materials manufactured and extracted regionally
- 82% of construction waste diverted from landfills
- Use of low-VOC paints, coatings, flooring, adhesives, and sealants
- Learning Center for Energy Consumption- provides a touchscreen public interface for display of building energy consumption and status of sustainability goals.

Project Data

- Budget: $47.6 M
- Schedule: Completion Scheduled for Summer 2014
- Square Feet: 62,500 gross sq. ft.

Substantially Complete: June 2014

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

George Granger Brown Memorial Laboratories Renovation

Project Description

The approximately 220,000-gross-square-foot George Granger Brown Memorial Laboratories building was constructed in 1958 and houses the chemical, civil, materials sciences, and mechanical engineering departments. The project will upgrade the entire building's fire detection, alarm and emergency power systems. Throughout the majority of the building, there will be a deep infrastructural renewal updating heating, ventilation, air conditioning, electrical, plumbing, roof, windows, and interior finishes. The renovation will also create approximately 25,000 square feet of state-of-the-art academic and instructional spaces.

Energy Efficiency Measures

- The building's design and systems include a number of energy efficient features that allow for an estimated 38% energy savings compared with an energy code compliant building as defined in ASHRAE 90.1-2007 Appendix G
- High-performance glazing systems for increased thermal performance
- Increased insulation in roof assemblies
- High efficiency HVAC system
- Lab exhaust recovery with water-to-water Runaround System
- Pre-heat outside air make-up to labs with North Campus Chilled Water Loop
- Increased thermostat "dead band" for Offices and Classrooms (5° to 7°)
- Occupancy sensors to turn off HVAC when spaces are un-occupied
- Reduced overall lighting power density
- Energy efficient light fixtures
- Occupancy sensors to turn off lights when spaces are un-occupied

Other Sustainability Features

- Maintain 95% of the existing structural walls, floors and roof
- Project site located near public and U-M bus routes to encourage use of public transit
- Close proximity to basic services such as banks, theaters and restaurants to encourage building occupants to walk instead of drive
- Reduced water consumption through the use of dual flush water closets, low flow urinals and reduced flow sinks
- Re-use of furniture and equipment in several areas
- Construction waste to be diverted from landfills when possible
- Wood used on project to be FSC certified
- Low-VOC adhesives, sealants, paints, flooring, and composite materials

Project Data

- Budget: $47 M
- Schedule: Completion Scheduled for Summer 2016
- Square Feet: 220,000 gross sq. ft. renovation

Substantially Complete: September 2016

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

Glenn E. Schembechler Hall Entrance and Museum Renovation

Project Description

This 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.

Energy Efficiency Measures

- 18% more efficient thermal barrier than prescribed by ASHRAE 90.1-2007
- Passive solar glazing strategies
- Envelope inspections
- 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
- Tall interior spaces coupled with clerestory glazing to optimize daylight harvesting
- 20% recycled and regional materials
- 75% diversion rate for construction waste
- Only low-VOC materials used on interior spaces
- Indoor Air Quality plan for all construction activities

Project Data

- Budget: $9 M
- Schedule: Completion Scheduled for Winter 2014
- Square Feet: 7,000 gross sq. ft. renovation
  7,000 gross sq. ft. addition

Substantially Complete: March 2014

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

Golf Practice Facility

Project Description

Provide a new Golf Practice Facility with driving bays, putting and chipping, offices, locker rooms, lounge study and conference room areas.

Energy Efficiency Measures

- This project is designed to surpass code required energy efficiency (ASHRAE 90.1-2007) by 30%
- Maximum insulation in foundation walls, exterior walls, and roof assemblies
- Energy efficient windows/glazing for increased thermal performance
- Daylighting controls for perimeter spaces
- Reduction of lighting levels through use of occupancy sensors
- Efficient mechanical heating/cooling systems. Geothermal wells and heat pumps are used to provide heating and cooling for 4000 square feet of the new golf practice facility. There are seven 300 feet deep wells that serve six heat pumps supplying conditioned air to several zones in the office areas. The geothermal field effectively and efficiently transfers the heat loss and gain from the building to an almost constant ground temperature source through a series of wells. The approximate energy savings is estimated to be 30% with an approximate payback period of 3-4 years.
- Domestic hot water reduction by using low flow fixtures
- Free cooling achieved by providing operable windows in regularly occupied areas

Other Sustainability Features

- The Golf Practice Facility 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 bus routes, encouraging use of public transit
- Bike racks and shower facilities are provided, encouraging alternative transportation
- Existing parking provided on the site modified but not increased
- Storm water management incorporates a bioswale that significantly reduce the quantity of storm water, as well as addressing storm water quality
- High SRI roofing material to reduce heat island effect
- Plumbing fixtures within the building are low-flow fixtures and dual flush toilets
- 50% of construction waste diverted from disposal
- Regional /recycled-content 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

Golf Practice Facility

Project Data

- Budget: $2.5 M
- Schedule: Completion Scheduled for Summer 2011
- Square Feet: 10,000 gross sq. ft.

Substantially Complete: September 2011

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

Institute for Social Research Addition

Project Description

This project includes construction of a four-level addition of approximately 44,700 gross square feet and renovation of approximately 7,200 gross square feet of space within the existing Institute for Social Research building. The Institute for Social Research would like to modify the scope of the project to increase the size of the addition to approximately 56,700 gross square feet, primarily through construction of one additional floor, and to increase the area of renovation where new construction attaches to the existing building to 12,800 gross square feet. The newly added research space is needed to address the institute's continued growth in programs and projects, including a significant increase in federally funded initiatives.

Energy Efficiency Measures

- The Institute for Social Research Addition designed to consume 30 percent less energy than allowed by the 2007 edition of American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 90.1
- 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 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 reduces 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

- This project is LEED® certified to the Gold level and achieved 63 points under the LEED for New Construction v2009 rating system.
- 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 U-M and public transportation and no installation of parking, to further encourage use of mass transportation
- Use of selected sustainable materials, such as terrazzo flooring

Institute for Social Research Addition

- Use of low-VOC materials, such as carpeting and paint
- Use of Certified Wood products
- Use of low emittance furniture
- 37 percent of new materials from local/regional sources
- 20 percent of new materials from recycled content
- 56 percent of nonhazardous construction and demolition debris 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: $23 M
- Schedule: Completion Scheduled for Spring 2013
- Square Feet: 12,800 gross sq. ft. renovation
  56,700 gross sq. ft. addition

Substantially Complete: May 2014

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

Intercollegiate Soccer Stadium

Project Description

Athletics is proposing to add 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

- Designed 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 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

- Site sediment and erosion control designed to best management practices
- Project located within 1/4 mile of 2 bus lines
- Bicycle racks and showers provided for building occupants
- No new parking provided
- Site disturbance was limited to 40' beyond the building perimeter and 5' beyond roadway curbs
- Vegetated open space adjacent to the building that is equal to the building footprint
- Post-development storm water peak discharge rate and quantity does not exceed the pre-development peak discharge rate nor 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
- Water efficiency maximized to reduce the burden on municipal water supply and wastewater systems by using low flow plumbing fixtures and waterless urinals
- Building products incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials, e.g. structural steel, carpet, athletic flooring
- Building materials extracted and/or harvested, as well as manufactured, within 500 miles of the project site, e.g. brick, structural steel
- Wood-based materials and products 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 reduced IAQ problems resulting from construction/renovation process
- Low VOC emitting adhesives, sealants, paints, coatings, and carpet reduce indoor air quality problems

Intercollegiate Soccer Stadium

resulting from the construction/renovation process

- Individual lighting controls provided for 90% of the building occupants to enable adjustments to suit individual task needs and preferences

Project Data

- Budget: $6 M
- Schedule: Completion Scheduled for Summer 2010
- Square Feet: 20,000 gross sq. ft.

Substantially Complete: August 2010

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

Intramural Sports Building Renovation

Project Description

Improvements to the Intramural Sports Building that will update infrastructure and address contemporary programmatic needs for fitness and recreational spaces. The project will reconfigure existing space within the building to provide larger areas for cardio and weight training; new group exercise rooms; improved racquetball courts, locker rooms, and staff offices; and spaces for social interaction. Infrastructure upgrades will include accessibility improvements, plumbing and wired and wireless networking upgrades, exterior window replacement, masonry repairs, lighting improvements, and gymnasium floor replacement.

Energy Efficiency Measures

- The building's design and systems include a number of energy efficient features that allow for an estimated 30% energy savings compared with an energy code compliant building as defined in ASHRAE 90.1-2007 Appendix G
- High-performance glazing systems for increased thermal performance
- Enthalpy Wheel allowing return air to condition outside air to reduce heating/cooling load in the air handling unit
- HVAC controls designed to prevent simultaneous heating and cooling; controls temperature using occupancy sensors
- Increase thermostat "deadband" to limit equipment cycling
- Variable air volume HVAC systems, including Laundry and Maintenance Shop
- Ventilation of mechanical room with relief air AHU-1
- High efficiency chiller
- Energy Efficient Lighting including new gymnasium lighting and LED lighting
- Occupancy sensors to turn off lights when spaces are unoccupied

Other Sustainability Features

- City-owned on-site Bike Share rack on site to promote alternative transportation
- Close proximity to basic services such as banks, theaters and restaurants to encourage building occupants to walk instead of drive
- Project site located near public and U-M bus routes to encourage use of public transit
- Use of native and adaptive plantings that do not require irrigation
- Stormwater drain lines to be repaired and rerouted to improve stormwater management
- A 20% water consumption savings beyond Michigan Plumbing Code is anticipated; savings will be obtained through use of dual flush water closets, 1/8 gallon flush urinals, and automatic sensor operated faucets
- Building Reuse of approximately 75% of the existing walls, floors, and roof
- Construction waste to be diverted from landfills when possible
- Low-VOC paints, adhesives and sealants
- Graphics to provide an educational tour of the building's sustainable features

Intramural Sports Building Renovation

Project Data

- Budget: $21.4 M
- Schedule: Completion Scheduled for Fall 2016
- Square Feet: 106,000 gross sq. ft. renovation

Substantially Complete: September 2016

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

Law Quad Infrastructure Improvements

Project Description

The iconic Law Quad is in need of significant infrastructure improvements to address deteriorated walkways, exterior lighting, and underground utilities. This project proposes to refurbish the historic exterior building lights at all entrances, install Collegiate Gothic style light poles, and replace deteriorated walkways with bluestone pavers. In addition, this project will provide needed upgrades to the existing underground utilities, including storm sewer repair and replacement and high voltage and tunnel repairs.

