PENNSTATE **Borland Laboratory Renovation**

Technical Assignment #2:

Cost

And

Methods Analysis

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Detailed Project Schedule Summary

See Appendix A Figure2.1 for the detailed Project Schedule

The Borland Laboratory Renovation has a strict duration of 449 days to final completion and move-in. Starting on November 27, 2006 the notice to proceed will be issued by Penn State Office of the Physical Plant. Following are a few key dates to the project.

Key Dates:

Completion of Abatement	January 31st, 2007
Completion of Demolition	February 28th, 2007
Basement Construction Compete	April 20th, 2007
Ground Floor Construction Complete	July 31st, 2007
First Floor Construction Complete	November 9th, 2007
Second Floor Construction Complete	February 19th, 2008
Penthouse Construction Complete	April 9th, 2008
Final Inspection	May 14th, 2008
Move-in Complete	August 14th, 2008

Site Layout

See Appendix B Figure 2.2 for the Detailed Site Plan

A detailed Site Plan is crucial in the Construction Industry for things to move smoothly. This is why there has been a lot of planning and detail put into the Site Layout for this project. The Borland Laboratory is located in the heart of the Pennsylvania State University Campus in State College, Pa. The location of this project will cause a lot of issues that can be eliminated by a well developed site plan. There will be two main entrances to the construction site along Shortlidge Road on the East side of the building and on the corner of Shortlidge Road and Curtain Avenue. Another alternate entrance on the West side of the building off of Curtin Avenue will also be used periodically during the construction phases. This is a renovation project, so there is no need for a lot of lay down areas or concrete deliveries. Also there will be no need for a construction trailer; all temporary offices will be located inside the building. The things that must be considered for this particular project are:

Location of Dumpsters
Crane Location
Location of Existing Trees
Location of Garbage Shoots
Unloading Area

The Location of existing trees becomes a large problem on this renovation project. All trees must be protected, and have a fence around the root and canopy perimeter. This left only one spot for the crane to be set. That is on the North side of the building, this was

chosen because of the surrounding trees and the crane will only be needed to erect parts of the new penthouse on east side of the building.

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Fire Protection Estimate

A major part of the Borland Laboratory Renovation at Penn State is a new state of the art fire protection system. There are 2 types of hazard classifications to be dealt with for this project. The first is light hazard occupancy. Under this classification the sprinkler heads to not need to be staggered, and they can be concealed in the ceiling using a sprinkler cover. There will we a wet system used for any spaces falling under this classification. This system has been specified for a water density of 0.10 GPM/Ft² (gallons per minute per square foot) on this project, that category covers the following.

Light Hazard Occupancy

- Pipe Space
- Common Areas
- Offices
- Classrooms

The second classification being used on this renovation is ordinary hazard. This includes all of the mechanical rooms and telecom areas. Due to the risk of equipment damage in the case of a leak in the system, this has been designed as a dry system. This fire protection system will have all upright sprinkler heads and will have a water density of 0.20 GPM/Ft².

Below in Table 2.1 is a square foot estimate of the sprinkler systems being used for this project.

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Table 2.1 Borland Laboratory Renovation, Fire Protection Estimate

Borland Laboratory Renovation				
Fire Protection Estimate				
Floor	**Coverage Area (SF)**	**Material Costs**	**Installation Costs**	**Total Costs**
Basement				
- Wet Pipe	14,000.00	$4,200.00	$13,090.00	$17,290.00
- Dry Pipe	1,302.00	$553.35	$1,302.00	$1,855.35
Ground Floor				
- Wet Pipe	25,192.00	$7,557.60	$23,554.52	$31,112.12
- Dry Pipe	1,580.00	$671.50	$1,580.00	$2,251.50
First Floor				
- Wet Pipe	26,772.00	$8,031.60	$25,031.82	$33,063.42
- Dry Pipe	0.00	$0.00	$0.00	$0.00
Second Floor				
- Wet Pipe	17,267.00	$5,180.10	$16,144.65	$21,324.75
- Dry Pipe	1,980.00	$841.50	$1,980.00	$2,821.50
Totals:	88,093.00	$27,035.65	$82,682.99	**$109,718.64**

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Detailed Structural Steel Estimate

See appendix C, Table 2.3 for a detailed Structural Steel take-off

Table 2.2 below shows the detailed structural steel estimate for the Borland Laboratory. Since this is a renovation project, not one bay could be picked to due a typical bay estimate. The table shows a complete estimate of all the structural steel for this project. All values for this estimate were found by using the 2005 RS Means Building Construction Cost Data book. Table 2.2 shows the estimate broken up by floor, and also examines the material, labor, and equipment costs to install this steel. The total includes all material, labor, equipment, and cost mark-ups for this phase of the project.

