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Construction Management
Dr. Messner
Franklin & Marshall College Row
Lancaster, PA
October 30, 2006
Technical Assignment 2



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Executive Summary

Through completion of this technical assignment, cost and methods, as part of the execution of a project, were analyzed. In this assignment, areas such as a detailed project schedule, a site layout plan for the excavation stage of the project, and assemblies, structural systems, and general conditions estimates were completed to look deeper into the execution of the Franklin & Marshall College Row project in Lancaster, PA.

Franklin & Marshall College required that their project be completed in time for the 2007/2008 school year. With the high demand and short duration, only 16 months to complete three new buildings, Alexander Building Construction was charged with creating a fast-paced schedule to meet their needs. Reflected in this schedule is an owner turnover date of Thursday July 26, 2007. Also important to the owner are activities such as first floor tenant fitout to begin on Friday June 1, 2007 and the residential fitout duration of Wednesday January 10 to Monday July 2, 2007.

The site plan evaluated in this report is for the superstructure phase of the project. Included on the site plan are crane locations, dumpsters, and office trailers. An important part of the construction site is the site fence because of the site's location along Harrisburg Pike and close to campus during the school year.

Included in this report are estimates evaluating the cost of the exterior wall assembly, the structural system for a typical bay, and the general conditions for the project. The total cost for the exterior wall estimate came to \$410,436. For the structural systems estimate, the total cost is \$433,652. And the general conditions estimate totaled \$1,008,564.

Detailed Project Schedule

Franklin & Marshall College requires that their College Row project be completed in time for use for the 2007/2008 school year. The resulting schedule is 16 month construction project, starting from preconstruction in April 2006 and ending with the turnover of the building to the owner on Thursday July 26, 2007.

The project schedule is broken down into two main categories, General Construction and Construction for Building A. Within the General Construction are important milestones, demolition activities, and site work. The Construction for Building A is separated based on the type of work.

Key dates, milestones, and activity durations:

- 1/10/07 to 7/2/07 - Interior finishes
- 2/1/07 - Mock-up apartment complete
- 6/1/07 - 1st floor tenant fitout
- 6/8/07 to 6/22/07 - Life safety systems testing
- 7/9/07 to 7/25/07 - Final clean-up
- 7/26/07 - Owner occupancy
- 8/8/07 - Interior punchlist complete
- 8/22/07 - Exterior punchlist complete






The detailed project schedule is located in Appendix A.