Energy Efficiency Measures

- Pedestrian site lighting and refurbished building lighting to utilize high efficiency, long-life, LED lamps
- Lighting design to minimize the number of required light fixtures
- Light fixtures contain lighting in desired areas while minimizing unwanted light distribution
- Use of existing building automation and site lighting control systems

Other Sustainability Features

- Protection of existing trees
- Existing building mounted lighting will be refurbished to reuse existing materials.
- Bluestone pavers, made from a natural stone product, eliminates energy and waste typically associated with manufactured stone products
- Existing building mounted lighting refurbished for reuse
- Reuse of existing historic benches

Project Data

- Budget: $6.2 M
- Schedule: Completion Scheduled for Fall 2017
- Square Feet: N/A

Substantially Complete: December 2017

- Project Status: Substantial Completion
- Design Complete: 100%
- Construction Complete: 99%

Law School Academic Building and Hutchins Hall Law School Commons Addition

Project Description

The proposed 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 as presented.

Energy Efficiency Measures

- The building's design and systems include a number of energy efficient features that allow for an estimated 30% energy savings compared with an energy code compliance building as defined in ASHRAE 90.1-2007 - Appendix G
- 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

- This project is LEED® Gold certified and achieved 44 points under the LEED for New Construction v2.2 rating system.
- 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 U-M 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

Law School Academic Building and Hutchins Hall Law School Commons Addition

storm water

- Storm water quality controlled with the use of hydrodynamic separators
- Light colored hardscape surfaces installed to help the heat island effect
- Plumbing fixtures within the building are low-flow fixtures and dual flush toilets
- 85% of construction waste will be diverted from disposal
- 44% of building materials extracted and manufactured regionally
- 98% as wood products used was harvested from FSC (Forest Stewardship Council) certified forests
- 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 Spring 2012
- Square Feet: 16,000 gross sq. ft. renovation
  100,000 gross sq. ft. addition

Substantially Complete: September 2011

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

Medical Science Research Building II Chiller Replacement and Chilled Water Interconnection to Medical Sciences Research Building III

Project Description

This project will replace three of the four steam absorption chillers with three electric centrifugal chillers, retaining the most reliable steam absorption chiller to provide backup capacity. The project will also replace the cooling towers, located on the roof of Medical Science Unit II, with new cooling towers. The project will also interconnect the chiller plant at MSRB II with the chiller plant at MSRB III, creating a regional chiller system that will result in energy savings, reduced operational and maintenance costs, and increased redundancy and reliability. In addition, the project will provide a new substation in the Animal Research Facility to serve the new electric load, and the obsolete substation that serves MSRB I will be removed.

Energy Efficiency Measures

- Installation of energy efficient electric centrifugal chillers to replace absorption chillers.
- Interconnection of the chiller plant at MSRB II with the chiller plant at MSRB III, creating a regional chiller system that will result in energy savings.

Project Data

- Budget: $14 M
- Schedule: Completion Scheduled for Winter 2016
- Square Feet: N/A

Substantially Complete: March 2016

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

Michigan Memorial Phoenix Project Laboratory Addition and Second Floor Renovation

Project Description

The project creates modern research laboratory space to support the Michigan Memorial Phoenix Energy Institute. A renovation of approximately 10,000 gross square feet 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

- The building's design and systems include a number of energy efficient features that allow for an estimated 30% energy savings compared with an energy code compliance building as defined in ASHRAE 90.1-2007 - Appendix G
- Existing uninsulated exterior walls impacted by the project were insulated
- Occupancy sensors utilized on the ground and upper floor common spaces to reduce run hours for the central station air handling units
- Increased insulation in foundation walls, exterior walls, under slab, and roof assemblies of addition
- Increased envelope inspections, including infrared scans during construction used to identify missing insulation, gaps in the enclosure, and other wall/roof assembly deficiencies
- Energy efficient windows/glazing installed for increased thermal performance
- External shading of curtain wall glazing
- High efficiency lighting throughout
- Daylight sensors for spaces with fenestration
- Occupancy sensors to control lighting in offices, bathrooms, corridors, and conference rooms
- Energy efficient transformers
- Increase thermostat deadbands (the gap between the heating setpoint and cooling setpoint during which no conditioning is provided)

Other Sustainability Features

- The new addition is LEED® Gold certified and achieved 61 points under the LEED for New Construction v2009 rating system.
- Use of an Erosion and Sedimentation Control Plan during construction reduced 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
- No new parking provided on site (to reduce pollution and land development impacts)
- Project is sited on public and U-M bus routes, encouraging use of public transit
- The use of water conserving plumbing fixtures including low flow toilets, urinals and shower heads reduce water consumption by over 20%
- Daylighting and views 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 select recycled materials (e.g. steel structure, terrazzo flooring)
- Use of regional and local materials where possible (e.g. stone and brick)

Michigan Memorial Phoenix Project Laboratory Addition and Second Floor Renovation

Project Data

- Budget: $11.1 M
- Schedule: Completion Scheduled for Spring 2013
- Square Feet: 9,600 gross sq. ft. renovation
  10,000 gross sq. ft. addition

Substantially Complete: April 2013

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

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: $6 M
- Schedule: Completion Scheduled for Summer 2014
- Square Feet: 350,000 gross sq. ft. renovation

Substantially Complete: August 2013

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

Michigan Stadium Renovation and Expansion Project

Project Description

Approximately 400,000 gross square feet of new facilities are proposed in five structures, and approximately 50,000 gross square feet of existing facilities will be renovated. Two small buildings at the north end of the stadium grounds and one small building at the south end will house restrooms, concessions, and support functions such as first-aid, police and security, and the will-call ticket office. The two main sideline buildings are proposed to accommodate bench seats, media facilities, accessible seats, restrooms, concession areas, an additional concourse, 83 suites, and approximately 3,200 indoor and outdoor club seats. The project will also include widening of the aisles and added handrails in the existing bowl. The renovation will address needed infrastructure upgrades related to site work, utilities, restrooms, concessions, and various mechanical and electrical systems. The capacity of the stadium will be approximately 108,000 following the completion of the project. The scope of this project includes the architectural, mechanical, and electrical work necessary to accomplish these improvements.

Energy Efficiency Measures

- Designed 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

Other Sustainability Features

- Site sediment and erosion control designed 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
- Reduction in 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
- Low-VOC materials, (e.g. adhesives, sealants, paints, coatings, and carpet)
- Building materials 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
- Complies with ASHRAE Standard 55-1992 for thermal control standards
- Daylighting provided to all interior spaces thereby reducing the use of electrical lights

Michigan Stadium Renovation and Expansion Project

Project Data

- Budget: $226 M
- Schedule: Completion Scheduled for Summer 2010
- Square Feet: 50,000 gross sq. ft. renovation
  400,000 gross sq. ft. addition

Substantially Complete: June 2010

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

MMED C.S. Mott Children's and Von Voigtlander Women's Hospitals Renovations for Child and Adolescent Psychiatric Hospital Relocation

Project Description

Renovate approximately 22,500 gross square feet of space on Level 8 of the C.S. Mott Children's and Von Voigtlander Women's Hospitals to accommodate the relocation and expansion of the Child and Adolescent Psychiatric Hospital (CAPH). The project will create a state-of-the-art facility, increase the CAPH from 14 to 16 beds, and increase the number of private rooms from 4 to 12.

Energy Efficiency Measures

The Children’s and Women’s hospital earned a LEED Silver certification in 2012

- Continued reduction of lighting power densities through the use of energy efficient compact fluorescent and LED fixtures
- Continued reduction of lighting power usage through occupancy sensors though out the renovated space

Other Sustainability Features

- Continued use of low flow plumbing fixtures
- Salvage and reuse of existing mechanical, electrical, and plumbing elements whenever possible; thus eliminating construction waste. (ex: light fixtures, toilets, sinks, HVAC diffusers, etc.)
- Salvage and reuse of existing acoustic lay-in ceiling tiles, doors, and casework whenever possible
- New building materials utilize a high amount of recycled content
- Construction and demolition waste diverted when possible

Project Data

- Budget: $10.9 M
- Schedule: Completion Scheduled for Winter 2016
- Square Feet: 22,500 gross sq. ft. renovation

Substantially Complete: February 2016

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

MMED Samuel and Jean Frankel Cardiovascular Center Hybrid Cardiac Catheterization Laboratory and Operating Room

Project Description

The Samuel and Jean Frankel Cardiovascular Center (CVC) opened in 2007, focusing on cardiovascular disease clinical care, research, and teaching. There has been a shift recently from open-heart surgical valve repair to catheter-based technologies that has resulted in better clinical outcomes, shorter inpatient stays, and reduced recovery time for patients. This approach to cardiac care is predicted to continue to increase. Hybrid operating rooms have flexible uses, allowing clinical care teams to perform open surgeries, catheter-based procedures or complex multi-specialty procedures in the same room. This project will renovate approximately 11,000 gross square feet of space on Level 2A to convert space to a hybrid cardiac catheterization operating room with laboratory and associated support spaces.

Energy Efficiency Measures

- Premium energy efficient motors with variable frequency drives on new air handling unit and return fan
- Occupancy sensors in all critical spaces to setback room air flow and temperature during unoccupied periods
- Occupancy sensors in all non-critical spaces to control lighting and setback room air flow during unoccupied periods
- HVAC system connected to the central building controls system for monitoring
- High efficiency lighting for all areas

Other Sustainability Features

- Low-flow plumbing fixtures in restrooms and at hand wash sinks

Project Data

- Budget: $14.8 M
- Schedule: Completion Scheduled for Spring 2017
- Square Feet: 11,000 gross sq. ft. renovation

Substantially Complete: February 2017

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

MMED Taubman Alfred A Health Care Center Central Cardiac Monitoring

Project Description

The project will renovate approximately 1,500 gross square feet of space on Level B 1 of the A. Alfred Taubman Health Care Center that will create a cardiac monitoring center with eight workstations initially covering 192 patients, with capacity to add four stations in the future to expand patient coverage.

Energy Efficiency Measures

- High Efficiency dedicated AHU with advanced digital controls.
- Lighting on Occupancy Sensors.
- Dual-level lighting control in Office and Workstation areas.

Other Sustainability Features

- Water saving faucets on hand wash and break room sink.

Project Data

- Budget: $5 M
- Schedule: Completion Scheduled for Summer 2017
- Square Feet: 1,450 gross sq. ft. renovation

Substantially Complete: June 2017

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

MMED University Hospital Operating Room Expansion

Project Description

This project will renovate approximately 24,500 gross square feet of space to create four new operating rooms within the surgical suite at University Hospital. Support spaces for operating room equipment storage, offices, and a new staff lounge will be created in space vacated by a prior project to relocate the adjacent EEG/EMG clinic to University Hospital South.

