State College Area High School

Technical Report Part 3

Senior Thesis

Bryce Burkentine

Construction Management

Project Location: State College, PA

Advisor: Chimay Anumba

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Technical Report Three

Bryce Burkentine |Construction |Dr. Anumba | State College Area High School |State College, PA |November 11th, 2015

Executive Summary

The State College Area High School is comprised of two buildings with around 1 million square feet of demolition, renovation, and new construction. The project is located on Westerly Parkway in State College, PA. The South Building consists of new construction and renovation, while the North Building will be demolished and rebuilt. The South Building plans to start construction in September 2015. The construction manager is Massaro Construction Company.

An interview was conducted with Tim Jones, the project manager of Massaro. Various aspects of the project were discussed. Subjects included the schedule, design management, value engineering, and delivery method concerns. The schedule is critical to the job. Since the schedule follows the school calendar is it imperative that the deadlines are made. Since this project is publicly funded, it is important to maintain the current budget or even lower it with value engineering techniques.

This report also includes critical industry feedback and trends attained from this year's annual PACE roundtable. Breakout sessions were held with industry leaders discussing leading topics of the industry. These topics included Innovations in Safety and Automating Design Analysis. At the end of the Roundtable, we meant one-on-one with industry leaders to discuss potential research topics for analysis on our thesis projects.

Many owners utilize BIM on their projects. BIM uses are now becoming a standard practice among architects and contractors. Since this project is on a strict budget, BIM is not being used. BIM uses were evaluated for this project with the creation of a high level process map to show how these models could be utilized throughout the life of the project. Since there is demolition, renovation, and new construction the uses could out way the costs. To ensure the budget is meant, these models could have foreseen problems in the existing MEP systems and developed better take offs for estimating purposes.

State College is obtaining a LEED Gold Certification for this building. The LEED checklist for the project is attached which includes LEED categories and preliminary point evaluation. State College Area High School is in line with their sustainable goals and could possibly improve their LEED Certification depending on how the budget is maintained or improved.

Project Management Interview: Tim Jones

1. What are the overall project challenges you expect?

Answer: Phasing is the number one challenge for Massaro. There are a lot of assumptions, information from the community, facility director, athletic department, and general education requirements that have to be meant for each phase.

2. What are the critical milestones that will be a challenge to keep on schedule?

Answer: Finishing phase one on time in January 2017 which is the majority of new construction. The school calendar cannot vary so therefore there is no option of delivering the phases late because the students will need to be moved and ready to go for the start of the semesters.

3. What are your clients' requirements?

Answer: Safety is one of the most important concerns of the school districts. Also, ensuring the overall project achieves the program's needs.

4. What will be the challenges to those requirements?

Answer: Quality control and safety will be a challenge due to the phasing and ensuring all the details are kept throughout the project. Also changes and disruptions to the plan will be a challenge to ensure all those changes are relayed to whom will be affected.

5. How will you ensure the design is being constructed as designed in the field?

Answer: Submittals, pre-planning, reviews, and quality control will be essential during the construction phase. Pre-construction meetings with the subcontractors before they actually start work will help keep work being performed to the spec.

6. What areas in the design do you foresee challenges?

Answer: Existing portions of the building and renovations will be a challenge. There will be a lot of unknowns in these areas.

7. What value engineering ideas will Massaro use to implement in order to save time, save money, and maximize safety on the site?

Answer: Input thus far is in the design phase such as, Massaro asked to have some of the existing building to be tore down to save money and to have more flexibility with the design.

9. What are the challenges of the delivery method being used?

Answer: Have not interacted with the contractors on the job yet. Once bids come in they will have a bond and the lowest bidder.

10. Do you recommend another delivery method that would be more efficient and effective for this project?

Answer: On a public project it is hard to get all quality contractors since they have to choose the low bid. Anything that would be more collaborative from the beginning would be better.

11. How will you ensure the safety of the students while working during the school year?

Answer: There will be a site fence, hard barricades, and flagging for traffic. Since safety is a very important factor to the owner it is imperative that safety is executed correctly.

12. Would you recommend a different system (structural/MEP) that would allow shorter schedule duration?

Answer: The roofing system between the old and new materials will be a challenge to ensure the roof does not leak. The best way would be to replace the whole roof to ensure there are no leaks.

