Illinois Institute of Technology

Final Report

Cottage and Area Physical Modeling for Enhancing a Classic Country Club

Olympia Fields Country Club

IPRO 320

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I. Executive Summary

The aim of this project was to assist Olympia Fields Country Club in taking inventory of current structures and help in the design of a new bridge. The country club does not have information on the layout of each of the twenty six cottages. Inventory of each of the cottages must be taken for tax purposes.

The existing bridge at the entrance of the country club is at a state of disrepair. The structural capacity of the bridge is failing. Because of this, the bridge had to be minimized to one lane for two-way traffic. As a part of IPRO 320, the team worked together with the country club and data from the engineering firm working with the club to design a new bridge.

This semester, the IPRO team has accomplished all of the given tasks plus some extra tasks. All twenty-six cottages were measured, the livable space of each one was calculated, and property lines were placed. The new bridge was designed to be put in the new location along with the décor of the bridge. Also a 3D view of all the cottages, a publication on photographic surveying, and a video of the construction process of the bridge along with interviews of each Capstone member was made.

II. Purpose and Objectives

With the increasing amount of golf players in the Chicago area, there was a need for a new golf club. The country club was founded in 1915 by a Chicago business man named Charles Beach. The location was chosen along the Illinois Central Railroad, a rolling meadow by a trickling stream. The name Olympia was chosen as the Grecian people held games in ancient Olympia where the heroes would gather. In recent years, the country club hosted the U.S. Open in 2003 and invested $9.5 million to improve practice facilities, bunkers, and other projects in 2005.

Olympia Fields Country Club has been opened for over ninety years. Since then the club has expanded with new construction including 26 cottages in total. At the owner's request, these cottages need to be modeled to document existing conditions. Along with modeling the cottages, the amount of livable space for each of the cottages need to be calculated for tax purposes.

Another issue the country club needs to resolve is the replacement of a dilapidated vehicular bridge. The two-lane bridge in question is at the entrance of the club and spans a stream. This bridge will need to be reconstructed due to its age and level of disrepair. The new bridge should fit in with

the theme of the club and also meet specifications for allowance of emergency vehicles to pass through.

III. Organization and Approach

The IPRO must have good communication along with several site visits in order for the project to go off with success. The clients need must be completed within the semester. Each step of the way will be put through quality control to make sure all the information is accurate. Information will need to be gathered on the cottages and the new location for the bridge. After meeting with the owner, brainstorming on how the project will conducted and what technologies will be used was done. The IPRO team was split into four teams: surveying team, drawing team, capstone team, and bridge design team.

The surveying team had the first task that needed to be done in order for the project to continue. This included several site visits to the country club. The team has decided that it would survey using measuring tape and a high resolution digital camera. All twenty-six cottages were measured and using that information, the livable space was calculated. The digital photos were used to create drawing plans of the cottages. Digital photo surveying was chosen because the new technology would be able to portray the cottages exactly how they look in the drawings. This method was also a lot less time consuming then having to model all the cottages using computer software. The surveying team also looked at the new site for the bridge and got a sense of the décor of the club so they would be able to design the bridge to fit with the club's style. Also on the site visits a HD camera was used to circle the fronts and backs of the cottages to create a 3D Map of the cottages.

The data collected from the site visits were compiled in a field book to be used for the cottage drawings. Using the measurements obtained the amount of livable space was calculated for each of the cottages. The drawings were chosen to be done on AutoCAD software due to the applications of the program and familiarity the team had with using the software.

The capstone team, comprised of 5 fourth-year civil engineering students, set out to work using data given by Robinson Engineering to design the new bridge. The data consisted of a 2007 AutoCAD topography file, a WSP2 Paper Copy of the Butterfield Creek Model (obtained from the IDNR-OWR), as well as a copy of a soil report and corresponding addendum (done by SEECO Consultants, a subcontractor of Robinson Engineering). The team divided up the work amongst the members into parts: culvert design, water flow, soil conditions, and road pavement. Beginning basic research was determining what culverts were as they were noted to be used in the bridge addendum. Some IPRO members including

