

The Research and Economic Development Center

Erie, Pa



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Thesis Proposal	

Executive Summary

The Thesis Proposal expands on the topics for the semester long thesis research class leading up to the Thesis Presentation. This proposal will go into detail of my three selected analysis topics as well as my research topic. I will discuss why each topic was chosen and describe the critical issue with each as well as provide background. After this I will illustrate the steps that will be taken during my research. A general synopsis of my building will also be presented.

From the issues that were identified as a result of the PACE Roundtable, I chose to look into an issue that directly affected my project for my industry research topic; WBE/MBE solicitation. This is the process whereby all contractors who wish to bid on any DGS project need to solicit bids for subcontracted work from minority and women owned businesses. I intend to find out whether requiring this is deemed fair by prime contractors, if they increase their bids due to being forced to provide this extra work, and if there are any other issues with respect to the solicitation process.

After a visit to my building and talking to the workers and key player for the project, several issues were brought up. Those issues were narrowed down and there were chosen to be used for my three technical analyses. These consisted of adding a windmill to the roof of my building to generate electricity, adjusting the cladding system for the building from a metal panel siding to either the brick or glass panels which clad the remainder of the building, and structurally redesign of the skylights to remove the steel joist that runs through the center of it.

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Building Synopsis

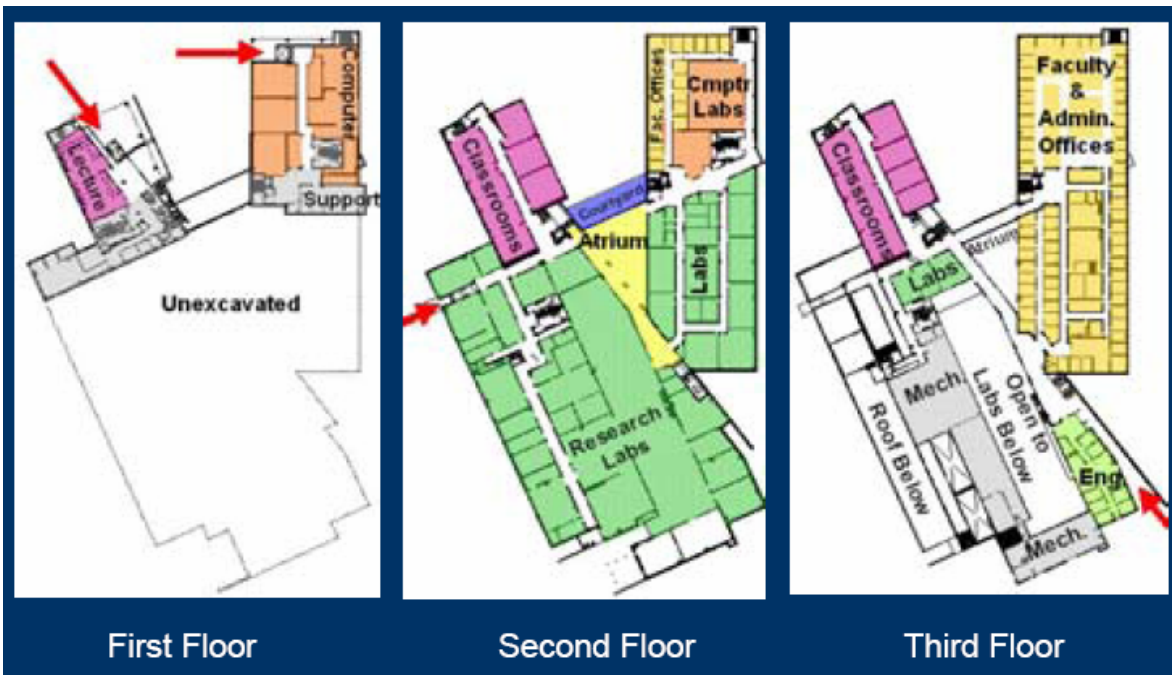
General:

- **Building Name:** REDC Building
- **Location:** Penn State Erie Campus
Behrend Campus
Erie PA
- **Building Occupants:** School of Business
School of Engineering and Engineering Technology
Pennsylvania State University
- **Occupancy Type:** Classrooms, Labs, and Offices
- **Size (Total Sq. Ft.):** 161,500 Sq.Ft.
- **Stories:** 2.5 Floors
- **Primary Project Team:**
 - Owner: Department of General Services
 - Using Agents: The Pennsylvania State University
 - Architect: Weber Murphy Fox, Inc.
 - Consulting Architect: NBBJ
 - Structural Engineer: Steele Structural Engineers
 - MEP Engineer: H.F. LENZ Company
 - Civil Engineer: Urban Engineers
 - Technology Consultant Group: The Sextant Group
 - Construction Manager: Turner Construction Co.
 - General Contractor: EE Austin & Son, Inc.
 - Mechanical Prime: Renick Brothers
 - Plumbing Prime: Raibe Environmental
 - Electrical Prime: Keystone/Deon – Pyramid
 - Fire Protection Prime: Simplex Grinnell
- **Dates of Construction:**
 - Start: April 28, 2004
 - Finish: February 2006
- **Cost Information:**

The overall cost of the building is \$30 million or \$165.76/SF. Minus soft costs the actual building cost is \$21.5 million or \$133.13/SF. The General costs of the building are \$13,379,000 or \$82.84/SF. HVAC costs were bid at \$3,430,000 or \$21.24/SF. The Plumbing System is \$925,000 or \$5.73/SF. The electrical system and telecom together cost \$3,394,816 or \$21.02/SF. Finally, the Fire Protection system came to \$328,800 or \$2.04/SF.
- **Project Delivery Method:** Design-Bid-Build

Architecture:

The building consists of a half basement and two floors with the top one boasting of an atrium bridge. The building is to bridge two sections of campus to promote a more unified college. It features two wings; the first faces Jordan Road and the Knowledge Park; the second faces towards the east side of campus. Wooded areas surrounding the site will be maintained along with new and existing pathways. The facility will have brick as is the norm for all Penn State Buildings. The building will be home to the College of Engineering and Engineering Technology as well as the School of Business. About half of the building will be engineering labs. One fourth is proposed to be classrooms and computer classrooms. Offices will make up the remaining fourth. Mechanical rooms will be located on the Basement and Second floors.



