

Student Life Building

Northampton Community College,
Monroe Campus, Tannersville Pa

Technical Report 3



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Executive Summary

Northampton Community College and D'Huy Engineering Inc, have been working on the design of the new Monroe Campus since late 2008 when the college purchased 72 acres of land in Tannersville, Pa. The campus will hold three buildings; The Enrollment Center, Classroom Roe, and the Student Life Building. The Student Life Building will house the campus' cafeteria, bookstore, gymnasium and fitness center, and central plant.

Throughout the design phase of the campus, and most especially the Student Life Building, the team has not strayed from the values of NCC. The project team has been able to help the college in their quest to pursue LEED silver ratings on new construction. Because preparation for construction began in 2008, the team initially used the LEED v2.2 and needed to convert to the LEED 2009 version once the bidding process began in 2011. The rating systems have multiple differences so this was not a quick process. However, the team was able to convert the project to comply with the newest LEED rating system. This rating is not easily attainable – the planning and monitoring of each credit must be carried throughout the construction process, and documentation by a LEED accredited professional is also mandatory.

During the interview conducted with the Student Life Building's Project Manager, the critical path was discussed. The main activity of the building's critical path schedule is the steel erection process. Because of the weather and the approaching winter, the building needs to be completely erected and metal decking must be laid before the underground MEP systems can be roughed in. The project could be accelerated or slowed depending on the speed of the steel erection.

The design team also implemented value engineering principles that could help the owner decide between alternate systems. The owner however chose numerous additional systems that had additional costs, like the geothermal HVAC systems. These decisions however made the initial estimate higher than desirable and as a result, the campus could not contain a child care center.

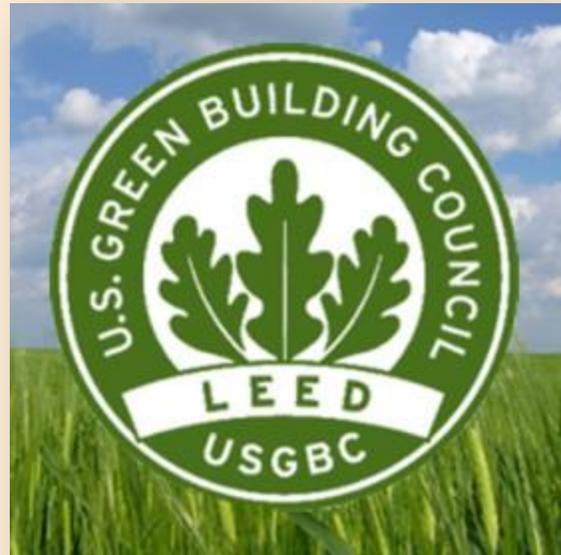
Despite the planning that went into the Student Life Building, there are some areas that could be improved or changed. I would like to research alternative fire protection systems, alternative wall facades and connections, and possible changes to the geothermal HVAC system.

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LEED

Northampton Community College views sustainability as one of its core values. The college believes in a “Commitment to the long term health of the institution, community, the economy and the environment.” Because of these beliefs, the college has committed itself to green building and decided all new construction must meet at least a LEED silver rating.



NCC initially contacted D’Huy Engineering Inc. in 2008 after purchasing the 72 acre site in Tannersville. The team at DEI helped the college to develop a LEED plan that would reach their standard of a ‘silver’ rating based on the then current LEED v2.2. With a preliminary design using v2.2 the team would obtain at least 29 points cementing their certification, and they would have the ability to receive an extra ten points through additional design. In the LEED v2.2, the highest rating is a 69; certification begins at 26 points, and the silver rating that the college is seeking would begin at 33 points.

When the bidding process finally began in 2011, the project team realized they would need to update their LEED criteria. In 2009, the newest rating system was published and was based on 110 point scale. To reach LEED certification, the team would need to reach 40 points, and to reach silver 50 points. Most categories of the two rating systems are similar, however the weighting of each point grew in the 2009 version, some prerequisites were added, and a new category, ‘Regional Priority’, was created.

Transferring to the LEED 2009 Rating System for New Construction and Major Renovations, the Student Life Building’s design team developed a checklist to pursue a ‘silver’ rating with 80 possible points – the ‘platinum’ rating – but the likelihood of receiving each point pursued is low. This system of over shooting their goal will help ensure the building meets the owner’s expectations.



