AE 481W

Technical Assignment 2: Cost and Schedule Analysis



Jonathan Revtai

Construction Management Consultant: Dr. Riley Bakery Square – Building 1 10/24/2008 BOOM STRUCTION MANAGEMENT PROJECT SIZE 378,00 SS PROJECT SIZE 324 MILLION START DATE 03.17.2008 END DATE 05.21.2009 DELIVERY MEMOD OM AT RISK

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R OWNER/ DEVELOPER BAKERY SQUARE J HOLDINGS, L.P. Ε ARCHITECT С Т ASTORINO Т CM AT RISK E Α P.J. DICK INC. M

BUILDING 1 AT BAKERY SQUARE

BUILDING 1 IS PART OF THE BAKERY SQUARE PROJECT BUILT AROUND THE RENOVATION OF THE 1918 NABISCO FACTORY. THIS FACILITY INCLUDES RETAIL SPACES, A FITNESS CENTER, RE-STARAUNTS, AND A PARKING GARAGE. THE PARKING GARAGE STRUCTURE IS BUILT AROUND ALL OF THE OTHER SPACES INCLUDING A CAST-IN-PLACE SWIMMING POOL ON LEVEL TWO. FACADE FINISHES WILL BE PROVIDED DURING FIT OUT, AND HAVE NOT BEEN FINALIZED.

PITTSBURGH, PA

SERINAL

MEP

ROOF TOP UNITS ARE USED TO CONDITION THE RETAIL FITNESS SPACES, WHILE WALL UNITS ARE USED IN THE PARKING GARAGE SECTION. PLUMBING IS LIMITED TO BATH-ROOMS

ELECTRICAL

THE FITNESS CENTER IS FED BY A SEPARATE SWITCH BOARD FROM THE REST OF THE BUILDING. THE FEED TO EACH SWITCH-BOARD IS A 3 PHASE, 480 V CONNECTION.

STRUCTURAL

PRECAST CONCRETE IS USED FOR MOST OF THE SUPERSTRUCTURE. STRUCTURAL STEEL IS USED FOR AN OUTSIDE BRIDGE, AND A HANG-ING MEZZANINE IN THE FITNESS CENTER.THE FOUNDATIONS ARE BUILT WITH AUGUER CAST PILES.



EXECUTIVE SUMMARY

The detailed construction schedule produced for Technical Assignment II shows activities by trade. The schedule is sorted into each category. The schedule runs from March 24, 2008 to August 31, 2009. The parking garage is to be completed by May 21, 2009. The fit-out for the fitness center extends the schedule into the end of August.

Site layout planning has made key issues apparent. Underground utilities are not an obstruction, but overhead electrical lines could interfere with the crane's swing path. Vehicular movement and parking is relocated several times due to changing site conditions and the ongoing renovation of Building #3. The precast storage compartments and office trailer must be moved during precast erection. This problem could be fixed by locating their trailers east of the building to avoid interring with the path of the crane. Office trailers will need to be placed onsite when Building #3 renovation is completed.

The result of the detailed structural estimate for Building #1 is a square foot cost of \$27.87. This can be broken down into square foot material, labor, and equipment costs of \$17.75, \$4.39, and \$0.99 respectively. The overall structural cost was calculated to be \$10,665,120. Cost breakdown were found to be material costs of \$6,793,727, labor costs of \$1,678,740, and equipment costs \$378,643 respectively. A similar building assembly estimate from R.S. Means would cost \$24.45/ SF. This might be a little low because of the special items in Building #1 such as the elevated CIP pool, the hanging steel mezzanine, and the combination of such a diverse structural system.

Calculation of the general conditions estimate for Building #1 resulted in a total cost \$923,250. This is roughly 3.5% of the \$24,000,000 GMP set for Building #1. The number may be a little lower than expected because P.J. Dick is constructing four other buildings on the Bakery Square site.

By attending the PACE seminar, I was able to better understand the state of the industry when it comes to BIM. I plan on focusing my research in that area and made contact with Jason, Coleman, and Dragana for that purpose.

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DETAILED PROJECT SCHEDULE

A detailed construction schedule has been developed from the summary schedule to show activities that reflect the actual construction of Building 1 at Bakery Square. Important phasing includes the foundation and underground work, bridge construction, finishes, and the precast sequencing that starts at the West end of the building and moves east in three stages. Milestone events have also been included in the schedule.

Building 1 - Project Milestones		
Description	Early Start	Early Finish
Start Precast Erection	July 16, 2008	
Precast Seq. 1 Complete		October 3, 2008
Precast Seq. 2 Complete		November 21, 2008
Precast Seq. 3 Complete		January 6, 2009
Install Permanent Power		March 4, 2009
Building Enclosure		February 3, 2009
Parking Garage Complete		May 21, 2008

• Table 1 - Building 1 - Project Milestones

Each construction phase has been broken down further into activities that were grouped into areas assigned to different trades. Precast erection, CIP concrete, masonry, and steel are some examples of trade categories.

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045 Pavement @ Acce	cess Drive	5			23-Mar-09	0								🗖 02 Jap 00 Pr
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050 Mobilize Precast C	Crono	5			15-Jul-08			Mobil	liże Precast Cran	e				
Precast - West		58			03-Oct-08	0		· · · · · · · · · · · · · · · · · · ·			03-Oct-	08, Precast - West		
051 Erect Precast Stair		5	5	100% 16-Jul-08	22-Jul-08			1	rect Precast Stain	1				
052 Erect Precast Bay	air 5 - West	8	8	100% 23-Jul-08	01-Aug-08				Erect Precast	1	1			
053 Erect Precast Bay	air 5 - West ay 15 - 14.1 - West	7	7	100% 04-Aug-08	12-Aug-08				Erect P	recast Bay 14.	1 - 13.6 - W€	est		

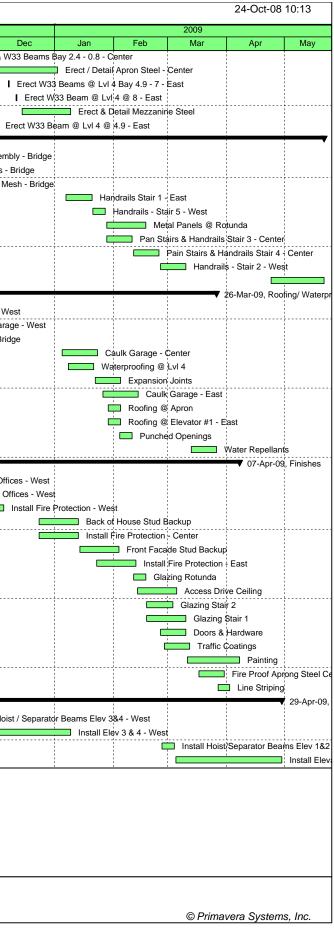
							24-Oct-08	10:13
						2009		
Dct		Nov	Dec	Jan	Feb	Mar	Apr	May
cast	Seq	uence 1 - West	Complete					
•	De	liver W30 & W3						
		♦ Pr	ecast Squence 2					
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						23	-Mar-09, CIP C	oncrete
Prep		OG - West						
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				🔲 Тор	ping Slab Lvl 2	2		
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				▼ 02-Jan-09, P	recast			
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Oct-	08, F	recast - West						
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						© Prima	/era Systems	s, Inc.

