



TECHNICAL ASSIGNMENT #2

COST AND METHOD ANALYSIS

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A. EXECUTIVE SUMMARY

This document is intended to provide information of how the project was executed. A detailed schedule is provided that reflects the phasing and sequencing of major activities. The site layout plan depicts the phases of construction as well as all temporary facilities and objects. A cost estimation of the building envelope, structural system and general conditions is included.

The Health and Human Services Building began Schematic Design in September 2003 and is scheduled to complete in August 2008. The University of Maryland, Baltimore has had some difficulty acquiring townhouses along Whitmore Avenue and this has affected the original site layout and logistics of the project. The impact on the steel erection process is discussed in further detail.

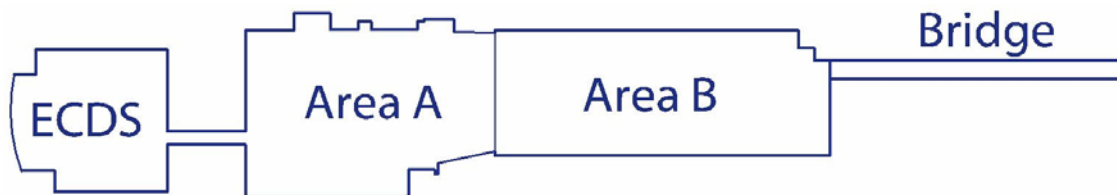
The assembly estimate of the building envelope is broken down into components. These components include masonry, metal panels, glazing, and roofing. The estimated total cost of the building envelope is \$2.4 million. The estimate of the structure of the building is composed of two detailed parts. The foundation and superstructure were taken off by breaking each one into its' different materials. The detailed estimated structural system is ____.



B. DETAILED PROJECT SCHEDULE

The schedule can be found in *Appendix A*.

The building is broken down into four different areas. As shown in the picture below.



Coppin State University Health and Human Services Building's Construction Area

The ECDS is the Early Childhood Development Center. It is a one story building that will house childhood day care. Although it is only one story, careful consideration has been taken in the selection of materials and products because it will be primarily used by children. One of these special features is a heated floor slab because the designers assumed the younger children would be crawling on the floor. The university has gone back and forth on the decision to save money or keep the one-story building included in the scope of work. This has made scheduling for the project difficult at times. Sub-contractors that were awarded with Bid-Package 3 were told not to include the ECDS when ordering materials.

The main building is divided into two areas. - Area A and Area B. Area A is the southern part of the main building. It is the only part of the building that has a sub-grade level. Area B is the northern part of the main building. The main building is 5 stories with mechanical equipment on the roof shielded by a metal screen wall.

The connection bridge is a pedestrian walkway that spans W. North Avenue. It connects the current Coppin State campus to the new part of campus. The walkway allows building occupants to exit the 2nd floor and walk across W. North Avenue without having to worry about traffic. The bridge will be constructed in a parking lot on the north side of W. North Avenue and then

be lifted into place by a crane. W. North Avenue will be closed for the weekend to allow the placement of the bridge to occur.

Foundation

The foundation system in the Health and Human Services Building is concrete. The deep foundation system utilized is caissons. Caisson caps and grade beams sit on top of the caissons. The basement walls are cast-in-place concrete. The basement only exists in the south end of the main building (Area A). Construction of the foundation system started in the basement, continued to the north end of the main building and completed in the Early Childhood Development Center (ECDS).

Activity	Duration	Early Start	Early Finish
BASEMENT CAISSONS	5	13-Sep-06	19-Sep-06
FRP Basement Grade Beams & Caisson Caps	20	20-Sep-06	17-Oct-06
INSTALL AREA B CAISSONS	10	27-Sep-06	10-Oct-06
INSTALL AREA A CAISSONS	5	11-Oct-06	17-Oct-06
FRP Area A Grade Beams & Caisson Caps	10	18-Oct-06	31-Oct-06
ECDS INSTALL CAISSONS	5	18-Oct-06	24-Oct-06
FRP Area B Grade Beams & Caisson Caps	20	1-Nov-06	28-Nov-06
FRP ECDS Grade Beams & Caisson Caps	15	29-Nov-06	19-Dec-06

Structural

The steel erection starts in Area A's basement. The floors one thru three in Area B will be erected followed by floors two thru four in Area A. The fourth floor thru the roof in Area B will be erected next followed by the fifth floor and the roof in Area A. The floors will be erected this way due to the column splices. After the main building is erected the ECDS will begin. The bridge erection is dependant on when the city of Baltimore will allow W. North Avenue to be closed for one weekend.

Activity	Duration	Early Start	Early Finish
Erect Basement Struct. Steel	10	26-Jan-07	8-Feb-07
Erect Struct. Steel Area B 1st - 3rd flr.	10	9-Feb-07	22-Feb-07
Erect Struct. Steel Area A 2nd - 4th Flr.	10	23-Feb-07	8-Mar-07
Erect Struct. Steel Area B 4th - Roof	10	9-Mar-07	22-Mar-07
Erect Struct. Steel Area A 5th Flr. - Roof	10	23-Mar-07	5-Apr-07
Erect ECDS Structural Steel	15	4-May-07	24-May-07
Erect Pedestrian Bridge	10	4-May-07	17-May-07

Finishes

MEP coordination was completed with weekly team meetings using a light table. Once all of the major equipment is put into place finishes will

begin. Finishes will be completed floor by floor starting in Area A and moving to Area B and ending with the ECDS. The contractors will complete the finishes in the following order:

- Metal Studs
- MEP Rough-in
- Ceiling Grid
- Electrical and Lighting Fixtures
- Ceiling Tiles
- Gypsum Board
- Painting
- Floor Finishes (Carpet, Tile, etc.)
- Furniture



C. SITE LAYOUT PLANNING

The Site Layout Plan can be found in *Appendix B*.

The layout and logistics of the site have changed from the original plans. The townhouses located on the east side of Whitmore Avenue were to be demolished in April 2006. Unfortunately, the University has not been able to acquire these properties. This has restricted Barton Malow Company's on site storage as well as the lay-down and shake-out area. The crawler crane was originally planned to move up and down Whitmore Avenue erecting steel. The un-demolished houses have forced the crane to erect steel from the opposite side of the building. The crane will now travel along the west side of the building. The Site Layout Plan depicts the steel erection phase.

The three entrances to the site allows all entering trucks to make a loop within the site. This reduces congestion because the trucks do not need to turn around. All trucks enter the site on Whitmore Avenue and must pass the Barton Malow Company trailer. Wheel washes are located at the other two entrances for sediment control. Dumpsters are located near the entrances to allow for easy trash removal.



