AE 481W

Technical Assignment 2: Cost and Schedule Analysis

Jonathan Revtai

Construction Management

Consultant: Dr. Riley

Bakery Square – Building 1

10/24/2008

BkSq

Jonathan Revtai

Construction Management

Project Size
378,000 SF

Project Cost
$24 Million

Start Date
03.17.2008

End Date
05.21.2009

Delivery Method
CM at Risk

Building 1 at Bakery Square

Pittsburgh, PA

Project Team

Owner/ Developer
Bakery Square Holdings, L.P.

Architect
Astorino

CM at Risk
P.J. Dick Inc.

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, restaraunts, 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.

www.engr.psu.edu/ae/thesis/portfolios/2009/jar5015

MEP

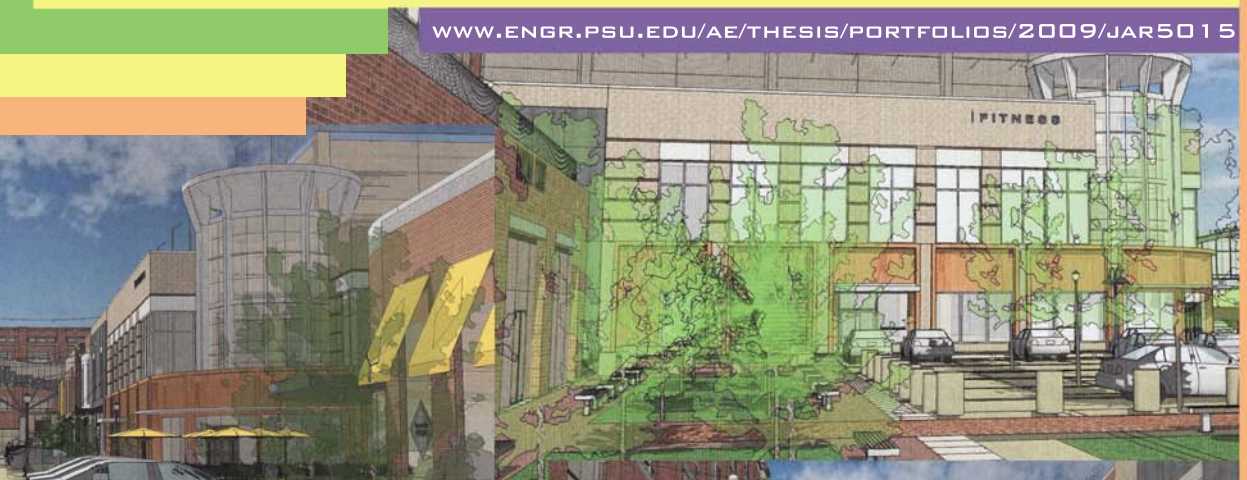
Roof top units are used to condition the retail fitness spaces, while wall units are used in the parking garage section. Plumbing is limited to bathrooms

Electrical

The fitness center is fed by a separate switch board from the rest of the building. The feed to each switchboard 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 hanging 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

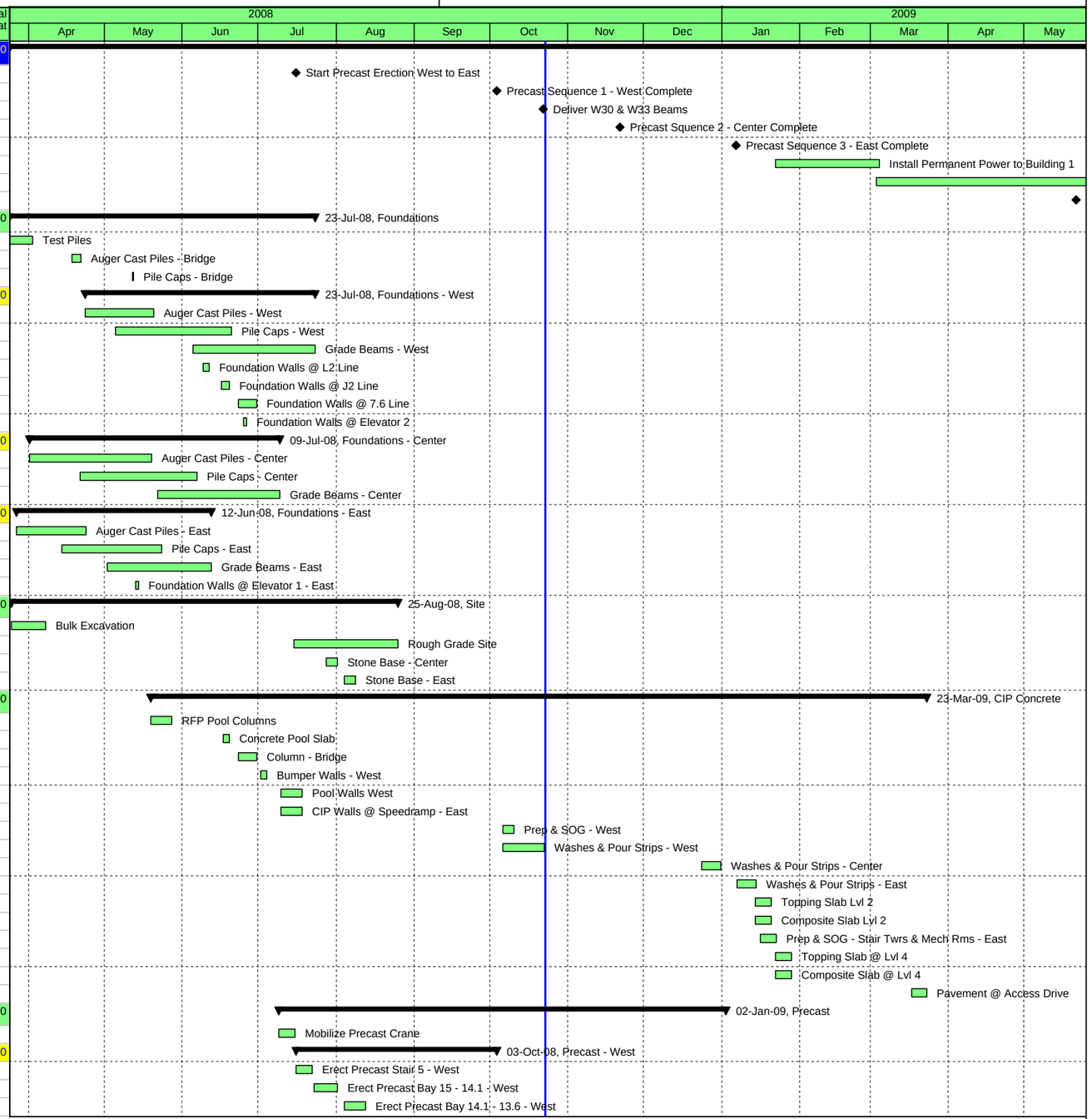
A detailed construction schedule has been developed from the summary schedule to show activities that reflect the actual construction of Building 1 at Bakery Square. Important phasing includes the foundation and underground work, bridge construction, finishes, and the precast sequencing that starts at 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

