

I. Executive Summary

The following report contains detailed information regarding alternative systems and methods for the construction of the BCDC Expansion project. Included within this report are construction site logistics, temporary utilities, a detailed structural estimate, a general conditions estimate, a detailed project schedule and a cash flow curve.

The site layout for construction was broken down into four phases; excavation, foundation/garage construction, housing/administration construction and the finished phase. Each of these phases required changes in the site layout to maximize productivity and eliminate field conflicts.

Electrical and heating are two of the temporary utilities required for the construction of the BCDC Expansion. The structure will need to have electrical power for the tower crane and for the temporary lighting requirements. Heating systems are required to heat the areas of concrete pours to the required 50°C.

A detailed structural estimate was created within this report for an overall total of \$8,757,223. This value was calculated by dividing the estimate into three categories; C.I.P. concrete, pre-cast concrete and structural steel. All unit prices for the structural estimate was gathered from R.S. Means 2004 and construction professionals.

The estimated general conditions cost for the three year BCDC project was \$1,189,414. The general conditions cost for the construction manager is covered by the County. Monthly the County will pay approximately \$50,539. All other GC cost were incorporated within the bids of each of the contractors.

Each of the estimates as well as the cash flow curve were based on the dates that were determined in the detailed schedule. The project started in March 2002 and should be completed in April 2005. These dates include all design, preconstruction, value engineering delays and construction activities.

The cash flow curve was also formulated to provide the owner with the estimated cost per month. The cost was relatively level for the entire project with a peak at the beginning of the project for the first three bid packages and at the end for retention payback. The typical monthly cost for the project was between \$1,000,000 and \$3,000,000.





II. Site Layout Planning

This section shows the phased construction of the BCDC Expansion project during the excavation, superstructure erection and project completion.

Phase 1: Excavation Site Plan

The excavation phase of the BCDC Expansion includes all utility relocation, demolition and excavation work. Below in figure 1 is a brief summarization of the dates in which this phase took place.

Approximate Start Date	Approximate Finish Date
June 10, 2002	August 02, 2002
June 10, 2002	June 14, 2002
June 07, 2002	September 26, 2002
	June 10, 2002 June 10, 2002

Figure 1: Summarized Timetable for Excavation Phase

The excavation, foundation and garage portions of this project were fast-tracked for political reasons. The first three bid packages were released and bid in March 2002; several months before the 100% contract document were completed.

Upon completing the demolition and utility relocation of the items shown within the required excavated area of figure 3 the actual excavation began. First soldier piles were driven approximately 20 feet apart around the perimeter of the soon to be excavated area. The excavation was done in five foot increments. Every five feet the lagging system would be installed as the tiebacks were drilled and tensioned. Tiebacks were used for a majority of the retaining system excluding the southeast side of the site where there were existing buildings adjacent and temporary rakers were used. Since three levels of the BCDC are to be below grade the soldier pile and lagging system was engineered to become part of the permanent exterior walls once rebar and shotcrete were applied.

On the right is a photograph looking north of the actual excavation in progress. The overall layout of the site was efficient. There were two mobile cranes in use along with a team of loaders, dozers and backhoes. There was an occasional issue with entering/exiting the site due to the limited entrances/exits but there were no alternatives to improve this condition due to the elevation changes and the heavy traffic on the adjacent streets.



Figure 2: Excavation in progress Dec. 2002





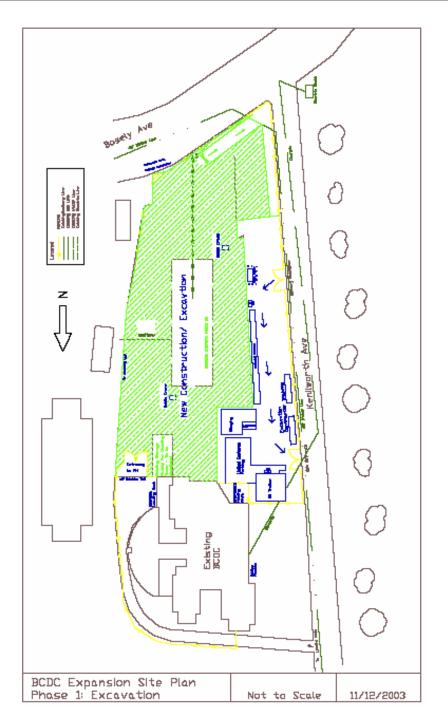


Figure 3: Phase 1 Site Plan (larger PDF file available on webpage)







Phase 2: Foundations & Garage Structure

Once the site work contractor had completed excavation the concrete contractor began pouring the concrete footings. The footings were excavated and poured from the south to the north side of the site. The footings on the south side of the site were poured first so that the garage concrete could be started immediately. The table below in figure 4 shows a timetable of this phase of the project.

Activity	Approximate Start Date	Approximate Finish Date
Foundations	September 20, 2002	October 17, 2002
Garage – Level 1	October 11, 2002	October 24, 2002
Garage – Level 2 & 2M	October 31, 2002	December 25, 2002
Garage – Level 3	December 24, 2002	January 07, 2003

Figure 4: Summarized Timetable for the Foundation/Garage Phase

Once the garage was under construction the project was slowed down by the owner for a value engineering process because several of the bids came in over the estimated value. This phase was also extended due to poor weather; primarily rain and snow.

The garage was divided into six sections for a concrete construction sequence. The sequence is shown on the next page in figure 6. In each section on each level the columns and walls were formed, reinforced and poured. Then the slabs were formed, reinforced and poured. The garage concrete bid package included that all MEP & security work within the garage was to be roughed-in by the concrete contractor. Thus there would be minimal coring issues later in the project.

There were not many problems with this phase of the construction. The concrete contractor was the only contractor on site and had unlimited space for storage and rebar staging. This was also the only activity the crane was being used for thus productivity was at its maximum potential.

Phase 3: Housing & Administration Structures

As the garage neared substantial completion the housing and administration areas began construction. The table in figure 5 shows a summarized timetable of the construction in this phase.

Activity	Approximate Start Date	Approximate Finish Date
C.I.P. Concrete - Housing	February 25, 2003	April 28, 2003
Structural Steel - Admin. Area	May 20, 2003	June 25, 2003
Pre-Cast – Housing Area	May 13, 2003	July 14, 2003

Figure 5: Summarized Timetable for Housing/Admin. Phase





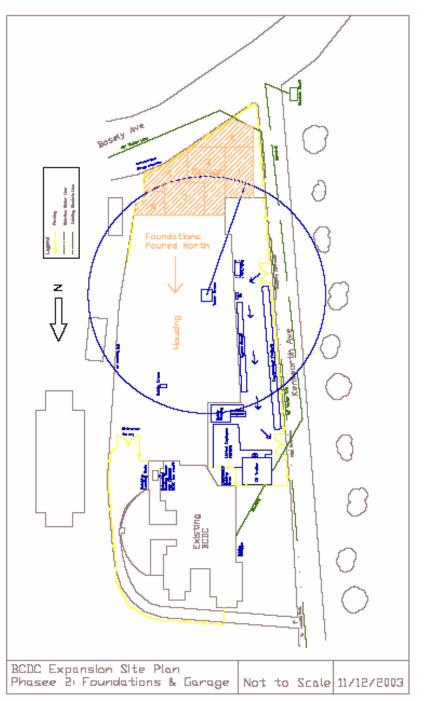


Figure 6: Phase 2 Site Plan (larger PDF file available on webpage)





The first level of the housing area is C.I.P. concrete and the above six levels are pre-cast modular units. Since the concrete contractor was first on site the housing structural sequence was set by the concrete sequence. This sequence is shown on the next page in figure 7. Construction began in the southwest corner and proceeded to the northeast corner of the structure. The tower crane was left in place until the pre-cast erection began at which point the pre-cast contractor provided a different erection method.

The pre-cast concrete modular units were erected at a plant in Telford, PA. The units were delivered to site daily as needed. One problem with this system is that there is to be no construction or deliveries to site before 7:30 a.m. or after 4:30 p.m. If the trucks arrived outside of those times they would have to wait to make the delivery. The County assisted in providing a delivery truck staging area one block away that the trucks could sit and wait to make their delivery.

Another future problem with the pre-cast units onsite will be erection. The limited site space will require a mini-deck crane to place the pre-cast units. Coordination between the concrete contractor and pre-cast contractor will be imperative to ensure the constructability/erectability of the pre-cast units.