Activity Name		Original	Remaining	Schedule % Start Complete	Finish	To					2008								2009		
054 Erect Precast Bay 13.6 - 12		Duration			08 19-Aug		Jai	Apr	May	Jun	Jul	Aug Erect Pi	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	
055 Erect Precast Bay 13.6 - 12		7					_					i i		Bay 12.2 - 1	i .						
056 Erect Precast Bay 12.2 - 10		5													10.6'- 9 - West						
057 Erect Precast Elev/Stair Tw		10	-	· · ·			_								st Elev/Stair T						
058 Erect Precast Bay 9 - 7.6 - 1		5		· · ·										1	recast Bay 9 -						
Precast - Center		35		· · ·			0									▼ 21-Nov-08, Preca	st - Center				
059 Erect Precast Bay 7.6 - 5.6	Center	7	7	100% 06-Oct-)8 14-Oct-	08								E	ect Precast Ba	y 7.6 - 5.6 - Center					
060 Erect Precast Stair #3 - Cer	ter	5	5	100% 15-Oct-	08 21-Oct-	08									Erect Precas	t Stair #3 - Center					
061 Erect Precast Bay 5.6 - 4.1	Center	5	5	20% 22-Oct-	08 28-Oct-	08									Erect Pre	cast ฿่ay 5.6 - 4.1 - 0	enter				
062 Erect Precast Bay 4.1 - 2.4	Center	5	5	0% 29-Oct-	04-Nov	-08									Erect	Precast Bay 4.1 - 2.4	- Center				
063 Erect Precast Bay 2.4 - 0.8	Center	5	5	0% 05-Nov	08 11-Nov	-08									🔲 Er	ect Precast Bay 2.4	0.8 - Center				
064 Erect Precast Stair #4 - Cer	ter	4	4	0% 12-Nov	08 17-Nov	-08										Erect Precast Stair	#4 - Center				
065 Erect Precast Bay 0.8 - 1.6	Center	4	4	0% 18-Nov	08 21-Nov	-08										Erect Precast Bay	0.8 - 1.6 - Cente	÷r	1		
Precast - East		30	30	0% 24-Nov	08 02-Jan-	09	0									-	🔻 02-Jan-09, F	recast - East			
066 Erect Precast Bay 1.6 - 3.4	East	4	4	0% 24-Nov	08 27-Nov	-08										Erect Precast I		1			
067 Erect Precast Bay 3.4 - 4.9	East	4	4	0% 02-Dec	08 05-Dec	-08										i	ast Bay 3.4 - 4.9	i .			
068 Erect Precast Bay 4.9 - 7 -		4	4	0,0 00 200													recast Bay 4.9 -				
069 Erect Precast Bay 7 - 8 - Ea		4	4	070 12 200													t Precast Bay 7	1			
070 Erect Precast Bay 8 - 9 - Ea		4	4							1							rect Precast Bay				
071 Erect Precast Elev/Stair #1	East	8	-	0,0 21200													Erect Precas		1		
lumbing		59	59	0% 24-Nov			0									V		12-Fe	b-09, Plumbin	g	
132 Above Grade Plumbing Rou	gh-in - West	5	5	0% 24-Nov	08 28-Nov	-08										Above Grade					
133 Above Grade Plumbing Fin		10	10														Grade Plumbing	1	1		
134 Above Grade Plumbing Rou	gh-in - Center	5	-	0% 24-Dec	08 30-Dec	-08											Above Grade		-		
135 Above Grade Plumbing Fin		10	10	0% 31-Dec-													Above	1	, •		
136 Above Grade Plumbing Rou	-	5	-														i.	Above Grade			
137 Above Grade Plumbing Fin	shes - East	10																Above	e Grade Plumb	oing Finishes - E	
lectrical		95	95	0% 24-Nov	08 03-Apr-	09	0									V				• 03-Apr-09,), Elec
138 Above Grade - Electrical/Fin	e Alarm Rough-in - West	5	5	0% 24-Nov	08 28-Nov	-08										Above Grade	Electrical/Fire A	larm Rough-ir	- West		
139 Above Grade - Electrical/Fin	e Alarm Distrbution - West	10	10	0% 01-Dec-	08 12-Dec	-08										Above	Grade - Electrica	/Fire Alarm D	strbution - We	est	
140 Above Grade - Electrical/Fin	e Alarm Finishes - West	10	10	0% 15-Dec-	08 26-Dec	-08											Above Grade - E	lectrical/Fire A	larm Finishes	- West	
141 Above Grade Electrical/Fire	Alarm Rough-in - Center	4	4	0% 02-Jan-	09 07-Jan-	09											Above Gra	de Electrical/F	Fire Alarm Rou	ıgh-in - Center	
142 Above Grade Electrical/Fire		8	8	0% 08-Jan-													1	i	1	m Distribution -	i i
143 Above Grade Electrical/Fire		8	8															1	1	Alarm Finishes	1
144 Above Grade Elec/Fire Alar	8	4	4	0% 30-Jan-													[1	1	Alarm Rough-in	
145 Above Grade Elec/Fire Alar		8	8																	/Fire Alarm Dist	
146 Above Grade Elec/Fire Alar	n Finishes - East	8										·							Above Grade	e Elec/Fire Alarm	
147 Festoon Lighting - Bridge		3	-		·								_	_			1		-	E Festoon Li	ightin
lasonry		169	169	0 0% 29-Sep	08 21-May	-09	0							•							
079 Masonry - Elevator Machine		2		· ·									I			hine Room - West					
080 Masonry - Garage Office Sp		5													Masonry - Gara	age Office Space - W	1				
081 Masonry - Stair Twr 3 - Cen		10								ļ		Ļİ				Masonry -	. .		ļ		
082 Masonry - Stair Twr 4 - Cen		10														— N	lasonry - Stair T				
083 Masonry - Stair Twr #2 - We		10								1							Masor	1.7	1		
084 Masonry - Elevator Machine		2																Elevator Mac			
085 Masonry - Mech/Elec Room		7								1								ry - Mech/Ele	1		
086 Masonry - Front Face - Eas		20								¦								Masonry -			·
087 Back of House Masonry		20					-			1									of House Mas		
088 Front Facade Masonry 089 Masonry - Stair Twr 1 - Eas		20					_												Front Fac	1	Maar
089 Masonry - Stair Twr 1 - Eas 090 Brick Veneer @ Stair Twr 1		20		· ·						1											iviaso
		30		· · · ·			0					▼ 15-Aug-08	8 Underara	ound Litilities							1
Inderground Utilities	and a second sec						-			 	· · · · ·							 	 		
046 Underground Plumbing - W		6									Under	ground Plumbing - V									
047 Underground Plumbing - Ce		19					_					Undergrou		r.							
048 Underground Plumbing - Ea	SI	19										Undergrou		5							
049 Underground Electrical		10			-		0					Undergrou		الم: 			00 1 0	Steel			
iteel		74		· · ·			0			ļ				·			• 09-Jan-0	ອ, ວເຍຍl	ļ		
072 Erect / Detail Bridge Steel -	Bridge	10	10	100% 30-Sep	08 13-Oct-	08								Er	ect / Detail Brid	lge Steel - Bridge					
								1	Doco	2 of 3		1									
Actual Work	Critical Remaining Work Sur							1	raye	2013		1									