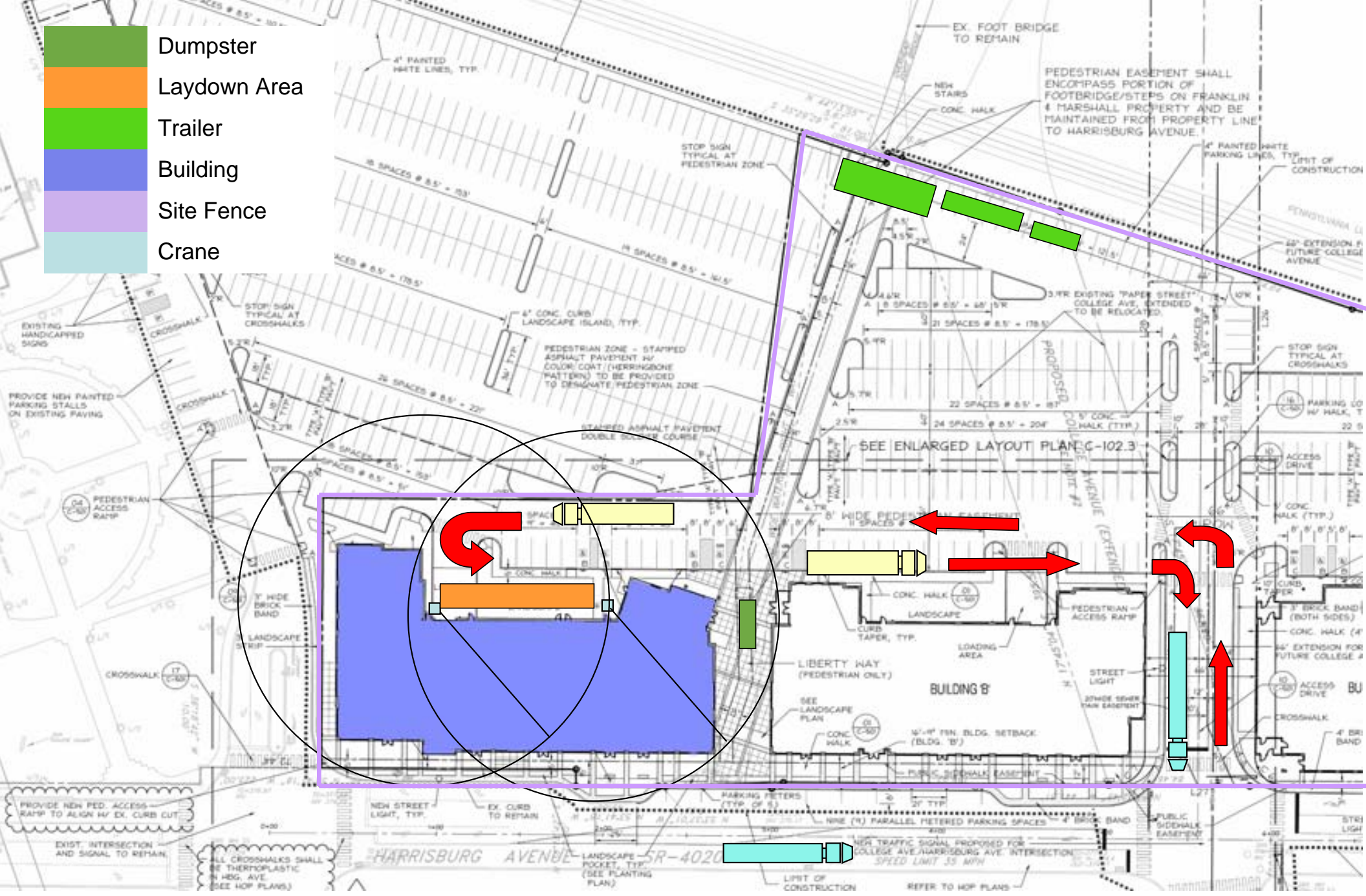
Site Layout Plan - Superstructure

The following site plan is an overall site plan for the superstructure construction phase at Franklin & Marshall College Row. At this point, the main entrance and exit of the site is off Harrisburg Pike, between the proposed Buildings B and C. Since the entrance/exit location is the same, there is ample space for trucks to turn around for delivery. The steel laydown area is centrally located behind the building, with easy access for both delivery trucks and the crane. The crane will first be on the west side of the inside of the building, and later move to the east side of the inside of the building.

At the beginning of the superstructure phase, the trailers are located along the north fence-line, along the railroad tracks. They will later be moved to a different location, and the temporary power set-up will be changed. The temporary power currently has been rerouted from a demoed building. Temporary power for the buildings under construction will be available late in November 2006 and in February 2007, permanent power will be hooked-up. The phone/internet connection is wireless out of the City of Lancaster, and the facsimile line is LAN.

The full detailed site plan is located on the following page.

-  Dumpster
-  Laydown Area
-  Trailer
-  Building
-  Site Fence
-  Crane



Franklin & Marshall College Row
Lancaster, PA

Aimee Bashore
Site Layout Plan - Superstructure

Assemblies Estimate - Exterior Wall

The following is a summary of the assemblies performed for the Franklin & Marshall College Row project. The system looked at in this estimate is the exterior wall. Included in the summary are total prices for the masonry, windows, and doors. All unit prices were taken from R.S. Means Building Construction Costs 2006. A location factor of 0.93 was taken into consideration for the project's Lancaster, PA locality.

A detailed exterior wall assembly estimate is located in Appendix B.

