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Technical Assignment #1:

Construction Conditions

And

Construction Project Management





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Construction Project Management

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Project Schedule Summary

Given on page 12 is a basic summary of the Schedule for the Borland Laboraty Renovation Project. You will notice that I have highlighted a lot of the processes that happen before the construction begins. This is for two reasons; first, The Pennsylvania State University has a very complex procedure that must be followed in order to recieve permission and funding for a project of this size. Second, as you can see, the project is in the Pre-bid Meeting phase right now. This means the the contract has not yet been awarded, and there is no project schedule at this point. Therefore the 2 major construction phases you can see on the schedule that I have labeled as (estimate) are just my assumptions of how long this task will take.

Building Systems Summary

Demolition

Being a renovation of the existing Borland Laboratroy, a lot of time will be spent in the demolition phase for this project. All together, the interior walls on the ground, first, and second floors will all be demolished to make room for a new floor plan. As an effect to this, the HVAC system will be totally removed from the building to make room for a new state of the art system. As for any Plumbing and Electrical fixtures, the supply lines will be cut and terminated at the entry point to the building.

Dustin Faust Construction Management October 6th, 2006



Borland Laboratory Renovation

During the construction phase, the existing electrical supply to the building will be metered by Penn State University Office of the Physical Plant (OPP) and used for the temporary construction power. This will be used until the new electrical utility lines are installed across Shortlidge Road between May 20th and August 23rd, 2007. The existing water supply will also be metered by OPP and used during the construction phase.

Along with the demolition phase comes a very large portion of this project. That is to remove the dairy products sales room on the South side of the building and also the garage on the North side of the building. These two portions of the existing building where additions to the original structure. They will be removed and brick will be matched to the original to fill in any spaces needed.

Also the beginning of the demolition phase will include asbestos abatement. Just like many of the other older buildings on The Pennsylvania State University Campus, the Borland Laboratory contains a lot of asbestos fire proofing. Before any other demolition or construction begins, the abatement crew will remove all of the harmfull fire protection following the Environmental Health and Saftey Codes.

Structural Steel Frame

Since this project is a renovation of the Borland Laboratory, and the existing building envelope will be reused, there isn't a lot of structural steel framing to be done. There is very little structural steel framing on the basement, ground, first, and second floors. Due to the relocation of ductbanks, elevator shafts, and stairs, there will be some W beams added to saport the above floors. There is an add-alternate for a Penthouse to be added on to a portion of the second floor. Included in this design is a fair amount of new structural steel work.



A new floor joist and roof truss system will be installed if this alternate is put into effect. The majority of steel conections have been designed with a double angle shear connection, and there is bracing designed for the roof truss system only. The crane size is unknown at this time.

Cast in Place Concrete

The Borland Laboratory project is a renovation, and requires minimal to no cast in place concrete work. The sum of concrete work will be done outside of the building for landscape designs. These sidewalks will be chute poured and require minimal formwork.

Precast concrete

This renovation has very little precast work to be done. It will only be necicary to replace some of the existing precast panels on the exterior façade of the building. After being cleaned and refurbished, the existing panels will be inspected and then a decision for a possible change order will be made to match and replace the existing panels.

Mechanical System

There are two mechanical rooms located in the basement. MB001 contains domestic water pumps, low pressure steam water heaters, and the hot water pumps. Located in MB002 are the chilled water pumps that take the University supplied chilled water and pumps it to the Air Handleing Units (AHU) on the above floors.



This project requires 4 Air Handleing Units. AHU1 and AHU2 are both located on the Second Floor in room M223. They are designed by <u>Trane</u> to have a maximum of 14,000 Cubic Feet per Minute (CFM) of air flow. The other two units (AHU3 and AHU4) are located on the room in on the Penthouse floor in room M301. These two units have also be designed by trane and have a maximum CFM of 12,000.

There will be two different types of fire protection utilized on this project. A wet system will be used in all pipe spaces, common areas, offices, and classrooms. Due to some equipment that could be damaged by a water leak, in the mechanical rooms and computer labs, and dry system will be utilized using schedule 40 galvanized piping.

Electrical System

The Borland Laboratory power system is supplied by The Pennsylvania State University's power system. Before entering the building, the power system will run through a transformer supplied by the University. Upon entering the building, the power supply is fed into a 280/120V, 3 phase, 4 wire, 2000 A switchgear. This swithgear then distributes the power to many different areas. The main switchgear carries a total connected and demanded load of 543.6 KW.

The emergency power is also being supplied from The Pennsylvania State University. It will come from the University's campus emergency back-up system. The emergency power for this building is switched at a 240/120V, 2 phase, 3 wire, 150A transfer-switch. This switch will automatically transfer power to the Normal Emergency and Emergency circuits in the case of a power loss.



Masonry

The only masonry required for this renovation will be to patch any holes or deteriated bricks with a pre-aproved brick to match the existing finish.

Curtain Wall

For the Borland Laboratory Renovation, the curtain wall along with many other things is also existing. The brick and precast that forms the curtain wall will be cleaned and refurbished to bring back the shine this building once had.

Excavation

There will be the usual excavation done to the exterior of for landscapeing and other architectural features. The only excavation needed for the building is a 8'x8'x10' pit for the elevator shaft. At this point the contract for excavation has not been awarded, and the specifications on Trenching and Shoring have not been completed.

Project Cost Evaluation

The Pennsylvania State University Borland Laboratory Renovation project has been put on a very tight budget. The total construction costs for this building have been listed at \$11,800,000 with a total building costs for Penn State of \$15,000,000. With 61,415 total square feet of usable space, that would equal a little over \$244 per square foot.



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STATE Borland Laboratory Renovation

Attached on page 13 is a cost per square foot estimate that I obtained using CostWorks. You will notice that the estimate given is about half of the actual cost for this building. This is due to the extensive mechanical and AV/IT system that Borland Laboratory will hold. The estimating system that I used does not allot extra money for such systems.

