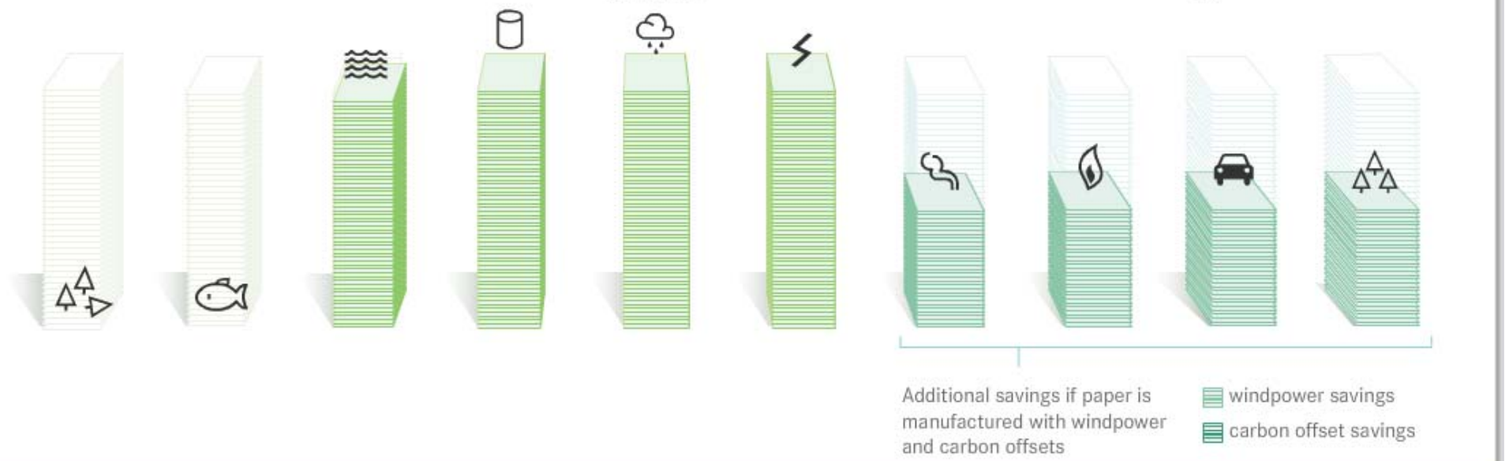
Greening the IMU

Eco-Charrette Report

02.23.2010

MOHAWK ENVIRONMENTAL CALCULATOR

MOHAWK



Environmental Savings for GIMU CHARRETTE REPORT

Please name your project and choose your system:

GIMU CHARRETTE REPORT

US measurement

How much paper will you use?

○ 2.07 lbs

◉ I don't know.

How many sheets? 74

Sheet size in inches 11 x 17

bond/ writing | 28 lb

What is the postconsumer recycled percentage?

100 %

Is it coated or uncoated?

◉ uncoated
○ coated

Is it made with windpower?

○ No
◉ Yes

Is it made carbon neutral?

◉ No
○ Yes

Greening the IMU

Eco-Charrette

INDIANA UNIVERSITY
BLOOMINGTON

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EXECUTIVE SUMMARY

The Indiana University Office of Sustainability (IUOS), organized an Eco-Charrette considering ways to make Indiana Memorial Union (IMU) operations and maintenance more environmentally effective. Over a two-day period, a diverse group of participants from IU, the City of Bloomington, and beyond toured the Indiana Memorial Union, reviewed sustainability initiatives already in place at Indiana University– Bloomington, and made recommendations for next steps to transform the IMU and the broader campus community. A charrette is an intensive planning session in which citizens, planning officials, and designers come together to collaborate on a vision for a particular development or project. The Greening of the IMU (GIMU) Charrette was focused on the topic of sustainability, also known as an Eco-Charrette. In particular, the Eco-Charrette looked at the feasibility and impact of certifying the IMU under USGBC's LEED-EB O&M Rating System.

The GIMU charrette took place on December 2, and 3, 2009. Charrette exercises focused participants attention to both campus-wide initiatives and ways they could be applied to improve sustainability at the IMU, specifically. The structure of the U.S. Green Building Council's (USGBC) Green Building Rating System LEED, Leadership in Energy and Environmental Design, for Existing Buildings- Operations & Maintenance (LEED-EB O&M) was outlined and the participants had a chance to apply this system to the IMU and rate its effectiveness for both low cost measures with quick and measurable return on investment as well as bolder green initiatives that can be applied to the IMU over time. The final session took the group through a hypothetical design exercise to see how the LEED-EB O&M certification would effect improvements scheduled to be made to the IMU and surrounding site. The results combined practical modifications to the building in light of earlier visioning by the University Architect's Office (UAO), Office of Sustainability, and in context of the 2009 Campus Master Plan with new sustainable criteria.

The facilitating team has compiled this report to provide a synopsis of the charrette and the background information gathered in its preparation, but most importantly the report outlines how to proceed with the LEED-EB O&M certification, and recommends necessary next steps in the quest for a greener IMU as well as a proposed completion schedule for the process. On January 26, 2010 a series of presentations of the final Eco-Charrette Report was given to the Office of the Architect, to the Provost Karen Hanson, Vice President Tom Morrison, to the charrette participants, and invited guests. **By leveraging the sustainability initiatives already underway on campus and enhancing them where necessary, it is anticipated that this process can be both cost effective at a basic certification level and also chart the way for reducing operational costs with significant energy savings.**

Photo Credits: Chris Meyer

ACKNOWLEDGMENTS

The facilitating team would like to express deep gratitude to Duke Energy for the generous funding that made the eco-charrette possible and for participating in the charrette event itself. Special thanks to Pam Chapman, Jeff Honaker, and Bruce Calloway. The Office of Sustainability (IUOS), Director Bill Brown, Emilie Rex, Nathan Bower-Bir, Farah Abi-Akar, Jenna Morrison, and all the hardworking IUOS interns for their support and assistance throughout the entire charrette process. Their help spanned from pre- charrette preparation and information gathering to the completion of the eco-charrette report. Thanks to Marine Tempels for her diligent work on the Greening of the IMU logo.

At the IMU we would like to thank Bruce Jacobs and Thom Simmons for their time, information, and hospitality. Steve Mangan for his hospitality, tours of the kitchens and insight into the food operations. Gary Chrzastowski provided tours of the "behind-the scenes" sections of the IMU and exemplified the service that everyone at IMU gladly provides to the students. Thank you to IMU administration for hosting the event and offering room and board to charrette participants and the facilitating team on the several occasions that required overnight stays.

Thanks to University Architect's Office (UAO) especially Bob Richardson for his time and informative presentations prior to and during the charrette, David Walter, a walking encyclopedia of IMU history, who provided us great information, and Theresa Thompson who, on short notice, helped us get access to the sea of information including necessary documents, drawings, and plans for use during the charrette and incorporation in the final report. At the University Engineering Services office we'd like to thank Jeff Kaden for presenting the technical details of the HVAC system and Charlie Matson who (with Nathan and Farah's assistance) enthusiastically provided information about systems data from the pre-charrette phase until just days before the final version the report was complete.

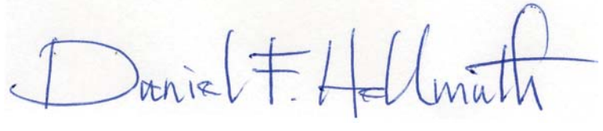
Daniel Overbey and his architecture students, Mickey McGlasson, Min Yong Shin, and Sara Reich, from Ball State University who traveled the distance to Bloomington, Indiana to participate in the charrette. They shared their knowledge and talents by producing sketches of the ideas that emerged during the conceptual design exercise as well as participating in other charrette sessions.

Kristin Simmons, of the USGBC Campus Campaign, was kind enough to make the trip from Washington, D.C. to attend the event. Special thanks for the presentation about the USGBC campus program and insights as to how the LEED process might benefit Indiana University.

Despite their busy schedules, Provost, Karen Hanson and Vice President for Capital Projects and Facilities, Thomas Morrison, took the time to personally welcome charrette participants and express the importance of sustainability at Indiana University. We appreciate their thoughtfulness and interest in the event.

To all the professionals that volunteered their time to participate, the busy students who put down the books to participate (despite looming finals around the corner) and everyone else, it has been a pleasure working with you on an iconic building such as the IMU. Thank you for your enthusiasm, contributions, and insights.

Sincerely,



Daniel Hellmuth on behalf of the facilitating team

Greening the IMU

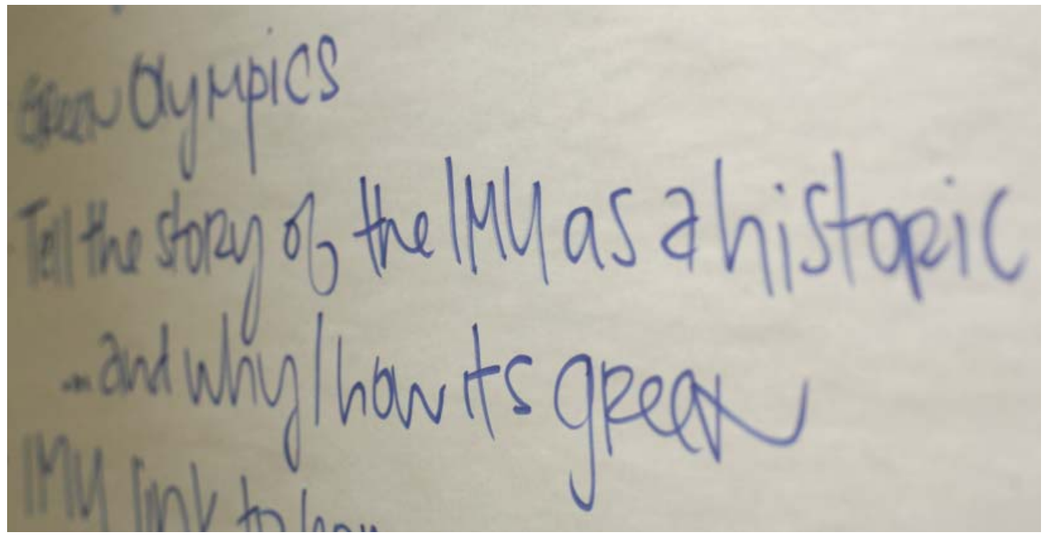
Eco-Charrette

INTRODUCTION

The Greening the Indiana Memorial Union (GIMU) Eco-Charrette was organized through the combined effort of the Office of Sustainability, the Indiana Memorial Union, the University Architect's Office, and made possible by the generous financial contribution from Duke Energy Foundation. IUOS 2009 summer intern Jenna Morrison assisted Bobbi Bosch of the Indiana University Foundation with the successful grant application to Duke Energy Foundation to fund the event. The GIMU Eco-Charrette, held on December 2nd and 3rd, 2009, served as a platform for brainstorming methods of achieving more sustainable operations and maintenance at the Indiana Memorial Union (IMU).

The goals of the GIMU charrette were to identify practical as well as far-reaching sustainability projects that would move IMU towards reduced energy and water use, ecologically sensitive site function, and low impact operations and maintenance practices. Additionally, it was hoped that the charrette process would reveal the applicability of LEED for Existing Buildings Operations and Maintenance (LEED-EB O&M) certification for the IMU. Determining practical and cost effective methods to achieve certification status was recognized as an important aspect of the charrette. The LEED-EB O&M certification process at IMU could be used as a format for the rest of the campus.

The Indiana Memorial Union is a 500,000 square foot building that serves as a central unifying force for the campus community. The Union was established in 1909 to serve as an organization promoting the spirit of collegiality on campus. The original structure serving as the home for the IMU was not built until 1932. Five additions followed in 1939, 1957, 1958, 1959, and 1960. The first renovation project since the 1960 expansions was done in the 1990s. The IMU is an iconic building on the Bloomington campus and draws people from the entire IU community. It has a historic presence that embodies the spirit of student cooperation, collaboration, and fraternity.



Above, a group of consultants, IU representatives, and students discuss the broad sustainability goals for Indiana University and IMU during the "Big Ideas" break-out session. Below, a snapshot of notes taken during group report-outs. *Photo credits: Chris Meyer*

Part I: Discovery: Pre-Charrette Information Gathering

Greening the IMU

Eco-Charrette

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TOWN AND GOWN

City of Bloomington

Bloomington, Indiana is located approximately 50 miles south of Indianapolis. While students make-up much of the city's population during the school year, the city is not vacant during academic off-times. The city's population at just under 70,000 is a small city in its own right. Nevertheless the city of Bloomington and Indiana University have an inextricable bond that has shaped their pasts and will guide their futures.

Bloomington is home to some very prestigious and unique organizations whose reach surpasses Indiana University boundaries. The Tibetan Cultural Center in Bloomington, which was founded by the Dalai Lama's brother, is the only center of its kind in the United States. The Kinsey Institute for Research on Sex, Gender, and Reproduction is an internationally respected institution and the first to tackle the sensitive subject of human sexuality. Another, is the Association of College Unions International (ACUI), a non-profit, educational association that brings together college union and student activities professionals together from hundreds of schools in several countries. The organization was founded in 1914 with a mission to build campus community through education, advocacy, and the delivery of services.

Bloomington is also home to a local chapter of the U.S. Green Building Council and the city is active in a variety of greening initiatives paralleling and supporting efforts being made on the IUB campus.

A view of Kirkwood Avenue from beyond Indiana University's iconic Sample Gates.

Photo credit: Robert E. Pence

Indiana University

Founded in 1820, Indiana University is a public, multi-campus, educational institution with undergraduate, graduate, professional students exceeding 100,000, spanning eight campuses across Indiana. All 50 states, Washington, D.C., three U.S. territories and over 150 foreign countries are represented. Faculty and staff add as additional 17,000 individuals to the IU population. The main university campus is located in Bloomington, Indiana.

Kiplinger's Personal Finance magazine recognized Indiana University in it's top 100 colleges ranking that was released in January 2010. The rating system distinguishes public colleges and universities that "deliver strong academics at affordable prices." This prestigious acknowledgement was given shortly before the State of Indiana released its announcement that due to budget cuts their funding would be reduced by 6 percent in 2010. The financial crisis has affected all sectors of the economy and unfortunately higher education is no different.

Despite smaller budgets, progress towards sustainability can still be made during this economic downturn. The environmental movement, after all seeks to address the triple bottom line; people planet and profit. While there is a premium for certain facility upgrades, there are also operations and maintenance cost savings associated with lower energy, water, chemical use in building and grounds practices. Most importantly, there are low and no cost improvements that contribute towards higher efficiencies and changed behavior that lead to better sustainability outcomes overall.

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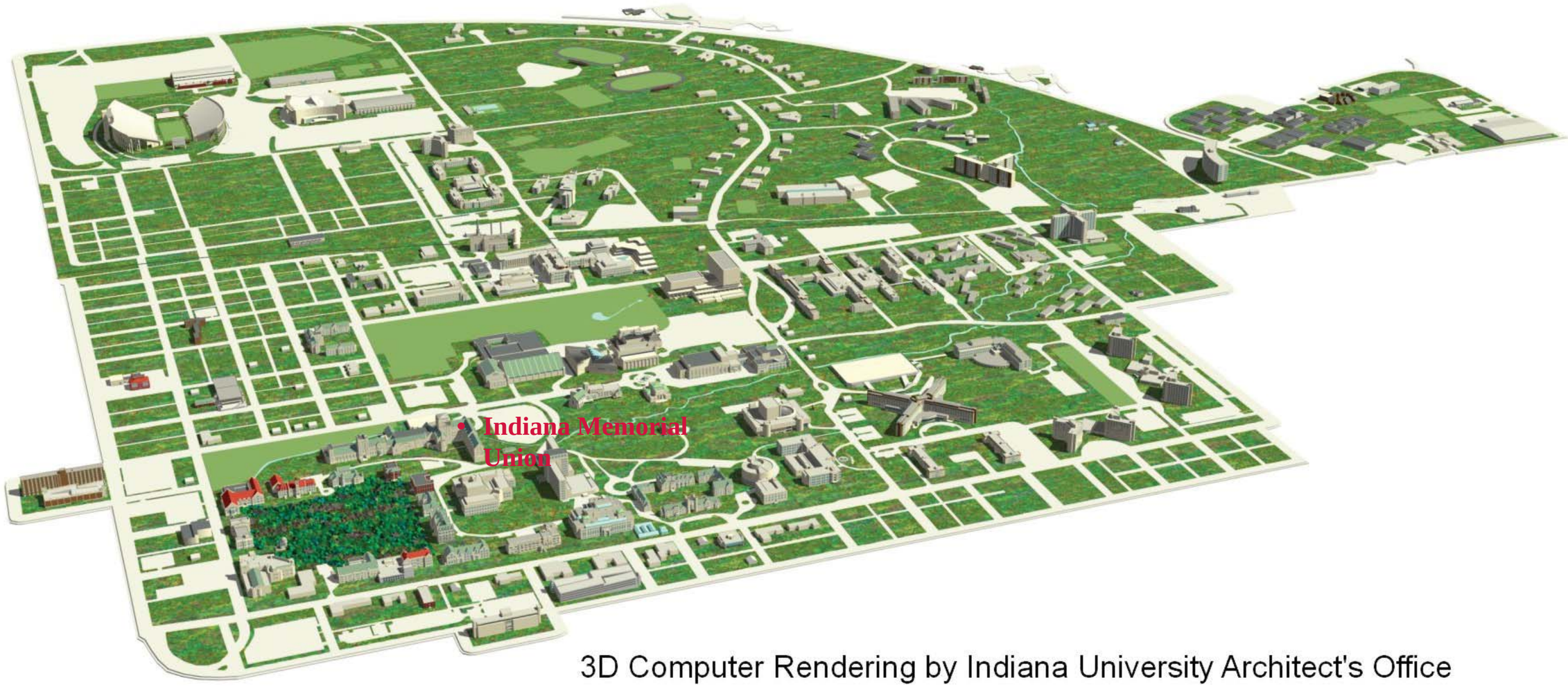
Indiana University Bloomington Campus



3D Computer Rendering by Indiana University Architect's Office

Greening the IMU

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IU Bloomington Campus

Indiana University Bloomington (IUB) is the main campus of the IU educational system. Indiana State government founded Indiana University in 1820 as the State Seminary. The name was officially changed to Indiana University in 1938.

IUB is the largest and most populated campus within the IU educational system at approximately 1,937 acres and 42,300 students enrolled in the Fall of 2009. There are 19 academic schools, colleges, and divisions offering undergraduate, graduate, and professional degrees in a wide array of disciplines.

Recently awarded third on The Daily Beast's "Decades 15 Hottest Colleges" list, Indiana University is one of the country's most valued academic institutions. According to the circulation, "Indiana University is hands-down the "It" state school of the aughts. In 2008, the school had 500 more students accept admissions offers than it had planned, and about 40 percent of Hoosiers—the largest percentage in the Big 10—now hail from out-of-state." Indiana University's high quality academic standing and charming campus have become increasingly recognized as an asset to students across the nation. In order to stay competitive, universities across the globe will have to earn accolades in a new set of criteria increasingly demanded by the next generation of enrolling students; campus sustainability. Indiana University is taking steps to ensure that sustainable campus practices will draw the next generation of enrolling students to IU.

THE INDIANA MEMORIAL UNION

IMU History & Function

Indiana Memorial Union was formed on December 6th, 1909 as a men's organization to improve civility on campus and promote a more unified student body. At the turn of the 20th century, the IU student population was highly fragmented, which often resulted in violent confrontations. John Whittenberger, an IU student at the time, noticed the demand for an organization that could bring the divided groups together. The IMU was formed with the support of IU President William Lowe Bryan and John Whittenberger, the organization's founding member, became the first union board president.

Initially the organization was housed in the east wing of the Student Building, but after years of increasing membership the need for a separate building emerged. In 1929, the architectural firm of Granger and Bollenbacher was chosen to build a facility devoted to the IMU.

The IMU functions as a central, unifying force for the IU campus and greater Bloomington community. IMU offers a broad array of events and services with something of interest to all segments of the IU population. From the worldly speakers that present at Whittenberger auditorium, to the bowling alley and billiard tables, to the multitude of serene nooks to study for exams, the union targets all walks of IU life. The union mission is to serve student groups on campus and several floors in the upper floors and tower of the IMU are devoted to student offices.

Google Earth image of the IMU shows the vast size of the facility from a bird's eye view.

Greening the IMU

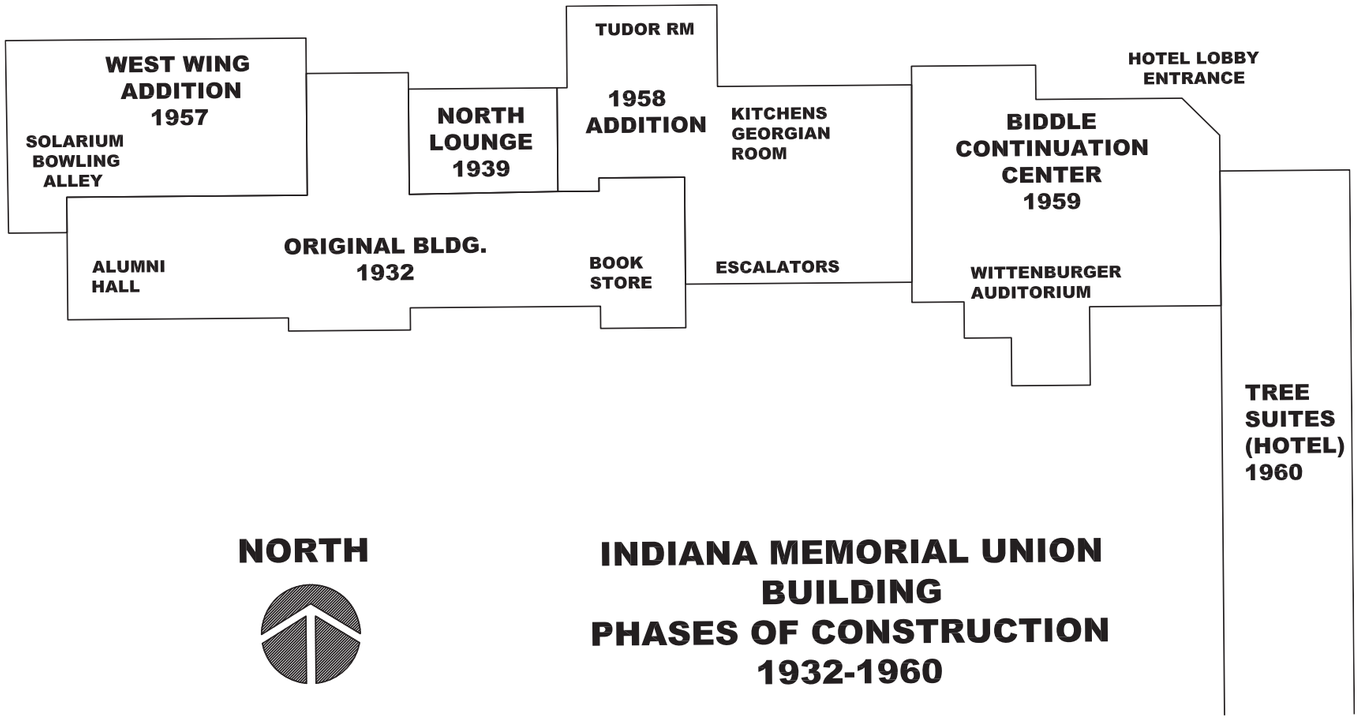
Eco-Charrette

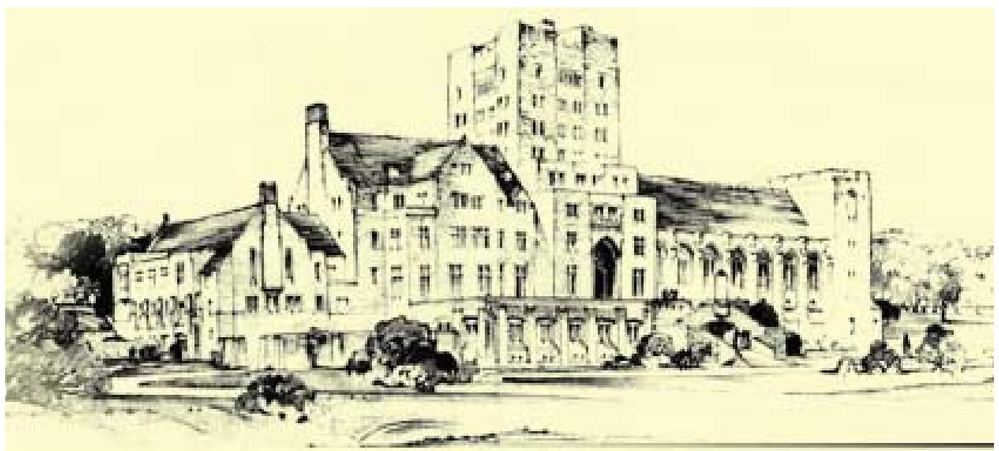
Building Development History

The original Union structure, built in 1932, included the current bookstore and alumni hall. The North Lounge was added in 1939, and originally served as a separate gathering place for women who were still restricted from joining the IMU. The late 1950's brought major expansions to the IMU. In 1957 the West Wing Addition was built to the north of Alumni Hall including the Solarium and the Bowling Alley. The 1958 Addition to the East Wing followed including the Tudor Room, Georgian Room, and escalators by the bookstore. The Biddle Continuation Center was completed in the 1959 Addition which included the Whittenberger Auditorium. The final major expansion was made in 1960 with the Tree Suites and hotel addition.

The Biddle Continuation Center was a major addition completed in 1960. Named after the Indiana Memorial Union's first Director, Ward Gray Biddle (1891-1946), the center was designed to fulfill the promise of personal and professional growth through conferences, workshops, and seminars, and includes 186 guest rooms and 50,000 sq. ft. of meeting space.

Renovation projects in 2009 increased and improved the computer space available at IMU with a focus on computer collaboration stations for student groups.

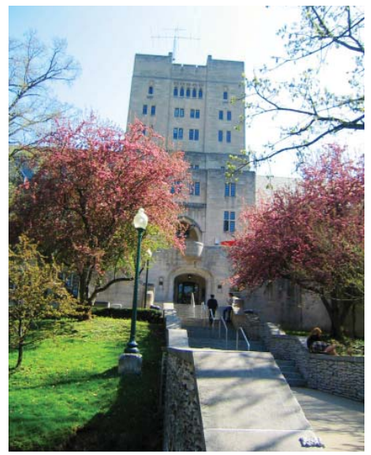




Sketch of the IMU featured on the IMU website

North side stairs to "front entrance" from 7th Street.
Photo credit: IU Photography

Patio seating outside Starbucks at the North side entrance to the IMU.



Spring Blooms near the entrance.
Photo Credit: IU Photography

Greening the IMU

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BLOOMINGTON

Site Background

Site & Stormwater Conditions

The Indiana Memorial Union is located in the southwest portion of the Indiana University campus, immediately south of the intersection of E. 7th Street and Woodlawn Avenue. This location lies at the north end of the historic portion of campus where most of the original campus buildings were constructed.

The IMU site covers approximately 11 acres and includes a portion of the Jordan River, the IMU building with approximately 2 acres under roof, a 1 acre north parking lot, and a 2.5 acre east parking lot. The remaining site area includes green space with a mature forest canopy and a network of pedestrian walks connecting the building to the surrounding campus. Stormwater is relatively uncontrolled, with the majority of building and paved surface discharging directly to the Jordan River.

Jordan River

The Jordan River flows from East to West across the site, passing north of the IMU building. The river is approximately 10 to 20 feet between its banks, and is confined laterally by sidewalks, the IMU building, and parking areas.

The river is enclosed in a culvert for approximately 400 feet as it passes beneath the hotel parking court and loading dock, and exposed potions of the river are in various states of degradation. River banks east of the IMU building have been stabilized with concrete near the east parking lot. River banks not stabilized with concrete are failing, most acutely near stormwater pipe outfalls.

IMU Building

The IMU building's size and proximity to the Jordan River create stormwater and stream bank stabilization issues. Roof drains from the building discharge either directly to the Jordan River or storm sewers that in turn discharge directly to Jordan River. The uncontrolled point discharge of these pipes destabilizes banks and contributes to water quality degradation.

Parking

Parking lots serving the building cover a large portion of the site, and contain approximately 130 spaces in the north lot, and approximately 180 spaces in the east lot. The lots are asphalt and contain tree islands only in the east lot. Both lots slope south towards the Jordan River. Runoff from these areas is uncontrolled and discharges to storm sewers that in turn discharge directly to the Jordan River.

The east lot also creates a physical barrier between the IMU and Forrest Avenue, a primary pedestrian commuter route from on campus housing to classroom buildings south of the IMU. Because of their location, the campus master plan has programmed both lots for removal except for a small area of parking adjacent to the hotel lobby.

Green Space

IMU green space surrounds the building and parking areas. The area is primarily mature forest, except for the Dunn Meadow area northwest of the building and north of the Jordan River. Although the green space is forested, trees are well spaced creating opportunities for distributed stormwater management areas such as rain gardens.

Site Access

The building is oriented with the original "front" of the building facing south towards the original campus buildings. However, the campus has expanded primarily to the north since its founding. This expansion has made the north side of the building the more prevalent user entry, and created a need for site improvements to better handle the flow of pedestrians into the building.

Points of entry to the building include the bridge entry and hotel lobby entry on the north side of the IMU, and the computer center entry, the green awning entry, and the bookstore entry on the south side of the IMU. The hotel lobby is a major point of entry due to the location of the two bus stops. The computer center was not originally constructed as a major point of entry, but has seen increased use since the computer center's recent opening.

Two primary bus stops serving the IMU are located north and east of the building. The north bus stop serves as an inter-modal stop for both campus and Bloomington city bus service, and is a primary commuter stop for off campus students parking at the university football parking lot. The east bus stop is a primary commuter stop for on campus students going between classroom building surrounding the IMU and student housing located on the opposite side of campus.

Greening the IMU

Eco-Charrette

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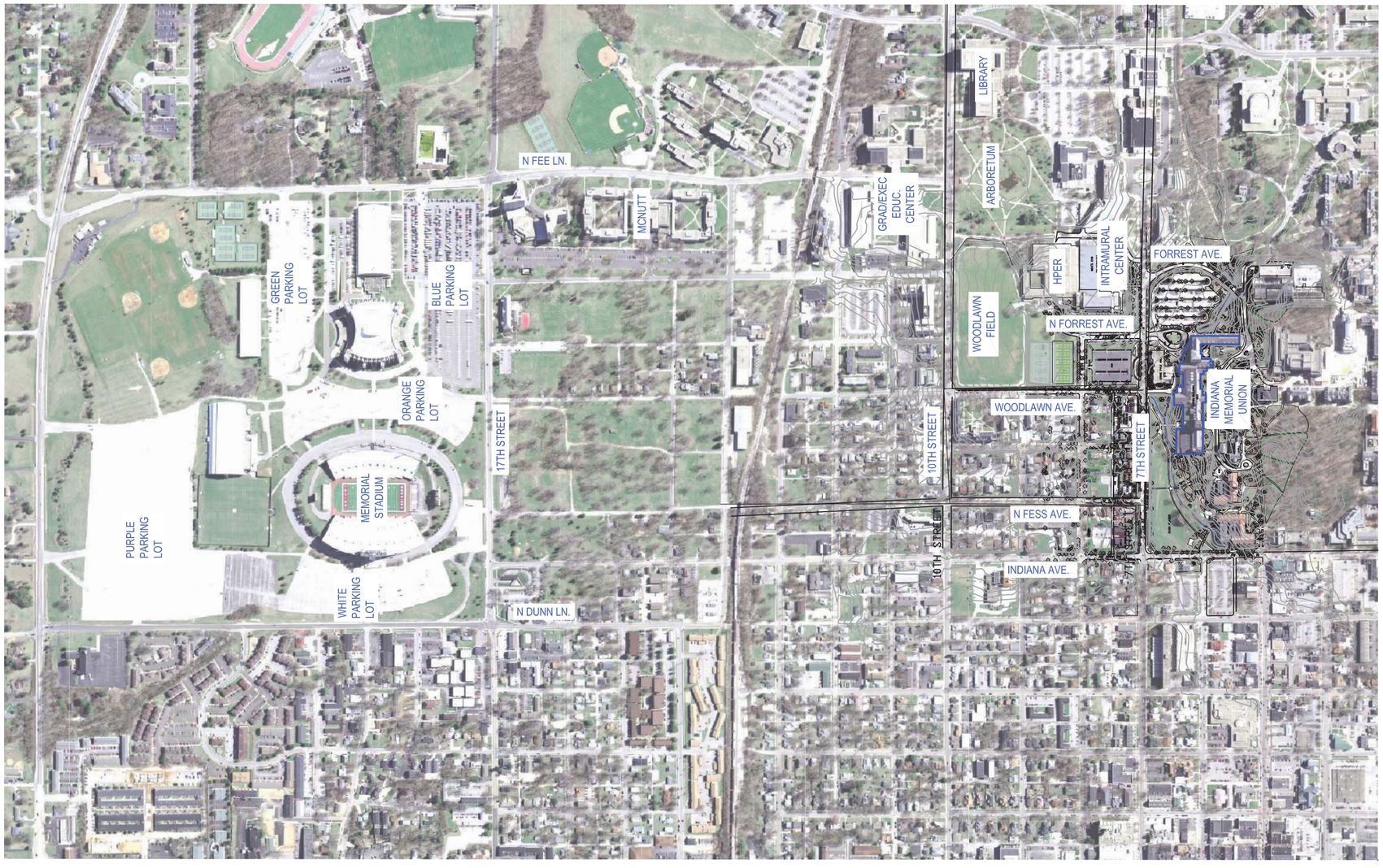

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INDIANA MEMORIAL UNION
900 E. 7TH STREET
BLOOMINGTON, IN 47405

VICINITY MAP

PROJECT NUMBER
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FIGURE 1
SHEET 1 OF 2

Greening the IMU

Eco-Charrette

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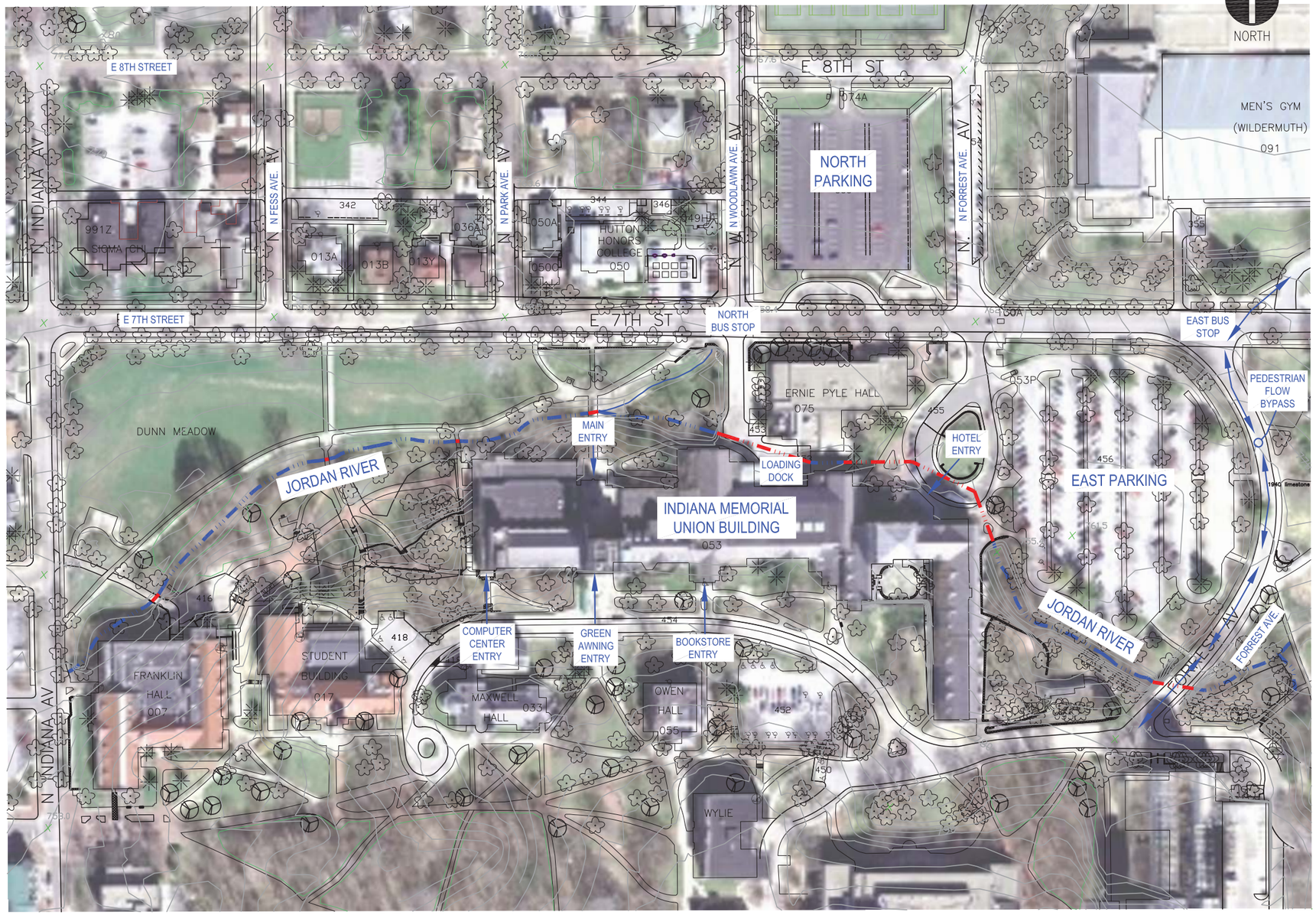

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DATE:	01-20-10

INDIANA MEMORIAL UNION
900 E. 7TH STREET
BLOOMINGTON, IN 47405

SITE MAP

PROJECT NUMBER
01.0302.A.1

DRAWING NUMBER
FIGURE 2
SHEET 2 OF 2

Greening the IMU

Eco-Charrette

INDIANA UNIVERSITY
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Building Conditions

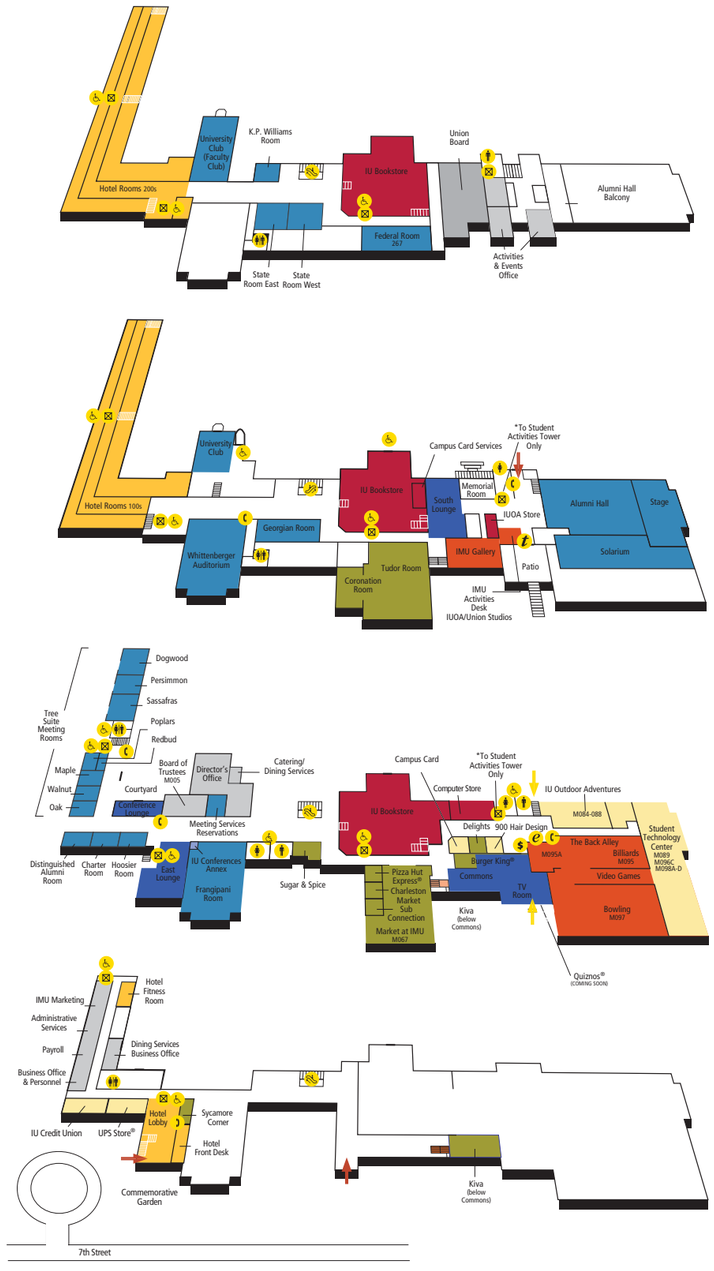
The IMU has had a series of major renovations. Some of the more recent renovations include the Starbucks addition, the Kiva cafe (with a planned outdoor terrace addition), and the highly successful computer lab spaces completed in 2009. The Brailsford and Dunlavey report (completed in 2006) has a very comprehensive assessment of the IMU with some very extensive renovation recommendations.

Although the building is generally in good physical condition it is likely due for a new slate roof and an overall upgrade to its mechanical equipment. There are a variety of renovation priorities including:

- Alumni Hall & Solarium
- Kitchen Consolidation Upgrades
- Student Offices

In addition there is great opportunity to open corridors and make the services inside more accessible and visible from the exterior. The potential of certifying IMU under LEED-EB O&M comes at a very opportune time and has the potential to change the type of renovations and how they might be implemented.

Outside of the major additions such as the North Lounge in 1939 and the Biddle Continuation Center addition in 1995, few upgrades or renovations were made until the 1990's. Approval of $19 million, funded Phase 1 which was completed in 1994. The financial investment completely refurbished the hotel rooms, conference rooms, and made major life safety, infrastructure upgrades, and repairs. The final phase was completed in 1998 with HVAC upgrades, and student/ staff offices, and other prominent rooms and spaces within the building. Numerous targeted renovations have been completed in the interim (see Indiana Memorial Union Strategic Plan 2007-2012 for a complete history).



Indiana Memorial Union
Main Floor Plans

Greening the IMU

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MEP Background Summary

HVAC Conditions

The IMU is a 438,000 square foot building. The building's mechanical systems are challenged with the task of serving a wide variety of occupancies that include dining, retail, office, meeting rooms, hotel, bowling alley, historic art throughout, and offices. The hotel portion includes 180 rooms. There are 700 people that work at the IMU, with approximately 50% working simultaneously.

The mechanical systems appear to be well maintained for their age, which is highly commendable. The mechanical systems do not appear to have any major capacity issues or concerns at this time. There are some minor deficiencies that are noticeable during extreme O.A. conditions.

HVAC Systems

The campus central chilled water and steam plant provides heating and cooling water to the building to meet the building's mechanical loads. The CHW and HW setpoints for the loop are manually adjusted at the change of seasons based upon a respective reset schedule. There are efficiency losses here, as this is not precise based on outside weather fluctuations.

The building is served by two DDC systems, a pneumatic control system, and some localized controls. The air compressors near the East end that serve the pneumatic control system seemed to have a very large run time relative to down time. This is a large indicator of leaks within the building, and the operation of the (2) 10 horsepower motors as regular as they are operating contributes to increased energy cost to the building. The air compressors at the West end of the building do not seem to have the leakage problems.

The majority of the building (85%) is served via a dual duct mechanical system. This type of system is very common in buildings constructed in the 1960s and 1970s. This system is very effective at maintaining comfort levels, as they have (2) independent ducts one hot and one cold that are routed throughout the building, and then they mix air at each space to achieve the temperature necessary. Given the age of the system and its diverse mechanical requirements as a student union, it was an appropriate system. Unfortunately, it is a very inefficient method of conditioning air. In dual duct systems many times a much larger volume of air is cooled, heated, and re-circulated than what is required by the building's load. Also another source of energy inefficiency is the dampers in the dual duct boxes frequently leak, even when they are supposed to be closed which can attribute to unwanted energy consumption.

A significant portion of the hotel rooms (approximately 40%) suffer from high levels of air noise within the hotel rooms. This high level of noise is the result of a previous project which converted the dual duct system into a VAV style system and utilizing only one of the two smaller sized ducts for supply air. This means that the ductwork is undersized and therefore a higher velocity has to be delivered through the duct to meet the heating and cooling requirements in the space. This high velocity is what then is noticed by occupants in the rooms as there is not enough length between the high velocity medium pressure ductwork and the diffuser in the room.

In the West end of the building 4-pipe fan coil units serve the heating and cooling needs of the building, this is one of the most efficient means of conditioning a space, and also one of the most costly to install initially.

Electrical Conditions

The building is currently served by six (6) substations. Two (2) of the substations' meters are not operational. These substations then meet the power requirements of the building. The lineup seems to be efficient, as there are not a lot of small transformers throughout the building, instead the 208/120V loads are concentrated, to a smaller quantity of transformers.

Overall the electrical system has no major capacity issues; there are a few minor issues that have cropped up over the course of time due to building age and load creep.

The building lighting controls in some areas are accessible, adequate, and appropriate; however in other areas such controls are non-existent, which contributes to increased energy consumption.

Images above depict the primary mechanical room of the IMU. The mechanical room houses the steam and chilled water service entries, pumps, controllers, and heat exchangers.

Greening the IMU

Eco-Charrette

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CHARRETTE PLANNING STRATEGY

One of the biggest challenges in preparing for the charrette was assimilating a large amount of information on a short schedule and imparting the key aspects during the charrette itself. This was especially important as the team was building on a base already established and not starting from ground zero. The ultimate certification of the IMU is co-dependant on broader campus initiatives as well as building only internal operations, if the IMU is to serve as the flagship for existing buildings.

A basic understanding of LEED-EB O&M was critical as well as an understanding of the issues associated with getting a complex building such as the IMU certified and potential outcomes of the process.

Given all the planning and visioning that has recently been completed for the IMU it was imperative to understand how the certification under LEED-EB O&M would affect future building renovations and additions. These critical issues helped determine the structure of the charrette into the following:

Administration & Facilities Support

- IMU background
- Campus sustainability Initiatives
  - Current status
  - Future benchmarks
- LEED-EB O&M as a process
- IMU LEED-EB O&M certifications' effect on the future of the building

The next two pages summarize five documents that guided the GIMU charrette process.

Charrette participants analyzing and discussing feasibility of earning credits under LEED-EB O&M in small groups assigned by LEED categories.

Photo Credits: Chris Meyer

Greening the IMU

Eco-Charrette

PREVIOUS REPORT SUMMARIES

Indiana University Memorial Union Preliminary Planning
Brailsford & Dunlavey, 2006

This in-depth report goes through a detailed analysis of the IMU and develops a comprehensive building concept plan for each level of the IMU. The report compares the IMU to a variety of peer institutions to put the Union in a broader national context.

An off-campus market analysis provides a snapshot of what market conditions are like outside campus and provides a preliminary financial analysis of the IMU operations as well as recommendations.

All the improvements and recommendations are then given a cost which is then projected into a total renovation budget of $12,980,000. Although this report is quite detailed, targeted, and has some very pertinent observations it does not seem to have been embraced totally be either IU or the IMU.

Indiana Memorial Union Strategic Plan 2007-2012

This is the follow-up to the 2002 Strategic Plan and provides a history of the visioning for the IMU and reinforces the Vision, Mission, Values and Principals behind the Union. It provides a frank assessment of the strengths and weaknesses many of which served as the basis for the Conceptual Design session during the GIMU Eco-Charrette. It outlines the strategic goals and objectives to keep the IMU "central and relevant" to student life on campus. The plan contains a detailed history of the IMU, its operations, financial structure, and governing structure. Many of the recommendations mesh well with the sustainable recommendations that came out of the charrette process but in the report are not couched in any type of environmental language.

IMU 2008 Charrette

This effort by the IMU in conjunction with the UAO looked at the IMU's overall layout and circulation, the history with renovation timelines, the surrounding landscape and recommended potential retrofits such as a roof garden and the visioning on-going with the master plan.

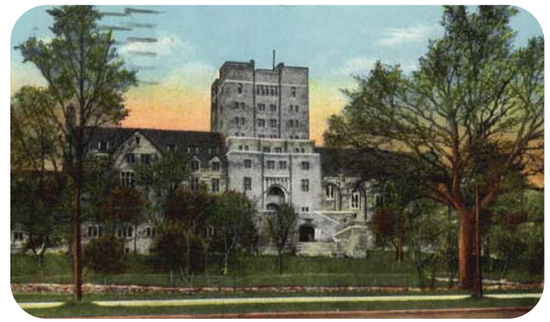
The report provides a financial overview of the IMU operations that is critical to understanding how to approach any renovation projects. From the big picture design perspective, other campuses and urban centers that have in common with the IMU can be explored along with attributes of other similar unions. The result of the charrette was a series of concept designs for each floor of the IMU that serves as a basis for understanding for the Eco-Charrette.

