

TECHNICAL REPORT 3



HFS WAREHOUSE AND BAKERY EXPANSION

University Park, PA

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CONSTRUCTION MANAGEMENT

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EXECUTIVE SUMMARY

Contained within this document is information concerning the renovation and addition of the Housing and Food Services Warehouse and Bakery Expansion for The Pennsylvania State University in University Park, Pennsylvania. This report entails topics such as an interview with the Project Manager, the 24th Annual PACE Roundtable event, BIM use, and LEED certification.

An overview of the interview with the Project Manager, Kevin Finke, is also encompassed in this report. Although the interview was short, some pertinent information was revealed. We discussed topics such as client requirements, value engineering, project schedule, project financing, and building occupancy.

I attended the 24th Annual PACE Roundtable event and had a chance to converse with industry members. Contained in this report is a summary of the breakout sessions attended. As well as the notes taken during this event. This was a great chance to learn about the industry and talk directly to industry members and owners alike. Many of the topics discussed were pertinent to future projects as well as my own thesis project.

Building Information Modeling or BIM is a tool that is being used to some capacity on almost every construction project. Implementing BIM on a project can completely change the dynamic of the project by creating schedule and cost savings. The Housing and Food Services Warehouse and Bakery Expansion did not implement a specific BIM plan on the project. However, an analysis was created and it shows how the project could have benefited from BIM investigation.

TABLE OF CONTENTS

HFS Warehouse and Bakery Expansion0

Executive Summary 1

Project Manager Interview3

 Project Management Services3

 Value Engineering4

PACE Industry Roundtable4

 Critical Industry Issues.....4

 PACE Feedback5

Leading Industry Practice Evaluation.....6

 Building Information Modeling Use Evaluation6

 Sustainability Implementation7

Appendix A: P.M. Interview Transcript.....8

Appendix B: PACE Roundtable Notes.....10

Appendix C: BIM Use Process Map.....12

Appendix D: LEED Evaluation Scorecard13

PROJECT MANAGER INTERVIEW

PROJECT MANAGEMENT SERVICES

Kinsley Construction received the Housing and Food Services Warehouse and Bakery Expansion as a Design-Build project. Kinsley worked with Penn State to create a larger storage and baking facility in order to expand their product and client base. This renovation and addition will allow Penn State to increase the amount of product stored and sold as well as serve new clients. Since this project is a Design-Build, there was a large contingency of about five million held to allow for additional costs that occur during construction. One issue that occurred during the renovation of the existing freezer was a thermal related problem. Large chunks of ice were found between roofing and walls of the freezer. There was a concern for the structural stability in this area as well as black mold.

Since Penn State is still occupying the building during construction, there needed to be little to no shutdown time for the food storage areas. To ensure this was possible, Kinsley installed a new switch gear. The new electrical service that supports the new freezer and cooler is a redundant system. As insurance, there was also an emergency power generator that could service the system's needs if the power failed. The safety of everyone on site, workers and occupants, is the most important requirements for the client. So, partitions were set up in areas throughout the building to separate construction from the occupants.

During the new construction phase of the project, dust control was a concern due to the food being stored on site. Partitions and sheets of plastic were installed to control the dust and other debris from entering the building. The HVAC ducts were also covered in plastic. The HVAC units are installed immediately after delivery to reduce the amount of debris entering the system.

"Every client wants the world but can only afford so much." Kevin Finke, Project Manager, said this when describing the key areas that have potential to better fit the project and client's needs. Kevin Finke described some areas that could have better fit the client's needs but Penn State decided against. One of them was a catering office off the south end of the building. This would increase the amount of catering but was too expensive to be feasible in this project. Penn State also decided to go with the minimum aisle width in the storage areas. The aisles could have been much wider to allow easy access for the lifts, but instead it was decided that increasing the height of the storage areas would be more economical. Although not every design was implemented in this project, the client's needs were satisfied with the increased capacity for storage. The 25,000 square feet allow for a larger client base and the ability to house new products.