D. BUILDING ENVELOPE ASSEMBLIES ESTIMATE

The Assemblies Estimate was calculated using *RSMMeans Assemblies2006*. The areas for each material were calculated from the building elevations. These areas were then used to estimate the total price for each material including labor.

Assembly Estimate				
	QTY	Unit	Unit Price	Total
Masonry				
Main Building	32,732	SF	\$28.65	\$937,772
ECDS	4,312	SF	\$28.65	\$123,539
Metal Panels				
2" Metal Wall Panels	21,619	SF	\$5.36	\$115,878
Insulated Screen wall	2,023	SF	\$6.45	\$13,048
Metal Doors				
3'x8'	10	EA	\$1,425.00	\$14,250
4'x8'	4	EA	\$1,891.00	\$7,564
Glazing				
Building	25,621	SF	\$31.00	\$794,251
ECDS	941	SF	\$31.00	\$29,171
Roof				
Single Ply Membrane	147,890	SF	\$2.18	\$322,400
Total:				\$2,357,873

Masonry

All four elevations of the building and the ECDS have brick veneer on their exterior.

Assumptions:

- Standard Common Brick with 6" Backup Thickness and no Backup Core.
- 6" thick Concrete Block Backup
- Unit Price includes aluminum flashing, shelf angles, control joints, and sealant.

Metal Panels

Two types of metal panels were used for the exterior of the Health and Human Services Building. The panels are only located on the main building. The insulated screen wall is located on the roof to hide all mechanical equipment.

Assumptions:

- Metal Wall Panels: 26 Ga. .0179" thick, galvanized and finished
- Insulated Screen Wall: .032" thick, painted

Glazing

Both the ECDS and the main building have glazing on their exteriors.

Assumptions:

- Storefront and Curtain Wall square footage was combined
- Tubular Aluminum Framing with two intermediate horizontals

Roof

The roof system in the ECDS and main building are the same.

Assumptions:

- Asphalt Flood Coat with 4-Ply Organic Felt



E. DETAILED STRUCTURAL SYSTEMS ESTIMATE

Structural Estimate Summary	
Structural Component	Cost
Caissons	\$53,942
Grade Beams	\$730,099
W- Shapes	\$76,664
Skin Connection	\$294,174
Slabs	\$365,617
Total:	\$1,520,496

Foundations - Caissons & Grade Beams

A detailed foundation estimate is provided in *Appendix C*.

Assumptions:

- A Unit Price Cost for the grade beams was developed by combining formwork costs and concrete placement costs.
- A Unit Price for the caissons was developed by including drilling, placement, testing, and casing costs
- The cost of rebar is included in the unit price calculation.
- Caisson caps are included in the grade beam take-off.

Superstructure - Structural Steel

A detailed foundation estimate is provided in *Appendix D*.

Assumptions:

- A Unit Price Cost for each W-Shape was developed by averaging the cost of each of each different kind of web length. This was done to include shapes that were not listed in *RSMMeans 2006*.
- The Unit Price for the column was determined by averaging the unit price for all columns.
- The cost of the labor, crane rental and operator are included in the Unit Price.
- The Unit Price of the Skin Connection Angles were provided by Barton Malow Company
- All slab thicknesses are 3"
- The Unit Price for the slabs includes the metal decking.



F. GENERAL CONDITIONS ESTIMATE

General Conditions Summary

General Conditions Estimate Summary	
PERSONNEL	\$1,166,016
FIELD OFFICE SUPPORT	\$401,475
RELOCATION, TRAVEL & MEALS	\$31,600
TEMPORARY UTILITIES-TEMPORARY HEAT	\$67,950
TEMPORARY FACILITIES, FENCES AND BARRICADES	\$92,700
WEATHER PROTECTION	\$73,500
SAFETY AND SECURITY	\$129,600
CLEAN-UP	\$356,500
PROTECTION OF FINISHED AND EXISTING WORK	\$20,000
TOOLS AND EQUIPMENT	\$15,000
MATERIAL HANDLING AND HOISTS	\$20,000
CONSULTANT AND PROFESSIONAL SERVICES	\$53,000
MISCELLANEOUS	\$10,000
GRAND TOTAL	\$2,514,454

The table above, *General Conditions Estimate Summary*, depicts the cost for thirteen different categories. A more detailed estimate can be found in *Appendix E* on page __. The detailed estimate provides a description for each item in the category. Almost 50% of the General Condition Costs are from personnel. The next section *Staff Reimbursables* details the calculation for the cost of each project team member. All numbers in the General Conditions Estimate were compiled using current industry unit/cost data provided by Barton Malow Company.

Staff Reimbursables

The 94% of the Barton Malow Company Team's Labor is reimbursable and part of General Conditions. The other 6% is part of the project overhead. Throughout the project, project team members change the amount of time they have dedicated to the Coppin State University - Health and Human Services Building Project. The Project Executive only dedicates ten percent of his time per month to the Coppin State Project. A table outlining the percentage of time per month each team member spends on the project for all

29 months of the project can be found in *Appendix F* on page __. Below is a table (*Staff Reimbursables*) depicting the monthly rate of man hours and cost of each team member for each fiscal year (July-June). The table also shows which team members are reimbursable and non-reimbursable.

Staff Reimbursables											
Calendar Year	Rate/Month						Reimbursable		Non-Reimbursable		Labor
Month	FY06		FY07		FY08		Labor		Labor		Total
POSITION	\$	MH	\$	MH	\$	MH	\$	MH	\$	MH	\$
Project Executive	\$17,233	112	\$30,723	192	\$23,964	144	\$0	0	\$71,920	448	\$71,920
Project Manager	\$82,391	1,083	\$146,891	1,856	\$114,575	1,392	\$343,857	4,331	\$0	0	\$343,857
Field Superintendent	\$87,405	1,083	\$155,831	1,856	\$108,043	1,237	\$351,279	4,176	\$0	0	\$351,279
Project Engineer	\$39,515	1,086	\$70,450	1,861	\$36,634	931	\$146,599	3,877	\$0	0	\$146,599
Project Engineer	\$27,490	755	\$68,614	1,813	\$31,517	801	\$127,620	3,368	\$0	0	\$127,620
Document Control	\$22,519	1,083	\$40,149	1,856	\$27,837	1,237	\$90,505	4,176	\$0	0	\$90,505
Coordinated Dwg. Engineer	\$11,648	320	\$0	0	\$0	0	\$11,648	320	\$0	0	\$11,648
Field Accountant	\$6,115	168	\$10,903	288	\$9,449	240	\$26,467	696	\$0	0	\$26,467
Close-Out Engineer	\$227	6	\$943	25	\$23,037	585	\$24,207	616	\$0	0	\$24,207
Test Engineer	\$3,494	48	\$7,268	96	\$13,858	176	\$24,621	320	\$0	0	\$24,621
Commissioning Agent	\$0	0	\$0	0	\$19,213	488	\$19,213	488	\$0	0	\$19,213
Safety	\$1,248	16	\$2,596	32	\$1,350	16	\$0	0	\$5,194	64	\$5,194