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1. ID	A strict Allows	1	2	Oak I I	0.4-2	Tin' I	· · · · ·				00					
ity ID	Activity Name	Duration	Remaining Duration	Schedule % Complete	Start	Finish	Total Float	Apr	May	20 Jun	Jul	Aug	Sep	Oct	Nov	
073	Erect W30 & W33 Beams Bay 2.4 - 0.8 - Center	1	1	0%	05-Nov-08	05-Nov-08		ЛРІ	widy	Jun	Jui	Aug	Ocp	000		W30¦& W3
0740	-	30	30		24-Nov-08	02-Jan-09			1							
076	Erect W33 Beams @ Lvl 4 Bay 4.9 - 7 - East	1	1	0%	08-Dec-08	08-Dec-08										1
077	Erect W33 Beam @ Lvl 4 @ 8 - East	1	1	0%	12-Dec-08	12-Dec-08										
078	Erect & Detail Mezzanine Steel	20	20	0%	15-Dec-08	09-Jan-09										
75	Erect W33 Beam @ Lvl 4 @ 4.9 - East	1	1	0%	02-Dec-08	02-Dec-08			1 1 1							I Er
Misce	Ilaneous Metals	158	158	0%	14-Oct-08	21-May-09	0									
102	Mesh Back-up Assembly - Bridge	7	7	100%	14-Oct-08	22-Oct-08									Mesh Back-u	up Assemb
103	Metal Panels - Bridge	10			23-Oct-08	05-Nov-08									- i -	l Panels - E
104	GKD Mesh - Bridge	10			06-Nov-08	19-Nov-08							+			GKD Me
105	Handrails Stair 1 - East	10			07-Jan-09	20-Jan-09			1				1			
106	Handrails - Stair 5 - West	5			21-Jan-09	27-Jan-09			1							
107	Metal Panels @ Rotunda	15	15		28-Jan-09	17-Feb-09			1							
108	Pan Stairs & Handrails Stair 3 - Center	10			28-Jan-09	10-Feb-09										
109	Pain Stairs & Handrails Stair 4 - Center	10			11-Feb-09	24-Feb-09				++			+			
110	Handrails - Stair 2 - West	10		0%	25-Feb-09	10-Mar-09			1							
111	Garage Fencing	20	20	0%	24-Apr-09	21-May-09										
Roofi	ng/ Waterproofing	118	118	0%	14-Oct-08	26-Mar-09	0		1 1 1							
091	Roofing @ Elev #2 - West	5	5	100%	14-Oct-08	20-Oct-08			1						Roofing @ Ele	ev #2:- We
092	Caulk Garage - West	15			23-Oct-08	12-Nov-08								·····		aulk Garag
093	Roofing @ Bridge	5			30-Oct-08	05-Nov-08			1				1		Roofir	
000	Caulk Garage - Center	15			05-Jan-09	23-Jan-09			1							ig e Dia
095	Waterproofing @ Lvl 4	10			08-Jan-09	20 Jan 00										
096	Expansion Joints	10			22-Jan-09	04-Feb-09			1							
097	Caulk Garage - East	15			26-Jan-09	13-Feb-09		+		¦			+			
098	Roofing @ Apron	5	5		29-Jan-09	04-Feb-09			- - -							
099	Roofing @ Elevator #1 - East	5	5		29-Jan-09	04-Feb-09										
100	Punched Openings	5			04-Feb-09	10-Feb-09										
101	Water Repellants	10	-		13-Mar-09	26-Mar-09			1							
Finish		122			20-Oct-08	07-Apr-09	0						+			
112	Drywall - Garage Offices - West	5			20-Oct-08	24-Oct-08									Drywall - Ga	arago Offic
112	Finishes @ Offices - West	10			20-Oct-08	07-Nov-08			1 1 1					T T	Finis	
113	Install Fire Protection - West	10			24-Nov-08	05-Dec-08										
115	Back of House Stud Backup	15			24-Dec-08	13-Jan-09			1							· ·
116	Install Fire Protection - Center	15			24-Dec-08	13-Jan-09										
117	Front Facade Stud Backup	15			14-Jan-09	03-Feb-09										
118	Install Fire Protection - East	15			23-Jan-09	12-Feb-09										
119	Glazing Rotunda	5	5		11-Feb-09	17-Feb-09			1 1 1							
120	Access Drive Ceiling	15			13-Feb-09	05-Mar-09										
121	Glazing Stair 2	10			18-Feb-09	03-Mar-09								<mark>-</mark> -		
122	Glazing Stair 1	15			18-Feb-09	10-Mar-09			1				1			
123	Doors & Hardware	10			25-Feb-09	10-Mar-09										
124	Traffic Coatings	10			27-Feb-09	12-Mar-09										
125	Painting	20			11-Mar-09	07-Apr-09			1							
126	Fire Proof Aprong Steel Center	10			17-Mar-09	30-Mar-09			·							
127	Line Striping	5			27-Mar-09	02-Apr-09										
Eleva		123			10-Nov-08	29-Apr-09	0		1 1 1						-	
128	Install Hoist / Separator Beams Elev 3&4 - West	5			10-Nov-08	14-Nov-08									— 1:	nstall Hoist
120	Install Flow 3 & 4 - West	40	40		17-Nov-08	09-Jan-09										
129	Install Hoist/Separator Beams Elev 1&2 - East	5	40		26-Feb-09	09-Jan-09 04-Mar-09			 							
130	Install Flow to 2 - East	40			05-Mar-09	29-Apr-09			-				1	i I		

Actual Work	Critical Remaining Work V Summary	Page 3 of 3	
Remaining Work 🔶	♦ Milestone		



SITE LAYOUT PLANNING

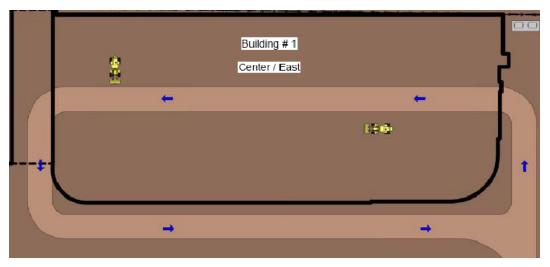
Three separate site layout plans were developed from the Existing Conditions Site Plan. Each plan describes a critical phase of the project in more detail. Excavation, Superstructure, and Finish phase site plans were constructed because these were the three most important areas of interest. Below are the critical issues for each phase.

Building 1 – Critical Phase Issues							
Excavation	Superstructure	Finishes					
Existing Utilities	Crawler Crane	Material Hoist					
Railroad Tracks	Overhead Electrical	Building #2					
Adjacent Buildings Material Storage							
P.J. Dick S	P.J. Dick Site Office						
	Truck Path						
	Parking Area						
	Dumpsters						

• Table 2 - Building 1 - Critical Phase Issues

Excavation Phase

During the excavation phase of the project, major concerns are efficiency and underground obstructions. A circular path was established onsite to allow trucks easy access to, from, and around the site.



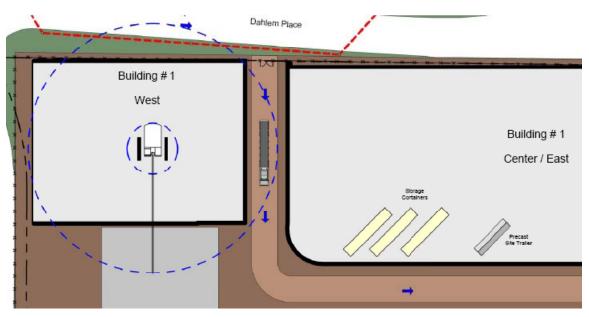
• Figure 2 - Excavation Snapshot

Underground utilities were not a concern for the contractor because all lines are run outside of the property line. Existing railroad tracks were buried onsite, but tracks were buried onsite, but the exact location of the rails was unknown. Foundations for Building #1 lock into the existing foundations for Building #3, and great care must

be taken while excavating around them. The contractor's office was located inside Building #3 because of their concurrent renovation work on that building. This eliminated the need for an office trailer onsite.

Superstructure Phase

Crane movement and usage is the most critical issue for the superstructure phase. A Manitowoc 999 crane started erection at the West end of the building and will work east to complete the structure. Overhead power lines have been tagged and must be watched while erected the West Garage. The path for vehicular movement was altered to avoid foundations and allow longer trailers an easy path through the site. The precast subcontractor's storage containers and office trailer were placed within the footprint of Building #1. They are not currently in the crane's path, but they will have to be moved in order to continue erection on the center portion of the building. A better location for the trailers might have been at the east end of the site next to the material storage location. Parking has been moved because site grading must occur at the east end of Building #3.