Assemblies Estimate Summary	
Item	Total Cost
Masonry	\$347,660
Doors	\$7,510
Windows	\$86,159
Location Factor = 0.93	\$441,329
TOTAL COST: \$410,436	

Detailed Structural Systems Estimate

The following is a summary of the general conditions estimate performed for the Franklin & Marshall College Row project. Included in the summary are total prices for the structural steel and the slab-on-deck. All unit prices were taken from R.S. Means Building Construction Costs 2006. A location factor of 0.93 was taken into consideration for the project's Lancaster, PA locality.

For the cast-in-place concrete, the slab-on-deck, the mixture is required to be either light or normal weight coarse aggregate, sand fine aggregate, and use either Type I or II Portland Cement. The concrete is to reach 4000psi compressive strength within 28 days. All structural steel columns and beams are to be made from A992 grade steel.

A detailed structural systems estimate is located in Appendix C.

Structural Systems Estimate Summary	
Item	Total Cost
Structural Steel	\$271,749
Slab-on-Deck	\$194,543
Location Factor = 0.93	\$466,292
TOTAL COST: \$433,652	

General Conditions Estimate

The following is a summary of the general conditions estimate performed for the Franklin & Marshall College Row project. Included in the summary are total prices for the bonding and insurance, project staff, and site office supplies. Percentages were taken from the total project cost of \$15,048,000. Hourly, weekly, and monthly costs were based on a 40 hour work week, with the project duration at 68 weeks and 16 months. Unit prices were based on either ICE 2000 estimating software or R.S. Means Building Construction Costs 2006. A location factor of 0.93 was taken into consideration for the project's Lancaster, PA locality.

Unit prices taken from R.S. Means Building Construction Costs 2006 include:

- Final Clean-up
- Office Trailers
- Miscellaneous Office Supplies
- Office Equipment
- Project Staff
- Bonds
- Insurance

Unit prices taken from ICE 2000 estimating software include

- Remaining office supplies

A detailed general conditions estimate is located in Appendix D.

General Conditions Estimate Summary	
Item	Total Cost
Bond	\$150,480
Insurance	\$96,307
Project Staff	\$752,216
Site Office Supplies	\$97,262
Location Factor = 0.93	\$1,096,265
TOTAL COST: \$1,008,564	

Appendix A

Detailed Project Schedule

Detailed Project Schedule
Franklin & Marshall College Row
Lancaster, PA

ID	Task Name	Duration	Start	Finish	, 2006		Qtr 3, 2006			Qtr 4, 2006			Qtr 1, 2007			Qtr 2, 2007			Qtr 3, 2007				
					May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep		
1	Construction	306 days?	Wed 6/21/06	Wed 8/22/07																			
2	General	230 days?	Thu 10/5/06	Wed 8/22/07																			
3	PPL Power Relocation (Start)	0 days	Thu 10/5/06	Thu 10/5/06																			
4	Mock-up Apartment Complete	0 days	Thu 2/1/07	Thu 2/1/07																			
5	1st Floor Tenant Fitout Start	0 days	Fri 6/1/07	Fri 6/1/07																			
6	Life Safety Systems Testing	11 days?	Fri 6/8/07	Fri 6/22/07																			
7	Interior Finishes Complete	0 days	Mon 7/2/07	Mon 7/2/07																			
8	Final Cleaning	13 days?	Mon 7/9/07	Wed 7/25/07																			
9	Certificate of Occupancy	0 days	Mon 7/23/07	Mon 7/23/07																			
10	Complete Punchlist Work	20 days?	Thu 7/26/07	Wed 8/22/07																			
11	Owner Occupancy	0 days	Thu 7/26/07	Thu 7/26/07																			
12	Interior Punchlist Completion	0 days	Wed 8/8/07	Wed 8/8/07																			
13	Exterior/Public Punchlist Completion	0 days	Wed 8/22/07	Wed 8/22/07																			
14	Demolition	34 days?	Wed 8/2/06	Mon 9/18/06																			
15	Demo Building 1 - Federal Mogul	22 days?	Wed 8/2/06	Thu 8/31/06																			
16	Demo Building 2 - Warehouse	34 days?	Wed 8/2/06	Mon 9/18/06																			
17	Sitework	220 days?	Wed 6/21/06	Tue 4/24/07																			
18	Water, Sewer, and Storm Lines	55 days?	Wed 6/21/06	Tue 9/5/06																			
19	Underground Elec/Tele/Data Ductwork	20 days?	Thu 9/7/06	Wed 10/4/06																			
20	Curb/Elec/Stone/Pavement	107 days?	Mon 11/27/06	Tue 4/24/07																			
21	Demo Existing Sidewalk Complete	0 days	Tue 3/6/07	Tue 3/6/07																			
22	Construction - Building A	270 days?	Mon 7/17/06	Fri 7/27/07																			
23	General	180 days	Wed 11/15/06	Wed 7/25/07																			
24	Building Dry to Begin Finishes	0 days	Wed 11/15/06	Wed 11/15/06																			
25	Substantial Completion	0 days	Wed 7/25/07	Wed 7/25/07																			
26	Sitework	40 days?	Mon 7/17/06	Fri 9/8/06																			
27	Backfill Foundation	40 days?	Mon 7/17/06	Fri 9/8/06																			
28	Concrete	40 days?	Wed 9/13/06	Tue 11/7/06																			
29	Pour Second Floor Slab	3 days?	Wed 9/13/06	Fri 9/15/06																			