13. How will you ensure the schedule will stay on track with the school calendar?

Answer: Constant monitoring from the CM and GC. Pull Planning will be essential to making sure the schedule is kept. The superintendent will manage the day to day activities while the project manager will look towards the future ensuring everyone has their permits and materials to work.

14. How would you change the phasing of the project if no one was occupying these building during the school year?

Answer: Restrictions on the job from the owner is the challenge right now. If they could limit the kids in buildings then they could be much more efficient. Creating another space for the students to learn would help Massaro.

15. Are there any constructability concerns?

Answer: Tying the new roof system with the old roof system will be a constructability concern. An existing roof structure will need to be reinforced to take the new snow load from the drifts the new higher building is producing. Keeping the old gym floor in good condition during condition will be an issue.

Project Management Services

The project management services from Massaro include documenting the whole job, ensuring quality on the project, safety oversight, and risk management. The Preconstruction services include budget estimate, constructability reviews, and checking for completeness in the drawings. Financing is a large constraint for the owner. Since it is a public project the owners are technically the tax payers. Since taxes did go up already in the school area, it is important they do not go up anymore. To fund this project it is vital to stay at or below the proposed budget. Phasing is another issue that the owners and construction management company will have to be on top of. Since the schedule is built alongside the school calendar, schedule phasing had to be implemented. Successful completion of these phases on time will be critical to ensure the students have a place to learn during the school year. Having to move from the South to the North Buildings will be a large challenge ensuring the same quality is kept throughout all phases of the project.

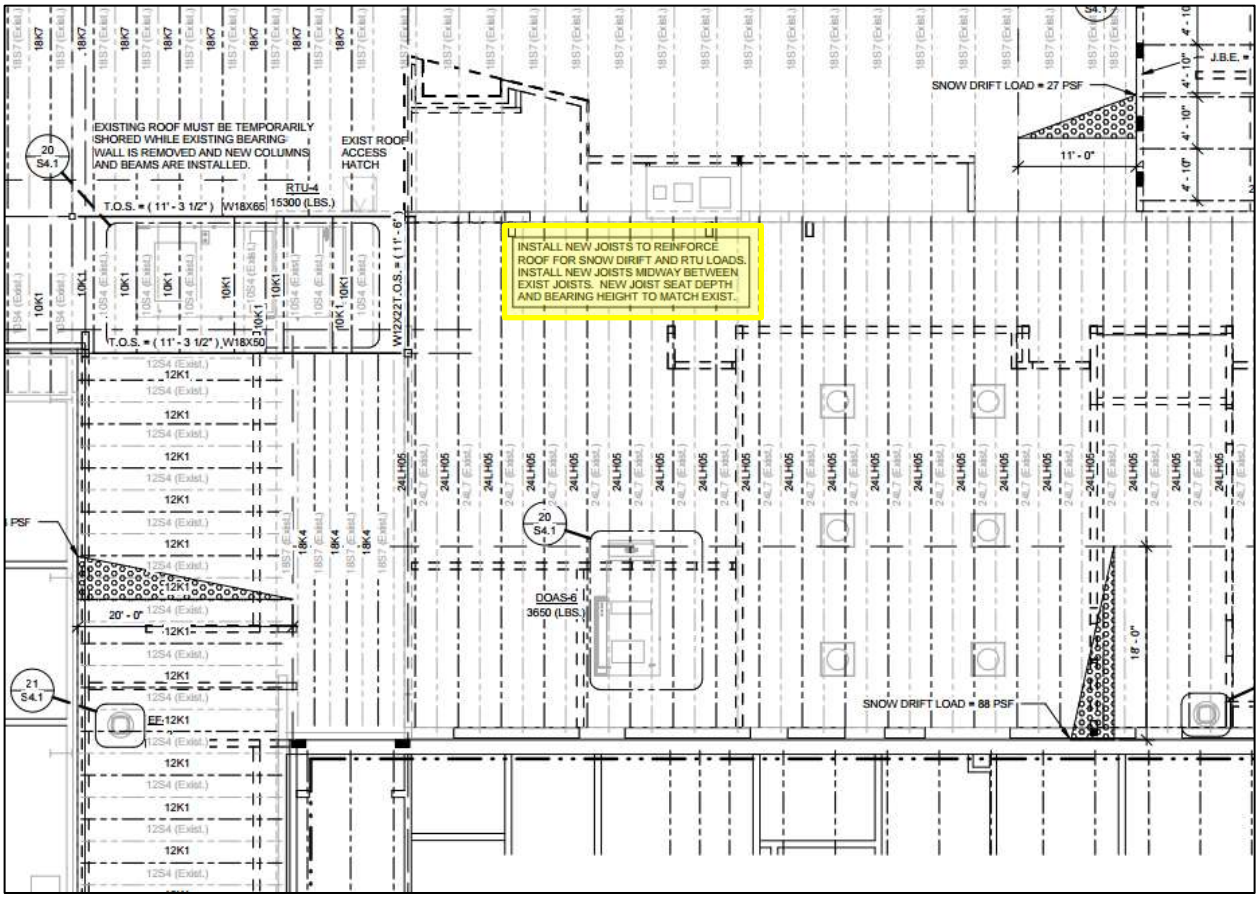
The key areas that have potential to better fit the project's needs are starting the telecommunication rooms earlier. Starting early will benefit the school district by having an updated telecommunications system in the building right away for the safety of the students. If the auditorium could be updated over the summer while not a lot activity is taking place, then the school district would not have to use the small auditorium for large events. Implementing these ideas would not expense any additional money but would benefit the end users of the building. Massaro is trying to cater to the owners and end users as much as possible and when there is an opportunity to do so then that idea should be executed.