Table 2.2 Detailed Structural Steel Estimate

Borland Laboratory Renovation

Detailed Structural Steel Estimate

Floor	Cumulative Tonnage (tons)	Material Costs	Labor Costs	Equip. Costs	Total Costs Including O&P
Basement	0.12	$ 216.00	$ 37.20	$ 19.92	$ 324.00
Ground Floor	4.00	$ 7,200.00	$ 1,240.00	$ 664.00	$ 10,800.00
First Floor	4.61	$ 8,298.00	$ 1,429.10	$ 765.26	$ 12,447.00
Second Floor	2.76	$ 4,968.00	$ 855.60	$ 458.16	$ 7,452.00
Roof - Penthouse	9.79	$ 17,622.00	$ 3,034.90	$ 1,625.14	$ 26,433.00
Mech. Room	6.20	$ 11,160.00	$ 1,922.00	$ 1,029.20	$ 16,740.00
Totals	27.48	$ 49,464.00	$ 8,518.80	$ 4,561.68	**$ 74,196.00**

General Conditions Estimate

Following in table 2.4 is the General Conditions Estimate for the Penn State University Borland Laboratory Renovation Project. The final total of $805,500 is only 5.37% of the $15 Million budgeted for this project. Included among many things are; personnel, existing tree protection, site security and clean-up.

Table 2.4 General Conditions Estimate

Borland Laboratory Renovation

General Conditions Estimate

Description	Amount
Personnel	$450,000.00
Mobilization	$75,000.00
Inspections	$35,000.00
Testing	$15,000.00
Temporary Utilities	$15,000.00
Tools and Equipment	$3,500.00
Existing Tree Protection	$20,000.00
Insurance	$150,000.00
Clean-up	$37,000.00
Security	$2,000.00
Temporary Signs	$1,000.00
Temporary Fire Protection	$700.00
Office Equipment	$1,300.00
Total:	**$805,500.00**

Appendix A: Detailed Project Schedule

Appendix B: Site Layout

Appendix C: Detailed Structural Steel Take-Off

Table 2.3 Detailed Structural Steel Take-Off

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Borland Laboratory Renovation

Detailed Structural Steel Estimate
Take-offs

Basement		
Steel Member	**Total Length (LF)**	**Cumulative Weight (lbs)**
W 18X15	16.5	247.5
	TOTAL (TONS):	**0.12375**

Ground Floor		
Steel Member	**Total Length (LF)**	**Cumulative Weight (lbs)**
W 8X18	42.75	769.50
W 10X12	381.5	4,578.00
W 10X19	9	171.00
W 12X14	7	98.00
W 12X19	48	912.00
L 6X6X1/2	75.5	1,479.80
	TOTAL (TONS) :	**4.00**

First Floor		
Steel Member	**Total Length (LF)**	**Cumulative Weight (lbs)**
W 8X10	102.5	1,025.00
W 8X13	18	234.00
W 8X15	67.5	1,012.50
W 8X18	136	2,448.00
W 12X14	171.5	2,401.00
W 14X22	12	264.00
L 3X3X1/4	80	392.00
L 3X3X3/8	43.33	312.00
L 4X4X1/4	170	1,122.00
	TOTAL (TONS):	**4.61**

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Detailed Structural Steel Estimate
Take-offs

Second Floor

Steel Member	Total Length (LF)	Cumulative Weight (lbs)
W 8X10	308	3080
W 8X13	20	260
W 8X15	24	360
W 8X21	22	462
W 12X14	79.5	1113
W 14X22	11.5	253
	TOTAL (TONS):	**2.76**

Roof - Penthouse

Steel Member	Total Length (LF)	Cumulative Weight (lbs)
W 8X18	423	7614
W 8X13	221.5	2879.5
W 8X10	23.5	235
W 8X28	25	700
W 18X35	72	2520
W 18X46	49	2254
C 4X7.25	153	1109.25
C 6X8.2	59	483.8
C 8X11.5	80	920
L 3X3X3/8	120	864
	TOTAL (TONS):	**9.79**

Borland Laboratory Renovation		
Detailed Structural Steel Estimate Take-offs		
Mech. Room		
Steel Member	**Total Length (LF)**	**Cumulative Weight (lbs)**
W 6X26	80	2080
W 6X36	40	1440
W 8X10	5	50
W 8X18	10	180
W 16X57	28.5	1624.5
W 18X35	80	2800
W 18X46	92	4232
	TOTAL (TONS):	**6.20**