The administration area composed of the structural steel was erected from the east to the west using the tower crane. The steel was delivered and staged on top of the finished garage. The steel package is relatively small so erection should proceed without conflict.

Phase 4: Finish Phase Site Plan

The final phase of the project is shown below in figure 8. This layout shows the access to the newly constructed building. This layout was in place for all interior installations. The MEP & security contractors (MEPS) stored all materials in the garage area. The sequence of the MEPS followed the same sequence shown in figure 7. Once demolition and the final clean up occurred the site was accessed regularly as shown in figure 8.





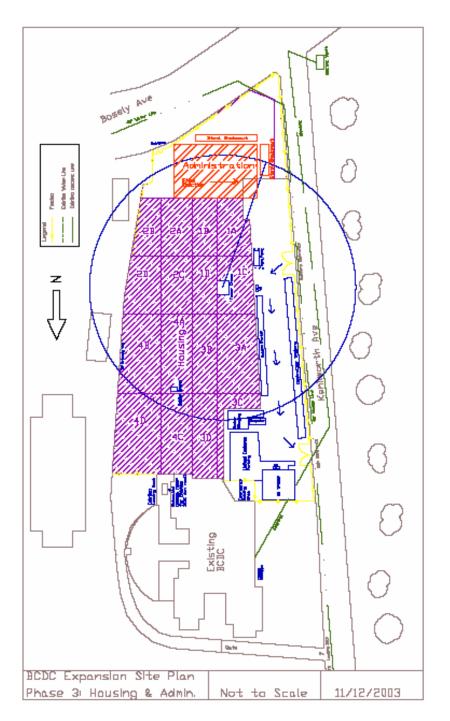


Figure 7: Phase 3 Site Plan (larger PDF file available on webpage)





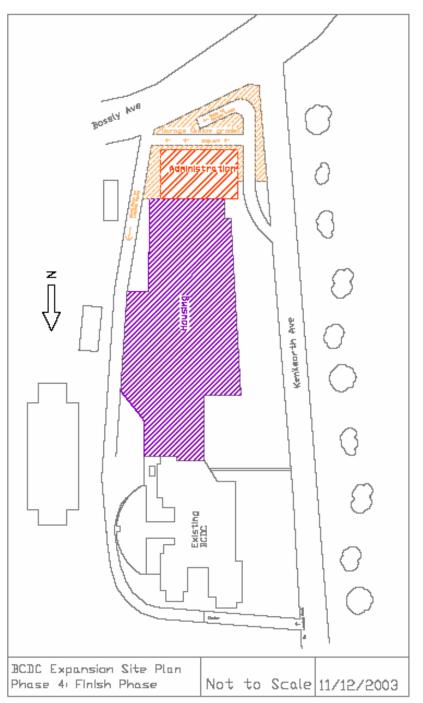


Figure 8: Phase 4 Site Plan (larger PDF file available on webpage)





III. Temporary Utilities

In order to perform various construction activities there are different requirements for temporary utilities such as electrical power, lighting, ventilation, heating and cooling. These requirements are typically detailed in specification section 1500. The temporary utilities were installed early in the project within bid packages #1-3. For the BCDC project two main concerns were the electrical service for the erection of the structure and proper heating for the concrete elements.

Electrical Power/Lighting

The erection of the structure required electrical power mainly for the temporary lighting and the tower crane. The temporary electrical power was supplied by an electrical vault located across from the site. The power supplied was a 1200A, 120/280V, 3 phase temporary distribution panel. The distribution panel was located as close to the crane as possible for minimal wiring. The tower crane itself required electrical power for operation but the specification also required a temporary lighting system that fulfilled security and protection requirements without the operation of the full system.

Heating

The structure was mainly composed of CIP concrete and pre-cast concrete. Concrete is required to be poured and cured at a minimum of 50°C. The temperature requirements will be achieved by using vented, self-contained, liquid-propane-gas or fuel heaters with individual space thermostatic control.

The CIP concrete within the garage was poured in the winter below 50°C. The concrete was specially design with admixtures for these conditions and poured in insulated formwork to ensure the concrete quality. The adjustments due to the temperature were not an issue because the weather was expected and measures were taken within the bid to cover the extra cost.

Concrete is just one element that requires a minimal temperature at time if application. Many of the finishes and grout within the interior structure will also require heating.

IV. Detailed Structural System Estimate

A detailed structural estimate was performed for the BCDC expansion using R.S. Means Building Construction 2004. The estimate was divided into three main categories C.I.P.





concrete, pre-cast concrete and structural steel. All calculations do not include overhead or profit.

C.I.P. concrete

The C.I.P concrete estimate includes the foundations, garage concrete, level one housing concrete and the slab on grade. The following assumptions were made for this portion of the structural estimate:

- 1) Foundations
 - a. Excavate Footings- Assume concrete and excavation CY the same; \$37.50/ CY added to the labor for each footing
 - b. Concrete strength was 3000psi
 - c. Poured in Earth no cost formwork
 - d. Reinforcing was assumed to be 0.052 ton per footing. This added \$27.88/ CY to the material unit price per footing and \$15.44/CY to the labor unit price per footing.
 - e. Direct Chute, over 5 CY add \$10.35/CY for labor cost per footing and \$0.54/CY for equipment per footing
 - f. Strap beams were not accounted for
- 2) Garage
 - a. Each type of shear wall has the same dimensions
 - b. All elevations of all walls equal on every floor
 - c. Columns all 10 feet column sizes to fit unit prices given in Means
 - d. Elevated slab assume reinforcing 0.043 ton/ 1 SF of slab
- 3) Housing-Level 1
 - a. Columns assumed to be 14 feet
 - b. All beams and transfer girders assumed to be one averaged size
- 4) Slab on Grade
 - a. Assume average depth of slab 1-'6", cost as 15" thick
 - b. Formwork is negligible
 - c. Reinforcing, welded wire fabric 4 x 4, 61lb/CSF

The cost difference between the estimated value and the contract value is in the concrete accessories that were not included in the estimate. The cost of box-out labor, dovetails, embeds and filler compose a relatively large portion of the CIP concrete bid package but are not accounted for in the estimate. There was also rough-in work within the concrete bid package that will account for some of the cost difference.





					Labor		Materials		Equipment		
Description	Number	Quanity Ea.	Units	Total Quanity	U/P	Cost	U/P	Cost	U/P	Cost	Total Cost
4"-0" × 4"-0" 1"-2"	e	0.69	сγ	2.07	63.29	131.01	100.38	207.79	0.54	1.12	\$339.91
6'-0' × 6'-0' × 1'-8'	11	2.22	ç	24.42	63.29	1545.54	100.38	2451.28	0.54	13.19	\$4,010.01
6'-0' × 12'-0' × 3'-2'	5	8.44	ç	42.20		2670.84	100.38	4236.04	0.54		\$6,929.66
7'-0' × 7'-0' × 2'-0'	13	3.63	ç	47.19	63.29	2996.06	100.38		0.54	25.48	
7'-0' × 10'-0' × 2'-8'	4	6.91	ç	27.64	63.29	1749.34	100.38	2774.50	0.54		\$4,538.76
7'-6' × 7'-6' × 2'-2'	5	4.51	ç	22.55	63.29	1427.19	100.38	2263.57	0.54	12.18	
8'-0' × 8'-0' × 2'-2'	14	5.14	ç		63.29	4554.35	100.38		0.54	38.86	\$11,816.55
8"-6" × 8"-6"× 2"-4"	12	6.24	ç	74.88	63.29	4739.16	100.38	7516.45	0.54	40.44	\$12,296.04
9'-0' × 9'-0' × 2' -6'	22	7.50	ç	165.00	63.29	10442.85	100.38	16562.70	0.54	89.10	\$27,094.65
10'-0' × 10'-0'' × 2' -0'	5	7.41	ç		63.29	937.96	100.38	1487.63			\$2,433.59
10'-6' × 10'-6'' × 2' -10''	10	11.57	ç	115.70		7322.65	100.38	11613.97		62.48	
11'-0' × 11'-0'' × 2'-0''	2	8.96	ç	17.92		1134.16	100.38		0.54	9.68	
11'-0' × 11'-0'' × 2'-10'	9	12.70	ç	76.20	63.29	I .	100.38		0.54		
11'-6'×11'-6' × 3'-0'	7	14.69	ç	102.83			-		0.54	55,53	
12'-0'' × 12'-0'' × 3'-2''	12		ç	202.68		-	-	64	0.54	-	\$33,282.08
13'-0'' × 13'-0'' × 3'-4''	2	20.86	ς	41.72	63.29	2640.46	100.38		0.54	22.53	\$6,850.84
15'-0' × 15'-0'' × 3'-8''	4				63.29	12:96:11	100.38		0.54		
12'-6'' x 12'-6'' x 3'-2''	6		ς	164.97	63.29	10440.95		16559.69	0.54	89.08	\$27,089.72
14'-0'' × 14'-0'' × 3'-6''	9		ςΥ	152.46	63.29	9649.19	100.38	15303.93	0.54	82.33	\$25,035.46
17-0" × 17-0" × 4"-2"	10	44.60	ς	446.00	63.29	28227.34	100.38	44769.48	0.54	240.84	\$73,237.66
,											\$317,820.24
Garage											
					Labor		Materials		Equipment		
Description	Number	Quanity Ea.	Units 7	Total Quanity	U/P	Cost	U/P	Cost	U/P	Cost	Total Cost
Shear Walls											
SW-113' × 10' × 10'	24	4.01	ς		164	-		-		-	29704.48
SW-2 24" × 10" × 10"	4			29.64			126	3734.64	Ļ	u)	9148.39
SW-4 40' × 10' × 8'	33				1	7143.24	-				
SW-5 50' × 10' × 10"	5	-			-	12660.8	-		,		
SW-6 32' × 10' × 10"	e				164	4860.96	-		`		
SW-7 56" × 10" × 10"	5	17.28		86.40	-	-	-	108.86.4			26667.36
SW-8 36" × 10" × 10"	2	11.12	ç		164	9118.4	128		18.65	1036 94	