You will also notice that on pages 14-17 I have attached a parametric estimate that I produced using D4 Cost 2002. Using this program I compared the Borland Laboratory Renovation to a College Expansion & Renovation at Brookhaven College located in Dallas, Texas. The estimate given for this college renovation was for a 20,000 square foot project. I adjusted the provided information to fit the Borland Laboratory project, and produced a fairly accurate estimat. My estimate came within \$400,000 of the actual predicted cost for this project.

Site Plan of Existing Conditions

Please view the site plan showing existing conditions and utility lines that is given on page 18.

Local Conditions

The Pennsylvania State University Park area is a challenging place for a construction firm to work, even though this area hosts a vast variety of projects. With the soil types, recycling laws, and limited parking for construction workers, it becomes a difficult place to get accustom to working. The soil basically consists of clay and large bolders.



However since this project is a renovation and very little excavation is needed, this should not be a problem. The Pennsylvania State University has recycling a plan for construction materials in their <u>Quality Service Action Plan Summary V for Renovation Services</u>. Also as a LEED rated building, the Contract Requirements and General Construction Specifications require 75% of all materials be recycled or salvaged. Parking on campus is one of the largest problems. Due to the great amount of students and faculty that need to park on campus, parking spaces are limited. This causes all of the construction workers to park in Lot 44, a considerable distance from the site, and be shuttled to the project at the contractor's expense.

Client Information

The Pennsylvania State University is ranked 40th among the <u>world's top 100 global</u> <u>institutions</u>. Penn State follows a list of very high quality standards that are backed up by the Office of the Physical Plant's <u>Construction Services Unit</u>. The Construction Services team is in charge of making sure that the project is a safe work environment for the workers and everyone on campus. Their job also consists of ensuring the Universities quality standards are met, that the job stays on schedule, and that the project is built to the specifications. The Construction Services Unit is a big part of any project on campus and more about their role in any project can be found on page 19.

Penn State has chosen to renovate this existing building instead of demolishing it and rebuilding. The main factor in this decision was to preserve a historical site. The Borland Laboratory was first built in 1889 to enhance the research of dairy products. They also produced and sold ice-cream from this facility that has been known as the "University Creamery ever since and has become a landmark at Penn State for anyone visiting.



The creamery has just been moved one block East on Curtain road to a brand new facility. Now that the creamery has been moved, Borland Laboratory is empty and will be used for many different activities for this ever-growing university.

Then Pennsylvania State University has given a construction cost estimate of \$11,800,000 and a total building cost of \$15,000,000. This will include a lot of planning and scheduling on both sides of the project, because the campus is occupied by nearly 40,000 students almost everyday. This makes utility shutdowns and tie-ins very difficult to not disrupt the normal day activities of the students.

Project Delivery System

The Delivery System on this project will be a design-bid-build. As said in my Executive Summary, the project has been delayed for various reasons. This has allowed the architect to produce 100% complete construction drawings. Even though The Pennsylvania State University Office of the Physical Plant normally uses a design-bid-build system, it is unusual to start a project with complete drawings. On page 20 I have provided a visualation of how the project delivery system for the Borland Laboratory project will work. Also when looking at the delivery system, I have labled the types of contracts that will be used between trades. Since the contract has not been awarded yet, the General Contractor and their subs are unknown at this time.



Dustin Faust Construction Management October 6th, 2006

Staffing Plan

Bellow I have provided an organizational chart showing the staff is assigned to this job. Again since this project is not yet in the construction phase, I have focused more on The Pennsylvania State Univery Office of the Physical Plant's chain of command. Penn State utilizes a hyarcy system to run their projects. This can be better visualized bellow.





Summarized Project Schedule

ID	0	Task Name		Duration	Start	Finish	nuary 1	J /21	lanuary 2	21	Februar	y 11	March	1	March 21	April 11	11/2	May 1
1		Funding Aproval by Pe	enn State	12 days	Tue 2/24/04	Wed 3/10/04	2123 01	131	5/1	5/12	5/20	9/20	4/2	10/0	4/13 10/2	4/2/	11/2	5/10
2		Notice to proceed for	Architect	1 day	Tue 12/14/04	Tue 12/14/04			,	1								
3		Design Phase		369 days	Tue 4/26/05	Fri 9/22/06												
4	III	Present project to own	ner	1 day	Tue 4/4/06	Tue 4/4/06												
5	111	Obtain Permits		26 days	Tue 8/22/06	Tue 9/26/06							' Г					
6	TT	Pre-bid Meetings		11 days	Tue 10/3/06	Tue 10/17/06							_	ĥ				
7		Bids Due		1 day	Thu 10/26/06	Thu 10/26/06								Ĩ.				
8		Award Contract		1 day	Fri 11/3/06	Fri 11/3/06												
9		Notice to Proceed		1 day	Mon 11/27/06	Mon 11/27/06								ĽĿ.				
10		Construction Phase		357 days	Tue 11/28/06	Wed 4/9/08												
11		Abatement (estimated)	45 days	Thu 11/30/06	Wed 1/31/07												
12		Demolision (estimated	1)	48 days	Mon 12/25/06	Wed 2/28/07												
13		Building Power Energi	ized	1 day	Fri 2/22/08	Fri 2/22/08												
14		L&I Building Plan Rev	iew	30 days	Wed 2/27/08	Tue 4/8/08												
15		Commissioning		20 days	Wed 3/12/08	Tue 4/8/08												
16		Turnover to OPP		1 day	Wed 4/2/08	Wed 4/2/08										ī		
17		L&I COP		1 day	Tue 4/8/08	Tue 4/8/08										1		
18		Punch List		51 days	Wed 4/16/08	Wed 6/25/08												
19	111	Final Inspection		1 day	Wed 5/14/08	Wed 5/14/08												
20	111	As-Built Drawings sub	mitted	1 day	Wed 5/21/08	Wed 5/21/08												
21	111	Building Flush for LEE	Ds	11 days	Thu 6/26/08	Thu 7/10/08	1									Ŀ		
22	111	Move In		25 days	Fri 7/11/08	Thu 8/14/08												
23		Complete Bond Inspec	ction	20 days	Thu 2/26/09	Wed 3/25/09											Ь	
24		Close Out Project		20 days	Thu 3/26/09	Wed 4/22/09												
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			Progress			Project Summa	ry			[Deadline	•	\mathcal{V}					
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PENNSTATE Borland Laboratory Renovation

