Lafayette Tower
Washington, DC
Justin Wingenfield
Construction Management

Tech Assignment 2 | Dr. David Riley | 24 October 2008

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Executive Summary

This technical assignment analyzes the key features that affect the project execution of 801 17th Street NW, Washington DC, the site of Lafayette Tower. Within the report there will be explorations on several different aspects of the construction management process including a detailed projected schedule, site layout planning for the critical phases of the project, a detailed estimate of the structural system, a close look at the General Conditions requirements, and a review of some of the critical industry issues discussed at the 2008 PACE Roundtable.

The project schedule from this report goes into a lot more detail about the phasing of Lafayette Tower than the previous technical report. Specifically, the major phases of construction examined were the interior demolition, the structural demolition, sheeting and shoring, the placement of concrete, the building skin, MEP trades and the interior finishes. With only 143 line items, the schedule gives the reader a general awareness of the sequencing of events that took/are still taking place at 801 17th Street NW.

With a tight site in the heart of D.C., site layout planning is critical to the success of the project. The three main phases of construction for this project, demolition, superstructure and finishes, were scrutinized in an effort to determine the best possible scenario to optimize the flow of work around the site. Comparisons and critiques were made between the site organization laid out by Clark and the plans publicized in this report.

When taking off the structural system of Lafayette Tower, the scope of the areas accessed included the beams, columns, grade beams, and slabs. RS Means was used to provide a cost/CY value for all of the aforementioned items specifically breaking them down into material, labor and equipment costs. The total cost of the structural system was determined to be $6,944,578.42.

Through use of RS Means, assumptions, previous experience from both the classroom and the real world, and information provided by people from Clark and other industry professionals, a General Conditions estimate was developed. The total cost of the GCs ended up coming in at $3,127,883.72 or 6.7% percent of the total contract value.

The final piece of information addressed in this technical report is a summary of the 2008 PACE Roundtable and what was taken from it. This includes a general discussion of the events that took place, an in-depth look at the breakout sessions attended, and an analysis of how the topics discussed could affect or be applied to Lafayette Tower. Aside from the classroom portion of the Roundtable, another great feature of the event is that it also facilitated interaction between industry members and students which is also briefly touched on.

Detailed Project Schedule

As the schedule below shows, the project is broken up into two main parts; First, the demolition of the existing structure and second, the construction of the new building. Demolition started in September of 2006 where the building was systematically stripped from top to bottom removing everything that was non-structural. After about two months, the interior demolition was completed and the demolition heads back to the top of the building to start on the structural system.

To take down the structural system, they started by using skid steer with a hydraulic demolition hammer attachment to deconstruct the upper floors. The process they followed was to crush up the decks of the floor that they had the skid steer on then move down to the next floor to knock out the columns. This repeated until they could get in reach of the excavators with hydraulic shears.

To get down to the existing foundation, it took about 9 months with a good portion of that time being once they got below grade. This is because as they removed each level, they installed tiebacks, corner bracing and rakers to keep the surrounding soil from caving into the hole. Extra support was provided along the alley because of the additional weight from the nearby buildings. Demolition wrapped up in August of 2007.