Energy Efficiency Measures

- Variable air volume control where there are nonessential air pressure relationships (offices, locker rooms, break room, etc.)
- Occupancy sensors to turn off lighting when areas are unoccupied
- Cooling tower winterized, to allow “free cooling” when outdoor air temperature is low
- Free cooling in coordination with chiller basin and new high efficiency chiller
- High efficiency light fixtures

Other Sustainability Features

- Water use reduction through use of low consumption urinals, lavatory faucets and shower heads

Project Data

- Budget: $23.5 M
- Schedule: Completion Scheduled for Summer 2016
- Square Feet: 24,500 gross sq. ft. renovation

Substantially Complete: July 2016

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

MMED University Hospital Radiation Oncology Linear Accelerator Replacement

Project Description

The linear accelerator technology in Radiation Oncology treatment room B2C527 is aging and limiting the ability to improve patient throughput, convenience, and safety. This project will renovate the treatment room as well as part of the associated control and equipment rooms to accommodate installation of a new linear accelerator. The new accelerator will lead to several patient benefits, including faster and more efficient treatments using non-invasive positioning and real-time monitoring for improved patient safety. In addition, the chilled water system serving the linear accelerators in Radiation Oncology will be upgraded.

Energy Efficiency Measures

- New dedicated process chilled water loop to replace outdated and unreliable linear accelerator cooling systems. New system includes:
  - High efficiency pumps utilizing variable frequency drives
  - Fully automated DDC technology to monitor and adjust temperature and flow to maximize efficiency
  - Energy conservation motor technology to vary airflow based on demand
- Provide digital controls for new VAV boxes
- Use variable air volume systems
- High efficiency LED night lights and down lights
- Use multi-level switching and dimming of lights

Other Sustainability Features

- New dedicated process chilled water loop to replace outdated and unreliable linear accelerator cooling systems and reduce water usage by allowing continuous system operation in the event of failure, instead relying on city water as the only “back-up” cooling mode.
- Use of regional and local materials where possible
- Low VOC interior finishes such as paints, flooring and wall coverings
- Reuse of existing wall construction

Project Data

- Budget: $6.81 M
- Schedule: Completion Scheduled for Spring 2017
- Square Feet: 6,000 gross sq. ft. renovation

Substantially Complete: June 2017

- Project Status: Substantial Completion
- Design Complete: 100%
- Construction Complete: 98%

MMED University Hospital South Central Sterile Processing Department Scope Reprocessing Center

Project Description

This project will renovate approximately 6,300 gross square feet of underutilized space on Level 3 of University Hospital South to create space for the Central Sterile Processing Department to efficiently clean and process instruments for sterilization. This project will create significant process efficiencies for scope sterilization leading to improved operational outcomes.

Energy Efficiency Measures

- Energy efficient premium efficiency motors with variable frequency drives on new exhaust fans
- Occupancy sensors in all non-critical spaces to control lighting and setback room air flow during unoccupied periods to save lighting energy, fan energy, cooling energy and heating energy
- Entire HVAC system connected to the central building controls system for monitoring.
- High efficiency lighting for all areas

Other Sustainability Features

- Low water use plumbing fixtures in restrooms and hand wash sinks
- Low VOC/No VOC paints, adhesives, sealants, ceiling tiles
- Low VOC/FloorScore certified resilient flooring
- Low VOC/Green Label Plus carpet
- Mold-resistant FPR wall protection

Project Data

- Budget: $5.1 M
- Schedule: Completion Scheduled for Spring 2018
- Square Feet: 6,264 gross sq. ft. renovation

Substantially Complete: January 2018

- Project Status: Substantial Completion
- Design Complete: 100%
- Construction Complete: 95%

MMED University Hospital South Medical Short Stay Unit

Project Description

This project will renovate currently unoccupied space on level 4 of University Hospital South to create a twenty-one-bed medical short stay unit. The project will update spaces to address accessibility concerns and improve infrastructure, including plumbing, electrical, networking, and communications systems.

Energy Efficiency Measures

- New digital controllers replaced existing Double Duct Variable Volume (DDVAV) HVAC boxes
- DDVAV boxes connect to the Building Management System (BMS) and allow scheduling of spaces and energy savings

Other Sustainability Features

- Significant reuse of existing features

Project Data

- Budget: $9 M
- Schedule: Completion Scheduled for Summer 2015
- Square Feet: 19,650 gross sq. ft. renovation

Substantially Complete: July 2015

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

MMED West Ann Arbor Health Center

Project Description

Ambulatory Care activity within the University of Michigan Health System (UMHS) has risen steadily over time and is now nearing two million visits per year. In order to improve patient access to ambulatory care services, UMHS is both actively improving throughput within existing facilities and seeking to expand its capacity. As part of these efforts, the UMHS proposes the construction of a new and larger health center in the west Ann Arbor market. The existing West Ann Arbor Health Center is 6,000 square feet in leased space in Scio Township. Construction of an approximately 75,000-gross square-foot facility on property donated to the university in December 2010 will provide a significant expansion in access to an ambulatory diagnostic and treatment center, walk-in clinic, primary and specialty care, infusion, clinical pathology, and radiology services. The new facility will also include adequate surface parking adjacent to the health center.

Energy Efficiency Measures

- Glazing with low-E coating to reduce thermal losses in the winter and radiation gain in the summer
- LED lighting used exclusively
- Occupancy sensors throughout the building to turn off the lights when rooms are unoccupied
- HVAC setback mode for use during off hours
- Variable frequency drives on equipment to conserve energy when demand is low
- High efficiency motors and transformers to reduce energy consumption

Other Sustainability Features

- Landscape design to include naturalized plantings to minimize maintenance and irrigation needs
- A retention pond to control storm-water quantity and quality leaving the site
- A 20% water consumption savings beyond Michigan Plumbing Code is anticipated; savings obtained through the use of low flow fixtures and dual flush toilets
- Adjustable thermostats for occupant comfort
- Low-VOC interior finishes
- Construction waste to be diverted from landfill when possible

Project Data

- Budget: $46 M
- Schedule: Completion Scheduled for Fall 2017
- Square Feet: 75,000 gross sq. ft.

Substantially Complete: October 2017

- Project Status: Substantial Completion
- Design Complete: 100%
- Construction Complete: 99%

Mobility Transformation Facility

Project Description

The project will include the site clearing, grading, infrastructure and roadways for a four-lane 1,000-foot straight asphalt road, merge lanes, a network of asphalt and concrete urban streets, roundabout, traffic circle, crushed-gravel road segment, concrete calibration pad, service road connecting to the UMTRI parking lot, storage lot, security fencing around the entire site, covered pavilion, lighting, and electrical and networking infrastructure. This project also includes landscaping and storm water management, with a bridge, culverts, and bank stabilization to minimize wetland impacts adjacent to Millers Creek. The College of Engineering and UMTRI will be responsible for the future installation of site accessories that are not included in this project. Over time, these accessories may include building facades placed onto foundations to simulate urban streets, street signs and trusses for overhead highway signage, roadway and pedestrian lights, railroad crossings, traffic signals, benches, traffic barrels, mock fire hydrants, and other devices necessary to simulate a realistic driving environment.

The Mobility Transformation Facility, although not comprising a building, included several sustainability measures to lessen the impact on the environment. These measures include:

- No heating or cooling load required
- No domestic water or sewage uses
- No landscape irrigation
- Prairie seed mix instead of lawn
- Four stormwater quality control units
- Stormwater peak flow controls
- Stabilization of Millers Creek stream banks
- Reduced lighting within security fence
- Construction waste management

No heating or cooling load required

As this project does not comprise a building, no heating or cooling is required, with its associated energy consumption and maintenance efforts. The entire facility is located outdoors, allowing for vehicle testing through all weather conditions.

No domestic water or sewage uses

As this project does not comprise a building, there is not domestic water or sewage use required, with site occupants generally using the adjacent UMTRI building as needed. These occupants would otherwise be using facilities in their respective office buildings so there is not additional domestic or sewage load with this project, eliminating the associated energy uses, groundwater drawdowns, and potential leaks of additional piping. A future sporadic use of a rainwater simulator is planned, but will draw from a groundwater well to eliminate the need for treating and long-distance piping of domestic water.

No landscape irrigation

The project is designed with no landscape irrigation planned. Species are selected for their drought tolerance to ensure survival through dry summer periods. This will reduce unnecessary water and energy use.

Prairie seed mix instead of lawn

94% of the disturbed unpaved site area is seeded with prairie mix instead of lawn, allowing for native or adapted species to thrive with minimal, mowing, fertilization, and pesticides, and provide habitat for wildlife

Mobility Transformation Facility

while treating and absorbing stormwater.

Stormwater quality controls

All stormwater on the site flows through a filtration basin, a vegetated swale, or a vegetated filter strip to treat contaminants. Additionally, all water falling on paved surfaces are treated with swirl concentrator chambers to ensure 80% Total Suspended Solids removal in the 90% excedance events, through engineered measures that function fully throughout winter. Additionally, U-M-OSEH and MDEQ soil erosion and sedimentation controls are implemented.

Stormwater peak flow controls

Site stormwater is routed through a detention basin to ensure that the peak flow rate from the project entering Millers Creek is reduced below existing conditions for the 1-year, 2-year, 10-year, and 100-year storms.

Stabilization of Millers Creek stream banks

As a part of this project the portion of Millers Creek passing adjacent to the test track was armored to prevent future erosion and stream migration. Additionally, one area with a blown out culvert was restored with graded back slopes, and another damaged culvert was repaired, which will reduce soil migration.

Reduced lighting within security fence

Lighting on the main access drive from UMTRI is installed to U-M minimum access standards, and photocell controlled. While an extensive set of varying commonly-used light and traffic signal fixtures are installed within the secured MTF perimeter for vehicle testing purposes, they are turned off when not in use, and the MTF is metered separately and billed to the users to provide an extra incentive to reduce energy consumption when not required. The only lighting fixtures that are on during nighttime hours when the experimental fixtures are turned off are four solar-powered security lights installed throughout the secured perimeter.

Project Data

- Budget: $6.5 M
- Schedule: Completion Scheduled for Fall 2014
- Square Feet: N/A

Substantially Complete: December 2014

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

Munger Graduate Residences

Project Description

The University of Michigan has received a major gift to fund construction and fully furnish a new residential facility for graduate students. The eight-story building will be approximately 380,000 gross square feet and will accommodate approximately 600 students in an apartment-style layout. The new building is proposed to be located on the site of the current Thompson Street surface parking lot, immediately south of the Thompson Street Parking Structure and on adjacent parcels of land.