Cost Works Estimate

Project Name Project Name Project Name Project Name Note Project Model Type: Laboratory, Face Brick with Concrete Brick Back-up / Bearing Wall: State College, PA State College, PA State College, FA State College			JI NG 12501	mail		
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B1010 Floor Construction 3.570 964,000.00 B1020 Roof Construction 3.56 218,500.00 B2010 Exterior Walls 3.71 228,000.00 B2020 Exterior Doors 1.66 102,000.00 B3010 Roof Coverings 3.61 221,500.00 B3010 Roof Openings 0.15 9,275.00 C Interiors 20.3% C 1010 Partitions 8.21 504,500.00 C1020 Interior Doors 0.85 52,000.00 C3010 Wall Finishes 4.40 270,000.00 C3020 Floor Finishes 3.88 238,000.00 D Services 37.0% 0.03 1,975.00 D2010 Plumbing Fixtures 11.68 717,500.00 D2020 Domestic Water Distribution 0.53 32,800.00 D2010 Plumbing Fixtures 11.66 102,000.00 D3050 Terminal & Package Units 15.72 965,500.00 D4010 Sprinklers <td< td=""><td>B Shell</td><td></td><td></td><td></td><td></td><td>27.5%</td></td<>	B Shell					27.5%
B1020 Roof Construction 3.56 218,500.00 B2010 Exterior Walls 3.71 228,000.00 B2030 Exterior Wards 1.66 102,000.00 B2030 Exterior Doors 1.28 78,500.00 B3010 Roof Coverings 3.61 221,500.00 B3020 Roof Coverings 3.61 221,500.00 C Interiors 20.3% C1010 Partitions 8.21 504,500.00 C1020 Interior Doors 0.85 52,000.00 C3000 C3030 Fittings 0.03 1,975.00 C3020 Floor Finishes 4.40 270,000.00 C3020 Floor Finishes 3.88 238,000.00 C3020 Celing Finishes 3.88 238,000.00 D2010 Plumbing Fixtures 11.68 717,500.00 D2010 Plumbing Fixtures 11.68 717,500.00 D2040 Rain Water Drainage 0.46 28,500.00 D2040 Rain Water Drainage 0.46 28,500.00 D500.00 D500.00 D500.00 <	B1010	Floor Construction		15.70	964,000.00)
B2010 Exterior Walls 3.71 228,000.00 B2020 Exterior Windows 1.66 102,000.00 B2030 Exterior Doors 1.28 78,500.00 B3010 Roof Coverings 3.61 221,500.00 B3020 Roof Openings 0.15 9,275.00 C Interiors 20.3% C1010 Partitions 8.21 504,500.00 C1020 Interior Doors 0.85 52,000.00 C3030 Fittings 0.03 1,975.00 C3010 Wall Finishes 4.40 270,000.00 C3030 Ceiling Finishes 3.88 238,000.00 C3030 Ceiling Finishes 11.68 717,500.00 D2010 Plumbing Fixtures 11.68 717,500.00 D2020 Domestic Water Distribution 0.53 32,800.00 D2040 Rain Water Drainage 0.46 28,500.00 D4010 Sprinklers 1.66 102,000.00 D5010 Electrical Service/Distribution 1.02 62,500.00 D5030 Communications and Security 0.55 <td>B1020</td> <td>Roof Construction</td> <td></td> <td>3.56</td> <td>218,500.00</td> <td>)</td>	B1020	Roof Construction		3.56	218,500.00)
B2020 Exterior Windows 1.66 102,000.00 B2030 Exterior Doors 1.28 78,500.00 B3010 Roof Coverings 3.61 221,500.00 B3020 Roof Openings 0.15 9,275.00 C Interiors 20.3% C1010 Partitions 8.21 504,500.00 C1020 Interior Doors 0.85 52,000.00 C1030 Fittings 0.03 1,975.00 C3010 Wall Finishes 4.40 270,000.00 C3030 Celling Finishes 3.88 238,00.00 D2010 Plumbing Fixtures 11.68 717,500.00 D2020 Domestic Water Distribution 0.53 32,800.00 D2040 Rain Water Drainage 0.46 28,500.00 D2020 Domestic Water Distribution 1.02 62,500.00 D3050 Terminal & Package Units 1.66 102,000.00 D5010 Electrical Service/Distribution 1.02 62,500.00 D5030 Communications and Security 0.55 33,900.00 D5030 C	B2010	Exterior Walls		3.71	228,000.00)
B2030 Exterior Doors 1.28 78,500.00 B3010 Roof Coverings 3.61 221,500.00 B3020 Roof Openings 0.15 9,275.00 C Interiors 20.3% C1010 Partitions 8.21 504,500.00 C1020 Interior Doors 0.85 52,000.00 C1030 Fittings 0.03 1.975.00 C3010 Wall Finishes 4.40 270,000.00 C3020 Floor Finishes 4.57 280,500.00 C3030 Ceiling Finishes 3.88 238,000.00 D2010 Plumbing Fixtures 11.68 717,500.00 D2020 Domestic Water Distribution 0.53 32,800.00 D2010 Plumbing Fixtures 11.68 717,500.00 D20202 Domestic Water Distribution 0.53 32,800.00 D3050 Terminal & Package Units 15.72 965,500.00 D4010 Sprinklers 1.66 102,000.00 0 D5030 Communications and Security 0.55 33,900.00 0 D50300	B2020	Exterior Windows		1.66	102,000.00)
B3010 Roof Coverings 3.61 221,500.00 B3020 Roof Openings 0.15 9,275.00 C Interiors 20.3% C1010 Partitions 8.21 504,500.00 C1020 Interior Doors 0.85 52,000.00 C1030 Fittings 0.03 1,975.00 C3010 Wall Finishes 4.40 270,000.00 C3020 Floor Finishes 4.57 280,500.00 C3030 Ceiling Finishes 3.88 238,000.00 D2010 Plumbing Fixtures 11.68 717,500.00 D2020 Domestic Water Distribution 0.53 32,800.00 D2010 Plumbing Fixtures 11.68 717,500.00 D2020 Domestic Water Distribution 0.53 32,800.00 D3050 Terminal & Package Units 15.72 965,500.00 D4010 Sprinklers 1.66 102,000.00 D5030 Communications and Security 0.55 33,900.00 D5030 Communications a	B2030	Exterior Doors		1.28	78,500.00)