Value Engineering Topics

Since the project just went out to Bid, Massaro has not had any value engineering ideas come up yet. Massaro had some input doing the design phase tearing part of the existing building down to increase the owner's flexibility with design. This in turn might have save costs if the design had to be built around the existing part of the building. When the project gets started, subcontractors will come to the GC or CM to explain how a process or material can be alter to save costs or time. The subcontractors will be a critical element in the value engineering process.

One item I would like to shed some light on is an existing roof structure will have to be upgraded to the new snow load it will be experiencing. Due to a new second story building, the existing one story roof will need to be upgraded to sustain the new snow load from the second story building. There is potential for value engineering to this problem. As you can see in figure 1, the one story roof will need to be updated with new joists.

Figure 1: Existing One Story Roof



Critical Industry Issues- PACE

Innovation in Safety

The first session I attended was Innovation in Safety with Dr. Somayeh Asadi as the facilitator. Since construction is the leading industry for worker related accidents it is very important to understand the individual worker and why they put themselves in harms way. Understanding safety on the jobsite and realizing everyone is involved is the first step in improving safety on the jobsite. Is worker safety really the most important factor on the jobsite? Most owners, contractors, and subcontractors push for productivity with a shortcoming on safety. In order for workers to reach their productivity mark for that day sometimes they have to go out of their way to be safe. This in turn leads back to the management to understand workers can only go so fast while being safe.

Another topic discussed in the session was how do you determine if that individual worker is a risk taker? You could do a personality test, and the results would determine where the worker should be placed on the jobsite. With the eye tracking technology Dr. Asadi is using you can see how they react to unsafe situations and if the worker even notices those situations. Understanding the behavior of the worker first before he/she is place out on site could help keep safety up on the project. Determining the individual worker's past experiences and safety culture will help management react to why that individual unsafe.

The ways to improve the individual worker's awareness is first to have an orientation, which should be at least 40 hours long, then have an assessment at the end to ensure the individual was paying attention. The safety training needs to be related to the specific job the individual will be working on such as underground mining. OSHA is also great for general knowledge on construction sites. Daily safety meetings, tool box talks, and stretch and flex are all great ways to improve safety on the site. On-going learning is imperative to improve safety. When a new situation arises the management staff needs to pull their workers aside and explain exactly what is going on and how to prevent the situation.

Improving situational awareness in the individual workers is essential. The workers become numb to their surroundings and do not realize the safety hazards. Ways to improve situational awareness is having 3D or 4D models of the site. This could then have a worker walk through the site describing safety hazards on that specific site. Showing the cranes, equipment, scaffolding, excavations which will allow the worker to become familiar with the site he/she will be working on for the next couple of months. Having the workers mind on the job and not at home thinking about their personal life will help in situational awareness also. Having the worker on the job, knowing their surroundings and knowing their tasks at hand will help in improving safety on the project.