Building Envelope:

The building has a curtain wall system that supports structural glass in the stairways, brick with glass windows in the main part of the building and metal wall panels in the dock areas. The roof is Thermoplastic Sheet Roofing over most of the roof with the low roof being Architectural Metal Roofing. Under the roofing is a six inch layer of roofing insulation over steel deck.

Site Conditions:

The site is very steep with a rise of 50' over the length of the building. It has a shale sub-grade with silt under layer. Retaining walls will be very important.

Construction:

This project began in preliminary design stage. An estimate was drawn up using the campus estimators and the building was found to be overpriced. By removing an auditorium the building design and estimate were completed. After the design had been completed a CM Agency was hired through a bidding process. The CM Agency then held the bidding for the General Contractor and Primes. Construction began with the ground breaking on April 28, 2004. The scheduled finish for construction is set for February of 2006. The building cost came to \$21.5 million. With soft costs added in the total for the building was \$30 million.

Electrical:

Electricity will come in from the medium voltage campus distribution system. Primary service will come into the building through an underground duct bank near the loading docks. This will be for future campus expansion. Two secondary feeds will also be provided. The secondary feed, after coming in the building will go through a 480Y/277 volt, 1500KVA transformer and serves the majority of the building. The other secondary feed will enter into a 240 volt, 500 KVA transformer and will be sent out to the lab and manufacturing areas. Electricity will flow from the transformer to the main breakers to the main distribution center. There will be approximately 35 - 240/120 V, 3 phase, 3-4 W panel boards; 20 - 480Y/277 V, 3 phase, 4 W panel boards; 4 - Motor Control Centers at 480 V, 3 phase, 3 W; and one natural gas generator run from the power supplied. The emergency power will be an indoor diesel generator rated for 150 KW at 480Y/277V. This will be located in a room next to the loading dock and will be able to provide 24 hours of backup.

Lighting:

The lighting in the building is fairly simplistic and very systematic. For all of the labs, shops, and large bay areas there will be Metal Halide suspended bell lights. In the offices classrooms and smaller labs there will be fluorescent recessed lights with dimming capabilities.

Mechanical:

The central cooling plant will consist of two 250 ton screw chillers, cooling towers and primary/secondary pumps. The central heating plant will be two 3852 MBH cast iron hot water boilers with natural gas burners and primary/secondary zoned pumping.

The Air system will include five roof top, three basement, and four second floor air handling units. Of these ten are variable air volume and two are constant. One system has a redundant cooling for winter requirements. The building is zoned based on occupancy. Air is distributed to rooms through ceiling diffusers.

Though out the building there are 26 exhaust fans to remove air (8 rooftop, 7 basement, 2 first floor, and 9 second floor). In some areas there are cabinet unit heaters that use water to provide extra heating. The computer server rooms will have DX air

conditioning units for 24 hr/ 365 day cooling capabilities. The entire building will run off of a Direct Digital Control system.

Structural:

The building sits on three different types of foundations – strip, pad, and retaining wall. From these the steel superstructure arises. The typical column size is W14x61. Where there are CMU columns it is 8” CMU with 8” bond beam and 2 #4 bars. There is no typical bay size but they run about 30’x30’. All floor slabs are 4” concrete slabs with 6x6 W1.4xW1.4 wire mesh. The average beam size is around a W18x35 with 22KCS3 Joists. Exterior walls are all curtain walls with brick, glass, or metal. The roof is framed with 22K7 beams with joists at 3’6” on center and horizontal bridging.

Special Systems:

Due to the steep grades on this site a majority of the foundation walls were required to be retaining walls.

Research Breakdown

Description	Research	Value Engr.	Const. Rev.	Sched. Red.	Total
Cladding System	0	10	15	10	35
Windmill	10	15	5	5	40
Skylight	0	5	5	0	10
Issues Research	20	0	0	0	20
Total	30	30	25	15	100

Industry Research Topic

WBE/MBE Solicitation

During the remainder of the Thesis work, I will be examining the WBE/MBE contractor solicitation process. This is the process whereby all contractors who wish to bid on any DGS project need to solicit bids for subcontracted work from minority and women owned businesses. I intend to find out whether requiring this is deemed fair by prime contractors, if they increase their bids due to being forced to provide this extra work, and if there are any other issues with respect to the solicitation process.

I would like to be able to use this research to show The Office of Physical Plant and the Department of General Services the price of mandating WBE/MBE soliciting and forms during the prebid process.

I intend to delve into the solicitation process. A survey will be sent to a selected list of contractors, from the Office of Physical Plant's contractor database, who have bid on DGS projects in the recent past. A rough list of planned questions for this survey can be found in Appendix 1. The key parts to my research will be the process review, the survey analysis, and a summary.

