EXECUTIVE SUMMARY
In 2009, Indiana University at Bloomington introduced a campus master plan that incorporated the importance of sustainability on campus. As a result, the campus mandated a LEED silver certification standard on all new construction and renovated building projects. As of April 2012, the campus has two LEED certified buildings, with a many other projects scattered in the design, construction, and certification phases. However, as the school grows in area and student population, the number of building project proposals will rise and the need to monitor LEED standards will become increasingly important.

The intent of this internship was to facilitate the LEED process by creating a central database of common resources requested by consultants to expedite the accreditation process. The database will provide consultants with easy access to any necessary documentation from previous and current projects to help design and complete a LEED certified building. Additionally, the intern serves as a liaison between the campus and third party consultants to ensure all the key players stay on track to accomplish LEED certification in an appropriately time manner.

This final report serves to provide the basic background on LEED and the basic accreditation process. It also details the purpose of the LEED Documentation internship, and the progress that has been made with the database system. This report addresses why LEED plays and should continue to play an important role on campus. Finally, specific recommendations are given for the continued success of LEED and outstanding building performance at IU Bloomington.

THE LEED PROCESS
The LEED (Leadership in Energy and Environmental Design) green building certification system is a global rating system for buildings, homes, and communities designed to improve the environmental and human health performance of society (USGBC). The process is aimed to help improve sustainability in site development, water savings, energy efficiency, materials selection, and indoor environmental quality, to improve the overall quality of building performance. An additional category called design and innovation credits acknowledges exemplary performance for any credit in a previous category. Each of these categories plays a central role in reducing the carbon footprint in the environment, and contains specific elements that promote sustainable building practices. The main portal to LEED standards is the U.S. Green Building Council (USGBC) and it acts to educate and provide resources for individuals aiming for LEED certification.

STAGES
There are three stages to in the process of receiving certification: design, building construction, and finally certification. The design phase of LEED certification is stated to be one of the most important stages and requires the most insight on how buildings can obtain the most credits according to LEED standards. This introductory phase allows consultants to achieve the maximum sustainability credits they believe can be designed into the building. Careful planning in this phase allows buildings to strive for
high LEED levels and with careful supervision in the construction phase, buildings can achieve all the credits anticipated from the design phase.

LEVELS
The highest level of certification a building project can receive is platinum, followed by gold, then silver, and finally certified level. The number of credits a project gains directly translates to the level of certification received.

THE CAMPUS MASTER PLAN
Indiana University Bloomington instilled a campus master plan in 2009, with the intent to guide the campus “to create a strategic framework to develop and research academic needs, environmental needs, and broad campus constituencies” (IUB Master Plan). From the master plan, a campus sustainability report was established that included four overarching goals, one of which stated the campus must “plan for innovative sustainable buildings and landscapes”. This LEED documentation internship was created to help accomplish that goal, by facilitating key LEED players involved to create a more sustainable campus.

When the sustainability report was written, the university mandated all building projects (new construction and renovated) be silver LEED certified. This mandate comes at an ideal time, especially since IUB anticipates over 3 million gross square feet of new buildings will be constructed and a significant number of existing buildings will be renovated by 2020. With the constant development of new building construction and existing building renovations, the need for LEED certified buildings is crucial. By mandating silver certification, the campus ensures sustainability measures are integrated in the building structure early on and encourages sustainable behaviors for future years.

The campus master plan also expresses the need for energy and water use reduction, particularly if the campus will grow in building space and student population size. Buildings have a huge impact on the environment because of their size and the sheer number in urban areas. According to the USGBC, buildings have an impact of 12% on water use, 39% on carbon dioxide emissions, 65% of trash output, and 71% of electricity consumption. When IU incorporates LEED standards into the building design, it will dramatically lower the percentages of excessive water and energy usage, and waste and greenhouse gas emissions.

According to the master plan, the university has an overall goal to reduce campus GHG emissions based on the goals of two organizations: The American College and University Presidents Climate Commitment (AUPCC) and the Association for the Advancement of Sustainability in Higher Education’s (AASHE) Sustainability Tracking Assessment and Rating System (STARS). ACUPCC’s goal is to reduce emissions by 80% by 2050, or approximately 23% by 2020. STARS’s water conservation goals are to reduce potable non-irrigation water consumption by 10, 25, or 50% depending on the square footage of the building. Both goals can be met with specific strategies from implementing LEED standards on building projects. The campus intends to reduce their overall energy and water usage with the implementation of LEED standards on new construction projects (Appendix A, Graph 2). Similarly, the campus also relies on LEED standards to reduce its water consumption in bathrooms (Appendix A, Graph 3).

