



EXISTING CONSTRUCTION CONDITIONS

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OPPIN STATE UNIVERSITY

HEALTH & HUMAN SERVICES BUILDING
BALTIMORE, MARYLAND



CORINNE AMBLER • CONSTRUCTION MANAGEMENT • ADVISOR: DR. HORMAN

A. Executive Summary

The Health and Human Services Building at Coppin State University, located at 2500 W. North Avenue in Baltimore Maryland, is the first building of many to be located on the future south campus. The University's campus currently exists only on the north side of W. North Avenue. The building houses many different academic programs. It will be the new home for the Divisions of Graduate Studies, Nursing, Criminal Justice, Social Work, Applied Psychology and Rehabilitation Counseling. Coppin State University prides itself in incorporating various community outreach and clinical programs into the College and its curriculum. Spaces dedicated to the community outreach and clinical programs are integrated into the academic facility.

This document is intended to provide a background of the existing conditions under which this building is constructed. The assignment will provide an analysis and summarization of the project schedule, a description of each of the building systems, and cost evaluation. The cost of the building is broken down into the construction cost and total building cost and then estimated using D4Cost 2002 and R.S. Means.

In accordance with Maryland State Regulations, The University of Maryland, Baltimore coordinates the design and construction of this building for Coppin State University. The University of Maryland, Baltimore has hired Barton Malow Company as the construction manager at -risk with a soft GMP contract. Design Collective Inc is responsible for the design of the building. The project began construction in January 2006 and is scheduled to be completed in June 2008. An in depth look at the building systems describes the architecture as well as the structural, mechanical, electrical and lighting systems of the building. The cost of the building is currently \$48.6 million. The D4Cost Estimate produced a cost of \$32 million. The significant difference in price can be contributed to a number of reasons discussed in detail in part D. Project Cost Evaluation.



B. Project Schedule Summary

The one page schedule can be found in Appendix A.

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. 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).

Structural

The steel erection system divides the building into three sections. As mentioned above in the foundation summary, the south end of the main building with the basement is considered 'Area A', the north end of the main building is considered 'Area B' and the Early Childhood Development Center referred to as ECDS. Floors one through three will be erected in Area A, followed by floors one through three in Area B. The remaining fourth and fifth floors will be completed in a similar matter by completing Area A and then Area B. The ECDS is the last part of the building to be completed.

Finishes

MEP coordination was completed with weekly team meetings using a light table. Once all of the major units are put into place finishes will begin. Finishes will be sequenced in the same manner as the steel was erected. The contractors will complete the finishes in the following order:

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



C. Building Systems Summary

Work Scope	Yes	No
Demolition Required?	X	
Structural Steel Frame	X	
Cast in Place Concrete	X	
Pre-cast Concrete		X
Mechanical System	X	
Electrical System	X	
Masonry	X	
Curtain Wall	X	
Support Excavation	X	

Demolition

Before construction of the new Health and Human Services Building could begin, some demolition had to occur. Fifteen two-story row houses needed to be demolished. The state required that a retaining pond be placed in the south end of the site to help with storm water management.

Structural Steel

The structural system for the Health and Human Services Building is primarily ASTM A992 Structural Steel with composite metal decking. The metal decking carries a 3" 3500psi reinforced lightweight concrete slab.

Cast in Place Concrete

The foundation is the part of the building that is cast in place concrete. The caissons were drilled and then poured using removable casing as the formwork. The grade beams and elevator pits were formed using the earth as the formwork and cast in place. The foundation walls of the basement were formed using vertical formwork.

Mechanical System

All mechanical equipment is located on the roof or in the basement of the building. Two 1200 GPM 400ton cooling towers are on the roof of the building with

Existing Conditions

seven air handling units ranging from 12000 to 28000 CFM. There is also an eighth 1500 CFM air handling unit for make-up air in the kitchen located on the first floor. Two 6700MBH natural gas fired boilers are in the basement with two 400 ton chillers. The VAV boxes throughout the building are equipped with reheat coils. The distribution system is that of a supply duct and an open air return plenum. There are transfer ducts for non-critical spaces, such as storage, closets and hallways. Climate control is regulated by thermostats. Baseboard heating exists throughout the building. The fire suppression system is both wet and dry and there is a 750 GPM 125HP Motor wet pipe system.

Electrical System

The building ties into the north campus by running the lines underneath the overhead pedestrian bridge that crosses North Avenue. The service is 3000A with a 3-Phase 4-wire system. It runs at 480/277 Volts. All panel and switchboards are located in the basement of the building. There is a 400kW emergency back-up generator.