Energy Efficiency Measures

- The building's design and systems include a number of energy efficient features that allow for an estimated 30% energy savings compared with an energy code compliant building as defined in ASHRAE 90.1-2007 - Appendix G
- Exterior envelope rain screen wall system to minimize thermal bridging and air leakage, even under the negative pressurization required for laboratories
- Improved air-conditioning system efficiency through the use of chilled beams and dedicated outside air systems
- Return air from offices and classrooms utilized as makeup air to laboratories
- Energy recovery wheels in the dedicated outside systems to reduce energy consumption
- Occupancy sensors to turn off lights when spaces are un-occupied

Other Sustainability Features

- This project is LEED® Gold certified and achieved 71 points under the LEED for New Construction v2009 rating system.
- Project site located near public bus routes to encourage use of public transit.
- Close proximity to basic services such as banks, theaters and restaurants to encourage building occupants to walk instead of drive
- Native and drought tolerant plantings will be used on site to reduce irrigation water use by at least 50%
- Storm water management system that limits increased (post-construction) runoff levels of storm water into the existing storm water system
- Low-flow fixtures reduce water consumption by a minimum of 20% beyond Michigan Plumbing Code; savings obtained through the use of low flow bathroom fixtures.
- Construction waste to be diverted from landfills when possible
- Low-VOC adhesives and sealants, paints and coatings, flooring systems, and composite wood and agrifiber products
- Materials and products used to be extracted and manufactured within 500 miles of the project site when possible.
- Materials used to contain recycled content when possible
- Use low-impact refrigerants minimizing contributions to climate change

Munger Graduate Residences

Project Data

- Budget: $152 M
- Schedule: Completion Scheduled for Summer 2015
- Square Feet: 380,000 gross sq. ft.

Substantially Complete: July 2015

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

New Field Hockey Team Center New Field Hockey Stadium and Ocker Field Improvements

Project Description

This project will demolish the existing Ferry Field Locker Rooms building that no longer meets the needs for the current level of prominence of the field hockey program, and construct a new field hockey team center. The new 13,000-gross-square-foot building will house locker rooms for players and coaches, offices, training facilities, hydrotherapy pools, meeting space, and broadcast capabilities. The project will also construct a new grandstand with a capacity of 1,500 spectators and an approximately 2,000-gross-square-foot concessions building with public restrooms. Ocker Field will be completely refurbished with new turf, a new scoreboard, and new field lighting. This project will permanently displace ten parking spaces.

Energy Efficiency Measures

- High-performing thermal envelope reduces heating and cooling demand
- A balanced fenestration provides optimal light transmittance and thermal performance
- Energy Recovery enthalpy wheel designed to recover energy by transferring heat from exhaust air to preheat supply air
- Heat Pumps maximize efficiency by balancing the loads between hot and cold therapy pools
- Occupancy sensors control lights and mechanical equipment to only run when there is someone in the associated space
- High-efficiency mechanical equipment utilized to reduce annual operating expenses.

Other Sustainability Features

- Use of Best Management Practices and Erosion and Sedimentation control measures during construction minimized and prevented pollution, soil erosion, waterway sedimentation, and airborne dust generation
- Low-flow plumbing fixtures installed to reduce annual water usage by 32%
- Building materials utilize high amount of recycled content and were sourced as locally as possible
- Low-VOC materials utilized in building components

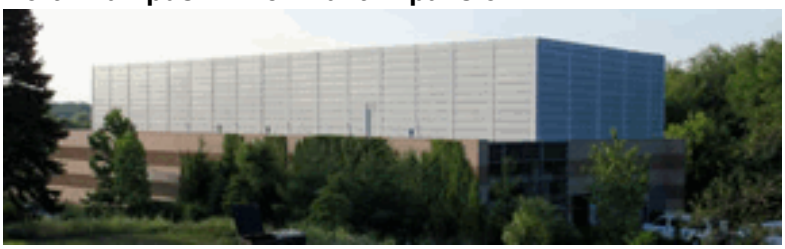
Project Data

- Budget: $13.5 M
- Schedule: Completion Scheduled for Summer 2014
- Square Feet: 13,000 gross sq. ft.

Substantially Complete: July 2014

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

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 approximately $200,000, with the majority of savings achieved with increased energy performance. We now propose to increase the size of the facility by 8,500 square feet and add 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 approximately $100,000 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

- Insulated exterior walls
- Chillers selection based on lowest life cycle cost, which is largely dictated by highest energy efficiency
- Turn off the new substation during winter operation and just use the existing substation
- Reduced 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 lowered energy usage of general lighting

Other Sustainability Features

- Salvaged the existing acoustical screen-wall panels on the east end of the building and re-installed them in the same relative location on the new east wall of the NCCP
- Salvaged the existing glass curtain wall on the east end of the building and re-installed it in the same relative location on the new east wall of the NCCP
- Underground piping extended to satellite buildings and installed by directional boring piping in select areas, to minimize disruption of trees and other surface elements
- The bentonite slurry from the directional boring was mixed with the top soil and compost 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 Summer 2011
- Square Feet: 8,500 gross sq. ft.

Substantially Complete: June 2011

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

North Campus Research Complex Building 16 Renovation for Health Services Research

Project Description

The Medical School proposes to co-locate a dozen or more health service research groups that are currently scattered in various locations into Building 16 in the North Campus Research Complex (NCRC). The five above-grade floors will be renovated to promote collaboration among groups and consolidation of redundant resources to create a more efficient and cost-effective research environment. Three conference rooms and fitness center located in below-grade level will also be renovated for general NCRC use. A renovation of approximately 120,000 gross square feet within Building 16 is planned to accommodate the programmatic needs for these relocations and to address anticipated growth. The renovation will also update the building's infrastructure, including heating, cooling, and ventilation systems; wired and wireless high-speed network access; bathroom facilities; and accessibility improvements. The scope of this project includes the architectural, mechanical and electrical work necessary to accomplish these improvements.

Energy Efficiency Measures

- The new floor plan design opened up work space to draw natural daylight further into the facility
- Life cycle analysis was evaluated for converting from existing electric heating panels to a new perimeter hydronic fin tube design solution
- New low flow fixtures 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 was reused in the renovated space
- New energy efficient lighting fixtures with electronic ballasts used
- New occupancy sensors provided for more energy efficient lighting controls in offices, conference rooms and support spaces
- New timer light switching provided in janitor closets and storage rooms that have infrequent use
- The existing carpeting was recycled as part of the renovation
- Low VOC and recycled content used where possible

Project Data

- Budget: $13.7 M
- Schedule: Completion Scheduled for Spring 2012
- Square Feet: 120,000 gross sq. ft. renovation

Substantially Complete: June 2012

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

North Quad Residential and Academic Complex

Project Description

The complex will include residential space consisting of suite-style units providing housing that responds to students' contemporary needs, and is not currently available in our housing inventory. The academic space will include the majority of the School of Information, and several highly complementary programs from the College of Literature, Science, and the Arts including Communication Studies, Film and Video Studies, and the Language Resource Center. Classrooms, dining, gallery space, group study areas, and some amenities will also be part of the complex. Flexible and integrated living and learning space will facilitate collaboration and engagement between students and faculty. The mixed-use development will foster student interaction and learning and will provide an appropriate mix of academic, residential, and formal and informal gathering spaces. North Quad will include sufficient space to accommodate 460 student beds and living areas, dining facilities, and, academic and support spaces.

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

North Quad Residential and Academic Complex

- 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 (e.g. terrazzo flooring, linoleum and cork flooring)
- Use of low-VOC materials (e.g. carpets, paints)
- Use of regional and local materials where possible (e.g. limestone, brick)
- Water-efficient landscaping

Project Data

- Budget: $186.4 M
- Schedule: Completion Scheduled for Spring 2010
- Square Feet: 360,000 gross sq. ft.

Substantially Complete: May 2010

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

North Quadrangle Residential and Academic Complex Residential Wing Roof Repairs

Project Description

This project will replace 30,000 square feet of roofing on the residential wing of the building and repair the roof substrate as required.

Energy Efficiency Measures

Maintain the existing thermal envelope while making the following improvements.

- Breaches in air-barrier to be corrected and made continuous from wall to roof transitions
- Breaches in air barrier to be correct and made air-tight at pipe penetrations
- Wet insulation to be replaced in-kind

Other Sustainability Features

- Existing brick will be salvaged and reused at locations where through wall flashing is to be replaced
- Some parts of existing safety rails to be reused, others that aren't reused are to be recycled
- Existing snow guards not reused to be recycled
- An attempt will be made to find a source to recycle the existing zinc roofing

Project Data

- Budget: $7.8 M
- Schedule: Completion Scheduled for Fall 2016
- Square Feet: 30,000 gross sq. ft. renovation

Substantially Complete: August 2016

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

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

- Existing heating hot water boilers replaced with noticeably more efficient condensing units
- The expected efficiency improvement increased 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
- New boilers 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 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 is 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.
- Boiler burner controls specified with a 5:1 turndown which allows each boiler to remain in efficient operation down to 20% of full load. Additionally, 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.
- Existing heating hot water system distribution pumps replaced with units driven by variable speed drives (VSDs), which represents electric power savings, as this feature allows 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 gross sq. ft. renovation

Substantially Complete: July 2012

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

Nuclear Engineering Laboratory Renovation

Project Description

The project will increase space utilization by creating additional usable floor space within the structure and existing penthouse, resulting in an additional 20 percent increase in the total building square footage to 20,500 gross square feet in this four-story building. This will accommodate the expansion needs of the Department of Nuclear Engineering and Radiological Sciences (NERS) in the College of Engineering. The NERS department has consistently maintained top rankings of graduate nuclear engineering programs and is growing in faculty, students, and research. This project includes a comprehensive renovation of the building, and new space for flexible research laboratories, testing areas, offices, support spaces, and mechanical equipment.

Energy Efficiency Measures

- Reduce energy usage of the primary air handling system below ASHRAE 90.1-2007 standard levels
- High-performance glazing systems to increase thermal performance
- Primary HVAC system consisting of a 100% OA (outside air) central air handling unit to provide ventilation to each space, with an enthalpy energy recovery wheel design to recover energy from the building exhaust
- Individual space fan coil units to provide space cooling, which decouples the space cooling load on a room level, resulting in increased energy efficiency
- Variable frequency drives (VFDs) for mechanical equipment
- Unoccupied ventilation setback modes to reduce ventilation load
- LED lighting fixtures used to reduce the lighting power density
- Task lighting installed at counters and laboratory casework
- Occupancy sensor lighting controls for automatic shutoff when rooms are un-occupied
- Premium efficiency distribution transformers

Other Sustainability Features

- Adaptive reuse of an existing building
- A 20% water consumption savings beyond Michigan Plumbing Code is anticipated; savings will be obtained through the use of low flow bathroom fixtures
- Zoned HVAC control systems provided to improve occupant comfort
- Low VOC paint systems
- Low VOC linoleum and resilient flooring and carpet adhesives
- Rubber tile containing 30% recycled product
- Solid surface counter top containing 83% recycled glass content
- FSC certified wood veneer
- Acoustical ceiling tile is containing 81% recycled content

Nuclear Engineering Laboratory Renovation

- Carpet is 100% recyclable after its life cycle and contains up to 44-67% recycled content
- Motorized window shades provided to control natural daylight
- Bi-level switching installed to provide light level flexibility
- Surface raceways installed to provide flexible power and data for laboratories
- Ceiling service panels installed to provide flexible power and data for laboratories

Project Data

- Budget: $12 M
- Schedule: Completion Scheduled for Spring 2017
- Square Feet: 20,500 gross sq. ft. renovation
  240 gross sq. ft. addition

Substantially Complete: March 2017

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

Palmer Drive Development

False

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 U-M 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.