Figure 9a: C.I.P Structural Estimate (pg 1)

C.I. P. Concrete



Erin Sharkey CM Option BCDC Expansion Towson, Maryland Consultant: D. Riley



456

22

úúú

SW-9 60' × 10' × 10"	2	5 18.52	ç	92.60	164	15186.4	126	11667.6	18.65	1726.99	28580.9	0.99
SW-10 26' × 10' × 10'	2	5 8.02	ç	40.10	164	6576.4	126	5052.6	18.65	747.865	12376.8	6.87
SW-11 16' × 10' × 10"	24	4.94	, C√	118.56	164	19443.8	126	14938.56	18.65	2211.144	36593.5	3.54
SW-12 4' × 10' × 10'		3 1.24	°.		164	610.08				69.378		8.18
Add 10% for gang forms						110414		84025.32			19443.9	3.94
Columns												
12' × 24''	9	6 0.74	ς	4.44	655	2908.2	310	1376.4	73.5	326.34	4610.9	0.94
20'×20'	20	1.03	δ	20.60	655	13493	310	63.96	73.5	1514.1	21393.	3.10
24" × 24"	134	1.48	ζ	-	410	81311.2	197	39069.04	46	9122.72	129502.9	2.96
20' Φ	3	9 0.81	ç	7.29	276	2012.04	295	2150.55	31	225.99	4368.5	8.58
24" ¢	18	3 1.16	ςΥ	20.88	245	5115.6		6117.84	27.5	574.2	11807.64	7.64
Elevated Slabs												
Level 2 28,892 SF x 9" slab	-	802.6	ç	802.60	3.75	3009.75	2.55	2046.63	0.28	224.728	5281.	1.11
Level 2M 28,339 SF x 9" slab	-	787.2	ς	787.20	3.75	2952	2.55	2007.36	0.28	220.416	5179.7	9.78
Level 3 28,339 SF x 9' slab	-	787.2	ç	787.20	3.75		2.55	2007.36	0.28	220.416	5179.	9.78
Reinforcing for slabs		3 500	Ton	1500.00	410	615000	605	907500			1522500.0	0.00
											\$1,538,140.66	0.66
										-		[
Dousing												
					Labor		Materials		Equipment			
Description	Number	Quanity Ea.	Units	Total Quanity	U/P	Cost	UVP	Cost	U/P	Cost	Total Cost	
Housing Shear Walls												
HSW-1 38' x 18' x 8'	-	16.89	Cγ	16.89	241	4070.49	158	2068.62	25.5	430.695	7169.80	805
HSW-2 38' x 20' x 10'	-	23.46	ç	23.46	-	64 3847.44	126	2955.96	18.65	437.529	7240.92	829
HSW-3 18' × 14' × 10'	-	7.78	γ	7.78	164	1275.92	126	980.28	18.65	145.097	2401.29	297
HSW-4 26" × 19" × 10"		15.24	cγ	15.24	-	64 2499.36	126	1920.24	18.65	284.226	4703.826	826
HSW-5 20' × 15' × 8'	-	7.41	ç		241	1785.81		1170.78	25.5	188.955	3145	545
HSW-6 40" × 16.5 × 8"	-	16.30	ς	16.30	241	3928.3	158	2575.4	25.5	415.65	691	6919.35

Figure 9b: CIP Structural Estimate (pg 2)





HSW-16 28' × 19' × 8'	-	13.14	ç	13.14	241	3166.74	158	2076.12	25.5	335.07	5577.93
HSW-17 142' × 14' × 10'	-	61.36	ç		164	10063	126	7731.36	18.65	1144.364	18938.764
HSW-18 50' × 18' × 8'	-	22.22	ç	22.22	241	5355.02	158	3510.76			9432,39
HSW-19 8' × 14' × 8'	-	2.77	ç		241	667.57	158	437.66	25.5		1175.865
HSW-20 16' x 18' x 8'	-	7.12	ç	7.12	241	1715.92	158	1124.96		181.56	3022.44
HSW-21 8' × 19' × 8'	-	3.75	ç	3.75		903.75	158	592.5		95.625	1591.875
Add 10% for Gang forms						79768.1		55166.46			13493.46
Columns											
8" x 16"	-	0.46	ç	0.46	655	301.3	310	142.6	73.5	33.81	477.71
14" × 14"	4	0.71	ç	2.84	655	1860.2	310	880.4	73.5	208.74	2949.34
16''×16'	42	0.92	ç	38.64	410	15842.4	197	7612.08	8	1777.44	25231.92
16'' x 22''	-	1.27	ç	1.27	410	520.7		250.19	8	58.42	829.31
16''×24''	17	1.38	ç	23.46	375	8797.5	258			Ű	-
16' x 36'	2	2.07	ç	4,14	375	1552.5		1068.12	42		2794.5
20' × 20'	80	1.44	ç	11.52	375	4320		2972.16	42	483.84	7776
24" × 24"	21	2.07	ς	43.47	375	16301.3	258	11215.26	42	1	29342.25
24" × 28"	13	2.42	ç	31.46	375	11797.5	258		42	1	21235.5
24"×32"	4	2.77	ç	11.08	375	4155		2858.64	42		7479
8" Φ	9	0.18	ç	1.08	435	469.8		340.2	49		26:298
12° Φ	2	0.41	ç	0.82	435	356.7			49		655.18
16° Φ	18	0.72	ς	12.96	345			4147.2			
22' Φ	12	1.37	ç	-		4537.44	295	4849.8		509.64	
24" Φ	0	1.63	ç	3.26	245	798.7	293	955.18	27.5	89.65	1843.53
32' Φ	2	2.9	ς	5.80	177	1026.6		1467.4	19.9	115.42	2609.42
Beams											
12" × 24" × 30"	113	2.22	сY	250.86	425	106616	233	58450.38	48	12041.28	177107.16
Transfer Girders											
28'' × 44'' × 40'	88	12.88	ς	850.08	355	301778	214	181917.1	40	340 03.2	517698.72
											\$990,818.42
sog											
					Labor		Materials		Equipment		
Description	Number	Quanity Ea.	Units	Total Quanity	U/P	Cost	UVP	Cost	U/P	Cost	Total Cost
SOG, w/o forms or reinforcing, over 10,000 SF	over 10,00	0 SF			0.86		3.64		0.01		
Reinforcing											
77,672 GSF, 15" thick	-	4315.11	ç	4315.11		22.86 98643.4		23.64 102009.2	0.01	43.1511	\$200,695.77

ERIN SHARKEY CM OPTION

BCDC EXPANSION TOWSON, MARYLAND CONSULTANT: D. RILEY

TOTAL \$3,047,475.09

Figure 9c: CIP Structural Estimate (pg3)





Pre-cast Concrete

The housing area of the BCDC Expansion is composed of pre-cast concrete modular units. These units are supplied by OldCastle Pre-Cast Modular Units. To calculate an accurate estimate for the pre-cast I contacted the BCDC project manager from OldCastle and requested an approximate cell/dormitory unit price. These were the numbers used to estimate the cost of pre-cast for the structural estimate.