four of the five capstone members met with the country club manager to discuss the entire IPRO group's task in further detail. After this meeting, the capstone members learned the country club was already in the process of designing and building the bridge, which was to be completed by May 8th, Mother's Day. Detailed research had to begin immediately and that included searching through hundreds of pages of state and national codes, manuals, and regulations associated with the bridge and road design. The team decided the approach was to follow the same process the engineering firm (and contractors), hired by the country club to do the actual bridge construction, would do and determine if our calculations and assumptions would match the engineering firms and also see if we might come up with new discoveries about the project itself. The team used online resources and even met with individuals in the profession to discuss and make sense of the material the team found and the data given by Robinson Engineering. Professor Anderson, an IIT professor in the Environmental Engineering department, helped to go explain in better detail about the Butterfield Creek hydrology data. The whole capstone team also met with a structural engineer (from a firm located in Chicago) to ask about designing box culverts as the members had never been taught how to in their previous IIT courses. The team had to make sure the two lane bridge was wide enough for emergency vehicles to pass through and strong enough to be loaded with heavy vehicles. During surveying of the cottages in the beginning of the semester, photographs of the bridge were taken and one could see the cracks and deterioration.

The bridge design team had the task of designing the new bridge's architectural elements. The team had to have good communication with the capstone members of the IPRO to get all the information on the bridge's substructure and its construction. The décor of the bridge was important because this would be the entrance bridge for the club. The country club specified that the bridge aesthetic should reflect the architectural elements of the country club. The design team addressed this issue by meeting with the country club representative and discussing design issues. Many paradigms were prepared and then presented to the country club representative. The tools used in the design process of the bridge were: Autodesk AutoCAD, Autodesk 3DsMax, Google SketchUp, and Adobe PhotoShop.

Aside from the larger tasks the IPRO team has decided that it would have other small tasks that would be completed as well. First was to make a 3D view of all the cottages and compiling it to create a seamless view of the cottages using PhotoSynth. Since photographic surveying is relatively new without much publication on it, we would make a publication on how the process is done to educate other people who may also want to use this technology. Also since the construction of the bridge will be done on May 8th the IPRO team has

decided that we will make a video on the construction process and interview Capstone members.

IV. Analysis and Findings

As for the surveying team all of the data that was necessary for livable space calculations were collected. For some of the views of the cottages, we were not able to get because of obstructions such as trees and other cottages. Also the site visits for the bridge has collected all the necessary information to design the bridge. The process on the photographic surveying was documented along the way which was used to make the publication. A golf cart was used to circle around the cottages to create a 3D view of the cottages using a HD camera.

The drawing team was able make a layout of all twenty six cottages along with the livable space calculations. A template layout in AutoCAD was made so that all the cottage drawings would be uniform. A scale for the layout of each cottage was also chosen in order to fit all the cottages on an 11x17 page and also to keep the uniformity in the drawings. The drawings show the field data collected and also a small map showing the location of the cottage. A sample of one of the cottages with a brief explanation of the template is shown in Appendix A.

The capstone team was able to design the bridge with hopes to see the construction in progress. The water flow and elevations of the dilapidated bridge's surrounding area although given to the team, were not accounted for in the final design. The reason being that the meeting with Professor Anderson and his analysis of the data reinforced the team's assumption that the data was not useful due to the fact that it was nearly 30 years old and many things might have changed affecting the water flow rates, which the team assumed they would need for bridge design. The structural engineer, who met with all capstone members, was very informative and he even showed the team a similar problem that the firm was working on to get a better understanding of the scope of box culvert design. The team had originally assumed a bridge with two box culverts; however, after realizing the size of two box culverts would be quite limiting and then receiving the proposed plans for the bridge design in the new site, the team found out there should be four box culverts. The proposed plans and notes that were given to the capstone highly detailed the bridge and the team realized how much they had left to cover in research and design. Thus soil condition analysis and road design (including pavement, horizontal and vertical alignment) were not fully completed and any finals assumptions made were based on the proposed plan information. With this sudden change of analysis approach, the team focused on just the box culvert design and creating

the final report of the capstone's process, which is a detailed paper over 30 pages long detailing the team's thought process, plan of action, and discoveries made through research. The construction process of the new, proposed bridge was not videotaped as scheduling conflicts did not permit the capstone team to go out to the country club. However, the team did create a video outlining the process it went through from data analysis to final assumptions made about the bridge design. This video was not made for the country club, but rather for other IPRO teams, specifically Civil Engineering capstone IPROs as a visual aid on one capstone team's experience.

With the data collected from the capstone team, the engineering firm, and the country club, the design team went forward in their efforts to design a new bridge at the entrance of the country club. In total, four designs were established and then presented to the country club representative. The representative that chose the design that best fit the country club's image and the team went forward in developing the final design. To develop the bridge design, concept drawings were first completed. Compiling the information from the engineering firm and the capstone team on the substructure of the bridge, preliminary construction drawings were completed. As a final deliverable to the country club; concept drawings, construction drawings, and three-dimensional iteration were turned over to the country club representative to help in the bidding and construction phase of the bridge.