Palmer Drive Development

False

- 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 (CO2) 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 challenged 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.

Pierpont Commons Cafe Renovation

Project Description

A renovation of approximately 10,500 gross square feet within the cafe's servery, dining areas, and adjacent corridors is planned that will provide upgraded finishes and seating, four new culinary stations, and select upgrades to infrastructure including mechanical, electrical, plumbing, and networking systems. The renovated spaces will revitalize the cafe and increase dining and study space for students in the North Campus community.

Energy Efficiency Measures

- Mechanical systems designed to meet ASHRAE 90.1-2007
- Lighting power density designed to be 29.3% below ASHRAE 90.1-2007, total density includes both general and accent lighting
- Master dimming cabinet provides automated lighting control for general and accent lighting zones in the dining and servery areas, dimmable light fixtures allow users to fine-tune desired light levels and save energy
- Occupancy sensors provide automated lighting control for closets and corridors
- The majority of light fixtures are LED type, while some fixtures utilize T-5 or T-8 fluorescent lamps, which should result in long-term maintenance savings. There are no incandescent sources

Other Sustainability Features

- Carpet used has one or more of the following sustainability features:
  - Post-Consumer Recycled Content
  - Pre-Consumer Recycled Content
  - Participation in carbon neutral program in which verified carbon offsets are purchased to cancel out the CO2 equivalent of carpet lifecycle cost
  - Participation in Green Label Plus program to ensure the highest standard of indoor air quality by limiting Volatile Organic Compounds (VOCs)
- All paint is low VOC
- Reclaimed wood used in a few locations provided by a local source
- Tile used has one or more of the following sustainability features:
  - Natural content which limits the release harmful substance into the environment
  - Recycled content to reduce waste and limit use of resources
  - Green guard certified to ensure the most stringent standards for low VOC levels

Project Data

- Budget: $5.3 M
- Schedule: Completion Scheduled for Fall 2014
- Square Feet: 10,500 gross sq. ft. renovation

Substantially Complete: August 2014

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

Player Development Center for Intercollegiate Basketball

Project Description

An addition of approximately 57,000 gross square feet to Crisler Arena is proposed. The new facility will house two new basketball practice courts that will provide better scheduling flexibility related to the academic schedules for student athletes as well as offer a complement of services not currently available to the men's and women's intercollegiate basketball teams. The project will include team locker areas, strength and conditioning space, athletic medicine space, and coaching and staff offices.

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 U-M 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)

Player Development Center for Intercollegiate Basketball

Project Data

- Budget: $23.2 M
- Schedule: Completion Scheduled for Fall 2011
- Square Feet: 57,000 gross sq. ft.

Substantially Complete: October 2011

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

Richard L. Postma Family Clubhouse

Project Description

Originally constructed in 1950, the clubhouse at the University of Michigan Golf Course is now outdated and no longer meets the university's needs. The replacement facility will be approximately 23,000 gross square feet located on the same site as the existing building and will optimize operational functions, increase energy efficiency, and include modern spacious banquet facilities for the use of the entire university community. Site work will include grade changes, adjustments to golf course holes one and ten, repair of the concrete creek lining, new structure for the west side crossing of the creek, and relocated parking.

Energy Efficiency Measures

- Building envelope designed to be 4% more efficient than required by ASHRAE 90.1-2007
- High performance curtain wall window assemblies increase thermal performance of the building envelope
- In-floor radiant heating maintains building temperatures during unoccupied periods without operation of packaged rooftop units
- High-efficiency condensing boilers with turndown ratios of 5:1
- Energy efficient LED lighting
- Occupancy sensors turn off lights when spaces are unoccupied.
- Commercial dishwashing units recirculate exhaust air to eliminate exhaust fan operation and conditioning of make-up air
- Variable speed compressors allow for peak efficiency in low load conditions and avoid short cycling of equipment

Other Sustainability Features

- Built on a previously developed site to reduce impact on environment
- Project site located near public and U-M bus routes to encourage use of public transit
- Impervious surface area reduction to reduce stormwater runoff
- 649 square feet of green vegetated roof
- A 20% water consumption savings beyond Michigan Plumbing Code is anticipated through the use of low flow plumbing fixtures
- Bottle refill station provided on electric water cooler to promote use of reusable water bottles
- Sorting and recycling of demolition and construction waste where possible
- Use of low-VOC flooring, adhesives and sealants where possible
- Use of recycled and regional materials where possible

Project Data

- Budget: $15 M
- Schedule: Completion Scheduled for Spring 2017
- Square Feet: 23,000 gross sq. ft.

Substantially Complete: March 2017

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

Ross Athletic Campus Athletics South Competition and Performance Project

Project Description

This project will construct approximately 280,000 gross square feet of space to become the future home for men's and women's track and field, cross country, lacrosse, and women's rowing. The project will include an indoor and outdoor track competition venue for 2,000 and 500 spectators respectively. In addition, a lacrosse stadium will be built on the site that will accommodate 2,000 spectators. A consolidated performance team center is more cost-effective to provide specialized team spaces and shared resources for strength and conditioning, athletic medicine, a performance lab, meeting space, and locker rooms. When completed, the development will allow hosting of home, regional, and national competitions, and use by students participating in recreational sports.

Energy Efficiency Measures

Sports Performance, Indoor Track, and Lacrosse Buildings:

- The building design and systems include a number of energy efficient features that will allow for an estimated 30% energy savings compared with an energy code compliant building as defined in ASHRAE 90.1-2007 Appendix G
- High performance glazing assemblies for increased thermal performance
- Increased insulation values in roof assemblies for improved thermal performance
- Increased insulation values in wall assemblies for improved thermal performance
- Demand control ventilation to control ventilation air brought into the building
- Energy efficient hot water heating boilers
- Chiller with heat recovery
- Variable speed drives on the cooling tower fans
- Destratification fans in large spaces
- Enthalpy economizer in lieu of dry bulb economizer
- Exhaust air recovery device with highest efficiency
- Increase the thermostat dead band
- Energy efficient lighting
- Reduction in lighting power density

Other Sustainability Features

Sports Performance, Indoor Track, and Lacrosse Buildings:

- The project is registered under the LEED green building rating system with the certification goal of LEED Silver. This project will use the LEED for New Construction v2009 rating system.
- A 30% water consumption savings beyond Michigan Plumbing Code is anticipated; savings will be obtained through the use of low flow bathroom fixtures
- Construction waste to be diverted from landfills when possible
- Use of regional materials when possible
- Use of recycled materials when possible
- Low-VOC paints, flooring, adhesives and sealants

Ross Athletic Campus Athletics South Competition and Performance Project

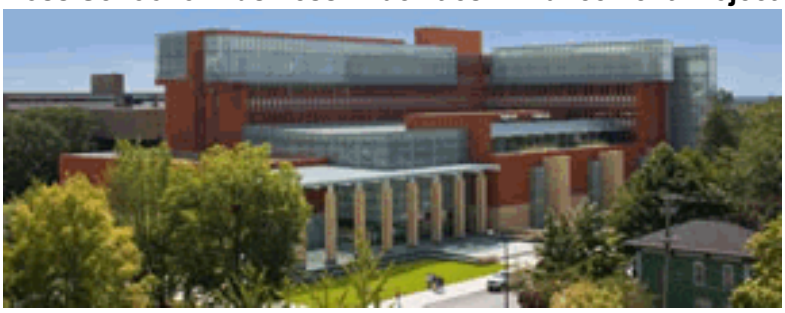
Project Data

- Budget: $168 M
- Schedule: Completion Scheduled for Winter 2018
- Square Feet: 280,000 gross sq. ft.

Substantially Complete: October 2017

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

Ross School of Business - Facilities Enhancement Project



Project Description

The Ross School of Business Project involves the demolition of Davidson Hall, Assembly Hall and Paton Center, (approximately 180,000 gross square feet) and construction of a new building of approximately 270,000 gross square feet. The new facility will be seven floors housing twelve tiered 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. Adjoining work at the Kresge Library includes the enclosure of the Kresge portico and air conditioning chiller installations in the Kresge Library mechanical room.

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 provide 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

- This project is LEED® Silver certified and achieved 36 points under the LEED for New Construction v2.1 rating system.
- 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 U-M 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

Ross School of Business - Facilities Enhancement Project

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: $145 M
- Schedule: Completion Scheduled for Fall 2008
- Square Feet: 270,000 gross sq. ft.

Substantially Complete: December 2008

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

School of Education Renovation

Project Description

A renovation is planned that will improve infrastructure and renovate select areas of the building to improve functionality. Infrastructure improvements on the first and second floors will include new heating, ventilation, and air conditioning systems, new accessible toilet facilities, and installation of a new fire alarm system for the entire building. In addition, a small renovation of approximately 8,300 gross square feet will provide a more visible and welcoming environment for students and visitors to the Office of Student Affairs and Teacher Education Suite. Three existing classrooms will be renovated to provide a teaching wet laboratory and an interactive classroom with four breakout rooms. A community lounge will also be created.

Energy Efficiency Measures

- DDC temperature controls
- Chilled beam cooling systems
- Air and water temperature reset
- Outside air flow monitoring
- Variable frequency drives for pumps and air handling unit fans
- Premium efficiency fan and pump motors
- Enthalpy energy recovery wheels in air handling units
- Where new lighting was required, the design outperformed ASHRAE 90.1-2007 energy targets by 16%
- Where new lighting was required, occupancy sensors were provided in the lounges, offices, classrooms, breakout rooms, and toilet rooms

Other Sustainability Features

- Utilized existing building structure, no site development
- All new plumbing fixtures are low-flow fixtures and dual flush toilets
- Regional materials used wherever possible
- Use of low-VOC materials (carpets, paints, etc.)

Project Data

- Budget: $13.6 M
- Schedule: Completion Scheduled for Fall 2015
- Square Feet: 8,300 gross sq. ft. renovation

Substantially Complete: August 2015

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

School of Nursing New Building

Project Description

The School of Nursing is proposing to construct a new building of approximately 78,000 gross square feet to accommodate its instructional space needs, including a clinical learning center with simulation and skill labs, and simulated patient suites in an environment that will foster collaboration and community. The new building will include space for a small number of faculty offices and limited administrative functions. The proposed site is located near the existing location just north of the North Ingalls Building. With the growth in academic and research programs and increases in student enrollment, the School of Nursing anticipates adding approximately 40 faculty and staff members in the next five to ten years. Approximately 125 parking spaces will be lost due to this project.