Indiana University

Memorial Union
Preliminary Planning

May 2006

Brailsford & Dunlavey



Greening the IMU

Eco-Charrette

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Campus Sustainability Report
January 7, 2008

This campus-wide report begins to harness the growing environmental awareness of the students and sets the stage for setting up the IUOS and hiring a new Sustainability Director. It was spearheaded by the Indiana University Task Force and jump starts the greening of the IUB campus that although likely bubbling under the surface has not been part of any of the criteria in earlier reports or planning documents.

The report makes recommendations across the gamut from Academic Initiatives, Energy, Indoor Environmental Quality, Recycling and Resource Use, Transportation, Built Environment and Food initiatives. An analysis of IUB's Strengths, Weaknesses, Opportunities, and Threats with respect to Sustainability helps chart the course. Interestingly enough one of the weaknesses is that the "legacy of older, energy-inefficient buildings; funding constraints and historic preservation guidelines limit energy-efficiency efforts." The Greening of the IMU perhaps has the opportunity to be a paradigm-shift!

This report along with the sustainability intern projects formed the basis of much that was learned about where IU was situated along the green spectrum and where it was headed. This report not only set a detailed and effective course of action but its influence can also be seen throughout the newly adopted Master Plan for the IUB campus. Many of its recommendations are being aggressively adopted such as utilities metering which is critical to successful certification under LEED-EB O&M and understanding the potential cost savings.

Campus Master Plan, 2009
SMITHGROUP JJR

A comprehensive Campus Master Plan was completed in November, 2009 by SMITHGROUP JJR for Indiana University. President Michael McRobbie led the effort for creating the vision for the future of this renowned institution that supports the "expressed mission of the University and encourages the rigorous pursuit of intellectual curiosity."

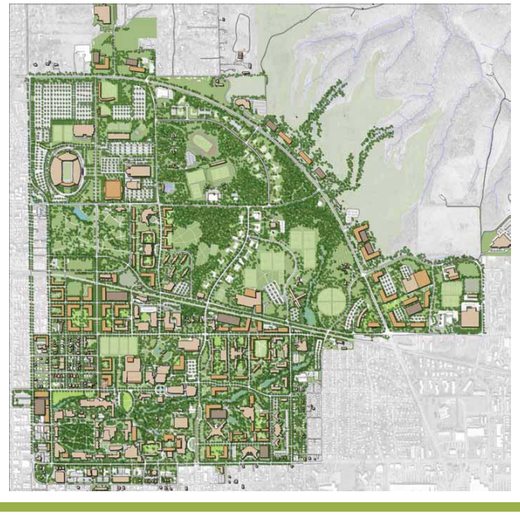
Master Plan Vision (all part of the mission and goals of the IMU)

Principles

- Respect character of Historic Core
- Restore Jordan River Corridor
- Create Compact, Walkable Campus
- Increase and Enhance Existing Gathering Spaces
- Preserve Natural Features and memorable Open Spaces
- Provide Vertical Integration

Goals

- Renovate and Re-purpose existing buildings and historic resources
- Enhance Student Life on Campus
- Encourage Connectivity to larger campus area
- Encourage Greater Social Interaction through use of Community Space



Images (left to right) The Campus Master Plan map, an aerial view of the plan, View to IMU down Woodlawn Avenue.

Credit:
SMITHGROUP JJR

Greening the IMU

Eco-Charrette

INDIANA UNIVERSITY
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SUSTAINABILITY

Indiana Memorial Union celebrated it's centennial anniversary in 2009. The long and rich history of the organization's mission is expressed in the physical structure of the building itself. Historically, the IMU has adapted to meet changing social structures, technological advancements, and an ever-expanding campus population. The 21st century will pose an additional challenge and require appropriate response from university and IMU administrators. The century of environmentalism is on the verge of entering into it's second decade, and Indiana University is taking steps to stay at the forefront of these critical issues.

Indiana University formalized it's commitment to sustainability with the establishment of the Office of Sustainability in early 2009. Under the leadership of Michael Hamburger and Paul Sullivan the IU Task Force on Campus Sustainability was appointed to guide the process of environmental administrative action at Indiana University in 2007. Initial steps towards creating the Office of Sustainability were made by a group of administrators, professors, and students that comprised the Indiana University Task Force on Campus Sustainability guided by 16 directors. This diverse group of stakeholders helped identify key sustainability concerns on and around campus in addition to promoting and defining the role of an Office of Sustainability (IUOS) at IU.

A great deal of research and sweat equity has been made since the inception of the IUOS. IUOS director, Bill Brown, with a team of dedicated staff, and interns have made significant strides in identifying sustainability goals, objectives, and determining hopeful sustainability outcomes for the university and the broader Bloomington community. Since the establishment of IUOS, research on a wide array of sustainability topics has been gathered to understand and define what attaining sustainability will mean for Indiana University. The IU Task Force of Campus Sustainability completed a "Campus Sustainability Report" in 2008 which summarizes current practices, identified key goals and objectives and recommended next steps towards institutional sustainability at IU.

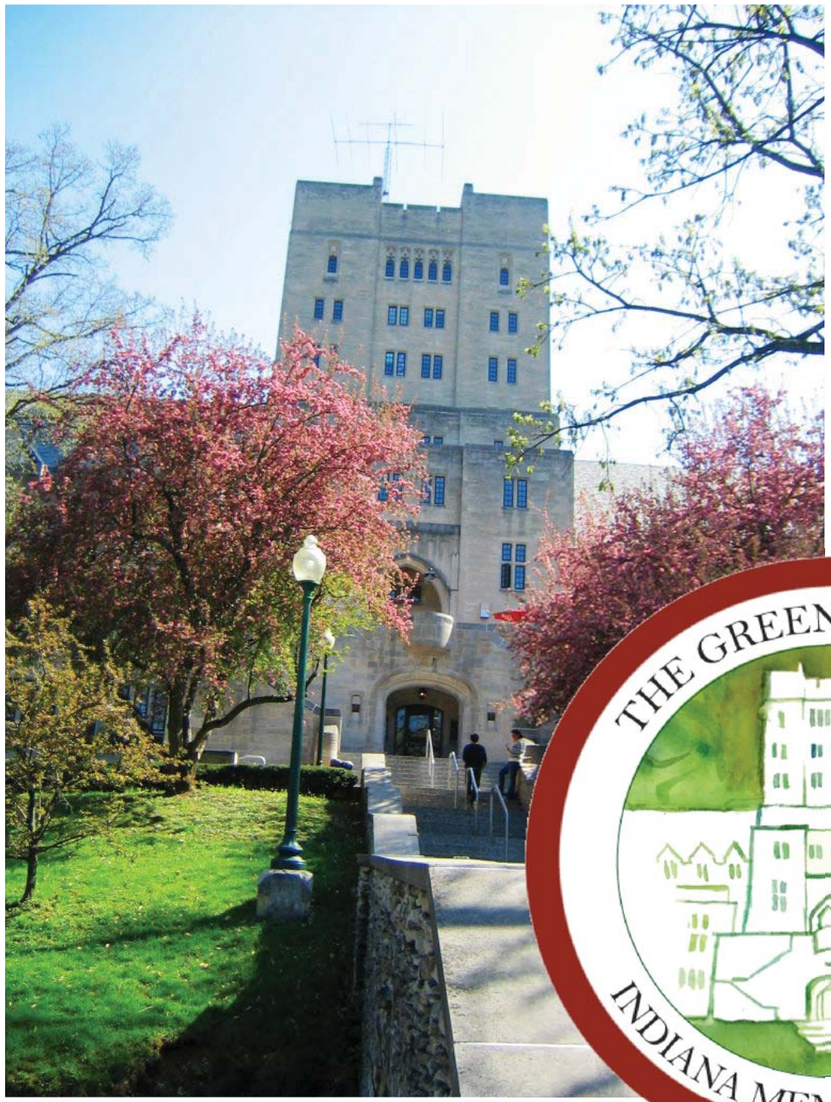

Photo Credit: IU Photography

Greening the IMU Logo created by IU student Marine Tempels

INTRODUCTION TO USGBC & LEED

The U.S. Green Building Council (USGBC) is a third party, non-profit organization based in Washington, D.C. whose mission is to transform the way that buildings and communities are designed, built and operated to create more sustainable environments and improve quality of life.

LEED

LEED, or Leadership in Energy and Environmental Design is a third-party certification system created by USGBC to recognize environmentally-sensitive, resource- efficient, building design, construction, and operation practices. There are several tracks of the LEED rating system developed for different project types and needs. LEED for New Construction, LEED for Existing Buildings Operations and Maintenance, LEED for Neighborhood Development are just a sampling of the tracks available for projects to pursue.

LEED Volume Certification

Property managers and developers now have the option of pursuing LEED certification for multiple buildings at once with a streamlined process called LEED Volume Certification. The LEED Volume Certification program is still in the pilot phase, however wide application should become available in the near future. Under this program the project manager works with USGBC to determine a prototype credit set which would be followed by all buildings that are seeking the certification. Each property must be individually certified under the LEED rating system, however the process becomes much faster with LEED Volume certification. Through volume certification however the process is largely carried out by the project manager's own quality control with spot checks by USGBC rather than a full review of every single credit for which each project under the volume program applied.

Once the prototype set is approved by USGBC each project seeking the LEED volume program certification would refer to the first certified project and follow the approved standard established in the prototype set. During review phase, the USGBC committee randomly selects six credits to review, which may or may not be part of the initial prototype set. Bypassing the typically longer review period where each attempted LEED credit is thoroughly reviewed by the committee results in a quicker, more efficient, and less expensive certification process.

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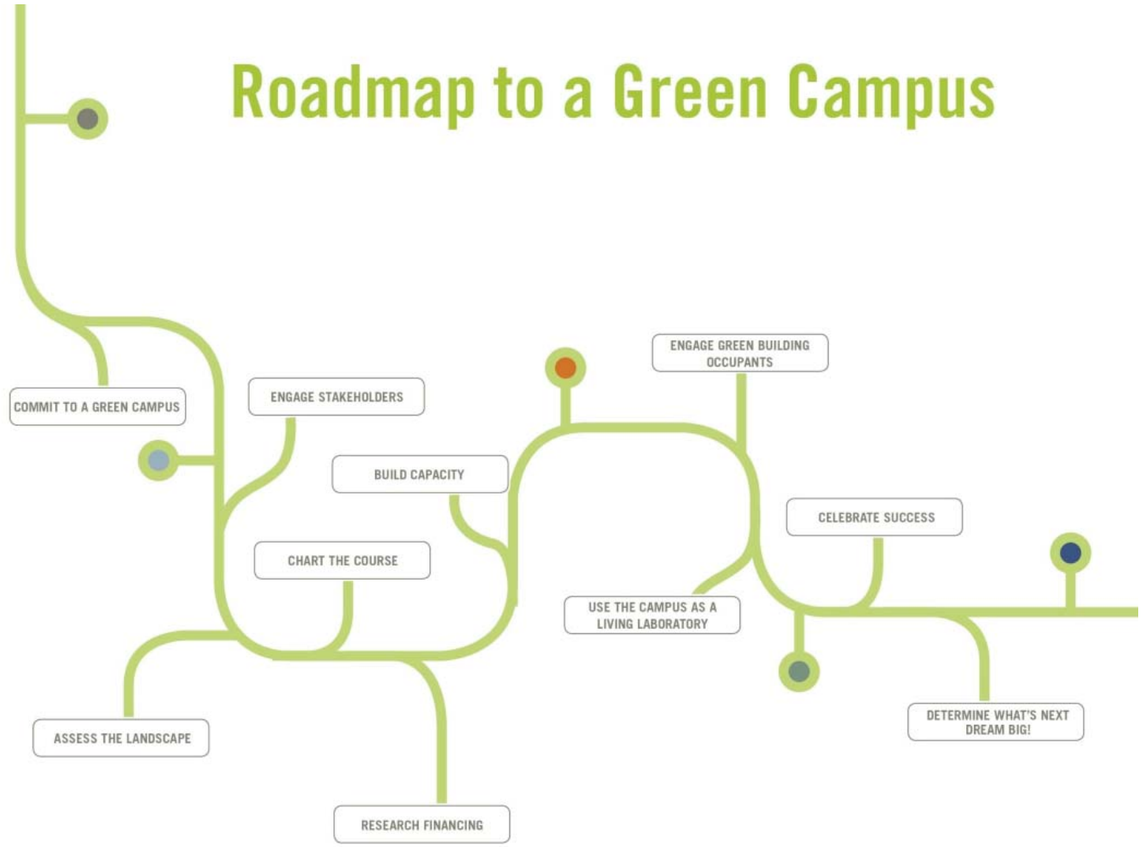
USGBC Green Campus Campaign

USGBC is working on building partnership with students, faculty and administrators to strengthen campus sustainability efforts. Through the green campus campaign, USGBC aims to increase accessibility to LEED for educational facilities and campus development, support student leadership and advocacy efforts and promote sustainability in curriculum.

Kristin Simmons, a USGBC Campus Campaign representative, joined the GIMU charrette. On the first day of the charrette she gave a presentation about this new program that is still being drafted by USGBC.



Part II: Greening the IMU - Eco-Charrette

Greening the IMU

Eco-Charrette

INDIANA UNIVERSITY
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INTRODUCTION

Indiana University's Office of Sustainability initiated the effort to host the Greening of the Indiana Memorial Union (IMU) Eco-Charrette in the late fall of 2009. This facility was chosen as the eco-charrette focus for its monumental and iconic, and yet familiar and beloved status in the community. The eco-charrette was made possible with a generous $50,000 grant from local utility company, Duke Energy. High traffic volume, familiarity, and accessibility make IMU the perfect candidate to spearhead the greening of Indiana University's existing building stock. IMU would be the ideal prototype from which other buildings on campus could learn to achieve the broader campus sustainability that IU seeks.

Several goals for the charrette outcome were acknowledged throughout the process. Chief among them, the IU community hopes to improve efficiency in building performance, increase cost savings, earn LEED-EB O&M certification to distinguish this iconic building. The LEED-EB O&M certification at IMU could be used to pave a new standard in the way IU operates and manages the remaining 524 existing buildings on the Bloomington campus. Determining the prototype building to incorporate sustainability initiatives becomes a critical step in concretizing institutional policies in tangible terms.

Typically, the IMU has between 12,000 and 14,000 visitors per day. Such immense foot traffic by students, staff, and visitors presents IU a special opportunity to showcase green building practices to a wide audience. IMU would serve an educational role, encouraging building users (and facility managers and administrators) to embrace sustainability as a personal mission and determine best management practices to incorporate at other existing buildings on campus.

College campuses, with a highly motivated and capable stock of individuals in the form of researchers, staff, and students, are uniquely poised to address the wide array of sustainability problems and solutions presented by the built environment. Student interns employed in tracking and documentation can substantially reduce consultant fees while at the same time providing educational value.

ECO-CHARRETTE ORGANIZATION

Team Selection Process

Indiana University distributed a Request for Proposal (RFP) for a Greening of the IMU facilitator in September 2009. The RFP submittal deadline was mid October, 2009. On November 1st the winning team was notified of the selection.

Facilitator Team

St. Louis based architecture firm, Hellmuth + Bicknese Architects, served as lead facilitator and partnered with Leonardo Academy, a sustainability consulting non-profit based in Madison, Wisconsin to organize the eco-charrette. The lead charrette facilitators teamed with St. Louis based Solutions AEC, as the mechanical, electrical, and plumbing engineer consultant, and Indianapolis based Williams Creek Consulting an ecological engineering firm specializing in sustainable site solutions.

Just as would be done on a LEED-EB O&M project, it was imperative to bring in all the disciplines on the consultant side for the eco-charrette. Including a team of professionals from differing disciplines was important so practical implementation of vetted ideas could be tested against the knowledge of team consultants. This same team is capable of implementing the LEED-EB O&M process along with any potential associated design work.

The facilitator team made two trips to Bloomington in preparation for the GIMU charrette. This time was spent meeting key charrette and IMU administrators, gathering background documents, and familiarizing the team with IMU and the Bloomington campus. IMU administrators generously offered their time to give the team very thorough tours of all sections of the IMU. The University Architect's Office graciously provided access to building and campus plans, drawings, and maps.

hellmuth + bicknese architects

LEO LEONARDO ACADEMY THE SUSTAINABILITY EXPERTS®

SOLUTIONS AEC

WILLIAMS CREEK CONSULTING

Greening the IMU

Eco-Charrette

INDIANA UNIVERSITY
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Charrette Participants

IUOS director, Bill Brown, thoughtfully compiled a list of charrette attendees from a wide range of professional backgrounds and Indiana University representatives to ensure well-rounded discussions. While specific individuals were invited to participate, the charrette was an open event and IU stakeholders were welcome to join either day of the events. The full list of charrette attendees is available in the Appendix of this report.

Orientation of Events

The eco-charrette took place over two days during the fall semester of 2009. On December 2 and 3, 2009 participants arrived at 7:30 for coffee and breakfast and dove into exercises on both days until 5:00 PM. The sessions were held in IMU Stateroom East of the IMU. Lunches were graciously provided by IMU food services in the Coronation Room and in the Federal Room.

Charrette participants were warmly welcomed by key individuals from the Office of Sustainability, Office of the Architect, and Indiana Memorial Union. Opening remarks were also made by Provost Hanson and Vice President Morrison. Following the facilitating team introductions and orientation to the days events a special presentation was made by a representative from the USGBC Campus Campaign sector addressing the importance of university commitment to environmental building, operations, and maintenance.

Greening the Charrette

In light of the charrettes' subject matter it became obvious that addressing the environmental sensitivity of the charrette event itself was a crucial factor to address. It is after-all through individual actions that worlds are changed. To mitigate the negative impact this event would have on the environment a comprehensive effort was made to green the meeting.

IMU food and beverage services were served with reusable plates and silverware, recycling containers were provided in Stateroom East, the location of charrette events, and the facilitators tried to keep printed materials to a minimum. Most documents were printed on 100% recycled, FSC-certified Mohawk paper produced 100% by wind-power. The markers used for writing on flip charts and for drawing during the conceptual design exercise were AusPen brand which are non-toxic, zero-VOC, 100% recycled content, and refillable.

Indiana University purchased carbon offsets to counteract the emissions created by charrette attendees through travel, etc. These carbon offsets were purchased from Leonardo Academy's Cleaner + Greener program.

CLEANER + GREENER®
LEONARDO ACADEMY

Images and photographs depict the efforts made to mitigate the negative environmental impact of the event.

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CHARRETTE DAY ONE: DECEMBER 2ND, 2009

Synopsis of Day One Events

The first day of the charrette commenced with opening remarks and brief presentations to orient participants. Day one was devoted to two main exercises followed by report-out sessions. During the first exercise, led by Daniel Hellmuth, participants were assigned to small groups to discuss sustainability initiatives in eleven broad categories. Due to the breadth of information and enthusiastic group discussions the exercise went longer than anticipated. This resulted in a working lunch for most groups who continued to deliberate over a delicious meal provided by IMU in the Coronation Room, the private room off the Tudor Room. Much to everyone's delight, Steve Mangan gave a nice talk about the local food we were eating and answered some general questions that attendees asked about the food operations at IMU.

Following lunch, Provost Karen Hanson gave a welcome address and provided some insight to the broader benefits that sustainability has for IU. The second exercise was a whole group visioning session, led by Michael Arny, during which all participants offered big picture ideas for achieving sustainability on campus and the IMU specifically. All ideas were jotted down on flip charts and are transcribed in the Appendix of this report. After a short break, the group reconvened in their smaller focus area groups to report-out their morning session discussion, this was intended to follow a presentation style, however due to time constraints followed a classroom report-out style. Despite the large amount of information covered on day one, participants remained engaged through the end of the day (which even went over by half an hour). The day was finished off with an informal and optional networking session at Nick's English Pub on Kirkwood Avenue to allow participants to soak up the Bloomington atmosphere.

Sustainable Focus Areas Exercise Instructions

Review summaries provided of sustainability actions and planning in each focus area for the campus, the IMU, and the city. Add any sustainability actions or planning that are missing from the summaries provided. Identify sustainability goals beyond those addressed in current actions and planning.

A Final Evaluation of each focus area includes:

- A Gap Analysis
- A Cost Impact
- An Overall Assessment
- Rate EACH Focus Area on a scale of importance

* Rating Scale ranges 1-10 with 10- Being Most Important (critical to address in near future)

Sustainable Focus Areas List

Charrette attendees were divided into six small groups to encourage in-depth conversations about eleven sustainability focus areas designated by the facilitator. Each team received a packet containing background information on the eleven focus areas. Packet documents were to be used as a springboard for further discussions and finally the evaluation forms for each focus area were to be completed by each group. The focus areas were designated as follows:

1. GREEN CLEANING, OPERATIONS, & MAINTENANCE
2. CAMPUS SUSTAINABLE FOOD OPERATIONS
3. CAMPUS ENERGY POLICY
4. CAMPUS TRANSPORTATION
5. CAMPUS SITE WATER CONSERVATION/ STORMWATER CONSERVATION
6. CAMPUS LANDSCAPING PLAN
7. CAMPUS RECYCLING + SUSTAINABLE PURCHASING
8. CAMPUS GREEN BUILDING POLICY
9. WATER CONSERVATION
10. CAMPUS CLIMATE CHANGE INITIATIVE
11. GREEN COMPUTING / E-WASTE

Greening the IMU

Eco-Charrette

INDIANA UNIVERSITY
BLOOMINGTON

Summary of Focus Area Exercise

Following welcoming remarks and opening presentations, charrette participants were separated into small break-out groups to start on their first exercise. Participants were assigned to separate groups by Hellmuth + Bicknese, ensuring that a representative mix of IMU executives, professional consultants and students were at each table. There were six groups total, all named after the years of major construction/ renovations at the IMU. The groups were 1932, 1939, 1957, 1958, 1959, and 1960.

Time constraints resulted in a working lunch for the small groups to complete the assignment. While several groups did not get through all eleven focus areas even in the longer exercise time frame, some groups got through everything. Evaluation sheets were filled out for every focus area. The full combined transcripts from all groups can be found in the Appendix along with summaries of current sustainability practices in each focus area, as well as brief summaries of how the 2009 Campus Master Plan, Sustainability Report, among others addressed each issue.

Groups had very enthusiastic conversations about the sustainability initiatives and ideas about how to improve current practices at IU and IMU.

Photo Credits: Chris Meyer

INDIANA UNIVERSITY
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CHARRETTE DAY TWO: DECEMBER 3RD, 2009

Synopsis of Day Two Events

The first exercise on the second day involved a LEED-EB O&M feasibility breakout session.

Prior to lunch Bruce Jacobs gave a brief speech about the history of the "one-of-a-kind" wallpaper replica we were about to see in the Federal Room, where the lunch was hosted.

In the afternoon charrette participants were once again assigned into groups by Hellmuth + Bicknese to participate in the final charrette exercise. This exercise was the conceptual design session where teams got to consider real site and building alterations to meet the sustainability and LEED criteria discussed over the duration of the charrette events. Five teams total came up with some very interesting ideas on methods to green the IMU, ranging from the practical to the more expansive. Just before participants dove into the exercise, Daniel Overbey, architect with Browning Day Mullins Dierdorf Architects, gave a presentation about solar access and energy model of the IMU.

In the late afternoon, charrette participants had the pleasure to see presentations about the LEED Rating System by the Leadership in Sustainability class taught by IUOS Director, Bill Brown. The day ended with closing speeches, and sincere thanks to all who joined the process.

LEED-EB O&M CERTIFICATION EXERCISE (MORNING SESSION)

The purpose of this LEED for Existing Buildings Operations & Maintenance Breakout Session, led by Michael Arny, was to explore base level and stretch goals for LEED-EB O&M prerequisite and credit achievements from a range of perspectives.

Attendees self-selected, by area of interest, into 5 groups with each group assigned to a primary LEED-EB credit category: Sustainable Sites (SS), Water Efficiency (WE), Energy and Atmosphere (EA), Materials and Resources (MR) and Indoor Environmental Quality (IEQ). Each group was seated at a separate table and given the task of identifying LEED-EB base and stretch goals for each credit in their assigned credit category, and for as many additional credit categories as they chose to address. Group transcripts can be found in the Appendix of this report.

These sessions provoked lively discussions with a lot of information and knowledge being shared around each table. The results of these table sessions were used along with other information developed by the consulting team to prepare a LEED-EB action plan and check list included in the Part III (Implementation Recommendations) of this report.

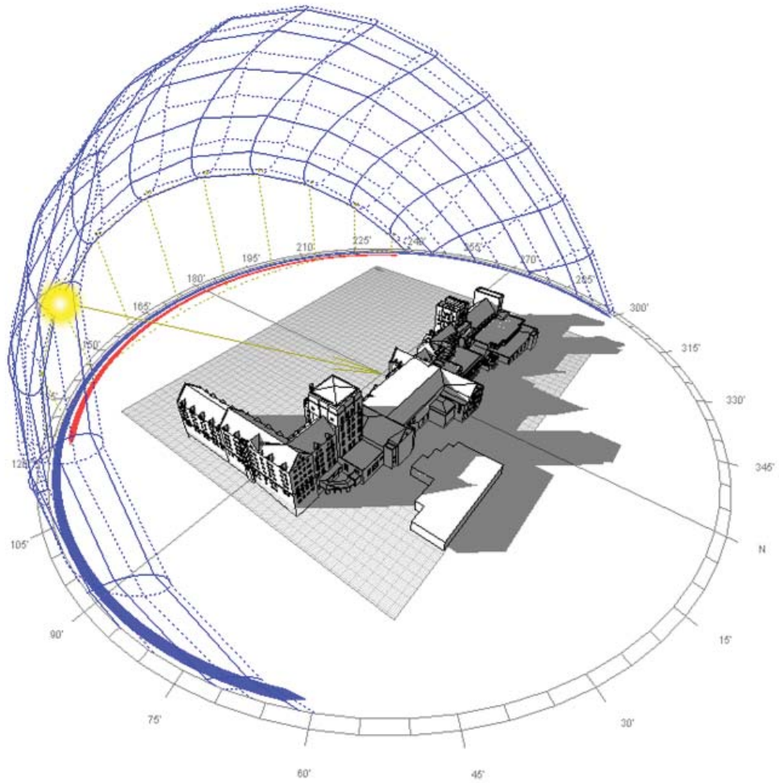
Greening the IMU

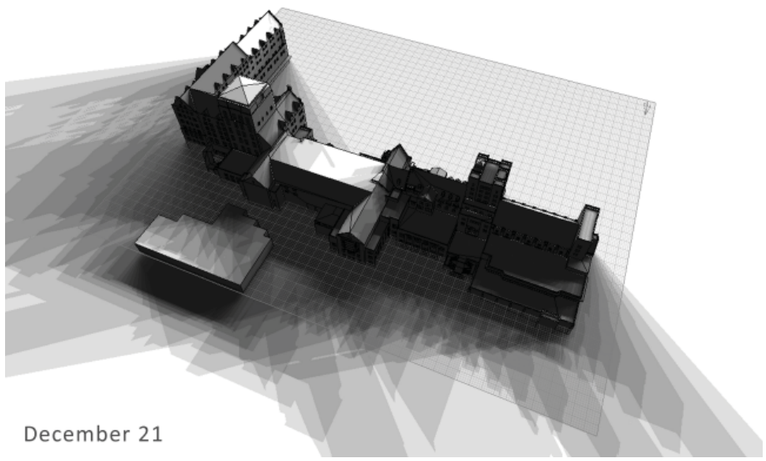
Eco-Charrette

INDIANA UNIVERSITY
BLOOMINGTON

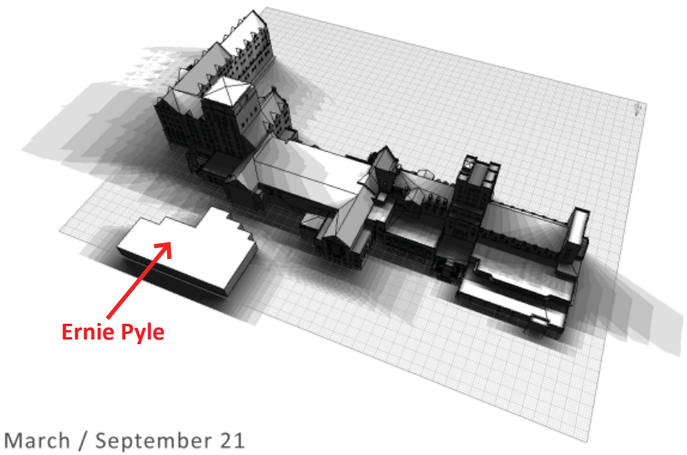
IMU SOLAR ACCESS STUDY/ ENERGY MODEL

Daniel Overbey, an architect with Browning Day Mullins Dierdorf Architects and instructor at Ball State University, lead a fifteen minute presentation on energy modeling and solar access at the IMU. Using Autodesk's Ecotect building analysis software, the restrictions on solar access on the different rooftops of the IMU quickly become apparent. Even with this initial analysis, the addition of PV to the middle of the flat roof area on the IMU would be debatable due to its partial shading, however a solar thermal application in the middle of the roof might be effective. Although the roof of Ernie Pyle, Journalism School facility, is clear most of the year there is considerable shade in winter months creating an environment where a green roof would be more suitable than a PV application.





December 21



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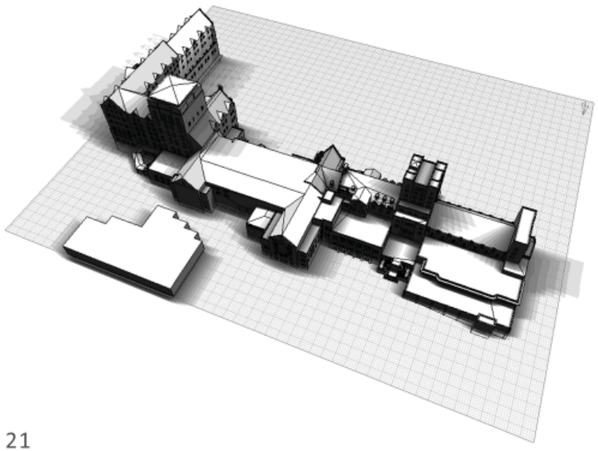

June 21

Greening the IMU

Eco-Charrette

CONCEPTUAL DESIGN CHARRETTE (AFTERNOON SESSION)

In the afternoon, participants were assigned into five groups that were designated by Hellmuth + Bicknese. The purpose of the conceptual design exercise was to look at possible renovations to meet LEED-EB O&M requirements discussed in the morning session for base level and stretch level.

The questions asked of participants were:

- What are some **BIG GREEN IDEAS** that would be exciting for the students, administration, IMU, and Bloomington that would at the same time draw more people into the building?

- In light of funding structure, how can these renovations be best accomplished?

Issues and Challenges

- Access to building
- Natural Light and Ventilation
- Historic Character and Construction of the IMU

Objectives

- Attract more Students, Faculty, Staff, Parents and the Public to the IMU
- Serve Student Groups at a higher level
- Provide Accessible and Visible Retail Space
- Save Money on Energy Use, Explore Savings Allocation

The transcripts of team comments can be found in the Appendix of this report.

Part III: Implementation Recommendations

Greening the IMU

Eco-Charrette

INDIANA UNIVERSITY BLOOMINGTON

IMPLEMENTATION RECOMMENDATIONS

Special Characteristics of the IMU Building

The IMU, being a student union, has many different types of spaces and many different uses. The building includes a hotel, a cafeteria, coffee shops, a bowling alley, meeting rooms, auditoriums, a book and clothing store, places to study and so on. This complex and rich environment makes implementing LEED a bit more challenging than a building with one predominant use like an office buildings.

IMU is a great building to demonstrate the implementation of LEED-EB O&M and to share the information developed with the IU campus, the Indiana university system, other unions and other universities.

Overview of Recommendations

The Consulting Team recommends that the IMU and IU move forward in an incremental way to implement LEED-EB O&M at the IMU, and then leverage by spreading the knowledge gained to the IUB campus, the IU system, other student unions, and other universities.

Goals

- To use sustainability to advance the IMU mission.
- To provide opportunities for students at IU to discuss and participate in sustainability issues on campus.
- To leverage IMU sustainability achievements and maximize impact.

Steps Going Forward

- Implement a minimum cost path to LEED-EB certification for the IMU.
- Establish a Certification Team - Integrate IMU and IU staff, students and consultants.
- Pursue Base-Level Certification - Focus on prerequisite achievement with a minimum number of credits (43-44 total credit points). (See the LEED checklist "Consultant Team Recommendations for Base Level LEED-EB Certification for IMU").
- Explore No/Low Cost Credits - Use LEED checklist to review recommended credits.
- Estimated Costs - Base Level certification should be relatively low-cost. The exact costs necessary to meet the energy and water prerequisites and LEED certification costs are currently unknown and will be calculated as implementation begins. The performance contracting investigation of efficiency opportunities in the IMU is scheduled in the next few months and it is expected that significant efficiency improvement measures will be on consulting team experience and the fact that this performance contracting efficiency improvement program is already underway, is that the additional cost of building improvements needed to earn base level LEED-EB O&M certification will be low to moderate.
- Campus and Community (Bloomington) Outreach on LEED-EB O&M- Keep IMU board, IMU fundraising structure, IU and Bloomington representatives up to date on IMU LEED-EB O&M implementation progress and educate this broad community about LEED-EB O&M and its benefits.

STEP 1: Developing Campus-wide LEED-EB O&M Compliant Policies and Procedures

Work with IU campus groups to:

- Integrate into IU campus design guidelines the consideration of actions that support increased LEED-EB compliance into all renovation, remodeling and new building projects on the IU campus.
- Identify opportunities for integrating the consideration of actions that support increased LEED-EB compliance into design process.
- Implement integration of the consideration of actions that support increased LEED-EB compliance into design process.
- For low-cost and no-cost LEED-EB operations actions (like green cleaning):
  - Develop campus-wide policies and practices that can also apply to the IMU so there is campus-wide consistency (including the IMU) wherever possible.
  - Implement the campus-wide policies and practices that are developed to the entire campus wherever practical so there is campus-wide consistency (including the IMU) wherever possible.
  - Provide training and education for IU staff and students on the new policies and procedures that are developed.

STEP 2: Reaching for the Vision - Continuous Improvement toward IMU's Sustainability Stretch Goals

After IMU LEED-EB O&Mcertification is achieved:

- Establish Ongoing LEED-EB O&M Recertification.
- Recertify building every one to five years to maintain LEED certification. During the recertification process, set "stretch" goals to improve the sustainability at IMU
- Develop a Strategic Plan:
  - Develop an implementation plan for achieving the moderate level "stretch" goals.
  - Develop a big vision level "stretch" goal plan for making the IMU a sustainability showcase.
  - Fundraising: Identify components of the sustainability strategic plan that appeal to alumni and work to build and implement a fundraising program.

Ongoing Activites

Leveraging the Results of the IMU LEED-EB Charrette and Implementation beyond the IMU Campus.
Activities that have begun and will continue going forward:

- All Indiana University System Campuses
- As opportunities are identified:
  - Revise LEED-EB IU campus policies for other campuses in the Indiana University System and implement as Indiana University system-wide policies.
  - Support implementation and provide training for staff and students.
  - Campuses Beyond Indiana University System.
  - Document each step of the IMU LEED-EB charrette and implementation process
  - Share IMU LEED-EB charrette and implementation process with others. including:
    - Other universities in the Duke Service Territory
    - Association for the Advancement of Sustainability in Higher Education (AASHE)
    - Other Student Unions
    - Document each step of the IMU LEED-EB O&M implementation process.
    - Share IMU LEED-EB O&M implementation process with other student unions.

LEED-EB O&M CREDITS CERTIFICATION CHECKLIST

To achieve LEED certification, buildings must meet all prerequisites in the rating system and earn a minimum of 40 points. Points are earned by achieving credits. LEED-EB O&M 2009 Certification levels are awarded according to the following point thresholds:

- Certification: 40-49
- Silver: 50-59
- Gold: 60-79
- Platinum: 80-100

The consulting team analyzed the feasibility of achieving LEED certification based on the charrette discussions and notes concerning the current operations and performance of the IMU building. The checklist (located on pages 27 & 28) details the analysis and includes the following information:

- Credits recommended to achieve the base certification
- Credits that remain uncertain because more information will be needed to determine practicality designated as "?"
- Credits that are not practical or not possible designated as "NP"

The consulting team recommends a three to four credit "cushion" beyond the minimum requirements of the desired certification level to ensure that the building will meet its goal. The following checklist outlines a low-cost method for how the IMU can earn initial certification.

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Certified 40-49 points **Silver** 50-59 points **Gold** 60-79 points **Platinum** 80 + points **Possible Points 110**

Consultant Team Recommendations for Base Level LEED-EB Certification for IMU

								Requirements / Strategies for Achieving Base Level Certification	Potential Campus Wide Policy
14	8	4	**Sustainable Sites**		Possible Points	26	**Sustainable Sites**		
Base Level	**?**	**NP[1]**							
		4	Credit 1	**LEED Certified Design & Construction** (4 points)		4	Credit 1	Building has previously been certified under either LEED: NC, for Schools, CS, CI	
1			Credit 2	**Building Exterior & Hardscape Management Plan**		1	Credit 2	Employ environmentally sensitive, low-impact exterior & hardscape management plan.	X
1			Credit 3	**IPM, Erosion Control, & Landscape Management Plan**		1	Credit 3	Develop and implement an IPM, erosion control, and landscape management plan that significantly reduces harmful chemicals used, energy waste, water waste, air pollution, solid waste, chemical runoff.	X
10	5		Credit 4	**Alternative Commuting Transportation** (3-15 points)		15	Credit 4	Quantify the number of full- and part-time staff as well as students that enter the building. Conduct two different surveys to determine usage rate of lower environmental impact commuting options: one for staff and one for students. Average the usage rates by counting the student as a percentage of full- or part-time staff.	
1			Credit 5	**Site Development-** Protect or Restore Open Habitat		1	Credit 5	Over PP have in place native vegetation on min. area: 25% of total site area (Excl. b. footprint) or 5% of total site area (WIG). Pursue off-site option for maintaining areas with native plants.	X
1			Credit 6	**Stormwater Quantity Control**		1	Credit 6	Evaluate storm water management on a campus-wide basis.	X
	1		Credit 7.1	**Heat Island Reduction-** Nonroof		1	Credit 7.1	Evaluate heat island reduction measures for hard scape associated with IMU - practicality and cost.	
	1		Credit 7.2	**Heat Island Reduction-** Roof		1	Credit 7.2	Upon roof reconstruction, evaluate heat island reduction measures for IMU roof. Use roofing materials with SRI index = or >29 (75% roof) OR- Install green roof (50%) OR- Combo of SRI & green roof	
	1		Credit 8	**Light Pollution Reduction**		1	Credit 8	Automatically control interior built-in luminaries to turn off during after-hours. Shield all exterior fixtures 50 watts and over OR measure night illumination levels around the perimeter of the site area.	X
2	10	2	**Water Efficiency**		Possible Points	14	**Water Efficiency**		
Base Level	**?**	**NP**							
X			Prereq 1	**Minimum Indoor Plumbing Fixture & Fitting Efficiency**		0	Prereq 1	Inventory plumbing fixtures and flush and flow rates - upgrade to highest efficiency practical considering low-cost measures first.	X
		2	Credit 1	**Water Performance Measurement** (1-2 points)		2	Credit 1	Install whole building and sub-system water metering.	
1	4		Credit 2	**Additional Indoor Plumbing Fixture & Fitting Efficiency** (1-5 points)		5	Credit 2	Over PP have strategies that reduce potable water use by: 10, 15, 20, 25, or 30% over WEp1 calc baseline. (1 pt each) See WE Prerequisite 1.	X
1	4		Credit 3	**Water Efficient Landscaping** (1-5 points)		5	Credit 3	Reduce irrigation on area of site associated with IMU application as much as practical. Turn off sprinklers, install rain sensors, or install microirrigation. Reduce water use: 50, 62.5, 75, 87.5, 100% over calculated baseline (1 pt each)	X
	2		Credit 4	**Cooling Tower Water Management** (1-2 points)		2	Credit 4	Meter makeup water and use control system that uses a conductivity meter. Apply to cooling tower(s) central plant	
5	27	0	**Energy & Atmosphere**		Possible Points	35	**Energy & Atmosphere**		
Base Level	**?**	**NP**							
X			Prereq 1	**Energy Efficiency Best Management Practices**		0	Prereq 1	Develop a formal building operation and preventative maintenance plan that is in accordance with LEED criteria. Develop a systems narrative and sequence of operations.	X
X			Prereq 2	**Minimum Energy Efficiency Performance-** Energy Star 69		0	Prereq 2	Use national college and university union average energy consumption as a comparison of the energy consumption in the building. Develop a score based on this comparison.	
X			Prereq 3	**Fundamental Refrigerant Management**		0	Prereq 3	Prepare a signed document stating that no CFC's are used in the building's HVAC&R base building systems or have 3rd party verify that replacement not feasible & phase-out plan is in place.	X
2	16		Credit 1	**Optimize Energy Efficiency Performance** (1-18 points)		18	Credit 1	Evaluate energy efficiency options.	
2			Credit 2.1	**Existing Building Commissioning-** Investigation & Analysis (2 points)		2	Credit 2.1	Develop, plan, and conduct the investigation and analysis phase for commissioning or conduct an energy audit meeting the requirements of ASHRAE Level II. Any systems not commissioned within the last two years will need to be recommissioned.	
	2		Credit 2.2	**Existing Building Commissioning-** Investigation & Analysis (2 points)		2	Credit 2.2	Implement no- or low cost operational improvements and create a plan for major retrofits or upgrades.	
	2		Credit 2.3	**Existing Building Commissioning- Ongoing Commissioning** (2 points)		2	Credit 2.3	Develop, plan, and complete half of the scope of work in the first commissioning cycle. The building needs to be commissioned on a 24-month cycle.	
	1		Credit 3.1	**Performance Measurement-** Building Automation System		1	Credit 3.1	The current BAS system monitors and controls temperature and ventilation at the level of the AHUs as well as VAV temperature and ventilation, space temperature, and lighting. Develop a preventive maintenance program for these systems.	
		2	Credit 3.2	**Performance Measurement-**System- Level Metering (1- 2 points)		2	Credit 3.2	Develop a breakdown of energy usage in the building. Install system-level metering covers at least 40% of the total expected annual energy consumption of the building.	
	6		Credit 4	**Onsite & Off-site Renewable Energy** (1-6 points)		6	Credit 4	Install onsite renewable energy systems or purchase renewable energy certificates offsite.	X
	1		Credit 5	**Enhanced Refrigerant Management**		1	Credit 5	Conduct calculations using current refrigerants to determine if this credit is achievable.	X
1			Credit 6	**Emissions Reduction Reporting**		1	Credit 6	Track and report emissions reductions. Report reduction using a third-party voluntary reporting or certification program .	X
21	46	8			**SUBTOTAL**	75			

[1]NP = Not Practical or Not Possible

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Certified 40-49 points **Silver** 50-59 points **Gold** 60-79 points **Platinum** 80 + points **Possible Points 110**

							Requirements / Strategies for Achieving Base Level Certification	Potential Campus Wide Policy
5	4	1	Materials & Resources	Possible Points	10	Materials & Resources		
Base Level	?	NP[1]						
X			Prereq 1	**Sustainable Purchasing Policy**	0	Prereq 1	Develop an Environmentally Preferable Purchasing policy that adheres to LEED criteria.	X
X			Prereq 2	**Solid Waste Management Policy**	0	Prereq 2	Develop a solid waste management policy for the building & site that diverts waste from incinerators and landfills.	X
	1		Credit 1	**Sustainable Purchasing- Ongoing Consumables**	1	Credit 1	Maintain sustainable purchasing program for regularly used and replaced items and document results.	X
1	1		Credit 2	**Sustainable Purchasing- Durable Goods**	2	Credit 2	Maintain sustainable purchasing program covering higher cost items/durable goods that are replaced infrequently.	X
	1		Credit 3	**Sustainable Purchasing- Facility Alterations & Additions**	1	Credit 3	Maintain sustainable purchasing program covering materials for renovations, demolitions, refits, & new construction additions.	X
1			Credit 4	**Sustainable Purchasing- Reduced Mercury in Lamps**	1	Credit 4	Develop a lighting purchasing plan that specifies maximum levels of mercury in mercury containing lamps for grounds, building, both indoor & outdoor.	X
		1	Credit 5	**Sustainable Purchasing- Food**	1	Credit 5	Achieve sustainable purchases of at least 25% of the total combined food & beverage purchases (by cost).	
1			Credit 6	**Solid Waste Management Policy- Waste Stream Audit**	1	Credit 6	Conduct a waste stream audit of the building's entire ongoing consumables to establish a baseline.	X
1			Credit 7	**Solid Waste Management Policy- Ongoing Consumables**	1	Credit 7	Maintain a waste redux & recycling program. MIN: paper, toner cartridges, glass, plastics, cardboard &old corrugated cardboard, food waste, & metals.	X
1			Credit 8	**Solid Waste Management Policy- Durable Goods**	1	Credit 8	Develop a waste program that recycles or reuses at least 75% of durable goods including electronic equipment and furniture. Provide documentation of reuse or recycling of these goods by weight, volume or replacement value.	X
	1		Credit 9	**Solid Waste Management Policy- Facility Alterations and Additions**	1	Credit 9	Divert at least 70% of waste (by volume) generated by facility alterations & additions from disposal in landfills and incinerators.	
8	5	2	Indoor Environmental Quality	Possible Points	15	Indoor Environmental Quality		
Base Level	?	NP						
X			Prereq 1	**Minimum Indoor Air Quality Performance**	0	Prereq 1	Conduct air testing to ensure that building ASHRAE Standard 62.1-2007 (2 Options)	X
X			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	0	Prereq 2	Prohibit smoking in the building and on-property within 25 feet of entries, outdoor air intakes, & operable windows.	X
X			Prereq 3	**Green Cleaning Policy**	0	Prereq 3	Develop and implement a green cleaning policy for the building and site that adheres to LEED-EB criteria.	X
1			Credit 1.1	**Indoor Air Quality Best Management Practices-** Indoor Air Quality Manage. Plan	1	Credit 1.1	Develop and implement on an ongoing basis an IAQ Management program based on EPA I-BEAM model.	X
		1	Credit 1.2	**Indoor Air Quality Best Management Practices-** Outdoor Air Delivery Monitoring	1	Credit 1.2	Install permanent, continuous monitoring systems that provide feedback on ventilation system performance.	
	1		Credit 1.3	**Indoor Air Quality Best Management Practices-** Increased Ventilation	1	Credit 1.3	Provide additional outdoor air ventilation rates for air-handling units serving occupied spaces by at least 30%.	
	1		Credit 1.4	**Indoor Air Quality Best Management Practices-** Reduce Particulates in Air Distrib	1	Credit 1.4	Install filtration media with minimum efficiency reporting value (MERV) of 13 or greater for all outside air intakes and inside air recirculation.	X
		1	Credit 1.5	**Indoor Air Quality Best Management Practices-** Alterations & Additions	1	Credit 1.5	Develop and implement an indoor air quality (IAQ) management plan for construction and occupancy phases. During construction meet or exceed the recommended design approaches of the Sheet Metal and Air Conditional National Contractors Association (SMACNA) "IAQ Guidelines for the Occupied Buildings Under Construction," 1995, Chapter 5	
1			Credit 2.1	**Occupant Comfort- Occupant Survey**	1	Credit 2.1	Assess the building occupants' comfort as it relates to thermal comfort, acoustics, indoor air quality, lighting levels, cleanliness, etc. via survey.	X
1			Credit 2.2	**Controllability of Systems-** Lighting	1	Credit 2.2	For at least 50% of the building occupants, use lighting controls that enable adjustments to suit task needs and preferences.	X
	1		Credit 2.3	**Occupant Comfort-** Thermal Comfort Monitoring	1	Credit 2.3	Install sensors to continuously monitor air temperature and humidity in occupied spaces. Periodically test air speed and radiant temperature in occupied spaces.	
	1		Credit 2.4 - RP	**Daylight & Views**	1	Credit 2.4 - RP	Assess whether the building meets option 1) 50% of regularly spaces have daylight illuminence at a certain level (several paths) or 2) 45% of spaces have access to outdoor views.	
1			Credit 3.1	**Green Cleaning-** High- Performance Cleaning Program	1	Credit 3.1	Develop and implement a high-performance cleaning program based on LEED requirements.	X
1			Credit 3.2	**Green Cleaning-** Custodial Effectiveness Assessment	1	Credit 3.2	Conduct an audit in accordance with APPA Leadership in Education Facilities' Custodial Staffing Guidelines. Facility must score 3 or less.	X
1			Credit 3.3	**Green Cleaning-** Purchase of Sustainable Cleaning Products & Materials	1	Credit 3.3	30% or more of actual cleaning purchases meet specific criteria.	X
	1		Credit 3.4	**Green Cleaning-** Sustainable Cleaning Equipment	1	Credit 3.4	Cleaning equipment must meet a set of sustainability criteria.	X
1			Credit 3.5	**Green Cleaning-** Indoor Chemical Pollutant Source Control	1	Credit 3.5	Employ permanent entryway (mats, grilles, etc) systems at least 10 feet long in the primary direction of travel at entries. Employ containment drains for hazardous waste.	X
1			Credit 3.6	**Green Cleaning-** Indoor Integrated Pest Management	1	Credit 3.6	Maintain Integrated Pest Management plan.	X
6	0	0	Innovation in Operation	Possible Points	6	Innovation in Operation		
Base Level	?	NP						
1			Credit 1.1	**Innovation in Operation**	1	Credit 1.1	Outreach: case study, signage and tours.	X
1			Credit 1.2	**Innovation in Operation**	1	Credit 1.2	Sustainable cleaning products and materials - exemplary performance.	X
1			Credit 1.3	**Innovation in Operation**	1	Credit 1.3	Light bulb mercury content - exemplary performance.	X
1			Credit 1.4	**Innovation in Operation**	1	Credit 1.4	Native and adaptive vegetation - exemplary performance.	X
1			Credit 2	**LEED™ Accredited Professional**	1	Credit 2	At least one principal of the project team shall be a LEED Accredited Professional (AP).	X
1			Credit 3	**Documenting Sustainable Building Cost Impacts**	1	Credit 3	Document overall building operating costs for the previous 5 years (or length of occupancy whichever is shorter).	X
	0	0	Regional Priority[2]	Possible Points	6	Regional Priority[2]		
Base Level	?	NP						
1			Credit 1.1	**Regional Priority: SSc4 (10%)**	1	Credit 1.1		
1			Credit 1.2	**Regional Priority: SSc6**	1	Credit 1.2		
		1	Credit 1.3	**Regional Priority: SSc7.2**	1	Credit 1.3		
	1		Credit 1.4	**Regional Priority: EAc4 (3%/25%)**	1	Credit 1.4		
1			Credit 1.4	**Regional Priority: WEc2 (10%)**	1	Credit 1.4		
	1		Credit 1.4	**Regional Priority: MRc9**	1	Credit 1.4		
22	11	4		SUBTOTAL	22			
43	57	12		TOTAL	43			
	TOTAL POINTS	110						

[1]NP = Not Pracical or Not Possible.