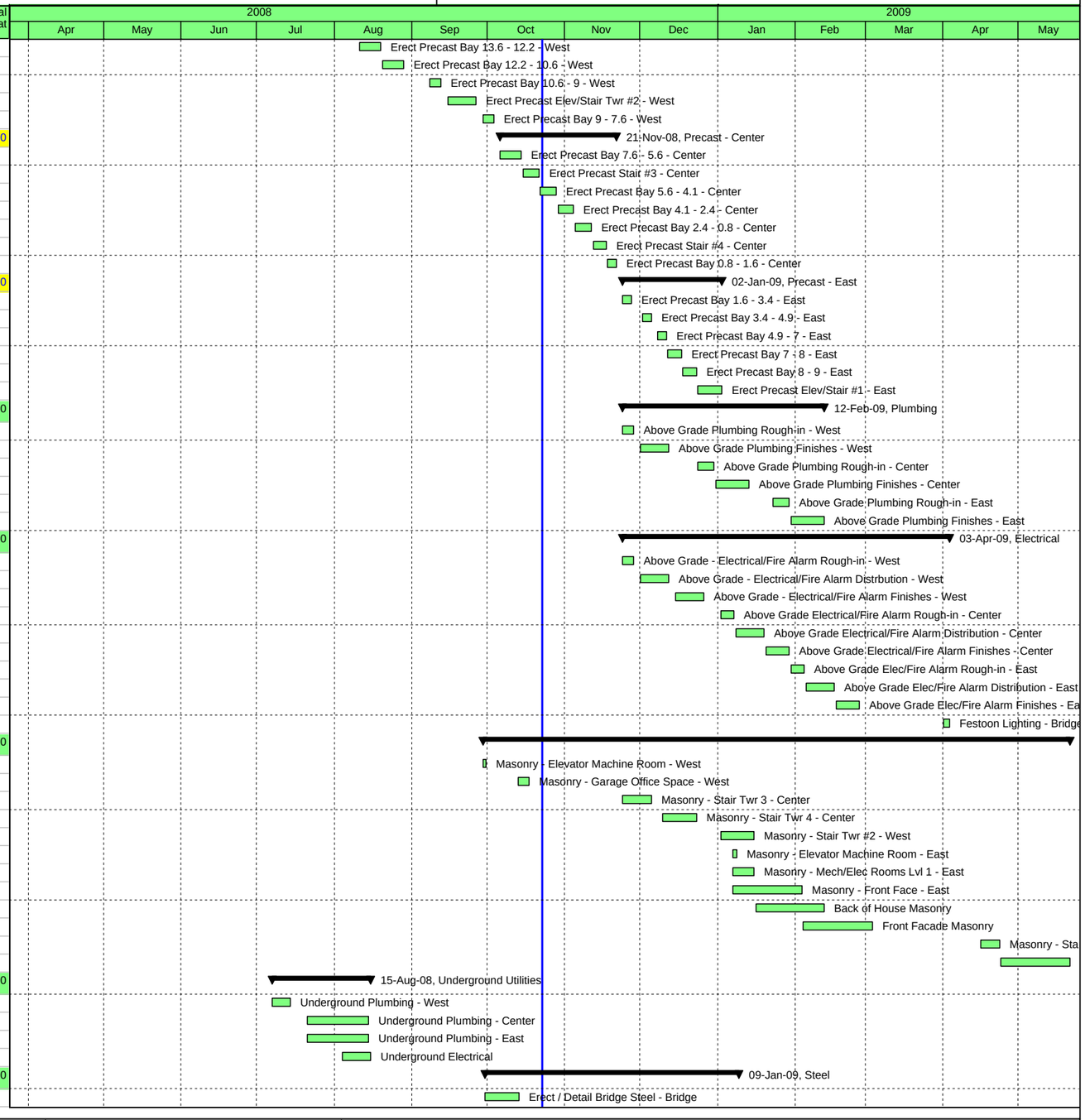
Each construction phase has been broken down further into activities that were grouped into areas assigned to different trades. Precast erection, CIP concrete, masonry, and steel are some examples of trade categories.

Activity ID	Activity Name	Original Duration	Remaining Duration	Schedule % Complete	Start	Finish	Total Float
Bakery Square - Building #1		376	376	0%	24-Mar-08	31-Aug-09	0
001	Start Precast Erection West to East	0	0	100%	16-Jul-08		
002	Precast Sequence 1 - West Complete	0	0	100%		03-Oct-08	
003	Deliver W30 & W33 Beams	0	0	100%	22-Oct-08		
004	Precast Squence 2 - Center Complete	0	0	0%		21-Nov-08	
005	Precast Sequence 3 - East Complete	0	0	0%		06-Jan-09	
006	Install Permanent Power to Building 1	30	30	0%	22-Jan-09	04-Mar-09	
007	Urban Active Fit-out	130	130	0%	03-Mar-09	31-Aug-09	
008	Parking Garage Complete	0	0	0%		21-May-09	
Foundations		88	88	0%	24-Mar-08	23-Jul-08	0
013	Test Piles	8	8	100%	24-Mar-08	02-Apr-08	
014	Auger Cast Piles - Bridge	2	2	100%	18-Apr-08	21-Apr-08	
015	Pile Caps - Bridge	1	1	100%	12-May-08	12-May-08	
Foundations - West		66	66	0%	23-Apr-08	23-Jul-08	0
023	Auger Cast Piles - West	20	20	100%	23-Apr-08	20-May-08	
024	Pile Caps - West	35	35	100%	05-May-08	20-Jun-08	
025	Grade Beams - West	35	35	100%	05-Jun-08	23-Jul-08	
026	Foundation Walls @ L2 Line	3	3	100%	09-Jun-08	11-Jun-08	
027	Foundation Walls @ J2 Line	4	4	100%	16-Jun-08	19-Jun-08	
028	Foundation Walls @ 7.6 Line	6	6	100%	23-Jun-08	30-Jun-08	
029	Foundation Walls @ Elevator 2	2	2	100%	25-Jun-08	26-Jun-08	
Foundations - Center		72	72	0%	01-Apr-08	09-Jul-08	0
020	Auger Cast Piles - Center	35	35	100%	01-Apr-08	19-May-08	
021	Pile Caps - Center	35	35	100%	21-Apr-08	06-Jun-08	
022	Grade Beams - Center	35	35	100%	22-May-08	09-Jul-08	
Foundations - East		56	56	0%	27-Mar-08	12-Jun-08	0
016	Auger Cast Piles - East	20	20	100%	27-Mar-08	23-Apr-08	
017	Pile Caps - East	30	30	100%	14-Apr-08	23-May-08	
018	Grade Beams - East	30	30	100%	02-May-08	12-Jun-08	
019	Foundation Walls @ Elevator 1 - East	2	2	100%	13-May-08	14-May-08	
Site		110	110	0%	25-Mar-08	25-Aug-08	0
009	Bulk Excavation	10	10	100%	25-Mar-08	07-Apr-08	
010	Rough Grade Site	30	30	100%	15-Jul-08	25-Aug-08	
011	Stone Base - Center	5	5	100%	28-Jul-08	01-Aug-08	
012	Stone Base - East	5	5	100%	04-Aug-08	08-Aug-08	
CIP Concrete		221	221	0%	19-May-08	23-Mar-09	0
0030	RFP Pool Columns	7	7	100%	19-May-08	27-May-08	
031	Concrete Pool Slab	3	3	100%	17-Jun-08	19-Jun-08	
032	Column - Bridge	6	6	100%	23-Jun-08	30-Jun-08	
033	Bumper Walls - West	3	3	100%	02-Jul-08	04-Jul-08	
034	Pool Walls West	7	7	100%	10-Jul-08	18-Jul-08	
035	CIP Walls @ Speedramp - East	7	7	100%	10-Jul-08	18-Jul-08	
036	Prep & SOG - West	5	5	100%	06-Oct-08	10-Oct-08	
037	Washes & Pour Strips - West	13	13	100%	06-Oct-08	22-Oct-08	
038	Washes & Pour Strips - Center	6	6	0%	24-Dec-08	31-Dec-08	
039	Washes & Pour Strips - East	6	6	0%	07-Jan-09	14-Jan-09	
040	Topping Slab Lvl 2	5	5	0%	14-Jan-09	20-Jan-09	
041	Composite Slab Lvl 2	5	5	0%	14-Jan-09	20-Jan-09	
042	Prep & SOG - Stair Twrs & Mech Rms - East	5	5	0%	16-Jan-09	22-Jan-09	
043	Topping Slab @ Lvl 4	5	5	0%	22-Jan-09	28-Jan-09	
044	Composite Slab @ Lvl 4	5	5	0%	22-Jan-09	28-Jan-09	
045	Pavement @ Access Drive	5	5	0%	17-Mar-09	23-Mar-09	
Precast		128	128	0%	09-Jul-08	02-Jan-09	0
050	Mobilize Precast Crane	5	5	100%	09-Jul-08	15-Jul-08	
Precast - West		58	58	0%	16-Jul-08	03-Oct-08	0
051	Erect Precast Stair 5 - West	5	5	100%	16-Jul-08	22-Jul-08	
052	Erect Precast Bay 15 - 14.1 - West	8	8	100%	23-Jul-08	01-Aug-08	
053	Erect Precast Bay 14.1 - 13.6 - West	7	7	100%	04-Aug-08	12-Aug-08	