Non-Reimbursable Total: \$77,114

Reimbursable Total: \$1,166,016

GRAND TOTAL: \$1,243,129



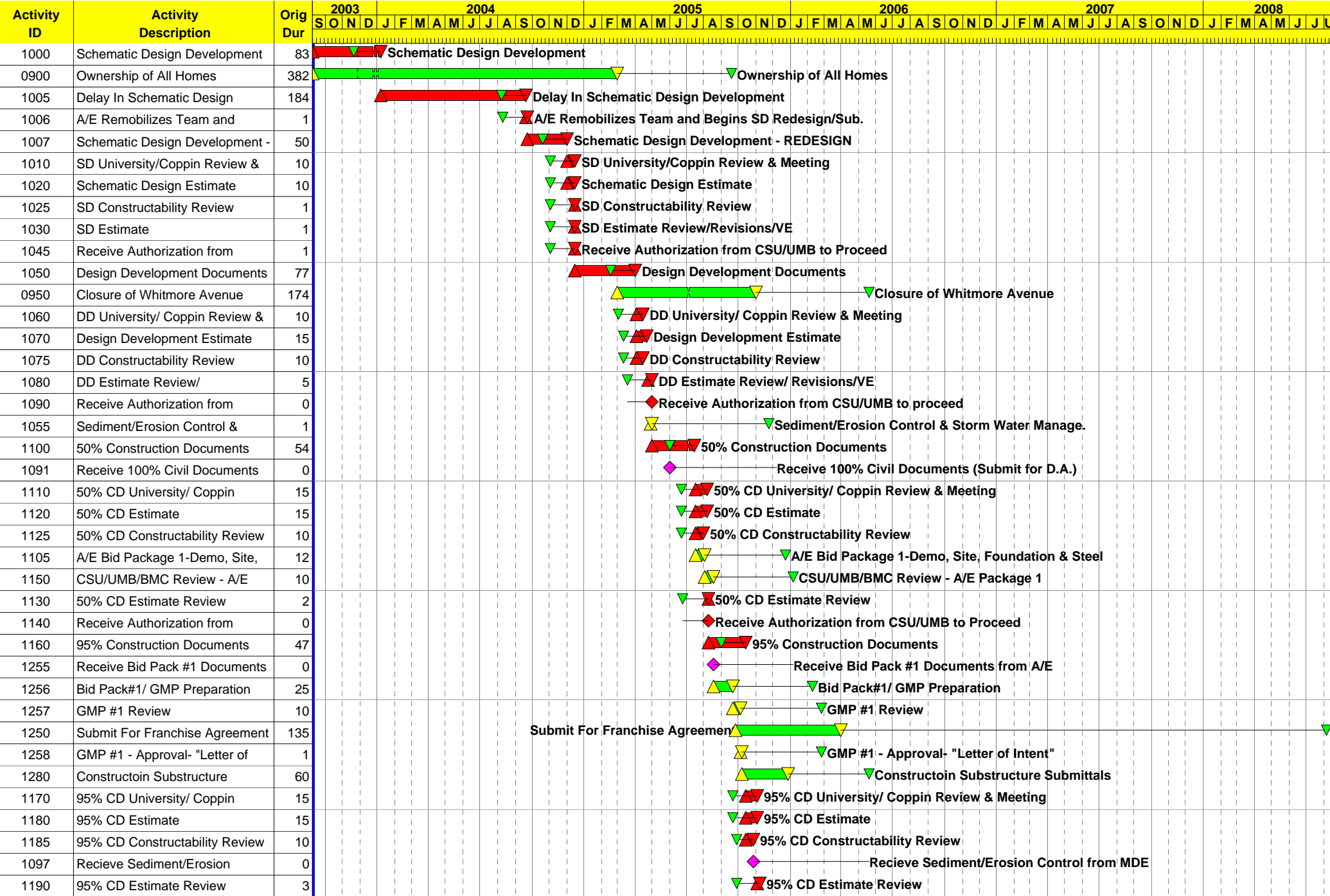
OPPIN STATE UNIVERSITY
HEALTH & HUMAN SERVICES BUILDING
BALTIMORE, MARYLAND



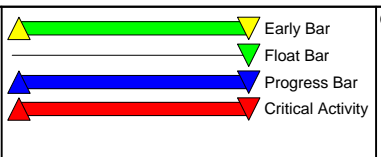
CORINNE AMBLER • CONSTRUCTION MANAGEMENT • ADVISOR: DR. HORMAN

APPENDIX A

Detailed Project Schedule



Start Date	09SEP03		Early Bar
Finish Date	06AUG08		Float Bar
Data Date	09SEP03		Progress Bar
Run Date	30OCT06 20:08		Critical Activity



CR12
 Barton Malow Company
 CSC Health & Human Service Building
 Classic Schedule Layout