[2]Six region priority credits are available; but only four points can be earned from regional priority credits.

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ADDITIONAL PREREQUISITE AND CREDIT INFORMATION

Sustainable Sites

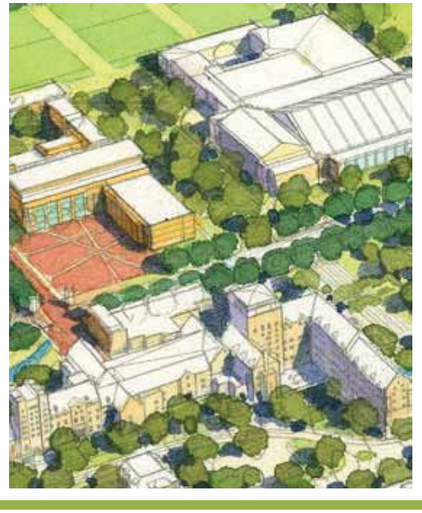
There are eight credits in the Sustainable Sites section of LEED-EB O&M (2009 version). Of the eight credits, SSc2 & SSc3 are under the purview of the IMU as an "auxiliary" facility but there are opportunities and efficiencies in coordinating overall landscaping practices on campus, especially in regards to landscape composting.

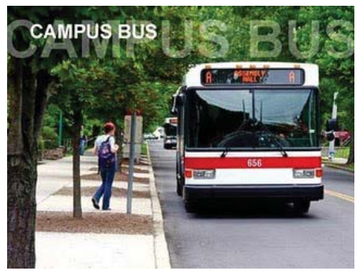
Sustainability Policies Credits

Many of the LEED-EB credits require developing sustainability policies and then following them. Earning these credits generally involves time and energy but not significant increased in expenditures. Developing and implementing, as well as tracking the achievements for these credits would provide a great job for students or interns with strong direction and oversight.

Alternative Commuting Transportation

The primary mode of transportation to the building by employees is car commuting. However, bus stops near the northeast corner and several bike racks provide transportation for most of the building's users and provide opportunities for alternate transportation for employees. Pay parking lots are currently located on the northeast corner of the building to the north and east. These lots provide hotel parking and pay parking for building users.





Images (left to right): Proposed 7th Street Gateway depicted in the Campus Master Plan, Bloomington Transit Bus, IU Campus Bus, and the proposed future redevelopment of 7th Street as presented in the Campus Master Plan.

Transportation Issues

Parking

- The IMU's largest source of revenue is their hotel, and the second largest source are their pay parking lots.
- The campus master plan deletes the large majority of the pay parking lots and calls for the creation of a park northeast of the IMU and a new building complex and pedestrian plaza north of the IMU.
- The location of this parking creates a barrier between the primary pedestrian corridor through campus and the building.
- Traffic flow into the pay parking lots is frequently congested, caused by:
  - Cars waiting in the traffic lane for parking spaces to become available.
  - Competition from buses and pedestrian traffic at the parking lot entry.

7TH STREET CORRIDOR

- Reinforce the of heart of campus
- Academic and cultural 'main street'
- Two remaining signature sites
- Additions to Wildermuth, library
- Reinvestment in IMU
- Ernie Pyle hall as front door to IMU
- New campus green
- Amphitheater for arboretum
- Improved Woodlawn Field for intramural sports

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Parking

- Charrette attendees suggested that a two story parking deck be constructed northeast of the IMU in the location of the current parking area. The 2006 Memorial Union Preliminary Planning study also suggested that a parking structure be built proximate to the IMU. Their concept is to create an at grade deck entry near the hotel entrance. The deck would be two stories, with parking on the ground level, parking on the first deck, and a public pedestrian plaza on the top deck. The deck could be built into the existing slope and create at grade pedestrian access from the northeast and create an opportunity for a new major entry to the IMU building on the mezzanine level at the building's northeast corner. Parking revenues could be used for debt service on the parking deck. Based on current parking revenues and preliminary construction costs, the deck could have a 2 to 4 year simple payback.
- Shelters need to be constructed at the student parking lot at the football stadium

Public Transportation

- The bus stop location is currently in front of the school of journalism building. The nearest entry to the IMU from this location is the hotel entry. The bus stop is at the same location as the main entry to pay parking lots, creating vehicle-pedestrian conflicts and associated safety issues.
- There is currently no formal infrastructure at the bus stop.
- No extra lane for loading
- No formal shelter
- No bicycle commuter facility
- More bicycle racks are needed and their current locations need to be better marked.
- The school of journalism building could be retrofitted to serve as a new entry to the IMU and as a transportation depot, including better bicycle facilities, retail (possibly the bookstore).
- The proposed plaza to the north could include a bus transportation hub to help separate pedestrians from the vehicle traffic.
- The proposed plaza could also include facilities for bicycle storage, zip cars, bicycle rental, and other modes of alternative transportation.

Alternative Commuting Credit

This credit has 15 points that can be earned by the level of alternative commuting used. This requires surveys to document staff and student participation. Documenting full-time staff and student participating can be time consuming and challenging; but very little cost is involved. This would provide a great job for students or interns with strong direction and oversight.

Images (left to right): Bus shelters installed at bus stops could be used as sustainability exclamation marks with either PV covered or green roofs. The proposed future view of E. 7th Street Historic Core *(right)* as presented in the Campus Master Plan *(shown on right)*.

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Jordan River

The Jordan River flows through the site and exhibits characteristics typical of urban streams; downcutting, hard armoring in need of repair, and destabilized banks. There are also several direct stormwater pipe discharges.

Opportunities

- The campus has developed plans addressing the Jordan River watershed on a larger scale. This plan can be implemented, in part, on the IMU site.
- Hard armored areas can be repaired or removed and replaced with bioengineered techniques.
- Destabilized banks can be pulled back and stabilized with vegetation.
- Stormwater pipes can be intercepted prior to discharge and treated using bioretention systems.

Stormwater Quantity Control

Stormwater Quantity Control (credit SSc6) is a broader campus issue and is addressed in the master plan.

- Stormwater runoff from the site is currently uncontrolled.
- Roof drains discharge directly to storm pipes that discharge directly to the Jordan River.

Opportunities

- Stormwater pipes can be intercepted prior to discharge and treated using bioretention systems.
- Outdoor plaza improvements are proposed for 2010 construction on the north side of the IMU building. Rain Gardens, porous pavements, and other green infrastructure tools can be implemented as part of this project to control stormwater runoff in this area.

Heat Island Reduction (non-roof)

- The north pay parking lot lacks tree islands.

Opportunities

- The campus master plan calls for the creation of new buildings and parks north and east of the IMU. These improvements can and likely will be designed with vegetation capable of reducing heat island effects.

Light Pollution Reduction

- Outdoor building and parking lighting may be contributing to light pollution.
- Likely a campus exterior lighting standard issue and a cost issue for the IMU if the fixtures need to be swapped out.

Opportunities

- Outdoor fixtures can be retrofitted using shielind to focus lighting downward and minimize light pollution.

Campus Master Plan images show the proposed Jordan River Restoration plans. Images (*top right to bottom, clockwise*): Panorama of Jordan River Restoration, Proposed Jordan River at IMU, Proposed Jordan River walk.

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WATER EFFICIENCY

There is one prerequisite and four credits available in the water efficiency category. These credits address both interior water use and exterior water used for landscaping and grounds maintenance. Water consumption is sometimes a silent energy drain, no pun intended. One does not often realize how much excess water they are using, especially when it comes to older plumbing fixtures. Actions to earn the WE credit 2 points In the implementation phase: Determine the cost and water saving benefits and other benefits of the water efficiency improvements needed to earn each water efficiency point and implement the level of water efficiency that makes sense.

Existing Conditions

- The existing fixtures consume more water than the current plumbing fixtures on the market today.
- The lavatory sinks do not all have automatic shut off valves, either manual or battery powered.
- The flush valves on most water closets were greater than 1.5 gallons per flush, industry standards today are at or below 1.2 gallons per flush.
- Some water efficient fixtures have been installed in the hotel (low-flow showers and faucets). Many parts of the building still utilize standard plumbing fixtures.

Opportunities

Retrofitting faucets in high traffic public rest rooms near South and North Lounge as well as the cafeteria, bowling alley, and computer labs with aerators would supplement water use reduction measures made in the hotel. Instituting an IMU (potentially campus-wide) policy that specifies high efficiency fixtures on upgrades and renovations will improve the water savings in the building over time without the large up-front improvement costs. There ample opportunities to greatly reduce the water consumption within IMU.

- By incorporating native planting and landscaping techniques. The small amount of irrigation in place could be eliminated resulting in reduced water consumption.
- Evaluate the hotel laundry facilities and equipment used.
- Utilize condensate coil water capture for gray water, this could be used for some of the irrigation, if required.
- It would not cost a lot of money, but would take some time to remove and replace aerators in existing plumbing fixtures with reduced flow aerators. This could be incorporated into an overall plumbing fixture retrofit, and/or replacement plan, and could also be tied into a class project to reduce the labor costs.

Cost Of Implementing LEED-EB O&M

WE Prerequisite 1 & Credit 2, Indoor Water Fixtures

A capital improvement cost may be required to meet the water efficiency credit requirements. This expenditure can help earn the water efficiency prerequisite and up to 5 credit points. Depending on the current fixtures in the building, the costs may be minor if purchasing fittings such as aerators and flush valve diaphragms or substantial if purchasing of new fixtures is necessary.

Install o.5 GPM aerators on all the lavatories, replace the diaphragms in the urinal flush valves with 1 gallon per flush diaphragms, and experiment to see how low the flush volumes for replacement diaphragms in the toilet flush valves can be taken without losing the effectiveness of the flush. Based on the outcome of this experimenting, determine how many toilet flush valves to replace and how many toilets to replace to reach the desired number of point for fixture water efficiency. These water fixture improvements reduce water use which provides both cost savings and environmental benefits. Most buildings can meet the LEED-EB prerequisite with few fixture replacements.

Examples of water efficient fixtures such as aerators for faucets, automatic sensor faucets, and low-flow toilets.

Water Efficiency (WE) Prerequisite 1: Minimum Indoor Plumbing Fixture and Fitting Efficiency

The water efficiency section contains one prerequisite: WE prerequisite 1, Minimum Indoor Plumbing Fixture and Fitting Efficiency. The intent of the credit is to reduce the indoor fixture and fitting water consumption, which will conserve water as well as capital.
Actions to earn WE prerequisite 1:

- Conduct and inventory of all plumbing fixtures in the buildings and calculate over all fixture water use relative to LEED-EB baseline water use for this building.
- Evaluate the following actions to determine what needs to be completed to earn the prerequisite and as many water efficiency points as is practical:
- Install 0.5 GPM aerators on all the lavatory faucets.
- Replace the diaphragms in the urinal flush valves with 1 gallon per flush diaphragms. Change diaphragms on a few test urinals initially to ensure that a low-flow diaphragm will function correctly.
- Experiment to see how low the flush volumes for replacement diaphragms in the toilet flush valves can be taken without losing the effectiveness of the flush. Based on the outcome of this experimenting, determine how many toilet flush valves to replace and how many toilets to replace to reach the desired number of point for fixture water efficiency.
- Make a policy to install high efficiency plumbing fixtures whenever new fixtures are installed in the building.

* Most building can meet the LEED-EB prerequisite with few fixture replacements.

Photos show some examples of water efficient plants and flowers.

WEc3, Water Efficiency Landscape Irrigation

IMU may use several strategies to reduce water consumption: 1) turn off sprinklers or reduce amount of time sprinklers are on, 2) install rain sensors, 3) install a microirrigation system.

- Since there is very little irrigation currently in place at IMU it might be easiest to turn off irrgation all together.

<u>Opportunities</u>
The irrigation system near the hotel entrance could be disconnected. The LEED-EB O&M (2009) rating system offers up to five points for 100% water use reduction used on landscaping. The turf grass may brown out depending on weather conditions, however the area is shaded in the afternoon so heat stress is minimal. Natural landscape standards are likely a broader campus policy issue and is addressed in the master plan.

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ENERGY & ATMOSPHERE

This is a campus issue, to the extent that the central plant operations affect the overall energy performance. Metering has been installed at the IMU and is being implemented as a broader campus initiative by the OA. Despite the fact that the IMU does not pay for its energy, building energy consumption is a concern to administrators. Due to the shear scale, and the functions within the IMU, unfortunately it is going to inherently consume a large amount of energy due to the great quantities of ventilation air that have to be conditioned and brought into the building to maintain a health indoor air quality.

Existing Energy Conditions

- A major concern is energy consumption monitoring. It is difficult to assess, and correct something that is not being measured. Therefore all building energy sources and systems (chilled water, steam, condensate, electricity) do not have fully functioning energy meters. It is apparent some of the gaps within this deficiency are being corrected parallel with our reporting on this item.
- A great deal of energy is consumed due to the inherent nature of the dual duct system.
- With the historic artwork there is a demand for even heating and cooling control, and attention being paid to humidity levels within the building.
- The existing lighting controls are somewhat cumbersome to use in areas, and therefore do not get switched off as frequently as they could.
- Compared to a 115,000 square foot student union that was finished in 2008, the IMU consumes over 20% more energy per square foot, based on our modeled projections of that building compared with the pro-rated and partial metered data provided to us by IMU sources.

Opportunities

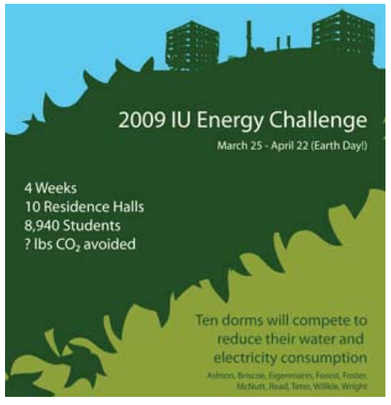
The HVAC control system could be updated and expanded to replace to leaking pneumatic system.

- The control system could be enhanced, and expanded to improve the operational and energy efficiency of the building.
- A reassessment may be appropriate in looking to deliver what the occupants and spaces need with less energy.
- Additional comparisons and benchmarking studies should be performed to assess potential performance gaps.
- Increased implementation of automatic lighting controls, and automatic HVAC controls would improve energy efficiency.
- Considerations were made for providing solar hot water to heat both domestic water and potentially building heating water.

EA Prerequisite 1: Energy Efficiency Best Management Practices

Actions to Earn Prerequisite

- Develop the following building operating documents::
  1. Sequence of operations for the building system.
  2. Building operating plan
  3. Systems narrative describing, at a minimum, the heating/ cooling ventilation, lighting, and any building control systems.
  4. Develop and implement a preventive maintenance plan for equipment in the systems narrative, and a schedule for preventive maintenance.
  5. Conduct an energy audit that meets the requirement of the ASHRAE Level I walk-through analysis.



Images (left to right): Energy Star logo, IU 2009 Energy Challenge, occupancy sensors that turn lights on and off automatically based on room occupancy, and finally a wind farm shows the potential for promoting clean energy through renewable certificate purchases.

EA Prerequisite 3: Refrigerant Management

Actions to earn this prerequisite: No use of CFCs in refrigeration or cooling equipment used by the IMU. This includes all refrigeration or cooling equipment used on site containing more than ½ pound of refrigerant and the chillers in the central plant that serves the IMU with chilled water. If there are CFCs in use this use can continue if it can be shown that it is not economic to replace the equipment that contains the CFCs. Students can be used to gather data on the cooling equipment used in the building and at the central plant.

EAc4: On-Site and Off-Site Renewable Energy

Relates to on and/ or off-site renewable energy and should likely be addressed as a broader campus issue. Due to the historic nature of the IMU and its collegic gothic roof conformation there is very little area on the building for integrated PV. From the broader campus perspective however, a PV plant somewhere in the more open quadrant of the Northeast section of the campus is a real but expensive proposition.

Green tags are a distinct possibility and are a great way to target alumni and student participation. Enhanced refrigerant management although very localized to the IMU by its restaurant and food service functions could benefit from an overall campus refrigerant policy for phasing out ozone-damaging chemicals.

EA Prerequisite 2: Minimum Energy Efficiency Performance

Aside from labor, this prerequisite should be a no cost prerequisite.

Actions to Earn Prerequisite

Evaluate the energy efficiency of the IMU relative to other buildings of a similar type and climate. The IMU is not covered by one of the building types available in U.S. EPA Energy Star Portfolio Manager the building so Energy star cannot be used to evaluate the energy performance of this building for LEED-EB and one of the alternative approaches will need to be used. The recommended approach is to develop a base line of energy performance for other unions and compare the IMU energy performance to this baseline. This approach makes all the energy points accessible for the IMU. The IMU can work with other student unions and the ACUI to gather energy use information for other unions to provide the needed baseline. Tracking down this data could be a great project for a student or intern with strong direction and oversight.

Cost Of Implementing LEED-EB O&M

EA Prerequisite 2 and EAc1

Depending on the results of the implementation phase comparison of the building energy use to peer buildings, the building may need to install additional energy efficiency improvements to meet the prerequisite.

- In the implementation phase: Determine the cost and energy saving benefits and other benefits of the energy efficiency improvements needed to additional energy efficiency point and implement the level of energy efficiency that makes sense.

EAc2.1, Commissioning Investigation and Analysis Phase

The cost of commissioning (EAc2.1-2.3) is derived from a study produced by Lawrence Berkeley Laboratories that outlines an average cost of existing buildings commissioning to be $0.27 per square foot with a payback period of 0.7 years discovered through operational (energy) savings. The commissioning costs would be the largest capital outlay for the building; however, the payback period should be approximately 1 year based on energy efficiency discoveries.

Credit Challenges And Opportunities

EAp2 has five corresponding credit points in the LEED Rating System, EA credits 1. This is the largest credit in LEED-EB with 18 points that can be earned.

Actions to earn the EA credit 1 points:

- In the implementation phase: Determine the cost and energy saving benefits and other benefits of the energy 3efficinecy improvements needed to additional energy efficiency point and implement the level of energy efficiency that makes sense.

All of the actions to increase energy efficiency implemented to earn points in the Energy and Atmosphere credits will save energy and reduce costs.

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MATERIALS & RESOURCES

Discussed at length during the charrette, the IMU has some independence in purchasing and to an extent lesser control over purchasing by some of its vendors. However the IMU wields grant moral authority and this is area of particular interest to the students. Coordinating with an abstractly be in place overall campus purchasing policy has great promise and may abstractly already be in place to some degree. IMU is responsible for smaller facility alterations and additions but a coordination with the OA on broader facility standards and specifications makes sense from an efficiency standpoint. The new LEED-NC projects on campus may have already established some campus precedents.

Materials and Resources Prerequisite 1 & 2: Sustainable Purchasing and Solid Waste Management Policies

Actions to Earn Prerequisite

- The Materials and Resources section contains two prerequisites, MR prerequisite 1, Sustainable Purchasing Policy, and MR prerequisite 2, Solid Waste Management Policy. The intent of these credits is to select sustainable materials, practice waste reduction strategies, and to reuse and recycle. Both of these prerequisites involve developing policies that adhere to LEED criteria. Beyond staff time devoted to their development, they do not require costs or quantification of performance making them very achievable. Students can be used to gather data on both purchasing and solid waste management.

Credit Challenges And Opportunities

Similar to the alternation transportation credit, it will be a challenge to capture achievements for all building occupants for the materials and resources category. The materials and resources category involves tracking purchasing and solid waste management. A significant level of occupant participation will be needed for the following credits:

- Sustainable Purchasing Ongoing Consumables MRc1.1
- Sustainable Purchasing Durable Goods MRc2.1
- Solid Waste Management Durable Goods (office equipment) MCc8
- Solid Waste Management – Facility Alterations (C&D recycling) MRc9

Developing and implementing as well as tracking the achievements for these credits would provide a great job for students or interns with strong direction and oversight.

Cost of Implementing LEED-EB O&M

MRc6, Waste audit: Material and Resources (MR)

- Credit 6 requires a waste stream audit.
- Build on what is already being done and use students and interns to gather additional data needed. This would provide a great job for students or interns with strong direction and oversight.

HOOSIER DISPOSAL

Images (top to bottom, clockwise): The well known symbol for the three 3 R's; Reuse, Reduce, Recycle. Hoosier Disposal is the local trash hauler in Bloomington. The IMU currently recycles various materials. Depicted here is a the central trash and reycling collection area with cardboard recycling and red bins for other recycleable items.

INDOOR ENVIRONMENTAL QUALITY

Campus policy on smoking reinforces the LEED prerequisite. Indiana University is a none smoking campus. Although a green cleaning policy is under the purview of the IMU and its vendors coordinating on a campus wide green cleaning policy would benefit the program. Having the procurement office stocking all the right cleaning materials centrally is also an opportunity for cost savings and making sure non-compliant materials are not used.

The indoor environmental quality is a multi-faceted topic that includes the quality of the air, the comfort of the occupants and artwork, the overall ability to maintain one's comfort by controlling their own temperature and light levels, and the ability to contain and remove odors and contaminants.

Indoor Environmental Quality Prerequisite 1: Outdoor Air Introduction & Exhaust Systems

Actions to Earn Prerequisite

- Document that the outdoor air ventilation rate required by ASHRAE 62.1-2007 is met.
- Document that the exhaust systems have been tested to perform as designed.

IEQ prerequisite 2: Environmental Tobacco Smoke Control

Actions to Earn Prerequisite

- Document the no smoking policy for the IMU.
- Establish and maintain a no smoking zone within 25 feet of the building entrances.

IEQ prerequisite 3: Green Cleaning Policy

Actions to Earn Prerequisite

- Establish a green cleaning policy for the IMU.

Cost of Implementing LEED-EB O&M

IEQc3.5, Indoor Chemical Pollutant Control

- The building may need to purchase and install mats, grills, or grates (at least 10 feet in the primary direction of travel) in all permanent entryways systems if not already in place. This may not be practical given the historic nature of the building. It is recommended that this be done of all entrances where it is practical

Challenges And Opportunities

The green cleaning credits involve developing sustainability policies and then following them. Earning these credits generally involves involve s time and energy but not significant increased in expenditures. Developing and implementing as well as tracking the achievements for these credits would provide a great job for students or interns with strong direction and oversight.

Issues

It is important to not forget the building not only has to maintain appropriate thermal comfort for people, but also for the historic artwork in which it contains and displays. The existing mechanical system type is a good system for maintaining a high level of thermal comfort for a variety of spaces. Attention should be paid to maintaining a consolidated area of cleaning supplies so that these contaminants can be easily captured via the exhaust system.

Opportunities

For a relatively small cost, improvements could be made to the lighting controls by adding, automatic lighting controls that would both reduce energy consumption and increase occupant control of their visual environment. More comprehensive tracking of the thermal environment to better understand the interior temperature and humidity fluctuations throughout occupancy time periods and outdoor air conditions.

INNOVATION IN OPERATIONS

There may be some other initiatives being implemented in the new buildings that blank fulfill an evolving campus policy applicable to the IMU. Many of these issues may be very specific to the IMU such as:

- Green hotel operations
- Green food service operations
- Green meeting facilitation
- Student involvement on innovative ideas is a grant opportunity here

REGIONAL PRIORITY

Due to their applicability to the southern Indiana region, these credits may already have been established under the NC projects or could be established as a precedent and with the IMU certification.

SUMMARY OF ACTIONS NEEDED TO EARN THE PREREQUISITES

The majority of the prerequisites will require staff time, with no necessary capital expenditure. Three prerequisites may require significant time and/or a low to moderate cost. WEp1 generally can be met at low to moderate cost with relatively small replacements of fixtures. For EAp2, the baseline for energy use of unions will need to be created in the implementation phase to determine the standing of the building relative to the prerequisite. For IEQ prerequisite 1, the outdoor air flows will need to be measured and be shown to meet or exceed the ASHRAE requirements or at least 10 CFM per person.

Any improvements that are needed in water efficiency and energy efficiency to meet the prerequisites will save water and energy and reduce costs. The outside air measurement and verification that it is adequate contributes to maintaining a healthy indoor environment for the students, staff and visitors using the union.

LEED-EB IMPLEMENTATION SUMMARY

In summary, IMU can implement LEED-EB in an incremental way that LEEDs to LEED-EB base level certification al the lowest cost by working toward achieving the credits selected in the LEED-EB Checklist. Careful review of the credits is recommended after additional information is gathered to verify the feasibility and cost of pursuing the selected credits. Many of the credits do not require significant investments capital improvement. Rather, these credits require time and energy. Developing and implementing as well as tracking the achievements for these credits will provided a great job for students or interns with strong direction and oversight. Other credits may require some costs and each credit should be evaluated to determine which to implement.

The process can begin by addressing the prerequisites described below:

- WEp1 Continue to update water use fixtures to comply with water use reduction requirements for the prerequisite and selected WE credits.
- EAp1 Begin documenting the building systems and schedules.
- EAp2 Assess the current energy consumption compared to other similar buildings.
- EAp3 Begin tracking on a regular basis if any refrigerant leakage occurs in the units in the building to confirm a leakage rate of less than 5%. Investigate the economic feasibility of refrigerant replacement all units containing more than ½ pound of CFCs.
- EQp1 Test each outside air intake and exhaust systems and compare with ASHRAE requirements to ensure compliance.
- MRp1 & p2, IEQp2 & p3: Begin writing the policies.

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SUSTAINABILITY AT THE IMU

The purpose of Greening the IMU is to serve as a foundation for implementing LEED-EB O&M campus-wide. Leveraging campus-wide sustainability initiatives with the IMU certification process and taking advantage of the "Campus Application" precedent in LEED leads to more successful and cost effective certification of the IMU while paving the way for the remaining 524 existing buildings on campus.

LEED for Existing Buildings (LEED-EB) provides a direct and practical tool for improving the sustainability at the IMU. As discussed above, the IMU can first identify the no- and low-cost efforts to achieve the base level certification. Although this process may not be "visible" on campus, improving the maintenance and operations will provide valuable ways to cut costs, increase efficiency, and make the indoor environment more suitable for the occupants.

Interns working with the OS and OA could do the a large portion of the work in getting the balance of the buildings certified. This is further reason the Greening the IMU could be a prototype for this process, help broaden and establish Green Campus Policies and Standards which than can all be employed for the balance of the LEED-EB O&M. In effect Greening of the IMU becomes a flagship project and one of the more challenging to prove it can be done, demonstrate cost savings and flush out the broader campus sustainability initiatives creating a comprehensive Greening strategy and system.

The consulting team recommends beginning the sustainability initiative at the IMU by striving to achieve the base level LEED-EB certification. In order to do so, the consulting team recommends taking the following steps:

The table below illustrates an example of a timeline for LEED Certification with a three month performance period.

Approximate LEED-EB Assessment and Certification Process Timeline										
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Performance Period			■	■	■					
Application Development				■	■	■	■			
USGBC Preliminary Review								■		
Supplemental Application Preparation & Submittal									■	
USGBC Final Review										■
Certification										■

Phase 1: Base Level Certification

1. Establish a certification team. Engage the facility managers, students and sustainability interns, and contractors.
   a. Set up projects and work plans for each project for students and interns to more the process forward and set up system for providing these students and interns with strong direction and oversight to make it a good learning experience to move the LEED-EB implementation and certification process along.
   b. Set up work plan for IMU and IU staff.
   c. Set up work plans for IMU and IU contractor staff.

2. Continue to Explore which are the Lowes Cost Credits for Earning Certification. Use the checklist highlighted in this report as a tool to identify which credits are possible and which are not. Evaluate each credit to determine the costs and benefits of implementing actions to earn each point and decide which to implement in the short term.

3. Register the IMU as LEED-EB project. Go to the USGBC website to complete registration.

4. Begin tracking and implement necessary building modifications. Ongoing tracking will help to establish the baseline performance metrics to determine which areas of sustainability need to be improved upon.

5. Start the performance period. The performance period for a LEED- application is the period during which data is collected to measure the building's sustainable performance. It can range from a three month to two year period of time depending on the LEED team's preferences and the performance of the building - particularly the building's energy efficiency. Choose a performance period length.

6. Apply for certification. Prepare all the application materials and submit them to the Green Building Certification Institute (GBCI), a LEED Certification third-party verifier.

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Phase 2: Continuous Improvement towards Stretch Achievement Goals

1. Establish ongoing LEED-EB recertification at the IMU.
Buildings certified under LEED-EB must recertify every one to five years in order to maintain certification and ensure that the building continues to operate in a sustainable manner.

2. Develop IMU strategic plan for continuous improvement.
The IMU can use this recertification process to its advantage by setting "stretch" goals to continually improve its sustainable practices. The IMU can create a strategic plan for its sustainability by using the various levels of certification as stretch goals. This process will allow the building to move up the LEED "scale." Upon each recertification application, the IMU can pursue higher levels of achievements. See the recommended recertification schedule and sustainability achievement goals below.

3. Fundraising based on IMU Sustainability Strategic Plan
Identify components of IMU sustainability strategic plan that appeal to alumni and develop and implement a fund raising program around these components.

LEED Certification Plan	
Base Level Certification	1 year
Silver Certification	4 years
Gold Certification	7 years
Platinum Certification	10 years

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STUDENT PARTICIPATION

USGBC Campus Campaign is creating added opportunities for the facilitation of student involvement in creating sustainable policies, working with facilities to investigate current operations and suggesting greener alternatives, and advocating for broad campus sustainability beyond the university institution. Just as Indiana Union Board membership, helps prepare students for their subsequent jobs post- graduation, involvement in the LEED certification process will result in better understanding through hands-on learning experience and boost leadership confidence, all while addressing real life complex issues whose solutions benefit the university. LEED-EB O&M provides the framework for achieving sustainability, although the students and facilities stakeholders ultimately drive the process and accomplish change through perseverance on an increasingly important scale.

In addition to the invaluable hands-on experience gained by students through intimate involvement with the LEED-EB O&M process, projects employing students have substantially saved on overall project costs. According to the USGBC Campus Campaign, projects involving students were 30% lower on average than projects exclusively employing outside consultants. Students can be engaged throughout the LEED-EB O&M certification process from the pre-planning stage (e.g. participating in the GIMU charrette), planning and research, through implementation and finally long-term monitoring between re-certification periods. Students are a fantastic resource and their involvement is symbiotic, benefiting parties across the board.

Student interns employed in tracking and documentation can substantially reduce consultant fees, however students can also contribute by identifying potential sources of funding and making the connections that result in financial assistance in sustainability upgrades. It was Jenna Morrison, a student intern, who largely assisted with the grant application that secured funds for the GIMU charrette.

There are ample opportunities to involve students on the road to greening the IMU. IU has already tapped in the rich resource of student participation. IUOS students and interns have compiled (or are currently compiling) 62 reports on a wide spectrum of sustainability issues. Most of these reports include both an assessment of current conditions and research of suggested solutions. Indiana has already mobilized students quite well and continuing to do so can only strengthen the success of sustainability initiatives made by administrators.

UPCOMING STUDENT INVOLVEMENT EVENTS AT IU

- Themester Tie-in (2010 Themester: Thriving on a Small Planet)
- Art Week Theme 2010: Environment and the Arts (Feb 18-28th, 2010)

Photos *(left to right):* Students meet on campus, Indiana University Office of Sustainability student interns (2009-10 left- top, 2008-09 left- bottom), and 2009 summer interns above). *Photo credits: IU Photography*

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LEVERAGING THE SUSTAINABILITY IMPACTS OF THE IMU BEYOND THE CAMPUS

LEED-EB Certification of the IMU Building is a critical step in the process of campus-wide sustainability. The IMU can be used as a prototype for implementation of LEED-EB for all other campus buildings - buildings that have been LEED for New Construction Certified and buildings that have not. The following list illustrates key ways that the IMU Building can act as a prototype:

- IMU Sustainable Policies and Plans. Other campus buildings can model their sustainable policies and plans off of those developed at the IMU.
- IMU No- and Low-Cost Measures Implemented. The no- and low-cost measures implemented at the IMU can provide a starting point for low- and no-cost measures to implement at other buildings; other buildings can learn from IMU's struggles and successes.
- IMU LEED-EB Checklists. Other buildings can also use the LEED-EB checklists as a tool for advancing the sustainability at other buildings. The checklists developed for IMU can provide a starting point for the other buildings.
- IMU LEED-EB Team. Individuals who participated on the LEED team for the IMU can create a campus-wide LEED team to share their knowledge and lessons learned.
- IMU Stretch Goal Approach. The other buildings can use the LEED recertification stretch goals approach to increasing their sustainability.
- Portfolio Program/Volume Certification.
- Finally, by using the IMU as a prototype, the IU Campus will have much of the documentation and tools already developed for the LEED application. These documents and tools can be adopted for the portfolio program – when it becomes available - through USGBC to document and submit the buildings' applications for LEED Certification.

The IMU not only can leverage campus sustainability initiatives, but can be the catalyst for broader campus audiences as well, particularly for 1) other campuses in Indiana, 2) other campuses in the Duke Service territory, 3) Other campuses belonging to sustainability association for colleges and universities, and 4) other unions involved it the Association of College Unions International (ACUI). IMU along with Hellmuth & Bicknese and Leonardo Academy could conduct outreach initiatives to reach other campuses and unions. Initiatives may involve in person presentations, webinars, etc. Whichever type of outreach is chosen, each of the key advantages for using IMU as a prototype listed can be transferred to the broader audience.

DUKE ENERGY SERVICE AREAS

Within Indiana, Duke Energy services over two thirds of the territory.

The Eco-Charrette process may prove to be a useful tool in helping Duke Energy green their portfolio by lowering demand peaks from one of their most demanding users – higher educational facilities. The IU/Duke Energy partnership can be mutually-beneficial for improving operations (and financial gains) at both entities. Shared success stories can serve as a mobilizing force for other higher education universities on how forging symbiotic partnerships can improve overall sustainability results.

In addition to Indiana, Duke Energy services facilities in the states of Kentucky, North Carolina, Ohio, and South Carolina and can supply green power to an even broader range of customers.

ASSOCIATION OF COLLEGE UNIONS INTERNATIONAL (ACUI)

The central office of the ACUI moved to the IUB campus in 1981 and off campus in Bloomington in 1996.

If one of the largest student unions in the US is successfully certified with student impetus both in the concept and actualization this creates a powerful motivating force for other like minded student unions across the country. The process in development at the IMU has the chance to become an approach to evaluating, LEED-EB O&M certification, and campus sustainability anywhere there is strong student interest and support.

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GREENING OTHER IU CAMPUSES

The successful implementation of GIMU, with earned LEED certification, could create a momentum for enhancing sustainability and certifying other existing buildings throughout the IU system. This process could be applied to other IU campuses throughout the state of Indiana including:

- IUPUI Indianapolis (total enrollment: 30,300): SmithGroup/JJR also has recently completed a sustainable master plan for this more urban campus.
- IU East (total enrollment: 3,447): This is a much smaller campus in Richmond, IN.
- IPFW/Indiana University- Purdue University (total enrollment: 6,948): This campus combines degree offerings with Purdue, and has an extensive continuing education system.
- IU Kokomo (total enrollment: 2,690): Focuses on programs to assist area workers in developing new and enhanced job skills.
- IU Northwest (total enrollment: 4,794): IU Northwest, in Gary, is located on a 36-acre campus in the northwest corner of the state.
- IU South Bend (total enrollment: 7,712): Offers a variety of degrees as well as continuing education for working professionals.
- IU Southeast (total enrollment: 6,482): Offers a broad range of degree programs and is located just across the river from Louisville, KY.

FUNDING

In light of recent state budget cuts a cost effective certification process is imperative as well as a demonstration of the cost savings from energy and water conservation measures ultimately applied. Due to its status as an auxillary the IMU operates much more independently that other IU facilities. Staff, janitorial service and building maintenance, and building alterations are generally handled internally. The IMU manages its own lease agreements with vendors and service providers with profits going back to supporting student activities. The hotel and convention center is operated directly by the IMU while food service is managed by Sodexo.

At a base level certification many of the credits do not have any associated expenses and Energy & Atmosphere credits have great potential for operational cost savings. A variety of funding approaches may be appropriate for accomplishing the LEED-EB O&M certification of the IMU and the team recommends getting the building certified at the base level and then reaching for stretch goals as funding and opportunities arise.

Funding approaches include:

- Fund Raising- IMU/ IU Alumni Association
- IU funding request
- Paid from Savings Approach
- Private/ Public Partnerships (e.g. Additional Duke Energy Grants, etc)

A key component to to keeping costs down will to effectively leverage student participation in the process. According to LEED Campus Campaign project employing student in the tracking and documentation process reduced costs by approximately 30 percent as compared to projects employing consultants exclusively to perform the work.

The potential for Paid from Savings approach probably lies in the future volume certification of other existing buildings on campus with the IMU certification establishing the process and benchmarking potential savings.

For a complete discussion and detailed approach to setting us a Paid from Savings structure see the recently published report from USGBC entitled the “The Paid- from- Savings Guide to Green Existing Buildings.”

Appendix

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CHARRETTE SCHEDULE: IMU LEED-EB & Eco-Charrette Schedule

LOCATION – IMU Stateroom East

Charrette Schedule: Wednesday, December 2

7:30-8:00 a.m. Breakfast Snacks (coffee, baked goods, juice)

8:00 a.m. Participant Sign-in and Focus Group assignment

8:30 a.m. *Welcome:* **Bill Brown**, Director of Sustainability, IU

Opening Address
8:40-9:00 a.m. **Tom Morrison**, Vice President of Indiana University

Introductory Remarks
9:00-9:10 a.m. **Bill Brown**, Indiana University: *Campus Sustainability Goals and Objectives*
9:10-9:30 a.m. **Bob Richardson**, IU Senior Associate Architect: *The New Campus Master Plan*
9:30-9:45 a.m. **Bruce Jacobs**, Executive Director, Indiana Memorial Union*: Mission and Goals of the IMU, Goals for Eco- Charrette outcome*
9:45-10:00 a.m. **Jeff Kaden**, **Charlie Madsen**, *LEED NC Buildings, Renewable Energy Grant, Energy Master Plan, and the Energy Service Contract*

10:00 a.m. Introductions and Orientation of Events
Daniel Hellmuth, Hellmuth + Bicknese Architects
Michael Arny, Leonardo Academy

- *Team Backgrounds*
- *Goals and Objectives of Agenda*
  - *Foster connections between:*
    - *Big picture goals and plans*
    - *Big picture sustainability goals and plans*
    - *Use of LEED-EB OM as a practical tool for driving and tracking sustainability implementation though the IMU and other existing buildings on campus*
- *Review Schedule of Events*
- *Campus Sustainability, Greening of the IMU as prototype, STARS*

Kristen Simmons. USGBC Campus Campaign Sector
LEED-EB OM as tool for Campus Greening, LEED-EB O&M Volume-Build and Campus Application Guide (currently in Pilot)

10:45 a.m. Break

11:00 a.m. Sustainability Focus Areas

- Review summaries provided of sustainability actions and planning in each focus area for the campus, the IMU, and the city
- Add any sustainability actions or planning that are missing from the summaries provided
- Identify sustainability goals beyond those addressed in current actions and planning

12:00 p.m. Lunch - Location: Coronation Room (private room off the Tudor Room)

Break Catch-up time for those out of the office, etc.

1:30 p.m. **Karen Hanson**, Provost and Executive Vice President

1:45 p.m. Whole Group Brain Storming/Visioning Session
A rapid gathering of ideas on flip charts, spending 10 minutes on each topic

(1) What are the big picture objectives of IMU:
   a. Role in campus and city life
   b. Role in campus and city sustainability
(2) Possible actions for advancing achieving IMU objectives
(3) How can implementing LEED-EB O&M contribute to achieving IMU objectives
(4) How can beyond LEED-EB O&M Sustainability Actions contribute to achieving IMU objectives
(5) How can IMU actions contribute to campus and city sustainability
(6) How can Campus and city contribute to IMU sustainability

3:00 p.m. BREAK

3:15-4:15 p.m. Report out of Findings: Focus areas, Brain storming / visioning session

4:15-4:30 p.m. **Dan Hellmuth**, *First Day Wrap-up and discussion of findings*
Preview of tomorrow's Schedule and Goals

5:00 p.m. Optional networking opportunity at famous Nick's English Hut, established in 1927. (two blocks west of IMU on Kirkwood Avenue) www.nicksenglishhut.com

Greening the IMU

Eco-Charrette

INDIANA UNIVERSITY
BLOOMINGTON

Charrette Schedule: Thursday, December 3

7:30-8:00 a.m. Breakfast (coffee, bagels, donuts, fruit juice)

8:00 a.m. Participant Sign-in Group Assignment
Restructure small groups based on a LEED-EB OM Categories

8:30 a.m. Introductions and Schedule of Events
H+B
Other Facilitators

9:00 a.m. Introduction LEED-EB OM & Presentation of Draft LEED-EB OM Checklist
Michael Arny, Leonardo Academy

9:30 10:30 a.m. Small Group Break-Out Session
Sort groups into **five** categories based on LEED- defined subject areas. Groups will be:

- Sustainable Sites
- Water Efficiency
- Energy and Atmosphere
- Materials and Resources
- Indoor Environmental Air Quality.
- Note: Each group can address Innovation in Design, the sixth LEED category

MARK UP Draft LEED-EB O&M WITH THE FOLLOWING:

- For Each Credit
  - Practical level of achievement
  - Stretch level of achievement
  - Ideas for path to stretch level achievements
  - Which credits are likely to be addressed with:
    - Standard Approach Credits that are used campus wide (Prototype Credits)
    - Credits earned on a campus wide basis
    - IMU Specific approach

10:45 a.m. Small Group Report Outs and Feedback
Each group shares highlights of results of small group discussion of credits in each credits
Groups share highlights of their discussion in each credit category along with findings from the small group break-out session on goals, objectives, and solutions for their focus areas.
Feedback and open discussion follow each presentation

Wrap Up, Michael Arny and Facilitators
General evaluation of IMU status relative to LEED-EB O&M requirements. Identify next steps towards sustainability and LEED-EB O&M implementation and certification process

11:45 a.m. LUNCH Location: Federal Room

12:45-1:00 p.m. **Michael Arny/ Dan Hellmuth**, *Transition from LEED-EB O&M to Design Exercise, Design Parameters and Goals of Charrette*

1:00-3:15 p.m. IMU Design Charrette (Program developed from first day of charrette)
Concept design for the IMU in light of Campus Sustainability issues, Campus Master Plan, LEED-EB O&M Requirements

3:15-3:30 p.m. BREAK

3:30-4:00 p.m. Presentations by SPEA V550 "Sustainability Leadership" class

4:00-4:30 p.m. Presentation of Concept Designs

4:30-5:00 p.m. Overall Eco-Charrette Wrap-Up, Final Remarks, Next Steps

Closing Remarks and Statement

IMU Steering Committee
Facilitator Closing Comments: Thanking Participants, Hosts, and Charrette Team

Charrette sponsored by Duke Energy Foundation

Duke Energy

GREENING OF THE INDIANA MEMORIAL UNION ATTENDEE LIST

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GREENING OF THE INDIANA MEMORIAL UNION ATTENDEE LIST

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FOCUS AREA EXERCISE
DAY ONE: DECEMBER 2ND, 2009 (MORNING SESSION)

The focus area exercise has been organized in this Appendix as follows:

1. The first portion of each of the eleven focus areas includes background information put together by the Hellmuth + Bicknese for use during the charrette.
2. The second portion of each focus area includes the combined transcripts from all of the six groups. The transcripts have been combined this way due to space constraints.

GREEN CLEANING, OPERATIONS & MAINTENANCE

- Current Initiatives Campus-wide
- Ideas for broadening initiatives
- Financial Impact
- Landscape Waste
- Pest Management
- Green Chemistry
- Snow Removal
- Equipment
- Parking Lot Maintenance
- Exterior Site Maintenance (Striping Parking Lot, Repainting Benches, Etc)
- Building Maintenance (Interior And Exterior)
- Window Washing
- Exterior Cleaning

Campus Sustainability Report (2008)

- Integrated Pest Management (IPM)In 2000, in response to multiple requests for information about IUB's pesticide use, Environmental Health & Safety initiated an effort to consolidate information regarding pest control.
- Starting in 2000, groups on campus in charge of pest management had already started to move in the direction of using less or eliminating some pesticides, using lower toxicity chemicals and utilizing more targeted applications. Many of the University's pesticide applicators had even had training in Integrated Pest Management techniques as part of their continuing professional education and license renewal process.
- Green Chemistry: Opportunities in both research and non-research settings at IUB. Green chemistry includes the elimination, reduction, and substitution of products to lessen the effects of chemical usage or associated waste.
    - Chemical management/ inventory systems
    - Green teaching and research labs
    - Green cleaning
    - IPM

A campus-wide chemical inventory systems can track and better utilize chemical usage. IUB was developing such an inventory system under the MAXIMUM initiative as of 2008.

IMU Focus

- Business Model for Janitorial Services, Building Exterior Cleaning:
    - Janitorial services are IMU staff directly, not out-sourced.
    - IPM services for IMU are contracted internally for the IMU.

- Green Cleaning Products
    - Many cleaning products used at IMU (and residential halls) are one of the following:
        - Green Seal Certified Environmental Choice certified, and/ or biorenewable.

Images above depict various environmentally- effective operations and maintenance practices that might be implemented at IMU to meet LEED credit requirements and increase sustainability at the facility. Clean cleaning, low-impact snow removal, and composting yard waste are just some examples of greener practices.

Greening the IMU

Eco-Charrette

FOCUS AREA EXERCISE TRANSCRIPT (All Group Responses)
DECEMBER 2ND, 2009

Additional Background Information (Missing From Narratives Provided)

- Reduced pesticide usage by 96% by going to IPM
- Does the campus have a sustainable pool of products from which to order?
- Need inventory of what chemicals are present on campus. Status of the chemistry database?
- Separate staff does hotel housekeeping and maintenance than the rest of IMU. Sodexo does dining area cleaning and another staff does the remainder of IMU. Three cleaning staff groups at IMU must be coordinated.
- Need to inventory use of chemicals annually.
    - Stormwater- plan does this already for exterior inputs.
- Green cleaning practices on campus need coordinated & integrated policy for auxillary, athletic, & PP staff
- Is the IMU policy consistent with LEED goals? If not, what must change?
- Laundry & hotel options- lower water use, green detergent, reduced laundry of linens.