Project: Schedule.mpp Date: Mon 10/30/06	Task		Milestone		External Tasks	
	Split		Summary		External Milestone	
	Progress		Project Summary		Deadline	

Detailed Project Schedule
Franklin & Marshall College Row
Lancaster, PA

ID	Task Name	Duration	Start	Finish	, 2006		Qtr 3, 2006			Qtr 4, 2006			Qtr 1, 2007			Qtr 2, 2007			Qtr 3, 2007			
					May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
30	Slab on Grade	5 days?	Wed 11/1/06	Tue 11/7/06																		
31	Structural Steel	42 days?	Wed 8/23/06	Thu 10/19/06																		
32	Erect Structural Steel	7 days?	Wed 8/23/06	Thu 8/31/06																		
33	Detail Steel	11 days?	Wed 8/30/06	Wed 9/13/06																		
34	Steel Deck and Studs	6 days?	Tue 9/5/06	Tue 9/12/06																		
35	Brick Angles / Frames 2nd Floor	8 days?	Tue 10/10/06	Thu 10/19/06																		
36	Masonry	137 days?	Mon 8/28/06	Tue 3/6/07																		
37	Masonry Foundation Walls	5 days?	Mon 8/28/06	Fri 9/1/06																		
38	Block Bearing Walls / Grout - 2nd Floor	8 days?	Thu 9/21/06	Mon 10/2/06																		
39	Block Bearing Walls / Grout - 3rd Floor	8 days?	Tue 10/10/06	Thu 10/19/06																		
40	Block Bearing Walls / Grout - 4th Floor	8 days?	Fri 10/27/06	Tue 11/7/06																		
41	Exterior Masonry	92 days?	Mon 10/30/06	Tue 3/6/07																		
42	Block Bearing Walls / Grout - 5th Floor	8 days?	Wed 11/15/06	Fri 11/24/06																		
43	Block Bearing Walls / Grout - 6th Floor	8 days?	Mon 12/4/06	Wed 12/13/06																		
44	Roof Masonry	10 days?	Thu 12/21/06	Wed 1/3/07																		
45	Precast Plank	57 days?	Tue 10/3/06	Wed 12/20/06																		
46	Floor Plank - 3rd Floor	5 days?	Tue 10/3/06	Mon 10/9/06																		
47	Floor Plank - 4th Floor	5 days?	Fri 10/20/06	Thu 10/26/06																		
48	Floor Plank - 5th Floor	5 days?	Wed 11/8/06	Tue 11/14/06																		
49	Floor Plank - 6th Floor	5 days?	Mon 11/27/06	Fri 12/1/06																		
50	Floor Plank - Roof	5 days?	Thu 12/14/06	Wed 12/20/06																		
51	Exterior Studs / Framing	72 days?	Tue 10/10/06	Wed 1/17/07																		
52	Exterior Metal Studs - 2nd Floor	14 days?	Tue 10/10/06	Fri 10/27/06																		
53	Exterior Metal Studs - 3rd Floor	14 days?	Mon 10/30/06	Thu 11/16/06																		
54	Exterior Metal Studs - 1st Floor	14 days?	Wed 11/8/06	Mon 11/27/06																		
55	Exterior Metal Studs - 4th Floor	14 days?	Fri 11/17/06	Wed 12/6/06																		
56	Exterior Metal Studs - 5th Floor	15 days?	Thu 12/7/06	Wed 12/27/06																		
57	Exterior Metal Studs - 6th Floor	15 days?	Thu 12/28/06	Wed 1/17/07																		
58	Roofing	16 days?	Wed 12/27/06	Wed 1/17/07																		