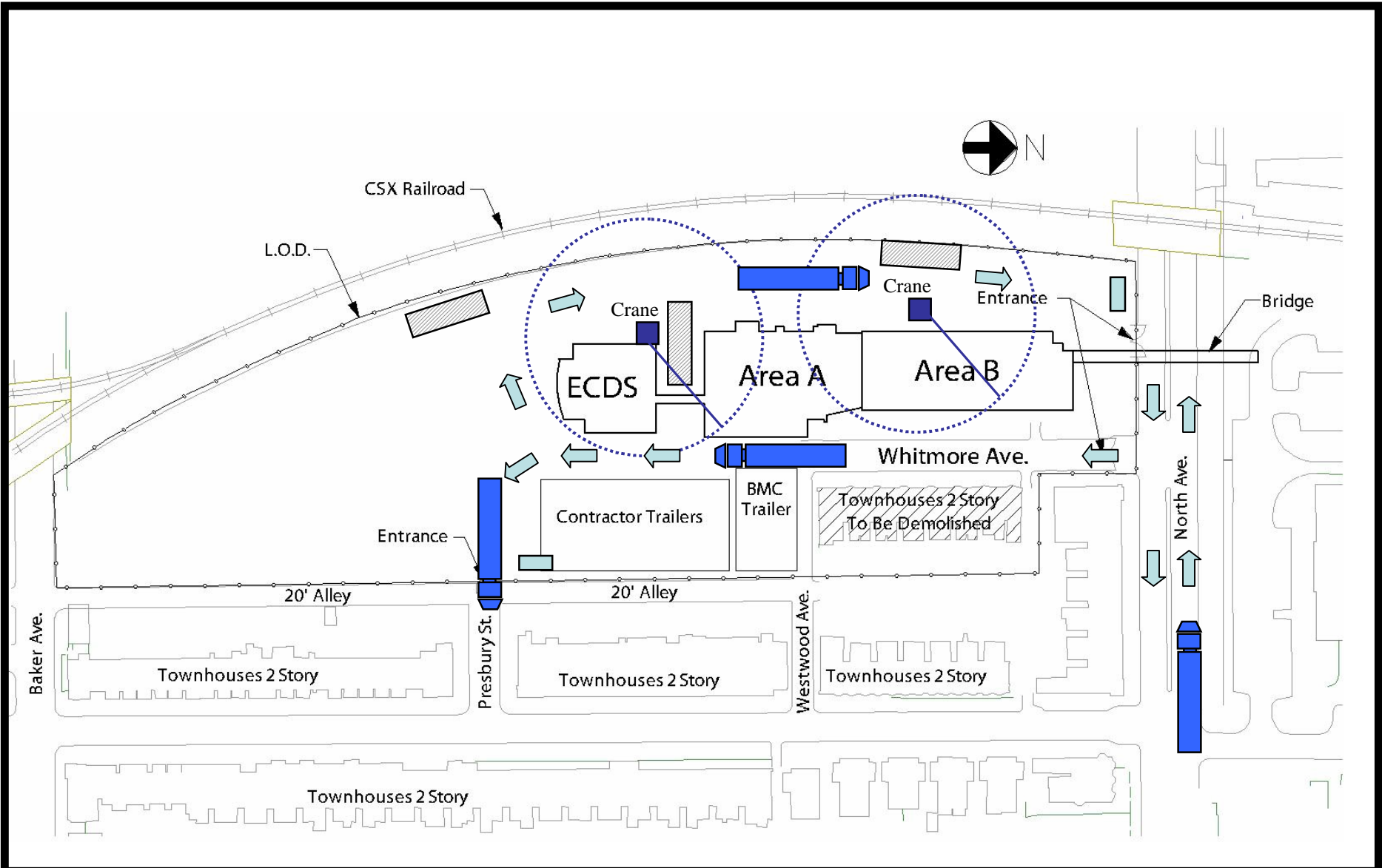
Sheet 1 of 5

Date	Revision	Checked	Approved






APPENDIX B

Site Layout Plan - Steel Erection Phase



Coppin State University
 Health and Human Services Building
 Structural Erection – Site Layout Plan

Steel Staging  Dumpster 
 Delivery Truck 

Note: Crane is a crawler crane and moves along entire west side of building



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APPENDIX C

Foundation Detailed Estimate Take-Off

Caissons

Caisson Number	Type	Diameter (feet)	Plan Bottom (feet)	Plan Top (feet)	Depth (feet)	Concrete (CY)	Unit Price (\$/CY)	Cost (\$)
F-6	C40	4	194.00	207.3333	13.33	6.21	\$987	6124,94212
F-7	C40	4	195.00	201	6.00	2.79	\$987	\$2,756.22
F-8	C40	4	196.00	207.3333	11.33	5.27	\$987	\$5,206.20
F-9	C40	4	190.00	203.8333	13.83	6.44	\$987	\$6,354.63
E-6	C40	4	190.00	204.3333	14.33	6.67	\$987	\$6,584.31
E-7	C40	4	195.00	204.3333	9.33	4.34	\$987	\$4,287.46
E-8	C40	4	196.00	199	3.00	1.40	\$987	\$1,378.11
E-9	C40	4	190.00	198.5	8.50	3.96	\$987	\$3,904.65
D-9	C40	4	197.00	205	8.00	3.72	\$987	\$3,674.97
C.8-5	TC40	4	185.00	204.3333	19.33	9.00	\$987	\$8,881.17
C.8-6	TC40	4	185.00	204.3333	19.33	9.00	\$987	\$8,881.17
C-5	TC40	4	185.00	204.3333	19.33	9.00	\$987	\$8,881.17
C-6	TC40	4	185.00	204.3333	19.33	9.00	\$987	\$8,881.17
C-7	C40	4	196.00	203.8333	7.83	3.65	\$987	\$3,598.40
B.9-8	C40	4	198.00	205.5	7.50	3.49	\$987	\$3,445.28
B.5-6	C40	4	193.00	204.3333	11.33	5.27	\$987	\$5,206.20
B.5-7	C40	4	196.00	204.3333	8.33	3.88	\$987	\$3,828.09
A-6	C40	4	193.00	203.3333	10.33	4.81	\$987	\$4,746.83
A-7	C40	4	196.00	203.3333	7.33	3.41	\$987	\$3,368.72
F-9.3	C30	3	194.00	204	10.00	2.62	\$987	\$2,583.96
F-10	TC40	4	193.00	219.6667	26.67	12.41	\$987	\$12,249.88
D.7-10	TC40	4	193.00	219.6667	26.67	12.41	\$987	\$12,249.88
D-10	C30	3	196.00	219.6667	23.67	6.20	\$987	\$6,115.37
B-10	C30	3	205.00	219.6667	14.67	3.84	\$987	\$3,789.81
F-5	C30	3	192.00	219	27.00	7.07	\$987	\$6,976.69
E-5	C30	3	192.00	219	27.00	7.07	\$987	\$6,976.69
B.5-5	C30	3	190.00	215.3333	25.33	6.63	\$987	\$6,546.03
A-5	C30	3	191.00	218.3333	27.33	7.16	\$987	\$7,062.82
B.5-8	C30	3	199.00	219.6667	20.67	5.41	\$987	\$5,340.18
A-8	C30	3	199.00	219	20.00	5.24	\$987	\$5,167.92
A-8.3	C30	3	199.00	219	20.00	5.24	\$987	\$5,167.92
AA-8.3	C30	3	202.00	219.6667	17.67	4.63	\$987	\$4,565.00
AA-9	C30	3	202.00	219.6667	17.67	4.63	\$987	\$4,565.00
A-9	C30	3	202.00	219.6667	17.67	4.63	\$987	\$4,565.00
A-9	C30	3	202.00	219.6667	17.67	4.63	\$987	\$4,565.00
C-9	C30	3	200.00	214.3333	14.33	3.75	\$987	\$3,703.68
F-11	C30	3	201.00	219.667	18.67	4.89	\$987	\$4,823.48
F-12	C30	3	202.00	225.667	23.67	6.20	\$987	\$6,115.46
F-13	C30	3	203.00	225.667	22.67	5.93	\$987	\$5,857.06
F-14	C30	3	204.00	225.667	21.67	5.67	\$987	\$5,598.67
F-15	C30	3	205.00	225.667	20.67	5.41	\$987	\$5,340.27
F-16	C30	3	206.00	224.333	18.33	4.80	\$987	\$4,737.17
F-16.4	C30	3	206.00	224.333	18.33	4.80	\$987	\$4,737.17
E.3-15.9	TC66	6.5	199.00	224.333	25.33	31.13	\$987	\$30,729.58
E.3-16.7	C30	3	208.00	224.333	16.33	4.28	\$987	\$4,220.38
E.3-17	C30	3	208.00	224.333	16.33	4.28	\$987	\$4,220.38
D.7-11	C30	3	200.00	226.333	26.33	6.89	\$987	\$6,804.34
D.7-12	C30	3	206.00	226.333	20.33	5.32	\$987	\$5,253.97
D.7-13	C30	3	206.00	226.333	20.33	5.32	\$987	\$5,253.97
D.7-14	C30	3	206.00	226.333	20.33	5.32	\$987	\$5,253.97
D.7-15	C30	3	208.00	226.333	18.33	4.80	\$987	\$4,737.17
D.7-15.9	TC66	6.5	199.00	224.333	25.33	31.13	\$987	\$30,729.58
D.7-17	C30	3	210.00	224.333	14.33	3.75	\$987	\$3,703.59
D-11	C30	3	200.00	226.333	26.33	6.89	\$987	\$6,804.34
D-12	C30	3	206.00	226.333	20.33	5.32	\$987	\$5,253.97
D-13	C30	3	206.00	226.333	20.33	5.32	\$987	\$5,253.97
D-13.5	TC40	4	202.00	226.333	24.33	11.33	\$987	\$11,177.87
D-14	TC40	4	202.00	226.333	24.33	11.33	\$987	\$11,177.87
D-15	C30	3	208.00	226.333	18.33	4.80	\$987	\$4,737.17
D-16	C30	3	204.00	226.333	22.33	5.85	\$987	\$5,770.76
D-17	C30	3	212.00	224.333	12.33	3.23	\$987	\$3,186.80
C.5-17.3	C30	3	214.00	225.667	11.67	3.05	\$987	\$3,014.71
Elevator-E	C30	3	214.00	222	8.00	2.09	\$987	\$2,067.17
Elevator-W	C30	3	212.00	222	10.00	2.62	\$987	\$2,583.96
C.3-10.7	TC40	4	198.00	222.667	24.67	11.48	\$987	\$11,331.30
C.3-11.3	TC40	4	202.00	222.667	20.67	9.62	\$987	\$9,493.81