Building Exterior – Masonry & Curtain Wall

The building exterior consists of glazed aluminum curtain wall and storefront, brick face veneer in masonry cavity wall construction, cast stone panels and pre-finished insulated metal wall panels, exposed flashings and copings. Two different metal wall type panels exist with 2" insulated panels. All panels, copings and flashings are pre-finished to match a custom color. The face brick is a running bond accented with stack bond window jambs and cast stone headers, sills and copings. The roof-top equipment is screened by a pre-finished insulated metal-panel screen wall. Structural tube framing supports the screen wall vertically.

The feature wall at the Early Childhood Demonstration Suite is constructed of segmented glazed aluminum curtain wall accented with insulated art-glass units of varying colors and textures. Generally, throughout the building, large vertical spans of curtain wall are braced by steel tube framing behind to limit the depth of units to 7-1/2". All curtain wall and storefront are factory finished to match a custom color.

Support Excavation

Sheathing and shoring was used to support excavation for the basement that exists in the south end of the main building. Tie backs and soldier beams were used on two of the four sides (north and east) of the basement to hold back 20 feet of earth. A ramp existed on the south side for access to the excavation and the other side was sloped in accordance with OSHA standards.



D. Project Cost Evaluation

Building Cost

The project was bid out to subcontractors in three separate bid packages. When construction began in January 2006 the cost of the building was \$41.95 million since then the cost has inflated to \$48.6 million. This means that at the current time the construction cost of the building is \$324/SF. The building system costs for each bid category are listed below:

Building System Costs	
Excavation and Grading	\$3,272,000
Demolition	\$63,290
Deep Foundations	\$400,750
Concrete (building)	\$3,031,600
Structural Steel	\$3,618,375
Spray Fireproofing	\$168,000
Elevators	\$734,685
Final Sitework (includes sidewalk concrete)	\$899,383
Landscaping	\$276,316
Masonry	\$2,505,700
Misc. Metals	\$484,018
Carpentry & Millwork	\$690,014
Metal Panels	\$1,256,700
Roofing	\$320,655
Doors, Frames, Hardware and General Trades	\$1,601,600
Glass Systems	\$2,902,720
Partitions and Ceilings	\$3,315,470
Ceramic Tile	\$126,652
Terrazzo	\$229,610
Carpet & Resilient Flooring	\$442,286
Painting and Coating	\$317,560
Lab Casework	\$171,240
Fire Protection	\$487,200
Mechanical	\$9,799,140
Electrical	\$4,850,146

Coppin State University Estimates the project will cost \$56 million or \$373/SF. This includes the cost of land and permits.

D4Cost Estimate

It was difficult to prepare a cost estimate in D4Cost 2002 due to the diversity of the building. Although the building is considered to be academic, it houses many things other than classrooms. The average cost of four buildings that are as similar as D4Cost 2002 can allow, produced a building cost of \$32 million. The print out estimate can be found in Appendix B. A comparison between D4Cost Estimate and the Building Cost can be found on the following page.

Square Foot Estimate

The square foot estimate turned out to be very challenging due to the fact that the building has many different functions. I combined data from a One-Story College Laboratory, Two to Three Story Office Building, and Three Story College Classroom. For all Estimates the entire building's square footage was used to find the price per square foot and then just the square footage of that area was multiplied. RSMMeans 2006 Square Foot Costs 27th Annual Edition used as reference.

College Classroom 3-Story

150,000 SF Unit Price = \$137.20/SF
Estimated SF of Classroom = 82,000SF
Unit Price Basement = \$27.60/SF
Estimated SF of Basement = 10,500SF
One Hydraulic Elevator #3500 pounds/2-Stops = \$56,000 each

$$\$137.20/\text{SF} \times 82,000\text{SF} = \$11.25 \text{ million}$$

$$\$27.60/\text{SF} \times 10,500\text{SF} = \$290,000$$

$$1 \times \$56,000 = \$56,000$$

$$\text{Total Cost} = \$11.6 \text{ million}$$

College Laboratory 1-Story

150,000 SF Unit Price = \$123.05/SF (determined by extrapolating)
Estimated SF of Laboratory= 30,000SF

$$\$123.05/\text{SF} \times 30,000\text{SF} = \$3.69 \text{ million}$$

$$\text{Total Cost} = \$3.69 \text{ million}$$

Office, 2- 3 Story

150,000 SF Unit Price = \$106.47/SF (determined by extrapolating)
Estimated SF of Laboratory= 38,000SF