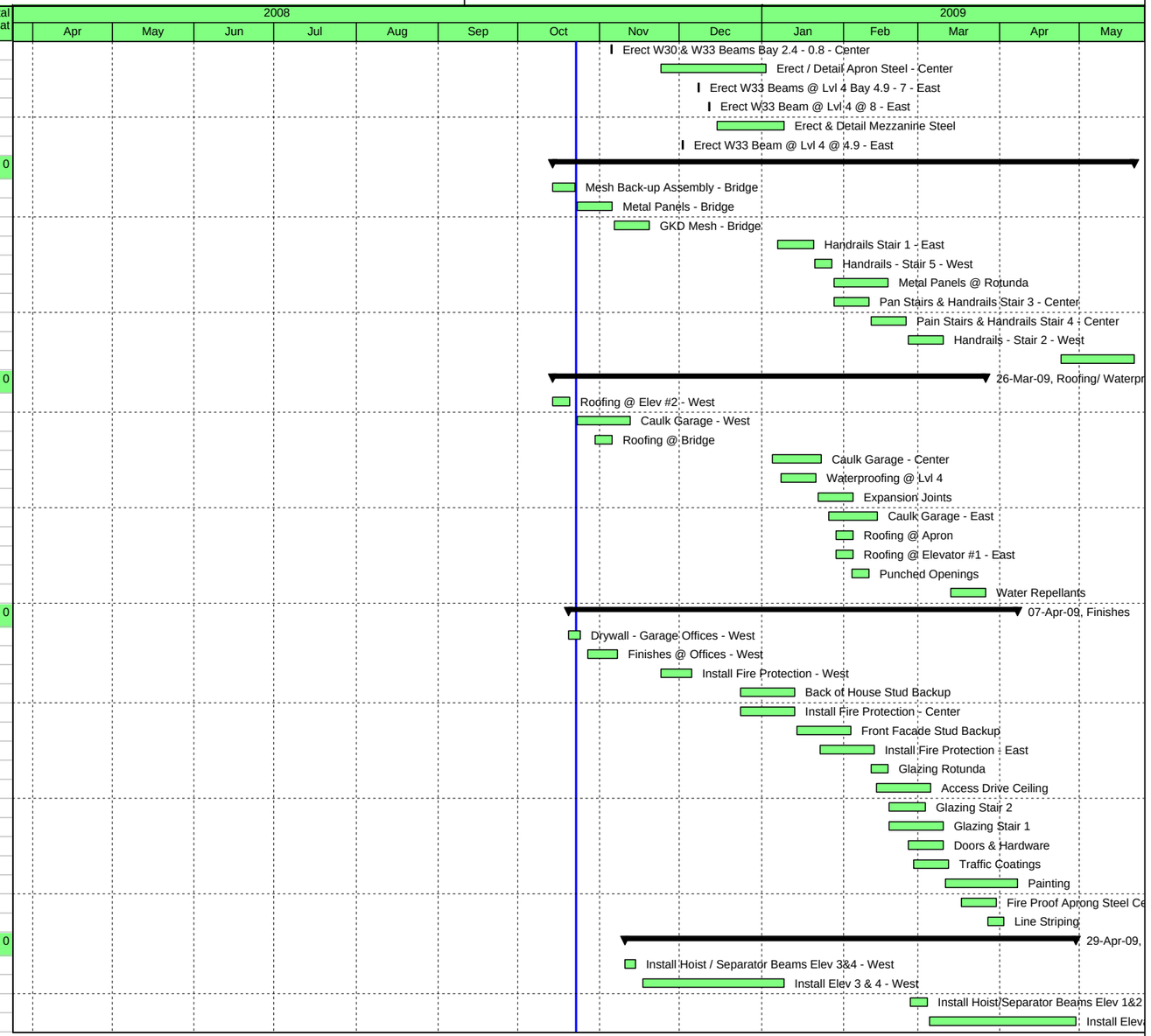
Actual Work | Critical Remaining Work | Summary
Remaining Work | Milestone