Issue Background

For State funded projects such as my thesis building and many other Penn State University building projects, the Department of General services requires contractors bidding on a project to solicit to Women and Minority Owned Businesses (MBE/WBE) for quotations for work. The goal of this program is to secure documentation that ensures that the Bidder has not discriminated against MBE and WBE subcontractors and suppliers in the Bidder's solicitation of and commitments to subcontractors and suppliers. This means that contractors must go outside their normal suppliers and subcontractors during the bidding phase to solicit work. Then documentation of all solicitations to these businesses must be submitted with bids. If this documentation is not up to DGS standards then the bid will be dismissed. A copy of the form for the solicitation process is in the next section.

The reason that this issue is so important is because this requires extra work during the prebid process. This also can result in contractors working with subcontractors and suppliers that they may have no relations with prior to this project, which could increase the risk that said contractor carries. Both of these issues may lead the contractor to mark up their bid; first due to extra work and second due to increased risk.

The last issue that could arise due to this process is one which the Office of Physical Plant encountered over the summer. All of the bidding contractors for two separate projects did not fill out the solicitation form properly. This caused all bids for both jobs to be thrown out and the project to be rebid. Now the owner is set behind schedule, the bid packages must be revised, and contractors must reinvest their time for the bidding process. This leads, not only to project delays, but also higher costs both to bidders and the owner.

Research Intent

The intent of this research is to devise if the requirement for WBE/MBE solicitation results in higher bids. I intend to find out whether requiring this is deemed fair by prime contractors, if they increase their bids due to being forced to provide this extra work, and if there are any other issues with respect to the solicitation process.

I would like to be able to use this research to show The Office of Physical Plant and the Department of General Services the price of mandating WBE/MBE soliciting and forms during the prebid process. The key points of my research are as follows:

- Research into the existing solicitation process.
- An initial survey to test my survey on several contractors that are currently working on state funded projects. (the initial survey is found in the next section)
- This survey after being refined will be sent to a selected list of contractors, from the Office of Physical Plant's contractor database, who have bid on DGS projects in the recent past.
- After the surveys have been returned, I will collate and organize the responses by type and answer.
- A summarization will be made from the surveys which will be presented in the thesis presentation, final thesis submission, and to the Director of Design and Construction at the Office of Physical Plant.

I expect that contractors that fall under the WBE/MBE classification will be happy with the process. I also believe that the other contractors think that the process is good be still increase their bids by a marginal percentage due to the extra work.

**MBE/WBE SUBCONTRACTOR AND SUPPLIER CERTIFICATION,
SOLICITATION AND COMMITMENT FORM**

This form, GSMWBE-16 (Form 16), is comprised of two parts: 16A - Certification and 16B - Record of MBE/WBE Solicitations and Commitments. Instructions on how to complete both parts of this form are provided at the end of this document.

FORM 16A – CERTIFICATION

This Form 16A must be completed and signed by the each bidder and submitted with its bid.

Bidder name: _____
Project #: _____

1. We commit to meet the MPLs for the project as stated in the Notice to Bidders for:
MBEs Yes _____ No _____
WBEs Yes _____ No _____

If the answer for both MBEs and WBEs is "Yes" **GO DIRECTLY TO THE SIGNATURE LINES AT THE END OF THIS CERTIFICATION. YOU DO NOT NEED TO COMPLETE THE REMAINDER OF THIS FORM AND YOU DO NOT NEED TO COMPLETE FORM 16B.**

If either answer is "No" you must check and complete either statement 2 or 3 below, sign this form and complete Form 16B.

2. We do not commit to meet both MPLs as stated in the Notice to Bidders. However, we did meet the the minimum solicitation requirements (5 MBE subcontractors and 5 WBE subcontractors from the "Work Area" as defined in the Instructions to Bidders Section A.31 and 5 MBE suppliers and 5 WBE suppliers) and we commit to the following participation levels:

MBEs % WBEs %

- We have included below an explanation of our failure to commit to both MPLs. (Attach additional sheets as necessary.)

MBE: _____

WBE: _____

- We have completed and included with our bid the Form 16B - Record of MBE/WBE Solicitations and Commitments.
- We included with our bid all additional documentation as required in the Form 16 - Instructions and the Instructions to Bidders Section A.31.
- We conducted all initial MBE/WBE solicitations at least five (5) business days in advance of the bid opening day.

Failure to check all boxes under this statement 2, to indicate the MBE/WBE participation levels, and to provide a satisfactory explanation shall result in the rejection of your bid as not responsive.

3. We do not commit to meet both MPLs as stated in the Notice to Bidders and we did not meet the minimum solicitation requirements (5 MBE subcontractors and 5 WBE subcontractors from the "Work Area" as defined in the Instructions to Bidders Section A.31 and 5 MBE suppliers and 5 WBE suppliers); however, we do commit to the following participation levels:

MBEs % WBEs %

- We have included below an explanation of our failure to commit to both MPLs. (Attach additional sheets as necessary.)

MBE: _____

WBE: _____

- We have included below an explanation for our failure to comply with the minimum solicitation requirements. For example, if you do not intend to use any subcontractors you may state that fact as your reason for noncompliance. Complete as many as are appropriate. (Attach additional sheets as necessary.)

MBE subcontractors _____

WBE subcontractors _____

MBE suppliers _____

WBE suppliers _____

- To the extent that we have solicited MBEs and WBEs, we have completed and included with our bid the Form 16B - Record of MBE/WBE Solicitations and Commitments.
- We have included with our bid all additional documentation as required in the Form 16 - Instructions and the Instructions to Bidders Section A.31.
- We conducted all initial MBE/WBE solicitations at least five (5) business days in advance of the bid opening day.

Failure to check all boxes under this statement 3, to indicate the MBE/WBE participation levels, and to provide satisfactory explanations shall result in the rejection of your bid as not responsive.