Sustainability Goals (Beyond What Is Currently Practiced)

- Volunteer "own a section" snow removal
- Need for Broad over-arching policy for procurement at IU for all departments
- Need a sustainable cleaning policy for IMU
- Currently some green cleaning products used, but not most of them- expand green cleaning products used
- Laundry, linens, housekeeping (hotel-green hotel services).
    - Some green cleaning/ detergents currently used, but could improve.
- Green shampoos, soaps, lotions in hotel rooms.
- IPM- Adopt IPM more fully? Push the envelope
- Green Cleaning- Adopt Green Seal certified cleaning products.
- Stormwater- too much pavement; rain gardens, naturalized areas, street sweeping.
    - Salt use?
- Hotel bathroom linens- next step, put some rods needed to allow towels to hang dry, etc.
- More research into chemicals used
- Need choices of different products to buy
- Touch-free paper towel dispensers- HP replace
- Recycled content paper towels
- Exterior Cleaning: Snow & ice removal
    - Make sure chemicals are eco-friendly
- Needs to be campus-wide

Gap Analysis (Disparity Between Current Practices And Listed Goals)

- Perception of high standards in hotel + food services- Educate guests so that they understand the sustainability measures and why the changes are made.
- Not too much at IMU- the rest of the campus have some catching up to do.
- Complete chemical inventory.

Cost Analysis (Estimated Financial Impact To Meet Goals)

- Potential for loss of money if guests expectations Are not met. Guests can be particular about expectations. Not expensive in light of other sustainability efforts.
- IMP- saves on pesticide costs; maintenance might cost more for labor.
- Green Cleaning-Lessens cost also if increasing tolerance, mostly cost neutral though.
- Minimal cost, but repeated through hotel.

Assessment (Final Thoughts Summarizing Discussion)

- Difficult to educate. Expand education to all users of the building. Hotel guests, students, staff, employees, etc. Start with a policy for campus and IMU.
- Need to do a better job of measuring it. Metrics, i.e., input to output and benefits. Need to keep up with new technology. A moving target.
- Great effort that may need some minor tweaking.

Greening the IMU

Eco-Charrette

INDIANA UNIVERSITY BLOOMINGTON

CAMPUS SUSTAINABLE FOOD OPERATIONS

- Current Initiatives Campus-wide
- Local Food
- Fair Trade
- Composting
- Certification
- Tableware
- Energy-star appliances
- Water use

Campus Sustainability Report (2008)

Food Objective: To promote high-quality dining options for IUB's students, staff, faculty that support sustainable agricultural & food distribution practices while minimizing energy use & waste generation.

Sustainable Food Model Focus

1. Sustainable food production and delivery.
2. Reduction and recycling of packaging materials and food waste.

The model incorporates current food carbon footprint for use as benchmark, examines feasibility of an edible permaculture plan for campus grounds, and explores ways to promote the food model to students, staff, and faculty.

Short-term Recommendations

1. Develop and support relationships with local vendors of locally- produced foods.
2. Appoint a Sustainable Food Coordinator.
3. Create comprehensive plans to reduce packaging on food ordered for campus dining halls, and recycle all unusable packaging materials.
4. Create comprehensive plan to reduce food waste & recycle remaining waste.

Long-Term Recommendations

1. Support a farm-to-college initiative to produce food for campus dining halls and to create food production learning experiences for students.
2. Establish a regular farmer's market on campus that would accept meal points.
3. Establishment of an edible permaculture project on open areas of the campus.
4. Instituting a series of cooking shows aimed at students to be distributed through IUTV network.
5. Monitor campus dining halls food carbon footprint.

Campus Practices & Success Stories

- Campus Food Stores Ammonia Elimination- In 2004, IU decommissioned the ammonia based cooling system associated with Campus Food Stores.
- Refrigerators & Freezers - The Utilities Division on the Bloomington Campus currently uses R- 123 refrigerant for its seven chillers, which is less toxic than the previous refrigerant that was used, although there is some capacity reduction that has been associated with switching to R-123.

Campus Focus

- Produced a guide for local growers wishing to sell to IU, explaining step by step process of becoming vendors.
- Purchased products from The Apple Works, Scholars Inn Bakehouse.
- Local distributor, Troyer Produce, has agreed to accept local produce and package for redistribution to IU.
- Have purchased apples, chicken, and bagels locally.
- Some organically grown or produced food (convenience store).
- Vegan entrees are offered.
- Some fair-trade coffee, hot chocolate mix.
- Re-useable and disposable dishware offered.
- Discounts offered for refillable beverages.
- Donate some food to shelter, Hoosier Hills Food bank.
- 15% waste diverted from landfill (2009).
- Recycling: paper, plastic, glass, cardboard, aluminum, & cooking oil.

IMU Focus

- Business Model for Cafeteria Operations: Sodexho-Marriott
- Current Practices at IMU include:
  - Pre-consumer vegetable scraps from kitchen preparations are collected in red bins for reuse as food for local farmer's pigs.
  - Pilot composting program at Kiva.
  - Old equipment is being replaced with Energy Star rated products as needed.

ENERGY STAR

Greening the IMU

Eco-Charrette

INDIANA UNIVERSITY BLOOMINGTON

FOCUS AREA EXERCISE TRANSCRIPT (All Group Responses)
DECEMBER 2ND, 2009

Additional Background Information (Missing From Narratives Provided)

- Three Food Service Operations at IU: 1. IMU (Sodexo) 2. RPS (Self- Op) 3. Stadium (Self-op)
- Private Vendors- Branded- loss of control.
- Composting pilot project at Collins Residential Hall.
- Styrofoam still used at IMU and plastic.
- Some compostable ware, but no composting bin.
- Is there any small farming curricula?
- Local growers guide has been written by no one meets criteria currently.
- Local Wednesday at the Tudor Room
- Offering locally produced meats (Fisher Farms) in some of their dining options.
- New eco-friendly coffee at sugar & spice.
- Significant partnerships exist (suppliers).
- Empty lot on (8th & Fess) turn it into a sustainable source.
- More information on what is currently being used.
- In house bakery.

Sustainability Goals (Beyond What Is Currently Practiced)

- Campus food policy needed.
- Combine food services to minimize confusion and form policy.
- How do you police branded vendors.
- Composting/ campus wide.
- Silverware-washing and hot water use considerations.
- Develop curricula for food education, produce, farming.
- Establish a farmers market on campus certain days of the week (vendors could sell pre-prepared foods to appeal to students that live in dorms with no kitchens).
- Make kitchen ware (napkins, utensils) less available to avoid wasteful usage.
- Reduce packaging on take out food, Green packaging, Coordinate composting and packaging with vendors (Starbucks), Eliminate plastic/ Styrofoam.
- Expand composting on campus.
- Continue to expand local food options, Additional “local” food options.
    - Track food & try to meet the 25% LEED-EB credit.
    - Herb Gardens- low-maintenance & can supply campus kitchens.
    - Promotion of unusual sources of farming.
    - Work on availability of local source to reduce costs.
- Additional recycling efforts to reduce waste.
- Student involvement with food production.

Gap Analysis (Disparity Between Current Practices And Listed Goals)

- IS recycling + food preparation practical? Is washing reusable table ware more sustainable than recycleable/ disposable (after energy and water use).
- Liability issues with small farms/ organic produce.
- Question asked: How does IMU ensure to keep the customer?
- Expand student meal points (RPS) to be used at IMU?
- Reduced or green packaging.
- Capacity of locally grown food, is there enough?
- Integrate SPEA business model by KSOB.

Cost Analysis (Estimated Financial Impact To Meet Goals)

- Farmers market- Blooming Foods- IMU
- Local growers can’t meet criteria.
- Repackaging costs.
- Local food more expensive.

Assessment (Final Thoughts Summarizing Discussion)

- Local Sourcing- Local contact might be Jeff Meese at Lennie’s (Lennie’s is a restaurant in town which uses local foods, and composts everything.
- Education importance as a resource. Advertising Kiva and Local Wednesday more. Make it more visible.
- Continue to develop local food sourcing and look further at packaging.
- What are other schools doing?

Photos *(bottom left to right, clockwise)*: A food recycling program is currently in place at IMU- Food waste such as bread, cake, and cookies are collected in large bins and picked up by a local pig farmer to feed his stock. Kiva, a cafe located in the IMU serves vegan, vegetarian, and some local food options. A vegetable and fruit compost program reduces food waste at IMU. A poster highlighting the breakdown of food into compost hangs in the kitchen of the IMU.

Greening the IMU

Eco-Charrette

INDIANA UNIVERSITY
BLOOMINGTON

CAMPUS ENERGY

- On-site Renewable
- Building Integrated Renewable Energy
- Off-site Renewable (on Campus)
- Central Plant Operation
- Green Tags/ Green power
- Energy Efficiency
- Energy Star Benchmarking
- Energy Competition
- Metering Infrastructure

Campus Sustainability Report (2008)

Energy Objective: To raise awareness of IUB's energy use among faculty, staff, and students, and implement strategies to maximize the efficiency of the on-campus production and distribution systems as well as reduce energy consumption and greenhouse gas emissions.

- Develop integrated energy master plan (Investigate potential for solar water heating, feasibility of PV, wind and/ or biomass, setting goal for GHG emissions, etc).
- Identify Qualified energy Savings Projects for Bloomington campus, targeting HVAC, lighting, and building envelope improvements that have 10-year or shorter payback.
- Develop campus-wide guidelines for computer use, incl. power-saving features for all personal computers, shutdown of all printers, and peripherals, enhanced video-conferencing to reduce travel.

Upon completion of a thorough GHG inventory, IUB can implement projects identified in the energy master plan including:

- Reduced energy consumption (load management through building renovations that include window and roof replacement, better building insulation and improved utility distribution systems, retro-commissioning of existing buildings).
- Utilization of renewable energy sources- e.g. solar water heating and photovoltaic electric production
- Evaluation of distributed energy production facilities.
- Investigation of biomass fuel for the central heating plant.
- Purchase renewable energy credits.

Summary Of Energy Use At IUB

- The majority of buildings on the IUB campus are heated with steam produced at IU's coal and gas fired Central Heating Plant. Condensate, produced from the release of steam energy within each building, is returned to the plant, treated, and re-heated and redistributed as steam to the campus. Electricity used on campus for lighting and power is purchased from Duke Energy, delivered to campus at 12,470 volts, and distributed from 2 main switching centers. All electricity is metered at the building level, but improvements are needed. All campus cooling systems are driven by electricity.

- All major buildings on the IUB campus are connected to the Physical Plant Control Center, an office responsible for the monitoring and control on a 24-7-365 basis. The computer control system allows remote monitoring and control of more than 20,000 points of control for heating, cooling, lighting, ventilating, and pumping system.

- Modern direct digital control (DDC) allows operators to troubleshoot problems from a remote computer terminal, modify set points for heating, cooling or ventilating, and establish relevant trends. Computer controlled HVAC systems have proven to be a very reliable method of energy management. DDC controls will continue to be the desired method of HVAC control in the construction of all new buildings and renovations of existing buildings.

- Indiana University is in the process of renovating the Central Heating Plant (CHP) on the Bloomington campus. The $34 million project will include the upgrade the emissions controls and be accomplished in three phases.

- Initial inventory of GHG emissions from 1990 to 2007 using the Clean Air Cool Plant Campus Carbon Calculator was collected in the summer 2007. According to the inventory, IUB consumed 4,511,319 million BTU of energy and emitted 418,043 metric tons of CO2 equivalents.

- Central Chilled Water Plant (CCWP) located at E. 13th and N Woodlawn.

- Central Heating Plant (CHP)

- Electricity: Duke Energy

Campus Focus

- Emails are sent to all Building Representative and Building Services Supervisors to turn off unused lights.
- Energy & water conservation contests between dorms & Greek houses held in April.
- BTUs Derived from each fuel source (2009).
    - *o* Coal: 81.9% Natural Gas: 17.9%, Oil: 0.2%

Greening the IMU

Eco-Charrette

INDIANA UNIVERSITY
BLOOMINGTON

IMU Mechanical Systems

The IMU is delivered chilled water from the campus chilled water system. It receives steam from the campus steam system, and has meters on the steam loop. The steam is converted to hot water in (2) different mechanical rooms within the building.

Roughly 85% of the building is served conditioned air via a dual duct air handling system. There are numerous mechanical units located throughout the building that serve the zoned dual duct boxes. The West Tower is served via 4 pipe fan coil units that are controlled by the Siemens BAS.

There is a mix of building controls between pneumatic, Siemens, and Johnson Controls. Two 20 HP air compressors serve the pneumatic controls system for the building. Roughly 25% of the building is served by the pneumatic control system. The Johnson Control system controls the 48 hotel rooms and 1 air handling unit. A small portion of the mechanical systems are only locally controlled and these occur at the West end of the building.

IMU Focus

- Business Model for Energy and Water Efficiency: IMU Business Model.
- IMU does not pay for utilities other that the small amount of gas that it uses.
- Update Building Controls
- Lighting Controls
- Review dual duct system
- Energy recovery options
- Increased efficiencies of equipment.

While some energy-saving measures involve infrastructure upgrades others involve changing people's behaviors. *(Left to right, top to bottom):* Reduce temperature while rooms are unoccupied, use energy-efficient light bulbs, solar hot water panel to heat water, install occupancy sensors that turn lights on and off as needed, PV panels on roof generate energy on site, automatic shut-off programs reduce energy used by computer monitors, encourage employees to unplug unnecessary electronic equipment to conserve energy.

Duke Energy®

Duke Energy is the local utility company that supplies electricity to Indiana University.

Greening the IMU

Eco-Charrette

FOCUS AREA EXERCISE TRANSCRIPT (All Group Responses)
DECEMBER 2ND, 2009

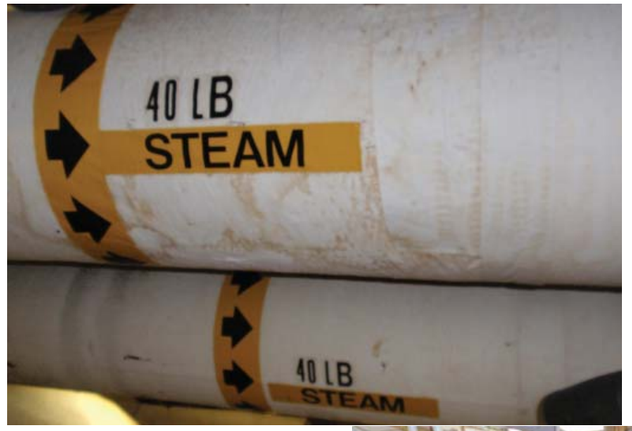
ENERGY CONTINUED

Additional Background Information (Missing From Narratives Provided)

- Metering- Is it working + measurable into sub-metering?
- Infrastructure change- IMU (condensate not metered or not accurate).
- Devin Hartmon- Intern on Renewable Energy Sources.
- Can IU Control center view, monitor, and control HVAC?
- Set point control for common areas.
- Noise and comfort control issues in the hotel.
- Peak use data.
- Sub-metering data.
- Other campuses signing on to make campuses carbon neutral.

Sustainability Goals (Beyond What Is Currently Practiced)

- Campus policy needs to require that all buildings be separately metered at the building level.
- Reduce consumption.
- Resource change- from coal to natural gas.
    - PV and/ or solar hotwater.
- Light sensors.
- Install submeters.
- Use condensate more efficiently (98%).
- Reduce GHG (all heating & cooling is fossil fuel based).
    - Look at integrating energy sources with lower GHG impact (natural gas) or renewable central plant technologies.
- Introduce incentives for conservation (department billing).
- To help facilitate behavior change focus on a visual student/ staff education component.
- Sub-metering- Opportunities for revenue from private food service firms.
- Benchmark IMU energy vs. Target Finder/ EPA/ Energy Star Portfolio Manager.
- Peak use control plan.
- Energy lobby information panels (digital signage).
- Set energy use goals.
- Install 20% solar thermal & PV on campus by 2020
- More opportunity for energy efficiency than on-site renewable energy.
- Occupant sensors- especially in conference rooms.
    - In hotel: Have to use key to turn lights.
    - Wall mount electric started with swipe key.



The series of photographs show some systems at IMU.

Greening the IMU

Eco-Charrette

Gap Analysis (Disparity Between Current Practices And Listed Goals)

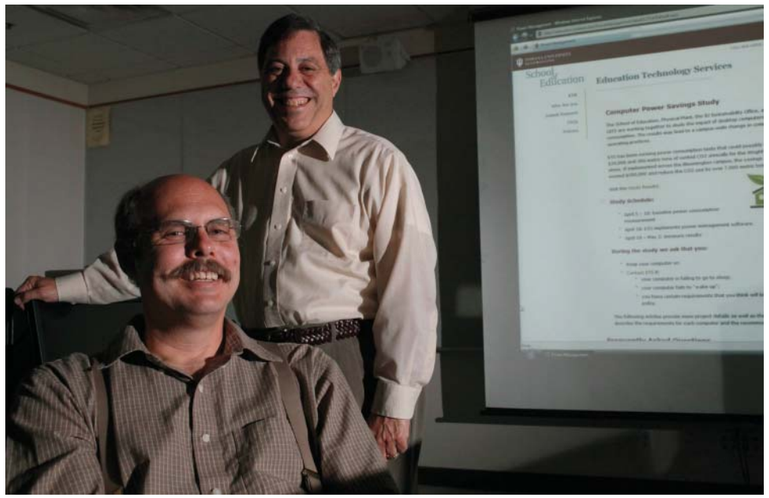
- Is reduction “better than” resource change?
- Further work of develop Renewable Energy sources & alternatives per current energy plan.
- Display energy & utility info throughout building.
- Display energy & utility info throughout building.

Cost Analysis (Estimated Financial Impact To Meet Goals)

- Lots of possible choices + associated costs are varied. Difficult assessment.
- Today energy conversion is expensive. Education & accountability is lower cost.
- Large investments in HVAC- disruptive.

Assessment (Final Thoughts Summarizing Discussion)

- IU has plans in place to further investigate/ implement goals. Education & accountability is critical.



Larry Riss and Steve Schunk saw significant energy savings from putting computers into “sleep mode” when they were not in use. The IT department at IU has made some good steps towards better energy usage on campus. *Photo Credit: IU Photography*

Indiana University’s Central Heating Plant (top) was renovated in 2009 to function more efficiently. New boilers and filters along with lime and carbon-flue gas injection systems reduce emissions and particulate matter that pollute the atmosphere.
Photo Credits: IU Photography

Greening the IMU

Eco-Charrette

INDIANA UNIVERSITY
BLOOMINGTON

CAMPUS TRANSPORTATION

- Bike Pedestrian Access (broader trail connections)
- Bus Connections (public, campus routes)
- Parking (scooter, car pooling, alternative fuel)
- Car Sharing
- Zip Car, ZipRide
- Bike Rental Program

Master Plan Vision

- Focus growth around Campus Core.
- Discourage Remote Development.
- Increase reliance on Pedestrian Circulation.
- Improve Bicycle Access Infrastructure (although popular, the infrastructure is not very well developed leaving lots of room for improvement).
- Improve Parking Infrastructure.
- Improve Transit Ridership.

<u>Woodlawn Avenue</u>
Develop a new vehicular, transit and Pedestrian circulation corridor along North Woodland Avenue from East Seventh Street to IC Athletics Neighborhood. This can become the ceremonial pedestrian walk from the Core Campus to neighborhoods north of the railroad corridor.

<u>East Seventh Street</u>
This corridor becomes the Academic and Cultural Main Street of Campus.

<u>Other Areas</u>
Existing Surface Parking Lot occupies critical visual zone on campus creating a “character gap.”

100% Corner is just to the NE of the IMU at the surface parking lot and could become the central gathering space for campus.

<u>Gap Issues</u>
Location of new parking.
Maintaining Revenue Stream for IMU Operations.

Campus Sustainability Report (2008)

TRANSPORTATION OBJECTIVE: To promote a sustainable transportation systems that will provide safe access and mobility for students, faculty, staff, and visitors, and to ensure that individuals have a broad range go safe and convenient transportation options to walk, bicycle, carpool, or ride public transit to and around campus.

1. Enhancing efforts to support alternative transportation options for IUB commuters by emphasizing alternative modes of transportation in long-term planning. Increased us of transportation Funds to support sustainable transportation options
2. Developing policies that improve pedestrian travel options within and to the IUB campus by: working with city officials to improve walking routes, developing incentives to encourage faculty, staff, and students to live within walking distance of campus; improving communication about pedestrian walkways to and throughout campus
3. Developing bicycle policies that supports bicycle travel options by working with city officials to improve the bikeways into campus, and to ensure that they connect easily to bikeways within the campus, improving the bike “infrastructure” on the campus, including a comprehensive plan that would include improved bike routes ,etc.
4. Developing bus policies that support public transit options. Establishing dedicated bus lanes, opening 7th street to buses, bikes, pedestrians, improving bus routes. Study Stadium Park & Ride, etc.
5. Developing parking policies that provide incentives that reduce single-occupancy while travel to, from, and on campus, including modifying parking fees to encourage flexible parking pass options, and subsidizing employees who regularly commute to campus.

IMU FOCUS

- Business Model for Access to the IMU Hotel and Conference Center.
- IMU is one of the most frequented buildings by bicycle.
- Employee Parking Issues at the IMU.
- Non-Employee Parking Issues at the IMU.
- Getting to the IMU easier by bike and by foot.

INDIANA UNIVERSITY
BLOOMINGTON

FOCUS AREA EXERCISE TRANSCRIPT (All Group Responses)
DECEMBER 2ND, 2009

Additional Background Information (Missing From Narratives Provided)

- 7th street extension not possible: building/ park prohibit 23,000 off campus students
- Integrated city/ campus bus
- Anyone can ride the IU campus bus for free. All people with a IU pass can use Bloomington transit for free.
- Does campus want cars at all?
- Is bus system necessary?
- What is handicap/accessible mobility strategy?
- What is emergency vehicle & maintenance vehicle strategy?
- Parking to permit community/ guests of IMU
- George Smerk- Developed walking plans- use bus
- # bus miles for students, # bus miles for faculty/ staff- metric is available, is it shared?

Sustainability Goals (Beyond What Is Currently Practiced)

- Improve Transit System: IU/ Bloomington Transit Interface.
- Expand transportation Options: Work with city to build housing near campus and expand park-n-ride.
- Transit station- multimodal potential at Union potential to Union use/ access.
- IU Intermodal Transit facility as a complimentary facility to Bloomington's new transit facility.
- Trolley
- Incentivise a "No Car Policy" for students, No new parking spaces.
- Change habits: Expand Dorm vs. Dorm competitions to promote behavior modification.
- Dedicate bike paths, protected parking.
- Parking is major concern, especially at the IMU.
- Covered bike parking.
- Install water stations dispersed throughout campus for bikers.
- Shuttles for events.
- Bike sharing system (swipe credit cards or student IDs to check out bikes).
- Prioritize: Pedestrian – Bikes – emergency vehicles- maintenance vehicles- vehicles- parking.
- Front entrance converted to pedestrian focus- accommodates vehicles.
- No free parking prevent parking pass reimbursement by school.
- Bus route does not support student needs.
- Buses don't go to all academic buildings (handicapped mobility support?).
- Transportation hub for out-of-town traffic (visitor center).
- Smarter parking & mass transit- multimodal focus.
- Restrict car use for freshman students: not issue for students.
- Identify barriers as to why we don't use bus; Promote existing resources.
- Current bus is not eco-friendly.

<u>IMU as alternative transportation hub</u>

- Bicycle, smart bikes, swipe, Zip cars.
- Better bus stop.
- Trolley- small something fun, short rides.
- Multilane paths (bike, pedestrians, etc).

Gap Analysis (Disparity Between Current Practices And Listed Goals)

Parking very important for IMU bottom line.

Assessment (Final Thoughts Summarizing Discussion)

Can be implemented at little cost by working into long-term plans.

(Top to bottom, clockwise): The IU Campus Bus is a great form of transportation near campus, students who ride their bikes to class will benefit from the proposed future bike paths in the campus master plan, walking to class is the most environmentally effective (and often the fastest) way to get around on campus.

Greening the IMU

Eco-Charrette

INDIANA UNIVERSITY
BLOOMINGTON

CAMPUS SITE WATER CONSERVATION PLAN & CONSERVATION STORMWATER MANAGEMENT

- Conservation Stormwater Management
- Watershed Information
- Stream and Wetland Information

Master Plan Vision

Connect Woods, streams and other key habitat to larger preserves.

Jordan River

- Most prominent natural feature on campus.
- Common thread through campus core.
- Connection to town and Griffy Lake area.
- Serves as Habitat Corridor.
- Align " March" with Jordan River Promenade.

Conservation Stormwater Management

- Restore Ephemeral Stream Beds.
- Reduce Impervious Ground Cover.
- Increase Tree Canopy Cover.

Watershed Protection

IUB campus is located in the Lower East Fork White River watershed. A majority of local run-off drains into the Jordan River which bisects the southern part of campus, and continues though downtown Bloomington, merging with Clear Creek, which eventually empties into the East Fork of the White River. Bloomington watershed is part of the Wabash- Ohio-Mississippi River flowing eventually to the Gulf of Mexico.
Campus activities that influence watershed include:

- Construction Run-off.
- Roadway pollutants (salt, sand, other particulates).
- Air pollutants (transportation, burning of fossil fuels, etc).
- Pesticides
- Fertilizer
- Stream Erosion

Jordan River Restoration

Environmental conditions in the river have improved in recent years. Beginning in 2000, discharges from the campus central chilled water plant have been rerouted to sanitary sewers and away from the Jordan; manhole covers near the river have been locked down; buffers around the river have been created, where fertilizer and pesticide treatments are forbidden. However, major rainfall events, periodic spills, sand salt and other road particulates, clippings from lawn maintenance, among other stressors, have taken their toll on the river ecosystem.
A number of projects have been proposed to rehabilitate the Jordan. All of the efforts would serve to decrease flow variability and enhance water filtering effects.

IMU FOCUS

- Stream conditions by IMU.
- Gutter & Downspout Location and inter-ties.
- Parking Lot Design.
- Stormwater Quality & Quantity Control.

(Top photo) A rains garden is located in a parking lot instead of conventional plant islands which helps clean and replenish the water table. *(Bottom photo)* Shows water used for landscape and turf. IMU currently only waters a very small portion of their turf which could be turned off completely to reduce water use on site.

INDIANA UNIVERSITY
BLOOMINGTON

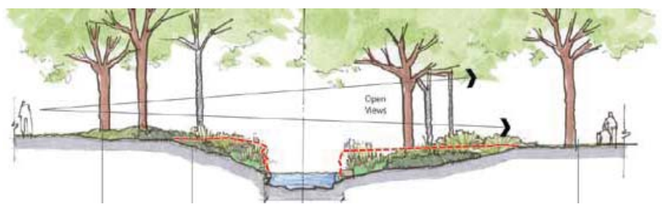
FOCUS AREA EXERCISE TRANSCRIPT (All Group Responses)
DECEMBER 2ND, 2009

Additional Background Information (Missing From Narratives Provided)

- Flooding issues along Jordan River.
- No combined sewers on campus.
- Proximity of bedrock to surface.
- Additional information about how buffers around the river were created.
- IU has a VAC TRUCK that is used for hardscape already.
- IU has filter bags on 100 inlets.
- Identify what area directly flows to stream, what area is tied to stormwater system.
- What IU is prepared to commit to problem: Land/ Greenspace, Money, Maintenance, etc.
- Get more specifics on sources, piping.
- Grow own plants in greenhouses.
- Nathan- Flooding pictures
- Office of Environmental Health & Safety (Michael Dorbett).

Sustainability Goals (Beyond What Is Currently Practiced)

- Add filter strip along both sides of Jordan River & use native plants (restoration).
- Use porous pavement where possible (May not be possible due to Bedrock).
- Disconnect downspouts & run access to rain gardens, or native areas or harvest rainwater for reuse.
- Integrate trees into stormwater management.
- Reuse chilled water discharge instead of sending to combined sewer.
- Lawn Management
- Water Quality Volume(WQV) Treatment using green infrastructure prior to discharge from "pre-development site". Reducing flash flooding on the Jordan River and improving water quality and wildlife habitat Meeting both credits for LEED and IU Master Campus Plan.
- Disconnect downspouts from buildings.



The photo shows the existing consitions of the Jordan River at Dunn Meadow, near the IMU. The drawing illustrates the proposed Jordan River Restoration.

<u>Suggested BMPs to meet goals:</u>

- Offline "Detention", Floodplain creation/ riparian corridor, landscaping, Rain Gardens, Rains Barriers, Distributed Storage, Pervious Pavers, WQV Treatment prior to discharge.
- Convert Parking lots to greenspace.
- Plant Tress
- Eliminate Landscaping unless necessary (lawn clippings, fuel usage, etc).
- Convert parking lots/ hardscapes into raw gardens that students interact with.
- Jordan River- Make more natural and socially appealing.
- Micro-retention
- What is the look- paradigm shift.
- Change the landscape culture.
- Will not increase imperviousness of campus.
- 20% reduction in streams.
- Mia W.- Micro-retention along river corridor.
- Need calculations/ metrics for run-off.
- Reduce manicured landscape- make native.
- Detention/ Quantity Control.
- Treatment/ Quality Control.
- Jordan River restoration on the IMU site.
- Permeable pavement/ pavers.

Gap Analysis (Disparity Between Current Practices And Listed Goals)

- Long-term cost savings due to reduced maintenance (less lawn to mow).
- Currently, minimal BMPs on campus. However, helps meet IU Master plan requirements into the future.
- No control on most old areas.
- Failing river banks.

Cost Analysis (Estimated Financial Impact To Meet Goals)

- No direct cost increases (capital) if computed as part of redevelopment or restoration building project.
- Low cost for areas, slated for change under master plan.
- Other areas will have minimal design/ construction costs compared to conventional water treatments.
- Rainwater harvest- expensive/ can be done.
- $0.15 to $0.36/ square foot of area managed.

Assessment (Final Thoughts Summarizing Discussion)

- Everyone agrees Water quality and natural resource management is important for the culture at IU.
- Flooding is an issue.

Greening the IMU

Eco-Charrette

INDIANA UNIVERSITY
BLOOMINGTON

CAMPUS LANDSCAPING PLAN

- Irrigation
- Planting Standards
- Fertilization
- Pesticide and herbicide use
- Heat Island Parking
- Tree Plan, Campus Inventory
- Open Space, Habitat and Connectivity

Master Plan Vision

- Frits Loonsten championed indigenous planting, naturalized landscaping following Kessler's and Ohmsted brothers
- Focus on wildflowers and naturalized areas

Campus Focus

- 60-65% landscaping waste is composted or mulched annually
- Tree Planting plans to dramatically increase tree coverage

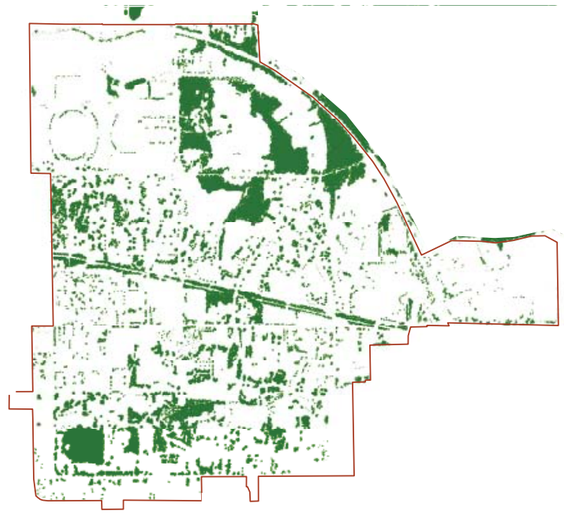
IMU Focus

- Business Model for Landscape Maintenance at IMU "site"

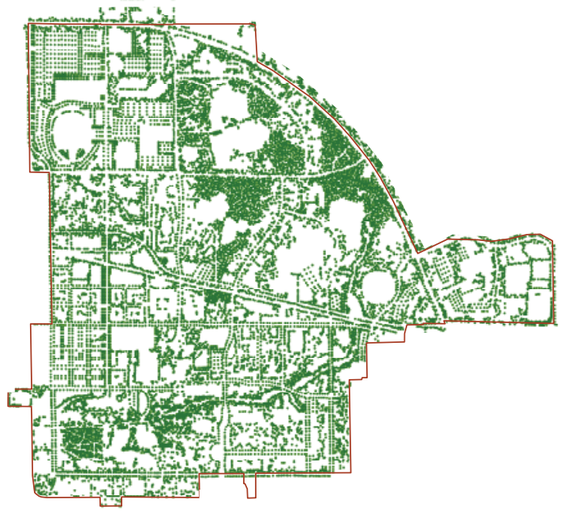
<u>Natural Areas near the IMU include</u>

- Dunn's Woods which anchors the Historic Campus Core and the Old Crescent
- Bryant Hollow
- Commemorative Garden at IMU
- Beck Chapel + Dunn Cemetery
- Sunken Garden

EXISTING TREE CANOPY: 20.4%



PROPOSED TREE CANOPY: 40.0%



(Top to bottom): Prairie restoration currently in progress at IU. Proposed tree canopy coverage to be doubled in 20 years as presented in the Campus Master Plan.

Photo credit: IU Photography

INDIANA UNIVERSITY
BLOOMINGTON

FOCUS AREA EXERCISE TRANSCRIPT (All Group Responses)
DECEMBER 2ND, 2009

Additional Background Information (Missing From Narratives Provided)

- Wetlands Report- Anya Hopple
- Native Prairie Restoration- Zach Brown & Marie Buckingham
- Jordan River Restoration
- Native Landscaping- Wes Kocher
- Campus focus- Double tree canopy
- What kinds of pesticides herbicides and fertilization used and how are these chemicals versed in sustainability goals?
- Percent of reusable plants such as bulbs or perennials, versus annual plants that cost to be replanted.
- Are mums or other perennials composted/ mulched when season is over or are they re-used next season, sold, or donated?
- Jordan River in Disrepair (along IMU site especially).

Sustainability Goals (Beyond What Is Currently Practiced)

- Change landscape specifications to require a minimum of 80% native on new installs/ renovations
- Rainwater harvesting for harvesting for landscape needs.
- Reduce turf grass for landscape needs to reduce use of unregulated emissions from lawn mowers; replace with natives & grasses & understory plants to increase groundwater infiltration; improve stormwater quality, reduced landscape maintenance.
- Increase native/ indigenous tree canopy.
- Naturalizing public spaces- changing aesthetic standards.
- Establishment/ restoration of riparian buffer.
- Functional landscape creation all improvements over time integrating stormwater management, water conservation, pedestrian connectivity, vehicular management, habitat restoration, safety, aesthetics.
- Education & signage.
- Chemical impact minimalizaion.
- Long-term invasive species management plan.
- Use groundcover that needs no mowing/ cutting such as low growing, aesthetically pleasing cover which lessens maintenance needs/ energy consumption.
- Seed grass instead of sod- more energy efficient.
- EX: Dunn Meadow after concert- much more than 60-65% of landscape waste can be reused. As for landscaping irrigation drains can be surrounded by grass or other low-lying plants to clean water chemicals/ impurities before drained.
- Student involvement with landscaping.
    - Give students sections to regulate, use landscape sections to do aesthetically-pleasing produce, overlap with university food practice and local/ campus food growth.

<u>Make Jordan River on South end of parking lot more natural for:</u>

1. Better stormwater management
2. New table & seating & eating area

- Restoration of Jordan River
- Irrigation from cisterns
- Make sure all plants are native vegetation
- Green roof or area for garden- practical landscape
- Rain gardens that double as herb garden
- Herbs along the Jordan River?

Gap Analysis (Disparity Between Current Practices And Listed Goals)

Some of these may be practices to an extent, but these practices can be pushed much further.

Cost Analysis (Estimated Financial Impact To Meet Goals)

Cost would actually be less because less work would be needed and plants/ shrubs wouldn't have to be changed as often.

Assessment (Final Thoughts Summarizing Discussion)

Campus can still be aesthetically pleasing without completely changing the landscaping every season.

Dunn Meadow is located near the IMU. It is a beautiful wooded area with meandering walk-ways to several buildings on campus.

Greening the IMU

Eco-Charrette

INDIANA UNIVERSITY
BLOOMINGTON

CAMPUS RECYCLING + SUSTAINABLE PURCHASING

Recycling

- Campus Policies
- Current Infrastructure and Logistics
- Bookstore
- Janitorial Supplies
- Waste Minimization Plan (goals)

Purchasing

- Brochures, maps, etc.
- General

Master Plan Vision

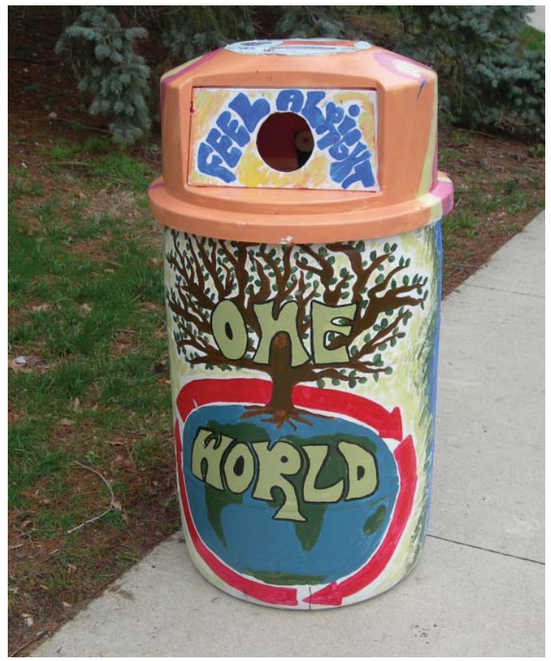
- Campus Sustainability Report (2008)
- Recycling/ Resource Use Objective: To raise awareness of resource use and recycling on the IUB campus among faculty, staff, and students, implement strategies to enhance campus recycling systems, and promote responsible resource use through green purchasing, conservation, and smart technology.
- Current Recycling includes: Paper, glass, aluminum, newspaper, and cardboard.
- End of Year Residence Collection.
- Surplus Store program generates approximately 300K annually.
- Green Purchasing policy promotes green office supplies, wood products from companies that have a “take an acre, replace an acre,” and do not purchase paper or products made from old growth forests.
- Residential Program Facilities (RPS), IMU, and Building Services currently recycle batteries. IMU collects batteries at the Custodial Office.
- Surplus Stores sells 90% of IU’s old computers to the general public. Those that do not sell are sold to Heritage Environmental on a per pound basis. Heritage recycles computers back to the market. All buyers of “bulk computer equipment” are required to certify that they will not sell any of the equipment to overseas operators.
- Construction Waste Management
- Enhancing IUB’s recycling efforts: including pilot outdoor recycling program and at athletic facilities, recycle bines for every room at residence halls, develop Greek and off campus recycling program, explore composting food waste generated at dining halls; explore unified recycling program at IUB- combine RPS and IMU recycling, establish concrete recycling (goal: 30% of waste diverted from landfill.
- Minimizing resource use: purchase high recycled content paper, recycling and conservation during residence move-in periods, and promoting the use and purchase of Energy Star appliances among students, faculty, academic departments, and operational units.

Campus Focus

- Over 50% of paper purchased is recycled paper.
- Batteries, cell phones, computers, light bulbs, printer cartridges, misc. E-waste are recycled.

IMU Focus

- Business Model for Recycling and Purchasing.
- Current Initiatives at the IMU.
  - In past 6 months recycling has almost doubled at the IMU requiring an additional collection day soon. Currently pay trash hauler to pick up once per week.
  - IMU recycles light bulbs.
  - IMU collects batteries at the Custodial Office.



Photos (left to right, clockwise): Red recycle bins at the IMU central recycling collection near the dock streamline materials from throughout the facility. Student decorated recycling bins are located in various locations on campus grounds. Finally recycling bins separated by material are located throughout the building.

INDIANA UNIVERSITY
BLOOMINGTON

FOCUS AREA EXERCISE TRANSCRIPT (All Group Responses)
DECEMBER 2ND, 2009

Additional Background Information (Missing From Narratives Provided)

- Food Service- within last year composting with local pig farmer.
- Coca- Cola fund- bottle sales vs. syrup.
- IU Systems applies to IUB.
- Outdoor recycling competition recently held.
- Internal Posting
- Discussion on purchasing specifications & standardization of products consumed at a building & campus level.
- How much duplication of products or inventory tales places, hoarding, etc?

Sustainability Goals (Beyond What Is Currently Practiced)

- Zero-Waste- IU drink containers; composting.
- Increase purchasing requirements towards sustainability.
- Coordinate recyclables in purchasing among various IU vendors.
- Creatively reconstitute the waste stream.
- Better inputs, fewer outputs.
- Buy from sustainability companies.
- Use innovative and effective products.
- Measure total impact- not just cost.
- Smaller and fewer dumpsters.
- Need outdoor recycling bins with a consistent look and aesthetic appeal.
- Get art students more involved in designing the look of the bins.
- Dining
- Involve Barnes & Noble
- Hotel Rooms Amenities
- Raise awareness (education)
- Consistency on recyclable, need trash container supplies to reduce packaging.
- Confirm that buyers do not sell computer parts overseas – reselling?
- Set goals for increasing recycled paper usage.
- Can consumables be replaced by reusables?
- Create campus wide, unified recycling program.
- Reconcile campus policy with city & county.
- IMU has a good program- Could be basis for campus.
- Occupant education
- Make it a policy not just practice.
- Policy that says any leased space has to follow building policy.

Gap Analysis (Disparity Between Current Practices And Listed Goals)

- Need consistent, standardized products throughout.
- Lack of education and accessibility to recycling bins throughout campus.
- Start at purchasing policy level. Establish someone to analyze standardization of products.
- No policy for purchasing, just recommended/ practice.
- Different policies from building to building.
- Missing information on how much – weight is being recycled.

Cost Analysis (Estimated Financial Impact To Meet Goals)

- Proper systems should be cost negligible if implemented properly.
- Medium
- Could be huge! As much as 15% of consumables- less waste.

Assessment (Final Thoughts Summarizing Discussion)

- Move Forward and standardize.
- Very important to offer adequate resources so people recycle.
- Requires life-cycle costing of products consumed.

Greening the IMU

Eco-Charrette

INDIANA UNIVERSITY
BLOOMINGTON

CAMPUS GREEN BUILDING POLICY

LEED NC

- Scorecards for current LEED Projects
- Green Building Standards

Master Plan Vision

- Commitment for all new structures to meet LEED Silver certification

Campus Sustainability Report (2008)

Built Environment Objective: To promote campus sustainability through innovation building design and engineering that promote functionality, safety, and energy efficiency while respecting campus culture and heritage.

1. Reduce energy density by 3% per biennium: By applying standards for high performance, energy-efficient building to all new and renovation projects. Energy modeling as a prerequisite for all construction projects.
2. Construct and renovate buildings to LEED criteria.
3. Develop a utility enterprise based on comprehensive metering program for all energy and utility sources, the campus energy production & distribution services should be run as an auxiliary enterprise. Establishment of a billing procedure would allow each academic & administrative department to become aware of their energy consumption. Ultimately: Incentives to fund energy- saving projects.

Regardless of age, most buildings on the campus (over 15,000,000 square feet of space) are clad in a fine-grained white limestone that is locally quarried. Consequently, issues of sustainability in the built environment are intertwined with architectural integrity and preservation.

Indiana University has developed building design guidelines based on the Construction Specification Institute divisions. These standards are intended to guide the design team toward the development and implementation of high-performance institutional quality facilities lasting 75 years.

The United States Green Building Council developed Leadership In Energy and Environmental Design Green Building Rating System to serve as a third-party non-profit performance measurement tool for sustainability in construction, operations, and maintenance in the built environment. Indiana University has adopted a campus-wide policy requiring all new facilities to be built to LEED- Silver standards or higher (if feasible).

Gap Issues

- New Construction only amounts to x% of the campus built environment. What should the Campus LEED EBOM commitment be?

IMU Focus

- National Registry of Historic Places (currently not listed).
- IMU as Pilot for other existing buildings on campus.
- IMU as prototype for International Student Union Association.
- Scheduled to replace & repair major parts of the roof in the next 5 years.

Greening the IMU could serve as a catalyst for further improvements in sustainability among Indiana University's existing and new building stock. The IMU can serve as a sustainability learning laboratory.

INDIANA UNIVERSITY
BLOOMINGTON

FOCUS AREA EXERCISE TRANSCRIPT (All Group Responses)
DECEMBER 2ND, 2009

Additional Background Information (Missing From Narratives Provided)

- Before renovating, the school must invest in the analysis necessary to perform targeted renovations.
- Energy production potential?
- Lighting! Geothermal Heat Sync?
- Target areas: Thermal Bridge in Envelope/ Roof
- Including historic fabric criteria in renovation plans to meet LEED criteria.
- Historic fabric evaluation of the IMU's interior fabric: Determining a zone classification basis the historic/ cultural importance of the various elements of the IMU.
- Include historic fabric criteria in design guidelines.

Sustainability Goals (Beyond What Is Currently Practiced)

- IU Must celebrate the moves it makes towards sustainability. Creating a resource center would be a significant step in the right direction. Make an asset list.
- Use students- Any educational institutions greatest resource.
- Carbon footprint- make it visual.
- Recycling and reusing existing materials in new development projects.
- Returning 50% of interior elements in renovation projects.
- Recognizing the value of embodied energy that exists in the existing fabric.
- Factoring in the cultural importance of historic fabric- both interior and exterior.
- Meter all buildings- let people know what they are using.
- Do current bench mark based on LEED-EB O&M.
- Any renovation, painting, carpet, etc. goes along with LEED-EB O&M and future sustainable plan.
- Retro-commissioning to make sure buildings running correctly.
- Reinvest savings into more "greening" activities.
- Energy savings incentive program of some sort.

Gap Analysis (Disparity Between Current Practices And Listed Goals)

- No LEED-EB O&M policy currently.

Greening the IMU

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WATER CONSERVATION

- Domestic (Toilets/ sinks, shower, etc)
- Process (Circulating Hot Water, Fire Sprinkler Water)
- Irrigation
- Metering Infrastructure

Master Plan

- Central Chilled Water Plant (CCWP) located at E. 13th and N Woodlawn.
- Central Heating Plant (CHP)

IMU Focus

- IMU will be fully metered by December 3rd, 2009.
- Some shower heads and faucets have been replaced with low-flow fixtures throughout IMU (Hotel, etc).

Conventional water fixtures tend to waste water due to improper usage, incomplete shut-off, and longer running times. Retrofitting conventional fixtures with automatic, water-efficient, fixtures can substantially reduce water use within the facility. Installing aerators can be an inexpensive improvement with proven benefits.

Low flow shower heads save water without compromising comfort

Aerator

Waterless urinal

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FOCUS AREA EXERCISE TRANSCRIPT (All Group Responses)
DECEMBER 2ND, 2009

Additional Background Information (Missing From Narratives Provided)

- Metering & sub-metering for water usage needed.
- Billing users for use once sub-metering is complete..
- Current usage is average per sq. foot.
- Expansion of water treatment plant proposed- $20 million.

Sustainability Goals (Beyond What Is Currently Practiced)

- Waterless toilets
- Policy and goals should be made for meeting water reduction.
- Low to no flow toilets.
- aerated restrictors.
- Education
- Rain capture
- Grey water treatment + Reuse- Dual plumbing building.
- Rainwater catchment & harvesting for irrigation.
- Replace as updating to low flow dual flush toilets.
- Native landscaping & green Infrastructure.
- Blow down waste reuse.
- Track & monitor.
- Outreach for water usage (Education).
- Reduce potable water for irrigation by established %.
- Replace all applicable shower heads & faucets with low-flow.
- Replace kitchen dishwashing equipment with more efficient (water & energy) unit?
- Captured rainwater, low-water plant species.
- 20% water reduction in 5 years.
- 30% in 10 years.
- Get usage data & compare to other institutions- also look at sub-meters to pin-point high usage areas. Still need additional sub-metering beyond what is proposed to do this effectively.
- For broader campus water reuse opportunities at chiller plant.
- Much of IMU water & energy use takes place at chiller plant so need to think more broadly.
- Create partnership structure between various components that control usage.
- Opportunities for grey-water reuse- possible pilot program.
- Low flush fixtures
- Automatic sinks-no touch
- Grey water-expensive to retrofit.
- Low flow showers
- Aerators on faucets
- Capture of rainwater: irrigation, campus vehicle washing.
- For all of the systems have:
- Policies
- Real-time metering-visually prominent display board.
- Number of flat screens around.
- (Prius effect)

Gap Analysis (Disparity Between Current Practices And Listed Goals)

Upgrading but no formalized plan

Cost Analysis (Estimated Financial Impact To Meet Goals)

- HIGH
- 10-year payback on water efficiency improvements because of high sewage fee.