B3020 Roof Openings 0.15 9,275.00 C Interiors 20.3% C1010 Partitions 8.21 504,500.00 C1020 Interior Doors 0.85 52,000.00 C1030 Fittings 0.03 1,975.00 C3010 Wall Finishes 4.40 270,000.00 C3020 Floor Finishes 4.57 280,500.00 C3030 Ceiling Finishes 3.88 238,000.00 D2010 Plumbing Fixtures 11.68 717,500.00 D20200 Domestic Water Distribution 0.53 32,800.00 D20200 Demestic Water Drainage 0.46 28,500.00 D3050 Terminal & Package Units 15.72 965,500.00 D4010 Sprinklers 1.66 102,000.00 D5030 Communications and Security 0.55 33,900.00 D50300 Other Electrical Systems 0.07 4,500.00 E1020 Institutional Equipment 1.00 61,500.00 E1030 Other Equipment	B3010	Roof Coverings		3.61	221,500.00)
C Interiors 20.3% C1010 Partitions 8.21 504,500.00 C1020 Interior Doors 0.85 52,000.00 C1030 Fittings 0.03 1,975.00 C3010 Wall Finishes 4.40 270,000.00 C3020 Floor Finishes 4.40 270,000.00 C3030 Ceiling Finishes 4.57 280,500.00 C3030 Ceiling Finishes 3.88 238,000.00 D Services 37.0% 37.0% D2010 Plumbing Fixtures 11.68 717,500.00 D20200 Domestic Water Drainage 0.46 28,500.00 D20200 Demestic Water Drainage 0.46 28,500.00 D4010 Sprinklers 1.66 102,000.00 D5010 Electrical Service/Distribution 1.02 62,500.00 D5030 Communications and Security 0.55 33,900.00 D50300 Other Electrical Systems 0.07 4,500.00 E1020 Institutional Equipment 1.00	B3020	Roof Openings		0.15	9,275.00)
C1010 Partitions 8.21 504,500.00 C1020 Interior Doors 0.85 52,000.00 C1030 Fittings 0.03 1,975.00 C3010 Wall Finishes 4.40 270,000.00 C3020 Floor Finishes 4.57 280,500.00 C3030 Ceiling Finishes 3.88 238,000.00 D2010 Plumbing Fixtures 11.68 717,500.00 D2020 Domestic Water Distribution 0.53 32,800.00 D2020 Domestic Water Distribution 0.53 32,800.00 D2040 Rain Water Drainage 0.46 28,500.00 D4010 Sprinklers 15.72 965,500.00 D4010 Sprinklers 1.66 102,000.00 D5010 Electrical Service/Distribution 1.02 62,500.00 D5030 Communications and Security 0.55 33,900.00 D5090 Other Electrical Systems 0.07 4,500.00 E1020 Institutional Equipment 1.00 61,500.00 E1090 Other Equipment 3.39 208,000.00	C Interio	ors				20.3%
C1020 Interior Doors 0.85 52,000.00 C1030 Fittings 0.03 1,975.00 C3010 Wall Finishes 4.40 270,000.00 C3020 Floor Finishes 4.57 280,500.00 C3030 Ceiling Finishes 3.88 238,000.00 D Services 37.0% D2010 Plumbing Fixtures 11.68 717,500.00 D2020 Domestic Water Distribution 0.53 32,800.00 D2040 Rain Water Drainage 0.46 28,500.00 D3050 Terminal & Package Units 15.72 965,500.00 D4010 Sprinklers 1.66 102,000.00 D5020 Lighting and Branch Wiring 8.25 506,500.00 D5030 Communications and Security 0.55 33,900.00 D5090 Other Electrical Systems 0.07 4,500.00 E1020 Institutional Equipment 1.00 61,500.00 E1020 Institutional Equipment 3.39 208,000.00 E1020 Institutional Equipment 3.39 208,000.00 GENERAL CONDITIO	C1010	Partitions		8.21	504,500.00)
C1030 Fittings 0.03 1,975.00 C3010 Wall Finishes 4.40 270,000.00 C3020 Floor Finishes 4.57 280,500.00 C3030 Ceiling Finishes 3.88 238,000.00 D Services 37.0% D2010 Plumbing Fixtures 11.68 717,500.00 D2020 Domestic Water Distribution 0.53 32,800.00 D2040 Rain Water Drainage 0.46 28,500.00 D3050 Terminal & Package Units 15.72 965,500.00 D4010 Sprinklers 1.66 102,000.00 D5020 Lighting and Branch Wiring 8.25 506,500.00 D5030 Communications and Security 0.55 33,900.00 D5090 Other Electrical Systems 0.07 4,500.00 E 1020 Institutional Equipment 1.00 61,500.00 E 1020 Institutional Equipment 3.39 208,000.00 E 1020 Institutional Equipment 3.39 208,000.00 E 1020 Institutional Equipment 1.00 61,500.00 E 1	C1020	Interior Doors		0.85	52,000.00)
C3010 Wall Finishes 4.40 270,000.00 C3020 Floor Finishes 4.57 280,500.00 C3030 Ceiling Finishes 3.88 238,000.00 D Services 37.0% D2010 Plumbing Fixtures 11.68 717,500.00 D2020 Domestic Water Distribution 0.53 32,800.00 D2040 Rain Water Drainage 0.46 28,500.00 D3050 Terminal & Package Units 15.72 965,500.00 D4010 Sprinklers 1.66 102,000.00 D5020 Lighting and Branch Wiring 8.25 506,500.00 D5030 Communications and Security 0.55 33,900.00 D5090 Other Electrical Systems 0.07 4,500.00 E1020 Institutional Equipment 1.00 61,500.00 E1090 Other Equipment 3.39 208,000.00 E1090 Other Equipment 3.39 208,000.00 GENERAL CONDITIONS (Overhead & Profit) 25% 26.98 1,657,000.00 ARCHITECTURAL FEES 0% 0.00 0.00 0.00	C1030	Fittings		0.03	1,975.00)