Signature Certification

I certify that the information on this form is true and correct to the best of my knowledge and that I am authorized to represent the above-named Bidder in connection with this certification.

Signature: _____

Name (print or type): _____

Title: _____

FORM 16B - RECORD OF MBE/WBE SOLICITATIONS AND COMMITMENTS

(1)

(2)

Company Name: EIN No.: Address: Telephone: FAX No.: E-Mail Address: Contact Person:	Contract Number & Point: Project Name: County: Bid Amt. (Base Bid #1): \$
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Note to Bidders:

In completing this form, the Bidder must comply with the Form 16 – Instructions and the Instruction for Bidders Section A.31. The following is provided for informational purposes only.

1. If you commit in your bid to meet the MPLs for both MBEs and WBEs you do not need to complete this Form 16B.
2. If you do not commit in your bid to meet both MPLs you must complete this Form 16B and submit all additional documentation as required by the Instruction to Bidders Section A.31 and as described in the Form 16 - Instructions. Failure to do so will be sufficient cause for rejection of the bid as NOT RESPONSIVE.
3. In completing Form 16B, the Bidder shall (see Form 16 - Instructions and Instructions to Bidders Section A.31 for complete detail):
 - a. solicit a minimum of 5 Subcontractors-MBE, 5 Subcontractors-WBE, 5 Suppliers-MBE and 5 Suppliers-WBE;
 - b. initiate all solicitation at least five (5) business days prior to the bid opening date;
 - c. solicit MBE and WBE subcontractors within the Work Area, as defined in the Instructions to Bidders Section A.31, and
 - d. record on Form 16B information pertaining to all solicitations, quotes (solicited and unsolicited) and commitments from MBE and WBE firms.
4. By submitting this form, the Bidder certifies that it has solicited the MBE and WBE firms for all services for which it intends to enter into a subcontract and for all supplies for which it intends to purchase within the Contract scope of work.

SUBCONTRACTORS - MBE

(3) Company Name, Address, Zip Code, County Tel. No. with Area Code Contact Person's Name	(4) DGS-certified MBE?	(5) Type of Work to be Performed and/or Material to be Supplied	(6) Total Dollar Amount of Quote Received	(7) Total Commitment Dollar Amount

SUBCONTRACTORS - WBE

(3) Company Name, Address, Zip Code, County Tel. No. with Area Code Contact Person's Name	(4) DGS-certified WBE?	(5) Type of Work to be Performed and/or Material to be Supplied	(6) Total Dollar Amount of Quote Received	(7) Total Commitment Dollar Amount

SUPPLIERS - MBE

(3) Company Name, Address, Zip Code, County Tel. No. with Area Code Contact Person's Name	(4) DGS-certified MBE?	(5) Type of Work to be Performed and/or Material to be Supplied	(6) Total Dollar Amount of Quote Received	(7) Total Commitment Dollar Amount

SUPPLIERS - WBE

(3) Company Name, Address, Zip Code, County Tel. No. with Area Code Contact Person's Name	(4) DGS-certified WBE?	(5) Type of Work to be Performed and/or Material to be Supplied	(6) Total Dollar Amount of Quote Received	(7) Total Commitment Dollar Amount

FORM 16 - INSTRUCTIONS

1.0 Purpose

The purpose of Form GSMWBE-16 (Form 16) is to secure documentation that ensures that the Bidder has not discriminated against MBE and WBE subcontractors and suppliers in the Bidder's solicitation of and commitments to subcontractors and suppliers. Form 16 is comprised of two parts: 16A – Certification and 16B - Record of MBE/WBE Solicitations and Commitments as well as these instructions. Before completing Form 16, the Department of General Services (Department) strongly encourages the Bidder to review the Instruction to Bidders Section A.31: Minority Business and Women Business Enterprise Participation for further instruction on completing Form 16 and consequences for providing incomplete or incorrect information.

2.0 Instructions for Form 16A – Certification

All Bidders must complete, sign and submit Form 16A - Certification (Form 16A) with their bids.

Instructions for Statement 1

Check box 1 and complete statement 1, if you commit to meet both MPLs for the project or if you commit to meet the MPL for either MBEs or WBEs.

A Bidder who commits to meet both the MPLs for MBEs and WBEs only needs to check the "yes" box for both MBEs and WBEs, and to have an authorized representative of the company sign the form. If the Bidder is selected for award, the Bidder will be required to submit detailed information including but not limited to copies of quotes and any contracts or letters of intent documenting the Bidder's commitment to the MPLs within ten calendar days after notice of award from the Department. Failure to provide the documentation, satisfactory to the Department, detailing commitments made to MBEs and WBEs within ten (10) calendar days after notice of award from the Department shall result in rejection of the bid as non-responsive and the Bidder's bid security shall be forfeited to the Department as liquidated damages for the bid default.

A Bidder who commits to only one MPL is required to indicate which MPL and to complete the remaining portions of the Form 16A and Form 16B in compliance with the instructions provided herein and the Instructions to Bidders Section A.31.

Instructions for Statement 2

Check box 2 and complete statement 2 if you do not commit to meet both MPLs but you have complied with the minimum solicitation requirements: you have solicited proposals from a minimum of 5 MBEs and 5 WBEs for subcontracting from the "Work Area" as defined in the Instructions to Bidders Section A.31 and 5 MBEs and 5 WBE for supplies.

