Integrating Service Projects into CER-021 Elementary Surveying

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Abstract

This paper discusses the use of service projects in the Elementary Surveying course at Union College. The use of service projects gives the students a chance to give back to the community while learning surveying, organizational, and time management skills. This year's success and ease of finding projects has opened the way for the service project to become a permanent part of the surveying experience at Union.

Introduction

Community service has become a major part of the education of students at Union College. Most of the community service programs (Big Brothers / Big Sisters, We Care About U - Schenectady to name two) are run as extra curricular activities for the students. This does not guarantee that students will become involved in community service. The impetus behind adding community service to CER-021 Elementary Surveying class was to give students a chance to work on a real job and give back to the community. By finding surveying jobs needed by non-profit groups and local governments an element of community service was added into the course. Since CER-021 is an introductory half course, two hours of lecture - three hours of lab per week, the projects needed to be of a scale that the students could complete the field work and plan within a four week time frame, approximately 18 hours of time. The projects for this year's class were: site plan of YWCA backyard, Enlarged Erie Canal Lock 23 site plans, and Schenectady Water District buildings site plan.

Class Framework

Union College operates on the trimester system. This means that courses meet for ten weeks before final exams. For this reason the survey course is lab intensive for the first six weeks so that the students will have an adequate knowledge of surveying before starting their final project. The labs consist of the following:

Lab 1 is basic surveying lab where students learn how to layout and reference a baseline and then perform a baseline survey with a right angle level and cloth tapes. They are also introduced to levels and stadia rods.

Lab 2 is their first lab where they need to use the level and stadia rod. The object of the lab is to do a level run between two known elevation, USGS benchmarks, with an error of no more than 0.02 feet. This taught the crew how to operate the level and set up a level run. It also taught them the need for care in surveying, 3 of the 4 crews had to do the run twice due to unacceptable error.

Lab 3 had the crews set an elevation off a known elevation. This required the crews to set up a level run and run a level loop to determine the elevation of the new point.

Lab 4 taught the students how to use the total stations. The crews needed to determine the difference in height between 3 places on campus. This was done using triangulation. The three points could be seen form the center of campus. The crews had to place a backsight point, measure the distance to the point by EDM, find vertical and horizontal angle, and calculate the results based on readings at the 2 points.

Lab 5 required the crews to layout a rugby field - the four corners, 22 yard lines, and 50 yard lines.

In addition to the lab exercises all the crews needed to keep field books and record their work correctly into the field book. They also learned how to perform calculations to balance traverses, find x, y, z coordinates of points and determine the contours of their sites, and find

USGS benchmarks. All members of the crew had a chance to do all the jobs, run the instrument, hold the rod/prism, keep notes, and crew chief.

At the beginning of the seventh week the students are shown their project, given a short description of what is needed and how it will be used, and then allowed to set up a surveying program to accomplish the project. The final project includes all calculations, field notes, and a plan of the project, either hand drawn or computer generated.

Projects

Project Set-up

Determining the projects for this class was not difficult. With local contacts it was possible to quickly determine which projects would work for the Surveying course. The YWCA project came through efforts of the YWCA to have Union College do some design work for their site. The Erie Canal related work came about through contacts that Prof. Wolfe had with the county planning agency and the ASCE Student Chapter restoration work on Lock 23.

The projects for next year's surveying course are in the planning stages and should include work at several local parks to provide topographic surveys for walking paths.

The students were given three weeks to accomplish the field work and calculations. This meant that the crews had to be organized and use care in their surveying to lower the field time. The students were allowed to use the surveying equipment at any time during the day and most of the groups worked extra hours to complete the project on time.

Project 1 was a site plan for the Schenectady YWCA (See Figures 1 & 2). The YWCA is planning to build a playground in the back of its property and needed a site plan for the engineers. The students were required to survey an area of approximately one acre. The survey included topography and property lines. The site consists of two terraces separated by a 12 foot slope. There is a small stone foundation, a 30 foot long retaining wall, basketball court and

many trees on the site as well. The design work will become a Senior Capstone Design Project for several students.

Project 2 was a site plan for the Enlarge Erie Canal Lock 23 area (See Figure 3). The area consists of the two parallel lock chambers, the tow path, and the canal bed for a distance 50 feet downstream. The tow path is currently used part of the Mohawk-Hudson bikeway and is used by many local people for biking and walking. The lock was used to raise and lower canal boats between two segments of the Enlarged Erie Canal. Lock 23 was the first lock west of Schenectady, NY and the busiest lock on the canal. The locks were built in the 1840's and expanded in the 1880's. The 1840's lock chambers are 20 feet deep, 17 feet wide and 110 feet long with a 20 foot wide "island" separating the locks. The extension of the southern lock doubled the length of the lock to 220 feet. This lock is currently being brushed out and cleaned up by the ASCE Student Chapter. The long term goals for the lock include rehabilitation of the lock chambers to working order and beautification of the surrounding area. The site plans developed by the surveying class will be used to determine the amount of dredging needed to reach the bottom of the lock, and give an overall view of the lock and its structural condition.