Pre-Cast Concrete Modular Units

Description	Quanity	Unit	Unit Price	Total
Cells	84	Each	38,750	3,255,000
Dormitories	92	Each	46,000	4,232,000
				\$7,487,000

TOTAL \$7,487,000

Figure	10:	Pre-cast	Structural	Estimate

The cost will not match the pre-cast bid package exactly because the BP includes embeds and attached fixtures. This contract was also design/build so the overhead and profit will drive the contracted value higher.

Structural Steel

The structural steel estimate included the steel columns, beams, metal decking in the administration area and the roof joist within the administration portion of the structure. The following assumptions were made:

1) Columns

a. Assumed the T.O.S for level 3 was 406' at all locations

2) Beams

a. Drawings with beam dimensions not available assumed tonnage of the calculated columns and beams were equal.

3) Metal Decking

a. Assumed metal decking SF equivalent to GSF for administration and housing

4) Roof Joista. Roof foist are space evenly every 12'





The difference between the actual cost of the steel contract and the estimated cost shown in figure 11 can be accounted for by the miscellaneous metals that were included within the steel bid package but not this estimate.

Columns														
			—											
Description	Number	Length	Ib/f	t	Quanity	/	Units	;						
W 8 x 24	13	3 .	12	24			Ton							
W 8 x 31	1	1 1	12	31	0.1	19	Ton							
W10 x 33		2 :	30	33	0.9	99	Ton							
W10 x 33	3		.5	33			Ton							
W10 x 33	-	5 12	2.5	33	1.0	33	Ton							
W10 x 39	4	24	.5	39	1.3	91	Ton							
W10 x 45	1	1 3	30	45	0.6	58	Ton							
W10 x 45	1	1 24	.5	45	0.4	55	Ton							
N10 x 49	1	1 3	30	49			Ton							
N10 x 49	7	7 42	2.5	49	7.2	29	Ton							
W10 x 54	1	1 3	30	54	0.8	81	Ton							
N10 x 54		2 42	2.5	54	2.3	30	Ton							
N10 x 60		1 24	_	60			Ton							
W10 x 60			30	60			Ton							
N10 x 60				60	2.4	55	Ton							
N10 x 68	1	1 3	30	68	1.0	32	Ton							
N10 x 77		2 42	2.5	77	3.2	27	Ton							
N10 x 77	3		30	77	3.4	47	Ton							
N10 x 88	1	1 42	1.5	88	1.8	87	Ton							
W10 x 88			30	88		_	Ton							
W10 x 100				100		_	Ton							
W10 x 112	1			112			Ton							
						_	Ton							
Beams						_		-						
					40.0	09	Ton							
						_	Ton							
								-						
Office 1-2 Stories														
		Labor	—		Materials	, 1			Equip	ment				
Total Quanity	Units	U/P	Cost		UVP	_	Cost		U/P	- As the	Cost		Total C	lost
80.18			84 22771	1.12		_	10222	_		145		626.1		8,820
ou.10	1.011	2	22//	. 14	1,21	2	102.22	2.2		143	- 11	040.1	\$10	1,021
00.10						-								-1-4
Metal Decking														
		Labor			ateriais			Equi	lpment					Т
Total Quanity	Units	U/P	Cost	UN	P (Cos	st	U/P		Cost		Total	Cost	
Open Type Galvanled, 18 G					T									
255,981	8F	0.06	15358.8	6	3.99	10	021364		0.04	102	39.24	\$1,0	46,962.	28
Roof Joist				_										_
		Labor			ateriais	_			lpment					
	L Log Bar	U/P	Cost	UV	P (Cos	st .	U/P		Cost		Total	Cost	7
Total Quanity	Units	OIP .	0031	-	· · ·	_								
Total Quanity Open Web Joist 18K5, 7.7 It 97,360	VL, Span 3	30' Min	142145				4472.8		0.78		940.8		32,669.	

TOTAL \$1,716,148.21

Figure 11: Structural Steel Estimate





Summary

The following table in figure 12 summarizes the total structural cost for the BCDC Expansion.

Description	Cost
C.I.P. Concrete	\$3,047,475.09
Pre-cast Concrete	\$7,487,000.00
Structural Steel	\$1,716,148.21
TOTAL	\$12,250,623

Figure 1	2:	Summary	of	Structural	Estimate
----------	----	---------	----	------------	----------

The structural estimate is approximately 22% of the construction hard cost. This is relatively low for a typical contract. The structural estimate may not reflect the true cost of the structural system due to the all the unique details that make up the system. There is very little repetition in any of the structural elements which makes it difficult to account for all of the cost associated with the structure. An economical analysis of the benefits of a repetitive design may be investigated further at a later date.

V. General Conditions Estimate

The general condition costs incurred by Gilbane for the construction of the BCDC Expansion were paid for by Baltimore County. The following assumptions were made to perform the general conditions estimate found below in figure 13:

General Assumptions

- 1) R.S. Means Building Construction Cost Data 2003 was used for all value in the GC estimate
- 2) The project lasted a total of 35 months
- 3) Work was performed 5 days a week for 8 hours a day
- 4) Assumed 4 weeks in each month

Staffing Assumptions

- 1) Only on-site staff will be paid for
- 2) The cost per week for the part time staff was modified based on the time spent on site as stated in technical assignment #2.
- 3) Overtime is not paid for

R.O.S. = Staff cost/Fee = \$783,300/\$2,718,185 = 0.29







A typical return on staff should be about 0.80. This R.O.S. shows weather a project is staffed properly based on the profit a company is receiving. An R.O.S. over 1 means that the overhead is too high and no profit is being made. If the R.O.S. is too low a project is understaffed. At the BCDC project there were not enough employees on the job hence, the 0.29 R.O.S. Just recently two additional employees were added to the job to cover the overflow of work.

Temporary Facilities

- 1) Gilbane has three trailers approximately 50' x 10'
- 2) There is one dumpster used onsite

Utilities

- 1) All water is supplied by the existing detention center until 8/2003 when the indoor plumbing facilities were connected to the trailer
- 2) Temporary lighting accounts for the total CSF of the new structure
- 3) Temporary heating is only within the housing structure to meet the curing requirements for the grout between the pre-cast modular units
- 4) Chemical toilets paid for within the GC cost till 9/2003 and BP #16 became contractually responsible

Clean-up

1) Clean up is paid for in the GC cost till 9/2003 when BP#16 takes over

Typically the overall value of the general conditions cost is 6 to 7% of the contract sum. The BCDC GC cost is 1.65% of the total contract sum. However, the County has assigned a majority of the general condition cost to the various contractors on the project. The general trades contractor, BP #16 is responsible for most of this cost. This is why the general conditions cost estimate shown above is relatively low for a \$72 million project.





				Labor		Materials		Equipment		
Code	Description	Quantity	Units	U/P	Cost	U/P	Cost	U/P	Cost	Total Cost
CM MA	CM MANAGEMENT & SUPERVISION									
	Regional Operations Manager - Off Site	0	week							
	Project Executive	116	16 week	425	49300					4930
	Project Manager	124	124 week	1,500	186000					18600
	Project Superintendent	144	144 week	1,400	201600					20160
	Project Engineer	128	128 week	920	117760					117760
	Project Engineer	132	132 week	920	121440					12144(
	Office Engineer	80	week	710						5680
	MEP Engineer	80	80 week	630	50400					50400
	Professional Surveying	5.3	5.3 acre	247	1309.1	16				139
	Blue Printing	45	45 set			150	6750	0		675(
	Engineering Equipment	-	1 job							400
	Safety Training	-	1 job							200(
OFFICE										10544
	ľ									
	Job Telephone/ Fax	36	35 month			204	7140	0		714
	Postage	35	35 month			50	1750	0		175(
	Office Supplies	35	35 month			83.5	2922.5	2		2923
	Furniture & Equipment	35	35 month			139	4965	2		4865
	Water Cooler	35	35 month			120	4200	0		4200
	Copy machine (1)	35	35 month			500	17500	0		1750
ON-SIT	ON-SITE BUILDINGS									38378
	Trailer Transportation - 3	20	50 mile			1.53	76.5	2		2
	Trailer Setup - 3	e	3 ea	300	006					006
	Trailer Rental (50'x10') - (3/35mo)	35	35 mo			266	9310	0		9310

Figure 13a: General Conditions Estimate (pg1)