What was very interesting to me was how safety really isn't at the top of the priority list. First the management needs to react to this situation and make it a top-down approach. Management showing they truly care about safety and not productivity will help get the mindset of the worker to think about safety. What I can take away from this is how important safety will be on a school project, not just for the workers but also the students. Having a 3D or 4D model of the site, not only to show the workers but to show the students will greatly help to have successful safety program on the project. Dr. Asadi would be a good contact to talk about how the 3D and 4D model would fit into the safety program. Jerry Shaheen from Gilbane would be able to advise on how the workers would interact to the model.

Automating Design Analysis

The second session that I attended was Automating Design Analysis with Dr. Somayeh Asadi as the facilitator. The topic of discussion, can the computer be used in place of engineers and architects for automated design. Having repetitive designs in the construction industry would work very well but if the project had to have specific designs then it wouldn't be as effective. Having automated design in an integrated building would not be as complex because the data the computer is pulling from has already been used or created.

The model created by the computer is only as good as the input it is given. If you have bad input then you will have a bad output. If the computer was to take over the architect then it would need to think like an architect. Having data the computer can pull from will entail having a large database to ensure the computer can build or design exactly what is expected from it. On a simpler term, automating a warehouse for loading, unloading, stacking, work areas, and walk areas have already been mastered by companies that build 500 warehouses a year. The company knows exactly what they need to be efficient. But could the computer tell a different story? Possibly the computer could tell you the exact areas and materials you need in a space to have a certain productivity. Once that productivity changes so does the warehouse arrangement.

What surprised me about the session was the interaction between the computer and the architect. Comparing the two was interesting because the architect sometimes has ideas no computer would have output. The issues that could be applied to my project could be automating a classroom; and having a certain design that would ensure the most efficient way to learn. The rooms around the classrooms could have an automatic output for acoustical performance between the classrooms. Dr. Michelle Vigeant, Assistant Professor of Acoustics and Architectural Engineering, could help with the acoustical performance. Dr. Asadi could be a point of contact for understanding how to automate the process.

Leading Industry Practice Evaluation

Building Information Modeling Use Evaluation

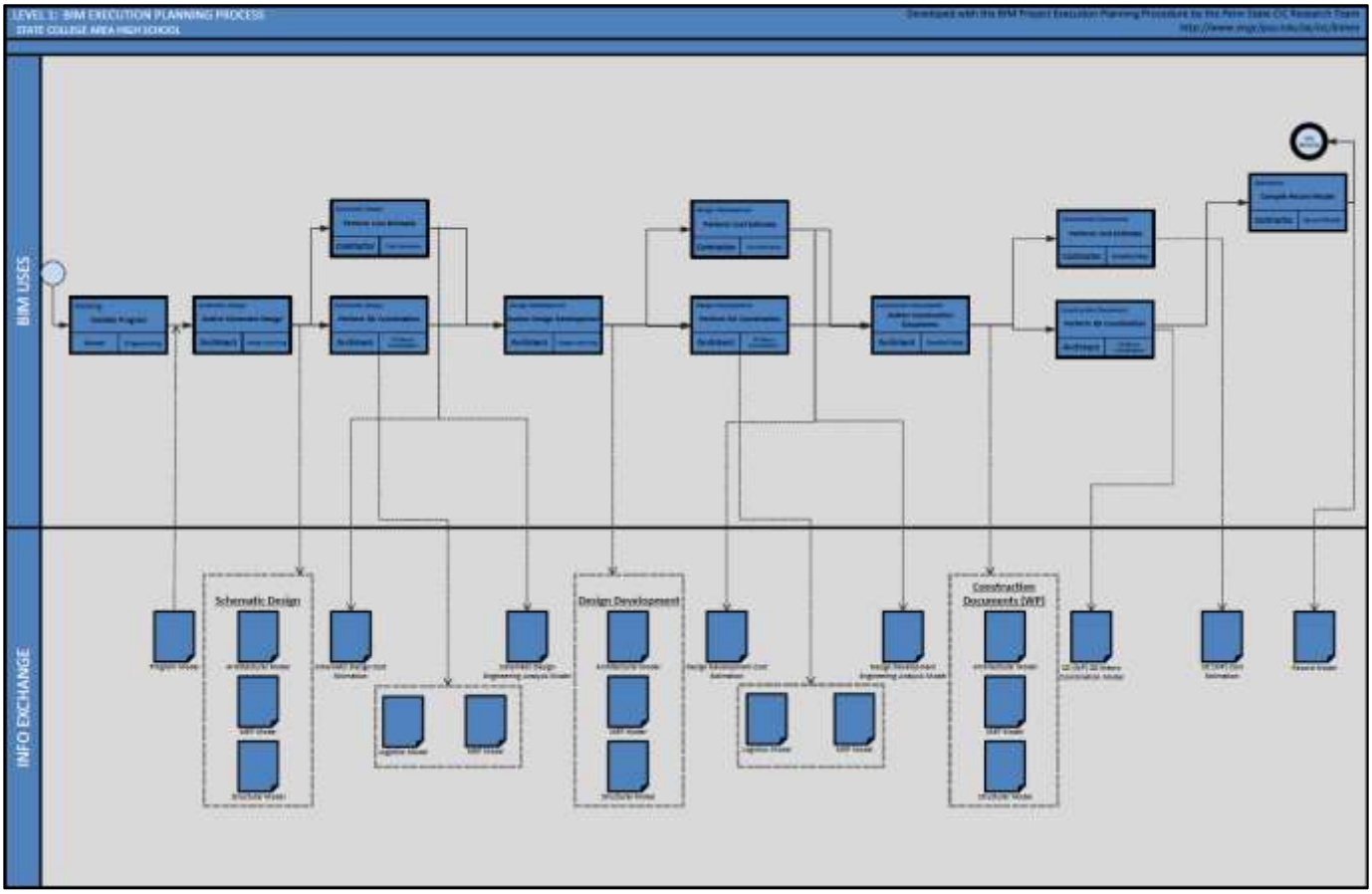
State College Area High School does not have a BIM model. This project is perfect for Building Information Modeling. Demolition, renovation, and new construction in a specific area are where problems arise and unforeseen problems cause money to add up quick. To prevent this, clash detection could be used to understand how the old building systems could tie in with the new systems. In the Level 1 BIM Process Map it shows how BIM could have been implemented on this