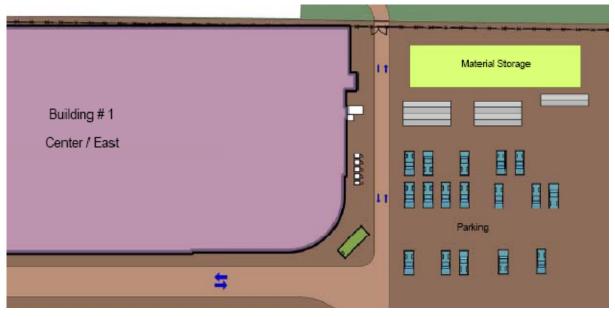


• Figure 3 - Superstructure Snapshot

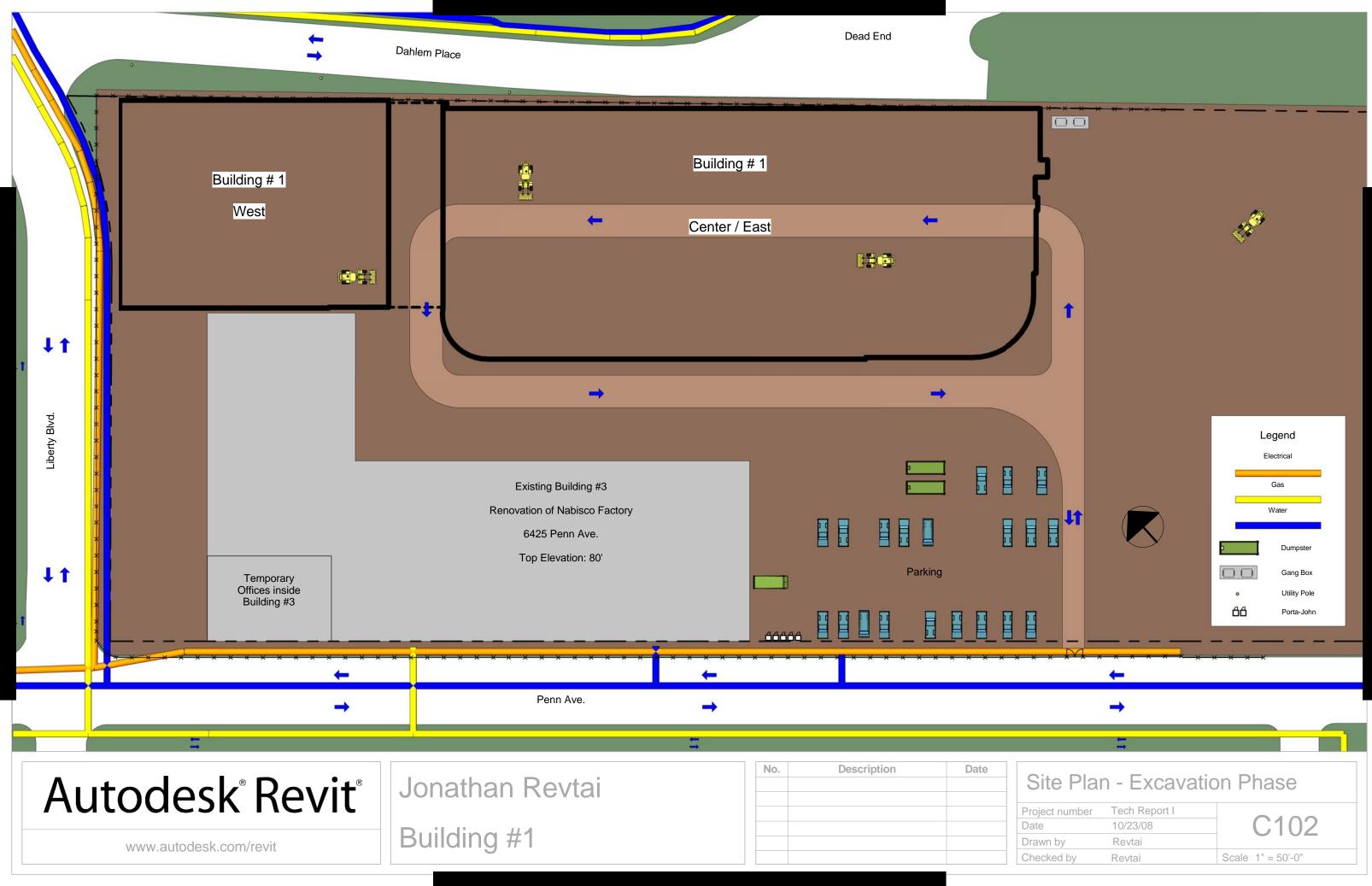
Finishes Phase

Work paths and efficiencies are again key issues for the finishes phase. Two material hoists will be erected. They will primarily be used to install the elevators and the infill steel around them, but while in place they can be used to lift materials 8

up to the upper levels of the building. Since renovation work on Building #3 will be complete at this point, office trailers will need to be used and dumpsters will be moved closer to Building #1.