PROJECTS
Currently, the Bloomington campus has two completed LEED projects: the Biology Research and Teaching Lab, and the Innovation Center, both of which are silver certified under new construction buildings. Additionally, the campus has multiple ongoing projects including a few projects that are very
close to the certification submittal stage as of April 2012. The second Multidisciplinary Science Building (MSB II), and the Union Street Center were also new construction building projects, and currently waiting to get gold and silver certified, respectively. The university is undergoing a plethora of other projects, which are tabulated in Appendix B, with their individual certification goals.

When building designers design a project, they have to ensure the building can reach silver LEED certification within the specified IU budget. Recently, however, LEED project buildings have been reaching for gold standards, and successfully been able to obtain the number of credits needed to receive gold certification. Completed projects, such as MSB II and CIB, are both striving for gold certification, and CIB has even expressed interest in reaching for platinum certification. Essentially, buildings have been designed and constructed to be more sustainable than originally expected and paid for; IU has built gold-standard buildings while only expending a budget for silver-standard buildings.

This should be a clear sign that IUB is on the right path to fulfill their sustainability goals from the campus master plan, through the integration of LEED standards into their building projects. If IU continues to mandate only a silver certification standard, and employs consultants to design silver certified projects while having the potential to receive gold or platinum certification, then the school should continue to mandate LEED standards to utilize this financial gain.

THE DATABASE AND ITS PURPOSE
The main purpose of the LEED Documentation internship is to provide assistance to LEED projects, as projects are often complex and time intensive. The intern acts as a liaison between the campus and third party consultants to ensure all the key players stay on track to accomplish LEED certification in an appropriately timed manner. Oftentimes, individuals have all the necessary documents needed to obtain specific credits, but these document are not placed in the right locations for submittal. Because multiple people are involved in the LEED process, it is essential to develop a central database to place all these documents for current and future projects, to help with the ease of project submittal.

Initially, the database contained common documents IU was responsible for, such as the green housekeeping policy, tobacco policy, heat island (non-roof) credit documents, and green power agreement certificates. These common documents are files that may be slightly altered from project to project to satisfy the needs of a specific credit. The database was created to reduce the need to acquire the same documents from the same people to satisfy the same credit, just for different projects. For future projects, the school only has to search for the documents they need in this database, without always asking for assistance from a third party.

To further develop the database, additional documents on completed projects were placed on the website, including templates and the associated paperwork for project certification. For example, MSB II finished construction October of 2009, but only currently in the process of getting certification. All the necessary files to receive certification can be accessed through the Green Building Certification Institute (GBCI), but not all individuals can access the MSB II project on the GBCI website. Similarly, almost all individuals who were interested in the process of how the school’s LEED projects got certified, would have no information, unless they specifically request documents from a project manager. This database takes away that additional step, and allows any interested individual to access the public database, view a pdf, and take away the information needed. Ideally, these individuals will be able to use the public database and take documents, which will be used as templates for future projects. For example, MSB II received an exemplary innovation credit for ‘alternative transportation- public transportation access’, and in the future the documents that supplied that credit, may be resourceful for other projects who may to know how to best apply for the same alternative transportation credit.
Currently, this database is only in its introductory stages. Since only a few projects are completely certified or near certification, only a few sets of completed documented projects are in that database. It is a good starting point to get projects from each type of building in that database, including academic building, laboratory, and residential building. However, in the future, the school should further develop the database by adding more projects when projects become certified buildings.

CASE STUDIES
Furthermore, the school can receive addition points if they agree to write a case study to be published on the USGBC website that summarizes the main sustainable features of the building. In the future, the school should seize this opportunity to gather additional points, or as a means to publicize the sustainability efforts of the campus.

RESOURCES
Many resources were used to assist with the success of the LEED Documentation internship. The main motivation to create the database was from the Harvard University Office for Sustainability Green Building Resource. Harvard University has a webpage that lists all their certified and current projects, including their scorecards and the breakdown of credits received in each category. Additionally, the school also has a list of each credit in each category, and what projects have achieved that specific credit. This allows for quick and easy access for anyone to search for a credit, and see which projects accomplished the goals set out for that credit. The sustainability office strives to create a database of similar nature to that of Harvard’s Green Building Resources.