project. Using technology on any project might cost more money up front but most times will save money during the project.

There are a number of BIM uses for this project. Building placement on the site is very important in order to maximize the sunlight in the building. The State College Area High School wants to be LEED Gold which means the building should have a life-cycle analysis done to ensure it meets the necessary requirements. The schedule is one of the most important factors to this project. The milestone dates have to be finished on time to ensure the project schedule stays on track with the school calendar schedule. Also, since there is demolition, renovation, and new construction, it is very important to show how the old systems will work with the new systems. The potential BIM uses to obtain these goals would include design reviews, 3D coordination, 4D modeling, 3D coordination, and LEED evaluation.

In Figure 2, the Level 1 BIM Process Map shows 3D coordination and cost estimation during both design and construction phases of the project. Once the model is made, the estimating department can use this as a tool to do quantity take-offs for more accurate estimates. Also, the model could be used for clash detection between the existing and new MEP systems.

Figure 2: Level 1 BIM Process Map



Sustainability Implementation

Commitment to leadership in sustainability will be State College High School's goal for the life of the project and something to model for years to come. The project is trying to obtain LEED Gold, with 73 points in the yes column, 18 points in the question mark column, and 10 no points. As you can see in Figure 3, each point category is broken down. Sustainable sites category has 24 possible points with 21 points the school says they will get. This includes development density and community connectivity, alternative transportation, storm water design, heat island effect, etc. Another large category is energy and atmosphere with optimizing energy performance being a large contributor to those points. The 3D model could be a large factor in ensuring this criterion is meant for LEED. The project is at 73 points and only needs 7 more points to receive LEED Platinum Certification. The school could upgrade or improve the water efficiency and indoor environmental quality to obtain this certification.

After reviewing the checklist I believe the points reflect the owners' goals. The school wants the building to be something to model for years to come. In order to do this, it starts now creating a building that can give back. The sustainability strategy in 2025, is giving back. Giving back to the community on what it has given to the students is something the school board wants to accomplish. Creating a building that can give energy back to the community is the end goal.