A Bidder who does not commit to meet both MPLs but who meets the minimum solicitation requirements must:

1. Indicate the MBE and WBE participation levels that it has committed to in its bid.
2. Indicate by checking the first check box that it has provided in the space provided an explanation of its failure to commit to both MPLs. If the Bidder provides its explanation on a separate page it must indicate so in the space provided.
3. Indicate by checking the second check box that it has completed Form 16B.
4. Indicate by checking the third check box that it has included with its bid the additional documentation as required in these instructions and the Instructions to Bidders Section A.31.
5. Indicate by checking the fourth check box that it has conducted all initial MBE/WBE solicitations at least five (5) business days in advance of the bid opening day.
6. Have an authorized representative of the company sign Form 16A.

Failure to properly complete and submit Forms 16A and 16B and to provide the additional documentation as required in the Instruction to Bidders Section A.31 with the bid shall result in the rejection of the bid.

Instructions for Statement 3

Complete statement 3 if you do not commit to meet both MPLs and you have not complied with the minimum solicitation requirements: you have not solicited proposals from a minimum of 5 MBEs and 5 WBEs for subcontracting from the "Work Area" as defined in the Instructions to Bidders Section A.31 and 5 MBEs and 5 WBE for supplies.

A Bidder who does not commit to both MPLs and who does not meet the minimum solicitation requirements must:

1. Indicate the MBE and WBE participation levels that it has committed to in its bid.
2. Indicate by checking the first check box that it has provided an explanation of its failure to commit to both MPLs. If the Bidder provides its explanation on a separate page it must indicate so in the space provided.
3. Indicate by checking the second check box that it has provided an explanation for not meeting the minimum solicitation requirements. If the Bidder provides its explanation on a separate page it must indicate so in the space provided.
4. Indicate by checking the third check box that it has completed Form 16B to the extent that it has solicited MBEs and WBEs and included it with its bid.
5. Indicate by checking the fourth check box that it has included with its bid the additional documentation as required in these instructions and the Instructions to Bidders Section A.31.
6. Indicate by checking the fifth check box that it has conducted all initial MBE/WBE solicitations at least five (5) business days in advance of the bid opening day.
7. Have an authorized representative of the company sign Form 16A.

Failure to properly complete and submit Forms 16A and 16B and to provide the additional documentation required in the Instruction to Bidders Section A.31 with the bid shall result in the rejection of the bid.

3.0 Instructions for Form 16B - Record of MBE/WBE Solicitations and Commitments

A Bidder who commits in its bid documents to meet the MPLs does not need to complete Form 16B. Form 16B must be completed by the Bidder who does not commit to meet both MPLs as set forth in the Notice to Bidders. **A Bidder completing form 16B must solicit and commit to Department certified MBEs and WBEs only.** Firms certified by any other entity will not be recognized for purposes of compliance with these instructions and the invitation for bids. The Department's searchable database of certified MBE/WBE firms appears on the Department's website:

http://www.dgsapp.state.pa.us/imaginepa/bcabd/vendor_search.asp?bcabdRNavrad6BC2C=

Instructions for Block 1

Provide your company name, federal employer identification number, address, telephone number, fax number, e-mail address and contact person. The e-mail address should be for the person within your organization who handles contract compliance or EEO-related issues.

Instructions for Block 2

Provide the Department's contract number, project name, county in which project is located, and total amount of the bid. If more than one base bid is submitted, provide the total bid amount for Base Bid #1.

Instructions for Blocks 3 - 7

3. Enter the subcontractor or supplier's company name exactly as it appears on the Department's website list of certified MBEs/WBEs. Do not use a D/B/A (Doing Business As) name. List the address, zip code, county, telephone number with area code, and contact person's name.

4. Indicate whether the firm is a Department-certified MBE or WBE. If the firm is both a Department-certified MBE and a Department-certified WBE, the Bidder will receive credit for the firm as either an MBE or a WBE, at the Bidder's determination. **The Department shall count a firm toward only one category.**
5. Briefly describe the specific type of work to be performed and/or materials to be supplied by the listed Department-certified MBE or WBE. In order to count towards reaching the MPLs, the Bidder must solicit Department-certified MBEs/WBEs for the goods and services for which they are certified. For example, if an MBE/WBE is Department-certified for electrical supplies and the Bidder lists plumbing supplies, the Bidder will not receive credit for that firm. Geographical location may not be used as a reason for limiting MBE/WBE solicitations.
6. Enter the total dollar (\$) amount of any (solicited and non-solicited) quote received. If the quote was received in the form of unit prices or hourly rates, a total dollar amount must still be provided. If the solicited subcontractor did not respond to the Bidder, the Bidder must indicate "No Response." Copies of all MBE/WBE quotes (solicited and unsolicited) must be submitted with the bid. In addition, the bidder must submit with its bid an example of its request for quotation issued to MBE and WBE contractors and suppliers.
7. Enter the total dollar (\$) amount of the contractual commitment made to the listed MBE/WBE. If the Bidder does not commit to use the quote from a MBE/WBE because lower a priced quote was received, the Bidder must provide an explanation with its bid and submit a copy of the lower priced quote. On partial commitments, the Bidder must provide an explanation with its bid why it made only a partial commitment and must submit a copy of the lower priced quote.