Caissons

Caisson Number	Type	Diameter (feet)	Plan Bottom (feet)	Plan Top (feet)	Depth (feet)	Concrete (CY)	Unit Price (\$/CY)	Cost (\$)
B.3-17.3	C30	3	216.00	225.667	9.67	2.53	\$987	\$2,497.91
B-11	C30	3	208.00	218.667	10.67	2.79	\$987	\$2,756.31
B-12	C30	3	211.00	218.667	7.67	2.01	\$987	\$1,981.12
B-13	C30	3	212.00	220	8.00	2.09	\$987	\$2,067.17
B-14	C30	3	213.00	220	7.00	1.83	\$987	\$1,808.77
B-15	C30	3	214.00	222	8.00	2.09	\$987	\$2,067.17
B-16	C30	3	215.00	224.333	9.33	2.44	\$987	\$2,411.61
B-17	C30	3	216.00	224.333	8.33	2.18	\$987	\$2,153.21
E.5-1	C30	3	202.00	217	15.00	3.93	\$987	\$3,875.94
E.5-2	C40	4	202.00	217	15.00	6.98	\$987	\$6,890.56
E.5-3	C50	5	200.00	216.5	16.50	12.00	\$987	\$11,843.15
E.5-4	C46	4.5	198.00	215.5	17.50	10.31	\$987	\$10,174.34
E-1A	C30	3	203.00	217	14.00	3.67	\$987	\$3,617.54
E-1	C36	3.5	202.00	217	15.00	5.35	\$987	\$5,275.58
D.2-1A	C30	3	204.00	217	13.00	3.40	\$987	\$3,359.15
C.2-1A	C40	4	205.00	217	12.00	5.59	\$987	\$5,512.45
B.8-1	C40	4	204.00	217	13.00	6.05	\$987	\$5,971.82
B.8-2	C46	4.5	204.00	217	13.00	7.66	\$987	\$7,558.08
B.8-3	C46	4.5	203.00	217	14.00	8.25	\$987	\$8,139.47
B.8-4	C60	6	203.00	215.5	12.50	13.09	\$987	\$12,919.80
B.8-4.4	C26	2.5	207.00	217	10.00	1.82	\$987	\$1,794.42
B.8-4.6	C26	2.5	207.00	217	10.00	1.82	\$987	\$1,794.42
B.6-4.4	C26	2.5	207.00	217	10.00	1.82	\$987	\$1,794.42
B.6-4.6	C26	2.5	207.00	217	10.00	1.82	\$987	\$1,794.42
A.6-1A	C36	3.5	206.00	217	11.00	3.92	\$987	\$3,868.76
A.6-1	C40	4	207.00	217	10.00	4.65	\$987	\$4,593.71
A.6-2	C30	3	207.00	217	10.00	2.62	\$987	\$2,583.96
A.2-2	C50	5	207.00	217	10.00	7.27	\$987	\$7,177.67
A.2-3	C50	5	207.00	216.5	9.50	6.91	\$987	\$6,818.78
A.2-4	C40	4	207.00	216.5	9.50	4.42	\$987	\$4,364.02
A.1-1	C30	3	207.00	216	9.00	2.36	\$987	\$2,325.56