Greening the IMU

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CAMPUS CLIMATE CHANGE INITIATIVE

- Campus Position
- Talloires Declaration
- American College & University Presidents' Climate Commitment
- Chicago Climate Exchange
- 2030 Challenge
- LEED NC 20% Lower Emission Credit

Master Plan Vision

- Implement Greenhouse Gas Emmission Reduction Strategies.
  - Reduce Energy Consumption
  - Diversify Energy Resources
  - Stream-Electricity Co-generation
  - Monitor Campus Energy Use
- 30% Reduction by 2020
- 80% Reduction by 2050

Campus Sustainability Report (2008)

1. Talloires Declaration- Developed at an international conference in Taillores, France in 1990, is the first official statement made by university administrators of a commitment to environmental sustainability in higher education.
2. American College and University President's Climate Commitment.
   - Completing an emission inventory.
   - Within 2 years, setting a target date and interim milestones for becoming climate neutral.
   - Taking immediate steps to reduce greenhouse gas emissions by choosing froma list of short-term actions.
   - Integrating sustainability into the curriculum and making it part of the educational experience.
   - Making the action plan, inventory and progress reports publicly available.
3. Chicago Climate Exchange- North America's only legally binding rules-based greenhouse gas emissions allowance trading system.

Other Institutional Commitments

2030 Challenge- All new buildings, developments and major renovations shall be designed to meet a fossil fuel, GHG-emitting, energy consumption performance standard of 50% of the regional (or country) average for that building type. At a minimum, an equal amount of existing building area shall be renovated annually to meet a fossil fuel, GHG-emitting, energy consumption performance standard of 50% of the regional (or country) average for that building type.

The fossil fuel reduction standard for all new buildings and major renovations shall be increased to:

- 60% in 2010
- 70% in 2015
- 80% in 2020
- 90% in 2025
- Carbon-neutral in 2030 (using no fossil fuel GHG emitting energy to operate).

Gap Analysis (Disparity Between Current Practices And Listed Goals)

- Sign American College & University Presidents' Climate Commitment

IMU Focus

- Monitor Energy Use by Building and by Occupancy
- IMU a Carbon Neutral Facility
- Student Climate Action Group Center

AMERICAN COLLEGE & UNIVERSITY
PRESIDENTS CLIMATE COMMITMENT

The American College & University Presidents' Climate Commitment logo stands as a serious institutional commitment to making steps towards carbon neutrality.

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FOCUS AREA EXERCISE TRANSCRIPT (All Group Responses)
DECEMBER 2ND, 2009

Additional Background Information (Missing From Narratives Provided)

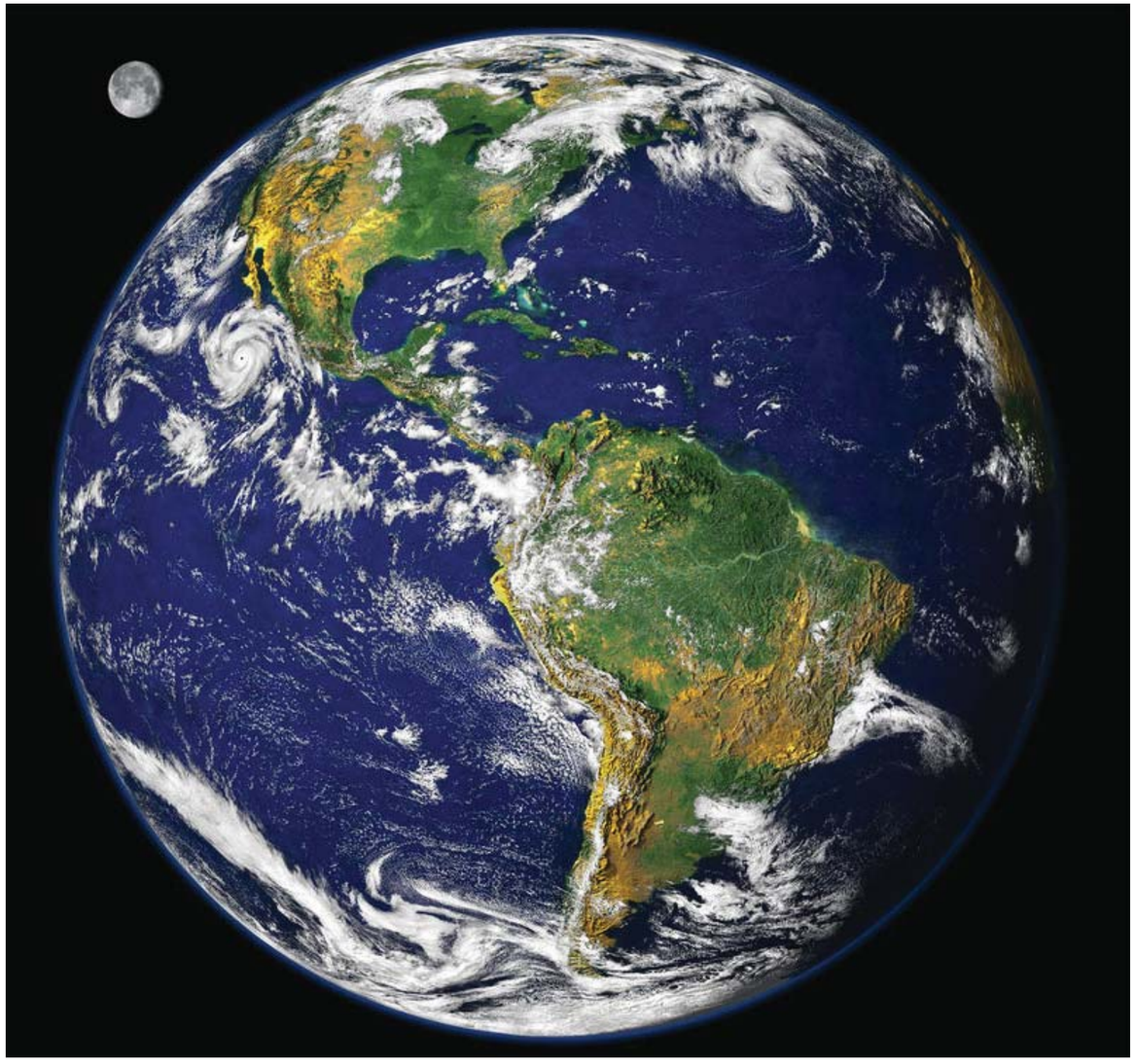
- Devin Hartman
- Offsets- Sequestration, double campus canopy, green roof canopy.
- CMP commitment, sustainability master plan.
- Renewable energy
- Mass transit
- How do existing goals relate to STAR campus sustainability framework?

Sustainability Goals (Beyond What Is Currently Practiced)

- Increased energy efficiency & behavior change- Increase education.
- New renewable energy alternatives.
- On campus offsets- sequestration through green roofs, canopy increases.
- Creation of long-term climate neutrality plan.
- Inclusion of climate goals and plan in IUOS masterplan.
- Cannot tell what goals are for integrating climate change issues with curriculum & sustainability.
- Identify effects of climate change on local environment (flora & fauna).
- Incorporate anticipated cost of energy into transport planning, etc increased.
- Time line for IMU climate neutral vs. masterplan goal?
- Energy & carbon neutrality.
- Factor climate legislation into into cost analysis.
- Get president to sign ACUPCC.

Gap Analysis (Disparity Between Current Practices And Listed Goals)

- 80% reduction by 2050 less stringent than 90% by 2025/ 100% by 2030 goals of 2030 challenge.
- Insufficient energy monitoring system in place.
- President hasn't signed ACUPCC.



Greening the IMU

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GREEN COMPUTING SYSTEMS/ E-WASTE

- Student incentive programs
- Energy efficient technology
- Managing equipment waste

Campus Sustainability Report (2008)

IUB Standing and Sustainability Report Recommendations:

- Conservatively IU has between 30,000 and 50,000 computers on campus and optimal energy conservation savings mode not set on all computers.
- Surplus Stores sells 90% of IU's old computers to the general public. Those that do not sell are sold to Heritage Environmental on a per pound basis. Heritage recycles computers back to the market. All buyers of "bulk computer equipment" are required to certify that they will not sell any of the equipment to overseas operators.
- More experience is needed with "meeting technologies" (video-conferencing, etc) - this is directly related to travel costs and emissions.
- Whenever possible portrait –mode cap able computers should be specified- may reduce need to print and reduce paper waste.
- Many departments use their own servers- research indicates that local servers tend to be under-utilized. Consolidating in campus data center may be more efficient.
- Education programs about computer technologies to educate users on energy efficiency.

Campus Focus

Annual residential hall collection totals recycled:

- Batteries: 200 pounds
- Cell Phones: 20 pounds
- Computers: 3,000 computers and 3,000 monitors annually.
- Light bulbs: 400 pounds
- Printer cartridges: 40 pounds

IMU Focus

- New computer lab technologies
- Planned Upgrades
- E-Waste Management

Millions of pounds of E-waste are generated throughout the world every year. Much of the waste can be recycled.

Cell phones can be collected for recycling as seen in the photograph below.

Photo Credit: Treehugger

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FOCUS AREA EXERCISE TRANSCRIPT (All Group Responses)
DECEMBER 2ND, 2009

Additional Background Information (Missing From Narratives Provided)

- Amount of printing- can be reduced with double sided printing.
- Reduction of complements to computers- paper, ink.
- Reduce amount students print!
- Impact of recycled paper in printers cost vs. benefit.
- Recycled cartridges for ink.
- Look at technologies that allow students to more effectively study using just a computer.
- Reduce printing, increase recycling of computer paper.
- New computer center for servers (LEED).
- Green program/ gadget on computers- monitor carbon, energy, etc.
- Go Green Gadget- Partially used server rooms in all buildings- trying to move to main server room on campus.
- Every 3 years upgrade.

Sustainability Goals (Beyond What Is Currently Practiced)

- Reduce packaging on purchases of computers.
- Auto program to control “energy savings mode” throughout campus.
- Recycle all electronic waste.
- Enhance ability for students to connect to campus computer networks through personal computer.
- Make it easier for students to connect computer lab computers to personal computers- Majority of students have laptops). New Student Technology center in IMU allows for this, More stations needed a (MAC and PC).
- Tailoring computer equipment to user needs.
- Cloud computer approach would reduce demand- centralize server use.
- Replace equivalent cycle could be extended with better actual energy savings.
- Do we only move IT someplace else.
- IMU focus to reduce energy footprint by 50% in 5 years.
- End Goal: Remove server building by going all virtual.
- Utilize existing tools (Go Green Gadget) to reduce energy consumption in computer use for staff & student technology center machines. Use 100% recycled- content paper.

Gap Analysis (Disparity Between Current Practices And Listed Goals)

- Energy conservation modes not set on computers, few education programs.
- Existing tools are not being used effectively.

Cost Analysis (Estimated Financial Impact To Meet Goals)

- Some high, some low. Consolidating servers expensive, better energy consumption of computers cheap.
- Low/ no cost improvements can be made by utilizing existing tools more effectively and across campus to reduce energy use.

Assessment (Final Thoughts Summarizing Discussion)

- Green computing can greatly be improved through efficiency.

Photos show the computers and accessories recycled during Indiana University’s E-Waste Days, when a concerted effort is made on campus to recycle electronic waste.

Photo Credit: IU Photography

SUSTAINABLE FOCUS AREA REPORT-OUT TRANSCRIPTS
DAY ONE: DECEMBER 2ND, 2009 (AFTERNOON SESSION)

The last exercise for the first day included a report-out session from the morning's focus area exercise. Charrette participants gave a synopsis of what each of the small groups discussed during the morning exercise. Due to time constraints the report-outs were completed for the first six of the twelve categories. The transcripts from the report-out session follow.

Green Cleaning

- EcoLab uses Apex to reduce phosphate use – better racks for fewer loads, machine usage is monitored.
- Some green chemicals being used already (increase the usage).
- Wash 'n Walk (Ecolab cleaning product) is Green Seal Certified.
- Three different vendors cleaning on campus (IMU, Building Services and RPS -compare cleaning practices, draft an official policy).
- Laundry uses Formula One – need less to rinse therefore reducing water consumption
- Mop solution is Green Seal Certified – cost savings associated with water consumption
- Need campus-wide policy statement to guide implementation on a building-by-building basis.
- (use IMU as example)
  - LEED EB-O&M framework to inform operations.
  - Green purchasing and procurement (purchasing department currently isn't authorized to mandate choices).
- Hotel standards may be different than other parts of IMU and campus (i.e guest satisfaction).
- Education, outreach and exposure will be very important.
- Supply chain sustainability.
- Perform an audit on green cleaning practices to date and fill in the gaps.
- Green cleaning training program for employees.
- Work towards innovation in operation credits for things like laundry and kitchen practices.
- Need to look at snow and ice removal policy – green this aspect.
- Can green cleaning on campus inform and educate students, faculty and staff about green cleaning within their home?

Greening the IMU

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CAMPUS SUSTAINABLE FOOD OPERATIONS

- A lot already going on
- Need better metrics for locally sourced food (buying patterns, etc.).
- Promote the successes – signage, website, education & outreach.
- Sustainable catering practices – less Styrofoam, more compostable wares if it must be.
- disposable (establish percentage goals for sustainable purchases).
- No composting process in place for wares (compostable ware is more expensive).
- Disposable kitchen ware versus dishwashing (differences between sustainability out comes, costs, perceptions, safety, etc.).
- Alter collective thinking of food "waste" into food as a resource for compost and fuel.
- Hilltop gardens – food dryers.
- Campus Gardens
- Freezing excess produce for winter use.
- Promote unique farming techniques (sustainable growing practices).
- Interdisciplinary approach to service learning: Tie food issues into curriculum (Hilltop Garden, etc.)
- Curriculum on nutrition and diet – education for K-12 audience.
- Sodexo has sustainability task force and resources for campus gardens and sustainable food initiatives.

ENERGY

- Decrease power demand in addition to energy efficiency: power demand vs. power conservation (projected future demands and needs).
- Amish thinking
- Metering and sub-metering benchmark.
  - Need meters to capture peak demand in addition to net consumption.
- Enhance control systems.
- Renewable energy opportunities: solar hot water installed on the roof of IMU.
- Sell savings in carbon market.
- Motion and occupant sensors.
- Address environmentally sensitive items housed at the IMU (such as artwork, historic building elements that need controlled temperatures and humidity levels).
- Smart hotel occupancy issues – provide incentives to guests.
- Set a goal for energy reductions for IMU with aim of having it spread across the campus.
  - Problems for certain buildings like music and science.
  - Deliver what people want and need with less energy.
- Energy recovery for systems within a building.

WATER EFFICIENT LANDSCAPING

- Very little irrigation is currently in place. The only known are of irrigation is a small turf plot near the hotel entrance.
- Learn from peers (look at other institutions for innovative ways to solve problems at IU)
  - U of East Anglia uses body heat as tool for warming a building.
  - U of Alabama stores heat in the ground during summer months.

Greening the IMU

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TRANSPORTATION

- Bike friendly campus – improve bike accessibility, safety, and trail connectivity through out campus and surrounding areas (covered bike parking, drinking fountains, racks, access, and trails).
- Utilize Little 500 as a catalyst for encouraging more bike use.
- IMU as hub of transportation (multi-modal transit center) as complement to the city transportation hub.
    - Multi-modal paths – designated lanes for bicycles, pedestrians, cars, buses.
    - Compressed air available.
    - Solar Charging Stations.
- Shower facilities must be available for staff and students in convenient locations.
- "Taxes" and fees for having cars on campus.
- Decrease tuition for students with NO car.
- Incentives for alternative transportation.
- Convert buses to natural gas and alternative fuel and hybrid.
- Competition between dorms to promote alternative transportation use.
- Bike share program with accountability: Community bikes and bikes for loan with student ID card or credit card.
- No car policy – institute a policy restricting car use for freshmen.
- Specially designated parking spots for smaller vehicles and energy efficient vehicles.
- Solar charging station.
- Zip car and Zim ride
- Cargo bikes
- Publicize carpooling opportunities (establish carpool networking website for students to make contact with others).
- Priority policy – prioritize pedestrian travel over all other modes.
- Pedestrian safety at crosswalks and improvements to 7th Street.
- Design streetscapes that discourage jaywalking; the urban center of campus should promote walking.
- Pervious pavement.

SITE & STORMWATER CONSERVATION

- No potable water for irrigation (at IMU only a very small portion of grass uses irrigation; eliminate irrigation completely at IMU to earn 2 points under LEED).
- Integrate stormwater management into the landscape.
- Graywater use for irrigation (some concern regarding city response, however building codes and laws change).
- Condensate capture and reuse (quasi-graywater system for flushing toilets, etc).
- Cistern and rainwater capture for laundry.
- Water fixture retrofitting.
- Disconnect downspouts.
- Pervious surfaces
- Retrofit site for stormwater quality and quantity (various methods: filter strips, etc.). Track water quality and quantity over time (pre- and post-retrofit and eco-upgrades). Tracking could be part of a Biology and Environmental class syllabus.
- Ideas for the Jordan:
    - Restore Jordan for pedestrians.
    - Reopen Jordan to daylight.
    - Reduce cooling load and makeup water.
    - Increase filtration as a way to buffer against flooding.
    - Filter strip plantings along river.
    - Jordan as Learning Lab – have classes work on restoration each semester.
    - Increase tree canopy (Campus Master Plan includes doubling tree canopy in approximately 20 years).

Greening the IMU

Eco-Charrette

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LANDSCAPING

- Shift to native species (add requirement to specifications).
- Reduce turf grass for mowing purposes or replace with native species.
- Reduce pesticide and herbicides.
- Balance look of plants with value of perennials.
- Long-term invasive species plan.
- Culture of landscape on campus – paradigm shift.
- Education is key in helping people understand less manicured look and benefits of native landscaping.
- Food scraps and/or landscaping waste composting as well as a potential fertilizer.
- Look at National Wildlife Federation (NWF) certification.
- Reflective paving for heat island mitigation.
- Eliminate 2-cycle equipment, use 4-cycle motors for equipment.

RECYCLING & SUSTAINABLE PURCHASING

- Department of Purchasing oversees all IU campuses.
  - Great opportunity for cost effectiveness in bulk purchasing (good opportunity to make a far-reaching sustainability impact on many IU campuses).
  - Coordination with vendors (purchasing power might serve as catalyst to increase sustainability practices by IU vendors themselves).
  - Institutional contracts – janitorial and computers, etc.
  - RFPs with sustainable requirements – need to examine selection criteria determined by department.
  - IMU could set environmental standards, when balanced against cost.
  - What about enforcement?
  - This should really apply at the whole campus.
- Incentives for using the reusable bottles.
- Promote greening of the IMU with stainless steel bottle sales. Bottles might have sustainability facts.
- Lack of campus coordination of recyclables – how does Hoosier Disposal process the recyclables? Dual Stream vs. Single Stream.
- Consistent branding of recycling bins for campus (inside and outside).
- Panera Bread model of using re-usable kitchenware (problem of students taking off with the kitchenware if not disposable).

Greening the IMU

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FOCUS AREA EXERCISE PARTICIPANT SIGN-IN SHEETS

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WHOLE GROUP BRAINSTORMING & VISIONING
DAY TWO: DECEMBER 2ND (AFTERNOON SESSION)

The purpose of this whole group brainstorming and visioning session, led by Michael Arny of Leonardo Academy, was to identify sustainability goals for the IMU from a range of perspectives.

The results of the brainstorming have been organized into the following categories: 1) What are the big picture objectives of the IMU?, 2) Connectedness of IMU to Bloomington, 3) Role of IMU in campus and city sustainability, 4) Execution: How to achieve goals.

The results of this brainstorming and visioning session provided a rich resource of ideas on where the IMU and the campus can take LEED and sustainability.

Results of Brainstorming & Visioning Session

What are the big picture objectives of the IMU?

a. Role on campus and city life.
b. Role in and campus and city sustainability.

- Grow Revenue
- Increase foot traffic.
- More outside events and more outside everything.
- Day and night activities.
- IMU as a convener and unifier.
- Improved public transportation options (bike access, racks, education about options).
- Connectivity to arts and sports locally.
- Pedestrian oriented entrances (make main entrances more accessible).
- Preserve historic façade and exterior.
- Reconnect and redesign central hallways.
- Use Jordan River as a thoroughfare.
- Have the Union serve as a model for the higher education community.
- Engage School of Journalism in promoting what's being done.
- Allow meal point usage at IMU.
- Student survey of potential building uses.
- Coordinate with Bloomington convention center on co-hosting events.
- Establish a greater partnership with larger community to host events at IMU (green events, etc.).
- Performance Dashboard(s) throughout IMU.
- Coordinated vendors and contractors (e.g. waste and recycling and haulers and bins).
- IMU promotional opportunities for events (arts, sports, continuing and adult education).
- Better tie-in and coordination with other buildings.
- Centralized parking on campus with shuttles (fewer student "taxis").
- Trolley fueled by biodiesel.
- Host classes and lectures on non-academic buildings.
- Thermometer to track green success and progress visibly located outside Union to promote more sustainable behaviors.
- Annual student art show (green theme).
- Faculty club (for before and after events) – public spot for alcohol in the IMU.
- Better promotion of what sustainable practices IMU is doing (advertise local Wednesdays at Tudor Room, notify building users about energy consumption, sub-metering feedback, percentage of recycling per month, etc.).

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INDIANA UNIVERSITY
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Connectedness to Bloomington

- Better access (trolley?)
- Multi-modal transportation center connected to IMU (Epi-Center).
- Tudor Room – Sunday Brunch (Increase other activities to encourage activity on less busy days, i.e. weekends).
- How can the union better utilize the space in the off hours?
- Connect sporting events with IMU usage – local and university connections (Better connection to basketball program).
- More pedestrian friendly.
- What is the interface and Woodlawn ending at IMU loading dock – Improve IMU accessibility opportunities.

Role of IMU in City & Campus Sustainability

- Farmer's Market – encourage local environmental and economic prosperity.
- Host local farmer talks during lunch and/or open forum discussions.
- Education on campus sustainability within the IMU to get students fired up (dorm competitions, inter-university competition (competitions between other unions).
- Competition with local businesses and organizations.
- Role of new board around sustainability (Can this be an agenda item for retreat in January?)
- Green Olympics
- Tell the story of the IMU as a historic building and why and how it is green (highlight sustainability significance of reusing a structure versus rebuilding new).
- IMU link to homecoming.
- Green events (speakers at IU: Michael Pollan, etc).
- "Make a large footprint small" potential campaign theme and word play on Hermann B. Wells quote, "You can't make a small place feel big, but you can make a big place feel small."

Execution: How to Achieve Goals

- Show how much can be done at low or no cost (it will be a model project that others look to for ideas and inspiration).
- Need to define sub-metering – Holistic Sustainability Performance tracking
- Engage alumni to rally behind greening efforts (appeal to nostalgia while emphasizing importance of changing to be more green).
- Use alumni foundation money to host green events.
- Use green events to raise money.
- Feature articles promoting sustainability at IU in the alumni magazine.
- Email poll on Greening the IMU to alumni – focus on IMU Board alumni, also target other alumni groups to raise funds for greening efforts.
- Engage Whittenberger Society
- Target alumni reunion class for a green homecoming to start revolving loan fund
- Green promotional packages at hotel (green "getaways").
- Building itself will become a learning lab for students (grant and loan opportunities)
- Joint price for event and transportation to auditorium and MAC, Theatre and Sports events – increase shuttles available.
- Get rid of parking lot and allow alumni to "buy-a-brick and (permeable paver)" on the new plaza.
- Matching grants for solar panels, etc.
- Host classes, demos, etc. to raise money.
- Lower costs of improvements through student involvement and interaction (use the greatest resource: students).
- Brand the greening of the IMU to maximize results through identification and outreach.
- Get IMU on National Registry of Historic Buildings.
- Develop Partnerships with other companies (such as wind farms and development).

LEED FOR EXISTING BUILDINGS BREAK-OUT SESSION
DAY TWO: DECEMBER 3RD, 2009 (MORNING SESSION)

Separate Tables for Each LEED for Existing Buildings Credit Category

The purpose of this LEED for Existing Buildings Breakout Session was to explore base level and stretch goals for LEED-EB prerequisite and credit achievements from a range of perspectives. This session was led by Michael Arny of Leonardo Academy.

The attendees were divided up in to 5 groups with each group assigned a primary LEED for Existing Buildings (LEED-EB) credit category: Sustainable Sites (SS), Water Efficiency (EE), Energy and Atmosphere (EA), Materials and Resources (MR) and Indoor Environmental Quality (IEQ). Each group was seated at a separate table and given the task of identifying LEED-EB practical base goals and stretch goals for each credit in their assigned credit category. Each table was invited to also address as many additional credit categories beyond their assigned category as they chose to address.

These sessions provoked lively discussions with a lot of information and knowledge being shared around each table. Because there were a wide range of levels of LEED-EB expertise among the people at each table, these sessions were a great learning exercise with those with more knowledge teaching those with less knowledge. The results of these table sessions were used along with other information developed by the consulting team to prepare a LEED-EB action plan and check list included in Section Four of this Report.

Results of the Breakout Session
The following table presents the results of this breakout session for the tables with the primary responsibility for each credit category. The full results of the table session are included in the following pages (84-88) of the report.

Category	Practical Base Goal (Number of Points)	Stretch Goals (Number of Points)	Number of Credits that Could be Applied Campus Wide
Sustainable Sites	11	17	0
Water Efficiency	8	11	0
Energy and Atmosphere	11	26	0
Materials and Resources	7	10	4
Indoor Environmental Quality	12	12	5
Innovation	10	10	0
Total	**59**	**87**	**9**

As shown in the table, the LEED-EB category discussion groups estimated practical base goals totaling 59 points, category stretch goals totaling 87 points and campus wide applicability for 9 credits.

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SUSTAINABLE SITES

Certified 40-49 points **Silver** 50-59 points **Gold** 60-79 points **Platinum** 80 + points **Possible Points 110**

Compiled Results of LEED for Existing Buildings Breakout Session With Separate Tables for Each LEED-EB Credit Category

13	9	4	Sustainable Sites		Possible Points	26
Y	?	N				
		4	Credit 1	**LEED Certified Design & Construction** (4 points)		4
1			Credit 2	**Building Exterior & Hardscape Management Plan**		1
1			Credit 3	**IPM, Erosion Control, & Landscape Management Plan**		1
10	5		Credit 4	**Alternative Commuting Transportation** (3-15 points)		15
	1		Credit 5	**Site Development-** Protect or Restore Open Habitat		1
	1		Credit 6	**Stormwater Quantity Control**		1
	1		Credit 7.1	**Heat Island Reduction-** Nonroof		1
1			Credit 7.2	**Heat Island Reduction-** Roof		1
	1		Credit 8	**Light Pollution Reduction**		1

Requirements

Sustainable Sites	
Credit 1	Building has previously been certified under either LEED: NC, for Schools, CS, CI
Credit 2	Employ environmentally sensitive, low-impact exterior & hardscape management plan.
Credit 3	BMPs that significantly reduce harmful chemicals use, energy waste, water waste, air pollution, solid waste, chem. runoff.
Credit 4	Includes at a min: telecommuting; compressed work weeks, mass transit, walking, bicycles, carpools, AFV/ fuel efficient. RP credit.
Credit 5	Over PP have in place native vegetation on min. area: 25% of total site area (Excl. b. footprint) or 5% of total site area (WIG).
Credit 6	Over PP have SMP that: infiltrates, collects, & reuses runoff or evapotranspirates runoff from at least 15% precipitation. RP credit.
Credit 7.1	Two Options: Consult LEED reference guide
Credit 7.2	Use roofing materials with SRI index = or >29 (75% roof) OR- Install green roof (50%) OR- Combo of SRI & green roof
Credit 8	Three Options: consult LEED reference guide

Charrette Comments December 4, 2009

	Practical Goal (Number of Points)	Stretch Goal (Number of Points)	Could be Standard Credit Across Campus	Could Be Applied Campus wide	List Ideas for Strategies / Paths to Achieving Stretch Goals
Sustainable Sites					
Credit 1	N/A				
Credit 2	1				
Credit 3	1				
Credit 4	5	11			**SS Table Group Comments:** Do students count? How to count hotel guests?
Credit 5	1				**SS Table Group Comments:** Confirm with Mia Williams - campus issue. Need university approved mulch that is composted - Grounds Dept. - campus-wide.
Credit 6	1				**SS Table Group Comments:** Dunn Meadow - stormwater retention area
Credit 7.1	1				**SS Table Group Comments:** Jordan R. - future underground parking,
Credit 7.2	0				**SS Table Group Comments:** not achievable
Credit 8	1				**SS Table Group Comments:** as fixtures are replaced use better models
Total	10	16	0	0	

Greening the IMU

Eco-Charrette

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WATER EFFICIENCY

40-49 points	Silver	50-59 points	Gold	60-79 points	Platinum	80 + points	Possible Points	110

1	13	0	Water Efficiency		Possible Points	14
Y	?	N				
	?		Prereq 1	**Minimum Indoor Plumbing Fixture & Fitting Efficiency**		0
1	1		Credit 1	**Water Performance Measurement** (1-2 points)		2
	5		Credit 2	**Additional Indoor Plumbing Fixture & Fitting Efficiency** (1-5 points)		5
	5		Credit 3	**Water Efficient Landscaping** (1-5 points)		5
	2		Credit 4	**Cooling Tower Water Management** (1-2 points)		2

Requirements

Water Efficiency	
Prereq 1	For plumb system substantially completed before 1993 baseline is 160% of the water use that would result if all fixtures met codes
Credit 1	Two Options: Consult LEED reference guide. 1. Whole Building Metering 2. Sub-Metering
Credit 2	Over PP have strategies that reduce potable water use by: 10, 15, 20, 25, or 30% over WEp1 calc baseline. (1 pt each)
Credit 3	Reduce water use: 50, 62.5, 75, 87.5, 100% over calculated baseline (1 pt each)
Credit 4	Three Options: Consult LEED reference guide. 1. Chemical Management 2. Nonpotable Water Source 3. Both Options

Charrette Comments December 4, 2009

	Practical Goal (Number of Points)	Stretch Goal (Number of Points)	Could be Standard Credit Across Campus	Could Be Applied Campus wide	List Ideas for Strategies / Paths to Achieving Stretch Goals
Water Efficiency					
Prereq 1					
Credit 1	1 pt + 1 pt	1 pt + 1 pt			**WE Table Group Comments:** Whole building metered now; sub meter hotel food service. Need conversation with Physical Plant to benchmark water levels before fixture change in prereq. So IMU can benefit financially from water savings (mutual benefit).
Credit 2	1	1 - 4 pts			**WE Table Group Comments:** 189 hotel rooms; above 1 point gets to be a stretch financially, capture condensate from cooling coils for grey water - to flush toilets (stretch goal) capturing water easy, collecting difficult.
Credit 3	5	5			**WE Table Group Comments:** disconnect irrigation on "grassy knoll"
Credit 4					**WE Table Group Comments:** Would push whole campus compliance
Total	8	11	0	0	

Greening the IMU

Eco-Charrette

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ENERGY & ATMOSPHERE

40-49 points	Silver 50-59 points	Gold 60-79 points	Platinum 80 + points	Possible Points	110

15	20	0	Energy & Atmosphere		Possible Points	35
Y	?	N				
Y			Prereq 1	**Energy Efficiency Best Management Practices**		0
Y			Prereq 2	**Minimum Energy Efficiency Performance-** Energy Star 69		0
	?		Prereq 3	**Fundamental Refrigerant Management**		0
12	6		Credit 1	**Optimize Energy Efficiency Performance** (1-18 points)		18
2			Credit 2.1	**Existing Building Commissioning-** Investigation & Analysis (2 points)		2
	2		Credit 2.2	**Existing Building Commissioning-** Investigation & Analysis (2 points)		2
	2		Credit 2.3	**Existing Building Commissioning- Ongoing Commissioning** (2 points)		2
	1		Credit 3.1	**Performance Measurement-** Building Automation System		1
	2		Credit 3.2	**Performance Measurement-**System- Level Metering (1- 2 points)		2
	6		Credit 4	**Onsite & Off-site Renewable Energy** (1-6 points)		6
	1		Credit 5	**Enhanced Refrigerant Management**		1
1			Credit 6	**Emissions Reduction Reporting**		1

Requirements

Energy & Atmosphere

Prereq 1	Develop building operating plan that provides details on how the building is to be operated & maintained.
Prereq 2	Buildings eligible to use EPA ENERGY STAR Portfolio Manager (69 points is min). Two other options for non-eligible buildings.
Prereq 3	No CFC- based refrigerants in HVAC&R unless 3rd party verifies that replacement not feasible & phase-out plan is in place.
Credit 1	EPA's ENERGY STAR Energy Performance Rating: 71-95 pts-1 additional LEED point for every 2 pts exceeding the 69 pt min
Credit 2.1	Two Options: Consult Reference Guide. 1. Commissioning Process 2. ASHRAE Level II Energy Audit
Credit 2.2	Implement no- or low cost operational improvements and create a plan for major retrofits or upgrades.
Credit 2.3	Implement an ongoing commissioning program that includes elements of planning, system testing, performance verification, etc.
Credit 3.1	Have in place a computer-based automation system (BAS) that monitors and controls major building systems.
Credit 3.2	Develop a breakdown of energy usage in the building. % of total energy consumption to be metered (40 or 80%, 1 or 2 points)
Credit 4	Over PP meet some or all of the building's total energy use with on-site or off-site renewable energy sources. Regional Priority credit.
Credit 5	2 Options. 1. Do not use refrigerants in the building HVAC&R systems 2. Select refrigerants based on formula in ref. guide.
Credit 6	Track and report emissions reductions. Report reduction using a third-party voluntary reporting or certification program .

Charrette Comments December 4, 2009

	Practical Goal (Number of Points)	Stretch Goal (Number of Points)	Could be Standard Credit Across Campus	Could Be Applied Campus wide	List Ideas for Strategies / Paths to Achieving Stretch Goals
Energy & Atmosphere					
					EA Table Group Comments: Path for Stretch Goals
Prereq 1					
Prereq 2					
Prereq 3					
Credit 1	4	13			**EA Table Group Comments:** Implement energy conservation measures.
Credit 2.1	2	2			**EA Table Group Comments:** implement commissions/energy audit
Credit 2.2	2	2			**EA Table Group Comments:** facilities to implement
Credit 2.3	0	2			**EA Table Group Comments:** implement commissioning every 24 months, students/staff/P.P.
Credit 3.1	1	1			**EA Table Group Comments:** Existing
Credit 3.2	1	2			**EA Table Group Comments:** expense metering efforts
Credit 4	0	2			**EA Table Group Comments:** install renewable energy technology or purchase REC's. Consider onsite solar hot water hotel optional renewable energy charge.
Credit 5	0	1			**EA Table Group Comments:** check with IU Central Plant on refrigerant
Credit 6	1	1			**EA Table Group Comments:** complete IMU metering efforts, reporting
Total	11	26	0	0	

Greening the IMU

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Certified 40-49 points **Silver** 50-59 points **Gold** 60-79 points **Platinum** 80 + points **Possible Points 110**

8	2	0	Materials & Resources		Possible Points 10
Y	?	N			
Y			Prereq 1	**Sustainable Purchasing Policy**	0
Y			Prereq 2	**Solid Waste Management Policy**	0
1			Credit 1	**Sustainable Purchasing- Ongoing Consumables**	1
1	1		Credit 2	**Sustainable Purchasing- Durable Goods**	2
1			Credit 3	**Sustainable Purchasing- Facility Alterations & Additions**	1
	1		Credit 4	**Sustainable Purchasing- Reduced Mercury in Lamps**	1
1			Credit 5	**Sustainable Purchasing- Food**	1
1			Credit 6	**Solid Waste Management Policy- Waste Stream Audit**	1
1			Credit 7	**Solid Waste Management Policy- Ongoing Consumables**	1
1			Credit 8	**Solid Waste Management Policy- Durable Goods**	1
1			Credit 9	**Solid Waste Management Policy- Facility Alterations and Additions**	1

Requirements

Materials & Resources

Prereq 1	Have in place an Environmentally Preferable Purchasing (EPP) policy that includes at min.: purchasing for the building & site addressing req. for MRc1
Prereq 2	Have in place a solid waste management policy for the building & site that diverts waste from incinerators and landfills.
Credit 1	Maintain sustainable purchasing program for regularly used and replaced items: additional information in reference guide.
Credit 2	Maintain sustainable purchasing program covering higher cost items and durable goods that are replaced infrequently.
Credit 3	Maintain sustainable purchasing program covering materials for renovations, demolitions, refits, & new construction additions.
Credit 4	Develop lighting purchasing plan that specifies max. levels of mercury in mercury containing lamps for grounds, building, both indoor & outdoor.
Credit 5	Over PP: Achieve sustainable purchases of at least 25% of the total combined food & beverage purchases (by cost).
Credit 6	Conduct a waste stream audit of the building's entire ongoing consumables to establish a baseline.
Credit 7	Maintain a waste redux & recycling program. MIN: paper, toner cartridges, glass, plastics, cardboard &old corrugated cardboard, food waste, & metals.
Credit 8	Maintain a waste redux, reuse, & recycling program that addresses durable goods. MIN: office equipment, appliances, external power adaptors, TVs.
Credit 9	Divert at least 70% of waste (by volume) generated by facility alterations & additions from disposal in landfills and incinerators.

MATERIALS & RESOURCES

Charette Comments December 4, 2009

Practical Goal (Number of Points)	Stretch Goal (Number of Points)	Could be Standard Credit Across Campus	Could Be Applied Capuswide	List Ideas for Strategies / Paths to Achieving Stretch Goals
Materials & Resources				
Prereq 1 YES	NA	?		**MR Table Comments:** Starting with a IMU and eventually the campus. Already buy recycled content paper, etc. Meeting this requirement should not be a problem
Prereq 2 YES	NA	?	?	**MR Table Comments:** They already recycle, and compost, and mind their waste output. This is very do-able.
Credit 1 1	1			**MR Table Comments:** They currently purchase recycled paper. Instituting a policy for other items would be likely.
Credit 2 1	2	YES	?	**MR Table Comments:** Currently alreasdy replace appliaces with Estar as needed. Can institute sustainable purchasing policy.
Credit 3 ?	1	?	?	**MR Table Comments:** Do new construction projects have this as part of their required LEED credits? This is potentially likely, may be difficult on IMU.
Credit 4 ?	1	?	?	**MR Table Comments:** An inventory of lamps would be conducted, no problem. IMU might already meet requirement and if not bulb replacements would be evaluated. / **Other Table Comments:**
Credit 5 ?	1			**MR Table Comments:** Food purchased internally by Capital & Facilities. Sodexo has sustainability program. There are pathways to attain sustainability with Sodexo. Pehaps getting to 25% might not be do-able right away, but starting at a lower % with incremental increases as operations improve is possible. Approx. 3- 3.5 million spent on food annually. Potential innovation credit for they do already.
Credit 6 1	1	YES	?	**MR Table Comments:** Waste stream is already closely monitored and official audits can be made to meet credit.
Credit 7 1	1	?	?	**MR Table Comments:** Yes, this can be met no problem.
Credit 8 1	1	YES		MR Table Comments: **This is alrerady being done at a pretty large scale on campus** . Could intitute policy and imrpove.
Credit 9 2	1	YES		**MR Table Comments:** This falls on the responsibility of contractor mostly. Intitute policy and require with any project at IMU and campus.
Total 7	10	4	4	

Greening the IMU

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Certified 40-49 points **Silver** 50-59 points **Gold** 60-79 points **Platinum** 80 + points **Possible Points 110**

11	4	0	Indoor Environmental Quality		Possible Points 15
Y	?	N			
	?		Prereq 1	**Minimum Indoor Air Quality Performance**	0
Y			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	0
Y			Prereq 3	**Green Cleaning Policy**	0
1			Credit 1.1	**Indoor Air Quality Best Management Practices-** Indoor Air Quality Manage. Plan	1
	1		Credit 1.2	**Indoor Air Quality Best Management Practices-** Outdoor Air Delivery Monitoring	1
	1		Credit 1.3	**Indoor Air Quality Best Management Practices-** Increased Ventilation	1
1			Credit 1.4	**Indoor Air Quality Best Management Practices-** Reduce Particulates in Air Distrib	1
1			Credit 1.5	**Indoor Air Quality Best Management Practices-** Alterations & Additions	1
1			Credit 2.1	**Occupant Comfort- Occupant Survey**	1
1			Credit 2.2	**Controllability of Systems-** Lighting	1
	1		Credit 2.3	**Occupant Comfort-** Thermal Comfort Monitoring	1
	1		Credit 2.4	**Daylight & Views**	1
1			Credit 3.1	**Green Cleaning-** High- Performance Cleaning Program	1
1			Credit 3.2	**Green Cleaning-** Custodial Effectiveness Assessment	1
1			Credit 3.3	**Green Cleaning-** Purchase of Sustainable Cleaning Products & Materials	1
1			Credit 3.4	**Green Cleaning-** Sustainable Cleaning Equipment	1
1			Credit 3.5	**Green Cleaning-** Indoor Chemical Pollutant Source Control	1
1			Credit 3.6	**Green Cleaning-** Indoor Integrated Pest Management	1

Requirements

Indoor Environmental Quality

Prereq 1	Projects able to meet ASHRAE Standard 62.1-2007 (2 Options)
Prereq 2	Prohibit smoking in the building and on-property within 25 feet of entries, outdoor air intakes, & operable windows.
Prereq 3	Have in place a green cleaning policy for building and site addressing various criteria.
Credit 1.1	Develop & Implement on an ongoing basis an IAQ Management program based on EPA I-BEAM model.
Credit 1.2	Install Permanent, continuous monitoring systems that provide feedback on ventilation system performance.
Credit 1.3	Provide additional outdoor air ventilation rates for air-handling units serving occupied spaces by at least 30%.
Credit 1.4	Have in place filtration media w/ min efficiency reporting value (MERV) of 13 or greater for all outside sir intakes and inside air recirculation.
Credit 1.5	During construction, meet or exceed the recommended control measures of the SMACNA.
Credit 2.1	Provide an assessment of the building occupants' comfort as it relates to thermal comfort, acoustics, indoor air quality, lighting levels, cleanliness, etc.
Credit 2.2	For at least 50% of the building occupants, use lighting controls that enable adjustments to suit task needs and preferences.
Credit 2.3	Have in place a system for continuous tracking & optimization of systems that regulate indoor comfort & conditions.
Credit 2.4	2 Options: 1. 50% of regularly spaces have daylight illumanance at a certain level (several paths) 2. 45% of spaces have access to outdoor views.
Credit 3.1	Over PP have cleaning program supported by a green cleaning policy that addresses specific criteria.
Credit 3.2	Conduct an audit in accordance with APPA Leadership in Education Facilities' Custodial Staffing Guidelines. Facility must score 3 or less.
Credit 3.3	30% or more of actual cleaning purchases meet specific criteria.
Credit 3.4	Cleaning equipment must meet a set of sustainability criteria.
Credit 3.5	Employ permanent entryway (mats, grilles, etc) systems at least 10 feet long in the primary direction of travel at entries. Containment drains for haz mats.
Credit 3.6	Maintain Integrated Pest Management plan.

INDOOR ENVIRONMENTAL AIR QUALITY

Charette Comments December 4, 2009

	Practical Goal (Number of Points)	Stretch Goal (Number of Points)	Could be Standard Credit Across Campus	Could Be Applied Capuswide	List Ideas for Strategies / Paths to Achieving Stretch Goals
Indoor Environmental Quality					
Prereq 1	X				Low / no cost
Prereq 2	X		X	X	Low / no cost
Prereq 3	X		X	X	Low / no cost. Have a policy developed on new LEED NC projects, could be implmented here.
Credit 1.1	1				Low / no cost
Credit 1.2	1				Costly upfront, but definite savings due to large OA requirements, quick payback. (Artwork)
Credit 1.3					Not interested, increased energy use.
Credit 1.4	1		X	X	Low / no cost
Credit 1.5	1		X	X	Low/ no cost but required delaying reoccupaqncy of spaces while meeting flush out requirement not practical
Credit 2.1	1		X	X	Low / no cost
Credit 2.2	1				Low / no cost
Credit 2.3					Moderate Cost
Credit 2.4					Students could analyze spaces. May not be possible now due to interior configuration, could be made a goal with commitment to progress being made in each future renovaton of spaces in building
Credit 3.1	1				Low / no cost
Credit 3.2	1				Low cost
Credit 3.3	1				Low / no cost
Credit 3.4	1				Low / no cost
Credit 3.5	1				Low cost
Credit 3.6	1				Low / no cost
	12	12	5	5	

INDIANA UNIVERSITY
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LEED-EB O&M EXERCISE PARTICIPANT SIGN-IN SHEETS

TABLE: SUSTAINABLE SITES

TEAM MEMBER	AFFILIATION	EXPERTISE
ANITA DOUGLAS	IMU	FINANCE
NEIL MYERS	WILLAIMS CREEK	FINANCE
JENNIFER ROBERTS	ELEMENTS ENGINEERING	CIVIL ENGINEERING
KEN REMENSCHNEIDER	REMENSCHNEIDER	LANDSCAPE ARCHITECT
MIN YONG SHIN	BALL STATE	ARCHITECTURE
MICKEY MCGLASSEN	BALL STATE	ARCHITECTURE
ROB MEYER	IMU	ACTIVITIES/ EVENTS
GINELLE HELLER	IMU	OUTDOOR ACTIVITIES
GEORGE THOMAS	IMU	UNION BOARD
JACQUI BAUER	IU	SUSTAINABILITY WORKING GROUP

TABLE: WATER EFFICIENCY

TEAM MEMBER	AFFILIATION	EXPERTISE
CYNTHIA BRUBAKER	MIDDLE WAY HOUSE	GREEN BUILDING
GARY CHRZASTOWSKI	IMU	FACILITIES
CHUCK ANDREWS	RPS	NOT LISTED
RALPH BICKNESE	HELLMUTH + BICKNESE	GREEN BUILDING

TABLE: ENERGY & ATMOSPHERE

TEAM MEMBER	AFFILIATION	EXPERTISE
GRAEME SHARPE	SILVER CREEK ENGINEERIN(	ENGINEERING
JACK KANNADY	IMU	FACILITIES
PHIL YUSKA	PERFORMANCE SERVICES	RENEWABLE ENERGY
ANDY SMRIGA	IMU	BUILDING MANAGER
JEFF HONAKER	DUKE ENERGY	ELECTRIC ENERGY USAGE
BRUCE CALLOWAY	DUKE ENERGY	ENERGY DELIVERY C&M
BRUCE JACOBS	IMU	EXECUTIVE DIRECTOR
PAM CHAPMAN	DUKE ENERGY	ENERGY AREA MANAGER
TED MENDOZA	GENGEE LLC	WEPT/RCX

TABLE: MATERIALS & RESOURCES

TEAM MEMBER	AFFILIATION	EXPERTISE
NORA KAYDEN	SODEXO/ IUOS	SUSTAINABILITY/ FOOD
STEVE MANGAN	IMU/ SODEXO	DINING
SUSAN COLEMAN MORSE	UITS	COMPUTING
EMILIE REX	IUOS	ACADEMIC/ INTERNSHIPS
BRANDI HOST	IMU/ SODEXO	HOSPITALITY
WANDA EVANS	HELLMUTH + BICKNESE	LEED

TABLE: INDOOR ENVIRONMENTAL QUALITY

TEAM MEMBER	AFFILIATION	EXPERTISE
RON SZUMSKI	ECOLAB PEST MANAGEMENT	IPM AND PEST CONTROL
SHERRY ROUSE	IU ART MUSEUM	CURATOR OF CAMPUS ART
BRETT KRUG	SOLUTION AEC	ENGINEERING
THOM SIMMONS	IMU	MANAGEMENT
BILL BROWN	IUOS	DIRECTOR
DANIEL OVERBEY	BROWNING DAY MULLINS DIERDORF	ARCHITETURE/ ENERGY MODELING

INDIANA UNIVERSITY
BLOOMINGTON

IMU ECO-CHARRETTE: CONCEPTUAL DESIGN EXERCISE (AFTERNOON SESSION)

Background

The IMU despite its many positive attributes suffers from:

- Poor Internal Circulation.
- Poor visibility for Retail, Bookstore and Food Services.
- Hidden nature of Student Activities and Organizations.
- Lacks Open Gathering Spaces for Students to be see and be seen.
- Has its “back door” and service access facing East Seventh Street the new front door.
- Front access from East Seventh Street intimidating due to castle analogy of stairs and moat.