C3020 Floor Finishes 4.57 280,500.00 C3030 Ceiling Finishes 3.88 238,000.00 D Services 37.0% D2010 Plumbing Fixtures 11.68 717,500.00 D2020 Domestic Water Distribution 0.53 32,800.00 D2040 Rain Water Drainage 0.46 28,500.00 D3050 Terminal & Package Units 15.72 965,500.00 D4010 Sprinklers 1.66 102,000.00 D5020 Lighting and Branch Wiring 8.25 506,500.00 D5030 Communications and Security 0.55 33,900.00 D5090 Other Electrical Systems 0.07 4,500.00 E1020 Institutional Equipment 1.00 61,500.00 E1020 Institutional Equipment 3.39 208,000.00 E1020 Institutional Equipment 107.91 6,627,450.00 E1090 Other Equipment 25% 26.98 1,657,000.00 GENERAL CONDITIONS (Overhead & Profit) 25% 26.98 1,657,000.00 ARCHITECTURAL FEES 10% 13.49	C3010	Wall Finishes		4.40	270,000.00)
C3030 Ceiling Finishes 3.88 238,000.00 D Services 37.0% D2010 Plumbing Fixtures 11.68 717,500.00 D2020 Domestic Water Distribution 0.53 32,800.00 D2040 Rain Water Drainage 0.46 28,500.00 D3050 Terminal & Package Units 15.72 965,500.00 D4010 Sprinklers 1.66 102,000.00 D5020 Lighting and Branch Wiring 8.25 506,500.00 D5030 Communications and Security 0.55 33,900.00 D5090 Other Electrical Systems 0.07 4,500.00 E 1020 Institutional Equipment 1.00 61,500.00 E 1020 Institutional Equipment 1.00 61,500.00 E 1020 Institutional Equipment 1.00 61,627,450.00 100% E 1020 Institutional Equipment 25% 26.98 1,657,000.00 E 1020 Institutional Equipment 1.00 61,627,450.00 100% GENERAL CONDITIONS (Overhead & Pro	C3020	Floor Finishes		4.57	280,500.00)
D Services 37.0% D2010 Plumbing Fixtures 11.68 717,500.00 D2020 Domestic Water Distribution 0.53 32,800.00 D2040 Rain Water Drainage 0.46 28,500.00 D3050 Terminal & Package Units 15.72 965,500.00 D4010 Sprinklers 1.66 102,000.00 D5020 Lighting and Branch Wiring 8.25 506,500.00 D5030 Communications and Security 0.55 33,900.00 D5090 Other Electrical Systems 0.07 4,500.00 E1020 Institutional Equipment 1.00 61,500.00 E1020 Institutional Equipment 3.39 208,000.00 E1020 Institutional Equipment 3.39 208,000.00 E1090 Other Equipment 3.39 208,000.00 GENERAL CONDITIONS (Overhead & Profit) 25% 26.98 1,657,000.00 ARCHITECTURAL FEES 10% 13.49 828,500.00 USER FEES 0% 0.00 0.00	C3030	Ceiling Finishes		3.88	238,000.00)
D2010 Plumbing Fixtures 11.68 717,500.00 D2020 Domestic Water Distribution 0.53 32,800.00 D2040 Rain Water Drainage 0.46 28,500.00 D3050 Terminal & Package Units 15.72 965,500.00 D4010 Sprinklers 1.66 102,000.00 D5010 Electrical Service/Distribution 1.02 62,500.00 D5020 Lighting and Branch Wiring 8.25 506,500.00 D5030 Communications and Security 0.55 33,900.00 D5090 Other Electrical Systems 0.07 4,500.00 E 1020 Institutional Equipment 1.00 61,500.00 E 1020 Institutional Equipment 1.00 61,500.00 E 1020 Institutional Equipment 1.00 6,627,450.00 100% GENERAL CONDITIONS (Overhead & Profit) 25% 26.98 1,657,000.00 100% ARCHITECTURAL FEES 10% 13.49 828,500.00 0.00 0.00 USER FEES 0% 0.00 <	D Servic	ces				37.0%
D2020 Domestic Water Distribution 0.53 32,800.00 D2040 Rain Water Drainage 0.46 28,500.00 D3050 Terminal & Package Units 15.72 965,500.00 D4010 Sprinklers 1.66 102,000.00 D5010 Electrical Service/Distribution 1.02 62,500.00 D5020 Lighting and Branch Wiring 8.25 506,500.00 D5030 Communications and Security 0.55 33,900.00 D5090 Other Electrical Systems 0.07 4,500.00 E1020 Institutional Equipment 1.00 61,500.00 E1090 Other Equipment 3.39 208,000.00 E1090 Other Equipment 107.91 6,627,450.00 GENERAL CONDITIONS (Overhead & Profit) 25% 26.98 1,657,000.00 ARCHITECTURAL FEES 10% 13.49 828,500.00 USER FEES 0% 0.00 0.00 USER FEES 0% 0.00 0.00	D2010	Plumbing Fixtures		11.68	717,500.00)
D2040 Rain Water Drainage 0.46 28,500.00 D3050 Terminal & Package Units 15.72 965,500.00 D4010 Sprinklers 1.66 102,000.00 D5010 Electrical Service/Distribution 1.02 62,500.00 D5020 Lighting and Branch Wiring 8.25 506,500.00 D5030 Communications and Security 0.55 33,900.00 D5090 Other Electrical Systems 0.07 4,500.00 E Equipment & Furnishings 4.1% E1020 Institutional Equipment 1.00 61,500.00 E1090 Other Equipment 3.39 208,000.00 GENERAL CONDITIONS (Overhead & Profit) 25% 26.98 1,657,000.00 ARCHITECTURAL FEES 10% 13.49 828,500.00 USER FEES 0% 0.00 0.00 TOTAL BUILDING COST 148.38 9,112,950.00	D2020	Domestic Water Distribution		0.53	32,800.00)
D3050 Terminal & Package Units 15.72 965,500.00 D4010 Sprinklers 1.66 102,000.00 D5010 Electrical Service/Distribution 1.02 62,500.00 D5020 Lighting and Branch Wiring 8.25 506,500.00 D5030 Communications and Security 0.55 33,900.00 D5090 Other Electrical Systems 0.07 4,500.00 E Equipment & Furnishings 4.1% E1020 Institutional Equipment 1.00 61,500.00 E1090 Other Equipment 3.39 208,000.00 GENERAL CONDITIONS (Overhead & Profit) 25% 26.98 1,657,000.00 ARCHITECTURAL FEES 10% 13.49 828,500.00 USER FEES 0% 0.00 0.00 TOTAL BUILDING COST 148.38 9,112,950.00	D2040	Rain Water Drainage		0.46	28,500.00)