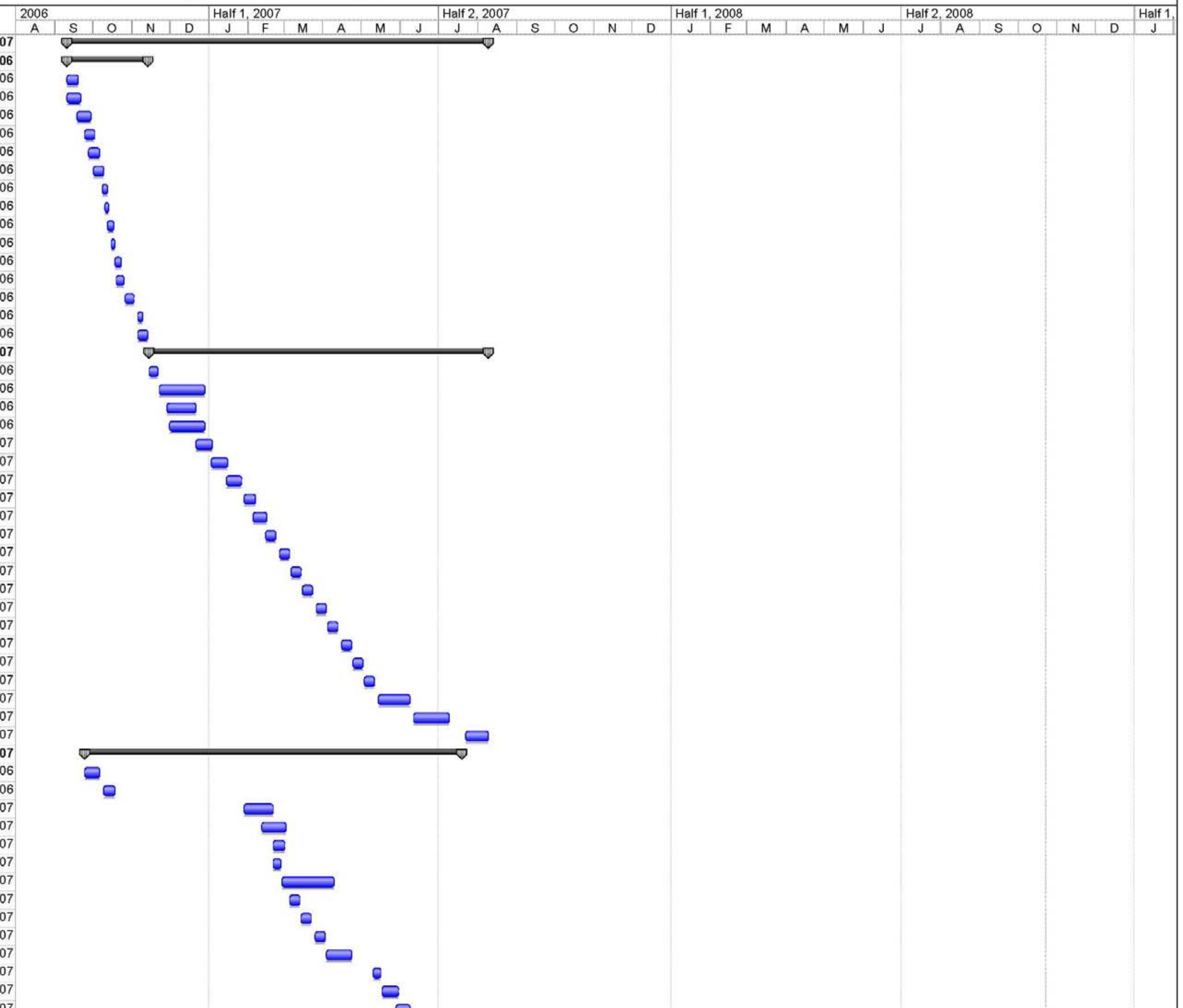
After demolition was finished, the critical path of the project moved onto the concrete as it came up and out of the hole. The existing foundation and foundation walls were kept but additional concrete was added to support the extra weight of the new building. It took a little under 4 months to get the project out of the hole and up to grade. Once the building was above grade, it took roughly two weeks per floor. The building topped out in April of 2008.

Before the concrete was finished, the curtain wall and MEP work was already underway. The curtain wall construction is not broken up by floors in the schedule because it was not constructed by floors on site. The original plan was to wrap the floors in a counter-clockwise fashion and move up the building uniformly but due to problems with fabrication and shipping, a different approach that took slightly more time had to be adopted. This led to the façade being several floors higher in some places than in others. The curtain wall finished up and the building became watertight in July of 2008.

Once the building was watertight, the finishes started in and are currently taking about 2 weeks per floor as they move up through the building. The reason that they can move so fast is because the scope only includes the core, which means little more than the bathrooms and elevator lobbies of the building where the tenants are responsible to fit-out of the majority of the floor themselves.

