PROJECT PLAN

IPRO 320

Sustainability Planning of IIT Buildings

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OBJECTIVES

The objective of IPRO 320, Sustainability Planning of IIT Buildings, is to contribute to the problem solving necessary to implement energy efficiency improvements in existing buildings and to the central steam and electric systems. Alternate possibilities for energy use in context with their building type and surroundings will be discovered through research of other university buildings at the University of Chicago, Loyola University, and IIT. This research will then be used in finding alternate forms of energy generation to secure the sustainability of the IIT campus.

BACKGROUND

The Illinois Institute of Technology can be compared to a small city, with the campus occupying 120 acres of land. Also in comparison, IIT has an on-site electric and steam generation plant, and owns and operates all of the utility lines between and within the campus buildings. Over 100 years ago the energy using devices and the concept of the campus was conceptualized; however, current thinking and technology must be applied to the existing campus in order to create buildings for the 21st century.

Energy consumption is becoming a large problem due to increase cost, increased damage to the environment, and lack of resources. As a result of the supply of resources continuing to decrease and the cost of energy consequently increasing, IIT feels it is necessary to cut energy consumption and cost. Energy-efficient systems and practices, as well as the investment in renewable technologies can assist in achieving greater energy and operating efficiency. It is ethically our responsibility to remedy the depletion of our natural resources.

METHODOLOGY / BRAINSTORM / WORK BREAKDOWN STRUCTURE

The problem we have to solve is to reduce energy consumption on the IIT campus through research of current conditions. We will research and implement change using a variety of resources listed below.

Lectures will be given to us either by our IPRO professor and/or guest lecturers. The lectures will inform the students about the current conditions on campus, about mechanical systems, new technologies, and other subjects that the students feel they need to be informed about.
Site visits will include the IIT Boiler Room, IIT Campus, Loyola Campus, and the University of Chicago Campus. Students will be given tours of mechanical/ electrical facilities on the mentioned campuses in order to view and understand how the machines are operated.

Work was provided to us from previous IPROs pertaining to either the same, or similar, problem we will solve. The information will be useful in understanding the IIT campus energy consumption and operation. We will be cooperating with Loyola and the University of Chicago regarding issues with their energy consumption. We will collect and review their data and compare it with data from the IIT campus.

We have divided up the IPRO group into 2 sections: the Architecture Team and the Engineering Team. The Architecture team will be divided up into 3 smaller sub-groups, corresponding to the 3 campuses that we will be studying in the first phase of research: IIT team, Loyola Team, and the U of C team. Each team will be headed by a data person. The data person will be responsible for gathering all the information from their campus. Once sufficient amounts of data are obtained, the data persons from each team will then meet with the Engineering team, who will at that time analyze the information. The engineering team will also be present at site visits to analyze mechanical systems and facilities structure.

Thermal imaging will be conducted at each campus using a FLIR camera once the weather turns cold. Prior to using the camera, the IPRO team members will receive training on how to use the camera and interpret the images produced.

The data will then be analyzed to determine any good ideas that produced energy efficiencies in the buildings of the other campuses. The results will be documented on charts and graphs in a format easy to quickly interpret and recognize the successful and unsuccessful techniques at each of the universities.

EXPECTED RESULTS

The Sustainability IPRO seeks to reduce energy consumption at Illinois Institute of Technology. It is expected that the unique styles of layout and architecture will give each of the campuses their own energy problems and corresponding solutions. Affecting the application of energy solutions is the type of building found at each campus, whether it be steel, glass, and brick at IIT, or the gothic style buildings found at the University of Chicago. Not all buildings will have the same solution for energy efficiency because of their unique facades. However, what we are expecting to find in our research are good ideas in each of these unique situations that produced energy efficiencies.

Energy consumption data from each of the schools for the year 2005 will be analyzed through a software program to determine what the energy is being used for and try to get a roundabout number of what is wasted. These numbers will be calculated along with cost to give a standard dollar amount. From there, new energy saving techniques will be researched, and their proposed savings will be calculated. Once a sustainability plan is set, it will be compared to the other universities in hopes of making easy sustainability plans for a range of diverse architectural layouts. Finally, the actuality of sustainability issues will be given as a report to the participating universities in hopes that they will use some of the information in and future renovations.