Project: Schedule.mpp Date: Mon 10/30/06	Task		Milestone		External Tasks	
	Split		Summary		External Milestone	
	Progress		Project Summary		Deadline	

Appendix B

Detailed Assemblies Estimate – Exterior Wall

Assemblies Estimate

Franklin & Marshall College Row
Lancaster, PA

Category	Description	Quantity	Size	Unit	Type	Unit Price	Total Cost
Masonry	Brick		20200	SF	4" x 4" x 12"	\$8.90	\$179,780
	Calcium Silicate Masonry Unit		5450	SF	4" x 16" x 32"	\$28.50	\$155,325
	Metal Shingle Cladding		2360	SF		\$5.32	\$12,555
Doors	D4	5	3' x 7'	EA	HM	\$395	\$1,975
	D15	1	12' x 11'	EA	Overhead	\$2,305	\$2,305
	L1	3	1' x 1'	EA	Louver	\$50	\$150
	L2	4	15'-8" x 3'-4"	EA	Louver	\$770	\$3,080

Assemblies Estimate
 Franklin & Marshall College Row
 Lancaster, PA

Category	Description	Quantity	Size	Unit	Type	Unit Price	Total Cost
Windows	W2	2	66	SF	Traco TR-7850	\$35.50	\$2,343
	W2A	2	68	SF	Traco TR-7850	\$35.50	\$2,414
	W3	2	276	SF	Traco TR-7850	\$35.50	\$9,798
	W5A	1	195	SF	Traco TR-7850	\$35.50	\$6,923
	W5B	1	320	SF	Traco TR-7850	\$35.50	\$11,360
	W6A	4	67	SF	Wausau 2250	\$35.50	\$2,379
	W6B	1	60	SF	Wausau 2250	\$35.50	\$2,130
	W7	7	189	SF	Traco TR-7850	\$35.50	\$6,710
	W7A	3	181	SF	Traco TR-7850	\$35.50	\$6,426
	W8	2	286	SF	Traco TR-7850	\$35.50	\$10,153
	W9	4	189	SF	Traco TR-7850	\$35.50	\$6,710
	W9A	3	181	SF	Traco TR-7850	\$35.50	\$6,426
	W10	170	47	SF	Wausau 2250	\$35.50	\$1,669
	W10A	15	47	SF	Wausau 2250	\$35.50	\$1,669
	W11	124	40	SF	Wausau 2250	\$35.50	\$1,420
	W11A	17	40	SF	Wausau 2250	\$35.50	\$1,420
	W13	8	175	SF	Traco TR-7850	\$35.50	\$6,213
Location Factor = 0.93							\$441,329
TOTAL COST: \$410,436							