Detailed Project Schedule - Lafayette Tower

ID	Task Name	Duration	Start	Finish
1	**Demolition**	**239 days?**	**Mon 9/11/06**	**Thu 8/9/07**
2	**Interior Demoliton**	**46 days?**	**Mon 9/11/06**	**Mon 11/13/06**
3	Soft Strip Lobby	7 days?	Mon 9/11/06	Tue 9/19/06
4	Prep PH for Demo	9 days?	Mon 9/11/06	Thu 9/21/06
5	Soft Strip 12th Floor	9 days?	Tue 9/19/06	Fri 9/29/06
6	Soft Strip 11th Floor	6 days?	Mon 9/25/06	Mon 10/2/06
7	Soft Strip 10th Floor	7 days?	Thu 9/28/06	Fri 10/6/06
8	Soft Strip 9th Floor	6 days?	Mon 10/2/06	Mon 10/9/06
9	Soft Strip 8th Floor	4 days?	Mon 10/9/06	Thu 10/12/06
10	Soft Strip 7th Floor	3 days?	Wed 10/11/06	Fri 10/13/06
11	Soft Strip 6th Floor	3 days?	Fri 10/13/06	Tue 10/17/06
12	Soft Strip 5th Floor	3 days?	Mon 10/16/06	Wed 10/18/06
13	Soft Strip 4th Floor	3 days?	Thu 10/19/06	Mon 10/23/06
14	Soft Strip 3rd Floor	4 days?	Fri 10/20/06	Wed 10/25/06
15	Soft Strip 2nd Floor	5 days?	Fri 10/27/06	Thu 11/2/06
16	Remove RTUs	4 days?	Mon 11/6/06	Thu 11/9/06
17	Demo PH Interior	6 days?	Mon 11/6/06	Mon 11/13/06
18	**Structural Demoliton**	**192 days?**	**Wed 11/15/06**	**Thu 8/9/07**
19	Demo PH Interior	5 days?	Wed 11/15/06	Tue 11/21/06
20	Demo PH Slab	26 days?	Thu 11/23/06	Thu 12/28/06
21	Remove Precast 17th St	17 days?	Wed 11/29/06	Thu 12/21/06
22	Demo Brick at Alley	20 days?	Fri 12/1/06	Thu 12/28/06
23	Remove Precast H St 12th Floor	9 days?	Fri 12/22/06	Wed 1/3/07
24	Demo Roof Slap	9 days?	Wed 1/3/07	Mon 1/15/07
25	Demo 12th Floor	10 days?	Mon 1/15/07	Fri 1/26/07
26	Demo 11th Floor	7 days?	Mon 1/29/07	Tue 2/6/07
27	Demo 10th Floor	9 days?	Mon 2/5/07	Thu 2/15/07
28	Demo 9th Floor	6 days?	Thu 2/15/07	Thu 2/22/07
29	Demo 8th Floor	6 days?	Mon 2/26/07	Mon 3/5/07
30	Demo 7th Floor	6 days?	Wed 3/7/07	Wed 3/14/07
31	Demo 6th Floor	6 days?	Fri 3/16/07	Fri 3/23/07
32	Demo 5th Floor	6 days?	Tue 3/27/07	Tue 4/3/07
33	Demo 4th Floor	6 days?	Thu 4/5/07	Thu 4/12/07
34	Demo 3rd Floor	6 days?	Mon 4/16/07	Mon 4/23/07
35	Demo 2nd Floor	6 days?	Wed 4/25/07	Wed 5/2/07
36	Demo 1st Floor	6 days?	Fri 5/4/07	Fri 5/11/07
37	Phase 1 Foundation Demo	19 days?	Tue 5/15/07	Fri 6/8/07
38	Phase 2 Foundation Demo	20 days?	Tue 6/12/07	Mon 7/9/07
39	Phase 3 Foundation Demo	14 days?	Mon 7/23/07	Thu 8/9/07
40	**Sheeting and Shoring**	**214 days?**	**Mon 9/25/06**	**Thu 7/19/07**
41	Install Tiebacks Mid Tier	10 days?	Mon 9/25/06	Fri 10/6/06
42	Install Tiebacks Lower Tier	7 days?	Tue 10/10/06	Wed 10/18/06
43	Install Tiebacks at SOG 17th & H	17 days?	Mon 1/29/07	Tue 2/20/07
44	Layout for Corner Bracing and Rakers	15 days?	Mon 2/12/07	Fri 3/2/07
45	Install Tiebacks at SOG @ Alley	7 days?	Wed 2/21/07	Thu 3/1/07
46	Test 17th and H St Tiebacks	4 days?	Wed 2/21/07	Mon 2/26/07
47	Excavate/Pour Underpining Pits	29 days?	Wed 2/28/07	Mon 4/9/07
48	Install Corner Bracing Upper Tier	6 days?	Tue 3/6/07	Tue 3/13/07
49	Install Corner Bracing Mid Tier	6 days?	Thu 3/15/07	Thu 3/22/07
50	Install Corner Bracing Lower Tier	6 days?	Mon 3/26/07	Mon 4/2/07
51	Install Phase 1 Rakers	14 days?	Wed 4/4/07	Mon 4/23/07
52	Install Tiesbacks Upper Tier @ H St	4 days?	Fri 5/11/07	Wed 5/16/07
53	Install Tiebacks Upper Tier @ 17th St	9 days?	Fri 5/18/07	Wed 5/30/07
54	Install Heelblocks for Upper Tier	9 days?	Tue 5/29/07	Fri 6/8/07