The success of the Starbucks and Art Gallery Lounge however highlights the potential of the IMU. Other major successes are the new Computer Lounge and Kiva Garden Patch as well as opening up the Tudor Room to students. A new outdoor courtyard will provide more visibility from the main entrance and expand the market for the Kiva venue.

New Student Unions are very open and flowing with both strong connections to the outdoors and open light areas inside. Despite these positive attributes, new Student Unions can never capture the character and charm of older, historic Student Unions. Opening up the IMU to the extent possible is a positive goal, but maintaining and building on its historic character and making this accessible is also critical.

In the Campus Master Plan, the Campus Core is a major focus and within that the IMU is one of the most prominent structures within the core. The plan calls for relocating the perimeter of campus and re-populating the center. It calls for the IMU to undergo major renovation to become the social and cultural destination on campus. The Campus Master Plan calls for 40,000 SF of additional retail and gathering spaces on campus of which 18,000 to 24,000 SF could be added to the IMU.

Campus Gathering Spaces

The IMU receives 20,000 visitors daily and the IMU Conference Center 750,000 visitors annually. The campus as a whole is underserved for retail, commercial, recreational, student run businesses and services, small restaurants, casual food, coffee houses and evening destinations many of which are the ideal for the IMU and are already provided at some level. The Campus Master Plan calls for 40,000 SF of additional retail and gathering spaces on campus of which 18,000 to 24,000 SF could be added to the IMU.

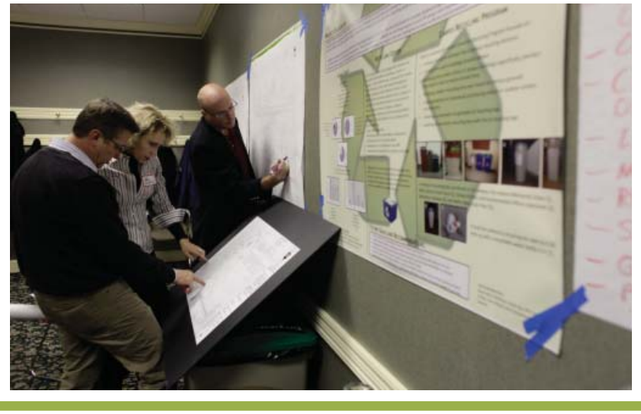
Residential Life

Goodbody, Memorial, Morrison and Sycamore Halls are proposed to be converted back to Residential Life to bring student activity closer to the Campus Core and the IMU. In summary the campus needs a wider variety of on-campus housing and locations nearer the Campus Core to reinforce the goal of a more walkable campus. And with the greater density around it, the IMU can provide more services at extended hours to help it achieve its mission of serving the student body.

Transportation

The East 7th Street Corridor from the IMU to the Auditorium is the “nexus of student, visitor & cultural life on campus and is the academic main street.”

North Woodlawn Avenue is proposed as a new street and a transit oriented roadway connecting the IMU with the Athletics Campus. This will also be a multi-modal corridor encouraging bicycle and pedestrian access.



Greening the IMU

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Conceptual Design Considerations

The Jordan River connects Griffy Lake to the Campus Core and to the City and is both a natural habitat corridor and potential promenade for the campus, the proposed improvements would not only greatly improve the aesthetics and environmental performance of the waterway but also bring more activity right by the front door of the campus.

A new Academic Plaza is envisioned across 7th Street to the north and a new Campus Green proposed for the existing surface parking lot serving the IMU hotel and conference center. This is located at the 100% pedestrian center of the campus and could further serve to re-position the center of gravity towards the Campus Core in general and the IMU in particular.

<u>Considerations</u>
Renovation to meet LEED-EB O&M Policies as determined in morning sessions for base level and stretch level.

What are some BIG GREEN IDEAS that would be exciting for the students, administration, IMU, and City that would at the same time draw more people into the building?

In light of funding structure, how can these renovations be best accomplished?

<u>Issues and Challenges</u>

- Access to building.
- Natural Light and Ventilation.
- Historic Character and Construction of the IMU.

<u>Objectives</u>

- Attract more Students, Faculty, Staff, Parents and the Public to the IMU.
- Serve Student Groups at a higher level.
- Provide Accessible and Visible Retail Space.
- Save Money on Energy Use, Explore Savings Allocation.

The top image depicts the proposed new campus green that would replace the existing IMU parking lot. The image below is an aerial snapshot of the proposed E. 7th Street Historic Core retrofit with the campus green.

Credit:
SMITHGROUP JJR

Greening the IMU

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Site and Building Program

Site Design and Parking

- Consider Pedestrian, Bicycle, Transit and Automobile Access to the IMU.
- IMU as Pedestrian nexus of campus.
- Effect of Woodlawn Avenue.
- Effect of Seventh Street "Commercial Street."
- Jordan River and the "March."
- Effect of creation of new Campus Green and Academic Plaza.
- Where could parking be relocated to maintain convenient parking for the Hotel and Conference Center, does the Master Plan structured parking solve the issue?

Alumni Hall/Stage and Solarium Renovation

- Opportunities on roof areas, expansion?

Food Service, Retail Space Renovation

- Visibility and Access
- Central Gathering Space
- Potential for additions
- Opening interior, getting natural light into the interior.
- Connection to Campus Community Garden.

Green Hotel and Conference Center Renovation

- Green Interior Finishes
- Linens, Towels
- Green Furniture
- Green Meetings
- Green Amenities (soaps, shampoo)
- Green Laundry, Dry Cleaning
- Energy Efficiency versus Guest Comfort Levels.

Student Office Renovations

- Visibility versus Hidden

Green Renovation and Upgrades - IMU

- HVAC Equipment
- Energy Efficiency Upgrades
- Building Automation Systems and Controls.
- Utility Metering.
- Building Performance Interface.
- Planned Upgrades.

IMU Hotel Entrance *(top)*, Indiana Memorial Union Biddle Hotel & Conference Center sign *(below)* and an IMU room with double beds *(left)*.

Greening the IMU

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TEAM 1

Site Discussion:

Create large plaza (hub for traffic, students, food, bikes, etc) adjacent to the north side of the building near the “main” entrance. The plaza would extend from the building towards 7th Street and would create better street access into the building. Two bridges over the restored wetland/ Jordan river to the new plaza would offer better accessibility and alleviate some of the IMU main entrance accessibility issues.

Construct an amphitheatre with performance space & seating next to the plaza on IMU side of 7th Street.

IMU parking is located within a sloped area- take advantage of existing conditions and maximize space. Leave the parking lot where it is and build a second level above the parking lot that is covered by greenscape, creating an open plaza for pedestrian and bicycle-oriented circulation. The greenscape would be located at even grade on the 100% corner.

Build a Transportation Hub across the parking lot on 7th Street, between North Forrest Avenue and North Woodland Avenue.

Get rid of the wall, moat, stairs since it makes entry inaccessible.

Intersection at 7th and Woodlawn becomes a pedestrian circle (like a round-about) with one plaza bridge connection to . Feudal décor with castle effects for grandeur.

Widen 7th street and create a separate lane for bicycles.

Locate a Bicycle Center (covered bicycle parking, etc) on the newly built plaza (above parking lot) above the hotel roundabout which would be located at lower grade.

Building Discussion:

Create a multi-story addition/ atrium with glazing all around to the south side of the building. The new addition might open to the escalators on the south side and function as a zero-energy facility. In appearance the addition might look similar to the Jordan Hall Greenhouse; three floors with jungle. PV panels and/ or solar hot water panels could cover the addition roof.

Improve Natural Lighting in Building:

- Bump out escalator/ stairwell exterior wall & make a glass/ Jordan hall-like greenhouse. The top could be a solar sustaining addition.
- Bookstore top floor skylight & other floors glazing- Add more glazing around bookstore to open up the space visually and allow more natural light.
- Alumni Hall & Solarium- skylights, natural light under ONE roof.

Create a wider corridor though bookstore Mezzanine level.

Greening the IMU

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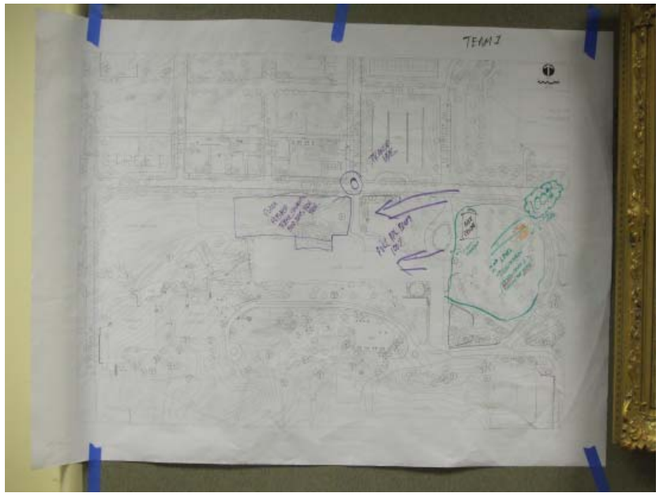
TEAM 1 Comments:

Powerful combination of underground parking in the master plan proposed “academic plaza” shifting over to the existing IMU surface parking lot which now becomes underground parking with the new master plan proposed campus green and the “100% corner”. Due to the scope the campus green would be “on grade along Forrest Avenue and one-story at the existing loop drop off. The bicycle transit helps reinforce ease of access to the IMU and ties into a bus transportation hub just north of 7th street. The idea of “pulling” people from the 100% corner into the IMU and increasing ease in bus access and pedestrian access is in combination very effective the plaza and bridge would also make access easier.

The atrium addition is a bold but potentially difficult from a historic and structural point of view but the concept is strong and in combination with opening the interior and making it more transparent is a critical challenge.



Greening the IMU

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TEAM 2

Site Discussion:

Jordan River Restoration- Native plants to eliminate bank erosion, add biodiversity, filter strip.

Install rain gardens/ native planted areas on the south side of IMU.

Disconnect downspouts.

Hotel parking: How to move people through the building instead of around it

- Follow the Master plan by:
  1. Creating a campus green current parking lot.
  2. Construct plaza at 7th, Woodlawn, North Forrest, and E. 8th Street.

The parking lot would remain below grade under the newly constructed campus green.

Redesign the parking lot hotel entry round-a-about.

Obstacles: Cost/ payback period, roof/ structural analysis/ bedrock.

Assets: External Roof Leaders/ good vertical relief/ possible student partnership/ education function.

Transportation HUB at 7th and Woodlawn Avenue- Strategic view, high access area, buses (city, IU, Indy airport shuttle)

- Bus stop becomes a multi-modal service/ Transit Hub
  - Accessible entrance to student side of IMU.
  - South side of 7th Street pedestrian corridor expansion (bikes/ runners/ walkers accessible) and separation from auto and dedicated bus aisle.
  - Bus shelter with PV roof.
  - Intermodal facilities at 7th and Woodlawn.

Kiva Patio- Create access to it from street, Visibility to intersection.

Parking retrofit/ plan- commuter lot amenities.

Alumni Club Access.

Automobile Way-finding to IMU.

Integrate hotel parking with master-planned greenscape near 100% corner.

Obstacles: Existing loading dock (truck access is poor now- block intersection to back into dock), traffic flow, gate house location, front of IMU “hidden” in back. Bedrock, Jordan River crossings.

Assets: Bus System, High use area- active, enlivens IMU traffic if traffic is captured.

Transit Hub will have:

- Bike Storage
- Public restrooms with showers
- Personal storage (for small and large items like skateboards)
- Wayfinding signage
- Food/ Coffee
- Bike Rental Hub
- Zip Car Hub
- Multi-use Trailhead

Building Discussion:

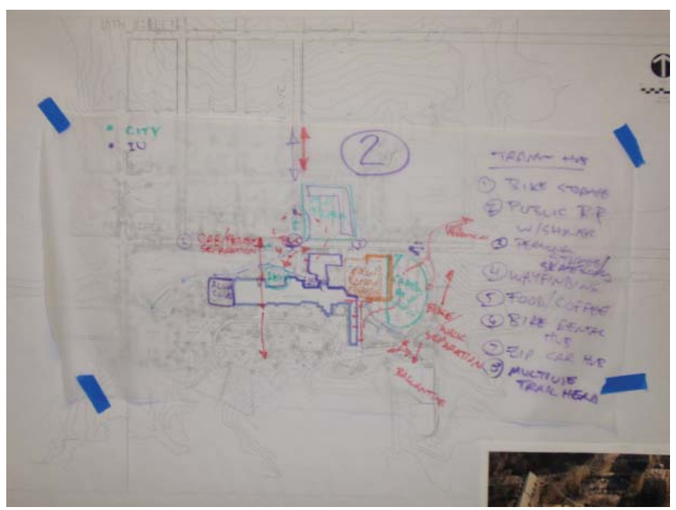
Green Roof- At entrance by the Starbucks visible to people entering building and dining. At hotel south entrance roof, visible from hotel rooms (advertise green roof view & possibly do green upgrades to those rooms for “green room marketing.” Green hotel accommodation packages/ Green Getaways.

Greening the IMU

Eco-Charrette

TEAM 2 Comments:

This approach really addressed the stormwater issues which show a strong effect of the LEED EB-O&M certification process. The combination parking/structure and campus green with a re-designed entry round-a-bout really seems to work well for the hotel. a multi-modal transit hub north of 7th street captures all the bus, pedestrian and bike traffic along with the potential for zip cars, green roofs, green hotel and green gateways really got to the big green ideas and link them with potentially powerful green marketing ideas.



Greening the IMU

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TEAM 3

Site Discussion:

Locate transportation shelter at 7th and Woodlawn bus stop and another further east transportation shelter at 7th Street bus stop curve at 100% corner.

Achieve light pollution reduction by retrofitting outdoor accent lighting at the hotel entrance off the parking lot.

Improve access to the Grand entrance on the North side by building a bridge off Woodlawn up to the plaza that will be located at Kiva entrance.

Add underground rainwater cisterns for water collection in several places surrounding the IMU.

Retrofit current motorcycle parking location across from IMU parking on 7th Street into a "Transit Hub" with Zip Cars, bike sharing, and air pumps for bicycles, etc.

Building Discussion:

Install green roofs in several locations on the IMU as well as photovoltaic panels. Rainwater catchments to water the green roof. Grow herbs for use in dining on greenroofs, tie-in with heirloom tomatoes sold at Wylie Hall.

Build two additions/ atriums onto the South side of IMU with a small outdoor plaza (congregation area) between them.

Install a Solar Tree (art feature) designed by local artist(s), and built by local contractor(s) in the outdoor plaza/ congregation area.

Install energy use monitors/ dashboards inside the building that will show real time energy use/ PV production, etc. Signage and/or monitors that highlight IMU green building features and information.

Install Hydration Stations throughout the building for refilling water bottles. re-usable water bottles.

Improvements to the Student offices (Floors, 4, 5, and 6):

The student offices were originally built as hotel rooms/ dorms with individual bathrooms. Currently there is space for only 45 groups.

1. Open up office areas so students can see one another and interact. Glass partitions, doors with window frames.
2. Remove individual bathrooms.
3. Central feature on each floor (fireplace) tables to encourage student interaction in common spaces and out of individual offices.
4. Create Mixture of private offices and common rooms for collaboration.

Common Rooms:

a. Consider moving storage off-site or to dedicated storage area.
b. Space for more groups (create "Think Tank" environment)
c. Modular/ open/ versatile

Kitchen and Laundry area ventilation problems- Add Make-up Air Handlers and utilize heat (heat reclamation) from common areas.

Example of a Solar Tree that could be customized by local artists for IU.

Greening the IMU

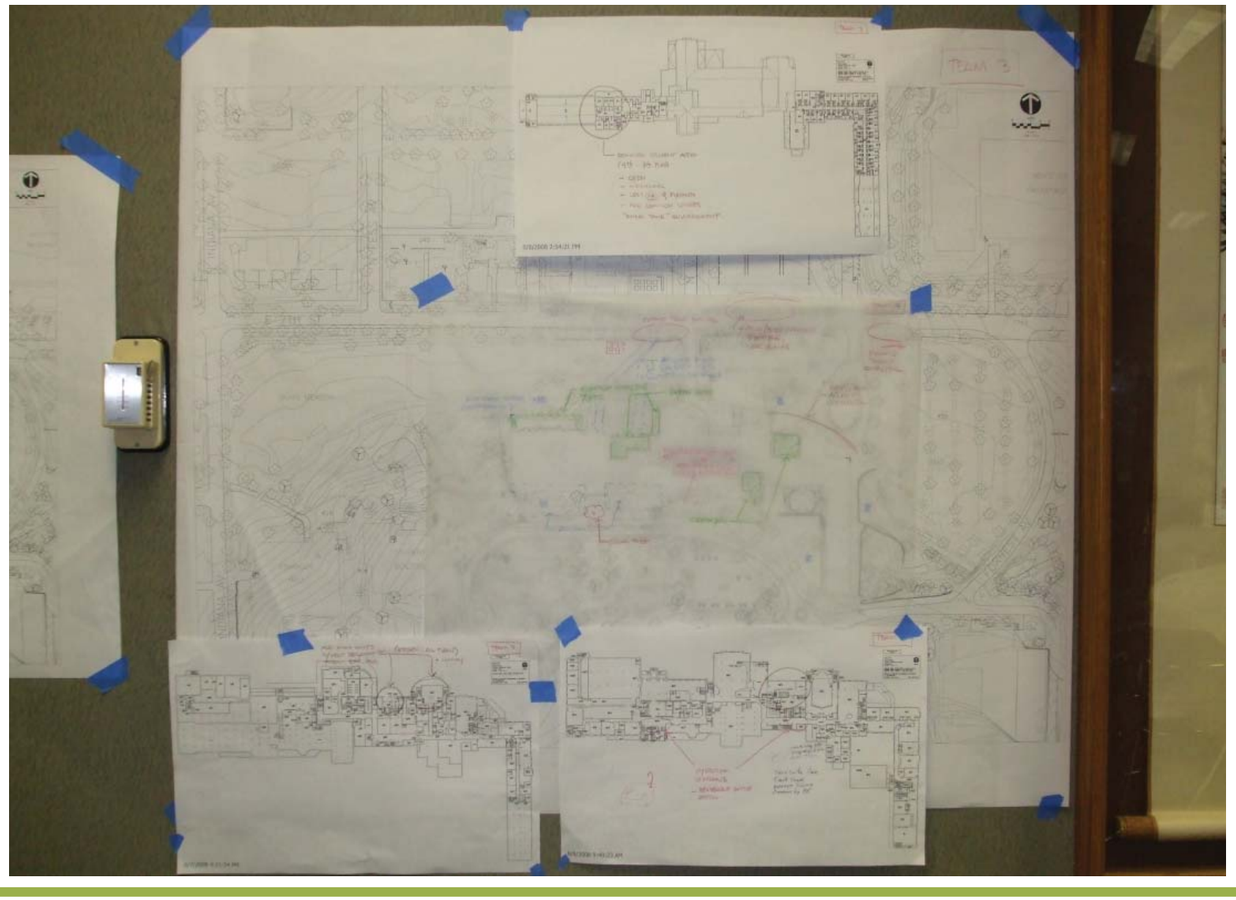
Eco-Charrette

TEAM 3 Comments:

A multi-modal transportation hub at 7th and Woodlawn combines bike, pedestrian, bus, motorcycles and zip cars and improved access across the Jordan invite the users into the IMU. More structural stormwater BMPs such as cisterns are recommended to help meet the stormwater quantity credit.

Atriums open up the interior with more light.

To make students and building users more aware of their impact, a building dashboard has been suggested in the lobbies to provide real-time feedback on building energy use. A unique approach to this team was the recommended renovation of the student offices which is after all the core mission of the IMU to support and a green approach would have a powerful message back to the students.



Greening the IMU

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TEAM 4

Site Discussion:

"Improve the North Side Experience"

Team goals was to improve functional, operational, and aesthetic value of the most prominent façade of the IMU, the North side.

Move loading dock to the west end of IMU with access from Indiana Avenue.
Turn area "5" into storeroom/ loading dock/ central service.

Locate transportation hub at 100% corner.

Building Discussion:

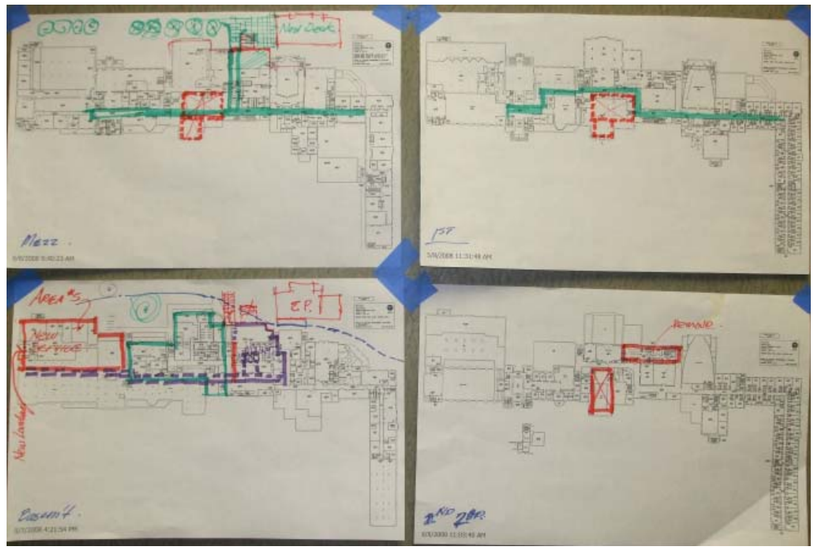
Move bookstore to Ernie Pyle building on 7th Street.

Add green roof to Ernie Pyle.
Remove the second (of three) floor of the current bookstore and replace with a couple walkways where people can hang out and observe others below, etc.

Consolidate kitchen (except Tudor kitchen) next to central service (central service spine).

Move maintenance to current storeroom area.

Create new atrium area with new grand staircase from 7th Street and Wood lawn area.



Greening the IMU

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TEAM 4 Comments:

Team 4 focused on the north side of the IMU. One of the bold ideas was to move the loading dock to the west end of the IMU which solves a lot of functional issues and frees up the area around the original loading dock. The creation of a central storage, loading dock and store room greatly streamlines the currently fractured service access to the building.

The transportation hub in this design moved over to the 100% corner.

One of the most powerful ideas in this group was to move the bookstore into the Ernie Pyle building which is a practical idea that bas been under consideration. this allows use of outside area between as sitting area and affords much better access of the students and public to the bookstore which suddenly becomes quite usable. The green roof on the building shows the potential in part of the LEED EB O&M certification.

The relocation of the bookstore creates a great opportunity for a new public entry to the IMU. Access from the south side of the building could then come into a grand hall with surrounding atrium providing vignettes to food service and retail opportunities and a view of other people in the building. Where now the elaborate vaulted ceiling and walkways are lost in the book store features. The open area where the bookstore is on the upper floor now connects directly to this service atrium and completely changes the perception coming down the corridor.

A new grand staircase on the south side entry also provides better and measurable access to the building. An overall kitchen consolidation along a central service spine could drastically streamline food service operations.

Ball State Architecture students, Mickey McGlasson and Min Yong Shin drew illustrations of the conceptual ideas for several groups.

Photo Credit: Chris Meyer

Greening the IMU

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TEAM 5

Site Discussion:

Create a “stealth dock” behind Ernie Pyle- Create a round-about at the cut-off of Woodlawn where it enters Ernie Pyle dock to create smoother traffic flow. Round-about will connect to an extended lot for parking/ unloading trucks.

Move bookstore into Ernie Pyle. The space in Ernie Pyle could accommodate the bookstore with space remaining for other uses such a café, office spaces.

Follow Master plan by:

1. Create a campus green above the current parking lot.
2. Create the public park square at 7th Street, N. Forrest, N. Woodlawn, and E. 8th Street.

Create a transportation hub off the new public park where motorcycle parking is currently located. A half circle for drop-off/ pick-up to alleviate traffic flow on 7th Street. Relocate 7th Street and Woodlawn bus stop to the transit hub. A designated pick-up lane for buses on the inside lane of the half circle. A covered transportation station with waiting area for bus travelers, an area to rent to Zip Cars (with a small adjacent lot into the public park), restrooms, and showers. Install solar panels on the covered transportation hub to create a self-sufficient structure.

Re-direct bus traffic from Woodlawn Ave to 8th Street and right at Forrest Avenue, and right at 7th into the Transportation Hub.

Building Discussion:

Renovate current bookstore into a common area- Create a common space with a lot of character in the union. Increase traffic into the union by re-purposing the historically charming grand hall for student use.

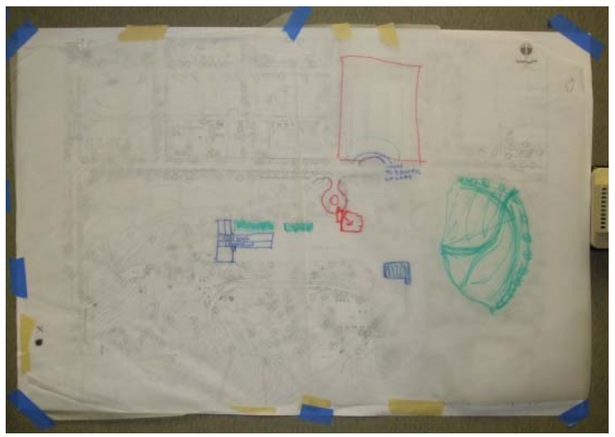
Enclose the south side courtyard outside of the tree suites with a glass atrium to encourage year-round use. Keep the large Kentucky Coffee tree in the courtyard. Fill space with plants to serve as a green refuge throughout the year.

Renovate Alumni Hall and Solarium to create a 1000-seat hall expansion. Rebuild the separate roofs on Solarium and Alumni Hall with one unified tall A-Frame roof with exposed support beams. Connect the floor space in Alumni Hall with the Solarium by removing the walls. Open up the dressing room next to Alumni Hal to the rest of the rooms and use temporary partitions/ room separations on an as needed basis.

Improve daylighting by potentially installing solar tubes in new roof of Alumni Hall and Solarium.

Install a green roof just on the roof next to the Solarium.

Install hot water panels on IMU roof (where feasible)- Fundraising money for installations could be achieved through a “Buy-A-Panel” program targeting alumni, and/ or student groups, etc.



Greening the IMU

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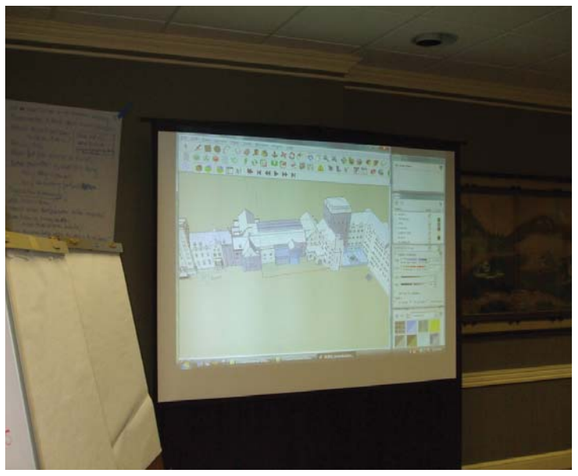
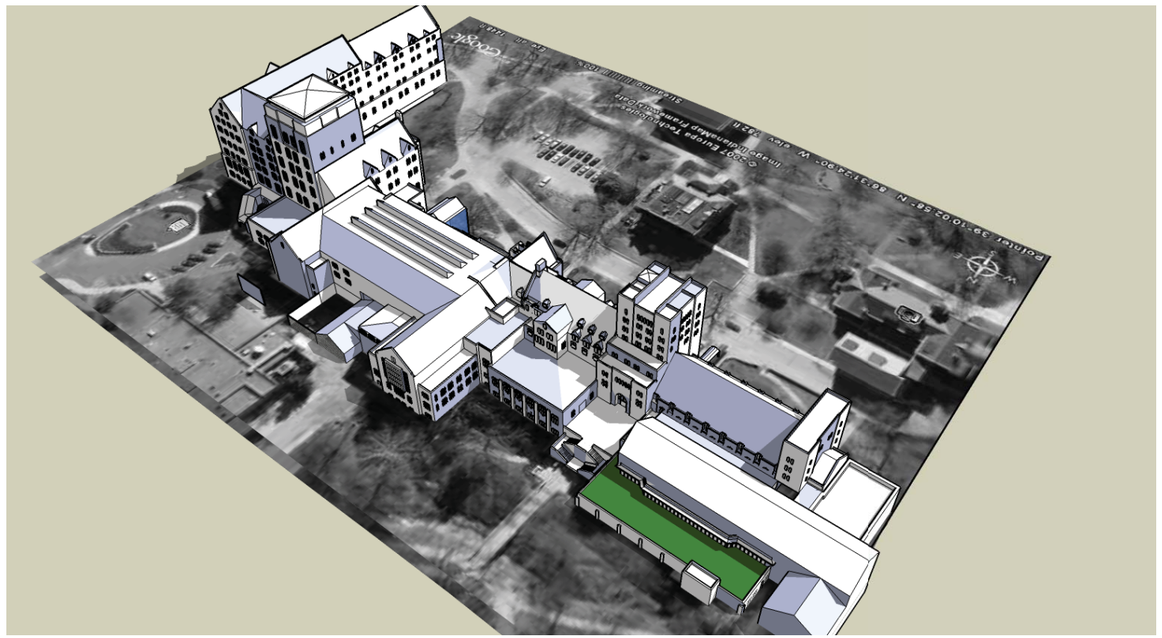
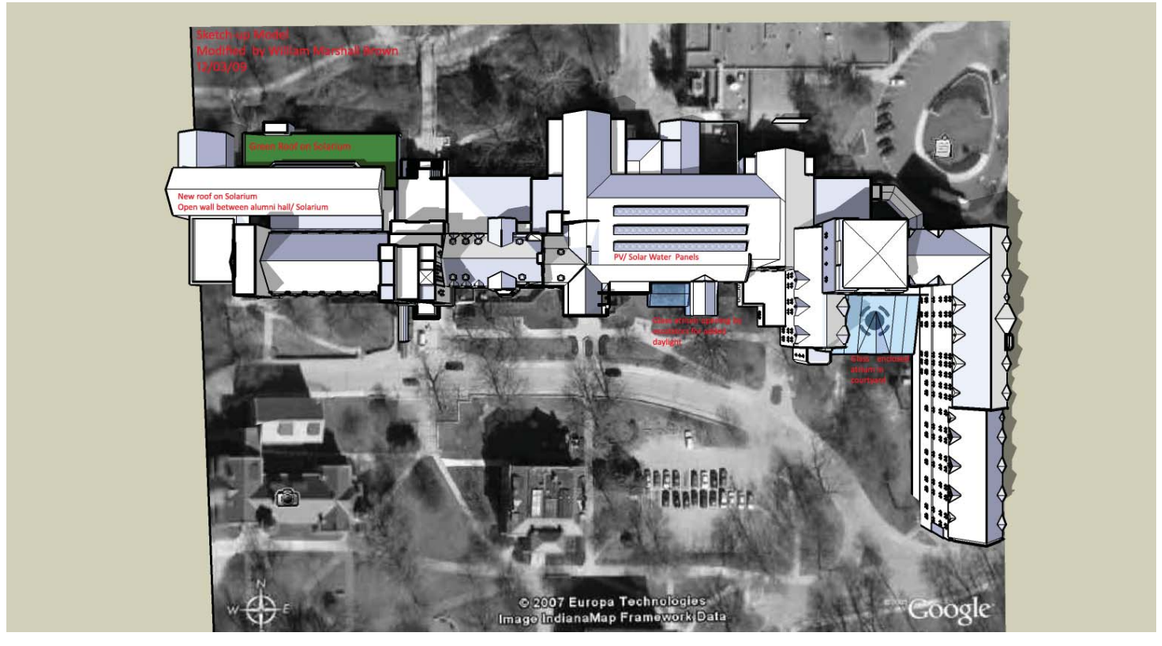
TEAM 5 Comments:

This team had very detailed and specific solution to the transportation hub which includes bus, zip cars and bikes. This works very well off the proposed new public park. The bookstore relocation into Ernie Pyle also frees up the current bookstore area for a more public student interaction area. Here the addition of atriums are more practical and could even have a heating benefit although natural ventilation to let the heat out would be critical. The renovation and addition of the Alumni Hall and Solarium have great market potential for the IMU and the green roofs and daylighting are in keeping with the LEED EB-O&M certification.







Greening the IMU

Eco-Charrette

Common Themes From Design Charrette

Thanks to the strong concepts brought together in the new campus master plan, the design ideas from the Office of the Architect , IMU administration, and the IUOS intern reports, the conceptual design teams had a great leg up on what improvements are needed for the IMU in the short and made in the long term. Filtering these through the focal lens of potential LEED-EB certifications make the recommended solutions all the more intriguing. Conceptual designs team kept sustainability at the fore-front of design alterations suggestions. Some of the common themes that emerged from the teams were:

Site

Multi-modal transportation hub:

- Bus
- Bike
- Car/zip car
- Pedestrian
- Shuttle (Airport, Indianapolis, Downtown)

At or near the 100% corner the hub would have a bike transit center, some concessions and be adjacent to a plaza or green space. The transit hub would have public restrooms with showers for bike commuters. Structures would have PV canopies and rainwater collection for non-potable water needs.

Campus Green and Structured Parking

This is the 100% corner and is also the most convenient and logical location for IMU parking especially for the hotel and conference center guests. Due to the topography the roof/green space would be at grade level along Forrest Avenue and one story at the existing IMU hotel lobby drop off. This location is in keeping with the vision of the master plan but more practical for the IMU.

Plaza (In Association with Transportation Hub)

This would be a gathering space to the north of the transportation hub bounded by 7th and 8th streets and Woodlawn and North Forrest. This is in conflict with the master plan that has structured parking and a new academic building but there may be a compromise with the structured parking no longer necessary and the new proposed building to the north side of the plaza along 8th street which creates a more energy efficient orientation (E & W).

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Conservation Stormwater Management

To both improve conditions along the Jordan River and to meet the LEED-EB O&M stormwater credit a variety of solutions were proposed that in total create a powerful interconnected approach.

- Implement a series of interconnected rain gardens and micro detention along the river in context with existing landscaping and accommodating water from all the IMU downspouts.
- Green roofs on Ernie Pyle to reduce this run-off and green roofs on small areas of the IMU to reduce its overall impact.
- All new plazas, paving, access roads to use pervious pavers and pavement.
- Stream bank restoration along the banks to restore degraded areas.
- Coordination of improvements with master plan proposed pedestrian/bike trail along the Jordan.
- Amphitheater, added bridge, pervious plazas along north side of IMU all geared at bringing more traffic to the IMU and making the activity more contagious.
- Underground detention as necessary to make up the difference.

Greening the IMU

Eco-Charrette

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Building

- Move bookstore to Ernie Pyle, create associated retail, café and outdoor space to make this location very prominent and fun to hang out in. Green renovation of building with green roof that would be very visible and effective on a two-story building. This should be a very visually green daylit building.

- Reconfigure bookstore "great hall" space into the main public node of the IMU. Create 2-story space with access from south entry. Configure other eating/shopping venues around upper arcade. This opening of the bookstore creates a visual opening along the long central east-west corridor on several levels and provides the missing "public heart" for the IMU.

- Renovation, addition to alumni hall and solarium into a vibrant green conference center adding green roof and bring more daylight into the space.

- Re-configure student office space in upper levels and towers into more open and collaborative space with better daylighting. Consider moving the IUOS into this area if appropriate.

- Loading dock, kitchen consolidation central service spine, storage area reconfiguration. Seriously consider the merits of Team #4 bold suggestions.

- Plaza, atrium, terrace implementation look at most practical and effective of these measures to open up the north side of the IMU and make it more visible to the high traffic count just outside the doors.

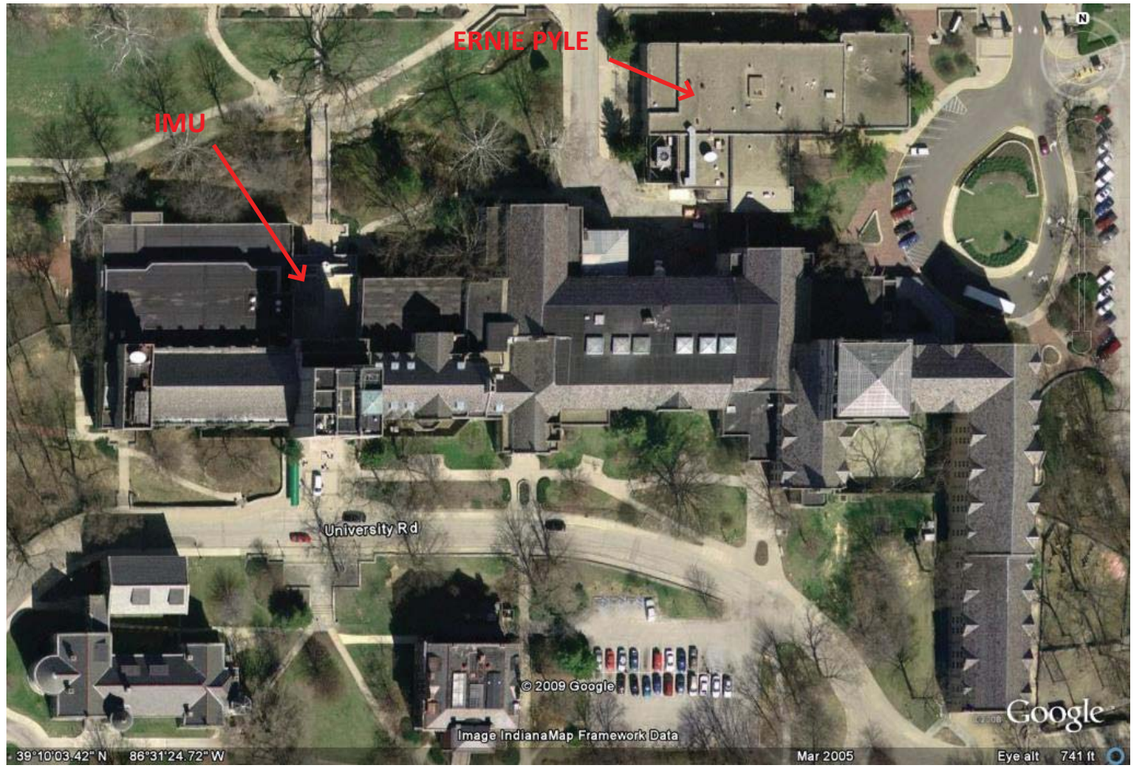
Other big green ideas include

- Building dashboard kiosks and displays at main entrances (also internet accessible).

- Green hotel and conference center (attract emerging market for environmentally sustainable meetings).

- Commit to 100% green power (green tags) at the IMU. Support local wind power in Indiana. Publicize and financially support through student drives.

Ernie Pyle School of Journalism is located North of the IMU. Ernie Pyle *(left)* is located just off 7th Street with good access of the street. An aerial view showing the proximity of the two buildings *(below)*.



CONCEPTUAL DESIGN PARTICIPANT SIGN-IN SHEETS

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INDIANA UNIVERSITY
BLOOMINGTON

STARS REPORTING TOOL

The Association for the Advancement of Sustainability in Higher Education (AASHE) has developed the Sustainability Tracking Assessment & Rating System (STARS) to help colleges and universities monitor and report their sustainability accomplishments and verify institutional claims.

STARS is designed to:

1. Provide a guide for advancing sustainability in all sectors of higher education.
2. Enable meaningful comparisons over time and across institutions by establishing a common standard of measurement for sustainability in higher education.
3. Create incentives for continual improvement toward sustainability.
4. Facilitate information sharing about higher education sustainability practices and performance.
5. Build a stronger, more diverse campus sustainability community.

STARS encourages environmental stewardship at higher education campuses through a voluntary, self-reporting framework for gauging relative progress toward sustainability. Colleges and universities of all sizes can register. Each institution is expected to include its entire main campus when collecting data, but may choose to include land holdings, facilities, and satellite campuses under institutional discretion. The STARS rating system targets the educational, administrative/ institutional commitment, and student engagement aspect of sustainability. The emphasis of this system is placed on student participation and involvement in furthering sustainability solutions. This rating system works well in conjunction with and is supplemental to the LEED rating systems, however it can be used independently as well.

The rating system is divided into three broad categories: Education & Research (ER), Operations (OP), and Planning, Administration & Engagement (PAE). Each broad category has subcategories that add up to a total of 100 points.

STARS 1.0 Table of Credits

Category 1: Education & Research (ER)		
Credit Number	**Credit Title**	**Possible Points**
Co-Curricular Education		
ER Credit 1	Student Sustainability Educators Program	5
ER Credit 2	Student Sustainability Outreach Campaign	5
ER Credit 3	Sustainability in New Student Orientation*	2
ER Credit 4	Sustainability Materials and Publications	4
Tier Two	*Co-Curricular Education Tier Two Credits*	2
Curriculum		
ER Credit 5	Sustainability Course Identification	3
ER Credit 6	Sustainability-Focused Courses	10
ER Credit 7	Sustainability-Related Courses	10
ER Credit 8	Sustainability Courses by Department*	7
ER Credit 9	Sustainability Learning Outcomes	10
ER Credit 10	Undergraduate Program in Sustainability*	4
ER Credit 11	Graduate Program in Sustainability*	4
ER Credit 12	Sustainability Immersive Experience*	2
ER Credit 13	Sustainability Literacy Assessment	2
ER Credit 14	Incentives for Developing Sustainability Courses	3
Research		
ER Credit 15	Sustainability Research Identification*	3
ER Credit 16	Faculty Involved in Sustainability Research*	10
ER Credit 17	Departments Involved in Sustainability Research*	6
ER Credit 18	Sustainability Research Incentives*	6
ER Credit 19	Interdisciplinary Research in Tenure and Promotion*	2
	Total	**100**

* credit does not apply to all institutions

INDIANA UNIVERSITY
BLOOMINGTON

Category 2: Operations (OP)		
Credit Number	**Credit Title**	**Possible Points**
Buildings		
OP Credit 1	Building Operations and Maintenance	7
OP Credit 2	Building Design and Construction*	4
OP Credit 3	Indoor Air Quality	2
Climate		
OP Credit 4	Greenhouse Gas Emissions Inventory	2
OP Credit 5	Greenhouse Gas Emissions Reduction	14
Tier Two	*Climate Tier Two Credits*	0.5
Dining Services		
OP Credit 6	Food Purchasing*	6
Tier Two	*Dining Services Tier Two Credits*	2.5
Energy		
OP Credit 7	Building Energy Consumption	8
OP Credit 8	Renewable Energy	7
Tier Two	*Energy Tier Two Credits*	1.5
Grounds		
OP Credit 9	Integrated Pest Management*	2
Tier Two	*Grounds Tier Two Credits*	1.25
Purchasing		
OP Credit 10	Computer Purchasing	2
OP Credit 11	Cleaning Product Purchasing	2
OP Credit 12	Office Paper Purchasing	2
OP Credit 13	Vendor Code of Conduct	1
Tier Two	*Purchasing Tier Two Credits*	0.5
Transportation		
OP Credit 14	Campus Fleet	2
OP Credit 15	Student Commute Modal Split*	4
OP Credit 16	Employee Commute Modal Split	3
Tier Two	*Transportation Tier Two Credits*	3
Waste		
OP Credit 17	Waste Reduction	5
OP Credit 18	Waste Diversion	3
OP Credit 19	Construction and Demolition Waste Diversion*	1
OP Credit 20	Electronic Waste Recycling Program	1
OP Credit 21	Hazardous Waste Management	1
Tier Two	*Waste Tier Two Credits*	1.5
Water		
OP Credit 22	Water Consumption	7
OP Credit 23	Stormwater Management	2
Tier Two	*Water Tier Two Credits*	1.25
	Total	**100**

* credit does not apply to all institutions

INDIANA UNIVERSITY
BLOOMINGTON

Cat. 3: Planning, Administration & Engagement (PAE)		
Credit Number	**Credit Title**	**Possible Points**
Coordination and Planning		
PAE Credit 1	Sustainability Coordination	3
PAE Credit 2	Strategic Plan*	6
PAE Credit 3	Physical Campus Plan*	4
PAE Credit 4	Sustainability Plan	3
PAE Credit 5	Climate Plan	2
Diversity and Affordability		
PAE Credit 6	Diversity and Equity Coordination	2
PAE Credit 7	Measuring Campus Diversity Culture	2
PAE Credit 8	Support Programs for Under-Represented Groups	2
PAE Credit 9	Support Programs for Future Faculty	4
PAE Credit 10	Affordability and Access Programs	3
Tier Two	*Diversity and Affordability Tier Two Credits*	0.75
Human Resources		
PAE Credit 11	Sustainable Compensation	8
PAE Credit 12	Employee Satisfaction Evaluation	2
PAE Credit 13	Staff Professional Development in Sustainability	2
PAE Credit 14	Sustainability in New Employee Orientation	2
PAE Credit 15	Employee Sustainability Educators Program	5
Tier Two	*Human Resources Tier Two Credits*	0.75
Investment		
PAE Credit 16	Committee Socially Responsible Investment*	2
PAE Credit 17	Shareholder Advocacy*	5
PAE Credit 18	Positive Sustainability Investments*	9
Tier Two	*Investment Tier Two Credits*	0.75
Public Engagement		
PAE Credit 19	Community Sustainability Partnerships	2
PAE Credit 20	Inter-Campus Collaboration on Sustainability	2
PAE Credit 21	Sustainability in Continuing Education*	7
PAE Credit 22	Community Service Participation	6
PAE Credit 23	Community Service Hours	6
PAE Credit 24	Sustainability Policy Advocacy	4
PAE Credit 25	Trademark Licensing *	4
Tier Two	*Public Engagement Tier Two Credits*	0.75
	Total	**100**

* credit does not apply to all institutions

Greening the IMU

Eco-Charrette

INDIANA UNIVERSITY BLOOMINGTON

LIST OF SUSTAINABILITY INTERN REPORTS

Green Cleaning

1. Nikki Ashkin, Green Cleaning (2008)
2. Stephanie Redick, Integrated Pest Management Pilot Program (2008)
3. Chris Kumfer, Green Chemistry Study (2007)

Food

1. Martin Sorge, Sustainable Food Procurement (2009/10)
2. Christina Musgrave & Kate Rogoski, Sustainable Food (2008/09)
3. Alayna Herr, Measuring the Carbon Footprint: Food Purchased for all Indiana University Residence Dining Halls (2008)
4. Jessica Colaluca, Local Food Purchasing Alternatives (2008)
5. Jessica Colaluca, Food Project : IUB Residential Programs and Services
6. The Working Group on Food (2007)
7. Andrew Shelby, Food Survey (2007)

Energy

1. Farah Abi-Akar, Strategic Energy Planning (2010)
2. McKenzie Beverage, IU Energy Challenge (2010)
3. Paul Stanley, Non-Academic Energy Audits (2010)
4. John Miller, Campus Energy Metric Development (2009)
5. Veronica Rog, Utility Department Media Relations (2009)
6. Gavin Merriman, Utility Conservation: Non-Academic Buildings (2009)
7. McKenzie Beverage, IU Energy Challenge 2009 (2009)
8. Rachel Weeks, Utility Conservation: Water & Energy (2009)
9. Brian Wright, Utility Conservation: Auxiliary Departmental Buildings (2009)
10. Abby Schwimmer, Central Heating Plant Media Relations (2009)
11. James Pierce, Energy Aware Campus Dwelling: Eco-Visualization and the IU Energy Challenge (2008)
12. David Roedl, Interactive Utility Display: Conservation Through Awareness (2008)
13. Jonathan Brooks Bell, Towards Carbon Neutrality at Indiana University (2008)
14. Laura Kunz, Energy Density Benchmarking (2007)
15. David Fuente and Matt Robinson, Excellence in Metering (2007)

Transportation

1. Andrew Davis, Bike & Pedestrian Infrastructure (2009/10
2. Sarah Germann, Carsharing Implementation Study (2009/10)
3. Ashleigh Klingman, Feasibility of Acquiring Alternatively Fueled Buses (2009/10)
4. Wes Kocher, Transportation Demand Management (2009)
5. Patrick Bourland, Bicycle & Pedestrian Infrastructure (2009)
6. Michael Steinhoff & Julie Harpring, Transportation & Sustainability on the Indiana University, Bloomington Campus (2008)
7. Jonathan Brooks Bell, Towards Carbon Neutrality at Indiana University (2008)
8. Justin Naab, Transportation Subcommittee Intern Presentation (2007)

Conservation Stormwater Management

1. Kari Metcalf, Wetland & Stream Inventory of IUB and five Regional Campuses (2009/10)
2. Anya Hopple, Campus Wetlands Inventory (2009)
3. Heather Giles, Water Conservation (2008)
4. Neil Sahu, Indiana University Griffy Lake Watershed (2008)
5. Rachel Powers & Nancy Arazan, Jordan River Master plan Proposal (2008)

Landscaping

1. Wesley Kocher, Native Landscaping
2. Zach Brown & Marie Buckingham, Prairie Restoration & Labyrinth Development (2009/10)
3. Trevor Hegedorn, Campus Tree Inventory (2009)
4. Richard Thurau, Indiana University Campus Tree Inventory & GIS Analysis (2008)
5. Brandon Schmitt, Tree Distribution and GIS Analysis (2007)

Greening the IMU

Eco-Charrette

INDIANA UNIVERSITY
BLOOMINGTON

Green Building Policy

1. Nathan Bower-Bir, Greening of the IMU Charrette (2009/10)
2. Nathan Bower-Bir, LEED Documentation (2009)
3. Melissa Enoch, Building Standards & Sustainable Design Practices (2008)
4. Melissa Enoch, Incorporating Environmental Sustainability into Indiana University's Building Standards (2007)

Water Conservation

1. Heather Giles, Water Conservation (2008)
2. James Pierce, Energy Aware Campus Dwelling: Eco-Visualization and the IU Energy Challenge (2008)
3. David Roedl, Interactive Utility Display: Conservation Through Awareness (2008)
4. David Fuente and Matt Robinson, Excellence in Metering (2007)

Climate Change Initiative

1. Devin Hartman, Presidents Climate commitment/ Climate Action Plan (2009)
2. Jonathan Brooks Bell, Towards Carbon Neutrality at Indiana University (2008)

Green Computing/ E-Waste

1. Laura Knudsen, E-Waste Solutions (2009/10)
2. Susan Coleman-Morse, Sustainable Computing Practices (2009)
3. Laura Knudsen, E-Waste Solutions IUB & IUPUI (2009)
4. Kristin Hanks, Sustainable Computing (2008)

Education, Student Involvement, & Outreach

1. Laura Nading, Integrating Sustainability into First Year Experience Programs (2009/10)
2. Isaac Farley, Greening of the Athletic Department (2009/10)
3. Jamie Panunzio, Sustainability Reporting Research & Database (2009/10)
4. Hana Ros, College Themester (2009)
5. Sarah Vessel, Green Team Coordination & Planning (2009/10)
6. Marie Buckingham, Funding Opportunities for IUOS (2009/10)
7. Andy Davis, Communications & Outreach (2009)
8. David Gehl, Campus Sustainability Reporting Research & Database (2009)
9. Jenna Morrison, Funding Opportunities for Campus Sustainability Projects (2009)
10. Aimee Light, Diversity & Sustainability (2008)
11. Kevin Pozzi, Green Orientation Guide (2008)
12. Joshua Hunter, Education & Community Outreach (2008)
13. Isabel Estevez, Communications (2008)
14. Adity Mutsuddi, Sustainability Website (2007)
15. Faye Wanchic, Peer Survey of University Sustainability Programs (2007)
16. Joice Chang, Outreach study (2007)
17. Tatyana Ruseva, Survey of Academic Sustainability Programs (2007)

IUOS Summer Interns 2009
Photo Credit: IUOS website

INDIANA UNIVERSITY
BLOOMINGTON

Utility Data

BUILDING INFORMATION REQUEST FORM

WATER

What year was the plumbing system for water use fixtures substantially completed?
☒ Pre-1994
☐ 1994 or later

Does the building have a main water meter that measures water use for the entire building and associated grounds?
☒ Yes
☐ No

Does the building have meters for any of the following?
☐ Irrigation water – potable
☐ Irrigation water – non-potable
☐ Indoor plumbing fixtures
☐ Cooling Towers
  ☐ Make-up Water
  ☐ Blow-down Water
  ☐ Conductivity Meter
☐ Hot water heating
☐ Process water:
  ☐ Humidification
  ☐ Restaurants / Cafeterias / Kitchens
  ☐ Laundry
  ☐ Pools
  ☐ Manufacturing
  ☐ Other: not sub-metered

Are meters measuring potable water use continuous and data-logged?
☐ Yes
☒ No

Are meters compiled monthly with annual summaries?
☐ Yes
☒ No

Are the meters calibrated annually?
☐ Yes
☒ No

Please provide the flow rates and quantities for all water fixtures of the following types that are present in the building. Use additional lines when flow/flush rates vary.