Additional resources for this internship includes the LEED Handbook and the U.S. Green Building Council website. Both resources have comprehensive backgrounds on LEED and the process of certification. The Handbook is essential to any individuals interested in the details of the LEED accreditation process, because it details specific requirements to obtain each credit according to LEED standards. There are also multiple handbooks and instruction guides to the LEED process, all of which can play some part understanding LEED.

THE TRUE COST OF LEED CERTIFICATION
LEED is a comprehensive certification project that heightens the need for sustainable practices in all building designs. However, some contractors and building managers are reluctant to go through the LEED process, due to their misconceptions that certifying buildings have high design and construction costs. Many believe living sustainably means living more expensively compared to the standard, non-sustainable way. However, a 2004 study done by Davis Langdon Adamson, a consultant company, measured construction costs of certified buildings and found that certification had little to no budgetary impact against conventional, non-sustainable buildings (NRDC). Other real world examples have also shown that certified buildings only have an average of 2% more in upfront costs, but are almost immediately recovered through faster lease-up rates, increased rental premiums and market valuation. (NRDC) Regardless of the actual construction costs to construct LEED certified buildings, it is comparable to the construction costs of non-LEED certified buildings.

There are also additional costs to operate a building, including electricity, water usage, and waste disposal. The long-term costs managing a sustainable building will be significantly less than that of a non-sustainable building. According to a study on the financial benefits of a green building, the average building saves approximately 30% in energy, 40% in carbon dioxide emissions, 40% in water usage, and 70% in waste costs (Katz 2003). USGBC has similar estimations on the cost savings of green buildings. Investing in LEED certified projects, which has been shown to have no to little higher upfront construction costs to non-certified buildings, will be greatly returned in the form of operational cost savings.
Finally, there are benefits that are valued but are not calculated in monetary savings. The health benefits associated with sustainable living are large. Improved indoor air quality, due to low VOC paints and air filtration systems, is incalculable in terms of health savings. In the future, less GHG emissions emitted in the atmosphere, due to LEED’s standards for green power, and on site alternative energies, will generate cleaner ambient air quality. Less water usage will mean less wastewater treatment and may lead to less wastewater disposal into the nation’s waterways.

If one takes the positive environmental and associated health externalities of sustainable building construction and operation into consideration, certifying buildings is, in fact, cheaper than non-certifying buildings. All the environmental and health benefits from pursuing certification, such as a reduction in greenhouse gases and waste outputs, adds additional cost and social value to LEED certification. If one analyzes and assigns values on all positive externalities (which is acknowledged to be extremely difficult), and includes them into project costs, paying the additional minute construction costs to receive certification is a smart move.

IU & LEED

It has been assumed that all sustainable designs will lead to sustainable buildings, which will lead to LEED certifications. However, that is not always the case. Due to various reasons, many contractors and building managers strive for LEED standards without achieving actual certification. Can contractors strive for LEED standards without actually paying for LEED?

The USGBC’s original goal for instilling LEED standards was to create “a framework for assessing building performance and meeting sustainability goal”. The green building council can enforce LEED standards because projects must incorporate specific environmental practices into their building design and construction, to receive certification. The LEED certification essentially acts as a facilitator and motives businesses, organizations, and schools to be more sustainable in building performance. Without the USGBC oversight, there would be no incentive to follow through sustainable design plans.

There have been slight controversies made on campus concerning if IU should pursue its own sustainability standards (with LEED standards as guidelines), and forgo the LEED accreditation process. If IU were to stop pursuing LEED certification, and instead choose to perform their own sustainable codes, the school would have a difficult time meeting their the campus master plan sustainability goals. Currently, with LEED certification, the university still has long time delays between when building construction is completed and when certification is finally acknowledged by the USGBC. If the school were to stop pursuing LEED certification, this lag time would be even greater. There are simply too many tasks that need to be accomplished to ensure building performance are at an acceptable sustainable standard, and with other campus priorities, sustainable building performance usually ranks low on the list. This is by no fault of any one individual, but eliminating LEED standards will only eliminate an extra source of supervision that advocates for greater building sustainability. The campus will not be held accountable by anyone to monitor its sustainability; thus will be easier to exclude the need for any standards in the future. There is no implication that this will occur in the future, especially with the inclusion of sustainability goals in the campus plan, but continuing to mandate LEED standards will only benefit the school in the future.