VALUE ENGINEERING

Value engineering was not implemented in this project much at all. Since it is such a short project, one year, schedule savings and cost savings were not a large concern. The Design-Build project is fast paced, and value engineering is all but thrown to the side. However, when it came to the mechanical equipment the team was able to select a system that better align with the goals of the client.

One of the ways Kinsley did this was with the refrigeration and freezer units. They have a better economic efficiency rating than the past units. The units are more effective while consuming less electric. Another way they increased cost savings was by using variable frequency drive (VFD) on the fan speed in the HVAC units. This means the fans will shut off automatically when they are not needed. This decreases the cost of maintaining the system.

PACE INDUSTRY ROUNDTABLE

CRITICAL INDUSTRY ISSUES

POST BIM – CHALLENGES AND OPPORTUNITIES

This breakout session was led by Dr. Robert Amor, the same person who had given the keynote presentation just before breakout session 1B. BIM is a broad topic with an unquantifiable amount of definitions and interpretations. Several main topics were discussed throughout the session, including owner education in defining BIM and what it can be used for. This conversation was sparked by another attendee who was an owner of a hospital being constructed. As an owner he referenced how almost every Request for Proposal received from an owner simply states that a contractor is required to use BIM. It is uncommon for an owner to specify the level of use for BIM. This owner agreed that most owners think of BIM as a 3D coordination and clash detection. Industry professionals must take every opportunity to educate owners on the importance of BIM. Contractors can take owners to conferences pertaining to the subject and expanding their knowledge. Industry members can also give presentations to expand the owners understanding of BIM.

As stated in this session, the contract value dictates what level of BIM integration a client wants and needs. No two construction projects are exactly the same, and each project has a different dollar value associated with it. While a BIM model is beneficial, it is rarely cost effective. An example provided in the discussion was that a project with a contract value of \$100 million might have a \$1 million expense on BIM, but a \$10 million project might have a \$250,000 BIM expense for similar services. This makes the decision to buy full BIM integration on a project easier, as the contract value increases.

TECHNOLOGY IN CONSTRUCTION: THE NEW 'NORM' OF CONSTRUCTION COMPETENCIES

The second breakout session I attended was held by Kathryn Davies and Fadi Costronovo. This session mainly discussed the pros and cons of introducing technology to construction. Some of the pros conferred upon were the ability to solve problems before construction starts. The same problems occur in construction but we have new tools to resolve them. Models solve problems and can speed up the design phase, however, motivating the older generation to use these tools can be difficult. This was one of the cons to introducing technology to construction. The older generation is set in their ways and may not be willing to learn the techniques. This produces redundancies within the work completed. The construction industry should strive toward using computer based models and moving away from paper driven models or drawings.

Another topic discussed in this session was that BIM is still a "specialty" route in education and industry. It is split between VDC and BIM. Creating an intermediary role in understanding both sides of the consumers and creators, the P.E. and VDC Specialists, and looking for new applications. Experience is needed in the field and with software to create a well-rounded model. Overall, introducing technology into construction will take time and education. It is not something that happens overnight. The new generation of engineers will be gear more toward virtual simulations and 3D modeling. This will push technology further into the industry, and there will be new ways of solving problems.

PACE FEEDBACK

At the conclusion of the 24th Annual PACE Roundtable event I had the opportunity to further discuss the topics with an industry member. I took this opportunity to talk to the young Ms. Abby Kreider who graduated from Penn State's Architectural Engineering program in 2014. Ms. Kreider is a Project Engineer for Barton Malow Company. Our discussion was based on the second breakout session, Technology in Construction: The new 'Norm' of construction competencies. Abby agreed that we need to broaden the skill set all around the industry and get people to understand and use the technology. She thought there should be a documentation standard for 3D models and paper documents.