		Cost Total Cost		30954	11256	1000	570	43780	2769	4797	1225	156001	162023	200	1400	100	100	1800	54800	7245	48600	2170	4500
	Equipment			4	9		50		0	.6	5	.4			0				0	2	00	0.	G
General Conditions Cost Estimate	Materials	U/P Cost		2.94 19404			50 50		4 1200	1.64 1476	35 1225	0.38 65143.4			40 1400				2.11 10550		7.85 31400	62 2170	
onditions Co		Cost		11550			0 520		3 1569			3 90857.9							5 44250		3 17200		
General Co	Labor	Units U/P		1.75	-		y 520			3.69	onth	0.53		_	onth				F/floor 8.85		5F/ floor 4.3	onth	ch/mo
		Quantity		6600 SY	2400 SY	1 job	1 day		300 LF	900 LF	35 month	171,430 SF		1 job	35 month	1 job	1 job		5000 CSF/floor	35 month	4000 CSF/ floor	35 month	30 each/mo
		Description	ALTES	Temp. Roads- 4" gravel	Parking	Project Signs	Layout & Batterboards	TION	Security Fence for Inmates	Perimeter Fences- Chain link 6' high over 1000'	Fire Protection	Winter Protection	INSTALL UTILITIES TRAILER	Temp. Power Hookup	Temp. Lighting	Install Heating System	Telephone/Telex Setup	TEMPORARY UTILITIES	Lighting: lamps, wiring and outlets	Power Bills	Heat	Water Bills	Chemical Toilet (2/15 mo)
		Code	SITE FACILITIES					PROTECTION					INSTALL (TEMPORA					

Figure 13b: General Conditions Estimate (pg2)





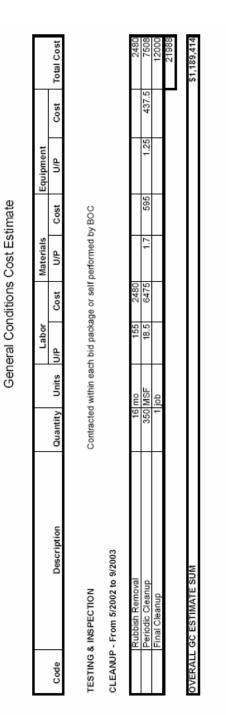


Figure 13c: General Conditions Estimate (pg3)





VI. Project Schedule

The following is a detailed project schedule for the BCDC Expansion project. The project starts March 8, 2002 and is to be completed May 02, 2002.