$$\$106.47/\text{SF} \times 38,000\text{SF} = \$4.05 \text{ million}$$

$$\text{Total Cost} = \$4.05 \text{ million}$$

Additional Elevators

One Electric Geared Traction Elevator 3500 pounds /5-Stops = \$120,300 each

One Electric Geared Traction Elevator 5000 pounds /6-Stops = \$127,300 each

2 x \$120,300 = \$240,600

1 x \$127,300 = \$127,300

Total Cost = **\$367,900**

Grand Total = \$19.7 million

= \$131/SF

Estimate Comparison

The estimated costs provided by D4Cost 2002 and RS Means 2006 are significantly lower than the building cost. RS Means 2006 estimate's inaccuracy can be contributed to the difficulty of combining multiple building types to try to create a similar building. The square foot estimate of the Building Cost is almost two and a half times greater than the RS Means 2006 estimate. Below is a table comparing the Building Cost and the D4Cost 2002 estimate. The D4Cost 2002 estimate is almost \$13 million dollars lower than the Building Cost.

Building System Costs Comparison			
	Amount Bid	D4Cost	Difference
Sitework	\$4,447,699	\$1,115,778	\$3,331,921
Demolition	\$63,290	\$0	\$63,290
Concrete	\$3,432,350	\$3,633,564	(\$201,214)
Masonry	\$2,505,700	\$1,041,169	\$1,464,531
Metals	\$4,270,393	\$1,539,028	\$2,731,365
Wood & Plastics	\$690,014	\$560,807	\$129,207
Thermal & Moisture Protection	\$4,480,075	\$756,673	\$3,723,402
Doors & Windows	\$1,601,600	\$1,275,564	\$326,036
Finishes	\$4,602,818	\$3,412,454	\$1,190,364
Conveying Systems	\$734,685	\$362,760	\$371,925
Mechanical	\$10,286,340	\$8,674,175	\$1,612,165
Electrical	\$4,850,146	\$4,052,907	\$797,239
Specialties, Equipment, Furnishings	\$0	\$2,632,503	(\$2,632,503)
	\$41,965,110	\$29,057,382	\$12,907,728



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APPENDIX A

One Page Schedule Summary

Activity ID	Activity Description	Orig Dur	Rem Dur	%	Early Start	Early Finish	Total Float	2003												2004												2005												2006												2007												2008											
Owner Property Acquisition																																																																															
+ Schematic Design																																																																															
		556	556	0	09SEP03	31OCT05	12																																																																								
Pre-Construction																																																																															
+ Schematic Design																																																																															
		329	329	0	09SEP03	15DEC04	0																																																																								
+ Design Development																																																																															
		119	119	0	16DEC04	31MAY05	2																																																																								
+ 50% Construction Documents																																																																															
		239	239	0	02MAY05	31MAR06	212																																																																								
+ 95% Construction Documents																																																																															
		65	65	0	10AUG05	08NOV05	17																																																																								
+ 100% Construction Documents																																																																															
		139	139	0	17AUG05	27FEB06	17																																																																								
Construction																																																																															
+ Submittal Phase																																																																															
		153	153	0	06OCT05	08MAY06	17																																																																								
Construction																																																																															
1269	GMP #1-Notice to Proceed to Start Construction	0	0	0	17NOV05		0																																																																								
1270	Mobilize to Job Site	10	10	0	17NOV05	30NOV05	0																																																																								
1335	Fabrication/ Deliver Steel	80	80	0	17NOV05	08MAR06	0																																																																								
1300	Install Sediment & Erosion Controls	5	5	0	24NOV05	30NOV05	0																																																																								
1310	Abandon and New Utilities	30	30	0	01DEC05	11JAN06	0																																																																								
1315	Hazmat Abatement/ Site Demolition	20	20	0	15DEC05	11JAN06	0																																																																								
1320	Mass Excavation/ Earth Retention System	20	20	0	12JAN06	08FEB06	0																																																																								
1330	Foundations & Abutments	35	35	0	26JAN06	15MAR06	0																																																																								
1340	Structure	60	60	0	09MAR06	31MAY06	0																																																																								
1360	Pedestrian Bridge	140	140	0	03APR06	16OCT06	212																																																																								
1345	Concrete Topping Slab	15	15	0	18MAY06	07JUN06	5																																																																								
1350	MEP Rough-In	140	140	0	01JUN06	14DEC06	0																																																																								
1370	Building Enclosure	120	120	0	01JUN06	16NOV06	0																																																																								
1380	Interiors Rough-in	120	120	0	17NOV06	07MAY07	0																																																																								
1390	Roofing	30	30	0	17NOV06	29DEC06	189																																																																								
1400	Conveying Systems	100	100	0	02JAN07	21MAY07	189																																																																								
1410	Interior Finishes	220	220	0	27FEB07	03JAN08	0																																																																								
1420	Final Site Work ("Hardscape")	30	30	0	22MAY07	02JUL07	189																																																																								
1440	Landscaping	20	20	0	03JUL07	31JUL07	189																																																																								
1430	Commissioning	79	79	0	04JAN08	23APR08	0																																																																								