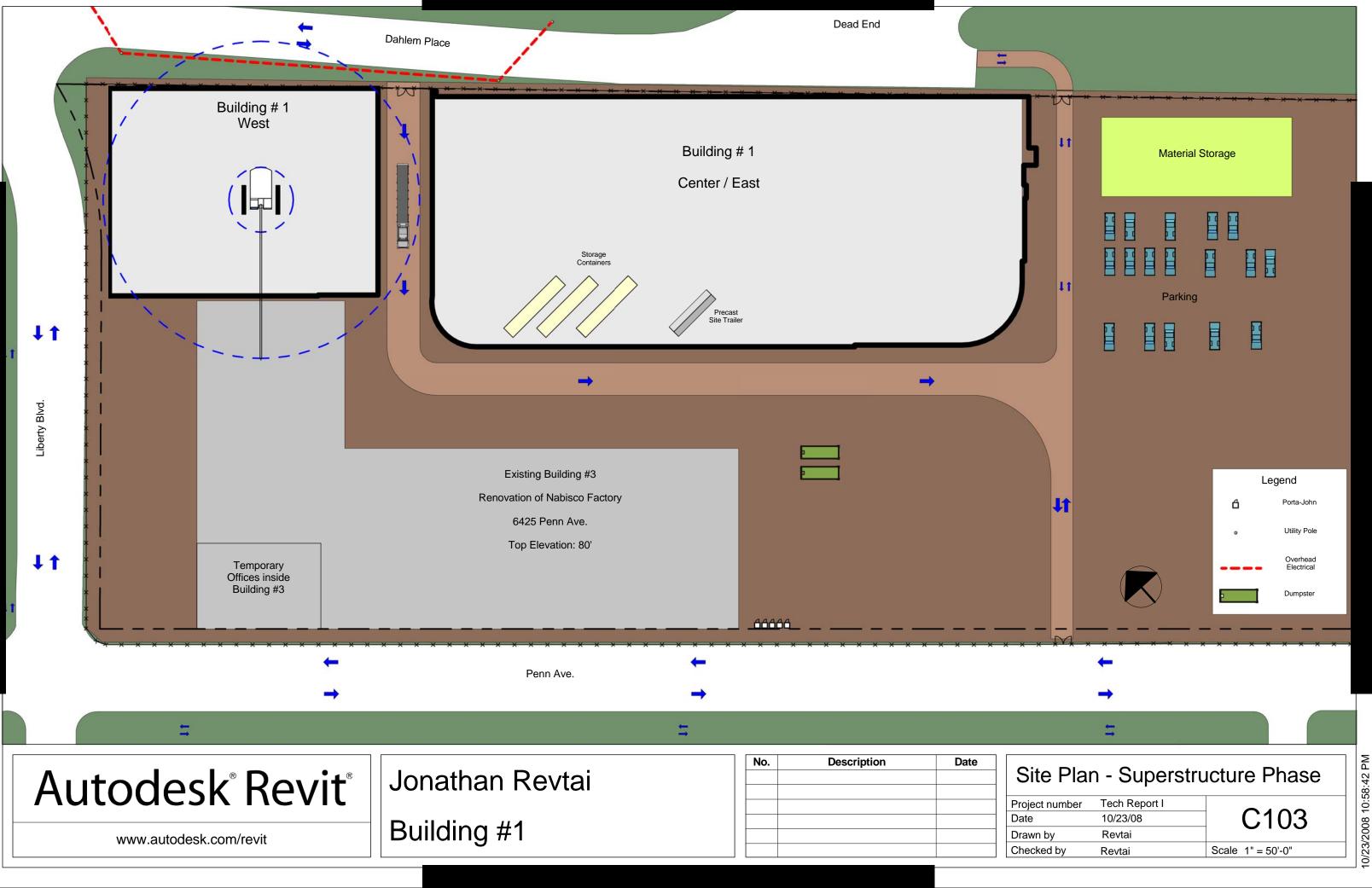


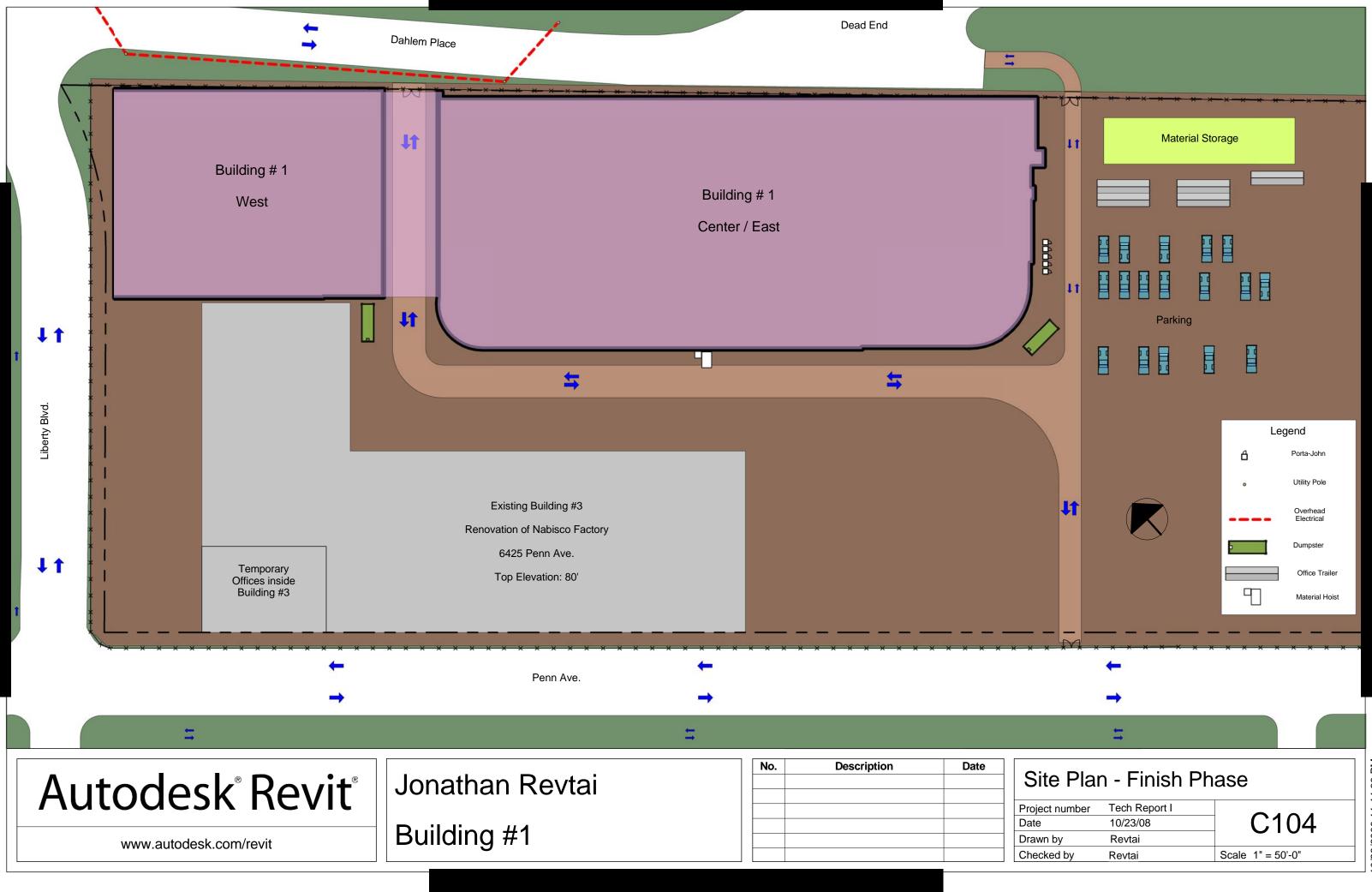
• Figure 4 - Finishes Snapshot



Project number	Tech Report I
Date	10/23/08
Drawn by	Revtai
Checked by	Revtai

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Project number	Tech Report I
Date	10/23/08
Drawn by	Revtai
Checked by	Revtai

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DETAILED STRUCTURAL SYSTEMS ESTIMATE

Structural system costs were calculated for the detailed systems estimate. This system was divided into four separate parts of work including foundations, typical precast bays, typical steel bays, and non-typical items.

Takeoff Assumpt	ions
Foundations	Auger Cast Piles were bored to an average depth of 32'
	A singular 10' long #8 bar reinforces each pile
	Plywood forms are used 4 times
	10% waste included
Typical Precast	Columns bisected by grid line count as ¹ / ₂
	Interior Lite Walls are considered T-Beams
	10% waste included on non-precast items
Typical Steel	Columns bisected by grid line count as ¹ / ₂
	Beams bisected by grid line count as ¹ / ₂
	13% waste included
Non-Typical	Plywood forms are used 4 times
	Steel grouped into similar sizes
	Plywood forms - columns used 4 times, 1 time for all else
	13% waste included for steel
	10% waste included for all else

• Table 3 - Takeoff Assumptions

Cost data was gathered from R.S. Means and from there calculations were made to find the cost per each of the sections mentioned above. Estimate assumptions were tailored specifically for Building #1.

Estimate Assump	tions
Location	Pittsburgh, Pennsylvania 15206
Cost Book	Commercial New Construction
Labor Type	Standard Union
Data Release	Year 2008 Quarter 1
Sub Markup	5%
GC O&P	4%

• Table 4 - Estimate Assumptions

Cost Break Do	Cost Break Down												
Description	Area	Material	Labor Cost	Equipment	Total Cost								
	(SF)	Cost		Cost									
Foundation	57,394	2,640,568	1,277,868	199,817	5,206,041								
Precast	295,695	3,355,066	291,820	152,646	4,369,651								
Steel	10,277	264,134	22,793	11,053	341,558								
Non-Typical	19,321	533,959	86,258	15,127	747,869								
Total	382,688	6,793,727	1,678,740	378,643	10,665,120								

Table 5 - Cost Breakdown

Square Foot Estimate												
Material Cost/	Labor	Equipment	Total									
SF	Cost/SF	Cost/SF	Cost/SF									
\$ 17.75	\$ 4.39	\$ 0.99	\$ 27.87									

• Table 6 - Square Foot Estimate

For more estimate information see **Appendix A**.

GENERAL CONDITIONS ESTIMATE

The general conditions estimate is based on a general contractor with a 4% fee. Adjustments were made for the percent of time involved in on this project that has an overall duration of 14 months. Overall General Condition cost equal \$923,250. Based on a \$24,000,000 jobs this comes out to be about 3.5% of the total. This may be a little lower than expected because many of these items are shared with Building #3. Since P.J. Dick is hired to construct 5 building at Bakery Square they are able to save money in the general conditions portion of their price. See table on next page.

General	Conditions Estimate		
Item	Description	Duration	Cost
010020	Mobilization	1 time	\$110,200
010010	Demobilization	1 time	\$ 4,300
011002	Senior Project Manager	7 months (50%)	\$84,200
011004	Superintendent	14 months	\$146,700
011013	Project Engineer	14 months	\$68,100
011018	Safety Engineer	3 months (20%)	\$12,600
011021	Secretary	7 months (50%)	\$ 31,100
011030	РХ	3 months (20%)	\$40,000
011031	Intern	6 months	\$25,000
012300	Permits	1 time	\$ 83,400
012400	Accounting	-	\$ 18,000
013000	Survey/Layout	14 months	\$25,500
015000	Office	14 months	\$21,500
015100	Field Communication	14 months	\$44,000
015200	Office Equipment	14 months	\$4,750
015310	Job Office Supplies	14 months	\$2,400
015320	Overnight Mail & Postage	14 months	\$2,900
016000	Utilities	14 months	\$53,200
016200	Winter Protection	3 months	\$6,250
016300	Temp Heat	3 months	\$16,000
017000	Safety	14 months	\$3,100
018000	Clean up	14 months	\$67,500
018500	Dumpsters	14 months	\$19,500
019010	Small Tools	14 months	\$4,250
019020	Photographs	14 months	\$700
019030	Project Signs	14 months	\$600
019040	Plans and Specs	1 time	\$10,000
019060	Parking	14 months	\$2,000
019100	Temp. Fence & Gates	14 months	\$13,000
019170	Snow Removal	3 months	\$2,500
Total			\$923,250

• Table 7 - General Conditions Estimate

For more general conditions information see **Appendix B**.

CRITICAL INDUSTRY ISSUES

I attended the Building Information Modeling (BIM) breakout session during the PACE Roundtable Meeting. The main topic of discussion was the implementation of BIM on the project and organizational level. Key issues such as document control, 3-D MEP coordination, file-sharing, software, process, and training were discussed.

MEP Coordination

MEP Coordination was the first topic and is considered by most to be a "low-hanging fruit" that most companies start to pursue when implementing BIM.

Document Control

From there the conversation headed toward document control and what needed to be done in order to safely implement BIM. Possible solutions for security integrity included Constructware, an online database, improved technical departments, and the ability to lock or checkout files.