Energy Efficiency Measures

- The building's design and systems include a number of energy efficient features that allow for an estimated 27% energy savings compared with a code energy compliant building as defined in ASHRAE 90.1 - Appendix G
- Optimized below grade wall, above grade wall and roof insulation to improve the building envelope performance
- Lighting power density is 30% below ASHRAE 90.1 2007 allowable, calculated by the whole building method
- Lighting reduction through the use of occupancy sensors and photocells
- High Efficiency Chillers to reduce energy use
- High Efficiency Boilers to reduce energy use
- 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

- This project is LEED® Gold certified and achieved 63 points under the LEED for New Construction v2009 rating system.
- Low-flow plumbing fixtures aim to reduce potable water usage by 35% when compared to the 2009 Michigan Plumbing Code
- Native/adaptive vegetation and a centrally controlled irrigation management system designed to reduce potable water consumption by 67%.
- 35% of the building materials, by value manufactured using recycled materials
- 89% of construction waste diverted from the landfill
- 24% of the building materials, by value, were manufactured and extracted within 500 miles of the project site
- 97% of the total wood-based building materials are certified by the Forest Stewardship Council (FSC)
- All adhesive and sealant products, paints and coatings, flooring systems and wood and agrifiber products used inside the building are low VOC
- Natural daylight is maximized in interior spaces to reduce electric lighting needs and to provide occupants with a connection to the outdoors
- 2,320 square feet of green vegetated roof

School of Nursing New Building

Project Data

- Budget: $50 M
- Schedule: Completion Scheduled for Fall 2015
- Square Feet: 78,000 gross sq. ft.

Substantially Complete: July 2015

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

South Quad Renovation

Project Description

The project will renovate approximately 106,700 gross square feet of space, including the ground and first floors of South Quadrangle. 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

- The building's design and systems include a number of energy efficient features that allow for an estimated 30% energy savings compared with a code energy compliant building as defined in ASHRAE 90.1-2007 Appendix G
- Improved glazing system performance
- Use of occupancy sensors as lighting controls
- Utilized VAV kitchen hood exhausts as well as partial hood makeup via transfer from community spaces
- Utilized additional kitchen hood enclosures such as baffles and side curtains
- South façade external shading devices
- Specified low pressure loss air handling units
- Utilized infrared scans of building during construction

Other Sustainability Features

- Water conservation measures for this project include the following measures to target a 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 provided to encourage bicycle usage
- Porous pavers utilized in several areas
- Select kitchen equipment rehabilitated and reused
- Construction waste management such that 50% of the material diverted from landfills
- Building materials both regional and local have been sought to make up minimum of 10% the cost of total building materials
- Kitchen waste going through a pulper, significantly reducing the amount of solid waste from the dining facility

South Quad Renovation

Project Data

- Budget: $68.5 M
- Schedule: Completion Scheduled for Summer 2014
- Square Feet: 106,700 gross sq. ft. renovation

Substantially Complete: July 2014

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

Stephen M. Ross School of Business Kresge Business Administration Library Renovation, Computer and Executive Education Building Demolition, Jeff T. Blau Hall, and Exterior Cladding Project

Project Description

This project includes a comprehensive renovation of the Kresge Business Administration Library, demolition of the Computer and Executive Education Building, construction of a new academic building, and the addition of exterior building finishes (or cladding) to Sam Wyly Hall, the Business Administration Executive Dormitory, and the Hill Street Parking Structure to create a unified look for the entire Ross School complex of buildings. In total, this project represents approximately 75,000 gross square feet of building renovation and 104,000 gross square feet of new building construction. The project will add classrooms, study space, and faculty and research offices, and enhance non-academic operations to improve the student experience, including student life, financial aid, admissions, and onsite recruiting for careers. The new building design will strive to create a welcoming and unified exterior aesthetic along with well-functioning internal connections within the complex.

Energy Efficiency Measures

- The building's design and systems include a number of energy efficient features that will allow for an estimated 30% energy savings compared with an energy code compliant building as defined in ASHRAE 90.1-2007 Appendix G
- High performance glazing and exterior wall assemblies for improved thermal performance
- Chilled beams in the Kresge building
- High efficiency chiller with optimized part load to improve performance
- Air systems with improved design for part load and low load operation to track occupancy
- Air handing units that will only cool to the minimum temperature needed to satisfy the space heat and dehumidification loads, reducing the zone reheat
- Task lighting, efficient light fixtures, and the integration of natural daylight to help reduce the building's electrical load
- Occupancy sensors to turn off lights when spaces are unoccupied

Other Sustainable Features

- This project is LEED® certified to the Gold level and achieved 60 points under the LEED for New Construction v2009 rating system.
- Project site located near public and U-M bus routes to encourage use of public transit
- 86% reduction in stormwater runoff
- 90% of total suspended solids (TSS) removed from stormwater runoff
- Designed for a 41% water consumption savings beyond Michigan Plumbing Code; savings will be obtained through the use of low flow bathroom fixtures
- Centrally controlled irrigation management system to reduce potable water use for irrigation by 56% and ensure proper watering through monitoring of flow rates and weather
- 87% construction waste to be diverted from landfills
- Over 37% of materials used contain recycled content
- Over 68% of materials used were extracted and manufactured within 500 miles of the project site
- Low-VOC paints and coatings, flooring systems, and adhesives, and sealants

Stephen M. Ross School of Business Kresge Business Administration Library Renovation, Computer and Executive Education Building Demolition, Jeff T. Blau Hall, and Exterior Cladding Project

Project Data

- Budget: $135 M
- Schedule: Completion Scheduled for Fall 2016
- Square Feet: 75,000 gross sq. ft. renovation
  104,000 gross sq. ft. addition

Substantially Complete: December 2016

- Project Status: Substantial Completion
- Design Complete: 96%
- Construction Complete: 99%

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

Project Description

A comprehensive renovation of The Charles T. Munger Residences in the Lawyers' Club and the John P. Cook Building, and 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, 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
- Use of existing structure, eliminated much construction demolition materials from landfill, also eliminated the need to construct a new building
- Offsite modular prefabrication of toilet rooms allowed for higher quality control, expedites schedule and reduces costs

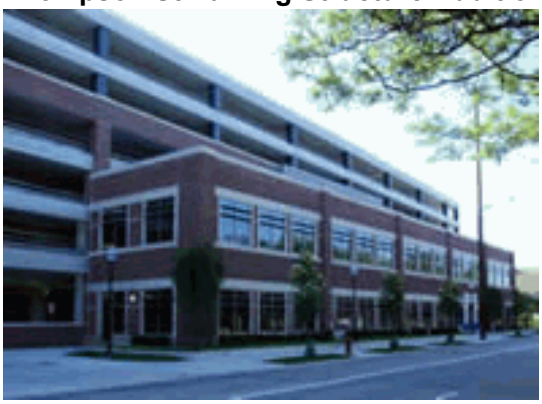
Project Data

- Budget: $39 M
- Schedule: Completion Scheduled for Summer 2013
- Square Feet: 159,000 gross sq. ft. renovation

Substantially Complete: June 2013

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

Thompson St 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 385-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 Thompson Street Parking Structure and parking lots within the development zone currently provide 776 parking spaces. When the addition is complete, the entire parking structure will accommodate approximately 1,060 vehicles, for a net increase of 284 parking spaces.

Energy Efficiency Measures

- Electrical systems, including lighting, 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 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 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 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 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 installed to minimize water consumption
- Natural daylighting is provided to all office spaces

Project Data

- Budget: $15.7 M
- Schedule: Completion Scheduled for Fall 2010
- 273 Net Parking Space

Substantially Complete: November 2010

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

Towsley Center for Children Replacement Facility

Project Description

The Towsley Center for Children is currently located within two conjoined houses at 710 and 716 South Forest that were constructed in 1912 and 1914 and have been altered many times over the years. We evaluated an option to renovate and expand the existing facility; however, the cost to address barrier-free access and correct existing deficiencies would result in costs that are comparable for a new facility. Therefore, we are proposing to replace the existing facility with a 21,000 gross square foot, two-story building on the same site. Approximately 13,000 net square feet will provide capacity for 142 spaces for children within the new Towsley Center, 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 U-M 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 (e.g. synthetic slate roofing, PVC-free flooring tile and carpets)
- Use of low-VOC materials (e.g. carpets, paints)
- Use of regional and local materials where possible (e.g. brick)
- Water-efficient landscaping

Project Data

- Budget: $8 M
- Schedule: Completion Scheduled for Fall 2009
- Square Feet: 25,441 gross sq. ft.

Substantially Complete: December 2009

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

UMHHC A. Alfred Taubman Health Care Center Internal Medicine

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 designed to optimize efficiency
- Utilized Variable Air Volume system
- Use of digital controls for new VAV Boxes
- Energy Efficient Lighting fixture
- 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: $7.5 M
- Schedule: Completion Scheduled for Summer 2013
- Square Feet: 27,500 gross sq. ft. renovation

Substantially Complete: November 2013

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

UMHHC A. Alfred Taubman Health Care Center Levels 1 and 2 Backfill

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 re-evaluate 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 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

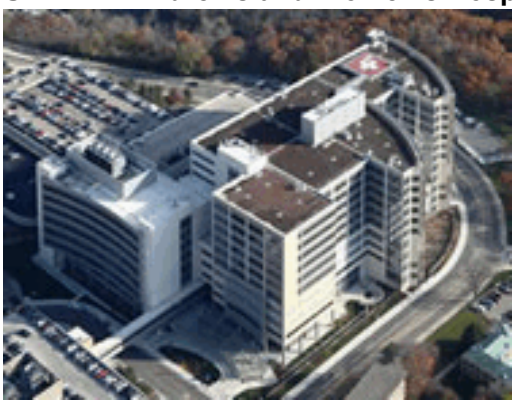
Project Data

- Budget: $13 M
- Schedule: Completion Scheduled for Spring 2013
- Square Feet: 35,000 gross sq. ft. renovation

Substantially Complete: August 2013

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

UMHHC Children's and Women's Hospital Replacement Project



Project Description

The C. S. Mott Children's and Von Voigtlander Women's Hospitals Replacement Project will provide a new, state-of-the-art inpatient and outpatient facility for children and women. An approximately 1,100,000 gross square foot facility is planned that consists of a clinic building of 9 floors and an inpatient building of 12 floors plus a helipad on the easternmost roof. The building will include inpatient space, clinic and office space to support children's and women's programs. Since demand for patient care services has increased beyond expectations, the project will also include the completion of the majority of the shelled space within the original program (approximately 151,000 square feet) including 84 additional patient rooms, two magnetic resonance imaging (MRI) units, one operating room (OR), and an inter-operative MRI/OR suite along with additional clinic and office space.

The building will be connected to the existing Taubman Health Center via a link as well as the Simpson Parking Structure. Site Improvements include utility reconfigurations, roadway reconfigurations, landscaping, steam tunnel and ductbank extensions, and stormwater detention.

Energy Efficiency Measures

- Designed to ASHRAE Standard 90.1-2004 including building envelope 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

- This project is LEED® Silver certified and achieved 36 points under the LEED for New Construction v2.2 rating system.
- Vegetative roof reduces storm water run-off, reduce heat island effect, and create a natural habitat
- Storm water infrastructure (collection) and management minimizes 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 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
- Recycled approximately 75% of construction waste
- Building materials utilized a high amount of recycled content
- Very low amount of volatile organic compounds (VOC) utilized in building components

UMHHC Children's and Women's Hospital Replacement Project

Project Data

- Budget: $539 M
- Schedule: Completion Scheduled for Fall 2011
- Square Feet: 1,100,000 gross sq. ft.