Figure 3: LEED Project Checklist: State College Area High School

LEED 2009 for Schools New Construction and Major Renovations

Project Checklist

State College Area High School- Westerly Site Options

September 15, 2014, DRAFT

Y	?	N			
21	**1**	**2**	**Sustainable Sites**	**Possible Points:**	**24**
Y			Prereq 1	Construction Activity Pollution Prevention	
Y			Prereq 2	Environmental Site Assessment	
1			Credit 1	Site Selection	1
4			Credit 2	Development Density and Community Connectivity	4
1			Credit 3	Brownfield Redevelopment	1
4			Credit 4.1	Alternative Transportation--Public Transportation Access	4
1			Credit 4.2	Alternative Transportation--Bicycle Storage and Changing Rooms	1
2			Credit 4.3	Alternative Transportation--Low-Emitting and Fuel-Efficient Vehicles	2
2			Credit 4.4	Alternative Transportation--Parking Capacity	2
		1	Credit 5.1	Site Development--Protect or Restore Habitat	1
1			Credit 5.2	Site Development--Maximize Open Space	1
1			Credit 6.1	Stormwater Design--Quantity Control	1
1			Credit 6.2	Stormwater Design--Quality Control	1
		1	Credit 7.1	Heat Island Effect--Non-roof	1
1			Credit 7.2	Heat Island Effect--Roof	1
	1		Credit 8	Light Pollution Reduction	1
1			Credit 9	Site Master Plan	1
1			Credit 10	Joint Use of Facilities	1
6	**5**		**Water Efficiency**	**Possible Points:**	**11**
Y			Prereq 1	Water Use Reduction--20% Reduction	
4			Credit 1	Water Efficient Landscaping	2 to 4
	2		Credit 2	Innovative Wastewater Technologies	2
2	2		Credit 3	Water Use Reduction	2 to 4
	1		Credit 3	Process Water Use Reduction	1
17	**7**	**1**	**Energy and Atmosphere**	**Possible Points:**	**33**
Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
10	5		Credit 1	Optimize Energy Performance	1 to 19
2	2		Credit 2	On-Site Renewable Energy	1 to 7
2			Credit 3	Enhanced Commissioning	2
1			Credit 4	Enhanced Refrigerant Management	1
2			Credit 5	Measurement and Verification	2
		1	Credit 6	Green Power	2
6	**1**	**5**	**Materials and Resources**	**Possible Points:**	**13**
Y			Prereq 1	Storage and Collection of Recyclables	
		2	Credit 1.1	Building Reuse--Maintain Existing Walls, Floors, and Roof	1 to 2
		1	Credit 1.2	Building Reuse--Maintain 50% of Interior Non-Structural Elements	1
2			Credit 2	Construction Waste Management	1 to 2

Y	?	N			
			Materials and Resources, Continued		
		1	Credit 3	Materials Reuse	1 to 2
2			Credit 4	Recycled Content	1 to 2
2			Credit 5	Regional Materials	1 to 2
		1	Credit 6	Rapidly Renewable Materials	1
	1		Credit 7	Certified Wood	1
13	**4**	**2**	**Indoor Environmental Quality**	**Possible Points:**	**19**
Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
Y			Prereq 3	Minimum Acoustical Performance	
1			Credit 1	Outdoor Air Delivery Monitoring	1
		1	Credit 2	Increased Ventilation	1
1			Credit 3.1	Construction IAQ Management Plan--During Construction	1
1			Credit 3.2	Construction IAQ Management Plan--Before Occupancy	1
3	1		Credit 4	Low-Emitting Materials	1 to 4
1			Credit 5	Indoor Chemical and Pollutant Source Control	1
1			Credit 6.1	Controllability of Systems--Lighting	1
	1		Credit 6.2	Controllability of Systems--Thermal Comfort	1
1			Credit 7.1	Thermal Comfort--Design	1
1			Credit 7.2	Thermal Comfort--Verification	1
2	1		Credit 8.1	Daylight and Views--Daylight	1 to 3
1			Credit 8.2	Daylight and Views--Views	1
	1		Credit 9	Enhanced Acoustical Performance	1
		1	Credit 10	Mold Prevention	1
6			**Innovation and Design Process**	**Possible Points:**	**6**
1			Credit 1.1	Innovation in Design: Integrated Pest Management	1
1			Credit 1.2	Innovation in Design: Green Cleaning	1
1			Credit 1.3	Innovation in Design: Exemplary Preformance MRc5 Regional Mat.	1
1			Credit 1.4	Innovation in Design: Exemplary Performance SSc5.2 Open Space	1
1			Credit 2	LEED Accredited Professional	1
1			Credit 3	The School as a Teaching Tool	1
4			**Regional Priority Credits**	**Possible Points:**	**4**
1			Credit 1.1	Regional Priority: SSc3 Brownfield Redevelopment (Asbestos)	1
1			Credit 1.2	Regional Priority: SSc4.4 Alternate Transportation	1
1			Credit 1.3	Regional Priority: SSc5.2 Site Development- Max Open Space	1
1			Credit 1.4	Regional Priority: SSc6.2 Stormwater Design- Quality Control	1
73	**18**	**10**	**Total**	**Possible Points:**	**110**