Activity ID	Activity Name	Original Duration	Remaining Duration	Schedule % Complete	Start	Finish	Total Float
054	Erect Precast Bay 13.6 - 12.2 - West	7	7	100%	11-Aug-08	19-Aug-08	
055	Erect Precast Bay 12.2 - 10.6 - West	7	7	100%	20-Aug-08	28-Aug-08	
056	Erect Precast Bay 10.6 - 9 - West	5	5	100%	08-Sep-08	12-Sep-08	
057	Erect Precast Elev/Stair Twr #2 - West	10	10	100%	15-Sep-08	26-Sep-08	
058	Erect Precast Bay 9 - 7.6 - West	5	5	100%	29-Sep-08	03-Oct-08	
Precast - Center		35	35	0%	06-Oct-08	21-Nov-08	0
059	Erect Precast Bay 7.6 - 5.6 - Center	7	7	100%	06-Oct-08	14-Oct-08	
060	Erect Precast Stair #3 - Center	5	5	100%	15-Oct-08	21-Oct-08	
061	Erect Precast Bay 5.6 - 4.1 - Center	5	5	20%	22-Oct-08	28-Oct-08	
062	Erect Precast Bay 4.1 - 2.4 - Center	5	5	0%	29-Oct-08	04-Nov-08	
063	Erect Precast Bay 2.4 - 0.8 - Center	5	5	0%	05-Nov-08	11-Nov-08	
064	Erect Precast Stair #4 - Center	4	4	0%	12-Nov-08	17-Nov-08	
065	Erect Precast Bay 0.8 - 1.6 - Center	4	4	0%	18-Nov-08	21-Nov-08	
Precast - East		30	30	0%	24-Nov-08	02-Jan-09	0
066	Erect Precast Bay 1.6 - 3.4 - East	4	4	0%	24-Nov-08	27-Nov-08	
067	Erect Precast Bay 3.4 - 4.9 - East	4	4	0%	02-Dec-08	05-Dec-08	
068	Erect Precast Bay 4.9 - 7 - East	4	4	0%	08-Dec-08	11-Dec-08	
069	Erect Precast Bay 7 - 8 - East	4	4	0%	12-Dec-08	17-Dec-08	
070	Erect Precast Bay 8 - 9 - East	4	4	0%	18-Dec-08	23-Dec-08	
071	Erect Precast Elev/Stair #1 - East	8	8	0%	24-Dec-08	02-Jan-09	
Plumbing		59	59	0%	24-Nov-08	12-Feb-09	0
132	Above Grade Plumbing Rough-in - West	5	5	0%	24-Nov-08	28-Nov-08	
133	Above Grade Plumbing Finishes - West	10	10	0%	01-Dec-08	12-Dec-08	
134	Above Grade Plumbing Rough-in - Center	5	5	0%	24-Dec-08	30-Dec-08	
135	Above Grade Plumbing Finishes - Center	10	10	0%	31-Dec-08	13-Jan-09	
136	Above Grade Plumbing Rough-in - East	5	5	0%	23-Jan-09	29-Jan-09	
137	Above Grade Plumbing Finishes - East	10	10	0%	30-Jan-09	12-Feb-09	
Electrical		95	95	0%	24-Nov-08	03-Apr-09	0
138	Above Grade - Electrical/Fire Alarm Rough-in - West	5	5	0%	24-Nov-08	28-Nov-08	
139	Above Grade - Electrical/Fire Alarm Distrbution - West	10	10	0%	01-Dec-08	12-Dec-08	
140	Above Grade - Electrical/Fire Alarm Finishes - West	10	10	0%	15-Dec-08	26-Dec-08	
141	Above Grade Electrical/Fire Alarm Rough-in - Center	4	4	0%	02-Jan-09	07-Jan-09	
142	Above Grade Electrical/Fire Alarm Distribution - Center	8	8	0%	08-Jan-09	19-Jan-09	
143	Above Grade Electrical/Fire Alarm Finishes - Center	8	8	0%	20-Jan-09	29-Jan-09	
144	Above Grade Elec/Fire Alarm Rough-in - East	4	4	0%	30-Jan-09	04-Feb-09	
145	Above Grade Elec/Fire Alarm Distribution - East	8	8	0%	05-Feb-09	16-Feb-09	
146	Above Grade Elec/Fire Alarm Finishes - East	8	8	0%	17-Feb-09	26-Feb-09	
147	Festoon Lighting - Bridge	3	3	0%	01-Apr-09	03-Apr-09	
Masonry		169	169	0%	29-Sep-08	21-May-09	0
079	Masonry - Elevator Machine Room - West	2	2	100%	29-Sep-08	30-Sep-08	
080	Masonry - Garage Office Space - West	5	5	100%	13-Oct-08	17-Oct-08	
081	Masonry - Stair Twr 3 - Center	10	10	0%	24-Nov-08	05-Dec-08	
082	Masonry - Stair Twr 4 - Center	10	10	0%	10-Dec-08	23-Dec-08	
083	Masonry - Stair Twr #2 - West	10	10	0%	02-Jan-09	15-Jan-09	
084	Masonry - Elevator Machine Room - East	2	2	0%	07-Jan-09	08-Jan-09	
085	Masonry - Mech/Elec Rooms Lvl 1 - East	7	7	0%	07-Jan-09	15-Jan-09	
086	Masonry - Front Face - East	20	20	0%	07-Jan-09	03-Feb-09	
087	Back of House Masonry	20	20	0%	16-Jan-09	12-Feb-09	
088	Front Facade Masonry	20	20	0%	04-Feb-09	03-Mar-09	
089	Masonry - Stair Twr 1 - East	6	6	0%	16-Apr-09	23-Apr-09	
090	Brick Veneer @ Stair Twr 1 - East	20	20	0%	24-Apr-09	21-May-09	
Underground Utilities		30	30	0%	07-Jul-08	15-Aug-08	0
046	Underground Plumbing - West	6	6	100%	07-Jul-08	14-Jul-08	
047	Underground Plumbing - Center	19	19	100%	21-Jul-08	14-Aug-08	
048	Underground Plumbing - East	19	19	100%	21-Jul-08	14-Aug-08	
049	Underground Electrical	10	10	100%	04-Aug-08	15-Aug-08	
Steel		74	74	0%	30-Sep-08	09-Jan-09	0
072	Erect / Detail Bridge Steel - Bridge	10	10	100%	30-Sep-08	13-Oct-08	