RECOMMENDATIONS

There are a plethora of things the campus, in conjunction with the sustainability office, can do to ensure the LEED process remains a relatively quick and easy task to accomplish. The intent of the LEED documentation internship was to facilitate all the key players involved with LEED on campus to expedite
the accreditation process. This was mostly accomplished through the creation of the LEED online database and the accumulation of documents in that database. In the future, individuals at IU working on any LEED project should utilize the central database by placing important documents online, and downloading important documents as needed to fulfill the credits for future projects. This database should be consistently updated with all the appropriate documents from new and ongoing projects.

Furthermore, in addition to the ease of finding out what documents would be needed to fulfill certain credits, the database also allows consultants to research what credits have been accomplished from previous projects, and gain ideas on how to receive additional credits on current projects. Consultants can use previous projects as models for documentation, but also as a springboard to gain ideas on how to meet higher levels of standard for current and future projects. In the long-term, only the best sustainability practices will be integrated into the design and construction of LEED buildings. Perhaps in the future, the campus will mandate gold certified buildings, for the IU sustainability benchmarks have risen overtime.

Finally, the database may be useful for some consultants, but other IU constituents, such as students and faculty, might be more interested in the overall sustainability of certain buildings. The USBGC encourages businesses to write-up case studies detailing some of the most prominent sustainable elements in the building. The case study will provide a snapshot on how the building accomplished certification and educate individuals about the sustainable features in each building. Case studies are also an additional outlet for future consultants to gain information from, and to quickly see what the campus has the capacity to accomplish.

The Office of Sustainability should continue to encourage key LEED players to stay on track and follow design plans for certification. As stated earlier, the design phase is the most important part of the LEED process to promote the most sustainable behaviors in a building project. However, a comprehensive design plan with integrated sustainable features is the best way the school can maintain the cost-effectiveness of LEED projects. Consultants have to completely understand the current LEED process (and LEED updates every two years) and design a sustainable plan that can be accomplished in a reasonable amount of time and within budget. With comprehensive design plans, projects should have minimal issues that may jeopardize certification.

While in the short-term, LEED may not prioritized as the most urgent task to complete, in the long-term, the goals of campus sustainability should motivate individuals to complete projects in the most timely manner. As IU receives more projects to accomplish, it will be easier prolong to certification process, and to avoid that, IUOS needs to encourage individuals at IU and consultants alike to complete their roles in the project certification process.
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APPENDIX A: The Master Plan Goals on Sustainability

Graph 1. Predicted GHG Emissions Growth with IU Reduction Targets

Graph 2. GHG Emissions Reduction Recommendation Wedges
Graph 3. Water Use Recommendation Wedges

1. Use efficient toilets and urinals in all new construction.
2. Retrofit existing fixtures with efficient toilets and urinals.
3. Use efficient faucets and showers in all new construction.
4. Retrofit existing fixtures with efficient faucets and showers.
5. Use graywater recovery in all new construction.
### Projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Certification/ Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology Research and Teaching Preserve</td>
<td>Silver Certified</td>
</tr>
<tr>
<td>Innovation Center</td>
<td>Silver Certified</td>
</tr>
<tr>
<td>Union Street Center</td>
<td>Silver Goal</td>
</tr>
<tr>
<td>Jacobs School of Music</td>
<td>Gold Goal</td>
</tr>
<tr>
<td>Multidisciplinary Science Building II (MSB II)</td>
<td>Gold Goal</td>
</tr>
<tr>
<td>Cyber Infrastructure Building (CIB)</td>
<td>Gold Goal</td>
</tr>
<tr>
<td>Rose Residential Hall</td>
<td>Platinum Goal</td>
</tr>
<tr>
<td>Southeast Side Apartments</td>
<td>Gold Goal</td>
</tr>
<tr>
<td>Tulip Tree Apartments</td>
<td>Silver Goal</td>
</tr>
<tr>
<td>Forest Quad Residence Hall</td>
<td>Gold Goal</td>
</tr>
<tr>
<td>Kelly School of Business Addition</td>
<td>Gold Goal</td>
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</tbody>
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Table 1. Completed and Current IUB LEED projects with achieved or anticipated goals