Attribution Common from the field Structure in the	Detailed BODO Expashion Project	ect		Classic Schedule Layout 12-Nov-03 00:39	
Clippendom. Coll Network Contraction Contraction <thcontraction< th=""> <thcontraction< th=""></thcontraction<></thcontraction<>	stivity Name	Original Start Duration	Finish	6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	
tion control of the second of	Detailed BCDC Expasnion		02-May-05	 02-May-05, Detailed BCDC Expashion Project 	
erreining 46 11.Mar-20 10.Mar-20 Poening Poening Enreinings 415-Jul-02 15-Jul-02 10.Mar-20 10.Mar-20 Poenino Enreinings 415-Jul-02 15-Jul-02 10.Mar-20 10.Mar-20 Poenino Enreining 415-Jul-02 12-Jul-02 12-Jul-02 10.Mar-20 Poenino E1 10 10.Jul-02 12-Jul-02 12-Jul-02 10.Mar-20 10.Mar-20 E1 10 11-Feb-03 12-Jul-02 12-Jul-02 10.Mar-20 10.Mar-20 B1 0 0.1 11-Feb-03 10.Mar-20 10.Mar-20 10.Mar-20 B1 0 0.1 11-Feb-03 10.Mar-20 10.Mar-20 10.Mar-20 B1 0.0 0.0 0.0 0.0 0.0 10.Mar-20 10.Mar-20 B1 10 0.0 0.0 0.0 0.0 10.Mar-20 10.Mar-20 B1 10 11.Feb-03 10.Mar-20 12.Mar-20 10.Mar-20 10.Mar	Preconstruction	252 08-Mar-02	24-Feb-03	Z4-Feb-03, Preconstruction	
Dimenings 45 3.5.May 20 2.2.Jun/22 Com newings 2 15.May 20 7.3.May 20 7.4.May 20 7.4.May 20 7.4.May 20 7.4.May 20 7.4.May 20 7.4.May 20	Recieve Construction Drawing & Bid		10-May-02	Recieve Construction Drawing & Bid Job	
Intervings 4 15-Jul-02 17-Jul-02 17-Ju	Complete 100% Drawings	45 13-May-02	12-Jul-02	Complete 100% Drawings	
16 20 13.4May 20 07.4ma02 184 Bit 8.18 40 19.4Me02 12.54May 20 11.74M1 8.16 10 11.74Ma 20 15.74May 20 12.54May 20 12.74May 20 12.74May 20 12.74May 20 12.74May 20 14.74M1	Review 100% Drawings	4 15-Jul-02	18-Jul-02	Review 100% Drawings	
i6 40 19-Jund2 23-Sep-02 10-Jund2 12-Sep-02 10-Jund2 1 11-Jund2 1 1 11-Jund2 1 1 11-Jund2 1 1 11-Jund2 1 <td>Bid BP #1-3</td> <td>20 13-May-02</td> <td>07-Jun-02</td> <td>DT 파파 100</td>	Bid BP #1-3	20 13-May-02	07-Jun-02	DT 파파 100	
8:18 40 19-Ju/22 22-Sep/22 1 1 8:16 10 17-Fb/30 22-Sep/22 1 1 8:16 10 11-Fb/30 24-Fb/30 1 1 10 11-Fb/30 24-Fb/30 1	Bid BP#4-14 & 16	40 19-Jul-02	12-Sep-02	Bid BP#4-14 & 16	
10 27.489/23 07.4m/23 1 NTP 8.16 10 11.76b/33 24.76b/33 1 NTP 8.15 10 11.76b/33 24.76b/33 24.76b/33 1 NTP 8.16 10 11.76b/33 24.76b/33 24.76b/33 1 NTP 8.16 0 0.446/25 15.444/92 27.444/92 3 1 Noisi Map Process 50 0.50-56/25 15.444/92 27.444/92 3 1 Noisi 3 1 1 Noisi 3 1 Noisi 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Bid BP#15,17 & 18	40 19-Jul-02	12-Sep-02	Bid BP# 15,17 & 18	
10 06-Jund2 11-10-20 1	NTP BP#1	10 27 May 02	07 Jun 02	NTP BP#1	
6.16 10 11.Fieb.03 24.Feb.03 Mpet Star 10 10 11.Fieb.03 24.Feb.03 Mpet Star 10 10 11.Fieb.03 24.Feb.03 Mpet Star 10 10 11.Fieb.03 24.Feb.03 Mpet Star 11 11.Fieb.03 24.Feb.03 Mpet Star Mpet Star 11 11.Fieb.03 21.Amp.02 21.Amp.02 21.Amp.02 10.Mixiz 11 11.Fieb.03 11.Amp.02 12.Amp.02 23.Amp.02 Moinizi 11 11.Bit.02 12.Amp.02 13.Amp.02 10.Mixiz 1 11.Fieb.13 11.Amp.02 13.Amp.02 13.Amp.02 10.Mixiz 1 1 11.Bit.12 13.Amp.02 13.Amp.02 13.Amp.02 1<	NTP BP#2&3	10 08-JuH02	19-JuH02	I NTP BP# 263	
(k 18) 10 11.Fieb.03 24.Feb.03 0jed. Standardz Ing. Process 50 05.be.02 12.Feb.03 0jed. Standardz Ing. Process 50 05.be.02 12.4May.02 21.4May.02 Utilities/Earth 13 17.3May.02 21.4May.02 21.4May.02 Utilities/Earth 15 13.4May.02 12.4May.02 21.4May.02 Utilities/Earth 15 0.5.May.02 12.4May.02 21.4May.02 1.Level 10 0.5.May.02 15.4May.02 10.Pem0 1.Level 10 0.5.May.02 15.4May.02 10.Pem0 1.Level 10 0.5.May.02 15.4May.02 10.Pem0 I.Level 10 0.5.May.02 15.4May.02 10.Pem0 I.Level 10 0.5.May.02 15.4May.02 10.Pem0 I.Level 10 10.5.May.02 10.5.May.02 10.Pem0 I.Level 10 10.5.Sep.02 10.5.Sep.02 10.Pem0 I.Level 11 10.1.0.402 23.4May.02 10.Pem0 I.Level 11 11.5.2.Sep.02 10.5.5ep.02 10.9 I.Level 11 11.4May.02 25.4May.02 10.Pem0 I.Level 11	NTP BP#4-14 & 16	10 11-Feb-03	24-Feb-03	■ NTP BP# 4-14 & 16	
Ing Process 0 0.64.mic/2 r/line r/line <th l<="" r="" td=""><td>NTP BP#15,17 & 18</td><td>10 11-Feb-03</td><td>24-Feb-03</td><td>■ NTP BP# 15,17 & 18</td></th>	<td>NTP BP#15,17 & 18</td> <td>10 11-Feb-03</td> <td>24-Feb-03</td> <td>■ NTP BP# 15,17 & 18</td>	NTP BP#15,17 & 18	10 11-Feb-03	24-Feb-03	■ NTP BP# 15,17 & 18
Ing Process 50 0.5 Dec.22 10,FPH33 21,4My-Q2 21,	Project Start	0 08-Mar-02		oject Start	
7 13.4May 02 21.4May 02	Value Engineering Process	50 03-Dec-02	10-Feb-03	Value Englineering Process	
T 13-May-02 21-May-02 21-May-02 21-May-02 Monitor Utilities/Earth 16 - Jamo22 17-Jamo22 16 - Jamo22 17 - Jamo22 16 - Jamo22 17 - Jamo22 18 - Jamo22 10 - Jamo22	Site Set Up	7 13-May-02	21-May-02	Z 21-May-02, Site Set Up	
Utilities/Earth 11 10-um-02 15-low-02 15-low-02 15-low-02 15-low-02 16-low-02 <	Mobilization	7 13-May-02	21-May-02	Modifization	
38 17-Jan 02 22-Jag 02 8 16 9 10	BP #1 - Site Utilities/Earth	115 10-Jun-02	15-Nov-02	15-Nov-CC, BP #1 - Site Utilities/Earthwork	
Inclusion Inclusion <t< td=""><td>Site Utilities</td><td>35 17-Jun-02</td><td>02-Aug-02</td><td>Site Utilities</td></t<>	Site Utilities	35 17-Jun-02	02-Aug-02	Site Utilities	
Luevel 10 05-Aug/22 16-Aug/22 16-Aug/22 16-Aug/22 16-Aug/22 15-Aug/22 16-Aug/22 16-Aug/2	Demolition	5 10-Jun-02	14-Jun-02	I Demolition	
Induced 10 15-Aug/22 30-Aug/22 15-Aug/22 16-Aug/22 16-Aug/	Excavation - 1st Level	10 05-Aug-02	16-Aug-02	Excertation - 1st Level	
I Level 10 C2:Sep-02 15:Sep-02 15:Sep-02 10 <	Excavtation - 2nd Level	10 19-Aug-02	30-Aug-02	Excertation - 2nd Level	
Ref Piles 35 6-Augo2 0.05 0.01	Excavation - 3rd Level	10 02-Sep-02	13-Sep-02	Excavation - 3rd Level	
ats slde 15,23-550-22 10,64/22 0 14. 14. 14. 14. 14. 14. 14. 14. 14. 14.	Drill/Drive Soldier Piles	35 05-Aug-02	20-Sep-02	Drill/Drive Soldier Piles	
• Notion 5 Sciencial 5 Sciencial 1 • Notion 5 Sciencial 1 1 • Notion 1 07-Jung 202 22-Jung 202 1 Tenebrish 1 1 1-Jung 202 25-Sep-022 1 Tenebrish 1 2 21-Jung 202 05-Sep-022 1 1 Tenebrish 2 2 2 05-Sep-022 1	Install Rakers East Side	15 23-Sep-02	11-Oct-02	Install Rakers East Side	
Instance 12 77.Aug/22 22.Aug/22 11 11 Trebexis- statuent 12 17.Aug/22 0.54m/02 1 11 Trebexis- statuent 12 17.Aug/22 0.54m/02 1 11 Trebexis- statuent 12 17.Aug/22 0.54m/02 1 11 Trebexis- and Level 12 21.Aug/22 0.55m/02 1 <td< td=""><td>Excavate Ramp Out</td><td>5 20-Sep-02</td><td>26-Sep-02</td><td>Excavate Ramp Out</td></td<>	Excavate Ramp Out	5 20-Sep-02	26-Sep-02	Excavate Ramp Out	
Theteks - Ist Level 15 (1+Aug/22) 0.53 sep 022 0 0 2nd Level 12 (1+Aug/22) 05 sep 022 0	Install Lagging - 1st Level	12 07-Aug-02	22-Aug-02	I Install Lagging - 1st Level	
Joint Level 12 2041 Level 12 12 2041 Level 12 12 2041 Level 12 12 2041 Level 14 14 2041 Level 14 <t< td=""><td>Drill & Tension Tiebacks - 1st Level</td><td>15 14-Aug-02</td><td>03-Sep-02</td><td>Drill & Tension Tiebacks - 1st Level</td></t<>	Drill & Tension Tiebacks - 1st Level	15 14-Aug-02	03-Sep-02	Drill & Tension Tiebacks - 1st Level	
Titteries 201 20-58-102 20-5	Install Lagging - 2nd Level	12 21-Aug-02	05-Sep-02	Install Lagging - Znd Level	
Mill 45 HS-sep 22 FS-sep 23 FS-sep 23<	Drill & Tension Tiebacks - 2nd Level	20 26-Aug-02	20-Sep-02	Drill & Tension Hebacks - Znd Level	
arrage city 78 35-56-92 71-30-02 arrage city 78 35-56-92 71-30-02 unmus & wals. Lew 15 20-56-92 71-30-02 oi 21-00-102 28-40-022 1 oi 11-00-102 28-40-022 1 oi 10 11-00-102 28-40-022 1 oi 10 11-00-102 28-40-022 1 oi 10 11-00-102 28-40-022 1 oi 11-00-102 28-40-022 1 1 oi 11-00-102 28-40-0422 2 1 oi 11-00-102 28-40-0422 1 1 oi 11-00-102 28-40-0422 1 1	Install Lagging - 3rd Level	12 04-Sep-02	18-Sep-02		
arrange CIP 78 acsept2 07-amross 1 r Fourings Walls - Lev 10 11-06-102 24-064-02 0 0immis & Walls - Lev 10 11-06-102 24-064-02 0 21 01 11-06-102 24-064-02 14-34-002 0 21 01 11-06-102 24-004-02 14-34-002 0 21 01 11-06-102 24-064-02 24-064-02 1	Demo. Retaining Wall	45 16-Sep-02	15-Nov-02		
r Foolings 15 00-502 00	BP #2 & 3 - Garage CIP	78 20-Sep-02	07-Jan-03	07-Jan-03, BP #2 & 3- Garage CP	
outmus & Walls - Lev 10 11-05-02 24-06402 1 03 22 20 22-06402 1 1 13 7 06-Nev-02 13-Nev-02 1 1 141 10 51-06-62 20-Nev-02 1 </td <td>Excavate & Pour Footings</td> <td>15 20-Sep-02</td> <td>10-Oct-02</td> <td>Excavate & Pour Footings</td>	Excavate & Pour Footings	15 20-Sep-02	10-Oct-02	Excavate & Pour Footings	
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	Form & Pour Columns & Walls - Lev	10 11-Oct-02	24-Oct-02	Form & Pour Columns & Walls - Level 1	
21 10 11 10 11 10<	Prep & Pour SOG	5 23-Oct-02	29-Oct-02	Prep & Pour SOG	
#12 7 (6-Mov/2011) 14-Mov/2021 R-Mov/2011 R-Mov/201	Form - Level 2	10 31-Oct-02	13-Nov-02	Form - Level 2	
evel 2 8 11-Nev/22 20-Nov-02 1 Install Rebar- Vork Vork Vork TASK filter: All Activities Remaining Work en	Rough-in - Level 2	7 06-Nov-02	14-Nov-02	Rough-in - Level 2	
4 15-Nov-02 20-Nov-02 I Pour - Level Vork Summary TASK filter: All Activities Remaining Work	Install Rebar - Level 2	8 11-Nov-02	20-Nov-02	Install Rebar - Level 2	
Vork Summary TASK filter: All Activities ing Work Remaining Work	Pour - Level 2	4 15-Nov-02	20-Nov-02	Pour - Level 2	
ing Work Remaining Work te	Actual Work	 Summary 		tter: All Activities	
Remaining Work	Remaining Work				
9	Critical Remaining Work				
	 Milestone 				
	Primavera Systems, Inc.			Page 1 of 4	