Actual Work | Critical Remaining Work | Summary
Remaining Work | Milestone

Activity ID	Activity Name	Original Duration	Remaining Duration	Schedule % Complete	Start	Finish	Total Float
073	Erect W30 & W33 Beams Bay 2.4 - 0.8 - Center	1	1	0%	05-Nov-08	05-Nov-08	
0740	Erect / Detail Apron Steel - Center	30	30	0%	24-Nov-08	02-Jan-09	
076	Erect W33 Beams @ Lvl 4 Bay 4.9 - 7 - East	1	1	0%	08-Dec-08	08-Dec-08	
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	
Miscellaneous 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	
103	Metal Panels - Bridge	10	10	0%	23-Oct-08	05-Nov-08	
104	GKD Mesh - Bridge	10	10	0%	06-Nov-08	19-Nov-08	
105	Handrails Stair 1 - East	10	10	0%	07-Jan-09	20-Jan-09	
106	Handrails - Stair 5 - West	5	5	0%	21-Jan-09	27-Jan-09	
107	Metal Panels @ Rotunda	15	15	0%	28-Jan-09	17-Feb-09	
108	Pan Stairs & Handrails Stair 3 - Center	10	10	0%	28-Jan-09	10-Feb-09	
109	Pain Stairs & Handrails Stair 4 - Center	10	10	0%	11-Feb-09	24-Feb-09	
110	Handrails - Stair 2 - West	10	10	0%	25-Feb-09	10-Mar-09	
111	Garage Fencing	20	20	0%	24-Apr-09	21-May-09	
Roofing/ Waterproofing		118	118	0%	14-Oct-08	26-Mar-09	0
091	Roofing @ Elev #2 - West	5	5	100%	14-Oct-08	20-Oct-08	
092	Caulk Garage - West	15	15	0%	23-Oct-08	12-Nov-08	
093	Roofing @ Bridge	5	5	0%	30-Oct-08	05-Nov-08	
094	Caulk Garage - Center	15	15	0%	05-Jan-09	23-Jan-09	
095	Waterproofing @ Lvl 4	10	10	0%	08-Jan-09	21-Jan-09	
096	Expansion Joints	10	10	0%	22-Jan-09	04-Feb-09	
097	Caulk Garage - East	15	15	0%	26-Jan-09	13-Feb-09	
098	Roofing @ Apron	5	5	0%	29-Jan-09	04-Feb-09	
099	Roofing @ Elevator #1 - East	5	5	0%	29-Jan-09	04-Feb-09	
100	Punched Openings	5	5	0%	04-Feb-09	10-Feb-09	
101	Water Repellants	10	10	0%	13-Mar-09	26-Mar-09	
Finishes		122	122	0%	20-Oct-08	07-Apr-09	0
112	Drywall - Garage Offices - West	5	5	60%	20-Oct-08	24-Oct-08	
113	Finishes @ Offices - West	10	10	0%	27-Oct-08	07-Nov-08	
114	Install Fire Protection - West	10	10	0%	24-Nov-08	05-Dec-08	
115	Back of House Stud Backup	15	15	0%	24-Dec-08	13-Jan-09	
116	Install Fire Protection - Center	15	15	0%	24-Dec-08	13-Jan-09	
117	Front Facade Stud Backup	15	15	0%	14-Jan-09	03-Feb-09	
118	Install Fire Protection - East	15	15	0%	23-Jan-09	12-Feb-09	
119	Glazing Rotunda	5	5	0%	11-Feb-09	17-Feb-09	
120	Access Drive Ceiling	15	15	0%	13-Feb-09	05-Mar-09	
121	Glazing Stair 2	10	10	0%	18-Feb-09	03-Mar-09	
122	Glazing Stair 1	15	15	0%	18-Feb-09	10-Mar-09	
123	Doors & Hardware	10	10	0%	25-Feb-09	10-Mar-09	
124	Traffic Coatings	10	10	0%	27-Feb-09	12-Mar-09	
125	Painting	20	20	0%	11-Mar-09	07-Apr-09	
126	Fire Proof Aprong Steel Center	10	10	0%	17-Mar-09	30-Mar-09	
127	Line Striping	5	5	0%	27-Mar-09	02-Apr-09	
Elevators		123	123	0%	10-Nov-08	29-Apr-09	0
128	Install Hoist / Separator Beams Elev 3&4 - West	5	5	0%	10-Nov-08	14-Nov-08	
129	Install Elev 3 & 4 - West	40	40	0%	17-Nov-08	09-Jan-09	
130	Install Hoist/Separator Beams Elev 1&2 - East	5	5	0%	26-Feb-09	04-Mar-09	
131	Install Elevator 1 & 2 - East	40	40	0%	05-Mar-09	29-Apr-09	



Actual Work | Critical Remaining Work | Summary
Remaining Work | Milestone

SITE LAYOUT PLANNING

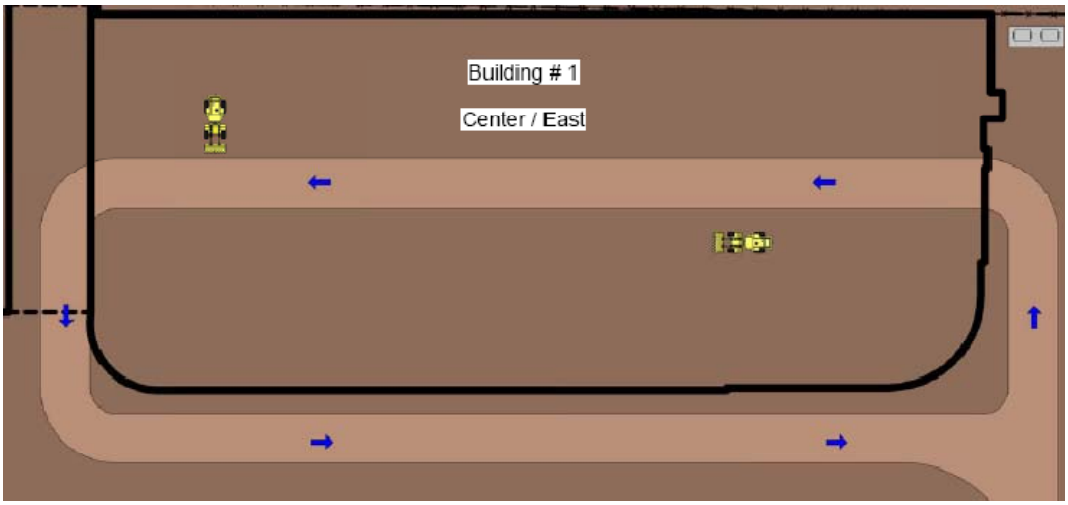
Three separate site layout plans were developed from the Existing Conditions Site Plan. Each plan describes a critical phase of the project in more detail. Excavation, Superstructure, and Finish phase site plans were constructed because these were the three most important areas of interest. Below are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