4.0 The Bureau of Minority and Women Business Opportunities

The Bureau of Minority and Women Business Opportunities (BMWBO) is available for technical assistance to all Bidders submitting proposals for this contract. A listing of Department-certified MBEs and WBEs is incorporated in the contract documents. Department certification of an entity as an MBE/WBE means only that the applicant for certification has submitted information that qualifies it as an MBE/WBE in terms of its ownership and control. It does not imply, and no Bidder shall infer, that the Department has in any way investigated or approved the entity's competence to perform work. Please direct your question to:

Bureau of Minority and Women Business Opportunities
502 North Office Building
Harrisburg, Pennsylvania 17125
717-787-7380

MBE/WBE Solicitation Survey For General Service's Projects

1. Are you a WBE/MBE Contractor?
2. Have you bid on a DGS project which has required WBE/MBE Contractor Solicitation?
3. How many?
4. Does this increase the time that is required in the pre-bid processes?
5. Does your company increase its bid to cover extra work?
6. How much does your company increase the bid by? (percentage or dollar amount)
(If you are not comfortable answering this question, skip it
although a general answer would be appreciated)
7. Do you understand the contractor solicitation forms?
8. Do you think that this is a fair requirement for all DGS projects?
9. Have you hired a subcontractor that you wouldn't have normally used, due to this?
10. If yes, has it worked out well?
11. Do you feel that this requirement is accomplishing its intended purpose?
12. Additional Comments

Technical Analysis

Cladding System

There is a problem with metal panel siding in Erie due to the weather swings and construction practices so I propose to redesign the cladding of the building to increase the construction ease and cost of the building. This will take into account the cost of fixing the system while the building is in its first five years of building use. A comparison with brick and glass panel walls will be conducted. Research into the initial cost of construction and schedule, research into maintenance costs, a comparative analysis between the systems using cost, schedule, and constructability, and a summary are the measurable steps of this analysis.

Issue Background

At the Pennsylvania State University, Erie, The Behrend Campus, there are now three buildings with metal panel systems. The two previous buildings have both needed work on the metal panel within five years due to leaking at windows, doors, and panel connections. This leaking has been attributed to the climate changes throughout the year causing major expansion and contraction of the panels. Although this expansion was expected, the results on the sealant were not. The weather is harsh on the sealant which gets harder than it would normally. This and the movement with the panels cause cracking in the caulk. These cracks have been causing water damage in the buildings. It is expected that this issue will arise with the metal panel system on the new Research and Economic Development Center as well.

Research Intent

The intent for this analysis is changing the cladding system to either the glass panels or the brick that the remainder of the building is built with. A comparison between these replacement systems and the existing systems will consist of schedule comparisons, cost comparisons and cost of maintenance comparisons. Also it will be important to check that the structural system will remain the same or of a similar cost.

I would like to be able to use this research to show the architect and owners of the building which system would be the best to use. The key points of my research are as follows:

- Research into the cost of maintaining the metal panel systems and the length of time between the need for maintenance.
- Cost of systems analysis using RS Means cost data
- Duration of construction of system analysis using RS Means construction duration estimates
- Research into maintaining the proposed systems and the length of time between needs for maintenance.
- A weight of system comparison.
- Structural redesign of curtain wall down to the first floor columns. The structural system at this point and lower should not need to be redesigned due to factors of safety used and because the wall system load should not differ that greatly.
- There will be a comparison of the cost and schedule of each system.
- A constructability review of each system will be performed and a comparison will be made.
- A chart of the pros and cons of each system will be used to identify which system is the best to use. This chart will be presented during the thesis presentation and in my final thesis submission.

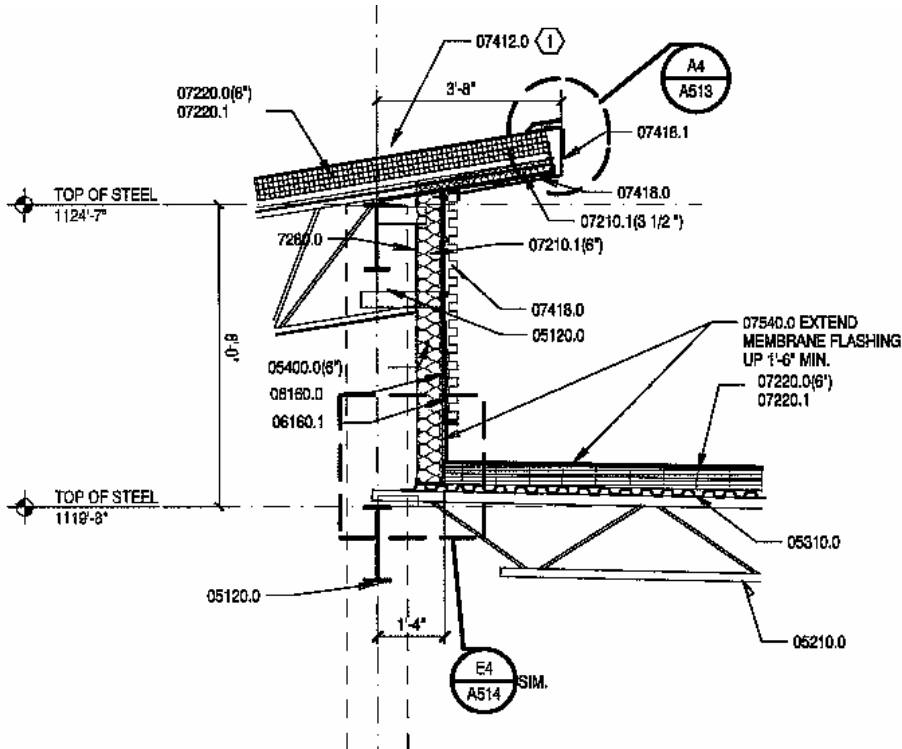
I expect that the brick system will end up being the system selected. The metal panel will be the cheapest and shorter to construct but have a high maintenance cost and problems with the construction. The glass system is predicted to be the highest cost second longest construction. It will also have high maintenance cost and issues during construction. Because brick is very traditional, it will have lower cost than glass have less maintenance issues and ease of construction. It will also probably have the longest construction time.