File-Sharing

Problems often occur during file-sharing due to lack of a central file type. This issue was brought up and questions were asked about an Industry Foundation Classes (IFC) file type. A universal file type such as IFC would allow data to be transferred more accurately between software programs.

BIM Breakout Recap
B M – Information in a model is the new goal
Most companies should start with a pilot project
Information transfer is complicated between programs
An execution strategy should be implemented
A Design-Build delivery system works best at this time
Modeler should consider design intent and subcontractor involvement

• Table 8 - BIM Breakout Recap

PACE Reflection

It surprised me how little the industry members knew about BIM. I thought that I was quite inexperienced about the topic, but during the discussion I realized that the professionals attending the session were there hoping to learn how to implement the program.

A couple of issues could possibly be applied to my project. 3-D MEP coordination would be helpful on a small scale for the underground utilities being installed for Building #1. An investigation of document control could also be administered for Building #1 because P.J. Dick is already using Constructware. Training and implementation process could also be investigated because P.J. Dick is just starting to use BIM for their jobs.

Key Contacts		
Contact	Affiliation	Reason
Coleman Walker	Haskell	Very interested in BIM – Haskell is a
		design/build firm which is very well
		suited for BIM
Jason Reece	Balfour Beatty	Has had much experience in
		implementing BIM – especially in area
		of 3-D coordination
Dragana Nikolic	Penn State	Involved in CIC research

Table 9 - Key Contacts

APPENDIX A Detailed Estimate Information

Building 1 Foundation

Unit Cost Estimate

6425 Penn Ave. Pittsburgh PA 15206

Data Release : Year 2008 Quarter 1

Quantity	Unit	LineNumber	Description	Ext	. Mat. O&P	Ext	. Labor O&P	Ext.	Equip. O&P	Ext	. Total O&P
			Uncased drilled concrete piers, cast in								
			place augered piles, 18" diameter, priced								
			using 200 piles, 60' long, unless								
			specified otherwise, excludes pile caps								
15858	V.L.F.	024551000085	or mobilization, casing or reinforcing	\$	329,687.82	\$	186,172.92	\$	210,435.66	\$	726,296.40
			Cast-in place adds for drilled concrete								
			piers, for reinforcing, 4000 psi concrete,								
12816	Lb.	024551001500	7 ga.	\$	13,072.32	\$	-	\$	-	\$	13,072.32
			Structural concrete, ready mix, normal								
			weight, 3000 psi, includes local								
			aggregate, sand, portland cement and								
	0 Y	00040000450	water, delivered, excludes all additives					•		•	
1418	C.Y.	033102200150	and treatments	\$	151,612.56	\$	-	\$	-	\$	151,612.56
			Structural concrete, placing, pile caps,								
070	o v	000407004050	over 10 CY, includes vibrating, excludes	^		<u>م</u>	4 707 50	¢	4 5 4 0 0 0	¢	0 000 00
379	C.Y.	033107004050	Structural concrete, ready mix, normal	\$	-	\$	4,737.50	\$	1,546.32	\$	6,283.82
			weight, 3000 psi, includes local								
			aggregate, sand, portland cement and								
			water, delivered, excludes all additives								
379	C.Y.	033102200150	and treatments	\$	40,522.68	\$	_	\$	-	\$	40,522.68
010	0.11	000102200100	Structural concrete, placing, grade	Ψ	40,022.00	Ψ		Ψ		Ψ	40,022.00
			beam, pumped, includes vibrating,								
1418	C.Y.	033107003250	excludes material	\$	-	\$	23,552.98	\$	7,699.74	\$	31,252.72
_	-		Reinforcing steel, in place, footings, #4	Ť		Ť		Ŧ	.,	Ť	_
			to #7, A615, grade 60, incl labor for								
			accessories, excl material for								
1.65	Ton	032106000500	accessories	\$	1,581.41	\$	1,928.07	\$	-	\$	3,509.48

			Reinforcing steel, in place, footings, #8 to #18, A615, grade 60, incl labor for accessories, excl material for				_			
2544	Ton	032106000550	accessories	\$2	,313,208.32	\$ 1,728,342.72	\$	-	\$4	,041,551.04
11727	SFCA	031104303150	C.I.P. concrete forms, pile cap, square or rectangular, plywood, 4 use, includes erecting, bracing, stripping and cleaning	\$	11,375.19	\$ 53,357.85	\$	-	\$	64,733.04
	0504		C.I.P. concrete forms, pile cap, triangular or hexogonal plywood, 4 use, includes		0.407.07	40.040.00	÷			00.400.05
3069	SFCA	031104304150		\$	3,467.97	\$ 16,940.88	\$	-	\$	20,408.85
			Reinforcing steel, in place, beams and girders, #3 to #7, A615, grade 60, incl labor for accessories, excl material for							
4.86	Ton	032106000100	accessories	\$	4,896.84	\$ 7,395.95	\$	-	\$	12,292.79
			Reinforcing steel, in place, beams and girders, #8 to # 18, A615, grade 60, incl labor for accessories, excl material for							
29.95	Ton	032106000150	accessories	\$	30,177.02	\$ 27,184.12	\$	-	\$	57,361.14
			C.I.P. concrete forms, grade beam, plywood, 4 use, includes erecting,							
6943	SFCA	031104350150	bracing, stripping and cleaning	\$	6,387.56	\$ 30,757.49	\$	-	\$	37,145.05

Total

\$ 2,905,989.69 \$ 2,080,370.48 \$ 219,681.72 \$ 5,206,041.89

Typical Garage Bay - 1 Level

Unit Cost Estimate

6425 Penn Ave. Pittsburgh PA, 15206

Data Release : Year 2008 Quarter 1

Quantity	Unit	LineNumber	Description	Ext	. Mat. O&P	Ext.	Labor O&P	Ext	. Equip. O&P	Ext. O&F	Total
			Precast column, small, square, to 24'								
64	L.F.	034102100300	high, 3000 psi, includes material only	\$	3,294.72	\$	2,268.80	\$	791.04	\$6	6,354.56
4040		024407500200	Precast tees, double, floor, 60' span,	•	07 504 50	•	0.444.00	¢	4 000 04	• 40	00040
4216	S.F.	034107500200	prestressed	\$	37,564.56	\$	3,414.96	\$	1,222.64	\$42	2,202.16
2	Ea.	034101000250	Precast beam, L shaped, 40' span, 24" x 52", includes material only	\$	6,682.50	\$	850.74	\$	297.44	\$ -	7,830.68
2	La.	004101000200		Ψ	0,002.00	Ψ	000.74	Ψ	201.44	Ψι	,000.00
1	Ea.	034101002300	Precast beam, tee shaped, 30' span, 24" x 52", includes material only	\$	4,182.75	\$	425.37	\$	148.72	\$ 4	1,756.84
			Structural concrete, ready mix, normal weight, high early, 3000 psi, includes local aggregate, sand, portland cement and water, delivered, excludes all								
5.3	C.Y.	033102200460	additives and treatments	\$	597.58	\$	-	\$	-	\$	597.58
			Reinforcing steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for								
0.16	Ton	032106000400		\$	173.01	\$	135.66	\$	-	\$	308.67
			Welded wire fabric, sheets, 6 x 6 - W2.9								
3.93	C.S.F.	032202000300	x W2.9 (6 x 6) 42 lb. per C.S.F., A185	\$	85.01	\$	166.59	\$	-	\$	251.60