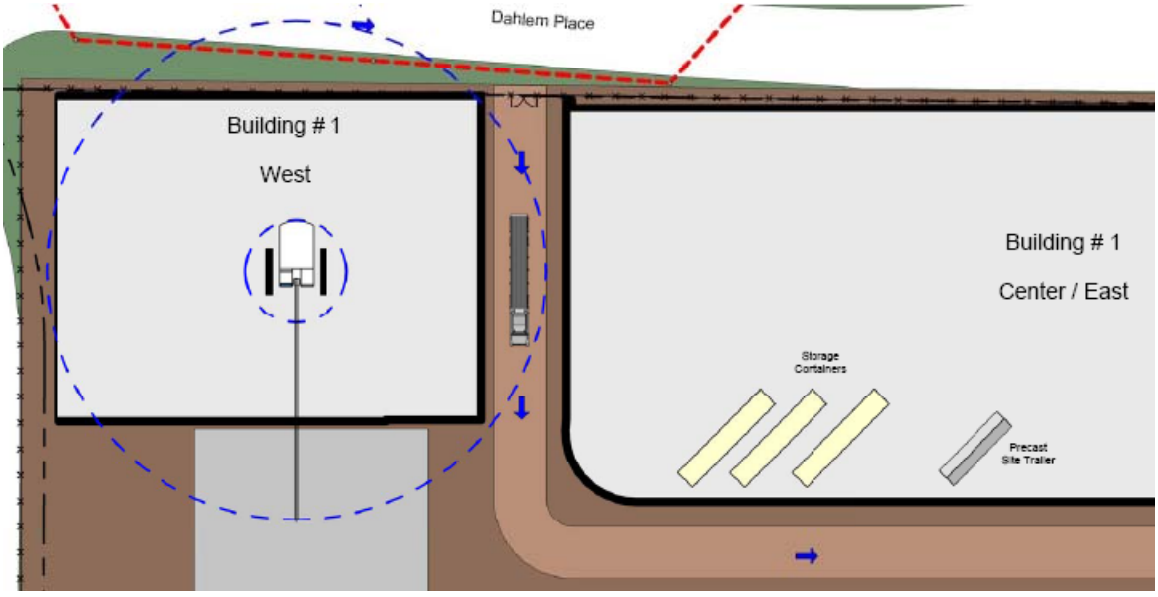
• Figure 2 - Excavation Snapshot

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.

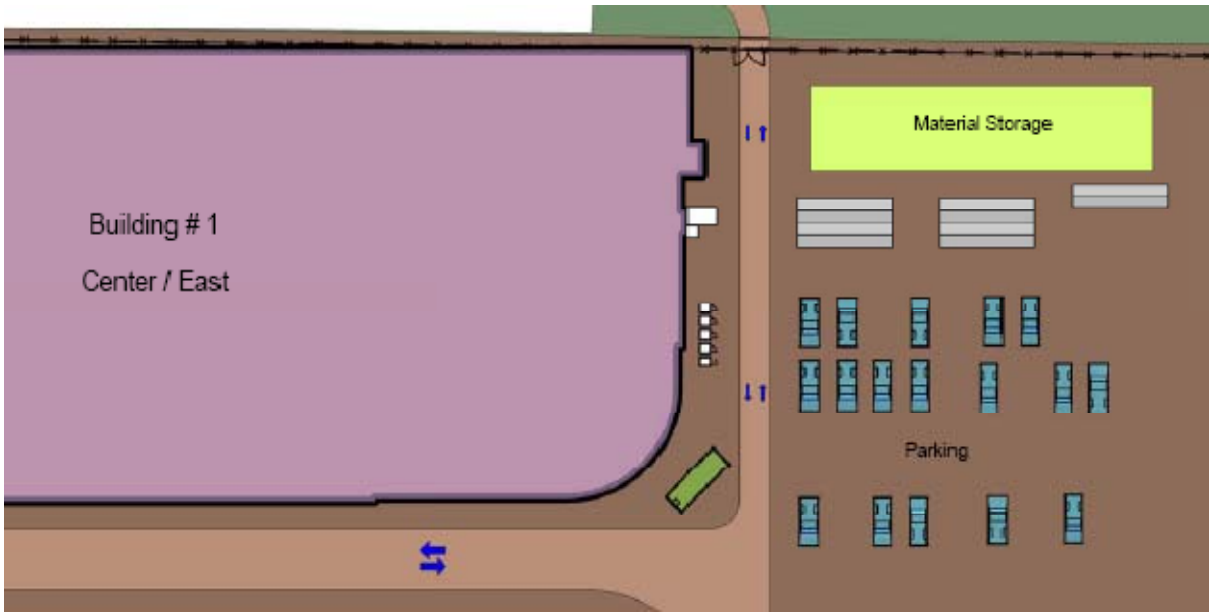


• Figure 3 - Superstructure Snapshot

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

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

Dahlem Place

Dead End

Building # 1

West

Building # 1

Center / East

Liberty Blvd.

Existing Building #3

Renovation of Nabisco Factory

6425 Penn Ave.

Top Elevation: 80'

Temporary
Offices inside
Building #3

Parking

Penn Ave.

Legend

Electrical

Gas

Water

Dumpster

Gang Box

Utility Pole

Porta-John

Autodesk® Revit®

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Jonathan Revtai

Building #1

No.	Description	Date

Site Plan - Excavation Phase

Project number	Tech Report I	C102
Date	10/23/08	
Drawn by	Revtai	
Checked by	Revtai	Scale 1" = 50'-0"

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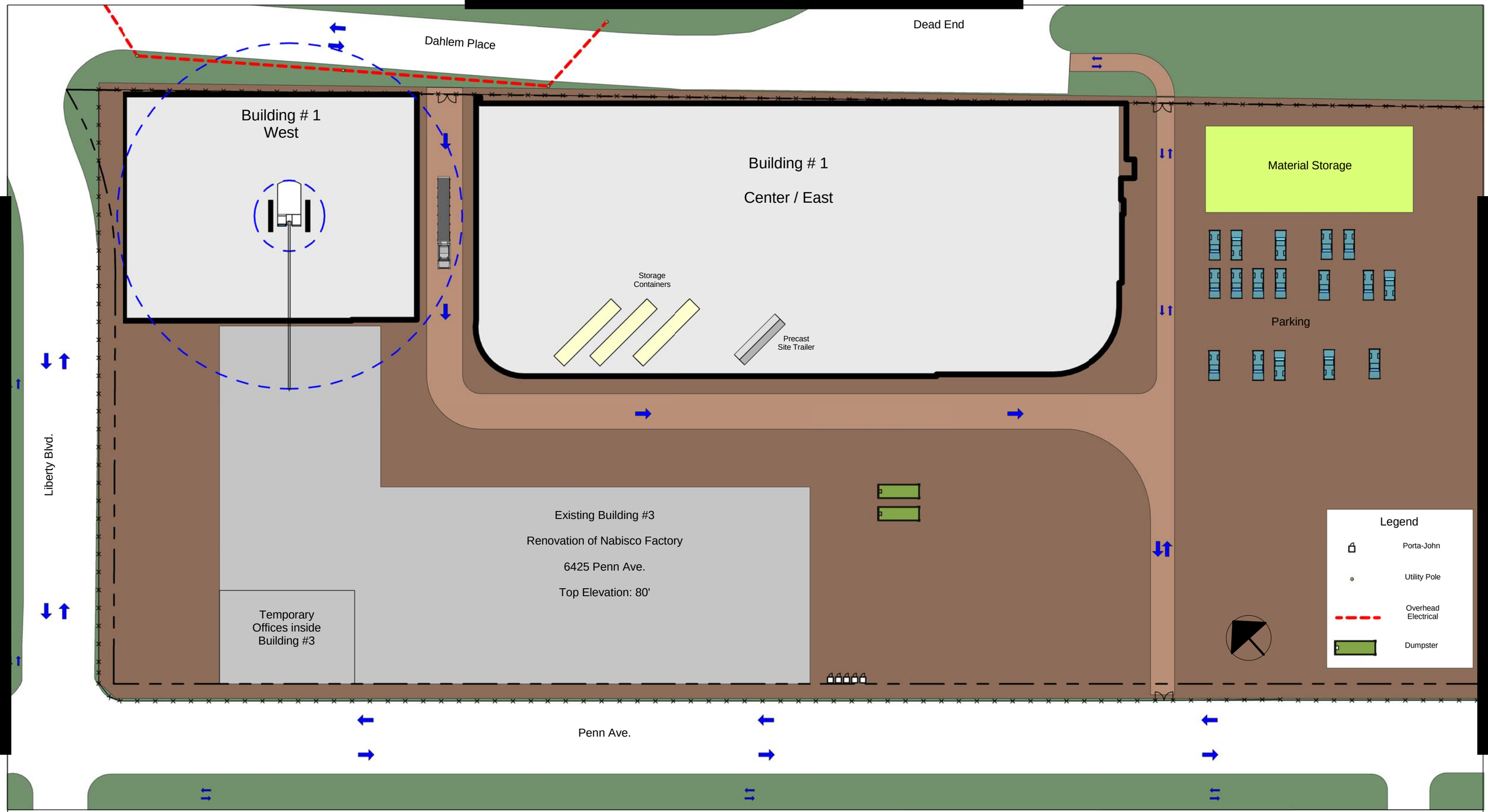