Project: Project Schedule.mpp
Date: Thu 10/23/08

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

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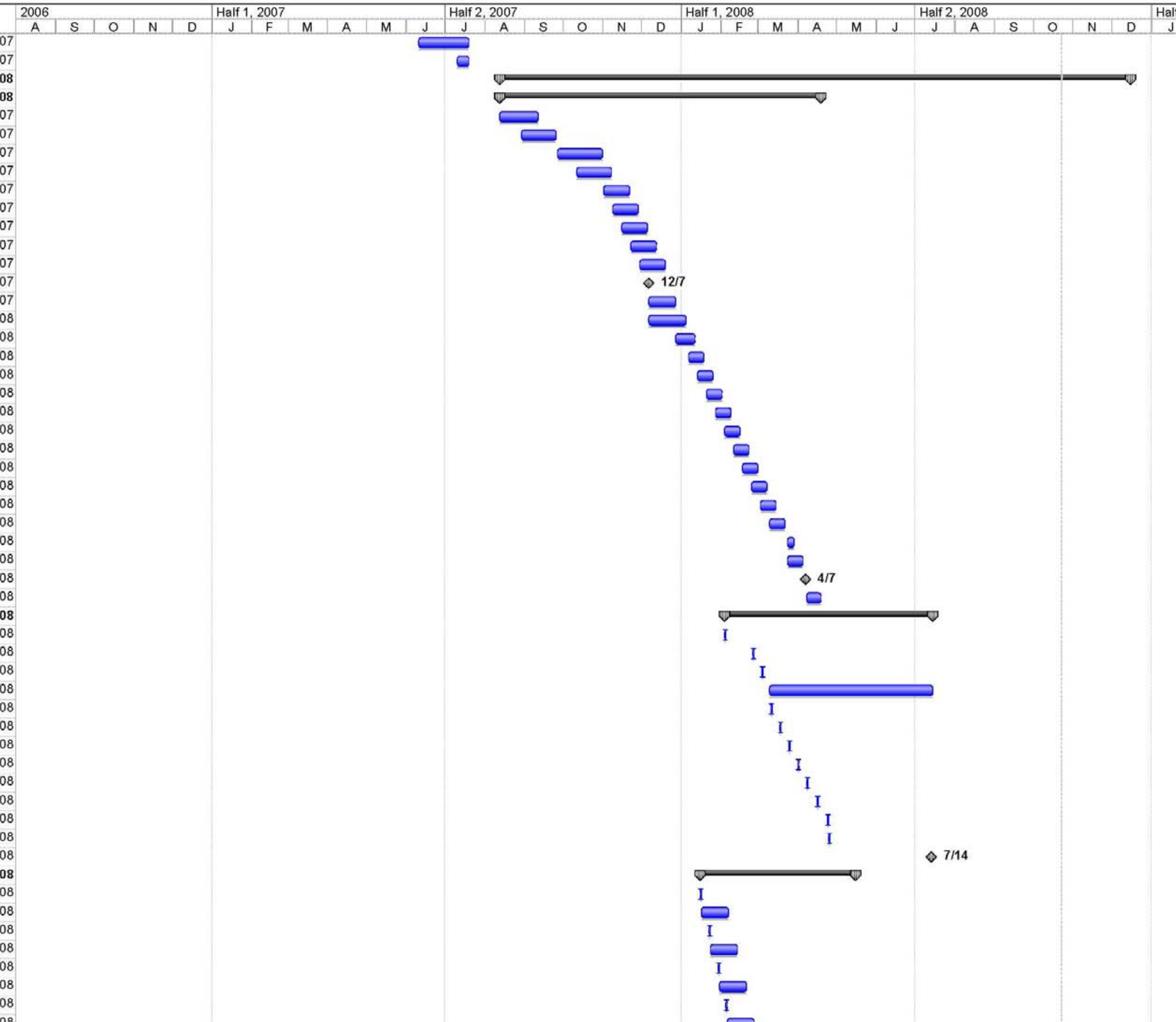
Detailed Project Schedule - Lafayette Tower