D4010 Sprinklers 1.66 102,000.00 D5010 Electrical Service/Distribution 1.02 62,500.00 D5020 Lighting and Branch Wiring 8.25 506,500.00 D5030 Communications and Security 0.55 33,900.00 D5090 Other Electrical Systems 0.07 4,500.00 E Equipment & Furnishings 4.1% E1020 Institutional Equipment 1.00 61,500.00 E1090 Other Equipment 100 6,627,450.00 100% GENERAL CONDITIONS (Overhead & Profit) 25% 26.98 1,657,000.00 ARCHITECTURAL FEES 10% 13.49 828,500.00 USER FEES 0% 0.00 0.00 TOTAL BUILDING COST 148.38 9,112,950.00	D3050	Terminal & Package Units		15.72	965,500.00)
D5010 Electrical Service/Distribution 1.02 62,500.00 D5020 Lighting and Branch Wiring 8.25 506,500.00 D5030 Communications and Security 0.55 33,900.00 D5090 Other Electrical Systems 0.07 4,500.00 E Equipment & Furnishings 4.1% E1020 Institutional Equipment 1.00 61,500.00 E1090 Other Equipment 3.39 208,000.00 Sub-Total 107.91 6,627,450.00 100% GENERAL CONDITIONS (Overhead & Profit) 25% 26.98 1,657,000.00 ARCHITECTURAL FEES 10% 13.49 828,500.00 USER FEES 0% 0.00 0.00 TOTAL BUILDING COST 148.38 9,112,950.00	D4010	Sprinklers		1.66	102,000.00)
D5020 Lighting and Branch Wiring 8.25 506,500.00 D5030 Communications and Security 0.55 33,900.00 D5090 Other Electrical Systems 0.07 4,500.00 E Equipment & Furnishings 4.1% E1020 Institutional Equipment 1.00 61,500.00 E1090 Other Equipment 3.39 208,000.00 GENERAL CONDITIONS (Overhead & Profit) 25% 26.98 1,657,000.00 ARCHITECTURAL FEES 10% 13.49 828,500.00 USER FEES 0% 0.00 0.00 TOTAL BUILDING COST 148.38 9,112,950.00	D5010	Electrical Service/Distribution		1.02	62,500.00	
D5030 Communications and Security 0.55 33,900.00 D5090 Other Electrical Systems 0.07 4,500.00 E Equipment & Furnishings 4.1% E1020 Institutional Equipment 1.00 61,500.00 E1090 Other Equipment 3.39 208,000.00 Sub-Total 107.91 6,627,450.00 100% GENERAL CONDITIONS (Overhead & Profit) 25% 26.98 1,657,000.00 ARCHITECTURAL FEES 10% 13.49 828,500.00 USER FEES 0% 0.00 0.00 TOTAL BUILDING COST 148.38 9,112,950.00	D5020	Lighting and Branch Wiring		8.25	506,500.00)
D5090 Other Electrical Systems 0.07 4,500.00 E Equipment & Furnishings 4.1% E1020 Institutional Equipment 1.00 61,500.00 E1090 Other Equipment 3.39 208,000.00 GENERAL CONDITIONS (Overhead & Profit) 25% 26.98 1,657,000.00 ARCHITECTURAL FEES 10% 13.49 828,500.00 USER FEES 0% 0.00 0.00 TOTAL BUILDING COST 148.38 9,112,950.00	D5030	Communications and Security		0.55	33,900.00)
E Equipment & Furnishings 4.1% E1020 Institutional Equipment 1.00 61,500.00 E1090 Other Equipment 3.39 208,000.00 Sub-Total 107.91 6,627,450.00 100% GENERAL CONDITIONS (Overhead & Profit) 25% 26.98 1,657,000.00 ARCHITECTURAL FEES 10% 13.49 828,500.00 USER FEES 0% 0.00 0.00 TOTAL BUILDING COST 148.38 9,112,950.00	D5090	Other Electrical Systems		0.07	4,500.00)
E1020 Institutional Equipment 1.00 61,500.00 E1090 Other Equipment 3.39 208,000.00 Sub-Total 107.91 6,627,450.00 100% GENERAL CONDITIONS (Overhead & Profit) 25% 26.98 1,657,000.00 ARCHITECTURAL FEES 10% 13.49 828,500.00 USER FEES 0% 0.00 0.00 TOTAL BUILDING COST 148.38 9,112,950.00	E Equip	ment & Furnishings				4.1%
E1090 Other Equipment 3.39 208,000.00 Sub-Total 107.91 6,627,450.00 100% GENERAL CONDITIONS (Overhead & Profit) 25% 26.98 1,657,000.00 ARCHITECTURAL FEES 10% 13.49 828,500.00 USER FEES 0% 0.00 0.00 TOTAL BUILDING COST 148.38 9,112,950.00	E1020	Institutional Equipment		1.00	61,500.00)
Sub-Total 107.91 6,627,450.00 100% GENERAL CONDITIONS (Overhead & Profit) 25% 26.98 1,657,000.00 ARCHITECTURAL FEES 10% 13.49 828,500.00 USER FEES 0% 0.00 0.00 TOTAL BUILDING COST 148.38 9,112,950.00	E1090	Other Equipment		3.39	208,000.00)
GENERAL CONDITIONS (Overhead & Profit) 25% 26.98 1,657,000.00 ARCHITECTURAL FEES 10% 13.49 828,500.00 USER FEES 0% 0.00 0.00 TOTAL BUILDING COST 148.38 9,112,950.00			Sub-Total	107.91	6,627,450.00	100%
ARCHITECTURAL FEES 10% 13.49 828,500.00 USER FEES 0% 0.00 0.00 TOTAL BUILDING COST 148.38 9,112,950.00		GENERAL CONDITIONS (Overhead & Profit)	25%	26.98	1,657,000.00)
USER FEES 0% 0.00 0.00 TOTAL BUILDING COST 148.38 9,112,950.00		ARCHITECTURAL FEES	10%	13.49	828,500.00)
TOTAL BUILDING COST 148.38 9,112.950.00		USER FEES	0%	0.00	0.00)
		TOTAL BUILDING COST		148.38	9,112,950.00)