Total

\$ 52,580.13 \$

7,262.12 \$ 2,459.84 \$62,302.09

Typical Steel Bay

Unit Cost Estimate

6425 Penn Ave. Pittsburgh PA, 15206

Data Release : Year 2008 Quarter 1

Quantity	Unit	LineNumber	Description	Ext	. Mat. O&P	Ext	. Labor O&P	Ext	. Equip.	O&P	Ext. O&P	Total
			Column, structural, 2-tier, W10x68, A992									
			steel, incl shop primer, splice plates,									
46.33	L.F.	051202607050	bolts	\$	3,983.45	\$	233.04	\$		92.66	\$ 4	,309.15
			Structural steel member, 100-ton project,									
			1 to 2 story building, W12x14, A992									
			steel, shop fabricated, incl shop primer,									
27.12	L.F.	051206401100	bolted connections	\$	480.57	\$	152.96	\$		60.75	\$	694.27
			Structural steel member, 100-ton project,									
			1 to 2 story building, W18x35, A992									
			steel, shop fabricated, incl shop primer,									
307.36	L.F.	051206403300	bolted connections	\$	13,579.16	\$	2,335.94	\$	6	85.41	\$16	,600.51
			Structural steel member, 100-ton project,									
			1 to 2 story building, W18x55, A992									
			steel, shop fabricated, incl shop primer,									
76.84	L.F.	051206403900	bolted connections	\$	5,328.85	\$	611.65	\$	1	80.57	\$6	,121.07
			Steel plate, structural, for connections &									
			stiffenners, 3/4" T, shop fabricated, incl									
4.66	S.F.	051205600450		\$	163.80	\$	-	\$		-	\$	163.80
			Structural steel member, 100-ton project,									
			1 to 2 story building, W24x55, A992									
			steel, shop fabricated, incl shop primer,									
28.25	L.F.	051206404900	bolted connections	\$	1,959.14	\$	185.04	\$		54.24	\$ 2	,198.42
Total				\$	25,494.97	\$	3,518.63	\$	1,0	73.63	\$30	,087.22

Non-typical elements

Unit Cost Estimate

6425 Penn Ave.

Pittsburgh PA 15206

Data Release : Year 2008 Quarter 1

Quantity	Unit	LineNumber	Description	. Mat. O&P	Ext	. Labor O&P	Ext	. Equip. O&P	Ext. Total O&P
66	L.F.	051206406100	Structural steel member, 100-ton project, 1 to 2 story building, W30x99, A992 steel, shop fabricated, incl shop primer, bolted connections	\$ 8,276.40	\$	399.96	\$	117.48	\$ 8,793.84
66	L.F.	051206406700	Structural steel member, 100-ton project, 1 to 2 story building, W33x118, A992 steel, shop fabricated, incl shop primer, bolted connections	\$ 9,843.90	\$	408.54	\$	120.12	\$ 10,372.56
66	L.F.	051206406900	Structural steel member, 100-ton project, 1 to 2 story building, W33x130, A992 steel, shop fabricated, incl shop primer, bolted connections	\$ 10,847.10	\$	424.38	\$	124.74	\$ 11,396.22
66	L.F.	051206407140	Structural steel member, 100-ton project, 1 to 2 story building, W33x201, A992 steel, shop fabricated, incl shop primer, bolted connections	\$ 16,803.60	\$	436.92	\$	128.04	\$ 17,368.56
131	L.F.	051206408100	Structural steel member, 100-ton project, 1 to 2 story building, W36x300, A992 steel, shop fabricated, incl shop primer, bolted connections	\$ 49,780.00	\$	922.24	\$	271.17	\$ 50,973.41
131	L.F.	051206407920	Structural steel member, 100-ton project, 1 to 2 story building, W36x260, A992 steel, shop fabricated, incl shop primer, bolted connections	\$ 42,935.25	\$	922.24	\$	271.17	\$ 44,128.66

			Structural steel member, 100-ton project,	I							
			1 to 2 story building, W8x35, A992 steel,								
			shop fabricated, incl shop primer, bolted								
147	L.F.	051206400520	connections	\$	6,494.46	\$	1,323.00	\$	526.26	\$	8,343.72
147	L.I .	031200400320	Structural steel member, 100-ton project,	Ψ	0,494.40	φ	1,323.00	Ψ	520.20	ψ	0,343.72
			1 to 2 story building, W10x15, A992								
			steel, shop fabricated, incl shop primer,								
180	L.F.	051206400620	bolted connections	\$	3,411.00	\$	1,488.60	\$	590.40	\$	5,490.00
100	<u> </u>	001200400020	Structural steel member, 100-ton project,	Ψ	0,411.00	Ŷ	1,400.00	Ψ	000.40	Ψ	0,400.00
			1 to 2 story building, W10x22, A992								
			steel, shop fabricated, incl shop primer,								
24	L.F.	051206400700	bolted connections	\$	672.72	\$	198.48	\$	78.72	\$	949.92
		001200100100	Structural steel member, 100-ton project,	Ψ	012.12	Ŷ	100.10	Ψ	10.12	Ŷ	010.02
			1 to 2 story building, W12x14, A992								
			steel, shop fabricated, incl shop primer,								
116	L.F.	051206401100	bolted connections	\$	2,055.52	\$	654.24	\$	259.84	\$	2,969.60
			Structural steel member, 100-ton project,	Ť	,			T		T	,
			1 to 2 story building, W14x26, A992								
			steel, shop fabricated, incl shop primer,								
217	L.F.	051206401900	bolted connections	\$	7,113.26	\$	1,087.17	\$	431.83	\$	8,632.26
			Structural steel member, 100-ton project,								
			1 to 2 story building, W16x26, A992								
			steel, shop fabricated, incl shop primer,								
271	L.F.	051206402700	bolted connections	\$	8,883.38	\$	1,344.16	\$	533.87	\$	10,761.41
			Structural steel member, 100-ton project,								
			1 to 2 story building, W16x31, A992								
			steel, shop fabricated, incl shop primer,								
23	L.F.	051206402900	bolted connections	\$	906.89	\$	126.73	\$	50.60	\$	1,084.22
			Structural steel member, 100-ton project,								
			1 to 2 story building, W18x35, A992								
			steel, shop fabricated, incl shop primer,								
1413	L.F.	051206403300	bolted connections	\$	62,426.34	\$	10,738.80	\$	3,150.99	\$	76,316.13
			Structural steel member, 100-ton project,								
			1 to 2 story building, W18x46, A992								
50			steel, shop fabricated, incl shop primer,	^		^		\$	· • ·	_	
59	L.F.	051206403520	bolted connections	\$	3,419.05	\$	448.40	\$	131.57	\$	3,999.02

			Structural steel member, 100-ton project,	1							
			1 to 2 story building, W18x50, A992								
			steel, shop fabricated, incl shop primer,								
20	L.F.	051206403700	bolted connections	\$	1,263.60	\$	159.20	\$	47.00	\$	1,469.80
			Structural steel member, 100-ton project,		.,	Ŧ		- -		•	.,
			1 to 2 story building, W18x55, A992								
			steel, shop fabricated, incl shop primer,								
36	L.F.	051206403900	bolted connections	\$	2,496.60	\$	286.56	\$	84.60	\$	2,867.76
			Structural steel member, 100-ton project,								
			1 to 2 story building, W18x86, A992								
			steel, shop fabricated, incl shop primer,								
70	L.F.	051206403960	bolted connections	\$	7,581.00	\$	566.30	\$	166.60	\$	8,313.90
			Structural steel member, 100-ton project,								
			1 to 2 story building, W21x44, A992								
			steel, shop fabricated, incl shop primer,								
358	L.F.	051206404100		\$	19,897.64	\$	2,455.88	\$	719.58	\$	23,073.10
			Structural steel member, 100-ton project,								
			1 to 2 story building, W21x50, A992								
			steel, shop fabricated, incl shop primer,								
64	L.F.	051206404300	bolted connections	\$	4,043.52	\$	439.04	\$	128.64	\$	4,611.20
			Structural steel member, 100-ton project,								
			1 to 2 story building, W21x62, A992								
70		054000404500	steel, shop fabricated, incl shop primer,	•		^		^	100 74	•	
79	L.F.	051206404500	bolted connections Structural steel member, 100-ton project,	\$	6,192.02	\$	556.16	\$	162.74	\$	6,910.92
			1 to 2 story building, W21x68, A992								
			steel, shop fabricated, incl shop primer,								
28	L.F.	051006404700	bolted connections	\$	2 407 44	\$	197.12	\$	57.68	¢	2 662 24
20	Ц.Г.	031200404700	Structural steel member, 100-ton project,	φ	2,407.44	φ	197.12	φ	57.00	\$	2,662.24
			1 to 2 story building, W24x55, A992								
			steel, shop fabricated, incl shop primer,								
38	L.F.	051206404900	bolted connections	\$	2,635.30	\$	248.90	\$	72.96	\$	2,957.16
	<u> </u>	001200404000	Structural steel member, 100-ton project,	Ψ	2,000.00	Ψ	270.30	Ψ	12.30	Ψ	2,007.10
			1 to 2 story building, W24x68, A992								
			steel, shop fabricated, incl shop primer,								
86	L.F.	051206405300	bolted connections	\$	7,394.28	\$	563.30	\$	165.12	\$	8,122.70