In summary, Abby Kreider was a great industry member to talk to because she is relatively new to industry. She also can understand what it's like to be thrown into the industry directly after graduation. She also has an understanding on how the industry works and where the flaws are. It was great getting a different view point from someone who understands the challenges both at a student level and at a professional level.

LEADING INDUSTRY PRACTICE EVALUATION

BUILDING INFORMATION MODELING USE EVALUATION

The Housing and Food Services Warehouse and Bakery project team did not establish a BIM plan. Although BIM can be useful on many projects, this project is not very large or intensive. Even though the scope of work did not call for heavy BIM implementation, Kinsley Construction still took the time to use several BIM strategies to aid in construction.

First off, the team completed an in depth MEP clash detection throughout the project. Clash detection is becoming a normality on most construction projects. This is a process that involves the comparison of each model from all the trades in a clash detection software to find conflicts between them. This solves many problems before they reach the field. It is important to find these problems before construction starts to ensure the project progresses smoothly. This saves money and time during the actual construction process.

The other way that the project team took advantage of BIM strategies was by modeling the site layout. The main purpose in doing this was to show how the site safety measures would interact with the surrounding parking lot and building occupants. This modeled everything from material laydown to pedestrian walk ways.

While Kinsley Construction did not use BIM in its entirety, some strategies were implemented in this project. I believe that if the cost of BIM was not a factor in this project, it could have helped the entire construction process. One aspect that the project team should have used throughout the design and construction process was an in depth evaluation of the existing conditions. Although the site was surveyed using laser scanners, modeling the existing conditions could have increased productivity.

I would include the following if I were to develop a BIM Execution Plan.

X	Plan	X	Design	X	Construct	X	Operate
	Programming		Design Authoring	X	Site Utilization Planning		Building Maintenance Scheduling
X	Site Analysis		Design Reviews		Construction System Design		Building System Analysis
		X	3D Coordination	X	3D Coordination		Asset Management
			Structural Analysis		Digital Fabrication		Space Management / Tracking
			Lighting Analysis		3D Control and Planning		Disaster Planning
			Energy Analysis		Record Modeling		Record Modeling
		X	Mechanical Analysis				
			Other Eng. Analysis				
			Sustainability (LEED) Evaluation				
			Code Validation				
	Phase Planning (4D Modeling)	X	Phase Planning (4D Modeling)		Phase Planning (4D Modeling)		Phase Planning (4D Modeling)
	Cost Estimation		Cost Estimation		Cost Estimation		Cost Estimation
X	Existing Conditions Modeling	X	Existing Conditions Modeling	X	Existing Conditions Modeling		Existing Conditions Modeling

Figure 1: BIM Uses (bim.psu.edu)

SUSTAINABILITY IMPLEMENTATION

The construction of the Housing and Food Services Warehouse and Bakery Expansion is not a LEED project. This building does not have a rating based on the LEED Point System. However, it does follow some of the mandatory LEED policies set by Penn State. Based on the USGBC's description of each point category, I have determined that the total point value on the new v4 system would be 32 points. According to the v4 point requirements, the project would not be able to receive any LEED rating. Although there is no LEED rating to base this analysis on, I believe the 32 points to be accurate. The point requirements to attain point values have changed. This has made probable points from v3 become unattainable in the revamped v4. This is due mostly in part to the fact that the requirements in v4 have increased.

Penn State has a LEED Policy which dictates exactly which points must be pursued, attempted, and which points are not required. Even with these requirements, the Housing and Food Service Warehouse and Bakery Expansion still does not obtain any LEED certification. Some points that Penn State require are an impossibility on this project because it is only an addition and renovation. This issue arises with the points associated with the sustainable site.

Overall, I believe that the design team and general contractor created a building and construction plan that fits within the needs of the owner. It is not necessary for a Warehouse and Bakery to achieve a LEED certification. Although, in my personal opinion, I think it would have been possible to achieve at least a LEED Silver without tremendously increasing the budget.