TOTAL ASSEMBLIES COST: \$410,436

Appendix C

Detailed Structural Systems Estimate

Structural Systems Estimate
 Franklin & Marshall College Row
 Lancaster, PA

Category	Description	Length	Quantity	Unit	Unit Cost - Material	Unit Cost - Labor	Unit Cost - Equipment	Total Unit Cost	Total Cost
Structural Steel Columns	W 12x120	18.052	1	LF	\$199.00	\$2.39	\$1.56	\$202.95	\$3,663.65
	W 12x106	18.125	6	LF	\$125.00	\$2.27	\$1.49	\$128.76	\$14,002.65
	W 12x79	18.1875	5	LF	\$91.00	\$2.21	\$1.45	\$94.66	\$8,608.14
	W 12x72	19.1875	21	LF	\$52.50	\$2.11	\$1.38	\$55.99	\$22,560.47
	W 10x88	18.79	5	LF	\$117.00	\$2.27	\$1.49	\$120.76	\$11,345.40
	W 10x60	17.958	23	LF	\$71.00	\$2.21	\$1.45	\$74.66	\$30,837.12
	W 10x49	19.125	5	LF	\$47.00	\$2.11	\$1.38	\$50.49	\$4,828.11
Structural Steel Beams	W 30x211	21.021	3	LF	\$123.00	\$2.68	\$1.29	\$126.97	\$8,007.11
	W 30x148	28.875	4	LF	\$121.00	\$2.72	\$1.31	\$125.03	\$14,440.97
	W 27x129	27.854	2	LF	\$103.00	\$2.63	\$1.26	\$106.89	\$5,954.63
	W 27x84	24.875	2	LF	\$98.00	\$2.65	\$1.27	\$101.92	\$5,070.52
	W 24x192	21.021	1	LF	\$113.00	\$2.63	\$1.26	\$116.89	\$2,457.14
	W 24x176	18.969	1	LF	\$113.00	\$2.63	\$1.26	\$116.89	\$2,217.29
	W 24x146	28.875	1	LF	\$103.00	\$2.63	\$1.26	\$106.89	\$3,086.45
	W 24x131	21.375	1	LF	\$103.00	\$2.63	\$1.26	\$106.89	\$2,284.77
	W 24x103	19.667	2	LF	\$98.00	\$2.65	\$1.27	\$101.92	\$4,008.92
	W 24x94	19.4	8	LF	\$88.00	\$2.92	\$1.40	\$92.32	\$14,328.06
	W 24x84	28.875	2	LF	\$88.00	\$2.92	\$1.40	\$92.32	\$5,331.48
	W 24x76	20.708	9	LF	\$79.50	\$2.84	\$1.37	\$83.71	\$15,601.20
	W 24x68	28.875	4	LF	\$71.00	\$2.84	\$1.37	\$75.21	\$8,686.76
	W 24x62	19.875	3	LF	\$65.00	\$2.84	\$1.37	\$69.21	\$4,126.65
	W 24x55	18.885	7	LF	\$57.50	\$2.84	\$1.37	\$61.71	\$8,157.75