Substantially Complete: June 2011

- Project Status: Substantial Completion
- Design Complete: 100%
- Construction Complete: 98%

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

Project Description

The University of Michigan Hospitals and Health Centers (UMHHC) proposes 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.

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 used to improve the quality of the storm water leaving the site, this device removes more than 80% of the total suspended solids in the storm water runoff

Demolition Phase Sustainable Features

- 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 brought to a Class ll landfill
- Toxicity Characteristic Leaching Procedure (TLCP) testing performed on select materials to determine whether hazardous chemicals would leach from waste material, material was then disposed as either hazardous or non-hazardous material
- No vehicular idling was allowed on site and all diesel equipment is fueled by biodiesel fuel B-20
- All diesel equipment utilized exhaust after treatment devices to reduce emission from diesel engines
- U-M maintenance shops had an opportunity to salvage and reuse building components
- Maintained best practices for soil erosion and sediment control procedures

Project Data

- Budget: $5 M
- Schedule: Completion Scheduled for Fall 2012
- Square Feet: 69,000 gross sq. ft. renovation

Substantially Complete: December 2012

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

UMHHC University Hospital and University Hospital South Renovations for Magnetic Resonance Imaging Suite Expansion

Project Description

A renovation of approximately 11,000 gross square feet of space adjacent to the existing MRI suite is planned that will add a new MRI scanner and associated support space as well as shelled space for an additional MRI at a later date. The project will also enlarge patient reception, waiting areas and provide patient changing rooms, preparation rooms, toilet rooms, a consultation room, equipment room, and storage space.

Energy Efficiency Measures

- The project utilizes existing central HVAC equipment with a goal to utilize energy efficient methods wherever possible
- Premium efficiency motors for supply, return and exhaust fans
- Digital controls for new VAV boxes
- High efficiency lighting fixtures throughout the project
- High efficiency LED exit lights, and down lights
- Occupancy sensors to control lighting in offices and other support spaces
- Multi level switching and dimming of light fixtures

Other Sustainability Features

- Recycling and reuse of construction waste when possible
- Regional materials used when possible
- Low VOC flooring, adhesives, sealants, coatings wall coverings and paints

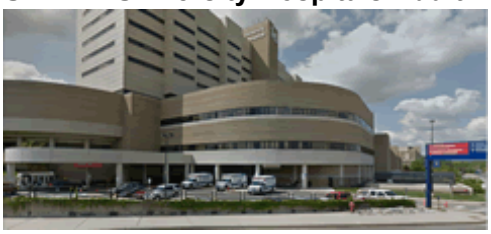
Project Data

- Budget: $10 M
- Schedule: Completion Scheduled for Winter 2016
- Square Feet: 11,000 gross sq. ft. renovation

Substantially Complete: April 2016

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

UMHHC University Hospitals Adult Emergency Department Critical Care Unit



Project Description

A renovation of approximately 7,800 gross square feet of space in the emergency department on Level BI of University Hospital formerly occupied by the pediatric emergency services area, now located at C.S. Mott Children's and Von Voigtlander Women's Hospitals, is planned. The renovation project will create a new critical care area of nine rooms, enabling stabilization and early initiation of intensive care unit (ICU) protocol-driven care for select populations in the emergency department. This effort is expected to reduce the length of stays in select ICU beds within University Hospital and create increased capacity.

Energy Efficiency Measures

- Variable Air Volume Air System
- High Efficiency Lighting
- Use of occupancy sensors to reduce airflow in non-occupied periods

Other Sustainability Features

- Low water use plumbing fixtures

Project Data

- Budget: $7 M
- Schedule: Completion Scheduled for Summer 2015
- Square Feet: 7,800 gross sq. ft. renovation

Substantially Complete: April 2015

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

UMHHC 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 were 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

Project Data

- Budget: $6.9 M
- Schedule: Completion Scheduled for Spring 2011
- Square Feet: 16,000 gross sq. ft. renovation

Substantially Complete: June 2011

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

UMHHC 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 from 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

Project Data

- Budget: $13.9 M
- Schedule: Completion Scheduled for Winter 2012
- Square Feet: 28,900 gross sq. ft. renovation

Substantially Complete: February 2012

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

UMHHC University Hospitals 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. The scope of this project includes the architectural, mechanical and electrical work necessary to accomplish these improvements.

Energy Efficiency Measures

- Occupancy sensors control lighting in office and other support spaces
- 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
- Selected sustainable materials such as quarry tile flooring
- Low-VOC materials such as sheet flooring, adhesives, sealants, coatings and paints
- Regional and local materials used where possible
- Enhanced commissioning, construction improved Indoor Air Quality management and thermal comfort improvements

Project Data

- Budget: $8.5 M
- Schedule: Completion Scheduled for Winter 2013
- Square Feet: 13,000 gross sq. ft. renovation

Substantially Complete: September 2012

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

UMHHC University Hospitals MPU Renovations

Project Description

The medical procedure unit (MPU) at University Hospital has a ratio of 2.3 prep/recovery bays per procedure room, well below the industry standard of 4 to 1, hindering patient throughput. 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 scope of this project includes the architectural, mechanical and electrical work necessary to accomplish these improvements.

Energy Efficiency Measures

- Maximized insulation in new roof assembly, exceeding min energy code requirements
- 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
- 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
- Multi-level switching and dimming of lights

Other Sustainability Features

- Infill of exterior courtyard, reused of existing wall construction
- Low VOC interior finishes (Paints, Flooring, Wall coverings, etc.)
- High level of air quality in spaces

Project Data

- Budget: $6 M
- Schedule: Completion Scheduled for Spring 2012
- Square Feet: 2,200 gross sq. ft. renovation
  4,000 gross sq. ft. addition

Substantially Complete: June 2012

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

UMHHC University Hospitals Positron Emission Tomography/Computed Tomography Scanner Replacement

Project Description

Combined positron emission tomography/computed tomography (PET/CT) scanners are an advanced imaging method that allows the detection and location of cancer cells. The PET/CT scanner located on level B1 of University Hospital was purchased in 2007 and remains operational. Since 2007, however, the technology in this area has advanced rapidly, and the University of Michigan Hospitals and Health Centers propose replacing the scanner to improve diagnostic capabilities. A renovation of approximately 1,000 gross square feet on level B1 is planned to accommodate the scanner replacement.

Energy Efficiency Measures

- Occupancy sensors in all critical spaces to setback room air flow and temperature during unoccupied periods to save fan energy, cooling energy and heating energy
- HVAC system connected to the central building controls system to allow monitoring
- High efficiency lighting for all areas

Other Sustainability Features

- Paint: Low VOC, Greenguard certified
- Rubber Base: Recycled content, Floorscore Certified
- Solid Surface: Greenguard Certified, Low VOC, 6-13% Recycled Content
- Ceiling Tiles: Greater than 50% Recycled Content
- Sheet Vinyl Flooring: 20% Recycled Content, Floorscore certified, low VOC

Project Data

- Budget: $6 M
- Schedule: Completion Scheduled for Winter 2016
- Square Feet: 1,000 gross sq. ft. renovation

Substantially Complete: April 2016

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

Varsity Drive Building Dry Collection Relocation Renovations

Project Description

This project will relocate dry research museum collections, associated lab spaces, and some offices for the Departments of Anthropology, Paleontology, and Zoology currently housed in the Alexander G. Ruthven Museums Building, the Campus Safety Services Building, and the Clarence Cook Little Science Building to the Varsity Drive Building. A renovation of approximately 71,000 gross square feet at the Varsity Drive Building is planned to accommodate the relocation of the collections. The project will create several environmentally-controlled areas with different temperature and humidity conditions appropriate to protect the various collections. The existing building is a warehouse, and the project will include comprehensive architectural, mechanical, and electrical work necessary to accomplish these improvements. The relocation of the “dry” research collections will create administrative efficiencies by co-locating with the “wet” research collections of the same departments at the Varsity Drive Building.

Energy Efficiency Measures

- The building’s design and systems include a number of energy efficient features that will allow for an estimated 21% energy savings compared with an energy code compliant building as defined in ASHRAE 90.1 -2007 Appendix G
- Improved building envelope for renovated area including additional wall insulation on south and east walls, additional insulation on low roof, improved glazing systems on south and east walls, and exterior shading devices/interior light shelves for south glazing
- Lower velocity ductwork and AHU components to reduce pressure drop and fan horsepower
- High efficiency condensing boilers
- High efficiency chillers
- Desiccant dehumidification vs. standard cool/reheat system
- High efficiency condensing water heaters
- Occupancy sensor tie-in to VAV boxes where appropriate
- Reduced lighting power density and added occupancy sensors throughout the renovated areas
- Daylighting controls for areas with south facing glass

Other Sustainability Features

- No additional parking added to promote use of public and alternative forms of transportation
- Bike storage and showers available to building occupants to promote use of alternative transportation
- Water use reduction through use of low flow plumbing fixtures
- Building adaptive reuse
- Recycled and regional materials used when possible
- Low-VOC materials used when possible

Project Data

- Budget: $27.45 M
- Schedule: Completion Scheduled for Winter 2015
- Square Feet: 71,000 gross sq. ft. renovation

Substantially Complete: September 2015

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

Vera B. Baits Houses II Renewal

Project Description

Constructed in 1967, the approximately 175,000-gross-square-foot, five-building Vera B. Baits Houses II complex (Baits II) provides housing for approximately 575 students. Consistent with the overall residential life initiative, we propose a comprehensive renovation of Baits II. 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 creation of community.

Energy Efficiency Measures

- Aluminum windows with 1-inch, double-pane insulated glazing, thermal breaks, and special coatings
- Roofing complies with ASHRAE 90.1-2007 standards, with insulating values between R21 and R40
- Energy-efficient light fixtures comply with ASHRAE 90.1-2007 standards, with occupancy sensors
- Energy-efficient and paper-saving electric hand dryers
- Energy-efficient kitchen appliances and computers

Other Sustainability Features

- Toilet fixtures with water-saving 1.6 gallons-per-flush and dual-action flush valves (0.6 gpf for liquids)
- Plumbing faucets and shower heads with water-saving features
- Salvaged existing student furniture from other U-M dormitories instead of purchasing new furniture
- Flooring contains recycled content, low-VOC emissions, and regionally-produced material

Project Data

- Budget: $11.95 M
- Schedule: Completion Scheduled for Summer 2013
- Square Feet: 175,000 gross sq. ft. renovation

Substantially Complete: August 2013

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

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 facade with open space at each end of the structure that will contain park-like landscaping with trees and gardens for storm water management which may also be used for irrigation and reducing storm runoff to the river. We also intend to include infrastructure for electric vehicle charging stations.