Figure 14a: Project Schedule (pg1, larger PDF file available on website)





Det	Detailed BCDC Expasnion Project	ect			Classic Schedule Layout 12-Nov-03 00:39
Activi	Activity Name	Original Start	Le le	Finish	
		DUIRITION			2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 11 2 3 14 15 16 17 18 19 10 11 12 3 14 15 16 17 18 19 10 31 32 3 14 25 28 28 20 31 33 31 32
	Form - Level 2M	10 25-Nov-02	Nov-02	06-Dec-02] Form - Level 2M
	Rough-in - Level 2M	7 29-1	29-Nov-02	09-Dec-02	Rough-in - Level 2M
	Install Rebar - Level 2M	8 04-1	04-Dec-02	13-Dec-02	Install Rober - Level 2M
	Pour - Level 2M	4 10-1	4 10-Dec-02	13-Dec-02	Pour - Level 2M
	Form - Level 3	10 18-1	10 18-Dec-02	31-Dec-02	E Form - Level 3
	Rough-in - Level 3	7 24-1	7 24-Dec-02	01-Jan-03	E Rough-in - Level 3
	Install Rebar - Level 3	8 27-1	27-Dec-02	07-Jan-03	Install Rebar - Level 3
	Pour - Level 3	4 02-	02-Jan-03	07-Jan-03	Pour - Level 3
	Form & Pour Columns & Walls - Lev	10 19-Nov-02	Nov-02	02-Dec-02	Form & Pour Columns & Walls - Level 2
	Form & Pour Columns & Walls - Lev	10 12-Dec-02	Dec-02	25-Dec-02	I Form & Pour Columns & Walls - Level 2M
	Garage Structure Top Out	0		07-Jan-03	
	BP #6 - Housing/Support S	157 20-Sep-02	Sep-02	28-Apr-03	28-Apr-03, BP #9 - Housing/Support Services CIP
	Evenue & Pour Fording	20-Sen-02	San-02	17-0.4-02	Excavation & Pour Footimes
	Form & Pour Columns & Walls	15 25-Feh-03	Eeh-03	17-Mar-03	Eform & Pour Columns & Walls
	Form Point - Level 2	30 04-Mar-03	Mar-03	14-Anr-03	Form Pour Level 2
	Rough-in - Level 2	6 18-	6 18-Mar-03	25-Mar-03	l Rough-in - Level 2
	Install Rebar - Level 2	15 20-Mar-03	Mar-03	09-Apr-03	 Install Rebar - Level 2
	Pour - Level 2	3 08-	3 08-Apr-03	10-Apr-03	I Pour - Level 2
	Prep & Pour SOG Housing	10 15-Apr-03	Apr-03	28-Apr-03	Prep & Pour SOG Housing
	BP #5 - Housing Pre-cast	227 13-Sep-02	Sep-02	28-JuH03	▼ 28-Jul-03, BP #5 - Housing Pre-cast
	Pre-Cast Submittals	120 13-Sep-02	Sen-02	27-Feb-03	Pre-Cast Submittals
	Fab & Install Mock-up	30 11-Feb-03	Feb-03	24-Mar-03	 Fab & Install Mock-up
	Fabricate Pre-Cast Units	40 25-1	25-Mar-03	19-Mav-03	Figure 1 - Cast Units
	Fabricate Pre-Cast Structural Members	45	Mar-03	26-May-03	Entricate Pre-Cast Structural Members
	Install - Level 2		9 13-May-03	23-May-03	D Install - Level 2
	Install - Level 2M	9 26-1	26-May-03	05-Jun-03	I Install - Level 2M
	Install - Level 3	9 06-	9 06-Jun-03	18-Jun-03	Install - Level 3
	Install - Level 3M	9 19-,	9 19-Jun-03	01-JuH03	Install - Level 3M
	Install - Level 4	9 02-,	9 02-Jul-03	14-Jul-03	Install - Level 4
	Install - Level 4M	9 15-,	15-Jul-03	25-Jul-03	D Install - Level 4M
	Housing Structure Top Out	1 28-,	28-Jul-03	28-JuH03	Housing Structure Top Out
	BP #7 - Administration Ste	. 100 25-Feb-03	Feb-03	14~JuH03	▲ 14-Jul-03, BP #7 - Administration Steel Structure
	Shop Drawings Steel	30 25-Feb-03	Feb-03	07-Apr-03	Shop Drawings Steel
	Fabricate Steel	30 08-	08-Apr-03	19-May-03	Eabricate Steel
	Set Columns & Level 3M Steel	5 20-1	20-May-03	26-May-03	Set Columns & Level 3M Steel
	Install Decking Level 3M	2 27-1	27-May-03	28-May-03	I Install Decking Level 3M
	Set Level 4 Steel	3 29-1	29-May-03	02-Jun-03	SetLevel 4 Skel
	Studs Level 3M	1 03-,	03-Jun-03	03-Jun-03	I Studs Level 3M
	Install Decking Level 4	3 04-	04-Jun-03	06-Jun-03	Install Decking Level 4
	Install Level 4M Steel	3 09-	09-Jun-03	11-Jun-03	I install Level 4M Steel
	Prep & Pour Level 3M	2 12-,	12-Jun-03	13-Jun-03	I Prep & Pour Level 3M
	Studs Level 4	1 16-,	1 16-Jun-03	16-Jun-03	Studs Level 4
	Install Level 4M Decking	3 17-,	3 17-Jun-03	19-Jun-03	Install Level 4M Decking
	Install Roof Level Steel	4 20-	20-Jun-03	25-Jun-03	Install Roof Level Steel
	Prep & Pour Level 4	2 26-	26-Jun-03	27-Jun-03	Prep & Pour Level 4
0 Pri	© Primavera Systems, Inc.				Page 2 of 4

Figure 14b: Project Schedule (pg2, larger PDF file available on website)