Structural Systems Estimate
 Franklin & Marshall College Row
 Lancaster, PA

Category	Description	Length	Quantity	Unit	Unit Cost - Material	Unit Cost - Labor	Unit Cost - Equipment	Total Unit Cost	Total Cost
Structural Steel Beams	W 21x111	21.854	1	LF	\$57.50	\$2.84	\$1.37	\$61.71	\$1,348.61
	W 21x68	21.375	6	LF	\$71.00	\$3.04	\$1.46	\$75.50	\$9,682.88
	W 21x62	21.375	1	LF	\$65.00	\$3.04	\$1.46	\$69.50	\$1,485.56
	W 21x44	20.578	1	LF	\$46.00	\$2.96	\$1.42	\$50.38	\$1,036.72
	W 18x86	20.51	2	LF	\$52.50	\$2.96	\$1.42	\$56.88	\$2,333.22
	W 18x71	19.646	1	LF	\$57.50	\$3.46	\$1.66	\$62.62	\$1,230.23
	W 18x50	12.375	2	LF	\$52.50	\$3.46	\$1.66	\$57.62	\$1,426.10
	W 18x40	22.29	3	LF	\$42.00	\$3.28	\$1.58	\$46.86	\$3,133.53
	W 18x35	9.9375	11	LF	\$36.50	\$3.28	\$1.58	\$41.36	\$4,521.17
	W 16x36	18.79	2	LF	\$42.00	\$2.72	\$1.78	\$46.50	\$1,747.47
	W 16x31	19	1	LF	\$32.50	\$2.42	\$1.59	\$36.51	\$693.69
	W 16x26	19.333	27	LF	\$27.00	\$2.18	\$1.43	\$30.61	\$15,978.14
	W 14x22	10.4	34	LF	\$27.00	\$2.20	\$1.44	\$30.64	\$10,834.30
	W 12x50	9.29	4	LF	\$75.00	\$3.40	\$2.23	\$80.63	\$2,996.21
	W 12x19	21.854	10	LF	\$23.00	\$2.48	\$1.62	\$27.10	\$5,922.43
	W 12x14	21.125	13	LF	\$14.65	\$2.48	\$1.62	\$18.75	\$5,149.22
	W 10x12	6.03	15	LF	\$23.00	\$3.63	\$2.38	\$29.01	\$2,623.95
Location Factor = 0.93								\$271,749	
TOTAL COST: \$252,727									

Structural Systems Estimate
 Franklin & Marshall College Row
 Lancaster, PA

Category	Description		Quantity	Unit	Unit Cost - Material	Unit Cost - Labor	Unit Cost - Equipment	Total Unit Cost	Total Cost
Metal Deck	3" x 18 gauge		18,607	SF	\$7.75	\$1.00	\$0.07	\$8.82	\$164,113.74
Concrete	6"		345	CY	\$60.70	\$11.50	\$16.00	\$88.20	\$30,429.00
								Location Factor = 0.93	\$194,543
								TOTAL COST: \$180,925	

TOTAL STRUCTURAL SYSTEMS COST: \$433,652

Appendix D

Detailed General Conditions Estimate

General Conditions Estimate
 Franklin & Marshall College Row
 Lancaster, PA

Category	Description	Quantity	Unit	Unit Price	Total Cost
Premiums	Bond		LS	1%	\$150,480
	Insurance		LS	0.64%	\$96,307
Project Staff	Project Executive	1 @ 2	HR/WK	\$75	\$10,200
	Project Accountant	1 @ 4	HR/WK	\$35	\$9,520
	Project Manager	2 @ 60	HR/WK	\$65	\$265,200
	Project Engineer	1 @ 40	HR/WK	\$31	\$84,320
	Superintendent	1 @ 40	HR/WK	\$61	\$165,920
	Superintendent Assistant	1 @ 40	HR/WK	\$56	\$152,320
	Project Assistant	1 @ 24	HR/WK	\$35	\$57,120
	Safety Director	1 @ 2	HR/WK	\$56	\$7,616
Office Trailers	23' x 44'	1	MO	\$586	\$9,376
	8' x 20'	1	MO	\$167	\$2,672
	8' x 10'	1	MO	\$90	\$1,440

General Conditions Estimate
 Franklin & Marshall College Row
 Lancaster, PA

Category	Description	Quantity	Unit	Unit Price	Total Cost
Supplies	Temporary Utilities		MO	\$1,390	\$22,240
	Telephones	10	LS	\$150	\$1,500
	Telephone/Internet Service		MO	\$150	\$2,400
	Dumpsters	1	MO	\$300	\$4,800
	Misc. Office Supplies		MO	\$90	\$1,440
	Copier / Fax	2	MO	\$145	\$2,320
	Coffee / Drinking Water		MO	\$150	\$2,400
	First Aid Kit		LS	\$50	\$50
	Extinguishers	3	LS	\$100	\$300
	Final Clean-up		LS	0.30%	\$45,144
	Drawing Reproduction		LS	\$1,000	\$1,000
	Sanitation/Chemical Toilet	2	MO	\$90	\$180
				Location Factor = 0.93	\$1,096,265
TOTAL COST: \$1,008,564					

TOTAL GENERAL CONDITIONS COST: \$1,008,564