Research Done

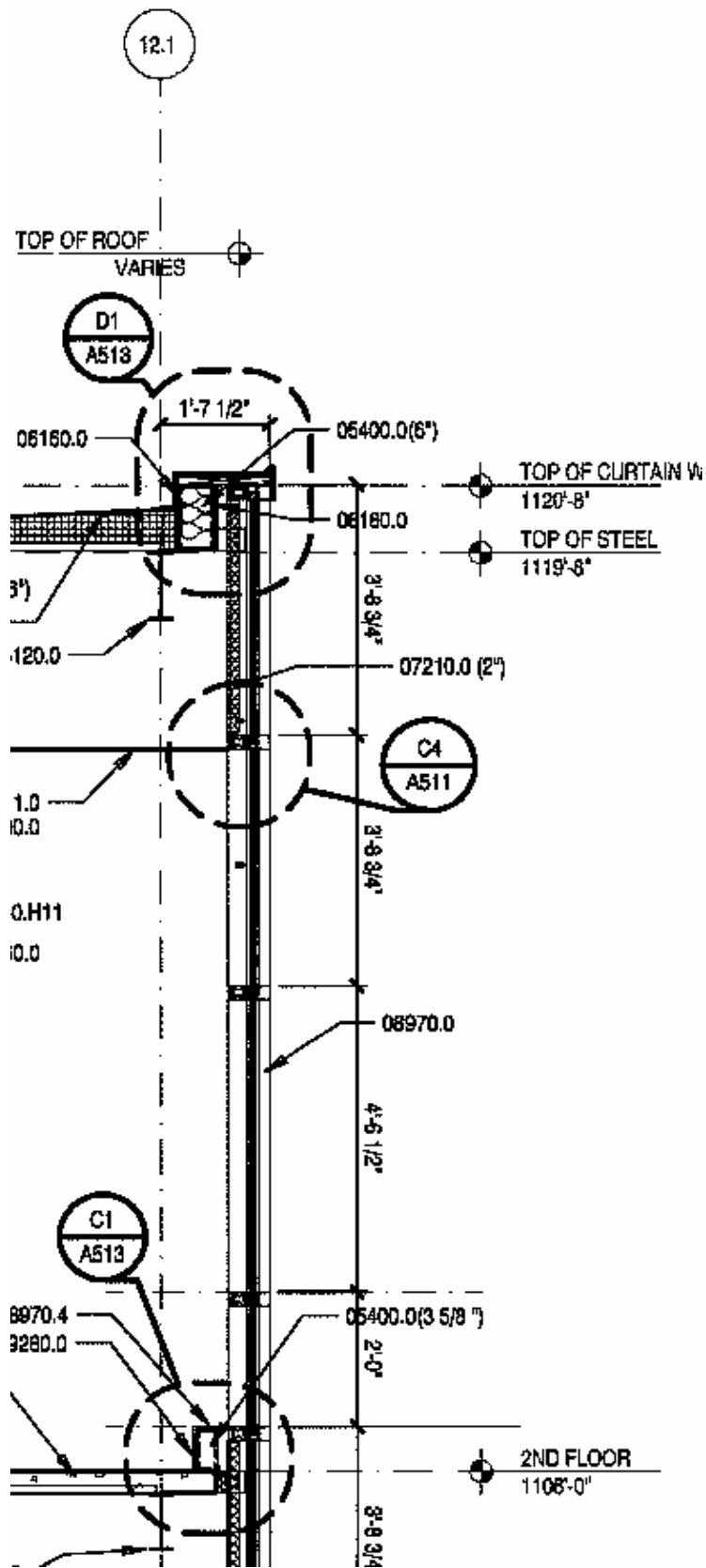
Name	Cost/ SF
Glass	\$55
Brick	\$26.99
Metal Siding	\$4.61

This shows the cost per square foot of each of the systems to be used for this analysis. As expected the metal panels are the cheapest with brick next followed by a very expensive glass panel system.