The breakdown of the individual points being pursued is below:

Sustainable Sites

There is a prerequisite in this category regarding construction pollution prevention. The team will be using this prerequisite so they are able to use the category. 'Sustainable Sites' has a total point sum of 26, and the design team is expecting to use about 16 of them. Among these 16 are points for storm water design, minimization of light pollution, site development- both protecting/restoring the site and maximizing open space – and alternative transportation. The project however cannot receive any credits in a few categories because it is a greenfield, or unconstructed land, and because the site is not closely located to a community or urban development project. Also because of the site's remote location, the possible points from alternative transportation area are being researched. The team needs to decide how beneficial it will be to provide public transportation access and bicycle storage.

Water Efficiency

Water Efficiency has a possible 10 points once it's prerequisite – reducing water use by 20% -- is met. The Student Life Building hopes to receive about 8 points from efficient landscape techniques, and overall water use reduction.

Energy and Atmosphere

This category has three prerequisites; fundamental commissioning of the building energy, minimum energy performance, and fundamental refrigerant management. All have been met, however only 8 of the possible 35 credits will be sought. The team will enhance refrigerant management and gain about 2 credits, and about 6 from the optimization of energy performance.

Materials and Resources

In order to qualify for any credits in this category, the project must store and collect their recyclables. Because they are doing this, the project team can also apply to receive another 3 credits from the category. The credits are from using regional materials, having a waste management system that will recycle or salvage 50% of the waste, and using 10% of building material that is considered recycled products.

Indoor Environmental Quality

Prerequisites for the Indoor Environmental Quality category include reaching the minimum in air quality performance and having environmental tobacco smoke control. The indoor air quality is one of the most important aspects to the owner. The project manual that they created with DEI in the early design phases outlines the importance of IEQ and the happiness of their students and employees. Out of the possible 15 points in the category, the team will pursue 12. The project will use all low-emitting materials which will bring about 4 credits, have an indoor air quality management plan during construction and before tenant move in, 2 points. The Student Life Building will also contain systems that are easily controlled for thermal comfort and lighting, and have an overall thermal comfort that has been designed and approved.

Innovation in Design

This category is a way for a project team to go above and beyond what is outlined in the LEED manuals. Out of the possible 6 credits in this area, the team will be receiving 2. One for an innovation in design and one for having a LEED accredited AP on staff.

Regional Priority Credits

Regional Priority Credits are like the bonus points of the LEED credits. There are 4 available and the Student Life Building and the Monroe Campus want to receive 3 of them. They will be based off of the zip code of the project.

Project Manager Interview:

Schedule Acceleration Scenarios

When looking at the schedule of the Monroe Campus, there are two critical paths to consider – the campus overall and the Student Life Building. The campus needs to complete and implement erosion control plans before work begins in May 2012 and also complete the initial site work mobilizing the site by July 2012. After those first milestones, construction will begin on the Student Life Building, then the Enrollment Center, and then Classroom Roe. The critical paths of construction in the separate buildings are similar, however with their differing forms and uses, the specific schedules change.

The critical path of the Student Life Building's schedule also begins with mobilizing the site. Because it's the first building to be started, the project site work in summer 2012 will also be the critical site work for the Student Life Building. After site work is complete, the project's critical path consists of constructing the building pad, foundations, steel erection will begin, and then the underground mechanical rough can begin. The steel erection and metal decking is the most important milestone for the team.

The project team needs to continue construction throughout the winter. Northeastern Pa can experience harsh winter conditions and in order to safely and comfortably proceed, the building's steel and roof systems need to be in place. Unlike conventional projects, the Student Life Building's underground plumbing, mechanical, and electrical supply lines will be installed after the steel erection process. If for any reason the steel erection is delayed, the overall schedule will also be delayed. Likewise, if the steel erection is accelerated, the underground rough in, interior partitions, and final completion will also be accelerated.