Borland Laboratory Renovation

Dustin Faust Construction Management October 6th, 2006

D4 Estimate

Estimate of Probable Cost

Penn State University Borland Labor - Oct 2007 - PA - State College

Duilding Ca Cigo		61415
Bullaing Sq. Size	•	01415
Bid Date	:	10/26/2006
Project Height	:	56
lst Floor Size	:	18000
lst Floor Height	:	12
No. Of Buildings	:	1
No. Of Floors	:	4
Project Type	:	REN
Building Use	:	Educational
Exterior Walls	:	MAS
Interior Walls	:	CMU
Foundation	:	CON
Roof Type	:	BUP
Floor Type	:	CON

Building Costs

Code Projected	Division Name	8	Sq. Cost
==========			:========
======			
01	General Requirements	5.88 13.65)
838,470	-		
	General Requirements	5.88 13.	65
838,470	-		
03	Concrete	3.8	5
8.92	548,006		
	Concrete	3	.85
8.92	548,006		
04	Masonry	6.84	L
15.87	974,567		
	Masonry	б.	84
15.87	974,567		
05	Metals	5.	44
12.62	775,245		
	Metals		5.44
12.62	775,245		
06	Wood & Plastics	1.83 4	.23
260,077			
	Wood & Plastics	1.83	4.23
260,077			
07	Thermal & Moisture Protection	3.62 8.40	516,117
	Thermal & Moisture Protection	3.62 8.40	,
516,117			
08	Doors & Windows	11.23 26.06	
1,600,651			
,,	Doors & Windows	11.23 26.	06

1,600,651

PENNSTATE Borland Laboratory Renovation

09 5.42 09 Finish 12.57 771,695 Finishes 5.42 Finishes
 12.57
 771,695

 10
 Specia

 4.49
 275,883
1.94 Specialties Specialties 1.94 4.49 275,883 34.45 79.91 15 Mechanical 4,907,957 34.45 79.91 Mechanical 4,907,957 16 Electric 45.25 2,779,017 Electrical 19.51 Electrical 19.51 45.25 2,779,017 _____ ======= Total Building Costs 100.00 231.99 14,247,685 Site Costs _____ Code Division Name 00 Sq. Cost Projected _____ ====== 02 Site Work 100.00 0.04 300,040 100.00 0.04 Site Work 300,040 ______ ====== Total Site Costs 100.00 3.57 300,040 _____ ======= Total Project Costs 14,547,725 Building Division Notes General Requirements _____ Bidding requirements, mobilization, bonding, surveyor. Concrete _____ Formwork, reinforcement, precast. Masonry _____ Masonry & grout.

AE 481W Senior Thesis

Dustin Faust Construction Management October 6th, 2006



Doors & Windows

Metal doors & frames, wood & plastic doors, special doors, metal windows.

Finishes

_____ Tile, acoustical treatment, wood flooring, resilient flooring, carpet, painting.

Specialties

Visual display board, louvers & vents, devices, fire prevention, operable partitions, toilet & bath accessories.