GMP #1-Notice to Proceed to Start Construction
 Mobilize to Job Site
 Fabrication/ Deliver Steel
 Install Sediment & Erosion Controls
 Abandon and New Utilities
 Hazmat Abatement/ Site Demolition
 Mass Excavation/ Earth Retention System
 Foundations & Abutments
 Structure
 Pedestrian Bridge
 Concrete Topping Slab
 MEP Rough-In
 Building Enclosure
 Interiors Rough-in
 Roofing
 Conveying Systems
 Interior Finishes
 Final Site Work ("Hardscape")
 Landscaping
 Commissioning

Start Date 09SEP03
 Finish Date 23APR08
 Data Date 09SEP03
 Run Date 05OCT06 14:49

Early Bar
 Float Bar
 Progress Bar
 Critical Activity

CORI
 Barton Malow Company
 CSC Health & Human Service Building

Sheet 1 of 1

Date	Revision	Checked	Approved



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APPENDIX B

D4Cost 2002 Estimate

Estimate of Probable Cost for CSU - HHSB

CSU - HHSB - Jan 2006 - MD - Baltimore

Prepared By: Corrine Ambler
 Penn State University
 528 West Beaver Ave
 State College, PA 16801
 Fax: 150000
 Building Sq. Size:
 Bid Date:
 No. of floors: 5
 No. of buildings:
 Project Height:
 1st Floor Height:
 1st Floor Size:

Prepared For: Dr. Michael Horman
 Penn State University
 University Park, PA 16801
 Fax: 248292
 Building use: Educational
 Foundation: CAI
 Exterior Walls: CUR
 Interior Walls: GYP
 Roof Type: CON
 Floor Type: CON
 Project Type: NEW

Division		Percent	Sq. Cost	Amount
00	Bidding Requirements	4.03	8.59	1,288,473
	Bidding Requirements	4.03	8.59	1,288,473
01	General Requirements	4.91	10.47	1,570,318
	General Requirements	4.91	10.47	1,570,318
02	Site Work	3.49	7.44	1,115,778
	Site Work	3.49	7.44	1,115,778
03	Concrete	11.35	24.22	3,633,564
	Concrete	11.35	24.22	3,633,564
04	Masonry	3.25	6.94	1,041,169
	Masonry	3.25	6.94	1,041,169
05	Metals	4.81	10.26	1,539,028
	Metals	4.81	10.26	1,539,028
06	Wood & Plastics	1.75	3.74	560,807
	Wood & Plastics	1.75	3.74	560,807
07	Thermal & Moisture Protection	2.36	5.04	756,673
	Thermal & Moisture Protection	2.36	5.04	756,673
08	Doors & Windows	3.99	8.50	1,275,564
	Doors & Windows	3.99	8.50	1,275,564
09	Finishes	10.66	22.75	3,412,454
	Finishes	10.66	22.75	3,412,454
10	Specialties	0.93	1.99	298,116
	Specialties	0.93	1.99	298,116
11	Equipment	6.30	13.44	2,015,958
	Equipment	6.30	13.44	2,015,958
12	Furnishings	0.99	2.12	318,429
	Furnishings	0.99	2.12	318,429
13	Special Construction	0.28	0.59	88,502
	Special Construction	0.28	0.59	88,502
14	Conveying Systems	1.13	2.42	362,760
	Conveying Systems	1.13	2.42	362,760
15	Mechanical	27.10	57.83	8,674,175
	Mechanical	27.10	57.83	8,674,175
16	Electrical	12.66	27.02	4,052,907
	Electrical	12.66	27.02	4,052,907
Total Building Costs		100.00	213.36	32,004,676
Total Site Costs		100.00	0.00	0
Total Project Costs		--	--	32,004,676