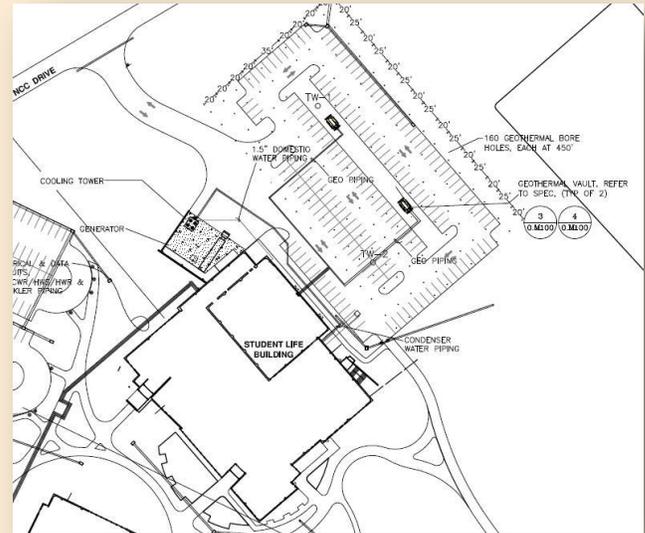
There are numerous ways the steel erection process could be accelerated. A second crane could be used, however rental costs for a crane may exceed the owner's budget. The current duration of steel erection is about 40 days and a second crane could cut the duration to under a month, however rental costs would still exceed the budget. Another way to hasten the process could be adding more crew members to the erection gang. Additional crew members or overtime hours could also cut into the 40 day duration and would have a smaller cost impact.



Value Engineering Topics

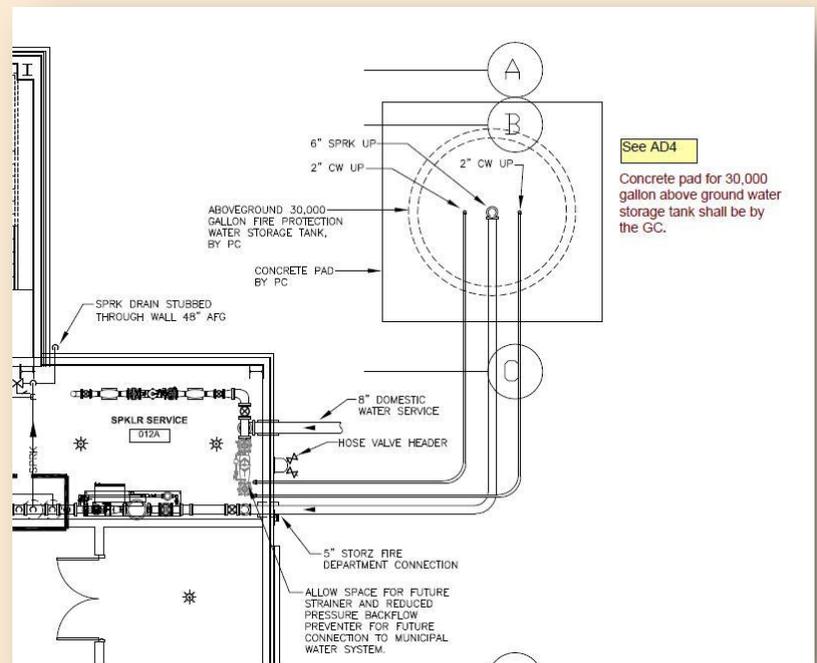
Value engineering is a process that takes into account the overall requirements of a project and searches for the most economical solutions to those requirements. While designing the Monroe Campus, and especially the Student Life Building, the concepts of value engineering were used in presenting various alternatives to the owner.

One of the largest areas studied in the VE analysis was a conventional HVAC system vs. the geothermal system. The well field is shown in the picture to the right. After studying both systems, the college decided that despite the larger initial cost, the geothermal system would best fit the campus. The geothermal system would help the campus to grow and keep to their ideals about



VE analysis was also produced in regards to the fire suppression system. It was decided that an above ground storage tank would be an easier solution than adding excavation and later maintenance costs of a below grade storage tank. The tank is located behind the building and is pictured at right.

Costs were also compared when considering the façade of the building. It would have been less expensive to stick with a brick veneer throughout, however the owner chose to rotate between brick and stone. NCC felt this would be similar to their nearby campus buildings and also would be more aesthetically pleasing.