Mechanical

_____ Basic materials & methods.

Electrical _____ Basic materials & methods.

Site Division Notes

Site Work

Earthwork, paving & surfacing, sewerage & drainage, improvements, landscaping.

Project Notes

Estimate Based On Case: EU030140 - College Expansion & Renovation Location: TX - Other Date: Jan 2001 Building Size: 21,300

* Farmers Branch, Texas * Construction Period January 2001 to May 2002. * Building 1, 7,500; Building 2, 13,800; total, 21,300 square feet.

PENNSTATE Borland Laboratory Renovation



Brookhaven College is one of eight colleges that make up the Dallas County Community College District that serves the Northwest area of the City of Dallas and the Farmers Branch, Addison, and Carrolton, Texas communities. The Brookhaven College campus opened in 1972 and has experienced enrollment growth that necessitated the expansion and renovation of its Business and Art Department Programs. Brookhaven College selected MPI Architects as the design architects based on their extensive experience with programming college facilities. Johnson/McKibben Architects, Inc. was chosen the Architect of Record, with the responsibility of leading the complete Architect/Engineering Team.

The challenge presented to the design team was to expand and renovate both departments and maintain existing operations. This was achieved by programming sessions with each department to maintain a focus on their individual needs and requirements.

The 10 classroom building addition to the Business School was designed to relieve the growing demands of computer lab training. The facility was wired with the latest technology to accommodate computer stations in all classrooms. The computer lab was centrally located with four surrounding instructional offices. This provides direct interaction between student and instructor.

Lighting in each classroom was also broken up to allow multiple levels based on the type of media used by instructors. Mixtures of fluorescent and incandescent fixtures with dimming capabilities were specific functions to minimize computer monitor glare.

Each computer lab classroom was designed with minimal sized exterior windows. Exterior natural light was achieved by running continuous clerestory windows along the interior main corridors. The natural light was transferred to the classroom lab with interior windows facing the clerestory corridors.

The Art Department consisted of an approximate 8,000 square feet building addition highlighted with the art gallery. This place was the focal point of the expansion to display renowned art exhibits. In addition, new classrooms featured a wood shop, metal shop, new CAD design classroom and an open courtyard foundry for metal sculpture and a wood burning kiln. The interior finishes in this area utilized stained concrete floors, painted CMU walls, and an open ceiling exposed structure and mechanical ducts. A suspended light grid has been installed to allow maximum flexibility with art displays.

This project also included selective renovations of existing classrooms and shop areas in both the Business School Building and the Art Department. A new chiller was added to the central plant mechanical room to support the existing campus HVAC system.

Manufacturers/Suppliers

DIV 07: Built-Up: Tamko; Metal: Berridge Manufacturing; EIFS: Finestone. DIV 08: Aluminum Storefront: Vistawall; Tempered Glass: Oldcastle; Wood Doors: Ampco; Hollow Metal Doors: P-W Metal Products.

AE 481W Senior Thesis Dustin Faust Building Statistics Construction Management October 6th, 2006 Dr. Reily DIV 09: Carpet: Shaw; Carpet Tiles: Lutyen; Resilient Tile: Armstrong;



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PENNSTATE Borland Laboratory Renovation



QUALITY SERVICE ACTION PLAN CONSTRUCTION SERVICES OFFICE OF PHYSICAL PLANT

OUR CUSTOMERS: Facility Coordinators, Project Managers, Project Coordinators, Contractors, Parking Office, faculty, students, university personnel, community, L&I inspectors, local codes/zoning, police services, Accounting, Design Professionals, Design Services, building users, and other OPP departments. **OUR CUSTOMERS' EXPECTATIONS:** Facilitation of the timely delivery of quality projects. They also expect us to be courteous and reliable while being committed to maintaining a positive and safe working environment.

OUR QUALITY SERVICE STANDARDS:

SAFE ENVIRONMENT:

- 1. Maintain organized and safe project sites.
- 2. Ensure installation of signage to communicate unsafe areas.
- 3. Ensure proper separation between occupied and non-occupied spaces.
- 4. Assure jobsite safety through inspection and observation.
- 5. Initiate and monitor corrective actions.
- 6. Focus on the environment around jobsite to ensure public safety.

SERVICE ATTITUDE:

- 1. Respond in a courteous, positive, and timely manner.
- 2. Empathetically listen to customers' needs and concerns.
- 3. Effectively communicate project information to all entities involved.

STEWARDSHIP:

- 1. Ensure contractors comply with contract requirements and quality standards.
- 2. Continuously inspect, monitor, and evaluate performance of contractor.
- 3. Coordinate project requirements to help facilitate the timely completion of the project.
- 4. Provide leadership at job conferences to resolve project issues.

EASE OF SERVICE:

- 1. Clearly identify all points of contacts for the work.
- 2. Ensure availability to allow timely resolution of project issues.
- 3. Provide continuous customer assistance throughout project process.
- 4. Pro-actively communicate project status.

EFFICIENCY:

- 1. Take a pro-active team approach maintaining positive relationships.
- 2. Establish a quality control action plan for the project.
- 3. Reduce rework through continuous monitoring of the work.
- 4. Attempt to review assigned projects during the pre-construction stage.
- 5. Periodically review and streamline the flow of communication.
- 6. Monitor project long-lead items to ensure timely delivery.
- 7. Track project schedule providing input throughout the project.
- 8. Commit to an efficient close-out/turnover of the project.

DEAR CUSTOMER,

The Construction Services department within Design and Construction Services is committed to exceeding your expectations by providing a positive and safe working environment through leadership

Dustin Faust Construction Management October 6th, 2006

and collaborative efforts. We will continuously strive to ensure all contract requirements are met in a timely manner and at the highest quality.