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

Technical Report Three

Appendix

A. Level 1 BIM Process Map

B. LEED Project Checklist

C. Feedback from PACE Industry Roundtable

Developed with the BIM Project Execution Planning Procedure by the Penn State CIC Research Team
http://www.engr/psu.edu/ae/cic/bimex

BIM USES

INFO EXCHANGE

Planning
Validate Program
Owner | Programming

Schematic Design
Author Schematic Design
Architect | Design Authoring

Schematic Design
Perform Cost Estimate
Contractor | Cost Estimation

Schematic Design
Perform 3D Coordination
Architect | 3D Macro Coordination

Design Development
Author Design Development
Architect | Design Authoring

Design Development
Perform Cost Estimate
Contractor | Cost Estimation

Design Development
Perform 3D Coordination
Architect | 3D Macro Coordination

Construction Documents
Author Construction Documents
Architect | Detailed Map

Construction Documents
Perform Cost Estimate
Contractor | Detailed Map

Construction Documents
Perform 3D Coordination
Architect | 3D Macro Coordination

Operations
Compile Record Model
Contractor | Record Model

END PROCESS

Program Model

Schematic Design
- Architectural Model
- MEP Model
- Structural Model

Schematic Design Cost Estimation

Logistics Model
MEP Model

Schematic Design Engineering Analysis Model

Design Development
- Architectural Model
- MEP Model
- Structural Model

Design Development Cost Estimation

Logistics Model
MEP Model

Design Development Engineering Analysis Model

Construction Documents (WP)
- Architectural Model
- MEP Model
- Structural Model

CD (MP) 3D Macro Coordination Model

CD (MP) Cost Estimation

Record Model

LEED 2009 for Schools New Construction and Major Renovations

Project Checklist

State College Area High School- Westerly Site Options

September 15, 2014, DRAFT

Sustainable Sites — Possible Points: 24

Y	?	N			
Y			Prereq 1	Construction Activity Pollution Prevention	
Y			Prereq 2	Environmental Site Assessment	
1			Credit 1	Site Selection	1
4			Credit 2	Development Density and Community Connectivity	4
1			Credit 3	Brownfield Redevelopment	1
4			Credit 4.1	Alternative Transportation—Public Transportation Access	4
1			Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
2			Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	2
2			Credit 4.4	Alternative Transportation—Parking Capacity	2
		1	Credit 5.1	Site Development—Protect or Restore Habitat	1
1			Credit 5.2	Site Development—Maximize Open Space	1
1			Credit 6.1	Stormwater Design—Quantity Control	1
1			Credit 6.2	Stormwater Design—Quality Control	1
		1	Credit 7.1	Heat Island Effect—Non-roof	1
1			Credit 7.2	Heat Island Effect—Roof	1
	1		Credit 8	Light Pollution Reduction	1
1			Credit 9	Site Master Plan	1
1			Credit 10	Joint Use of Facilities	1

Water Efficiency — Possible Points: 11

Y			Prereq 1	Water Use Reduction—20% Reduction	
4			Credit 1	Water Efficient Landscaping	2 to 4
	2		Credit 2	Innovative Wastewater Technologies	2
2	2		Credit 3	Water Use Reduction	2 to 4
	1		Credit 3	Process Water Use Reduction	1

Energy and Atmosphere — Possible Points: 33

Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
10	5		Credit 1	Optimize Energy Performance	1 to 19
2	2		Credit 2	On-Site Renewable Energy	1 to 7
2			Credit 3	Enhanced Commissioning	2
1			Credit 4	Enhanced Refrigerant Management	1
2			Credit 5	Measurement and Verification	2
		1	Credit 6	Green Power	2