82	L.F.	051206405500	Structural steel member, 100-ton project, 1 to 2 story building, W24x76, A992 steel, shop fabricated, incl shop primer, bolted connections	\$	7,867.90	\$	537.10	\$	157.44	\$ 8,562.44
			Structural steel member, 100-ton project,							
			1 to 2 story building, W30x116, A992							
			steel, shop fabricated, incl shop primer,							
104	L.F.	051206406500	bolted connections Structural concrete, ready mix, normal	\$	15,215.20	\$	650.00	\$	191.36	\$ 16,056.56
			weight, 4000 PSI, includes local							
			aggregate, sand, portland cement and							
			water, delivered, excludes all additives							
313	C.Y.	033102200300	and treatments	\$	35,594.36	\$	-	\$	-	\$ 35,594.36
			Welded wire fabric, sheets, 6 x 6 - W2.1							
203	CSE	032202000200	· · ·	\$	3,432.73	\$	8,055.04	\$	_	\$ 11,487.77
200	0.0.1 .	002202000200		Ψ	0,402.70	Ψ	0,000.04	Ψ		φ 11,407.77
			Welded wire fabric, sheets, 6 x 6 - W2.1							
191	C.S.F.	032202000200	x W2.1 (8 x 8) 30 lb. per C.S.F., A185	\$	3,229.81	\$	7,578.88	\$	-	\$ 10,808.69
			Structural concrete, ready mix, normal weight, 4000 PSI, includes local							
			aggregate, sand, portland cement and							
			water, delivered, excludes all additives							
323	C.Y.	033102200300	and treatments	\$	36,731.56	\$	-	\$	-	\$ 36,731.56
19052	S.F.	053103000300	Metal decking, steel, cellular units, galvanized, over 15 Sq, 2" D, 18-18 ga	¢	152,797.04	\$	43,057.52	\$	2,095.72	\$197,950.28
19052	З.Г.	053103000300	Structural concrete, placing, elevated	φ	152,797.04	φ	43,057.52	φ	2,095.72	\$197,950.20
			slab, pumped, less than 6" thick,							
323	C.Y.	033107001400	includes vibrating, excludes material	\$	-	\$	6,954.19	\$	2,254.54	\$ 9,208.73
			Structural concrete, placing, slab on							
313	C.Y.	022107004250	grade, pumped, up to 6" thick, includes	¢		¢	7 177 00	¢	0.000.45	¢ 0 E 40 0 4
313	U.T.	033107004350	vibrating, excludes material	\$	-	\$	7,177.09	\$	2,363.15	\$ 9,540.24

			Structural concrete, ready mix, normal	r –		1				
			weight, 5000 psi, includes local							
			aggregate, sand, portland cement and							
			water, delivered, excludes all additives							
144	C.Y.	033102200400	and treatments	\$	16,796.16	\$	-	\$	_	\$ 16,796.16
	0.11	000102200400	Structural concrete, placing, column,	Ψ	10,700.10	Ψ		Ψ		φ 10,700.10
			square or round, pumped, 12" thick,							
6	C.Y.	033107000400	includes vibrating, excludes material	\$	-	\$	300.48	\$	97.80	\$ 398.28
	0.11	000101000100	Structural concrete, placing, elevated	Ψ		Ψ	000.40	Ψ	07.00	φ 000.20
			slab, pumped, over 10" thick, includes							
90	C.Y.	033107001600	vibrating, excludes material	\$	-	\$	1,494.90	\$	488.70	\$ 1,983.60
	0.11	000107001000	Structural concrete, placing, walls,	Ψ		Ψ	1,404.00	Ψ	400.70	φ 1,000.00
			pumped, 15" thick, includes vibrating,							
48	C.Y.	033107005350	excludes material	\$	-	\$	1,190.40	\$	392.64	\$ 1,583.04
	0		Reinforcing steel, in place, elevated	Ŷ		Ŷ	1,100110	Ŷ	002.01	ф 1,000.01
			slabs, #4 to #7, A615, grade 60, incl							
			labor for accessories, excl material for							
6.72	Ton	032106000400	accessories	\$	7,266.34	\$	5,697.62	\$	-	\$ 12,963.96
			Reinforcing steel, in place, walls, #3 to	Ť	.,	Ť	0,001102	Ŧ		· · _,
			#7, A615, grade 60, incl labor for							
			accessories, excl material for							
3.11	Ton	032106000700	accessories	\$	2,980.72	\$	2,552.35	\$	-	\$ 5,533.06
			Reinforcing steel, in place, columns, #8	Ŧ	,		,			+ -,
			to #18, A615, grade 60, incl labor for							
			accessories, excl material for							
1.65	Ton	032106000250	accessories	\$	1,662.51	\$	1,757.68	\$	-	\$ 3,420.19
					,		,			. ,
			C.I.P. concrete forms, column, square,							
			plywood, 12" x 12", 4 use, includes							
562	SFCA	031104105650	erecting, bracing, stripping and cleaning	\$	466.46	\$	4,349.88	\$	-	\$ 4,816.34
			C.I.P. concrete forms, elevated slab, flat							,
			plate, plywood, to 15' high, 1 use,							
			includes shoring, erecting, bracing,							
1834	S.F.	031104201000		\$	8,968.26	\$	10,472.14	\$	-	\$ 19,440.40
			C.I.P. concrete forms, wall,							
			corbel/haunch, add to wall form, to 12"							
			wide, 1 use, includes erecting, bracing,							
130	L.F.	031104551000	stripping and cleaning	\$	319.80	\$	2,328.30	\$	-	\$ 2,648.10

		C.I.P. concrete forms, wall, job built, plywood, to 8' high, 1 use, includes				
1922	SFCA	erecting, bracing, stripping and cleaning	\$ 5,823.66	\$ 13,953.72	\$ -	\$ 19,777.38

Total

\$ 586,932.78 **\$** 144,503.61 **\$** 16,433.07 **\$**747,869.45

APPENDIX B General Conditions Information

Item	Description	Duration	Unit Cost	Cost
10020	Mobilization	1 time	-	\$110,200
10010	Demobilization	1 time	-	\$4,300
11002	Senior Project Manager	7 months (50%)	\$12,028.57	\$84,200
11004	Superintendent	14 months	\$10,478.57	\$146,700
11013	Project Engineer	14 months	\$4,864.29	\$68,100
11018	Safety Engineer	3 months (20%)	\$4,200	\$12,600
11021	Secretary	7 months (50%)	\$4,442.86	\$31,100
11030	РХ	3 months (20%)	\$13,333	\$40,000
11031	Intern	6 months	\$4,166.67	\$25,000
12300	Permits	1 time	-	\$83,400
12400	Accounting	-	-	\$18,000
13000	Survey/Layout	14 months	\$1,821.43	\$25,500
15000	Office	14 months	\$1,535.71	\$21,500
15100	Field Communication	14 months	\$3,142.86	\$44,000
15200	Office Equipment	14 months	\$339.29	\$4,750
15310	Job Office Supplies	14 months	\$171.43	\$2,400
15320	Overnight Mail & Postage	14 months	\$207.14	\$2,900
16000	Utilities	14 months	\$3,800.00	\$53,200
	Winter Protection	3 months	\$2,083	\$6,250
16300	Temp Heat	3 months	\$5,333	\$16,000
17000	Safety	14 months	\$221.43	\$3,100
18000	Clean up	14 months	\$4,821.43	\$67,500
18500	Dumpsters	14 months	\$1,392.86	\$19,500
19010	Small Tools	14 months	\$303.57	\$4,250
	Photographs	14 months	\$50.00	\$700
19030	Project Signs	14 months	\$42.86	\$600
19040	Plans and Specs	1 time	-	\$10,000
19060	Parking	14 months	\$142.86	\$2,000
	Temp. Fence & Gates	14 months	\$928.57	\$13,000
19170	Snow Removal	3 months	\$833	\$2,500
		Total		\$923,250