PROJECT BUDGET

Item	**Cost**
Computer Software	$ 350.00
Document Printing ($.07 per black and white)	30.00
Poster Printing ($5 per linear foot)	60.00
Final Printing (good paper, bound)	60.00
TOTAL	***$ 500.00***

SCHEDULE OF TASKS AND MILESTONE EVENTS

The schedule of tasks for the semester has been divided into two phases; Phase One includes all of the research and data gathering necessary to conduct our analysis of energy usage at the three campuses. The schedule for phase one includes the following critical events:

- Speakers from IIT, University of Chicago, and Loyola meet with all team members to brief them on the energy systems and facilities of each campus
- All team members participate in site visits to each campus where necessary data can be gathered and further meetings with facilities staff can be conducted. The information to be gathered from site visits pertains to landscape records, utilities equipment and facilities organization, energy usage, and campus building history.
- Thermal imaging will be utilized as much as possible on each campus, and the utilities team will analyze the photographs to discuss the significance of that they show.

- The teams decide on buildings from each campus which have energy usage designs that attain sustainability and have significance for possible implementation elsewhere, including the IIT campus.
- R-values for significant buildings are calculated and a design analysis for these buildings discussed by both the architectural and utilities team.
- The website for IPRO 320 will continually be updated throughout this phase and Phase Two as significant data are gathered.
- Phase one ends at which point the midterm report is due.

Phase Two will consist of presentation of the data and analysis from Phase One, along with further research of possibility for sustainability that have not yet been implemented at either of the three campuses. The tasks for Phase Two follow in chronological order:

- Designated data person from each Architectural team lead their team members while the poster and other presentation visuals are prepared.
- Utilities team research emerging energy technologies that have significance for implementation, and possibly create a design plan for how one or two of these technologies could be implemented.
- Analysis of available sustainability and recycling grants along with application for grants that have applicability at the IIT campus. At the present time, one possible recycling grant is already being discussed.
- All deliverables required by the IPRO office are completed, including the final poster, abstract, final report, website and CD-ROM.

A more detailed breakdown of tasks, showing all sub-tasks involved and also including estimates of hours needed to complete each task can be found in the chart from Microsoft Project below.