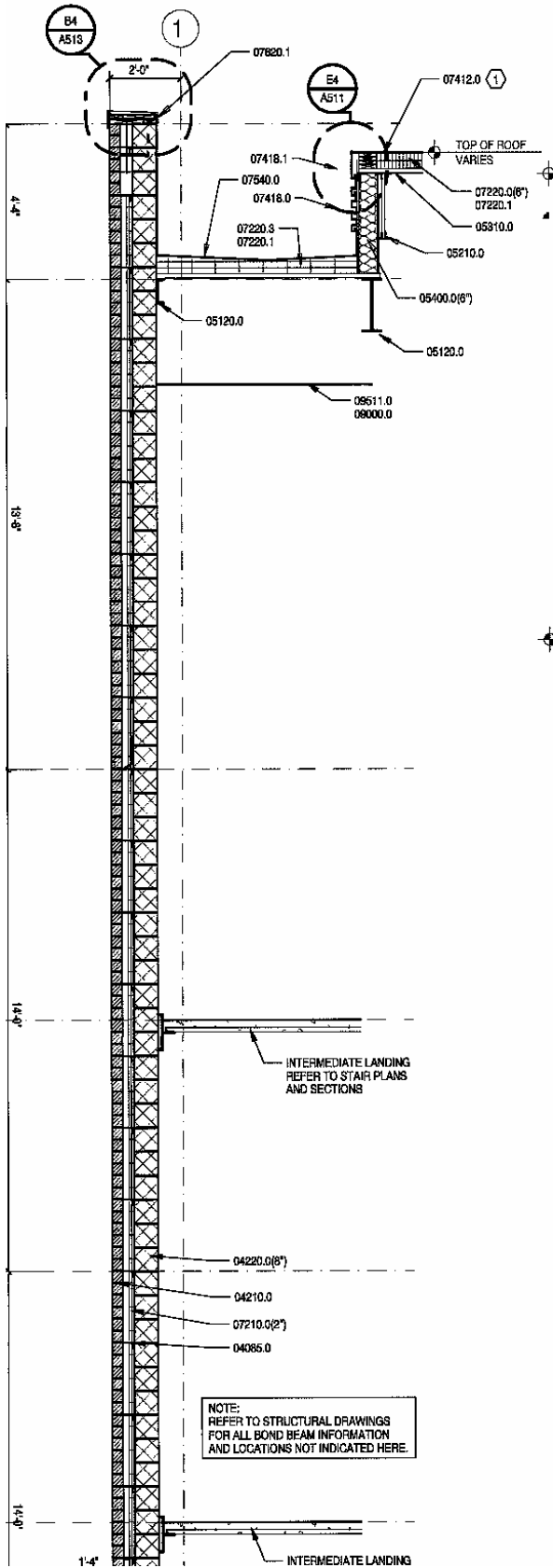
Picture of the Systems



This is a picture of the metal panel section with a description of connections



This Picture shows the glass panels and connections



This picture shows the brick system and connections.

Breath Analysis 1

Windmill Analysis

For the windmill analysis I will research the wind patterns of Erie, PA to discover the power generating capabilities of the building. I will also perform a cost analysis of the electricity savings versus the initial cost. I will also perform a structural analysis of the roof to make sure that the windmill will be able to be placed on the roof. Finally, the schedule impact will be looked at. This will be my first Breath Assignment and deals with electrical power use reduction and circuit redesign as well as a structural strength check. Research of windmills and wind availability, the structural analysis, the electrical load reduction, the cost analysis, schedule impact, and a summary are the key issues to this topic.

Issue Background

Because clean power has become a more prevalent theme in construction I have decided to look into one of these systems. Since the building sits less than 8 miles from Lake Erie, there is an abundance of lake effect wind on the building. From the roof of the building you can actually see the lake and the wind is very noticeable. The idea to generate clean power naturally fell to wind power. Wind power has many pros and cons. It can generate power whenever there is wind but is considered by many to be unsightly and noisy. This however is the new engineering technology building so it could be used as a learning facility.

Research Intent

The intent for this analysis is to analyze the pros and cons of placing one or more windmills on the roof of the Research and Economic Development building. Wind patterns and intensity will be used to estimate power generated. A specific windmill system will be selected and designed for. Cost, schedule impacts, and load impacts will be taken into effect. I will also look into vibration and sound proofing the system with respect to the rest of the building.

I would like to be able to use this research to show the owners of the building that this would be a viable alternative to traditional power and that it is cost effective to do so. The key points of my research are as follows:

- Windmill system selection
- Wind analysis of building
- Generating and estimate of power production and building load reduction
- Look into vibration and noise protection
- Calculate the schedule impact
- Check that the building can structurally carry a windmill on the roof and possible ways to beef up the roof if it can't
- Do a final comparison of initial cost of adding a windmill versus the cost savings due to power generation and make a recommendation as to the viability a system. This recommendation will be shown in my thesis presentation and final submission

I expect that the windmills will be possible so long as the structural system does not need to be a lot larger. I believe that with the wind that I experienced while visiting my building, there will be an adequate amount of wind to make this system a cost savings. I will also expect that since has the ability to become an educational area even if it does end up being slightly more expensive to install windmills, they could still be installed.

Wind Study Done 11-2-05

SOLOMAT 510e

PRINT STORED READINGS
TIME INTERVAL 1 HOUR
SITE 1- ERIE, PA (REDC)

RDG	SITE	MEASURE	UNITS
Max	1	12.65	m/s
Min	1	0.00	m/s
Avg	1	2.55	m/s

DATE 11-2-05

Breath Analysis 2

Skylight Redesign

For my second breath assignment I will do a structural analysis of a skylight in an attempt to remove the steel joist from the center of it. This will make the window look nicer and allow more light into the area. I will perform a load analysis of the skylight and then do a structural analysis to redesign the roof system for the joist to be removed. In my summary I will show the new design of the skylight.

Issue Background

In the entrance of the building, there is a skylight. The roof of the building has an exposed truss system. The truss system goes right through the center of the skylight. It looks silly.



Research Intent

The intent for this analysis is to check the possibility of removing the joist from the center of the skylight. Cost and load impacts will be taken into effect. The roof truss system will be redesigned.

I would like to be able to use this research to show the owners of the building that this is a silly thing to have and provide a price to fix it. The key points of my research are as follows:

- A load analysis of the current skylight system will be performed.
- structural design program will be used to see how the system could be redesigned to remove the joist from the center of it
- The final plan for new design of the roof will be drawn and a total cost of the redesign performed and submitted in my thesis presentation as well as my final thesis submission.

I expect that the joist will be able to be removed. I also expect that cost will not be too great to prohibit the owner from remove the joist in the skylight.

Schedule for Research

- Send out initial survey 1-10-06
- Research maintenance costs 1-14-06
- Look into RS Means for schedule and cost estimates for Cladding system and roof steel and wall steel and windmill construction 1-14-06
- Send out final survey 1-21-06
- Select windmill 1-21-06
- Get load data for skylight 1-21-06
- Estimate for power production 2-3-06
- Vibration control for windmill and other issues research 2-15-06
- All Structural analyses completed 3-10-06
- Surveys returned and compiled 3-15-06
- Summarize results of all topics 3-20-06
- Finish project book and presentation 4-10-06