Total: **\$563,942**

Grade Beams

Grade Beam	Width (in)	Depth (in)	Length (feet)	Concrete (CY)	Unit Price (\$/CY)	Cost (\$)
GB-1	24	36	30	40	\$308	\$12,320
GB-1A	24	36	4	5.333333	\$308	\$1,643
GB-1B	24	36	5	6.666667	\$308	\$2,053
GB-2	24	36	30	40	\$308	\$12,320
GB-2A	24	36	4	5.333333	\$308	\$1,643
GB-3	20	42	30	38.88889	\$308	\$11,978
GB-3A	20	42	3	3.888889	\$308	\$1,198
GB-4	30	42	30	58.33333	\$308	\$17,967
GB-4A	30	42	3	5.833333	\$308	\$1,797
GB-5	20	42	30	38.88889	\$308	\$11,978
GB-5A	12	42	10	7.777778	\$308	\$2,396
GB-5B	16	64	3	4.740741	\$308	\$1,460
GB-6	20	64	45	88.88889	\$308	\$27,378
GB-7	20	64	30	59.25926	\$308	\$18,252
GB-7A	20	64	3	5.925926	\$308	\$1,825
GB-8	16	64	10	15.80247	\$308	\$4,867
GB-9	24	64	30	71.11111	\$308	\$21,902
GB-9A	24	64	5	11.85185	\$308	\$3,650
GB-10	30	64	30	88.88889	\$308	\$27,378
GB-11	16	64	15	23.7037	\$308	\$7,301
GB-12	20	36	65	72.22222	\$308	\$22,244
GB-13	20	36	34	37.77778	\$308	\$11,636
GB-14	20	36	30	33.33333	\$308	\$10,267
GB-15	20	36	44	48.88889	\$308	\$15,058
GB-16	20	36	24.5	27.22222	\$308	\$8,384
GB-17	20	36	120	133.3333	\$308	\$41,067
GB-18	20	36	28	31.11111	\$308	\$9,582
GB-19	20	36	11	12.22222	\$308	\$3,764
GB-20	20	36	30	33.33333	\$308	\$10,267
GB-21	20	36	30	33.33333	\$308	\$10,267
GB-22	20	36	30	33.33333	\$308	\$10,267
GB-23	20	36	30	33.33333	\$308	\$10,267
GB-24	20	36	30	33.33333	\$308	\$10,267
GB-25	20	36	27	30	\$308	\$9,240
GB-26	20	36	12	13.33333	\$308	\$4,107
GB-27	20	36	19	21.11111	\$308	\$6,502
GB-28	20	36	30	33.33333	\$308	\$10,267
GB-29	20	36	30	33.33333	\$308	\$10,267
GB-30	20	36	30	33.33333	\$308	\$10,267
GB-31	20	36	30	33.33333	\$308	\$10,267
GB-32	20	36	30	33.33333	\$308	\$10,267
GB-33	20	36	27	30	\$308	\$9,240
GB-34	20	36	30	33.33333	\$308	\$10,267
GB-35	12	52	40	38.51852	\$308	\$11,864
GB-35A	12	52	8	7.703704	\$308	\$2,373
GB-36	20	36	13	14.44444	\$308	\$4,449
GB-37	20	36	18	20	\$308	\$6,160
GB-38	20	52	27	43.33333	\$308	\$13,347
GB-39	20	36	21	23.33333	\$308	\$7,187
GB-39A	20	36	10	11.11111	\$308	\$3,422
GB-40	24	36	12	16	\$308	\$4,928
GB-41	20	36	19	21.11111	\$308	\$6,502
GB-42	20	36	19	21.11111	\$308	\$6,502
GB-43	16	36	30	26.66667	\$308	\$8,213
GB-44	16	36	21	18.66667	\$308	\$5,749
GB-45	24	36	28	37.33333	\$308	\$11,499
GB-46	20	36	21.5	23.88889	\$308	\$7,358
GB-47	20	36	11	12.22222	\$308	\$3,764
GB-48	20	36	11	12.22222	\$308	\$3,764
GB-49	24	36	31	41.33333	\$308	\$12,731
GB-50	32	36	21	37.33333	\$308	\$11,499
GB-51	32	36	42	74.66667	\$308	\$22,997
GB-52	16	36	20	17.77778	\$308	\$5,476
GB-53	20	36	20	22.22222	\$308	\$6,844
GB-54	20	36	20	22.22222	\$308	\$6,844
GB-55	20	36	20	22.22222	\$308	\$6,844

Grade Beams						
Grade Beam	Width (in)	Depth (in)	Length (feet)	Concrete (CY)	Unit Price (\$/CY)	Cost (\$)
GB-56	20	36	30	33.33333	\$308	\$10,267
GB-57	20	36	30	33.33333	\$308	\$10,267
GB-58	20	36	30	33.33333	\$308	\$10,267
GB-59	20	36	30	33.33333	\$308	\$10,267
GB-60	24	36	21	28	\$308	\$8,624
GB-61	24	36	21	28	\$308	\$8,624
GB-62	24	36	13	17.33333	\$308	\$5,339
GB-63	24	36	62	82.66667	\$308	\$25,461
GB-64	24	36	13	17.33333	\$308	\$5,339

Total: \$730,099



OPPIN STATE UNIVERSITY
HEALTH & HUMAN SERVICES BUILDING
BALTIMORE, MARYLAND



CORINNE AMBLER • CONSTRUCTION MANAGEMENT • ADVISOR: DR. HORMAN

APPENDIX D

Superstructure Detailed Estimate Take-Off

First Floor Beams				
Beam Size	Length (LF)	Total (TON)	Unit Price (\$/TON)	Cost (\$)
W16x 26	330	4.29	\$416	\$1,784.64
W21x 50	241.5	6.0375	\$984	\$5,940.90
W8x 10	54	0.27	\$360	\$97.20
W18x 40	33.5	0.67	\$496	\$332.32
W21x 44	136	2.992	\$984	\$2,944.13
W27x 84	180	7.56	\$1,096	\$8,285.76
W24x 68	30	1.02	\$1,128	\$1,150.56
W21x 50	30	0.75	\$984	\$738.00
W30x 99	30	1.485	\$1,264	\$1,877.04

Total: **\$23,151**

ECDS Beams				
Beam Size	Length (LF)	Total (TON)	Unit Price (\$/TON)	Cost (\$)
W24x 55	263	7.2325	\$1,128	\$8,158.26
W14x 43	37	0.7955	\$376	\$299.11
W14x 26	48	0.624	\$376	\$234.62
W18x 35	138	2.415	\$496	\$1,197.84
W14x 30	88	1.32	\$376	\$496.32
W12x 14	76	0.532	\$504	\$268.13
W8x 18	52	0.468	\$360	\$168.48
W14x 43	36	0.774	\$376	\$291.02