ID	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1	**WEEKLY MEETINGS**	**6 days**	**Thu 8/24/06**	**Tue 12/12/06**		
8	**WEEKLY WEBSITE INPUT**	**6 days**	**Thu 8/24/06**	**Tue 12/12/06**		
15	**WEEKLY WEBSITE UPLOAD**	**7 days**	**Tue 8/29/06**	**Thu 1/4/07**		**ANNA**
23	**RESEARCHING PHASE 1**	**7 days?**	**Thu 8/24/06**	**Tue 1/2/07**		
24	NANCY SPEAKS TO U OF C	1 day	Thu 8/24/06	Tue 9/12/06		NANCY
25	QUESTION LIST FOR U OF C	1 day	Tue 9/12/06	Thu 9/28/06	24	ANNA,CHRISTINE,CF
26	LIST COLLEGE COMPARISON DATA	1 day	Thu 9/28/06	Tue 10/17/06	25	ANNA,CHRISTINE,CF
27	PROJECT PLAN	1 day	Thu 8/24/06	Tue 9/12/06		
28	**GUEST SPEAKERS**	**1.38 days**	**Tue 10/3/06**	**Thu 10/26/06**		
29	IIT	0.19 days	Tue 10/3/06	Tue 10/3/06		
30	LOYOLA	1 day	Thu 10/5/06	Tue 10/24/06	29	
31	U OF C	0.19 days	Tue 10/24/06	Thu 10/26/06	30	
32	**SITE VISITS**	**5 days?**	**Thu 8/24/06**	**Thu 11/23/06**		
33	OBTAIN EQUIPMENT LIST OF EACH SC	1 day?	Thu 8/24/06	Tue 9/12/06		
34	VISIT U OF C ENERGY CONTACT	1 day	Thu 8/24/06	Tue 9/12/06		
35	VISIT U OF C LANDSCAPE RECORD	1 day	Tue 9/12/06	Thu 9/28/06	34	
36	VISIT LOYOLA ENERGY CONTACT	1 day	Thu 9/28/06	Tue 10/17/06	35	
37	VISIT LOYOLA LANDSCAPE RECORD	1 day?	Thu 10/19/06	Tue 11/7/06	36	
38	UTILITIES GROUP	1 day	Tue 11/7/06	Thu 11/23/06	37	
39	CAMPUS HISTORY	7 days	Thu 8/24/06	Tue 1/2/07		
40	**THERMAL IMAGING**	**5 days**	**Thu 8/24/06**	**Thu 11/23/06**		
41	TRAINING TO LEARN CAMERA USAGE	1 day	Thu 8/24/06	Tue 9/12/06		ANNA,CHRISTINE,CF
42	PHOTOGRAPH IIT	1 day	Tue 9/12/06	Thu 9/28/06	41	
43	PHOTOGRAPH LOYOLA	1 day	Thu 9/28/06	Tue 10/17/06	42	
44	PHOTOGRAPH U OF C	1 day	Thu 10/19/06	Tue 11/7/06	43	
45	COMPARE PHOTOGRAPHS	1 day	Tue 11/7/06	Thu 11/23/06	44	
46	**DESIGN BUILDING ANALYSIS**	**1 day?**	**Thu 8/24/06**	**Tue 9/12/06**		
47	CHOSE ONE BUILDING ON EACH CAM	1 day?	Thu 8/24/06	Tue 9/12/06		
48	FIGURE OUT R-VALUE OF WALL	1 day?	Thu 8/24/06	Tue 9/12/06		
49	COMPARE CAMPUS BUILDINGS DATA	1 day?	Thu 8/24/06	Tue 9/12/06		
50	**MID TERM REPORT**	**1 day?**	**Thu 8/24/06**	**Tue 9/12/06**		
51	DIVIDE WHAT IS DUE	1 day?	Thu 8/24/06	Tue 9/12/06		
52	**RESEARCHING PHASE 2**	**7 days?**	**Thu 8/24/06**	**Tue 1/2/07**		
53	POSSIBILITIES OF NEW TECHNOLOGIES A	7 days	Thu 8/24/06	Tue 1/2/07		
54	INNOVATIVE METHODS FOR IIT	7 days	Thu 8/24/06	Tue 1/2/07		
55	APPLICATION FOR ILLINOIS RECYCLING G	1 day?	Tue 11/28/06	Thu 12/14/06		
56	**FINAL PRESENTATION**	**6 days**	**Thu 8/24/06**	**Tue 12/12/06**		
57	CHARTS FINALIZED	2 days	Thu 8/24/06	Thu 9/28/06		
58	DATA ORGANIZED	2 days	Thu 9/28/06	Tue 11/7/06	57	
59	WEBSITE COMPLETED	1 day	Tue 11/7/06	Thu 11/23/06	58	
60	ABSTRACT DUE	1 day	Thu 8/24/06	Tue 9/12/06		
61	POWER POINT PRESENTATION	1 day	Thu 11/23/06	Tue 12/12/06	59	
62	FINAL REPORT COMPLETED	1 day	Thu 8/24/06	Tue 9/12/06		
63	POSTER DESIGN	2 days	Thu 8/24/06	Thu 9/28/06		
64	POSTER DUE	1 day	Thu 8/24/06	Tue 9/12/06		
65	IPRO CD DUE	1 day	Thu 8/24/06	Tue 9/12/06		

INDIVIDUAL TEAM MEMBER ASSIGNMENTS

Loyola University Research Team	* Joanna Ruiz Craig Lanum Guillermo Gomez
University of Chicago Research Team	* Melissa Friel Despina Zouridis
Illinois Institute of Technology Research Team	* Chrissy Atterberry Sean Thompson Anna Dannhausen

* Data person that will coordinate research with other research teams and provide the data to the IPRO class in a manner that is easy to compare, analyze, and make conclusions.

Utilities and Data Engineering Analyzing Team	Elizabeth Bilitz Eugene Gargas
Policies and Grants Research / Floater	Erica Kahr

DESIGNATION OF ROLES

Minute Taker/ Agenda Maker	Erica Kahr
Master Schedule Maker	Joanna Ruiz
Web Site Designer	Anna Dannhausen