While in the procurement phase for the campus and Student Life Building, the project team overestimated their budget. They knew that the owner was choosing alternatives that would add cost, and eventually scrapped the idea of a child care center to be safe. However, looking back on their bidding process, the team realized that the bidding market was in their favor, and they could have kept the child care center.

Critical Industry Issues

The PACE roundtable event was a really interesting way to learn about industry issues from those actually experiencing them. I attended both sessions that dealt with supply chain, the first being 'Integrating Strategies and Technologies' and the second 'Modularization.'

During the first session, supply chain was defined as dealing with material and product deliveries. The team involvement for a successful supply chain process was discussed at length. We were able to conclude that the problems and challenges within the process occur when details and information are passed through different parties. The construction industry is a very team oriented industry and to eliminate this passage of information is impossible, so we talked about ways to improve communication within a team. We discussed different technologies, like list-serves, IRD codes, and ipad apps that can help all parties be updated, however in the end it is each individual's responsibility to maintain them.

Aside from communication, we talked about the different procurement strategies that will inevitably affect a project's success. It was concluded that early procurement helps to alleviate many delivery and material issues. Early planning and scheduling also allow for integrating strategies. It's important to plan your schedule keeping in mind the activities that will delay it the most. If those activities and the parties involved with them are constantly monitored, there should be less difficulty during the actual construction/installation.

The session discussing modularization was especially helpful because of the amount of industry professionals that were involved. They discussed modularization as something that the economy is calling for because of its faster work/less worker approach, but also talked about its positive effects on overall quality.

At the center of modularization is the idea of subcontractor involvement, and an integrated delivery approach. Without a repetitious design or early multi contractor involvement, modularization does not seem as beneficial. This

somewhat surprised me because I thought smaller portions of a building could be made modular and still benefit the overall timeline.

When thinking about the PACE roundtable and how the ideas discussed could affect the Student Life Building, there are multiple options to pursue. The most obvious issue that the Student Life Center would benefit from would be the BIM development. The campus could be created as the first Northampton Community College Campus to be maintained through models. However for this path to be an option the design team would have had to develop working models and a BIM plan. Also, the college would have to be open to training staff on the technical uses.

Another implementation from the breakout sessions could be modularization. I realize that the building itself is not repetitious and a completely modular construction is impossible, however in the breakout session, modularization of central plants was discussed. This is a topic I plan on researching more. Also, the restrooms and locker rooms are an area of the building that could benefit from a modular approach if the subcontractors were willing to work together early in the procurement process.

Finally, the quality control areas that were discussed within the first session could be implemented onsite. Currently, the team uses an online interface to keep all team members updated on daily site activities. I think adding items like the material scanning and check in could greatly help organization and deliveries to the site.

Observations

Problem Identification and Technical Analysis Options

The design team worked countless hours creating a campus and Student Life Building that would best suit Northampton Community College, and it is very evident in the thoroughness of the systems and design. There are some areas however that I think could be problematic.

The first area that I would like to research and analyze is the fire suppression system. The Student Life Building houses the central plant for the campus and as a result, it also contains the 30,000 gallon storage tank for the fire suppression system. The storage tank can help produce water pressure for the wet systems in each building, however I would like to analyze the size overall effectiveness of the system compared to its cost. There are also additional layers of upright sprinkler heads in numerous sections of the building. I would like to research the need for these and if an alternate system could cut costs while still meeting code.

In order to analyze this, the regions specific fire code could be researched and the IBC rules regarding the different areas involved, gymnasiums/fitness centers/kitchens could be researched. Once the standard system is determined, alternate systems could be researched and compared.

The second problem area that could be observed is the stone and brick veneer systems. Currently, the two systems are connected to the structural steel using cold form galvanized anchors. The materials are regional and help to gain a LEED credit.

I am interested in researching a modularization process that could possibly ease installation of manufacturing of the individual veneer sections. Creating a repetitious installation process could even help shorten the activity's duration in the project schedule.

Most of the items that I want to research would need to be decided upon or changed very early in the procurement process. They are items that will not be brought to the forefront in a multiple prime contract. Because of this, I also am interested in the industry shift to design-build construction. From previous research I think it would be more beneficial for owners to negotiate contracts and truly optimize the overall quality rather than a design-bid-build system that ensures a low bidder. I think that an overall industry study should be done to help push owners, and law makers to understand the benefits of design-build.