APPENDIX A: P.M. INTERVIEW TRANSCRIPT

Rutt: Hello Kevin Finke, this is Joseph Rutt calling. May I ask you a few questions regarding the HFS Warehouse and Bakery Expansion?

Finke: Sure, I set aside some time for this interview.

Rutt: Did Penn State have any schedule requirements such as shut down time and food storage during construction?

Finke: There was no shut down time for this project. A new electrical service to the building was installed that supports the new freezer and cooler. It is a redundant system with a new switch gear. This allows for limited to no shut down time.

Rutt: Was there any requirements for the food stored on site during construction?

Finke: New construction only went from March to October 1st. They were able to keep most of the food stored without any problems.

Rutt: Did you provide any services to Penn State before construction?

Finke: We worked directly with Penn State to design what they needed. Since it was a Design-Build project there weren't many preconstruction services.

Rutt: It is a relatively small project; does Penn State allow for any extra costs/ over budget?

Finke: Yes, there was a large contingency held at five million dollars. There was a thermal issue in the existing freezer. Chunks of ice formed between the roof and the walls. We were worried about the structural integrity of this area as well as black mold.

Rutt: Where there any specific design features in the warehouse addition or office space renovation to allow easy access for the occupants?

Finke: We set up partitions all around. Safety is our number one goal.

Rutt: Where there any quality drives for the client such as preventing dust and other debris in the new HVAC units?

Finke: We put plastic over the HVAC ducts and install the HVAC units immediately after they are delivered. This prevents dust from entering the system.

Rutt: Where there any areas that you improved to better fit the needs of the client?

Finke: We increased their capacity for storage. The 25,000 square foot addition allows Penn State to take on new clients and house more products than they could have before.

Rutt: Were there any design features that were not implemented into the project?

Finke: They wanted a catering office off the south end of the building and they could have made the aisles wider in the storage area. But every client wants the world but can only afford so much.

Rutt: Do the HVAC or Refrigeration units have any cost savings or value engineering features?

Finke: They are the best products for the money spent. There is some cost savings in the variable frequency drive fan speed we installed. It stops the fan from running when it is not needed.

Rutt: Well that's about all the questions I have. I'm sure you're busy so I won't take up any more of your time. Thank you for speaking with me.

Finke: Anytime. If you have any other questions, feel free to email me or call me on my work phone.

Rutt: Thank you!

APPENDIX B: PACE ROUNDTABLE NOTES

The 24th Annual PACE Roundtable

STUDENT FORM

Student Name JOSEPH RUTT

Session 1: Topic: ENABLING THROUGH TECHNOLOGY: POST BIM - CHALLENGES + OPPORTUNITIES
 Research Ideas:

- 1) TRADESMEN ATTENDING MEETINGS WITH FOREMAN. WEEKLY.
- 2) EDUCATING THE OWNERS ON BIM, ITS USED ^{FOR} MORE THAN CLASH DETECTION
 HOW IT CAN BE USEFUL TO OWNER. WHY ITS WORTH SPENDING MONEY ON
 A MODEL

Session 2: Topic: INDUSTRY PANEL SPEAKERS
 Research Ideas:

- 1) CULTURE AND VALUES OF BUSINESS. DOES IT FIT YOUR EXPECTATIONS?
- 2) BETTERING PEOPLE SKILLS, USING THOSE SKILLS IN EVERYDAY LIFE

Session 3: Topic: TECHNOLOGY IN CONSTRUCTION: THE NEW 'NAME' OF CONSTRUCTION
 Research Ideas: (COMPETENCE)

- 1) CREATING A BIM OPTION IN THE AE PROGRAM
- 2) HOW WE CAN MOVE AWAY FROM PAPER DOCUMENTS/DRAWING AND
 USE MODELING AND TECHNOLOGY

24

STUDENT FORM

Industry Member: ABBY KREIDER

Key Feedback:

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

TECHNOLOGY IN CONSTRUCTION: THE NEW 'NORM'
OF CONSTRUCTION COMPETENCIES

NEED TO BROADEN SKILL SET ALL AROUND.