Project 3 was a series of projects located along the Mohawk - Hudson bikeway which is run by Schenectady County. The projects included locating the upstream portion of Lock 23, locating an existing overlook and surrounding area, and topography of a washout area adjacent to the bikeway. The upstream end of lock 23 consists of a vertical stone wall and an inclined wall which mark the edges of the canal. This information will be combined with the information from project 2 to create a picture of the entire lock area. The overlook is a 25 foot tall concrete structure built into the riverbank by General Electric which overlooks the Mohawk River. It had metal seats and a fence for viewing the river. Currently, the site is protected by a chain link fence while the county determines how to fix the site to allow the safe public access. The third area in this project is a washout, which is threatening the bike path. The washout is on the bank of the Mohawk River and extend from the bike path to the river, approximately 25 feet vertically and 60 feet horizontally. The site plan generated by the survey crew will be used by the county to determine how to restore the area and protect it from future erosion.

Project 4 was the site plan for two abandon buildings owned by the City of Schenectady and located adjacent to Lock 23. The buildings were originally built in 1927 to house the superintendent of the Schenectady Water Works and his workers and families (See Figure 4). Both buildings are duplexes, one up and down - the other side by side. They currently are abandoned and need complete renovation of the roof and interior. The site plan includes all existing utilities, as well as the building footprints, spot elevations, and building location. This survey was tied into the other two Erie Canal Lock 23 surveys to allow an overall site plan of the area to be developed. These building are being redesigned as a museum and classroom for the Erie Canal Lock 23 cultural area that is being developed. Students from the Senior Design class will be designing the rehabilitation using the site plan developed by the surveying students.

Conclusion

The integration of community service into CER-021 Elementary Surveying provided a chance for students to give back to the community. In addition, it enhanced the lab experience by providing a real world project, which allows the students an opportunity to give back to the community. By moving the projects off campus the students developed better organization and field work skills. Since the projects where an average of 15 minutes from campus it was necessary for the students to determine their equipment needs, ask questions, and project times. These skills are all lacking with on campus projects due to the proximate of the equipment room, project location, and instructor. The students had a very positive response to the projects over the on-campus projects of past years. This feature of the surveying class will be retained in future years.