V. Conclusions and Recommendations

The project as a whole was a success; we have met all the needs of the owner plus some additional tasks. The site visits gathered all the required data that we needed for the project. The cottage drawings are more than what the owner needed. It shows the calculations done for the livable space which was requested by the owner for each individual cottage along with the layout of the cottage including digital photographs of the cottages. There is no need to continue this IPRO in upcoming semesters as all the work requested by the country club owner was completed.

The capstone team was able to design the bridge using the data they had. As an added bonus, the capstone team was able to see the actual construction of the bridge designed by Robinson Engineering.

The final design for the bridge was chosen by the club owner which will be built on a later date. The model created shows a detailed portrayal of the bridge that utilized new technologies.

As for the 3D view of all the cottages, we were able to use the video footage and compile it for a seamless video. The original plan of using PhotoSynth was unsuccessful because the photos would not compile in a way that would allow a

smooth viewing of all the cottages. The use of the HD camera proved to be successful.

VI. Acknowledgements and References

We would like to thank Russel for meeting with us on site visits. Good communication and quick responses has helped to complete the project within a timely manner. We would also like to thank Robinson Engineering for working alongside us and providing us with data needed to design the bridge.

Budget		
Item	**Quantity**	**Cost**
Lidar Database	1	$200
Hard Drive	1	$50
Transportation	816 miles	$408
32” HD LCD TV	1	$650
Thank You Cards	10	$20
Model	4	$85
Posters	6	$300
Printing	78	$65
	Total:	**$1778**

List of Team Members:

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Alisa Holm

Jill Ishii

Carolyn Kois

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Elizabeth Mauban

Grant Mosey

Angela Ng

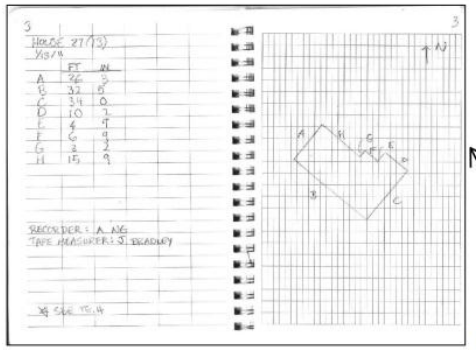
Trevor O’Keefe

Coral Pais

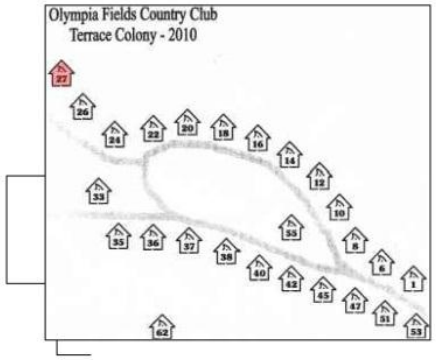
Official Website: http://www.ofcc.info/

Appendix A: Cottage Drawing Sample

Cottage 13 of 26

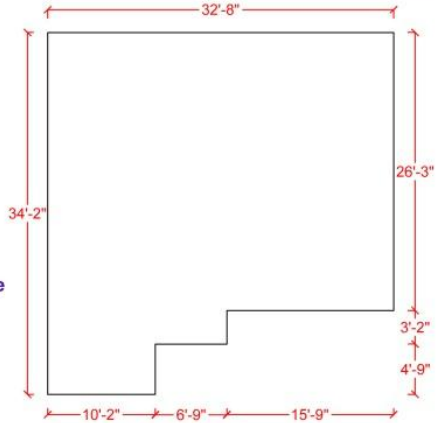


Field Book Scan



Cottage Location

Layout of Cottage Showing Dimensions



Four Side Views Showing Side and Roof Height

Space for extra notes

Notes:

To Be Filled Out By Recipient

Area of Each Level From Field Data

Estimated Volume By Multiplying Total Area By 8 feet

Estimate Based on Aerial Photo

Measured Space: _____
Course Level: 0 sq. ft.
Road Level: 960 sq. ft.
Floors Above Road Level: 0 sq. ft.
Total: 960 sq. ft.
Estimated Volume: 7680 cu. ft.
Aerial Estimate: 1198 sq. ft.

Cottage 27	Olympia Fields Country Club 2800 Country Club Drive Olympia Fields, IL 60461
Last revised 3/19/11 by William Lange	

Appendix B: Bridge Design Scheme