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Jonathan Revtai

Building #1

No.	Description	Date

Site Plan - Superstructure Phase

Project number	Tech Report I	C103
Date	10/23/08	
Drawn by	Revtai	
Checked by	Revtai	Scale 1" = 50'-0"

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Dahlem Place

Dead End

Building # 1

West

Building # 1

Center / East

Material Storage

Parking

Liberty Blvd.

Existing Building #3

Renovation of Nabisco Factory

6425 Penn Ave.

Top Elevation: 80'

Temporary
Offices inside
Building #3

Penn Ave.

Legend

- Porta-John
- Utility Pole
- Overhead Electrical
- Dumpster
- Office Trailer
- Material Hoist

Autodesk® Revit®

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Jonathan Revtai

Building #1

No.	Description	Date

Site Plan - Finish Phase

Project number	Tech Report I	C104
Date	10/23/08	
Drawn by	Revtai	
Checked by	Revtai	Scale 1" = 50'-0"

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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 Assumptions	
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 ½
	Interior Lite Walls are considered T-Beams
	10% waste included on non-precast items
Typical Steel	Columns bisected by grid line count as ½
	Beams bisected by grid line count as ½
	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 Assumptions	
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 Down					
Description	Area (SF)	Material Cost	Labor Cost	Equipment Cost	Total 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/ SF	Labor Cost/SF	Equipment Cost/SF	Total 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	PX	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
BIM – 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
15858	V.L.F.	024551000085	Uncased drilled concrete piers, cast in place augered piles, 18" diameter, priced using 200 piles, 60' long, unless specified otherwise, excludes pile caps or mobilization, casing or reinforcing	$ 329,687.82	$ 186,172.92	$ 210,435.66	$ 726,296.40
12816	Lb.	024551001500	Cast-in place adds for drilled concrete piers, for reinforcing, 4000 psi concrete, 7 ga.	$ 13,072.32	$ -	$ -	$ 13,072.32
1418	C.Y.	033102200150	Structural concrete, ready mix, normal weight, 3000 psi, includes local aggregate, sand, portland cement and water, delivered, excludes all additives and treatments	$ 151,612.56	$ -	$ -	$ 151,612.56
379	C.Y.	033107004050	Structural concrete, placing, pile caps, over 10 CY, includes vibrating, excludes material	$ -	$ 4,737.50	$ 1,546.32	$ 6,283.82
379	C.Y.	033102200150	Structural concrete, ready mix, normal weight, 3000 psi, includes local aggregate, sand, portland cement and water, delivered, excludes all additives and treatments	$ 40,522.68	$ -	$ -	$ 40,522.68
1418	C.Y.	033107003250	Structural concrete, placing, grade beam, pumped, includes vibrating, excludes material	$ -	$ 23,552.98	$ 7,699.74	$ 31,252.72
1.65	Ton	032106000500	Reinforcing steel, in place, footings, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	$ 1,581.41	$ 1,928.07	$ -	$ 3,509.48

2544	Ton	032106000550	Reinforcing steel, in place, footings, #8 to #18, A615, grade 60, incl labor for accessories, excl material for 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
3069	SFCA	031104304150	C.I.P. concrete forms, pile cap, triangular or hexogonal plywood, 4 use, includes erecting, bracing, stripping and cleaning	$ 3,467.97	$ 16,940.88	$ -	$ 20,408.85
4.86	Ton	032106000100	Reinforcing steel, in place, beams and girders, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	$ 4,896.84	$ 7,395.95	$ -	$ 12,292.79
29.95	Ton	032106000150	Reinforcing steel, in place, beams and girders, #8 to # 18, A615, grade 60, incl labor for accessories, excl material for accessories	$ 30,177.02	$ 27,184.12	$ -	$ 57,361.14
6943	SFCA	031104350150	C.I.P. concrete forms, grade beam, plywood, 4 use, includes erecting, 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. Total O&P
64	L.F.	034102100300	Precast column, small, square, to 24' high, 3000 psi, includes material only	$ 3,294.72	$ 2,268.80	$ 791.04	$ 6,354.56
4216	S.F.	034107500200	Precast tees, double, floor, 60' span, prestressed	$ 37,564.56	$ 3,414.96	$ 1,222.64	$42,202.16
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
1	Ea.	034101002300	Precast beam, tee shaped, 30' span, 24" x 52", includes material only	$ 4,182.75	$ 425.37	$ 148.72	$ 4,756.84
5.3	C.Y.	033102200460	Structural concrete, ready mix, normal weight, high early, 3000 psi, includes local aggregate, sand, portland cement and water, delivered, excludes all additives and treatments	$ 597.58	$ -	$ -	$ 597.58
0.16	Ton	032106000400	Reinforcing steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	$ 173.01	$ 135.66	$ -	$ 308.67
3.93	C.S.F.	032202000300	Welded wire fabric, sheets, 6 x 6 - W2.9 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. Total O&P
46.33	L.F.	051202607050	Column, structural, 2-tier, W10x68, A992 steel, incl shop primer, splice plates, bolts	$ 3,983.45	$ 233.04	$ 92.66	$ 4,309.15
27.12	L.F.	051206401100	Structural steel member, 100-ton project, 1 to 2 story building, W12x14, A992 steel, shop fabricated, incl shop primer, bolted connections	$ 480.57	$ 152.96	$ 60.75	$ 694.27
307.36	L.F.	051206403300	Structural steel member, 100-ton project, 1 to 2 story building, W18x35, A992 steel, shop fabricated, incl shop primer, bolted connections	$ 13,579.16	$ 2,335.94	$ 685.41	$16,600.51
76.84	L.F.	051206403900	Structural steel member, 100-ton project, 1 to 2 story building, W18x55, A992 steel, shop fabricated, incl shop primer, bolted connections	$ 5,328.85	$ 611.65	$ 180.57	$ 6,121.07
4.66	S.F.	051205600450	Steel plate, structural, for connections & stiffenners, 3/4" T, shop fabricated, incl shop primer	$ 163.80	$ -	$ -	$ 163.80
28.25	L.F.	051206404900	Structural steel member, 100-ton project, 1 to 2 story building, W24x55, A992 steel, shop fabricated, incl shop primer, bolted connections	$ 1,959.14	$ 185.04	$ 54.24	$ 2,198.42
Total				**$ 25,494.97**	**$ 3,518.63**	**$ 1,073.63**	**$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	Ext. 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