GET PEOPLE TO UNDERSTAND AND USE TECHNOLOGY.

SHOULD THERE BE AN INTERMEDIARY ROLE
THAT UNDERSTAND BOTH SIDES OF VDC AND BIM.

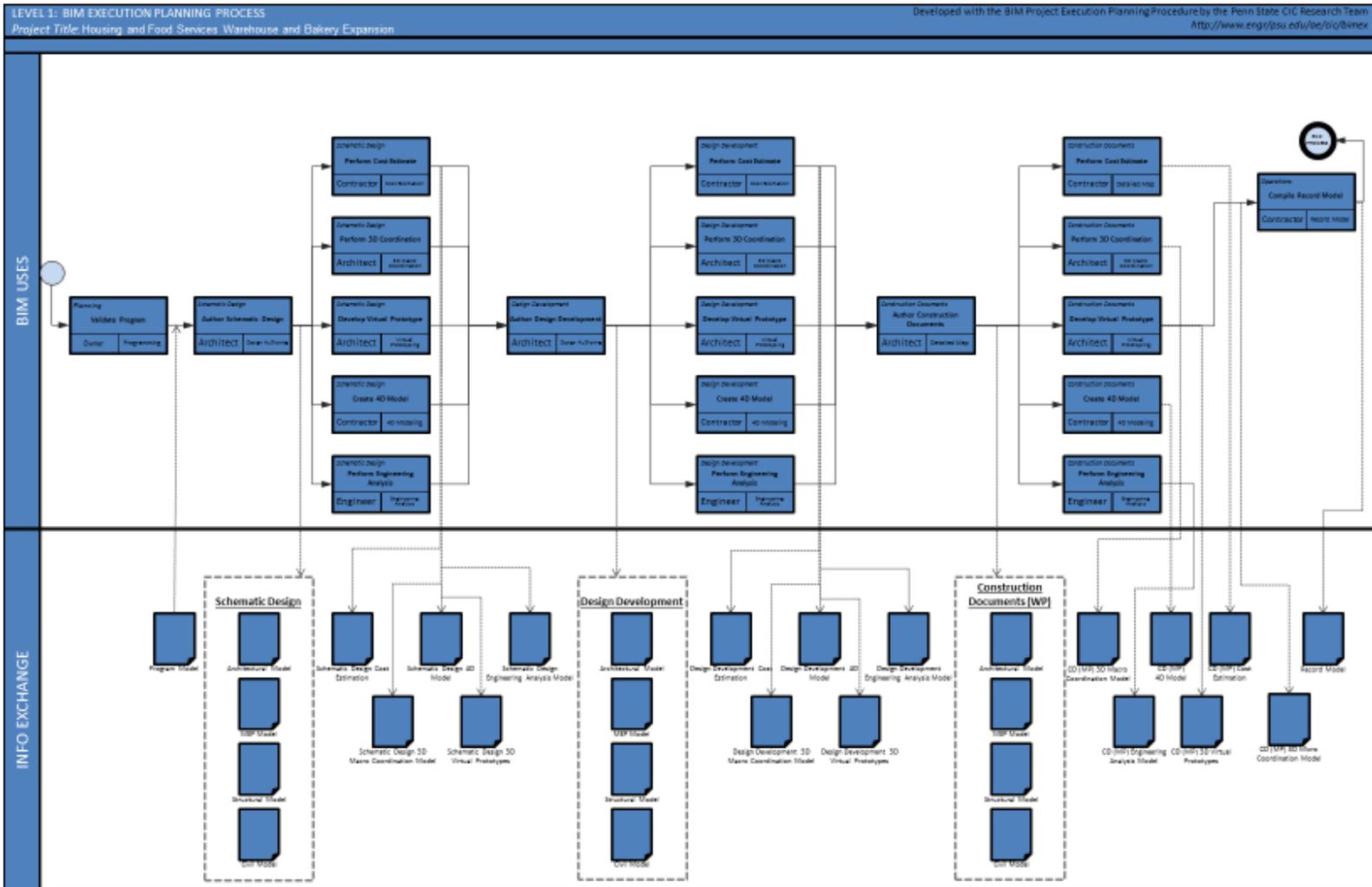
DOCUMENTATION STANDARDS: MODEL VS PAPER DOCUMENTS

Suggested Resources:

What industry contacts are needed? Is the information available?