De	Detailed BCDC Expasnion Project	ect			Classic Schedule Layout 12-Nov-03 00:39
Activ	Activity Name	Original Start		Finish	
		Duration			3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 28 27 28 20 31 32 31 22 32 32 32 32 32 32 32 32 32 32 32 32
	Studs Level 4M	1 30-Jun-03	in-03	30-Jun-03	Studs Level 4M
	Install Roof Decking	4 01-Jul-03	1-03	04~JuH03	Install Roof Decking
	Prep & Pour Level 4M	2 07-JuH03	I-03	08-Jul-03	Prep & Pour Level 4M
	Studs Roof Level	1 09-Jul-03	I-03	09-Jul-03	Studs Roof Level
	Prep & Pour Roof Level	2 10-Jul-03	1-03	11-JuH03	Prep & Pour Roof Level
	Administration Structure Top Out	1 14-Jul-03	I-03	14-Jul-03	I Administration Structure Top Out
	BP #11 & 15 - Administrati	. 139 25-Feb-03	sb-03	05-Sep-03	O5-Sep-03, BP #11 & 15 - Administration Skin
	Glass Glazino Shop Drawinos	40 25-Feb-03	sb-03	21-Apr-03	Glass Glazing Shop Drawings
	Fabricate Glass & Glazing	30 22-Apr-03	or-03	02-Jun-03	Fabricale Glass & Glazing
	Roof Shap Drawings	30 25-Feb-03	sb-03	07-Apr-03	Roof Shap Drawings
	Procure Roofing Material	30 08-Apr-03	pr-03	19-May-03	Procure Roofing Material
	Layout for Curtain Wall & Glazing	5 14-Jul-03	I-03	18-Jul-03	Layout for Curtain Wall & Glazing
	Install Level 4 Curtian Wall	10 21-Jul-03	1-03	01-Aug-03	Install Level 4 Currian Wall
	Install Level 4M Curtian Wall	10 04-Aug-03	10-03	15-Aug-03	Install Level 4M Curtian Wall
	Install Level 3 Curtian Wall	10 18-Aug-03	10-03	29-Aug-03	Install Level 3 Curtian Wall
	Install Roofing System	15 18-Aug-03	10-03	05-Sep-03	Install Roofing System
	BP #5 & 15 - Housing Skin	50 21-Jul-03	1-03	26-Sep-03	V 26-SeP 03, BP #5 & 15 - Housing Skin
	Layout for Architectural Pre-cast	5 21-Jul-03	I-03	25-Jul-03	Layout for Architectural Pre-cast
	Set West Elevation Arch. Pre-cast	9 28-Jul-03	1-03	07-Aug-03	Set West Elevation Arch. Pre-cast
	Set South Elevation Arch. Pre-cast	5 08-Aug-03	10-03	14-Aug-03	Set South Elevation Arch. Pre-cast
	Set East Elevation Arch. Pre-cast	7 15-Aug-03	10-03	25-Aug-03	Set Elevation Arch. Pre-cast
	Set North Elevation Arch. Pre-cast	3 26-Aug-03	10-03	28-Aug-03	Set North Elevation Arch. Pre-cast
	Install Main Roof	20 29-Aug-03	10-03	25-Sep-03	Install Main Roof
	Building Enclosed	1 26-Sep-03	ep-03	26-Sep-03	Building Enclosed
	BP #7-10 & 12-14, 16, 18	280 25-Feb-03	sb-03	22-Mar-04	22-Mar-04, BP #7-10 & 12-14, 16, 18 - Level 1 Interior Finishes
	Fabricate MEP Equipment	35 08-Apr-03	pr-03	26-May-03	Esbricate MEP Equipment
	Install MEP Equipment	50 27-May-03	ay-03	04-Aug-03	Install MEP Equipment
	MEP Submittals	30 25-Feb-03	sb-03	07-Apr-03	MEP Submittais
	Install HVAC Mains	35 24-Jun-03	in-03	11-Aug-03	Install HVAC Mains
	Install Pluming, Electrical & Security	. 20 24-Jun-03	in-03	21-Jul-03	Install Pluming. Electrical & Security Mains
	Set Door Frames	20 08-Jul-03	1-03	04-Aug-03	Set Door Frames
	Lay CMU	55 05-Aug-03	10-03	20-Oct-03	Carl Lay CMU
	Rough-In Plumbing, Electrical & Sec	20 21-Oct-03	ct-03	17-Nov-03	Rough-In Plumbing, Electrical & Security Walls
	Install Sprinkler Mains	10 22-Jul-03	1-03	04-Aug-03	Install Sprinkler Mains
	Paint Prime Coat	10 21-Oct-03	ct-03	03-Nov-03	Paint Prime Coat
	Frame Ceiling	20 04-Nov-03	01-03	01-Dec-03	Erame Celling
	Rough-in Sprinkler, Elecritcal & Secu	20 02-Dec-03	BC-03	29-Dec-03	Rough-in Sprinkler, Electrical & Security Ceilings
	Close Ceiling	20 18-Nov-03	01-03	15-Dec-03	Close Celling
	Final Paint	15 16-Dec-03	ec-03	05-Jan-04	Final Paint
	Flooring	25 06-Jan-04	in-04	09-Feb-04	Elocing
	Trim Out MEP, Sprinker & Security	20 10-Feb-04	sb-04	08-Mar-04	Trim Out MEP, Sprinker & Security
	Install Laundry & Kitchen Equipment	10 09-Mar-04	ar-04	22-Mar-04	Install Laundry & Kitchen Equipment
	BP #7-10 & 12-14, 16, 18	435 05-Aug-03	10-03	04-Apr-05	✓ 04.4pr.05, BP #7-10 & 12-14, 16, 18 - Level 2-4M Interior Finishes
	Level 2 Interior Finishes	160 05-Aug-03	ng-03	15-Mar-04	Level 2 Interior Flishes
	Level 2M Interior Finishes	160 30-Sep-03	ep-03	10-May-04	Level 2M Inferior Finishes
0 P	@ Primavera Systems, Inc.				Pane 3 of 4
					· · · · · · · · · · · · · · · · · · ·

Figure 14c: Project Schedule (pg3, larger PDF file available on website)







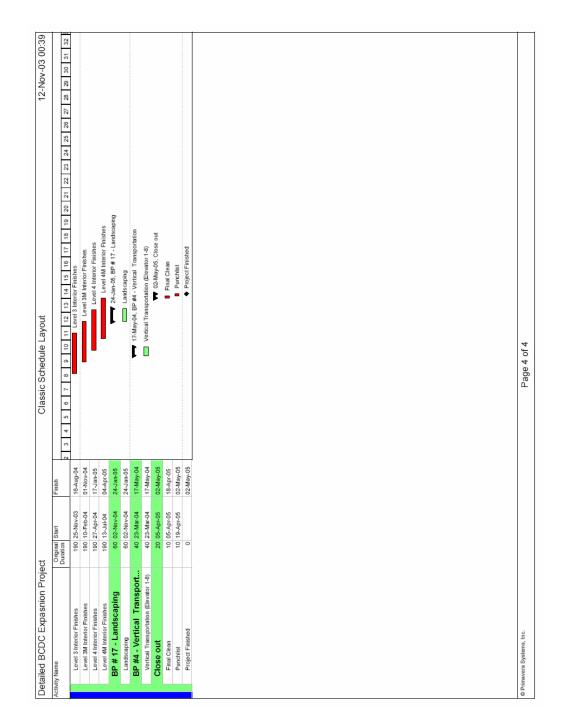


Figure 14d: Project Schedule (pg4, larger PDF file available on website)





The detailed schedule in figure 15 was then summarized to show the schedule for each contractor of the project. These dates were then used for the cash flow.

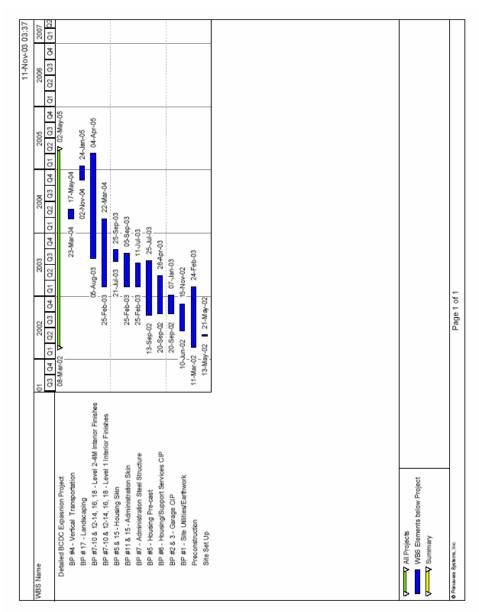


Figure 15: BP Breakdown Schedule (larger PDF file available on website)





VII. Cash Flow

The cash flow schedule for the owner was created using the price of each bid package and the bid package/contractor schedule shown in figure 15. The actual cash flow schedule is located in Appendices C. Once a cash flow schedule was created for each contractor a monthly anticipated cost was calculated and formatted into a cash flow curve shown in figure 16.

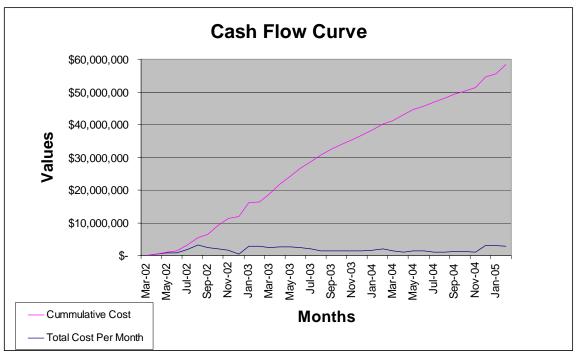


Figure 16: Cash Flow Curve

This cash flow curve will assist the County in forecasting a financing plan. The cost is fairly level throughout the project with a peak at the beginning of the project for the fast-tracked bid packages 1-3 and a peak at the end at the end for the retention payback. A blow up of the cost per month (S curve) is shown below in figure 17.





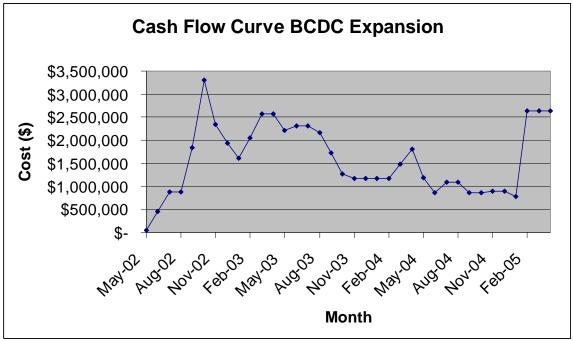


Figure 17: Enlarged Total Cost per Month (S curve)

VIII. Appendices

- A. Larger Site Plans (figure 3a-d)
- B. Larger Schedule (figure 14a-d)
- C. Cost Schedule