Water Closets	Flow Rate	# of Fixtures	Auto Controls Present? Y/N
Men's	?	23	N/A
Women's	?	35	N/A
Urinals	?	29	N/A
Lavatory faucets	?	62	N
Kitchen faucets	?	?	N/A
Showers	?	4	N/A
Janitorial faucets	?	?	N/A

Water Closets	Flow Rate	# of Fixtures	Auto Controls Present? Y/N
Men's	?	189 (hotel)	N/A
Women's			N/A
Urinals			N/A
Lavatory faucets	?	189	N
Kitchen faucets			N/A
Showers	?	189	N/A
Janitorial faucets			N/A

Water Closets	Flow Rate	# of Fixtures	Auto Controls Present? Y/N
Men's			N/A
Women's			N/A
Urinals			N/A
Lavatory faucets			
Kitchen faucets			N/A
Showers			N/A
Janitorial faucets			N/A

INDIANA UNIVERSITY
BLOOMINGTON

ENERGY

Please provide 12 months of energy use data for each energy source below.

Energy Source	Annual Energy Use
Electricity	6,783,999 kWh
Natural Gas	20,170 therms
Fuel Oil	
Steam	35,800,990 lbs (condensate)
Diesel	
On-site Renewable	
Solar	
Wind	
Other	
Off-site Renewable	
Solar	
Wind	
Other (e.g. REC use/purchase)	
Other	
Chilled Water	4,109,081 ton-hours
Water	13,501,446 gallons

Please list any energy source types listed above that are **not** individually metered:

Is all energy consumed on the site and building metered?
- [x] Yes
- [ ] No

Is there system level metering (e.g. process loads, separate uses, parking, cooling, etc.) for total annual energy consumption in the building?
- [ ] Yes
- [x] No

If yes, what percent of consumption is metered?
- [ ] 40%
- [ ] 80%
- [ ] Other: _____

List what systems are metered:

Can break down electrical system into 3 zones, geographic.
2 zones for chilled water.
2 zones for steam (measure condensate).
1 meter for water.
1 meter for gas.

Does the building use heating or cooling from a district or campus heating system?
- [x] Yes
- [ ] No

If yes, is the amount of heating energy delivered to the building metered?
- [x] Yes
- [ ] No

If yes, is the amount of cooling energy delivered to the building metered?
- [x] Yes
- [ ] No

Does the building's HVAC & Refrigeration system contain CFCs?
- [x] Yes

If yes, what system(s) and refrigerant type?

Freon refrigeration (mainly food service)---old units, haven't gone bad so haven't been replaced.

- [ ] No

Does the building's HVAC and Refrigeration system contain HCFCs?
- [ ] Yes

If yes, what system(s) and refrigerant type?

- [ ] No

Is there a fire suppressions system containing Halons?
- [ ] Yes
- [x] No

VENTILATION

Complete the following table, adding rows as necessary until each air handler has been included. The air handlers listed should be involved with delivering outside air to the building occupants

AHU	Area Served (sq ft)	Estimated Occupancy (#)	Main Space Type*
Please see separate document	named "IMU AHU Breakdown.xlsx"		

*Enter the main space type (the majority of the space) that each air handling unit serves. Common building space types include office space, conference/meeting, lobbies, cafeteria/fast food dining, and health club/aerobics rooms.

How many Air Handling Units does the building have? 36

If there is not a large quantity of AHUs (more than 10), please provide a brief description of the delivery system (e.g. there are two AHUs, each serving ½ of the building or by floor or wing):

Have the air handling units been tested and balanced within the past 2 years?
☐ Yes
☒ No

If yes, did the TAB report include outside air (OA) measurements?
☐ Yes
☐ No

MECHANICAL

Describe type of heating system used in building (Examples: ground source heat pump, natural gas boiler, electric resistance, etc.): metered:

Steam from campus CHP.

What is/are the heating fuel(s)? coal (90%), natural gas (10%)

Describe type of cooling system used in building (Example: terminal reheat): metered:

Chilled water from cooling plant.

What is/are the cooling system fuel(s)? electricity

What is the MERV rating of the filters for outside air intakes and returns?
Returns: _____
Outside Air intakes: _____

INDIANA UNIVERSITY
BLOOMINGTON

BUILDING AUTOMATION SYSTEM

Is there a computer-based building automation system (BAS) that monitors and controls key building systems?

- ☒ Yes
- ☐ No

If yes, what does the BAS monitor?

- ☒ Air Handling Unit (AHU)
  - ☒ Temperature
    - ☐ OA Temperature
    - ☐ Supply Air
    - ☐ Return Air
  - ☐ Relative Humidity
  - ☐ CO_2
  - ☒ Supply cfm
  - ☒ Return cfm
  - ☒ Outside Air cfm
  - ☐ Other: _____
- ☒ Variable Air Volume (VAVs)
  - ☒ Temperature
  - ☒ Cfm
  - ☐ Other: _____
- ☒ Space Conditions (with in space sensors)
  - ☒ Temperature
  - ☐ Relative Humidity
  - ☐ CO_2
  - ☐ Other: _____
- ☐ Lighting
  - ☐ Schedule
  - ☐ Requests
  - ☐ Other: _____

SYSTEM METERING

Does the building have metering for any of the following (please check the appropriate box:

- ☐ Lighting
- ☐ Separate electric meters for process load
- ☐ Separate natural gas meters for process loads
- ☐ Separate meters to aggregate water use
- ☒ Chilled water system loads
- ☐ Cooling loads
- ☐ Air and water economize/heat recovery
- ☐ Boiler efficiencies
- ☐ Process loads and efficiencies
- ☐ Motor loads (constant and variable)
- ☐ Variable frequency drive (VFD) operation
- ☐ Air distribution, static pressure, and ventilation air volumes
- ☐ Other:

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INDIANA UNIVERSITY
BLOOMINGTON

Utility Metering Data by Month

02/10/10

UTILITY INFORMATION GROUP
INDIANA MEMORIAL UNION
08/01/08

BLDG.	BUILDING NAME	METER SIZE	METER TYPE	PREVIOUS READING DATE	PREVIOUS READING	METER UNITS 07/01/08	CURRENT READING DATE	CURRENT READING	METER UNITS 08/01/08	% CHANGE FROM PREVIOUS MO.	MULT.	POUNDS COND, GAL or KWH	LBS/HR or GAL/KWH PER DAY JUN	LBS/HR or GAL/KWH PER DAY JUL	% CHANGE FROM PREVIOUS MO.
BL053	IMU	1 1/2"	COND	07/01/08	286000	32000	08/01/08	321000	35000	9.4%	1	291,900	383	392	2.3%
BL053	IMU	2"	COND	07/01/08	477800	25700	08/01/08	505200	27400	6.6%	1	228,516	308	307	-0.3%
BL053	IMU	4"	D	07/01/08	2007	592	08/01/08	2597	590	-0.3%	1,000	590,000	20,414	19,032	-6.8%
BL053	IMU	4"	D	07/01/08	2101	608	08/01/08	2710	609	0.2%	1,000	609,000	20,966	19,645	-6.3%
BL053	IMU	1"	I	07/01/08	10	0	08/01/08	10	0		400	0	0	0	

IMU 08-09

02/10/10

UTILITY INFORMATION GROUP
INDIANA MEMORIAL UNION
09/02/08

BLDG.	BUILDING NAME	METER SIZE	METER TYPE	PREVIOUS READING DATE	PREVIOUS READING	METER UNITS 08/01/08	CURRENT READING DATE	CURRENT READING	METER UNITS 09/02/08	% CHANGE FROM PREVIOUS MO.	MULT.	POUNDS COND, GAL or KWH	LBS/HR or GAL/KWH PER DAY JUL	LBS/HR or GAL/KWH PER DAY AUG	% CHANGE FROM PREVIOUS MO.
BL053	IMU	1 1/2"	COND	08/01/08	321000	35000	09/02/08	360000	39000	11.4%	1	325,260	392	424	7.9%
BL053	IMU	2"	COND	08/01/08	505200	27400	09/02/08	537300	32100	17.2%	1	267,714	307	349	13.5%
BL053	IMU	4"	D	08/01/08	2597	590	09/02/08	3223	626	6.1%	1,000	626,000	19,032	19,563	2.8%
BL053	IMU	4"	D	08/01/08	2710	609	09/02/08	3372	662	8.7%	1,000	662,000	19,645	20,688	5.3%
BL053	IMU	1"	I	08/01/08	10	0	09/02/08	10	0		400	0	0	0	

IMU 08-09

INDIANA UNIVERSITY
BLOOMINGTON

Utility Metering Data by Month

02/10/10

UTILITY INFORMATION GROUP
INDIANA MEMORIAL UNION
10/01/08

BLDG.	BUILDING NAME	METER SIZE	METER TYPE	PREVIOUS READING DATE	PREVIOUS READING	METER UNITS 09/02/08	CURRENT READING DATE	CURRENT READING	METER UNITS 10/01/08	% CHANGE FROM PREVIOUS MO.	MULT.	POUNDS COND, GAL or KWH	LBS/HR or GAL/KWH PER DAY AUG	LBS/HR or GAL/KWH PER DAY SEP	% CHANGE FROM PREVIOUS MO.
BL053	IMU	1 1/2"	COND	09/02/08	360000	39000	10/01/08	399000	39000	0.0%	1	325,260	424	467	10.3%
BL053	IMU	2"	COND	09/02/08	537300	32100	10/01/08	566800	29500	-8.1%	1	246,030	349	353	1.4%
BL053	IMU	4"	D	09/02/08	3223	626	10/01/08	3851	628	0.3%	1,000	628,000	19,563	21,655	10.7%
BL053	IMU	4"	D	09/02/08	3372	662	10/01/08	4037	665	0.5%	1,000	665,000	20,688	22,931	10.8%
BL053	IMU	1"	I	09/02/08	10	0	10/01/08	11	1		400	400	0	14	
BL053	IMU	3"	COND	09/03/08	0		10/01/08	126700	126700		1	1,056,678		1,572	

IMU 08-09

02/10/10

UTILITY INFORMATION GROUP
INDIANA MEMORIAL UNION
10/31/08

BLDG.	BUILDING NAME	METER SIZE	METER TYPE	PREVIOUS READING DATE	PREVIOUS READING	METER UNITS 10/01/08	CURRENT READING DATE	CURRENT READING	METER UNITS 10/31/08	% CHANGE FROM PREVIOUS MO.	MULT.	POUNDS COND, GAL or KWH	LBS/HR or GAL/KWH PER DAY SEP	LBS/HR or GAL/KWH PER DAY OCT	% CHANGE FROM PREVIOUS MO.
BL053	IMU	1 1/2"	COND	10/01/08	399000	39000	10/31/08	444000	45000	15.4%	1	375,300	467	521	11.5%
BL053	IMU	2"	COND	10/01/08	566800	29500	10/31/08	624800	58000	96.6%	1	483,720	353	672	90.1%
BL053	IMU	4"	D	10/01/08	3851	628	10/31/08	4546	695	10.7%	1,000	695,000	21,655	23,167	7.0%
BL053	IMU	4"	D	10/01/08	4037	665	10/31/08	4757	720	8.3%	1,000	720,000	22,931	24,000	4.7%
BL053	IMU	1"	I	10/01/08	11	1	10/31/08	11	0		400	0	14	0	
BL053	IMU	3"	COND	10/01/08	126700	126700	10/31/08	400600	273900	116.2%	1	2,284,326	1,572	3,173	101.8%

IMU 08-09

INDIANA UNIVERSITY
BLOOMINGTON

Utility Metering Data by Month

02/10/10

UTILITY INFORMATION GROUP
INDIANA MEMORIAL UNION
12/01/08

BLDG.	BUILDING NAME	METER SIZE	METER TYPE	PREVIOUS READING DATE	PREVIOUS READING	METER UNITS 10/31/08	CURRENT READING DATE	CURRENT READING	METER UNITS 12/01/08	% CHANGE FROM PREVIOUS MO.	MULT.	POUNDS COND, GAL	LBS/HR or GAL PER DAY OCT	LBS/HR or GAL PER DAY NOV	% CHANGE FROM PREVIOUS MO.
BL053	IMU	1 1/2"	COND	10/31/08	444000	45000	12/01/08	499000	55000	22.2%	1	458,700	521	617	18.3%
BL053	IMU	2"	COND	10/31/08	624800	58000	12/01/08	727000	102200	76.2%	1	852,348	672	1,146	70.5%
BL053	IMU	4"	D	10/31/08	4546	695	12/01/08	5019	473	-31.9%	1,000	473,000	23,167	15,258	-34.1%
BL053	IMU	4"	D	10/31/08	4757	720	12/01/08	5261	504	-30.0%	1,000	504,000	24,000	16,258	-32.3%
BL053	IMU	1"	I	10/31/08	11	0	12/01/08	11	0		400	0	0	0	
BL053	IMU	3"	COND	10/31/08	400600	273900	12/01/08	749000	348400	27.2%	1	2,905,656	3,173	3,905	23.1%

IMU 08-09

02/10/10

UTILITY INFORMATION GROUP
INDIANA MEMORIAL UNION
01/02/09

BLDG.	BUILDING NAME	METER SIZE	METER TYPE	PREVIOUS READING DATE	PREVIOUS READING	METER UNITS 12/01/08	CURRENT READING DATE	CURRENT READING	METER UNITS 01/02/09	% CHANGE FROM PREVIOUS MO.	MULT.	POUNDS COND, GAL	LBS/HR or GAL PER DAY NOV	LBS/HR or GAL PER DAY DEC	% CHANGE FROM PREVIOUS MO.
BL053	IMU	1 1/2"	COND	12/01/08	499000	55000	01/02/09	567000	68000	23.6%	1	567,120	617	738	19.8%
BL053	IMU	2"	COND	12/01/08	727000	102200	01/02/09	846700	119700	17.1%	1	998,298	1,146	1,300	13.5%
BL053	IMU	4"	D	12/01/08	5019	473	01/02/09	5402	383	-19.0%	1,000	383,000	15,258	11,969	-21.6%
BL053	IMU	4"	D	12/01/08	5261	504	01/02/09	5671	410	-18.7%	1,000	410,000	16,258	12,813	-21.2%
BL053	IMU	1"	I	12/01/08	11	0	01/02/09	11	0		400	0	0	0	
BL053	IMU	3"	COND	12/01/08	749000	348400	01/02/09	1187300	438300	25.8%	1	3,655,422	3,905	4,760	21.9%

IMU 08-09

INDIANA UNIVERSITY
BLOOMINGTON

Utility Metering Data by Month

02/10/10

UTILITY INFORMATION GROUP
INDIANA MEMORIAL UNION
02/02/09

BLDG.	BUILDING NAME	METER SIZE	METER TYPE	PREVIOUS READING DATE	PREVIOUS READING	METER UNITS 01/02/09	CURRENT READING DATE	CURRENT READING	METER UNITS 02/02/09	% CHANGE FROM PREVIOUS MO.	MULT.	POUNDS COND, GAL	LBS/HR or GAL PER DAY DEC	LBS/HR or GAL PER DAY JAN	% CHANGE FROM PREVIOUS MO.
BL053	IMU	1 1/2"	COND	01/02/09	567000	68000	02/02/09	639000	72000	5.9%	1	600,480	738	807	9.3%
BL053	IMU	2"	COND	01/02/09	846700	119700	02/02/09	929100	82400	-31.2%	1	687,216	1,300	924	-28.9%
BL053	IMU	4"	D	01/02/09	5402	383	02/02/09	5682	280	-26.9%	1,000	280,000	11,969	9,032	-24.5%
BL053	IMU	4"	D	01/02/09	5671	410	02/02/09	6016	345	-15.9%	1,000	345,000	12,813	11,129	-13.1%
BL053	IMU	1"	I	01/02/09	11	0	02/02/09	11	0		400	0	0	0	
BL053	IMU	3"	COND	01/02/09	1187300	438300	02/02/09	1635500	448200	2.3%	1	3,737,988	4,760	5,024	5.6%

IMU 08-09

02/10/10

UTILITY INFORMATION GROUP
INDIANA MEMORIAL UNION
03/02/09

BLDG.	BUILDING NAME	METER SIZE	METER TYPE	PREVIOUS READING DATE	PREVIOUS READING	METER UNITS 02/02/09	CURRENT READING DATE	CURRENT READING	METER UNITS 03/02/09	% CHANGE FROM PREVIOUS MO.	MULT.	POUNDS COND, GAL	LBS/HR or GAL PER DAY JAN	LBS/HR or GAL PER DAY FEB	% CHANGE FROM PREVIOUS MO.
BL053	IMU	1 1/2"	COND	02/02/09	639000	72000	03/02/09	693000	54000	-25.0%	1	450,360	807	670	-17.0%
BL053	IMU	2"	COND	02/02/09	929100	82400	03/02/09	971900	42800	-48.1%	1	356,952	924	531	-42.5%
BL053	IMU	4"	D	02/02/09	5682	280	03/02/09	6226	544	94.3%	1,000	544,000	9,032	19,429	115.1%
BL053	IMU	4"	D	02/02/09	6016	345	03/02/09	6607	591	71.3%	1,000	591,000	11,129	21,107	89.7%
BL053	IMU	1"	I	02/02/09	11	0	03/02/09	11	0		400	0	0	0	
BL053	IMU	3"	COND	02/02/09	1635500	448200	03/02/09	2090100	454600	1.4%	1	3,791,364	5,024	5,642	12.3%

IMU 08-09

INDIANA UNIVERSITY
BLOOMINGTON

Utility Metering Data by Month

02/10/10

UTILITY INFORMATION GROUP
INDIANA MEMORIAL UNION
04/01/09

BLDG.	BUILDING NAME	METER SIZE	METER TYPE	PREVIOUS READING DATE	PREVIOUS READING	METER UNITS 03/02/09	CURRENT READING DATE	CURRENT READING	METER UNITS 04/01/09	% CHANGE FROM PREVIOUS MO.	MULT.	POUNDS COND, GAL	LBS/HR or GAL PER DAY FEB	LBS/HR or GAL PER DAY MAR	% CHANGE FROM PREVIOUS MO.
BL053	IMU	1 1/2"	COND	03/02/09	693000	54000	04/01/09	742000	49000	-9.3%	1	408,660	670	568	-15.3%
BL053	IMU	2"	COND	03/02/09	971900	42800	04/01/09	1058400	86500	102.1%	1	721,410	531	1,002	88.6%
BL053	IMU	4"	D	03/02/09	6226	544	04/01/09	6805	579	6.4%	1,000	579,000	19,429	19,300	-0.7%
BL053	IMU	4"	D	03/02/09	6607	591	04/01/09	7246	639	8.1%	1,000	639,000	21,107	21,300	0.9%
BL053	IMU	1"	I	03/02/09	11	0	04/01/09	11	0		400	0	0	0	
BL053	IMU	3"	COND	03/02/09	2090100	454600	04/01/09	2420600	330500	-27.3%	1	2,756,370	5,642	3,828	-32.1%

IMU 08-09

02/10/10

UTILITY INFORMATION GROUP
INDIANA MEMORIAL UNION
05/01/09

BLDG.	BUILDING NAME	METER SIZE	METER TYPE	PREVIOUS READING DATE	PREVIOUS READING	METER UNITS 04/01/09	CURRENT READING DATE	CURRENT READING	METER UNITS 05/01/09	% CHANGE FROM PREVIOUS MO.	MULT.	POUNDS COND, GAL	LBS/HR or GAL PER DAY MAR	LBS/HR or GAL PER DAY APR	% CHANGE FROM PREVIOUS MO.
BL053	IMU	1 1/2"	COND	04/01/09	742000	49000	05/01/09	785000	43000	-12.2%	1	358,620	568	498	-12.2%
BL053	IMU	2"	COND	04/01/09	1058400	86500	05/01/09	1085200	26800	-69.0%	1	223,512	1,002	310	-69.0%
BL053	IMU	4"	D	04/01/09	6805	579	05/01/09	7412	607	4.8%	1,000	607,000	19,300	20,233	4.8%
BL053	IMU	4"	D	04/01/09	7246	639	05/01/09	7911	665	4.1%	1,000	665,000	21,300	22,167	4.1%
BL053	IMU	1"	I	04/01/09	11	0	05/01/09	11	0		400	0	0	0	
BL053	IMU	3"	COND	04/01/09	2420600	330500	05/01/09	2737200	316600	-4.2%	1	2,640,444	3,828	3,667	-4.2%

IMU 08-09

INDIANA UNIVERSITY
BLOOMINGTON

Utility Metering Data by Month

02/10/10

UTILITY INFORMATION GROUP
INDIANA MEMORIAL UNION
06/01/09

BLDG.	BUILDING NAME	METER SIZE	METER TYPE	PREVIOUS READING DATE	PREVIOUS READING	METER UNITS 05/01/09	CURRENT READING DATE	CURRENT READING	METER UNITS 06/01/09	% CHANGE FROM PREVIOUS MO.	MULT.	POUNDS COND, GAL	LBS/HR or GAL PER DAY APR	LBS/HR or GAL PER DAY MAY	% CHANGE FROM PREVIOUS MO.
BL053	IMU	1 1/2"	COND	05/01/09	785000	43000	06/01/09	815000	30000	-30.2%	1	250,200	498	336	-32.5%
BL053	IMU	2"	COND	05/01/09	1085200	26800	06/01/09	1111500	26300	-1.9%	1	219,342	310	295	-5.0%
BL053	IMU	4"	D	05/01/09	7412	607	06/01/09	7840	428	-29.5%	1,000	428,000	20,233	13,806	-31.8%
BL053	IMU	4"	D	05/01/09	7911	665	06/01/09	8404	493	-25.9%	1,000	493,000	22,167	15,903	-28.3%
BL053	IMU	1"	I	05/01/09	11	0	06/01/09	11	0		400	0	0	0	
BL053	IMU	3"	COND	05/01/09	2737200	316600	06/01/09	2968200	231000	-27.0%	1	1,926,540	3,667	2,589	-29.4%

IMU 08-09

02/10/10

UTILITY INFORMATION GROUP
INDIANA MEMORIAL UNION
07/01/09

BLDG.	METER SIZE	METER TYPE	PREVIOUS READING DATE	PREVIOUS READING	METER UNITS 06/01/09	CURRENT READING DATE	CURRENT READING	METER UNITS 07/01/09	% CHANGE FROM PREVIOUS MO.	MULT.	POUNDS COND, GAL	LBS/HR or GAL PER DAY MAY	LBS/HR or GAL PER DAY JUN	% CHANGE FROM PREVIOUS MO.
BL053	1 1/2"	COND	06/01/09	815000	30000	07/01/09	840000	25000	-16.7%	1	208,500	336	290	-13.9%
BL053	2"	COND	06/01/09	1111500	26300	07/01/09	1133000	21500	-18.3%	1	179,310	295	249	-15.5%
BL053	4"	D	06/01/09	7840	428	07/01/09	8405	565	32.0%	1,000	565,000	13,806	18,833	36.4%
BL053	4"	D	06/01/09	8404	493	07/01/09	9047	643	30.4%	1,000	643,000	15,903	21,433	34.8%
BL053	1"	I	06/01/09	11	0	07/01/09	11	0		400	0	0	0	
BL053	3"	COND	06/01/09	2968200	231000	07/01/09	3132300	164100	-29.0%	1	1,368,594	2,589	1,901	-26.6%

IMU 08-09

Utility Metering Data by Month

02/10/10

UTILITY INFORMATION GROUP
INDIANA MEMORIAL UNION
07/31/09

BLDG.	METER SIZE	METER TYPE	PREVIOUS READING DATE	PREVIOUS READING	METER UNITS 07/01/09	CURRENT READING DATE	CURRENT READING	METER UNITS 07/31/09	% CHANGE FROM PREVIOUS MO.	MULT.	POUNDS COND, GAL, KWH	LBS/HR or GAL PER DAY JUN	LBS/HR, GAL or KWH PER DAY JUL	% CHANGE FROM PREVIOUS MO.
BL053	1 1/2"	COND	07/01/09	840000	25000	07/31/09	866000	26000	4.0%	1	216,840	290	301	4.0%
BL053	2"	COND	07/01/09	1133000	21500	07/31/09	1157200	24200	12.6%	1	201,828	249	280	12.6%
BL053	4"	D	07/01/09	8405	565	07/31/09	8871	466	-17.5%	1,000	466,000	18,833	15,533	-17.5%
BL053	4"	D	07/01/09	9047	643	07/31/09	9588	541	-15.9%	1,000	541,000	21,433	18,033	-15.9%
BL053	1"	I	07/01/09	11	0	07/31/09	11	0		1000	0	0	0	
BL053	3"	COND	07/01/09	3132300	164100	07/31/09	3177500	-29800	-118.2%	1	-248,532	1,901	-345	-118.2%
BL053	*Master*	ELEC	07/24/09	1461		07/31/09	1488	27		1000	27,000	0	3,857	
BL053	*Master*	ELEC	07/24/09	342		07/31/09	438	96		1000	96,000	0	13,714	

Ernie Pyle COND 75000

IMU 09-10

INDIANA UNIVERSITY
BLOOMINGTON

Utility Metering Data by Month

02/10/10

UTILITY INFORMATION GROUP
INDIANA MEMORIAL UNION
09/01/09

BLDG.	METER	METER SIZE	METER TYPE	PREVIOUS READING DATE	PREVIOUS READING	METER UNITS 07/31/09	CURRENT READING DATE	CURRENT READING	METER UNITS 09/01/09	% CHANGE FROM PREVIOUS MO.	MULT.	POUNDS COND, GAL, KWH	LBS/HR, GAL or KWH PER DAY JUL	LBS/HR, GAL or KWH PER DAY AUG	% CHANGE FROM PREVIOUS MO.
BL053		1 1/2"	COND	07/31/09	866000	26000	09/01/09	894000	28000	7.7%	1	233,520	301	304	1.0%
BL053		2"	COND	07/31/09	1157200	24200	09/01/09	1182200	25000	3.3%	1	208,500	280	271	-3.2%
BL053	Sub 4		ELEC				09/15/09	5012			576	0		0	
BL053	Sub 5		ELEC				09/15/09	1876			320	0		0	
BL053	Sub 6		ELEC				09/15/09	9038			320	0		0	
BL053		1"	I	07/31/09	11	0	09/01/09	11	0		1000	0	0	0	
BL053		3"	COND	07/31/09	3177500	-29800	09/03/09	3212300	-44200	48.3%	1	-368,628	-345	-452	30.9%
BL053	Sub 1		ELEC				09/15/09	420			768	0		0	
BL053	Sub 2		ELEC				09/15/09	9850			400	0		0	
BL053		4"	D	07/31/09	8871	466	09/01/09	9507	636	36.5%	1,000	636,000	15,533	19,875	28.0%
BL053		4"	D	07/31/09	9588	541	09/01/09	10307	719	32.9%	1,000	719,000	18,033	22,469	24.6%
BL053	Sub 3		ELEC				09/15/09	276			500	0		0	
BL053			GAS				09/15/09	220095			1.01	0			
BL053	5A	*Master*	ELEC	07/31/09	1488	27	09/01/09	1611	123		1000	123,000	3,857	3,844	-0.3%
BL053	6B	*Master*	ELEC	07/31/09	438	96	09/01/09	900	462		1000	462,000	13,714	14,438	5.3%

DEDUCT from the IMU Tunnel meter

Ernie Pyle	COND	09/03/09	61000
Cravens	COND	09/03/09	4000
Edmonson	COND	09/03/09	14000
			79000

IMU 09-10

cc:

08/18/09 *Eventually the Smith condesate meter will be deducted from the Tunnel meter total.*

INDIANA UNIVERSITY
BLOOMINGTON

Utility Metering Data by Month

02/10/10

UTILITY INFORMATION GROUP
INDIANA MEMORIAL UNION
10/01/09

BLDG.	METER	METER SIZE	METER TYPE	PREVIOUS READING DATE	PREVIOUS READING	METER UNITS 09/01/09	CURRENT READING DATE	CURRENT READING	METER UNITS 10/01/09	% CHANGE FROM PREVIOUS MO.	MULT.	POUNDS COND, GAL, KWH	LBS/HR, GAL or KWH PER DAY AUG	LBS/HR, GAL or KWH PER DAY SEP	% CHANGE FROM PREVIOUS MO.
BL053	Sub 3		ELEC	09/15/09	276		10/01/09	422	146		500	73,000	0	4,563	
BL053			GAS	09/15/09			10/01/09	2402200			1.01	0			
BL053		1 1/2"	COND	09/01/09	894000	28000	10/01/09	923000	29000	3.6%	1	241,860	304	336	10.5%
BL053	Sub 4		ELEC	09/15/09	5012		10/01/09	5020	8		576	4,608	0	288	
BL053	Sub 5		ELEC	09/15/09	1876		10/01/09	1876	0		320	0	0	0	
BL053	Sub 6		ELEC	09/15/09	9038		10/01/09	9038	0		320	0	0	0	
BL053		2"	COND	09/01/09	1182200	25000	10/01/09	1206500	24300	-2.8%	1	202,662	271	281	3.7%
BL053		1"	I	09/01/09	11	0	10/01/09	11	0		1000	0	0	0	
BL053		3"	COND	09/25/09	3246700		10/01/09	3262700	-12000		1	-100,080	356	-695	-295.2%
BL053	5A	*Master*	ELEC	09/01/09	1611	123	10/01/09	1738	127	3.3%	1000	127,000	3,844	4,233	10.1%
BL053	6B	*Master*	ELEC	09/01/09	900	462	10/01/09	1332	432	-6.5%	1000	432,000	14,438	14,400	-0.3%
BL053	Sub 2		ELEC	09/15/09	9850		10/01/09	9966	116		400	46,400	0	2,900	
BL053	Sub 1		ELEC	09/15/09	420		10/01/09	468	48		768	36,864	0	2,304	
BL053		4"	D	09/01/09	9507	636	10/01/09	10338	831	30.7%	1,000	831,000	19,875	27,700	39.4%
BL053		4"	D	09/01/09	10307	719	10/01/09	11184	877	22.0%	1,000	877,000	22,469	29,233	30.1%

DEDUCT from the IMU Tunnel meter

Cravens	COND	09/25/09	356000		10/01/09	358000	2000
Edmonson	COND	09/25/09	1181000		10/01/09	1188000	7000
Smith	COND	09/25/09	357000		10/01/09	363000	6000
Ernie Pyle	COND	09/25/09	1547000		10/01/09	1560000	13000
						TOTAL	28000

		GALLONS
Diff. from Tunnel Meter	40000	**333,600**

IMU 09-10

INDIANA UNIVERSITY
BLOOMINGTON

Utility Metering Data by Month

02/10/10

UTILITY INFORMATION GROUP
INDIANA MEMORIAL UNION
11/02/09

BLDG.	METER	METER SIZE	METER TYPE	PREVIOUS READING DATE	PREVIOUS READING	METER UNITS 10/01/09	CURRENT READING DATE	CURRENT READING	METER UNITS 11/02/09	% CHANGE FROM PREVIOUS MO.	MULT.	POUNDS COND, GAL, KWH	LBS/HR, GAL or KWH PER DAY SEP	LBS/HR, GAL or KWH PER DAY OCT	% CHANGE FROM PREVIOUS MO.
BL053	Sub 3		ELEC	10/01/09	422	146	11/02/09	724	302	106.8%	500	151,000	4,563	4,719	3.4%
BL053			GAS	10/01/09	2402200		11/02/09	2616955	214755		1.01	216,903		6,778	
BL053		1 1/2"	COND	10/01/09	923000	29000	11/02/09	968000	45000	55.2%	1	375,300	336	489	45.5%
BL053	Sub 4		ELEC	10/01/09	5020	8	11/02/09	5038	18	125.0%	576	10,368	288	324	12.5%
BL053	Sub 5		ELEC	10/01/09	1876	0	11/02/09	1876	0		320	0	0	0	
BL053	Sub 6		ELEC	10/01/09	9038	0	11/02/09	9038	0		320	0	0	0	
BL053		2"	COND	10/01/09	1206500	24300	11/02/09	1290100	83600	244.0%	1	697,224	281	908	222.5%
BL053	*Irrigation*	1"	I	10/01/09	11	0	11/02/09	11	0		1000	0	0	0	
BL053	*Master*	3"	COND	10/01/09	3262700	16000	11/02/09	3422100	-600	-103.8%	1	-5,004	927	-7	-100.7%
BL053	5A	*Master*	ELEC	10/01/09	1738	127	11/02/09	1881	143	12.6%	1000	143,000	4,233	4,469	5.6%
BL053	6B	*Master*	ELEC	10/01/09	1332	432	11/02/09	1811	479	10.9%	1000	479,000	14,400	14,969	3.9%
BL053	Sub 2		ELEC	10/01/09	9966	116	11/02/09	10228	262	125.9%	400	104,800	2,900	3,275	12.9%
BL053	Sub 1		ELEC	10/01/09	468	48	11/02/09	565	97	102.1%	768	74,496	2,304	2,328	1.0%
BL053	Water	4"	D	10/01/09	10338	831	11/02/09	11062	724	-12.9%	1,000	724,000	27,700	22,625	-18.3%
BL053	Water	4"	D	10/01/09	11184	877	11/02/09	11954	770	-12.2%	1,000	770,000	29,233	24,063	-17.7%

DEDUCT from the IMU Tunnel meter

Cravens	COND	10/01/09	358000	2000	11/02/09	392000	34000
Edmonson	COND	10/01/09	1188000	7000	11/02/09	1230000	42000
Smith	COND	10/01/09	363000	6000	11/02/09	376000	13000
Ernie Pyle	COND	10/01/09	1560000	13000	11/02/09	1631000	71000
						TOTAL	160000

GALLONS
1,334,400

IMU 09-10

INDIANA UNIVERSITY
BLOOMINGTON

Utility Metering Data by Month

02/10/10

UTILITY INFORMATION GROUP
INDIANA MEMORIAL UNION
12/01/09

BLDG.	METER	METER SIZE	METER TYPE	PREVIOUS READING DATE	PREVIOUS READING	METER UNITS 11/02/09	CURRENT READING DATE	CURRENT READING	METER UNITS 12/01/09	% CHANGE FROM PREVIOUS MO.	MULT.	POUNDS COND, GAL, KWH	LBS/HR, GAL or KWH PER DAY OCT	LBS/HR, GAL or KWH PER DAY NOV	% CHANGE FROM PREVIOUS MO.
BL053	Sub 3		ELEC	11/02/09	724	302	12/01/09	982	258	-14.6%	500	129,000	4,719	4,448	-5.7%
BL053			GAS	11/02/09	2616955	214755	12/01/09	2791222	174267	-18.9%	1.01	176,010	6,778	6,069	-10.5%
BL053		1 1/2"	COND	11/02/09	968000	45000	12/01/09	1012000	44000	-2.2%	1	366,960	489	527	7.9%
BL053	Sub 4		ELEC	11/02/09	5038	18	12/01/09	5058	20	11.1%	576	11,520	324	397	22.6%
BL053	Sub 5		ELEC	11/02/09	1876	0	12/01/09	1876	0		320	0	0	0	
BL053	Sub 6		ELEC	11/02/09	9038	0	12/01/09	9038	0		320	0	0	0	
BL053		2"	COND	11/02/09	1290100	83600	12/01/09	1396800	106700	27.6%	1	889,878	908	1,279	40.8%
BL053	*Irrigation*	1"	I	11/02/09	11	0	12/01/09	11	0		1000	0	0	0	
BL053	*Master*	3"	COND	11/02/09	3422100	-600	12/01/09	3705500	185400		1	1,546,236	-7	2,222	
BL053	5A	*Master*	ELEC	11/02/09	1881	143	12/01/09	2007	126	-11.9%	1000	126,000	4,469	4,345	-2.8%
BL053	6B	*Master*	ELEC	11/02/09	1811	479	12/01/09	2227	416	-13.2%	1000	416,000	14,969	14,345	-4.2%
BL053	Sub 2		ELEC	11/02/09	228	262	12/01/09	439	211	-19.5%	400	84,400	3,275	2,910	-11.1%
BL053	Sub 1		ELEC	11/02/09	565	97	12/01/09	653	88	-9.3%	768	67,584	2,328	2,330	0.1%
BL053	Water	4"	D	11/02/09	11062	724	12/01/09	11491	429	-40.7%	1,000	429,000	22,625	14,793	-34.6%
BL053	Water	4"	D	11/02/09	11954	770	12/01/09	12423	469	-39.1%	1,000	469,000	24,063	16,172	-32.8%

DEDUCT from the IMU Tunnel meter

Cravens	COND	11/02/09	392000	34000	12/01/09	425000	33000
Edmonson	COND	11/02/09	1230000	42000	12/01/09	1230000	0
Smith	COND	11/02/09	376000	13000	12/01/09	377000	1000
Ernie Pyle	COND	11/02/09	1631000	71000	12/01/09	1695000	64000
					TOTAL		98000

GALLONS
817,320

IMU 09-10

INDIANA UNIVERSITY
BLOOMINGTON

IMU GAS FIRED EQUIPMENT **As of November, 2009**

Laundry Ironer: Chicago Model TGLLG-BP, 208v 3ph, 255,000 btu

Tudor Kitchen Broiler: Southbend Model HDC 48, 160,000 btu

Tudor Kitchen Cooking Range: Southbend Model P32A-BBB,
(6) Open burners, 33,000 btu
Oven 243,000 btu burner

Main Kitchen Combi Oven: Groen Model CC20-G,
Oven 90,000 btu
Broiler 96,000 btu

Main Kitchen Tilt Brazing Pan: Groen Model HFP/2-4, 144,000 btu

Bakery Rotating Oven: Middleby Marshall Model H, estimated 196,000 btu

Burger King Broiler: Nieco Model 980, 107,244 btu

Burger King Fryer: 3 bay, Frymaster h50, (3) 8000 btu burners

Burger King Fryer: single bay, Frymaster Model H50, 8000 btu

Burger King Fryer: single bay, Frymaster H50, 8000 btu

South Lounge Fireplace: gas logs, ½" gas line, (continuous operation)

Federal Room Fireplace: gas logs, ½" gas line, (intermittent use on demand)

INDIANA UNIVERSITY
BLOOMINGTON

Indiana Memorial Union

Air Handling Unit Breakdown, by floor

	AHU	Area Served (sq ft)	Est. Occupancy (#)	Main Space Type
Lobby Floor	AL1	?	0	Electrical Volt
	4C	?	30	Store Rooms, Locker Rooms, Lounge Shops
	DL1	?	30	Laundry Room, Hotel Lobby
	3A	?	10	Hotel Offices
	3E	?	15	Hotel Lobby, Offices
	503	?	30	Admin Offices, Retail Stores
Mezzanine Floor	AM1	3056	10	Bowling
	AM2	3056	10	Bowling
	AM3	3056	10	Bowling
	AM4	2980	100	Student Technology Center (Computer Lab)
	AM5	1447	10	Arcade
	AM6	2649	20	Corridor
	AL4	3073	20	Billiards
	AL5	2839	20	Office
	BM1	1634	15	Bookstore
	BM2	1130	15	Retail Shops
	BM3	1332	15	Dining Room
	BM4	4940	50	Dining Room
	4B	6694	50	Bookstore
	4C	13591	200	Kitchen, Food Serving, Dining Room
	3A	7319	50	Admin Offices
	3E	8686	100	Meeting Rooms
	503	8622	100	Meeting Rooms
	401	3729	75	Meeting Rooms
First Floor	A1-1	1912	20	Meeting Room
	A1-2	3825	40	Meeting Room
	A1-3	2582	15	Kitchen
	A4-1	7771	150	Meeting Room/Auditoriom
	B1-1	4495	100	Lounge, Starbucks
	B1-2	2301	15	Foyer
	B1-3	3276	40	Lounge
	4B	6465	50	Bookstore
	4C	16323	150	Dining Room, Meeting Room, Corridor
	C1	3154	30	Kitchen
	3A	3874	30	Meeting Room, Foyer
	3F	4756	75	Auditorium
	501	5428	25	Hotel Rooms
	502	5269	26	Hotel Rooms
	401	4404	24	Hotel Rooms
Second Floor	A4-1	733	?	?
	B2-1	5474	30	Offices
	4B	4868	20	Bookstore
	4C	9098	50	Meeting Rooms
	C2	2537	15	Kitchen
	3A	3093	?	?
	501	5428	25	Hotel Rooms
	502	5269	26	Hotel Rooms
	401	4404	24	Hotel Rooms
Thrid Floor	A4-1	268	?	Stage Support (for Alumni Hall)
	All Fan Coil Units	7322	50	Student Offices
	4C	3710	30	?
	3E	4685	20	Hotel Rooms
	501	5428	25	Hotel Rooms
	502	5269	26	Hotel Rooms
	401	4404	24	Hotel Rooms
Fourth Floor	All Fan Coil Units	4945	20	Student Offices
	3B	1589	?	?
	701	2341	7	Hotel Rooms
	501	5428	25	Hotel Rooms
	502	5269	26	Hotel Rooms
	401	3421	?	Mechanical Room
Fifth Floor	All Fan Coil Units	1946	20	Student Offices
	701	1629	4	Hotel Rooms
	502	3347	2	Hotel Rooms, Mechanical Room
	503	2050	?	Mechanical Room
	501	2050	?	Mechanical Room
Sixth Floor	All Fan Coil Units	2010	15	Student Offices
	701	2791	5	Hotel Rooms
Seventh Floor	All Fan Coil Units	2153	15	Student Offices
	701	784	?	?