Total: **\$11,114**

All Columns				
Beam Size	Length (LF)	Total (TON)	Unit Price (\$/TON)	Cost (\$)
W12x 65	205.31	6.673	\$1,344	\$8,968
W12x 72	344.66	12.408	\$1,344	\$16,676
W10x 54	161.33	4.356	\$1,344	\$5,854
W12x 45	88	1.980	\$1,344	\$2,661
W10x 39	58.66	1.144	\$1,344	\$1,537
W10x 68	146.65	4.986	\$1,344	\$6,701
W10x 49	178	4.361	\$1,344	\$5,861
W10x 33	58.67	0.968	\$1,344	\$1,301
W12x 87	58.67	2.552	\$1,344	\$3,430
W10x 60	29.33	0.880	\$1,344	\$1,183
W12x 50	29.33	0.733	\$1,344	\$985
W10x 77	117.33	4.517	\$1,344	\$6,071
W10x 88	154	6.776	\$1,344	\$9,107
W8x 58	58.67	1.701	\$1,344	\$2,287
W8x 48	117.35	2.816	\$1,344	\$3,785
W12x 79	176	6.952	\$1,344	\$9,343
W10x 60	29.33	0.880	\$1,344	\$1,183
W8x 35	29.33	0.513	\$1,344	\$690
W10x 54	29.33	0.792	\$1,344	\$1,064
W10x 45	14.67	0.330	\$1,344	\$444
W12x 96	95.33	4.576	\$1,344	\$6,150
W12x 53	88	2.332	\$1,344	\$3,134
W12x 152	29.33	2.229	\$1,344	\$2,996
W12x 106	80.67	4.276	\$1,344	\$5,746
W8x 28	14.67	0.205	\$1,344	\$276
W12x 120	36.67	2.200	\$1,344	\$2,957
W14x 176	29.33	2.581	\$1,344	\$3,469

Total: **\$113,861**

Second thru Fifth Floor Beams				
Beam Size	Length (LF)	Total (TON)	Unit Price (\$/TON)	Cost (\$)
W18x 40	598	11.96	\$496	\$5,932
W8X 10	328	1.64	\$360	\$590
W10x 22	37	0.407	\$312	\$205
W12x 16	37	0.296	\$504	\$324
W27x 84	37	1.554	\$1,096	\$783
W12x 19	37	0.3515	\$504	\$146
W16x 26	49	0.637	\$416	\$627
W21x 44	904	19.888	\$984	\$25,138
W30x 99	29	1.4355	\$1,264	\$1,413
W21x 30	24	0.36	\$984	\$395
W27x 84	438	18.396	\$1,096	\$39,735
W36x 135	29	1.9575	\$2,160	\$814
W16x 26	64	0.832	\$416	\$260
W10x 12	27	0.162	\$312	\$80
W18x 40	168	3.36	\$496	\$1,398
W16x 36	13	0.234	\$416	\$118
W12x 19	13	0.1235	\$504	\$62
W12x 14	42	0.294	\$504	\$322
W27x 94	192	9.024	\$1,096	\$11,406
W30x 99	84	4.158	\$1,264	\$4,690
W24x 68	78	2.652	\$1,264	\$2,610
W24x 55	218	5.995	\$1,128	\$2,254
W21x 50	243	6.075	\$984	\$7,679
W14x 22	317	3.487	\$376	\$1,730
W30x 99	116	5.742	\$1,264	\$2,848
W18x 35	124	2.17	\$496	\$2,743
W30x 116	192	11.136	\$1,264	\$14,076
W30x 108	30	1.62	\$1,264	\$2,048
W30x 90	30	1.35	\$1,264	\$1,706
W33X 18	38	0.342	\$1,344	\$460

Total: **\$132,593**

W- Shape Grand Total: \$678,496

Skin Connection			
Item	QTY (TON)	Unit Price (\$/TON)	Cost (\$)
Skin Connector Angles	59	\$4,986	\$294,174

Slabs				
Item	Area (SQFT)	Total (CY)	Unit Price (\$/CY)	Cost (\$)
Slab on Grade	147890	1,369.35	\$36	\$49,297
Slab on Deck	813395	7,531.44	\$42	\$316,320

Total: **\$365,617**



APPENDIX E

General Conditions Detailed Estimate

General Conditions Estimate Break-Down				
DESCRIPTION	QTY	UNIT	PRICE	AMOUNT
FIELD OFFICE SUPPORT				
Office Trailer Rental	27	MO	\$850	\$22,950
Office Space or Trailer Setup	1	LS	\$10,000	\$10,000
Maintain Field Office	27	MO	\$300	\$8,100
Security Systems	27	MO	\$200	\$5,400
Office Cleaning	27	MO	\$500	\$13,500
Radios/Nextel's	27	MO	\$400	\$10,800
Electric Usage - Trailers and Office	27	MO	\$2,500	\$67,500
Water Usage - Trailers and Office	27	MO	\$75	\$2,025
Sewer Hookup/Removal - Trailers and Office	1	LS	\$15,000	\$15,000
Telephone/Network Setup	1	LS	\$23,500	\$23,500
Telephone Monthly Costs	27	MO	\$1,000	\$27,000
Office Furniture/Furnishings	1	LS	\$8,000	\$8,000
Fax Machines/Supplies	1	LS	\$5,000	\$5,000
Office and Miscellaneous Supplies	27	MO	\$900	\$24,300
Copier/Supplies	27	MO	\$500	\$13,500
Photocopying Out-sourced	27	MO	\$200	\$5,400
Engineering Supplies	1	LS	\$2,500	\$2,500
Cameras/Film and Processing	1	LS	\$5,000	\$5,000
Drawing Reproduction	1	LS	\$50,000	\$50,000
Computers/Printers	1	LS	\$35,000	\$35,000
Software (Company Approved CMS, Sched.)	1	LS	\$20,000	\$20,000
Postage/Overnight Express	27	MO	\$1,000	\$27,000
SUB-TOTAL FIELD OFFICE SUPPORT				\$401,475
RELOCATION, TRAVEL & MEALS				
Local Travel-Field Personnel	27	MO	\$150	\$4,050
Out-of-Town Travel	1	LS	\$10,000	\$10,000
On-site work vehicle (Superintendent)	27	MO	\$500	\$13,500
Business Meals/Working Lunches	27	MO	\$150	\$4,050
SUB-TOTAL RELOCATION, TRAVEL & MEALS				\$31,600
TEMPORARY UTILITIES-TEMPORARY HEAT				
Maintenance of Perm. System	1	LS	\$20,000	\$20,000
Temporary Water & Sewer Hookup	1	LS	\$25,000	\$25,000
Temporary Water & Sewer Usage	27	MO	\$250	\$6,750
Temporary Electric Usage	27	MO	\$600	\$16,200
SUB-TOTAL TEMPORARY UTILITIES-TEMPORARY HEAT				\$67,950
TEMPORARY FACILITIES, FENCES AND BARRICADES				
Temporary Toilets/Port-a-johns	27	MO	\$1,300	\$35,100
Temporary Fence	1	LS	\$30,000	\$30,000
Barricades	1	LS	\$25,000	\$25,000
Temporary Rail	1	LS	\$20,000	\$20,000
Temporary Roads	1	LS	\$35,000	\$35,000
Job Signs	1	LS	\$5,000	\$5,000
Temporary Parking/Bus Services	1	LS	\$40,000	\$40,000
Drinking Water	27	MO	\$100	\$2,700
Temporary Ladder & Stairs	1	LS	\$5,000	\$5,000
Dust Control, Road Maintenance	1	LS	\$5,000	\$5,000
SUB-TOTAL-TEMPORARY FACILITIES, FENCES AND BARRICADES				\$92,700