Materials and Resources — Possible Points: 13

Y			Prereq 1	Storage and Collection of Recyclables	
		2	Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 2
		1	Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
2			Credit 2	Construction Waste Management	1 to 2

Materials and Resources, Continued

Y	?	N			
		1	Credit 3	Materials Reuse	1 to 2
2			Credit 4	Recycled Content	1 to 2
2			Credit 5	Regional Materials	1 to 2
		1	Credit 6	Rapidly Renewable Materials	1
	1		Credit 7	Certified Wood	1

Indoor Environmental Quality — Possible Points: 19

Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
Y			Prereq 3	Minimum Acoustical Performance	
1			Credit 1	Outdoor Air Delivery Monitoring	1
		1	Credit 2	Increased Ventilation	1
1			Credit 3.1	Construction IAQ Management Plan—During Construction	1
1			Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
3	1		Credit 4	Low-Emitting Materials	1 to 4
1			Credit 5	Indoor Chemical and Pollutant Source Control	1
1			Credit 6.1	Controllability of Systems—Lighting	1
	1		Credit 6.2	Controllability of Systems—Thermal Comfort	1
1			Credit 7.1	Thermal Comfort—Design	1
1			Credit 7.2	Thermal Comfort—Verification	1
2	1		Credit 8.1	Daylight and Views—Daylight	1 to 3
1			Credit 8.2	Daylight and Views—Views	1
	1		Credit 9	Enhanced Acoustical Performance	1
		1	Credit 10	Mold Prevention	1

Innovation and Design Process — Possible Points: 6

1			Credit 1.1	Innovation in Design: Integrated Pest Management	1
1			Credit 1.2	Innovation in Design: Green Cleaning	1
1			Credit 1.3	Innovation in Design: Exemplary Preformance MRc5 Regional Mat.	1
1			Credit 1.4	Innovation in Design: Exemplary Performance SSc5.2 Open Space	1
1			Credit 2	LEED Accredited Professional	1
1			Credit 3	The School as a Teaching Tool	1

Regional Priority Credits — Possible Points: 4

1			Credit 1.1	Regional Priority: SSc3 Brownfield Redevelopment (Asbestos)	1
1			Credit 1.2	Regional Priority: SSc4.4 Alternate Transportation	1
1			Credit 1.3	Regional Priority: SSc5.2 Site Development- Max Open Space	1
1			Credit 1.4	Regional Priority: SSc6.2 Stormwater Design- Quality Control	1

Total — Possible Points: 110

73	18	10	Total

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

C. Feedback from PACE Industry Roundtable

The 24th Annual PACE Roundtable

STUDENT FORM

Student Name Bryce Burkentine

Session 1: Topic: Innovation in Safety

Research Ideas:

1) 3D or 4D logistical Plans or models showing workers the site and hazards on the site. Also, could show the workers how the site will evolve throughout construction.

2) How do you keep an unsafe person out of the industry. Once one company gets rid of a worker, he/she will end up going to work for another company. We need to find a way to "black list" that worker so they cannot come back to the industry and end up harming someone.

Session 2: Topic: Automating Design Analysis

Research Ideas:

1) Can you replace an architect with a computer. Can you input raw data and have a computer output a room, assembly, or perhaps a building.

2) Creating a schedule that if one activity gets delayed can the computer see that delay and rearrange and understand what needs to happen in order to keep the schedule.

Session 3: Topic: _____

Research Ideas:

1)

2)

24

STUDENT FORM

Industry Member: Donald Stahlnecker

Key Feedback:

Which research topic is most relevant to industry? What is the scope of the topic?

safety is the most relevant to the industry. Creating a 3D or 4D model of the site and a logistical plan will help the workers understand the potential hazards. In the model/ video there can be someone walking around the site describing potential hazards to that specific project.

Suggested Resources:

What industry contacts are needed? Is the information available?

The contacts that are needed is really anyone that works in the construction Industry. It is really important to have everyone involved in safety and not just management pushing for it. The information is available but safety and technology needs to be integrated. Having the worker interact directly with the specific project before he gets on the jobsite will allow him to be more aware of his surroundings.

25