Indiana Memorial Union

Air Handling Unit Breakdown, by floor

AHU	Area Served (sq ft)	Est. Occupancy (#)	Main Space Type
401	20362	147	Meeting Rooms, Hotel Rooms, and Mechanical Room
501	23762	100	Hotel Rooms, Mechanical Room
502	24423	106	Hotel Rooms, Mechanical Room
503	10672	130	Meeting Rooms, Mechanical Room
701	7545	16	Hotel Rooms
3A	14286	150	Offices, Meeting Room, Foyer
3B	1589	?	?
3E	13371	135	Hotel Lobby, Offices, Meeting Rooms, Hotel Rooms
3F	4756	75	Auditorium
4B	18027	120	Bookstore
4C	42722	460	Store Rooms, Locker Rooms, Lounge Shops, Kitchen, Food Serving, Dining Room, Meeting Rooms, Corridor
A1-1	1912	20	Meeting Room
A1-2	3825	40	Meeting Room
A1-3	2582	15	Kitchen
A4-1	8772	150	Meeting Room/Auditoriom
AL1	?	0	Electrical Volt
AL4	3073	20	Billiards
AL5	2839	20	Offices
All Fan Coil Units	18376	120	Student Offices
AM1	3056	10	Bowling
AM2	3056	10	Bowling
AM3	3056	10	Bowling
AM4	2980	100	Student Technology Center (Computer Lab)
AM5	1447	10	Arcade
AM6	2649	20	Corridor
B1-1	4495	100	Lounge, Starbucks
B1-2	2301	15	Foyer
B1-3	3276	40	Lounge
B2-1	5474	30	Offices
BM1	1634	15	Bookstore
BM2	1130	15	Retail Shops
BM3	1332	15	Dining Room
BM4	4940	50	Dining Room
C1	3154	30	Kitchen
C2	2537	15	Kitchen
DL1	?	30	Laudry Room, Hotel Lobby

INDIANA UNIVERSITY
BLOOMINGTON

IMU Chilled Water Monthly Estimates					Calculation Sheet			Updated	11/20/2009		C.C. Matson			
Using the daily Ton-Hrs from the one week (Aug 13-19) in the trend data that we have that reached average temperatures for August :												22,810	Ton-Hrs per day	
Using the ratio of Aug to Dec Ton-Hrs at the Central Chilled Water Plant:												5.00		
Using the Cooling Degree Day Distribution (10 year average of Base 55 from IU UIG data) in Column B, calculate ton-hours for the other 10 months.														
Using the Ton-Hr to kWh ratio for Central Chilled Water Plant, adjusted up 1% for distribution system losses:												0.708		
Using the kWh to GHG factor posted on CARMA.org by Duke Energy Indiana, adjusting up 10% for transmission & distribution losses:												0.000974		
Month	**CDD Base 55**	**Hi/Lo Mon Daily Ton-Hours**	**Estimated Daily Ton-Hours By ratio**	**Days per Month**	**Ton-Hrs per Month**	**kWh per Mon at CCWP**	**GHG Metric Tons**							
July	600		22,220	31	688,833	487,693	475.0							
August	620	22,810	22,810	31	707,110	500,634	487.6							
September	382		15,794	30	473,814	335,460	326.7							
October	135		8,512	31	263,881	186,828	182.0							
November	32		5,476	30	164,276	116,308	113.3							
December	1	4,562	4,562	31	141,422	100,127	97.5							
January	3		4,621	31	143,250	101,421	98.8							
February	3		4,621	28	129,387	91,606	89.2							
March	32		5,476	31	169,752	120,184	117.1							
April	126		8,247	30	247,409	175,166	170.6							
May	282		12,846	31	398,221	281,940	274.6							
June	504		19,390	30	581,710	411,851	401.1							
Annual Totals	2720		134,575		4,109,065	2,909,218	2,833.6							

INDIANA UNIVERSITY
BLOOMINGTON

02/10/10

IMU
BUILDING CONDENSATE USAGE

METER	SERIAL NUMBER	PREVIOUS READING DATE	CURRENT READING DATE	PREVIOUS READING	CURRENT READING	GALLONS	POUNDS OF CONDENSATE	POUNDS PER DAY AVG	GALLON PER DAY AVG
WEST ROOM # 097	06544319	07/01/09	07/31/09	840000	866000	26,000	216,840	7,228	867
		07/31/09	09/01/09	866000	894000	28,000	233,520	7,298	875
		09/01/09	10/01/09	894000	923000	29,000	241,860	8,062	967
		10/01/09	11/02/09	923000	968000	45,000	375,300	11,728	1,406
		11/02/09	12/01/09	968000	1012000	44,000	366,960	12,654	1,517
		12/22/09	12/31/09	1055000	1075000	20,000	166,800	18,533	2,222
		12/31/09	01/07/10	1075000	1094000	19,000	158,460	22,637	2,714
		01/07/10	01/14/10	1094000	1112000	18,000	150,120	21,446	2,571
		01/14/10	01/21/10	1112000	1127000	15,000	125,100	17,871	2,143
		01/21/10	01/28/10	1127000	1142000	15,000	125,100	17,871	2,143

WEST CTR. ROOM # 085	3288319	07/01/09	07/31/09	3132300	3177500	45,200	376,968	12,566	1,507
		07/31/09	09/01/09	1157200	1182200	25,000	208,500	6,516	781
		09/01/09	10/01/09	1182200	1206500	24,300	202,662	6,755	810
		10/01/09	11/02/09	1206500	1290100	83,600	697,224	21,788	2,613
		11/02/09	12/01/09	1290100	1396800	106,700	889,878	30,685	3,679
		12/22/09	12/31/09	1487700	1524900	37,200	310,248	34,472	4,133
		12/31/09	01/07/10	1524900	1560800	35,900	299,406	42,772	5,129
		01/07/10	01/14/10	1560800	1593100	32,300	269,382	38,483	4,614
		01/14/10	01/21/10	1593100	1617800	24,700	205,998	29,428	3,529
		01/21/10	01/28/10	1617800	1643300	25,500	212,670	30,381	3,643

NORTH ROOM # 050	3298063	12/16/09 1:30 PM	12/17/09 1:30 PM	5,500	6400	900	7,506	7,506	900
		12/17/09 1:30 PM	12/18/09 1:38 PM	6400	7800	1,400	11,676	11,611	1,392
		12/18/09 1:38 PM	12/18/09 3:33 PM	7800	7900	100	834	10,443	1,252
		12/18/09 3:33 PM	12/21/09 2:55 PM	7900	11000	3,100	25,854	8,694	1,043
		12/21/09 2:55 PM	12/22/09 12:00 PM	11000	11500	500	4,170	4,747	569
		12/22/09	12/31/09	11500	16000	4,500	37,530	4,415	529
		12/31/09	01/07/10	16000	21300	5,300	44,202	6,315	757
		01/07/10	01/14/10	21300	26900	5,600	46,704	6,672	800
		01/14/10	01/21/10	26900	33500	6,600	55,044	7,863	943
		01/21/10	01/28/10	33500	40600	7,100	59,214	8,459	1,014

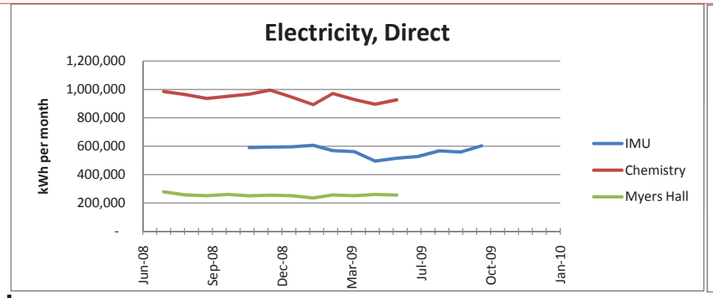
EAST ROOM # 050	9629974	12/16/09 1:30 PM	12/17/09 1:30 PM	45,000	53000	8,000	66,720	66,720	8,000
		12/17/09 1:30 PM	12/18/09 1:38 PM	53000	62000	9,000	75,060	74,645	8,950
		12/18/09 1:38 PM	12/18/09 3:33 PM	62000	63000	1,000	8,340	104,431	12,522
		12/18/09 3:33 PM	12/21/09 2:55 PM	63000	89000	26,000	216,840	72,921	8,744
		12/21/09 2:55 PM	12/22/09 12:00 PM	89000	97000	8,000	66,720	75,950	9,107
		12/22/09	12/31/09	97000	183000	86,000	717,240	84,381	10,118
		12/31/09	01/07/10	183000	268000	85,000	708,900	101,271	12,143
		01/07/10	01/14/10	268000	346000	78,000	650,520	92,931	11,143
		01/14/10	01/21/10	346000	406000	60,000	500,400	71,486	8,571
		01/21/10	01/28/10	406000	468000	62,000	517,080	73,869	8,857

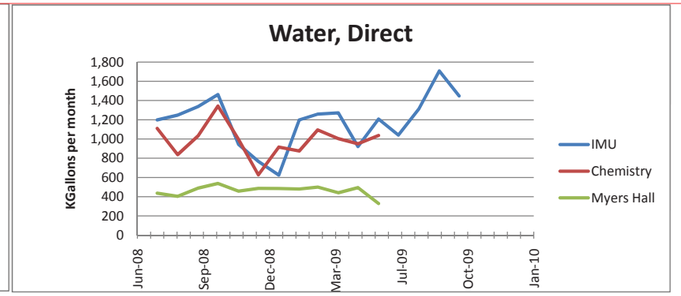
LAUNDRY ROOM # 053	9693412	12/17/09 1:30 PM	12/18/09 1:38 PM	2000	4000	2,000	16,680	16,588	1,989
		12/18/09 1:38 PM	12/22/09	4000	12000	8,000	66,720	19,441	2,331
		12/22/09	12/31/09	12000	29000	17,000	141,780	15,753	1,889
		12/31/09	01/07/10	29000	46000	17,000	141,780	20,254	2,429
		01/07/10	01/14/10	46000	65000	19,000	158,460	22,637	2,714
		01/14/10	01/21/10	65000	81000	16,000	133,440	19,063	2,286
		01/21/10	01/28/10	81000	97000	16,000	133,440	19,063	2,286

		BUILDING TOTAL			
12/22/09	12/31/09	164,700	1,373,598	157,555	18,892
12/31/09	01/07/10	162,200	1,352,748	193,250	23,171
01/07/10	01/14/10	152,900	1,275,186	182,169	21,843
01/14/10	01/21/10	122,300	1,019,982	145,712	17,471
01/21/10	01/28/10	125,600	1,047,504	149,643	17,943

INDIANA UNIVERSITY
BLOOMINGTON

UTILITY DATA: ENERGY & WATER

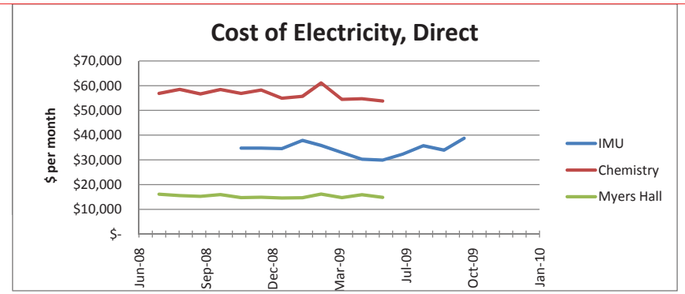




GSF			Usage																		
			Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09	Annual totals	Ann. avg dens. (units/GSF)	Avg/hour (units/hr)
438,966	IMU	**Electricity, Direct (kWh)**					*590,573*	*594,084*	*595,521*	*606,534*	*569,344*	*561,842*	*495,283*	*515,394*	527,143	566,719	559,000	602,563	6,783,999	15.454	774.43
438,966	IMU	**Electricity, Indirect (Share of CCWP) (kWh)**					*116,637*	*100,410*	*101,708*	*91,865*	*120,524*	*175,661*	*282,738*	*413,016*	*489,073*	*502,050*	*336,409*	*187,356*	2,917,448	6.646	333.04
438,966	IMU	**Natural Gas (Therms)**	1,655	1,535	1,708	1,695	1,756	1,662	1,244	1,796	1,449	1,921	1,832	1,716	1,763	1,742	1,772		20,348.99	0.046	2.32
438,966	IMU	**Condensate (lbs)**					*4,050,000*	*5,580,000*	*5,400,000*	*4,060,000*	*3,720,000*	*2,550,000*	*2,015,000*	*1,800,000*	*2,015,000*	*2,170,000*	*2,400,000*	*3,720,000*	39,480,000	89.939	4,506.85
438,966	IMU	**ENERGY TOTALS**																			
438,966	IMU	**Chilled water (Ton-hours)**					*164,277*	*141,423*	*143,250*	*129,387*	*169,753*	*247,410*	*398,222*	*581,713*	*688,835*	*707,113*	*473,816*	*263,882*	4,109,081	9.361	469.07
438,966	IMU	**Water, Direct (KGallons)**	1,199	1,248	1,338	1,462	945	768	625	1,199	1,259	1,272	921	1,208	1,041	1,313	1,708	1,447	13,705.84	0.031	1.56
438,966	IMU	**Water, Indirect (Share of CCWP) (KGallons)**					*246*	*212*	*215*	*194*	*254*	*371*	*597*	*871*	*1,032*	*1,059*	*710*	*395*	6,155.30	0.014	0.70
438,966	IMU	**WATER TOTALS**																	19,861.13	0.045	2.27
183,387	Chemistry	**Electricity, Direct (kWh)**	985,159	964,371	936,871	951,874	966,493	995,024	946,233	892,435	970,901	928,469	895,433	926,889					11,360,151	61.946	1,296.82
183,387	Chemistry	**Electricity, Indirect (Share of CCWP) (kWh)**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
183,387	Chemistry	**Natural Gas (Therms)**	*51,350*	4,274	4,455	4,612	3,865	3,616	4,231	3,835	4,486	3,944	4,281	4,431					97,379.59	0.531	11.12
183,387	Chemistry	**Condensate (lbs)**	3,315,984	3,221,408	3,279,705	3,696,164	4,199,786	5,249,593	6,160,303	4,405,501	3,785,995	3,434,476	3,355,849	3,078,976					47,183,741.38	257.291	5,386.27
183,387	Chemistry	**ENERGY TOTALS**																			
183,387	Chemistry	Chilled water (Ton-hours) (no data)																	0	-	-
183,387	Chemistry	**Water, Direct (KGallons)**	1,110	837	1,033	1,343	996	627	916	875	1,095	1,004	951	1,036					11,824	0.064	1.35
183,387	Chemistry	**Water, Indirect (Share of CCWP) (KGallons)**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-
183,387	Chemistry	**WATER TOTALS**																	12,860	0.064	1.47
76,521	Myers Hall	**Electricity, Direct (kWh)**	279,033	256,899	251,649	260,174	250,456	254,833	251,684	235,206	256,450	251,244	260,567	255,380					3,063,576	40.036	349.72
76,521	Myers Hall	**Electricity, Indirect (Share of CCWP) (kWh)**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
76,521	Myers Hall	Natural Gas (Therms) (no data)																	0.00	-	-
76,521	Myers Hall	**Condensate (lbs)**	36,934	43,090	41,700	67,029	205,521	2,355,587	2,719,565	1,943,711	1,265,954	1,077,785	861,800	629,291					11,247,967.08	146.992	1,284.01
76,521	Myers Hall	**ENERGY TOTALS**																			
76,521	Myers Hall	Chilled water (Ton-hours) (no data)																	0	-	-
76,521	Myers Hall	**Water, Direct (KGallons)**	437	404	489	537	458	487	485	480	500	441	495	329					5,543	0.072	0.63
76,521	Myers Hall	**Water, Indirect (Share of CCWP) (KGallons)**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-
76,521	Myers Hall	**WATER TOTALS**																	5,872	0.072	0.67

INDIANA UNIVERSITY
BLOOMINGTON

UTILITY DATA: ENERGY



			Cost ($)																		
MMBtu subtotals	MMBtu/hour demand	Btu/(year*GSF)	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09	Annual totals	Cost per ft^2 ($/GSF)	Average cost/hour ($/hr)
23,154	2.643	52,746					$ 34,750.83	$ 34,772.16	$ 34,556.22	$ 37,853.47	$ 35,836.88	$ 32,950.29	$ 30,265.19	$ 29,914.65	$ 32,305.86	$ 35,701.21	$ 33,963.51	$ 38,758.38	$ 411,628.65	$ 0.94	$ 46.99
9,957	1.137	22,683					$ 6,863.20	$ 5,877.07	$ 5,901.78	$ 5,733.25	$ 7,586.31	$ 10,301.99	$ 17,277.22	$ 23,972.37	$ 29,972.76	$ 31,627.32	$ 20,439.43	$ 12,051.24	$ 177,603.94	$ 0.40	$ 20.27
2,035	0.232	4,636																			
36,243	4.137	82,564																			
71,389	8.149	162,629																			
49	0.006	112																			
38,772	4.426	211,423	$ 56,863.98	$ 58,479.07	$ 56,681.58	$ 58,459.86	$ 56,870.96	$ 58,239.46	$ 54,906.94	$ 55,696.37	$ 61,112.53	$ 54,451.81	$ 54,717.12	$ 53,798.70					$ 680,278.39	$ 3.71	$ 77.66
-	-	-		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
9,738	1.112	53,101																			
43,315	4.945	236,193																			
38,772	4.426	211,423																			
-	-	-																			
10,456	1.194	136,642	$ 16,105.98	$ 15,578.25	$ 15,225.01	$ 15,978.71	$ 14,737.49	$ 14,915.52	$ 14,604.46	$ 14,679.07	$ 16,142.04	$ 14,734.69	$ 15,922.46	$ 14,822.83					$ 183,446.51	$ 1.00	$ 20.94
-	-	-		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
-	-	-																			
10,326	1.179	134,939																			
10,456	1.194	136,642																			
-	-	-																			

INDIANA UNIVERSITY
BLOOMINGTON

IU CENTRAL CAMPUS ELECTRICAL BILLING

YEAR	DAYS	PERIOD ENDS	MONTH OF	PEAK DATE	PEAK TIME	PEAK KVA	TOTAL KWH	AVERAGE KW	$ PRIMARY	P.F. @ PEAK	$ TOTAL	Cents/ kWh
2003	34	01/22/03	JAN	N/A	N/A	27,526.1	16,736,473	20,510.4	284,935.97	0.986	$609,667	3.64
	29	02/20/03	FEB	N/A	N/A	29,871.6	16,301,484	23,421.7	255,431.91	0.986	$629,724	3.86
	29	03/21/03	MAR	03/12/03	15:30 - 16:00	30,089.4	15,898,663	22,842.9	250,108.20	0.985	$621,188	3.91
	32	04/22/03	APR	04/14/03	14:00 - 14:30	34,172.5	18,897,635	24,606.3	292,447.00	0.977	$683,271	3.62
	29	05/21/03	MAY	05/09/03	13:00 - 13:30	36,860.1	18,057,474	25,944.6	263,791.78	0.972	$687,632	3.81
	30	06/20/03	JUN	06/16/03	15:00 - 15:30	33,950.7	17,651,493	24,516.0	305,630.12	0.977	$719,579	4.08
	32	07/22/03	JUL	07/21/03	12:30 - 13:00	36,876.0	22,316,634	29,058.1	367,591.21	0.973	$846,301	3.79
	29	08/20/03	AUG	08/14/03	13:00 - 13:30	36,038.8	20,634,772	29,647.7	322,293.89	0.972	$808,674	3.92
	29	09/18/03	SEP	09/10/03	13:30 - 14:00	38,732.4	22,580,596	32,443.4	329,579.01	0.970	$864,975	3.83
	31	10/19/03	OCT	09/24/03	14:30 - 15:00	36,463.9	19,947,711	26,811.4	305,909.24	0.974	$753,862	3.78
	29	11/17/03	NOV	11/03/03	14:30 - 15:00	34,688.3	17,406,280	25,009.0	260,804.95	0.975	$675,090	3.88
	31	12/18/03	DEC	11/18/03	15:00 - 15:30	32,844.4	17,251,837	23,188.0	271,608.10	0.980	$637,153	3.69
				2003 AVERAGE OR TOTAL		34,009.5	223,681,052	25,666.6	3,510,131.38	0.977	$8,537,114	3.82

YEAR	DAYS	PERIOD ENDS	MONTH OF	PEAK DATE	PEAK TIME	PEAK KVA	TOTAL KWH	AVERAGE KW	$ PRIMARY	P.F. @ PEAK	$ TOTAL	Cents/ kWh
2004	34	01/21/04	JAN	01/20/04	12:00 - 12:30	27,293.5	16,737,093	20,511.1	283,758.27	0.986	$558,668	3.34
	29	02/19/04	FEB	02/19/04	15:00 - 15:30	27,632.1	16,278,131	23,388.1	255,619.47	0.984	$569,464	3.50
	31	03/21/04	MAR	03/05/04	15:00 - 15:30	29,715.6	16,722,573	22,476.6	266,662.46	0.981	$594,051	3.55
	30	04/20/04	APR	04/19/04	14:30 - 15:00	33,951.6	18,319,659	25,444.0	276,379.34	0.976	$672,378	3.67
	29	05/19/04	MAY	05/06/04	14:00 - 14:30	33,750.3	18,579,304	26,694.4	263,200.90	0.972	$695,237	3.74
	32	06/20/04	JUN	06/15/04	12:30 - 13:00	35,541.6	21,732,414	28,297.4	335,676.93	0.960	$849,626	3.91
	30	07/20/04	JUL	07/20/04	15:00 - 15:30	35,439.6	20,971,395	29,126.9	352,029.03	0.967	$904,755	4.31
	29	08/18/04	AUG	07/22/04	14:30 - 15:00	38,592.7	19,604,315	28,167.1	328,755.57	0.963	$881,615	4.50
	32	09/19/04	SEP	08/27/04	14:30 - 15:00	40,741.5	24,528,542	31,938.2	354,354.14	0.963	$1,025,435	4.18
	30	10/19/04	OCT	09/23/04	15:00 - 15:30	37,876.1	19,120,252	26,555.9	292,435.00	0.968	$834,278	4.36
	29	11/17/04	NOV	10/29/04	13:00 - 13:30	36,415.5	18,340,936	26,351.9	264,551.58	0.971	$785,959	4.29
	33	12/20/04	DEC	11/18/04	14:30 - 15:00	32,159.1	18,584,763	23,465.6	291,724.35	0.978	$748,485	4.03
				2004 AVERAGE OR TOTAL		34,092.4	229,519,377	26,034.8	3,565,147.04	0.972	$9,119,951	3.97

YEAR	DAYS	PERIOD ENDS	MONTH OF	PEAK DATE	PEAK TIME	PEAK KVA	TOTAL KWH	AVERAGE KW	$ PRIMARY	P.F. @ PEAK	$ TOTAL	Cents/ kWh
2005	32	01/21/05	JAN	01/12/05	14:30 - 15:00	31,450.6	16,931,881	22,046.7	283,089.18	0.981	$629,979	3.72
	31	02/21/05	FEB	02/15/05	14:30 - 15:00	30,345.2	17,783,421	23,902.4	278,500.53	0.972	$673,384	3.79
	29	03/22/05	MAR	03/07/05	14:30 - 15:00	29,611.9	16,004,167	22,994.5	254,258.46	0.978	$658,216	4.11
	30	04/21/05	APR	04/20/05	15:00 - 15:30	34,850.5	18,854,024	26,186.1	283,029.80	0.975	$782,366	4.15
	28	05/19/05	MAY	05/11/05	15:00 - 15:30	34,484.0	17,741,566	26,401.1	267,713.41	0.970	$754,894	4.25
	32	06/20/05	JUN	06/10/05	13:30 - 14:00	37,478.3	21,312,667	27,750.9	337,549.90	0.969	$872,316	4.09
	30	07/20/05	JUL	06/30/05	14:00 - 14:30	39,372.2	23,000,156	31,944.7	348,091.78	0.965	$1,010,730	4.39
	29	08/18/05	AUG	07/26/05	14:30 - 15:00	39,157.0	23,145,335	33,254.8	328,953.62	0.966	$1,082,433	4.68
	32	09/19/05	SEP	09/09/05	13:30 - 14:00	41,161.5	25,462,386	33,154.1	352,255.17	0.967	$1,096,277	4.31
	29	10/18/05	OCT	09/22/05	14:00 - 14:30	42,503.7	20,907,900	30,040.1	291,562.21	0.965	$951,436	4.55
	29	11/16/05	NOV	10/19/05	14:00 - 14:30	36,184.8	17,899,220	25,717.3	261,556.34	0.974	$833,517	4.66
	33	12/19/05	DEC	11/20/05	13:30 - 14:00	32,333.2	18,328,836	23,142.5	291,959.98	0.981	$785,418	4.29
				2005 AVERAGE OR TOTAL		35,744.4	237,371,559	27,211.3	3,578,520.38	0.972	$10,130,965	4.27

Report Date: **02/10/10** H.HEWETSON, C.SHEPPARD, J.KORYTA, J.KADEN, C.MATSON, B.WILLIAMS, M. MENEFEE, G. MOULTON, R. TRUEBLOOD

IU CENTRAL CAMPUS ELECTRICAL BILLING

12/18/03

YEAR	DAYS	PERIOD ENDS	MONTH OF	PEAK DATE	PEAK TIME	PEAK KVA	TOTAL KWH	AVERAGE KW	$ PRIMARY	P.F. @ PEAK	$ TOTAL	Cents/ kWh
2004	34	01/21/04	JAN	01/20/04	12:00 - 12:30	27,293.5	16,737,093	20,511.1	283,758.27	0.986	$558,668	3.34
	29	02/19/04	FEB	02/19/04	15:00 - 15:30	27,632.1	16,278,131	23,388.1	255,619.47	0.984	$569,464	3.50
	31	03/21/04	MAR	03/05/04	15:00 - 15:30	29,715.6	16,722,573	22,476.6	266,662.46	0.981	$594,051	3.55
	30	04/20/04	APR	04/19/04	14:30 - 15:00	33,951.6	18,319,659	25,444.0	276,379.34	0.976	$672,378	3.67
	29	05/19/04	MAY	05/06/04	14:00 - 14:30	33,750.3	18,579,304	26,694.4	263,200.90	0.972	$695,237	3.74
	32	06/20/04	JUN	06/15/04	12:30 - 13:00	35,541.6	21,732,414	28,297.4	335,676.93	0.960	$849,626	3.91
	30	07/20/04	JUL	07/20/04	15:00 - 15:30	35,439.6	20,971,395	29,126.9	352,029.03	0.967	$904,755	4.31
	29	08/18/04	AUG	07/22/04	14:30 - 15:00	38,592.7	19,604,315	28,167.1	328,755.57	0.963	$881,615	4.50
	32	09/19/04	SEP	08/27/04	14:30 - 15:00	40,741.5	24,528,542	31,938.2	354,354.14	0.963	$1,025,435	4.18
	30	10/19/04	OCT	09/23/04	15:00 - 15:30	37,876.1	19,120,252	26,555.9	292,435.00	0.968	$834,278	4.36
	29	11/17/04	NOV	10/29/04	13:00 - 13:30	36,415.5	18,340,936	26,351.9	264,551.58	0.971	$785,959	4.29
	33	12/20/04	DEC	11/18/04	14:30 - 15:00	32,159.1	18,584,763	23,465.6	291,724.35	0.978	$748,485	4.03
					2004 AVERAGE OR TOTAL	34,092.4	229,519,377	26,034.8	3,565,147.04	0.972	$9,119,951	3.97

YEAR	DAYS	PERIOD ENDS	MONTH OF	PEAK DATE	PEAK TIME	PEAK KVA	TOTAL KWH	AVERAGE KW	$ PRIMARY	P.F. @ PEAK	$ TOTAL	Cents/ kWh
2005	32	01/21/05	JAN	01/12/05	14:30 - 15:00	31,450.6	16,931,881	22,046.7	283,089.18	0.981	$629,979	3.72
	31	02/21/05	FEB	02/15/05	14:30 - 15:00	30,345.2	17,783,421	23,902.4	278,500.53	0.972	$673,384	3.79
	29	03/22/05	MAR	03/07/05	14:30 - 15:00	29,611.9	16,004,167	22,994.5	254,258.46	0.978	$658,216	4.11
	30	04/21/05	APR	04/20/05	15:00 - 15:30	34,850.5	18,854,024	26,186.1	283,029.80	0.975	$782,366	4.15
	28	05/19/05	MAY	05/11/05	15:00 - 15:30	34,484.0	17,741,566	26,401.1	267,713.41	0.970	$754,894	4.25
	32	06/20/05	JUN	06/10/05	13:30 - 14:00	37,478.3	21,312,667	27,750.9	337,549.90	0.969	$872,316	4.09
	30	07/20/05	JUL	06/30/05	14:00 - 14:30	39,372.2	23,000,156	31,944.7	348,091.78	0.965	$1,010,730	4.39
	29	08/18/05	AUG	07/26/05	14:30 - 15:00	39,157.0	23,145,335	33,254.8	328,953.62	0.966	$1,082,433	4.68
	32	09/19/05	SEP	09/09/05	13:30 - 14:00	41,161.5	25,462,386	33,154.1	352,255.17	0.967	$1,096,277	4.31
	29	10/18/05	OCT	09/22/05	14:00 - 14:30	42,503.7	20,907,900	30,040.1	291,562.21	0.965	$951,436	4.55
	29	11/16/05	NOV	10/19/05	14:00 - 14:30	36,184.8	17,899,220	25,717.3	261,556.34	0.974	$833,517	4.66
	33	12/19/05	DEC	11/20/05	13:30 - 14:00	32,333.2	18,328,836	23,142.5	291,959.98	0.981	$785,418	4.29
					2005 AVERAGE OR TOTAL	35,744.4	237,371,559	27,211.3	3,578,520.38	0.972	$10,130,965	4.27

Year	Days	Period Ends	Month Of	Peak Date	Peak Time	Peak kVa	Total kWh	Average kW	$ Primary	P.F. @ Peak	$ Total	Cents/ kWh
2006	35	01/23/06	JAN	01/20/06	13:30	29,484.2	17,557,416	20,901.7	300,484.17	0.981	$746,631	4.25
	29	02/21/06	FEB	02/16/06	16:30	31,295.7	16,673,102	23,955.6	271,354.74	0.977	$790,836	4.74
	29	03/22/06	MAR	03/01/06	16:00	30,214.3	16,172,344	23,236.1	263,204.90	0.980	$765,135	4.73
	29	04/20/06	APR	04/14/06	13:30	36,288.4	18,010,801	25,877.6	293,125.79	0.985	$1,037,674	5.76
	29	05/19/06	MAY	04/20/06	14:00	35,063.3	17,580,777	25,259.7	286,127.15	0.978	$1,008,259	5.74
	32	06/20/06	JUN	05/30/06	13:30	37,344.4	21,067,885	27,432.1	342,879.83	0.975	$1,125,525	5.34
	30	07/20/06	JUL	07/19/06	14:30	39,908.4	22,291,907	30,961.0	362,800.79	0.973	$1,222,620	5.48
	29	08/18/06	AUG	08/10/06	12:30	40,609.5	22,665,736	32,565.7	368,884.85	0.971	$1,245,075	5.49
	32	09/19/06	SEP	08/28/06	14:30	43,397.5	24,842,795	32,347.4	404,316.49	0.963	$1,347,242	5.42
	29	10/18/06	OCT	10/04/06	14:30	40,786.9	19,810,459	28,463.3	322,415.22	0.974	$1,061,920	5.36
	29	11/16/06	NOV	11/10/06	16:00	35,376.0	17,916,805	25,742.5	291,596.00	0.976	$939,239	5.24
	33	12/19/06	DEC	11/29/06	13:30	35,712.0	19,361,212	24,446.0	315,103.73	0.976	$979,031	5.06
					2006 AVERAGE OR TOTAL	36,290.1	233,951,239	26,765.7	3,822,293.66	0.976	$12,269,187	5.24

Report Date: **02/10/10** H.HEWETSON, C.SHEPPARD, J.KORYTA, J.KADEN, C.MATSON, B.WILLIAMS, M. MENEFEE, G. MOULTON, R. TRUEBLOOD

IU Central Campus Electrical Billing Report

Year	Days	Period Ends	Month Of	Peak Date	Peak Time	Peak kVa	Total kWh	Average kW	$ Primary	P.F. @ Peak	$ Total	Cents/ kWh
2005	32	01/21/05	JAN	01/12/05	14:30 - 15:00	31,450.6	16,931,881	22,046.7	283,089.18	0.981	$629,979	3.72
	31	02/21/05	FEB	02/15/05	14:30 - 15:00	30,345.2	17,783,421	23,902.4	278,500.53	0.972	$673,384	3.79
	29	03/22/05	MAR	03/07/05	14:30 - 15:00	29,611.9	16,004,167	22,994.5	254,258.46	0.978	$658,216	4.11
	30	04/21/05	APR	04/20/05	15:00 - 15:30	34,850.5	18,854,024	26,186.1	283,029.80	0.975	$782,366	4.15
	28	05/19/05	MAY	05/11/05	15:00 - 15:30	34,484.0	17,741,566	26,401.1	267,713.41	0.970	$754,894	4.25
	32	06/20/05	JUN	06/10/05	13:30 - 14:00	37,478.3	21,312,667	27,750.9	337,549.90	0.969	$872,316	4.09
	30	07/20/05	JUL	06/30/05	14:00 - 14:30	39,372.2	23,000,156	31,944.7	348,091.78	0.965	$1,010,730	4.39
	29	08/18/05	AUG	07/26/05	14:30 - 15:00	39,157.0	23,145,335	33,254.8	328,953.62	0.966	$1,082,433	4.68
	32	09/19/05	SEP	09/09/05	13:30 - 14:00	41,161.5	25,462,386	33,154.1	352,255.17	0.967	$1,096,277	4.31
	29	10/18/05	OCT	09/22/05	14:00 - 14:30	42,503.7	20,907,900	30,040.1	291,562.21	0.965	$951,436	4.55
	29	11/16/05	NOV	10/19/05	14:00 - 14:30	36,184.8	17,899,220	25,717.3	261,556.34	0.974	$833,517	4.66
	33	12/19/05	DEC	11/20/05	13:30 - 14:00	32,333.2	18,328,836	23,142.5	291,959.98	0.981	$785,418	4.29
	364			**2005 AVERAGE OR TOTAL**		35,744.4	237,371,559	27,211.3	3,578,520.38	0.972	$10,130,965	4.27

Year	Days	Period Ends	Month Of	Peak Date	Peak Time	Peak kVa	Total kWh	Average kW	$ Primary	P.F. @ Peak	$ Total	Cents/ kWh
2006	35	01/23/06	JAN	01/20/06	13:30	29,484.2	17,557,416	20,901.7	300,484.17	0.981	$746,631	4.25
	29	02/21/06	FEB	02/16/06	16:30	31,295.7	16,673,102	23,955.6	271,354.74	0.977	$790,836	4.74
	29	03/22/06	MAR	03/01/06	16:00	30,214.3	16,172,344	23,236.1	263,204.90	0.980	$765,135	4.73
	29	04/20/06	APR	04/14/06	13:30	36,288.4	18,010,801	25,877.6	293,125.79	0.985	$1,037,674	5.76
	29	05/19/06	MAY	04/20/06	14:00	35,063.3	17,580,777	25,259.7	286,127.15	0.978	$1,008,259	5.74
	32	06/20/06	JUN	05/30/06	13:30	37,344.4	21,067,885	27,432.1	342,879.83	0.975	$1,125,525	5.34
	30	07/20/06	JUL	07/19/06	14:30	39,908.4	22,291,907	30,961.0	362,800.79	0.973	$1,222,620	5.48
	29	08/18/06	AUG	08/10/06	12:30	40,609.5	22,665,736	32,565.7	368,884.85	0.971	$1,245,075	5.49
	32	09/19/06	SEP	08/28/06	14:30	43,397.5	24,842,795	32,347.4	404,316.49	0.963	$1,347,242	5.42
	29	10/18/06	OCT	10/04/06	14:30	40,786.9	19,810,459	28,463.3	322,415.22	0.974	$1,061,920	5.36
	29	11/16/06	NOV	11/10/06	16:00	35,376.0	17,916,805	25,742.5	291,596.00	0.976	$939,239	5.24
	33	12/19/06	DEC	11/29/06	13:30	35,712.0	19,361,212	24,446.0	315,103.73	0.976	$979,031	5.06
	365			**2006 AVERAGE OR TOTAL**		36,290.1	233,951,239	26,765.7	3,822,293.66	0.976	$12,269,187	5.24

Year	Days	Period Ends	Month Of	Peak Date	Peak Time	Peak kVa	Total kWh	Average kW	$ Primary	P.F. @ Peak	$ Total	Cents/ kWh
2007	34	01/22/07	JAN	01/05/07	15:00	31,160.8	18,417,150	22,570.0	299,739.12	0.978	$756,481	4.11
	29	02/20/07	FEB	01/31/07	16:00	29,410.1	17,287,774	24,838.8	281,358.52	0.983	$714,188	4.13
	28	03/20/07	MAR	03/20/07	14:30	31,901.8	16,843,347	25,064.5	274,125.47	0.980	$740,545	4.40
	31	04/20/07	APR	03/27/07	14:30	38,148.8	19,577,742	26,314.2	318,627.75	0.973	$972,975	4.97
	31	05/21/07	MAY	05/01/07	15:00	39,091.5	21,235,111	28,541.8	345,601.43	0.979	$1,048,638	4.94
	30	06/20/07	JUN	06/08/07	10:30	40,356.6	21,604,092	30,005.7	351,606.60	0.968	$1,069,636	4.95
	30	07/20/07	JUL	07/19/07	14:00	41,780.3	23,131,251	32,126.7	376,461.11	0.968	$1,210,290	5.23
	31	08/20/07	AUG	08/08/07	12:00	42,406.6	24,980,222	33,575.6	406,553.11	0.973	$1,271,134	5.09
	30	09/19/07	SEP	08/29/07	14:00	45,278.2	25,283,504	35,116.0	411,489.03	0.974	$1,320,423	5.22
	29	10/18/07	OCT	09/24/07	15:00	45,620.5	23,386,407	33,601.2	380,613.77	0.973	$1,166,340	4.99
	29	11/16/07	NOV	10/18/07	14:00	42,200.5	19,189,125	27,570.6	312,303.01	0.979	$1,028,446	5.36
	33	12/19/07	DEC	12/11/07	16:00	35,504.4	19,401,752	24,497.2	315,763.51	0.980	$937,447	4.83
	365			**2007 AVERAGE OR TOTAL**		38,571.7	250,337,477	28,651.8	4,074,242.43	0.976	$12,236,543	4.89

Report Date: **02/10/10**

H.Hewetson, G. Lightner, J.Kaden, J. Koryta, C.Matson, B.Williams, M. Menefee, R. Trueblood, G. Moulto

IU Central Campus Electrical Billing Report

Year	Days	Period Ends	Month Of	Peak Date	Peak Time	Peak kVa	Total kWh	Average kW	$ Primary	P.F. @ Peak	$ Total	Cents/ kWh
2006	35	01/23/06	JAN	01/20/06	13:30	29,484.2	17,557,416	20,901.7	300,484.17	0.981	$746,631	4.25
	29	02/21/06	FEB	02/16/06	16:30	31,295.7	16,673,102	23,955.6	271,354.74	0.977	$790,836	4.74
	29	03/22/06	MAR	03/01/06	16:00	30,214.3	16,172,344	23,236.1	263,204.90	0.980	$765,135	4.73
	29	04/20/06	APR	04/14/06	13:30	36,288.4	18,010,801	25,877.6	293,125.79	0.985	$1,037,674	5.76
	29	05/19/06	MAY	04/20/06	14:00	35,063.3	17,580,777	25,259.7	286,127.15	0.978	$1,008,259	5.74
	32	06/20/06	JUN	05/30/06	13:30	37,344.4	21,067,885	27,432.1	342,879.83	0.975	$1,125,525	5.34
	30	07/20/06	JUL	07/19/06	14:30	39,908.4	22,291,907	30,961.0	362,800.79	0.973	$1,222,620	5.48
	29	08/18/06	AUG	08/10/06	12:30	40,609.5	22,665,736	32,565.7	368,884.85	0.971	$1,245,075	5.49
	32	09/19/06	SEP	08/28/06	14:30	43,397.5	24,842,795	32,347.4	404,316.49	0.963	$1,347,242	5.42
	29	10/18/06	OCT	10/04/06	14:30	40,786.9	19,810,459	28,463.3	322,415.22	0.974	$1,061,920	5.36
	29	11/16/06	NOV	11/10/06	16:00	35,376.0	17,916,805	25,742.5	291,596.00	0.976	$939,239	5.24
	33	12/19/06	DEC	11/29/06	13:30	35,712.0	19,361,212	24,446.0	315,103.73	0.976	$979,031	5.06
	365			**2006 AVERAGE OR TOTAL**		36,290.1	233,951,239	26,765.7	3,822,293.66	0.976	$12,269,187	5.24

Year	Days	Period Ends	Month Of	Peak Date	Peak Time	Peak kVa	Total kWh	Average kW	$ Primary	P.F. @ Peak	$ Total	Cents/ kWh
2007	34	01/22/07	JAN	01/05/07	15:00	31,160.8	18,417,150	22,570.0	299,739.12	0.978	$756,481	4.11
	29	02/20/07	FEB	01/31/07	16:00	29,410.1	17,287,774	24,838.8	281,358.52	0.983	$714,188	4.13
	28	03/20/07	MAR	03/20/07	14:30	31,901.8	16,843,347	25,064.5	274,125.47	0.980	$740,545	4.40
	31	04/20/07	APR	03/27/07	14:30	38,148.8	19,577,742	26,314.2	318,627.75	0.973	$972,975	4.97
	31	05/21/07	MAY	05/01/07	15:00	39,091.5	21,235,111	28,541.8	345,601.43	0.979	$1,048,638	4.94
	30	06/20/07	JUN	06/08/07	10:30	40,356.6	21,604,092	30,005.7	351,606.60	0.968	$1,069,636	4.95
	30	07/20/07	JUL	07/19/07	14:00	41,780.3	23,131,251	32,126.7	376,461.11	0.968	$1,210,290	5.23
	31	08/20/07	AUG	08/08/07	12:00	42,406.6	24,980,222	33,575.6	406,553.11	0.973	$1,271,134	5.09
	30	09/19/07	SEP	08/29/07	14:00	45,278.2	25,283,504	35,116.0	411,489.03	0.974	$1,320,423	5.22
	29	10/18/07	OCT	09/24/07	15:00	45,620.5	23,386,407	33,601.2	380,613.77	0.973	$1,166,340	4.99
	29	11/16/07	NOV	10/18/07	14:00	42,200.5	19,189,125	27,570.6	312,303.01	0.979	$1,028,446	5.36
	33	12/19/07	DEC	12/11/07	16:00	35,504.4	19,401,752	24,497.2	315,763.51	0.980	$937,447	4.83
	365			**2007 AVERAGE OR TOTAL**		38,571.7	250,337,477	28,651.8	4,074,242.43	0.976	$12,236,543	4.89

Year	Days	Period Ends	Month Of	Peak Date	Peak Time	Peak kVa	Total kWh	Average kW	$ Primary	P.F. @ Peak	$ Total	Cents/ kWh
2008	34	01/22/08	JAN	01/07/08	14:00	34,592.1	18,962,602	23,238.5	308,616.35	0.981	$984,821	5.19
	29	02/20/08	FEB	02/05/08	11:30	33,275.8	18,047,035	25,929.6	293,715.49	0.982	$961,018	5.33
	29	03/20/08	MAR	03/18/08	14:00	32,504.3	17,248,660	24,782.6	280,721.94	0.978	$927,354	5.38
	32	04/21/08	APR	04/08/08	15:00	35,939.6	20,246,206	26,362.2	329,507.00	0.979	$1,052,317	5.20
	29	05/20/08	MAY	04/25/08	14:00	38,291.2	18,486,137	26,560.5	300,861.88	0.988	$1,051,682	5.69
	30	06/19/08	JUN	06/12/08	14:00	41,899.9	21,015,071	29,187.6	342,020.28	0.958	$1,146,395	5.46
	32	07/21/08	JUL	06/26/08	13:00	42,075.9	24,254,411	31,581.3	394,740.54	0.973	$1,399,980	5.77
	29	08/19/08	AUG	07/21/08	10:30	41,957.9	22,386,878	32,165.1	364,346.44	0.972	$1,357,531	6.06
	30	09/18/08	SEP	09/03/08	13:00	46,123.9	24,526,493	34,064.6	399,168.67	0.965	$1,483,876	6.05
	29	10/17/08	OCT	10/15/08	14:00	41,626.2	21,611,299	31,050.7	351,723.89	0.976	$1,327,269	6.14
	32	11/18/08	NOV	11/04/08	15:00	35,890.2	20,424,830	26,594.8	332,414.11	0.979	$1,201,850	5.88
	31	12/19/08	DEC	12/09/08	16:00	32,082.6	18,475,822	24,833.1	300,694.00	0.980	$1,081,403	5.85
	366			**2008 AVERAGE OR TOTAL**		38,021.6	245,685,444	28,029.2	3,998,530.59	0.976	$13,975,497	5.69

Report Date: **02/10/10**

H.Hewetson, G. Lightner, J.Kaden, J. Koryta, C.Matson, B.Williams, M. Menefee, R. Trueblood, G. Moulton

INDIANA UNIVERSITY
BLOOMINGTON

IU Central Campus Electrical Billing Report

Year	Days	Period Ends	Month Of	Peak Date	Peak Time	Peak kVa	Total kWh	Average kW	$ Primary	P.F. @ Peak	$ Total	Cents/ kWh
2007	34	01/22/07	JAN	01/05/07	15:00	31,160.8	18,417,150	22,570.0	299,739.12	0.978	$756,481	4.11
	29	02/20/07	FEB	01/31/07	16:00	29,410.1	17,287,774	24,838.8	281,358.52	0.983	$714,188	4.13
	28	03/20/07	MAR	03/20/07	14:30	31,901.8	16,843,347	25,064.5	274,125.47	0.980	$740,545	4.40
	31	04/20/07	APR	03/27/07	14:30	38,148.8	19,577,742	26,314.2	318,627.75	0.973	$972,975	4.97
	31	05/21/07	MAY	05/01/07	15:00	39,091.5	21,235,111	28,541.8	345,601.43	0.979	$1,048,638	4.94
	30	06/20/07	JUN	06/08/07	10:30	40,356.6	21,604,092	30,005.7	351,606.60	0.968	$1,069,636	4.95
	30	07/20/07	JUL	07/19/07	14:00	41,780.3	23,131,251	32,126.7	376,461.11	0.968	$1,210,290	5.23
	31	08/20/07	AUG	08/08/07	12:00	42,406.6	24,980,222	33,575.6	406,553.11	0.973	$1,271,134	5.09
	30	09/19/07	SEP	08/29/07	14:00	45,278.2	25,283,504	35,116.0	411,489.03	0.974	$1,320,423	5.22
	29	10/18/07	OCT	09/24/07	15:00	45,620.5	23,386,407	33,601.2	380,613.77	0.973	$1,166,340	4.99
	29	11/16/07	NOV	10/18/07	14:00	42,200.5	19,189,125	27,570.6	312,303.01	0.979	$1,028,446	5.36
	33	12/19/07	DEC	12/11/07	16:00	35,504.4	19,401,752	24,497.2	315,763.51	0.980	$937,447	4.83
	365			**2007 AVERAGE OR TOTAL**		38,571.7	250,337,477	28,651.8	4,074,242.43	0.976	$12,236,543	4.89

Year	Days	Period Ends	Month Of	Peak Date	Peak Time	Peak kVa	Total kWh	Average kW	$ Primary	P.F. @ Peak	$ Total	Cents/ kWh
2008	34	01/22/08	JAN	01/07/08	14:00	34,592.1	18,962,602	23,238.5	308,616.35	0.981	$984,821	5.19
	29	02/20/08	FEB	02/05/08	11:30	33,275.8	18,047,035	25,929.6	293,715.49	0.982	$961,018	5.33
	29	03/20/08	MAR	03/18/08	14:00	32,504.3	17,248,660	24,782.6	280,721.94	0.978	$927,354	5.38
	32	04/21/08	APR	04/08/08	15:00	35,939.6	20,246,206	26,362.2	329,507.00	0.979	$1,052,317	5.20
	29	05/20/08	MAY	04/25/08	14:00	38,291.2	18,486,137	26,560.5	300,861.88	0.988	$1,051,682	5.69
	30	06/19/08	JUN	06/12/08	14:00	41,899.9	21,015,071	29,187.6	342,020.28	0.958	$1,146,395	5.46
	32	07/21/08	JUL	06/26/08	13:00	42,075.9	24,254,411	31,581.3	394,740.54	0.973	$1,399,980	5.77
	29	08/19/08	AUG	07/21/08	10:30	41,957.9	22,386,878	32,165.1	364,346.44	0.972	$1,357,531	6.06
	30	09/18/08	SEP	09/03/08	13:00	46,123.9	24,526,493	34,064.6	399,168.67	0.965	$1,483,876	6.05
	29	10/17/08	OCT	10/15/08	14:00	41,626.2	21,611,299	31,050.7	351,723.89	0.976	$1,327,269	6.14
	32	11/18/08	NOV	11/04/08	15:00	35,890.2	20,424,830	26,594.8	332,414.11	0.979	$1,201,850	5.88
	31	12/19/08	DEC	12/09/08	16:00	32,082.6	18,475,822	24,833.1	300,694.00	0.980	$1,081,403	5.85
	366			**2008 AVERAGE OR TOTAL**		38,021.6	245,685,444	28,029.2	3,998,530.59	0.976	$13,975,497	5.69

Year	Days	Period Ends	Month Of	Peak Date	Peak Time	Peak kVa	Total kWh	Average kW	$ Primary	P.F. @ Peak	$ Total	Cents/ kWh
2009	34	01/22/09	JAN	12/19/08	10:30	31,047.4	19,100,173	23,407.1	310,855.32	0.972	$1,108,324	5.80
	29	02/20/09	FEB	02/09/09	16:30	33,852.3	18,070,336	25,963.1	294,094.72	0.980	$1,127,760	6.24
	31	03/23/09	MAR	03/10/09	15:00	36,722.4	19,305,262	25,947.9	314,193.14	0.982	$1,215,154	6.29
	30	04/22/09	APR	04/17/09	14:00	35,881.0	19,420,440	26,972.8	316,067.66	0.970	$1,138,948	5.86
	29	05/21/09	MAY	04/30/09	14:00	39,240.4	20,168,285	28,977.4	328,238.84	0.978	$1,232,421	6.11
	32	06/22/09	JUN	06/19/09	14:30	42,876.9	23,780,680	30,964.4	387,030.57	0.958	$1,380,284	5.80
	30	07/22/09	JUL	06/25/09	14:00	43,643.8	23,450,892	32,570.7	381,663.27	0.966	$1,437,184	6.13
	29	08/20/09	AUG	08/17/09	13.30	44,015.7	23,608,123	33,919.7	384,222.20	0.965	$1,487,226	6.30
	32	09/21/09	SEP	08/26/09	14:30	44,214.3	25,558,175	33,278.9	415,959.30	0.968	$1,552,854	6.08
	29	10/20/09	OCT	09/22/09	15:00	45,263.8	20,454,225	29,388.3	332,892.51	0.963	$1,315,669	6.43
	29	11/18/09	NOV	10/30/09	14:30	38,483.3	19,052,282	27,374.0	310,075.89	0.969	$1,166,559	6.12
			DEC									
	334			**2009 AVERAGE OR TOTAL**		39,567.4	231,968,873	28,978.6	3,775,293.42	0.970	$14,162,381	6.11

Report Date: **02/10/10**

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