Energy Efficiency Measures

- Consumes energy at a rate that is 30% less than established by ASHRAE Standard 90.1-2007
- Designed as an open parking structure, thereby avoided the need for powered ventilation
- Energy-efficient fluorescent and LED light fixtures installed throughout
- Interior light fixtures controlled by occupancy sensors and photocells to minimize energy use and to increase security

Other Sustainability Features

- Covered bus stop to encourage park and ride use, minimizing motor vehicles on campus
- Native and adapted plant materials minimize the need for irrigation
- Landscaped areas maximized and porous pavements installed to reduce storm water runoff
- Rain garden at east front yard of parking structure collects surface storm water runoff to maximize on-site infiltration and minimize the potential for downstream flooding
- Storm water mechanically and environmentally cleaned on-site prior to discharge
- Infrastructure installed for electric vehicle charging stations

Project Data

- Budget: $34 M
- Schedule: Completion Scheduled for Spring 2014
- 530 Net Parking Space

Substantially Complete: July 2014

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

Weiser Hall Renovation

Project Description

A renovation of approximately 106,000 gross square feet vacated by the relocation of the Department of Astronomy to West Hall and the repurposing of classrooms will create spaces that will facilitate faculty collaboration and enhance opportunities for graduate and undergraduate students. The renovated space will be organized efficiently with sharing of staff, space, and core facilities between units housed in the building. In addition, approximately 1,500 gross square feet of space will be added by enclosing an overhang area on the ground floor, and extending windows outward on the tenth floor. The project will also address deferred maintenance in the areas renovated.

Energy Efficiency Measures

- The building's design and systems include a number of energy efficient features that allow for an estimated 30% energy savings compared with an energy code compliant building as defined in ASHRAE 90.1-2007 Appendix G
- Replacement of single pane windows with double pane insulated windows
- High performance glazing where masonry walls are to be replaced with sections of curtain wall
- Thermal break technologies, coatings, warm edge spacers and gases incorporated to optimize the vision unit performance
- Addition of insulation and vapor barrier at existing uninsulated masonry walls
- Chilled beams
- Coordination of mechanical system and operation to use realistic performance values to avoid unnecessary over-design of the mechanical system
- Replacement of existing light fixtures with more efficient light fixtures, task lighting, and the opening up of interior floor plates to allow for increased natural daylight penetration
- Occupancy sensors for lighting controls
- Rated glass partitions used to open view to existing exit stairs to encourage the use of stairs in lieu of elevator use

Other Sustainability Features

- Project site located near public and U-M bus routes to encourage use of public transportation
- A 20% water consumption savings beyond Michigan Plumbing Code is anticipated through the use of low flow bathroom fixtures
- Demolition and construction waste diverted from landfill when possible
- Low-VOC paints, flooring, adhesives and sealants
- Recycled and regional materials used where possible

Project Data

- Budget: $49 M
- Schedule: Completion Scheduled for Summer 2017
- Square Feet: 106,000 gross sq. ft. renovation
  1,500 gross sq. ft. addition

Substantially Complete: July 2017

- Project Status: Substantial Completion
- Design Complete: 100%
- Construction Complete: 99%

West Hall Renovation for the College of Literature, Science, and the Arts

Project Description

This project will relocate the Department of Astronomy from its current location in the David M. Dennison Building to the third and fourth floors of West Hall to permit greater collaboration with the Center for the Study of Complex Systems and the Department of Physics located in West Hall. A renovation of approximately 21,800 gross square feet of space within West Hall is planned to accommodate the relocation. The project will also relocate the administrative offices of the Department of Statistics from the fourth floor of West Hall to space that will be shared with the Department of Astronomy to gain administrative efficiencies.

Energy Efficiency Measures

- Energy efficient mechanical unit serves all four floors of the south wing of the building
- High efficiency zoned heating, ventilation and air conditioning unit (which exceeds building code requirements)
- Enthalpy economizer control
- Direct digital controls
- Increased thermostat dead band
- Use of energy efficient fluorescent light fixtures (in compliance with ASHRAE 90.1-2007)
- Lighting controls which include occupancy sensors and daylight sensors

Other Sustainability Features

- Low flow plumbing fixtures (20.7% savings)
- Reused building exterior and structure to conserve resources and reduce environmental impact
- Reused existing window shades to reduce waste while minimizing solar heat gain

Project Data

- Budget: $5.5 M
- Schedule: Completion Scheduled for Summer 2014
- Square Feet: 21,800 gross sq. ft. renovation

Substantially Complete: September 2014

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

West Quadrangle and Michigan Union-Cambridge House Renovation

Project Description

Originally constructed in 1937, West Quadrangle, combined with the Cambridge House portion of the Michigan Union, is an approximately 370,000-gross-square-foot residence hall housing approximately 1,100 students. As part of the ongoing Residential Life Initiative, a deep renovation of West Quadrangle and Cambridge House. Dining services for West Quadrangle residents will be relocated to the expanded Central Campus Dining Center at South Quadrangle, allowing renovation of the current West Quadrangle dining area into much-needed spaces for student interaction, creation of community, study and practice rooms and living and learning activities. Infrastructure upgrades will include new plumbing, heating, cooling, and ventilation systems; roof replacement; renovated bath facilities; exterior envelope and window repairs; and accessibility improvements.

Energy Efficiency Measures

- The building's design and systems include a number of energy efficient features that allow for an estimated 35% energy savings compared with a code energy compliant building as defined in ASHRAE 90.1-2007 Appendix G
- This project has been approved for the Designed to Earn ENERGY STAR® certification. This certification recognizes that this design project has met Environmental Protection Agency
- Increased wall insulation
- New roof insulation
- Improved glazing performance in Cambridge House where windows were replaced
- Utilized occupancy sensors in all common areas
- Utilized infrared scans of building during construction to minimize air infiltration
- Inspected exterior wall and fenestration during construction
- Energy efficient, regional chiller plant located in South Quad will serve cooling needs of the West Quad and Michigan Union-Cambridge House
- Utilized enthalpy wheels to recover heating and cooling energy from the exhaust systems
- Improved air conditioning system
- Reduced lighting density throughout the building

Other Sustainability Features

- Public transportation is available with one bus stop in front of the building, on the other side of the street
- Additional bicycle parking provided
- Most of the existing trees were preserved
- Native and adaptive vegetation planted to reduce irrigation needs
- Low flow fixtures installed to reduce water consumption by 20%
- West Quadrangle was renovated at its current location with great majority of both exterior and interior walls refurbished
- Existing site lighting poles, lamps and globes were reused
- Demolished material was recycled and/or reused; this includes steel, brick and block.
- Building materials, local and regional were sought wherever possible
- Low VOC product selection

West Quadrangle and Michigan Union-Cambridge House Renovation

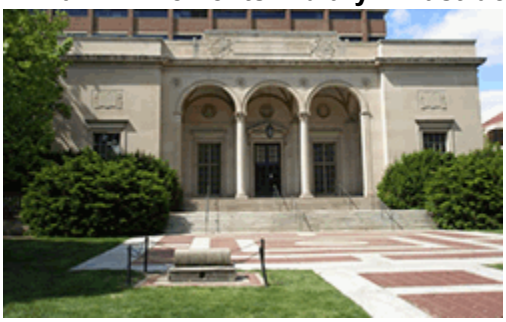
Project Data

- Budget: $114.5 M
- Schedule: Completion Scheduled for Summer 2016
- Square Feet: 370,000 gross sq. ft. renovation

Substantially Complete: July 2015

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

William L. Clements Library Infrastructure Improvements and Addition



Project Description

The project will involve a comprehensive renovation of approximately 17,300 gross square feet that 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 and suppression, and security systems; and an exterior restoration to protect this legacy building. In addition, the project will construct an underground addition of approximately 7,500 gross square feet that will house portions of the library's collection and mechanical equipment.

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
- 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
- Reduced lighting power density to reduce energy usage
- Occupancy sensors throughout the renovated areas to turn off lights in unoccupied areas

Other Sustainability Features

- Water use reduction through use of low flow plumbing fixtures
- Materials with recycled content used when possible
- FSC Certified wood materials
- Low-VOC paints, sealants and adhesives

Project Data

- Budget: $16.8 M
- Schedule: Completion Scheduled for Fall 2015
- Square Feet: 17,300 gross sq. ft. renovation
  7,500 gross sq. ft. addition

Substantially Complete: December 2015

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

Wolverine Tower Renovations for Business & Finance

Project Description

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. The scope of this project includes the architectural, mechanical and electrical work necessary to accomplish these improvements.

Energy Efficiency Measures

- New variable air volume (VAV) boxes installed to replace original building VAVs, which are more efficient in controlling temperature
- 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
- Occupancy sensor and time controls installed in offices and conference rooms

Project Data

- Budget: $6.3 M
- Schedule: Completion Scheduled for Fall 2011
- Square Feet: 61,000 gross sq. ft. renovation

Substantially Complete: September 2011

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

Yost Ice Arena Ice System Improvements

Project Description

The Department of Intercollegiate Athletics proposes a project that will upgrade the arena's ice rink floor, dasher board systems, and refrigeration system, as well as replace the flat roof on the building's north side.

Energy Efficiency Measures

- New energy efficient and high performance ice plant equipment
- New refrigeration system designed to capture and reuse a significant amount of the waste heat generated by the refrigeration system, which has been traditionally vented to the atmosphere, thereby reducing the use of natural gas and electricity required to operate the system

Other Sustainability Features

- Reduced the facilities carbon footprint by removing approximately 6,000 pounds of hydrochlorofluorocarbons (HCFCs) refrigerant and replacing with less than 800 pounds of an environmentally friendly and naturally occurring refrigerant with zero Ozone Depleting Potential (ODP) and zero Global Warming Potential (GWP)
- Minimized the amount of water used by the cooling tower through reduced operating time because of using more waste heat inside the building
- 15% fly ash in concrete mix design for floor in place of cement
- Recyclable plastics used where feasible within new dasher board system
- Construction waste sorted and recycled when possible

Project Data

- Budget: $5.8 M
- Schedule: Completion Scheduled for Summer 2015
- Square Feet: 22,000 gross sq. ft. renovation

Substantially Complete: September 2015

- Project Status: Substantial Completion
- Design Complete: 100%
- Construction Complete: 95%

Yost Ice Arena Seating Replacement and Improve Fan Amenities

Project Description

The Department of Intercollegiate Athletics is proposing a project that 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 not currently protected, and replacing the exterior windows.

Energy Efficiency Measures

- Replaced existing single pane windows with high performance glazing system
- Mechanical units replaced with high efficiency units

Other Sustainability Features

- Reused an existing building instead of tearing it down and/or building a new building

Project Data

- Budget: $16 M
- Schedule: Completion Scheduled for Fall 2012
- Square Feet: 44,965 gross sq. ft. renovation

Substantially Complete: October 2012

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