147	L.F.	051206400520	Structural steel member, 100-ton project, 1 to 2 story building, W8x35, A992 steel, shop fabricated, incl shop primer, bolted connections	$ 6,494.46	$ 1,323.00	$ 526.26	$ 8,343.72
180	L.F.	051206400620	Structural steel member, 100-ton project, 1 to 2 story building, W10x15, A992 steel, shop fabricated, incl shop primer, bolted connections	$ 3,411.00	$ 1,488.60	$ 590.40	$ 5,490.00
24	L.F.	051206400700	Structural steel member, 100-ton project, 1 to 2 story building, W10x22, A992 steel, shop fabricated, incl shop primer, bolted connections	$ 672.72	$ 198.48	$ 78.72	$ 949.92
116	L.F.	051206401100	Structural steel member, 100-ton project, 1 to 2 story building, W12x14, A992 steel, shop fabricated, incl shop primer, bolted connections	$ 2,055.52	$ 654.24	$ 259.84	$ 2,969.60
217	L.F.	051206401900	Structural steel member, 100-ton project, 1 to 2 story building, W14x26, A992 steel, shop fabricated, incl shop primer, bolted connections	$ 7,113.26	$ 1,087.17	$ 431.83	$ 8,632.26
271	L.F.	051206402700	Structural steel member, 100-ton project, 1 to 2 story building, W16x26, A992 steel, shop fabricated, incl shop primer, bolted connections	$ 8,883.38	$ 1,344.16	$ 533.87	$ 10,761.41
23	L.F.	051206402900	Structural steel member, 100-ton project, 1 to 2 story building, W16x31, A992 steel, shop fabricated, incl shop primer, bolted connections	$ 906.89	$ 126.73	$ 50.60	$ 1,084.22
1413	L.F.	051206403300	Structural steel member, 100-ton project, 1 to 2 story building, W18x35, A992 steel, shop fabricated, incl shop primer, bolted connections	$ 62,426.34	$ 10,738.80	$ 3,150.99	$ 76,316.13
59	L.F.	051206403520	Structural steel member, 100-ton project, 1 to 2 story building, W18x46, A992 steel, shop fabricated, incl shop primer, bolted connections	$ 3,419.05	$ 448.40	$ 131.57	$ 3,999.02

20	L.F.	051206403700	Structural steel member, 100-ton project, 1 to 2 story building, W18x50, A992 steel, shop fabricated, incl shop primer, bolted connections	$ 1,263.60	$ 159.20	$ 47.00	$ 1,469.80
36	L.F.	051206403900	Structural steel member, 100-ton project, 1 to 2 story building, W18x55, A992 steel, shop fabricated, incl shop primer, bolted connections	$ 2,496.60	$ 286.56	$ 84.60	$ 2,867.76
70	L.F.	051206403960	Structural steel member, 100-ton project, 1 to 2 story building, W18x86, A992 steel, shop fabricated, incl shop primer, bolted connections	$ 7,581.00	$ 566.30	$ 166.60	$ 8,313.90
358	L.F.	051206404100	Structural steel member, 100-ton project, 1 to 2 story building, W21x44, A992 steel, shop fabricated, incl shop primer, bolted connections	$ 19,897.64	$ 2,455.88	$ 719.58	$ 23,073.10
64	L.F.	051206404300	Structural steel member, 100-ton project, 1 to 2 story building, W21x50, A992 steel, shop fabricated, incl shop primer, bolted connections	$ 4,043.52	$ 439.04	$ 128.64	$ 4,611.20
79	L.F.	051206404500	Structural steel member, 100-ton project, 1 to 2 story building, W21x62, A992 steel, shop fabricated, incl shop primer, bolted connections	$ 6,192.02	$ 556.16	$ 162.74	$ 6,910.92
28	L.F.	051206404700	Structural steel member, 100-ton project, 1 to 2 story building, W21x68, A992 steel, shop fabricated, incl shop primer, bolted connections	$ 2,407.44	$ 197.12	$ 57.68	$ 2,662.24
38	L.F.	051206404900	Structural steel member, 100-ton project, 1 to 2 story building, W24x55, A992 steel, shop fabricated, incl shop primer, bolted connections	$ 2,635.30	$ 248.90	$ 72.96	$ 2,957.16
86	L.F.	051206405300	Structural steel member, 100-ton project, 1 to 2 story building, W24x68, A992 steel, shop fabricated, incl shop primer, 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
104	L.F.	051206406500	Structural steel member, 100-ton project, 1 to 2 story building, W30x116, A992 steel, shop fabricated, incl shop primer, bolted connections	$ 15,215.20	$ 650.00	$ 191.36	$ 16,056.56
313	C.Y.	033102200300	Structural concrete, ready mix, normal weight, 4000 PSI, includes local aggregate, sand, portland cement and water, delivered, excludes all additives and treatments	$ 35,594.36	$ -	$ -	$ 35,594.36
203	C.S.F.	032202000200	Welded wire fabric, sheets, 6 x 6 - W2.1 x W2.1 (8 x 8) 30 lb. per C.S.F., A185	$ 3,432.73	$ 8,055.04	$ -	$ 11,487.77
191	C.S.F.	032202000200	Welded wire fabric, sheets, 6 x 6 - W2.1 x W2.1 (8 x 8) 30 lb. per C.S.F., A185	$ 3,229.81	$ 7,578.88	$ -	$ 10,808.69
323	C.Y.	033102200300	Structural concrete, ready mix, normal weight, 4000 PSI, includes local aggregate, sand, portland cement and water, delivered, excludes all additives 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
323	C.Y.	033107001400	Structural concrete, placing, elevated slab, pumped, less than 6" thick, includes vibrating, excludes material	$ -	$ 6,954.19	$ 2,254.54	$ 9,208.73
313	C.Y.	033107004350	Structural concrete, placing, slab on grade, pumped, up to 6" thick, includes vibrating, excludes material	$ -	$ 7,177.09	$ 2,363.15	$ 9,540.24

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

1922	SFCA	031104552000	C.I.P. concrete forms, wall, job built, plywood, to 8' high, 1 use, includes 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	PX	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
16200	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
19020	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
19100	Temp. Fence & Gates	14 months	$928.57	$13,000
19170	Snow Removal	3 months	$833	$2,500
Total				$923,250