WEATHER PROTECTION				
Snow Removal	1	LS	\$10,000	\$10,000
Weather Protection Enclosures	1	LS	\$40,000	\$40,000
Pumping/Dewatering	1	LS	\$10,000	\$10,000
Erosion Control	27	MO	\$500	\$13,500
SUB-TOTAL-WEATHER PROTECTION				\$73,500
SAFETY AND SECURITY				
Watchman-Security Service	27	MO	\$4,000	\$108,000
Guard Shacks	1	LS	\$2,500	\$2,500
Safety Incentives	112	WK	\$50	\$5,600
Extinguishers	1	LS	\$5,000	\$5,000
First Air Kit	1	LS	\$2,500	\$2,500
Hard Hats and Rain Gear	1	LS	\$3,000	\$3,000
Safety Signs	1	LS	\$3,000	\$3,000
SUB-TOTAL-SAFETY AND SECURITY				\$129,600
CLEAN-UP				
Clean-up Foreman	27	LS	\$5,000	\$135,000
Periodic Clean-up	27	LS	\$2,500	\$67,500
Final Clean-up	1	LS	\$30,000	\$30,000
Dumpsters	250	LS	\$350	\$87,500
Rubbish chutes-install/maintain/remove	1	LS	\$35,000	\$35,000
Dump carts	1	LS	\$1,500	\$1,500
SUB-TOTAL-CLEAN-UP				\$356,500
PROTECTION OF FINISHED AND EXISTING WORK				
Protect Finished Work	1	LS	\$15,000	\$15,000
Elevator Protection-Cabs and Jambs	1	LS	\$5,000	\$5,000
SUB-TOTAL-PROTECTION OF FINISHED AND EXISTING WORK				\$20,000
TOOLS AND EQUIPMENT				
Small Tools	1	LS	\$11,000	\$11,000
Miscellaneous Equipment	1	LS	\$4,000	\$4,000
SUB-TOTAL-TOOLS AND EQUIPMENT				\$15,000
MATERIAL HANDLING AND HOISTS				
Temporary Elevator Cabs	1	LS	\$10,000	\$10,000
Hoist Operators	1	LS	\$10,000	\$10,000
SUB-TOTAL-MATERIAL HANDLING AND HOISTS				\$20,000
CONSULTANT AND PROFESSIONAL SERVICES				
Minority Affairs - MBE Outreach	1	LS	\$3,000	\$3,000
Surveyors	1	LS	\$50,000	\$50,000
SUB-TOTAL-CONSULTANT AND PROFESSIONAL SERVICES				\$53,000
MISCELLANEOUS				
Ceremony Expenses	1	LS	\$10,000	\$10,000
SUB-TOTAL-MISCELLANEOUS				\$10,000
GRAND TOTAL				\$1,271,325



APPENDIX F

Staff Reimbursables - Detailed Estimate of the Cost of Man Hours

Staff Reimbursables																														
Calendar Year	2006													2007										2008						
Month	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	
POSITION																														
Project Executive	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	5%	5%
Project Manager	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	50%	50%
Field Superintendent	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0%	0%
Project Engineer	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	50%	50%	50%	50%	0%	0%
Project Engineer	100%	50%	50%	50%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	10%	10%	10%	10%	0%	0%
Document Control	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0%	0%
Coordinated Dwg. Engineer	0%	50%	50%	50%	50%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Field Accountant	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Close-Out Engineer	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%	5%	0%	0%	0%	5%	0%	0%	0%	10%	0%	10%	0%	20%	20%	20%	100%	100%	100%	100%	100%
Test Engineer	0%	10%	0%	10%	0%	10%	0%	10%	0%	10%	0%	10%	0%	10%	0%	10%	0%	10%	0%	0%	10%	0%	20%	20%	20%	20%	20%	20%	0%	0%
Commissioning Agent	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	35%	90%	90%	90%	0%	0%	
Safety	0%	0%	5%	0%	0%	5%	0%	0%	5%	0%	0%	5%	0%	0%	0%	5%	0%	0%	5%	0%	0%	5%	0%	5%	0%	0%	0%	0%	0%	0%

Staff Reimbursable											
Calendar Year	Rate/Month						Reimbursable		Non-Reimbursable		Labor
Month	FY06		FY07		FY08		Labor		Labor		Total
POSITION	\$	MH	\$	MH	\$	MH	\$	MH	\$	MH	\$
Project Executive	\$17,233	112	\$30,723	192	\$23,964	144	\$0	0	\$71,920	448	\$71,920
Project Manager	\$82,391	1,083	\$146,891	1,856	\$114,575	1,392	\$343,857	4,331	\$0	0	\$343,857
Field Superintendent	\$87,405	1,083	\$155,831	1,856	\$108,043	1,237	\$351,279	4,176	\$0	0	\$351,279
Project Engineer	\$39,515	1,086	\$70,450	1,861	\$36,634	931	\$146,599	3,877	\$0	0	\$146,599
Project Engineer	\$27,490	755	\$68,614	1,813	\$31,517	801	\$127,620	3,368	\$0	0	\$127,620
Document Control	\$22,519	1,083	\$40,149	1,856	\$27,837	1,237	\$90,505	4,176	\$0	0	\$90,505
Coordinated Dwg. Engineer	\$11,648	320	\$0	0	\$0	0	\$11,648	320	\$0	0	\$11,648
Field Accountant	\$6,115	168	\$10,903	288	\$9,449	240	\$26,467	696	\$0	0	\$26,467
Close-Out Engineer	\$227	6	\$943	25	\$23,037	585	\$24,207	616	\$0	0	\$24,207
Test Engineer	\$3,494	48	\$7,268	96	\$13,858	176	\$24,621	320	\$0	0	\$24,621
Commissioning Agent	\$0	0	\$0	0	\$19,213	488	\$19,213	488	\$0	0	\$19,213
Safety	\$1,248	16	\$2,596	32	\$1,350	16	\$0	0	\$5,194	64	\$5,194

Non-Reimbursable Total: \$77,114

Reimbursable Total: \$1,166,016

GRAND TOTAL : \$1,243,129