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Figure 1. YMCA backyard

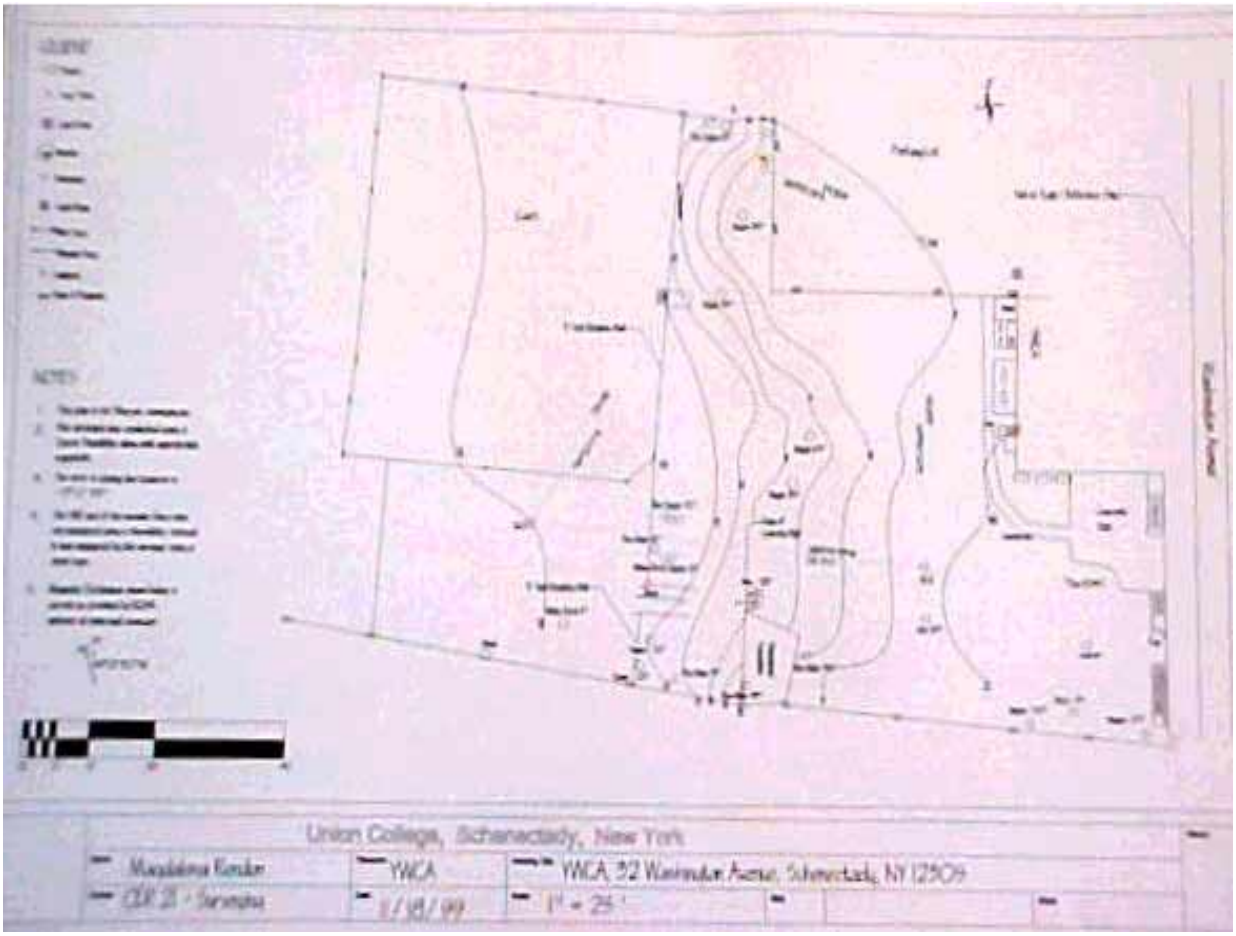

Figure 2. Site Plan of YMCA Backyard

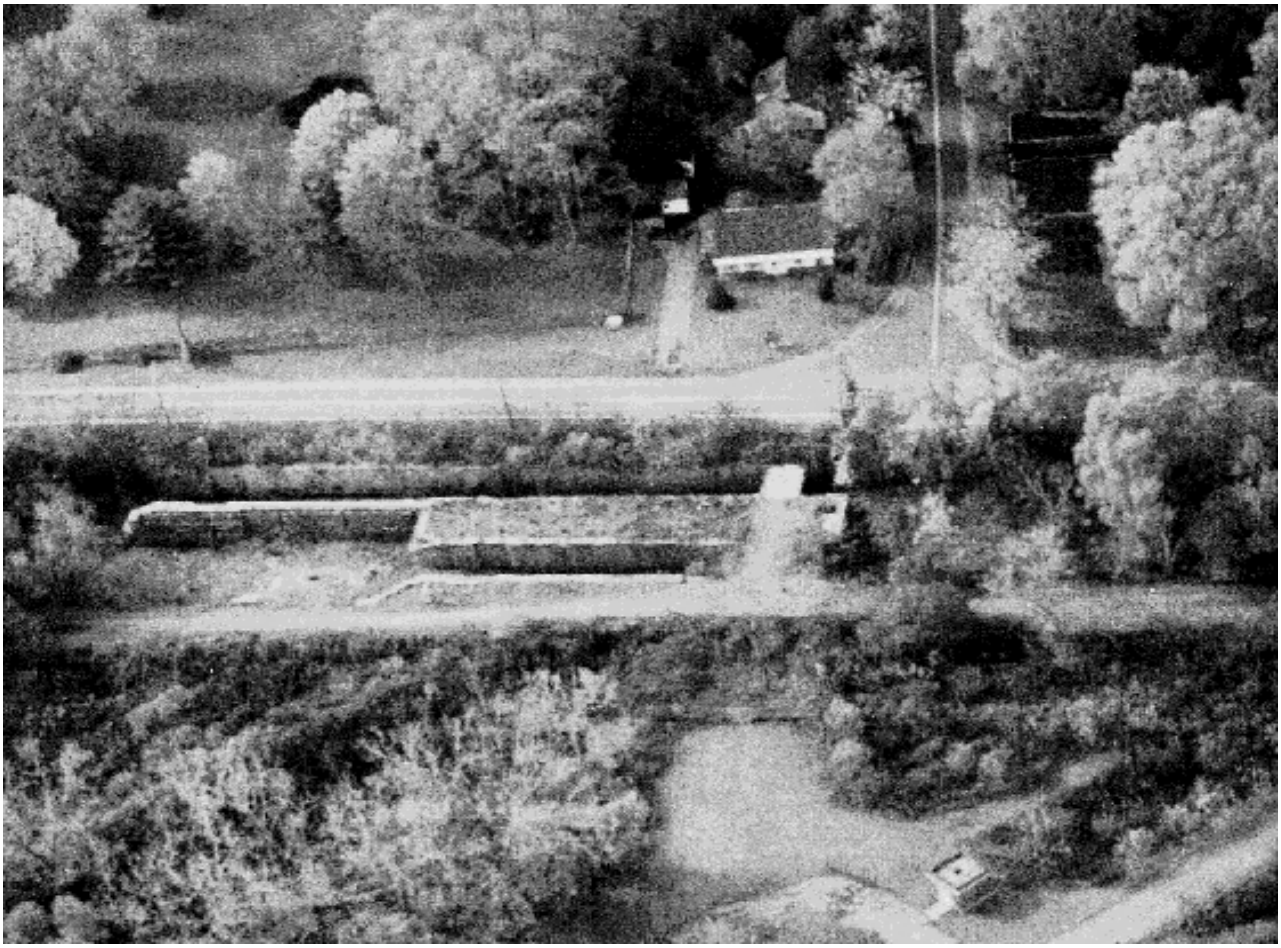

Figure 3. Aerial Photograph of Lock 23

Figure 4. Work Crew Surveying Building Lot