BRING IN PEOPLE FROM OFF AND OTHERS ^{FROM} AE DEPARTMENT
AND OWNERS/CLIENTS. BOARD MEMBERS
MEETING
TRADE FOREMAN.

APPENDIX C: BIM USE PROCESS MAP



APPENDIX D: LEED EVALUATION SCORECARD



LEED v4 for BD+C: New Construction and Major Renovation
Project Checklist

Project Name: HFS Warehouse and Bakery Expansion
Date: 11/11/2015

Y	?	N			
1			Credit	Integrative Process	1
10 0 6 Location and Transportation 16					
			Credit	LEED for Neighborhood Development Location	16
1			Credit	Sensitive Land Protection	1
		2	Credit	High Priority Site	2
3		2	Credit	Surrounding Density and Diverse Uses	5
5			Credit	Access to Quality Transit	5
1			Credit	Bicycle Facilities	1
		1	Credit	Reduced Parking Footprint	1
		1	Credit	Green Vehicles	1
1 3 6 Sustainable Sites 10					
Y			Prereq	Construction Activity Pollution Prevention	Required
		1	Credit	Site Assessment	1
		2	Credit	Site Development - Protect or Restore Habitat	2
		1	Credit	Open Space	1
1		2	Credit	Rainwater Management	3
		2	Credit	Heat Island Reduction	2
		1	Credit	Light Pollution Reduction	1
1 2 8 Water Efficiency 11					
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
		2	Credit	Outdoor Water Use Reduction	2
		6	Credit	Indoor Water Use Reduction	6
		2	Credit	Cooling Tower Water Use	2
1			Credit	Water Metering	1
9 12 12 Energy and Atmosphere 33					
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
		6	Credit	Enhanced Commissioning	6
8		10	Credit	Optimize Energy Performance	18
		1	Credit	Advanced Energy Metering	1
		2	Credit	Demand Response	2
		3	Credit	Renewable Energy Production	3
1			Credit	Enhanced Refrigerant Management	1
		2	Credit	Green Power and Carbon Offsets	2
2 5 6 Materials and Resources 13					
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
		5	Credit	Building Life-Cycle Impact Reduction	5
		2	Credit	Building Product Disclosure and Optimization - Environmental Product Declarations	2
		2	Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
		2	Credit	Building Product Disclosure and Optimization - Material Ingredients	2
2			Credit	Construction and Demolition Waste Management	2
6 2 8 Indoor Environmental Quality 16					
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
		2	Credit	Enhanced Indoor Air Quality Strategies	2
3			Credit	Low-Emitting Materials	3
		1	Credit	Construction Indoor Air Quality Management Plan	1
2			Credit	Indoor Air Quality Assessment	2
		1	Credit	Thermal Comfort	1
		2	Credit	Interior Lighting	2
		3	Credit	Daylight	3
		1	Credit	Quality Views	1
		1	Credit	Acoustic Performance	1
1 2 3 Innovation 6					
		3	Credit	Innovation	5
1			Credit	LEED Accredited Professional	1
2 0 2 Regional Priority 4					
1			Credit	Regional Priority: Specific Credit	1
1			Credit	Regional Priority: Specific Credit	1
		1	Credit	Regional Priority: Specific Credit	1
		1	Credit	Regional Priority: Specific Credit	1
32	27	51	TOTALS		Possible Points: 110
Certified: 40 to 49 points, Silver: 50 to 59 points, Gold: 60 to 79 points, Platinum: 80 to 110					