ID	Task Name	Duration	Start	Finish
55	Install Phase 2 Rakers	29 days?	Mon 6/11/07	Thu 7/19/07
56	Install Heelblocks for Mid Tier	7 days?	Wed 7/11/07	Thu 7/19/07
57	**Construction**	**351 days?**	**Mon 8/13/07**	**Mon 12/15/08**
58	**Concrete**	**180 days?**	**Mon 8/13/07**	**Fri 4/18/08**
59	Footings P3	22 days?	Mon 8/13/07	Tue 9/11/07
60	Walls P3	19 days?	Thu 8/30/07	Tue 9/25/07
61	Underground P3	25 days?	Thu 9/27/07	Wed 10/31/07
62	SOG P3	19 days?	Fri 10/12/07	Wed 11/7/07
63	Slab P2	14 days?	Fri 11/2/07	Wed 11/21/07
64	Walls P2	14 days?	Fri 11/9/07	Wed 11/28/07
65	Slab P1	14 days?	Fri 11/16/07	Wed 12/5/07
66	Walls P1	14 days?	Fri 11/23/07	Wed 12/12/07
67	Concrete Slab	14 days?	Fri 11/30/07	Wed 12/19/07
68	Project Up to Grade	0 days	Fri 12/7/07	Fri 12/7/07
69	Concrete Walls	15 days?	Fri 12/7/07	Thu 12/27/07
70	1st Floor Slab	21 days?	Fri 12/7/07	Fri 1/4/08
71	2nd Floor Slab	11 days?	Fri 12/28/07	Fri 1/11/08
72	3rd Floor Slab	10 days?	Mon 1/7/08	Fri 1/18/08
73	4th Floor Slab	10 days?	Mon 1/14/08	Fri 1/25/08
74	5th Floor Slab	10 days?	Mon 1/21/08	Fri 2/1/08
75	6th Floor Slab	10 days?	Mon 1/28/08	Fri 2/8/08
76	7th Floor Slab	10 days?	Mon 2/4/08	Fri 2/15/08
77	8th Floor Slab	10 days?	Mon 2/11/08	Fri 2/22/08
78	9th Floor Slab	10 days?	Mon 2/18/08	Fri 2/29/08
79	10th Floor Slab	10 days?	Mon 2/25/08	Fri 3/7/08
80	11th Floor Slab	10 days?	Mon 3/3/08	Fri 3/14/08
81	Main Roof	10 days?	Mon 3/10/08	Fri 3/21/08
82	Mech & Mezzanine Floor Slab	5 days?	Mon 3/24/08	Fri 3/28/08
83	Penthouse	10 days?	Mon 3/24/08	Fri 4/4/08
84	Top Out	0 days	Mon 4/7/08	Mon 4/7/08
85	Clean Down	9 days?	Tue 4/8/08	Fri 4/18/08
86	**Glass and Glazing**	**116 days?**	**Mon 2/4/08**	**Mon 7/14/08**
87	Layout and Install Anchors	1 day?	Mon 2/4/08	Mon 2/4/08
88	Stock 2nd Floor Curtain Wall	1 day?	Tue 2/26/08	Tue 2/26/08
89	Stock 3rd Floor Curtain Wall	1 day?	Tue 3/4/08	Tue 3/4/08
90	Curtain Wall Construction	91 days?	Mon 3/10/08	Mon 7/14/08
91	Stock 4th Floor Curtain Wall	1 day?	Tue 3/11/08	Tue 3/11/08
92	Stock 5th Floor Curtain Wall	1 day?	Tue 3/18/08	Tue 3/18/08
93	Stock 6th Floor Curtain Wall	1 day?	Tue 3/25/08	Tue 3/25/08
94	Stock 7th Floor Curtain Wall	1 day?	Tue 4/1/08	Tue 4/1/08
95	Stock 8th Floor Curtain Wall	1 day?	Tue 4/8/08	Tue 4/8/08
96	Stock 9th Floor Curtain Wall	1 day?	Wed 4/16/08	Wed 4/16/08
97	Stock 10th Floor Curtain Wall	1 day?	Thu 4/24/08	Thu 4/24/08
98	Stock 11th Floor Curtain Wall	1 day?	Fri 4/25/08	Fri 4/25/08
99	Building Watertight	0 days	Mon 7/14/08	Mon 7/14/08
100	**Mechanical/Electrical/Plumbing**	**87 days**	**Wed 1/16/08**	**Thu 5/15/08**
101	Stock P3	1 day	Wed 1/16/08	Wed 1/16/08
102	Install P3	15 days	Thu 1/17/08	Wed 2/6/08
103	Stock P2	1 day	Wed 1/23/08	Wed 1/23/08
104	Install P2	15 days	Thu 1/24/08	Wed 2/13/08
105	Stock P1	1 day	Wed 1/30/08	Wed 1/30/08
106	Install P1	15 days	Thu 1/31/08	Wed 2/20/08
107	Stock 1st Floor	1 day	Tue 2/5/08	Tue 2/5/08
108	Install 1st Floor	15 days	Wed 2/6/08	Tue 2/26/08



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Task		Progress		Summary		External Tasks		Deadline	
Split		Milestone		Project Summary		External Milestone			

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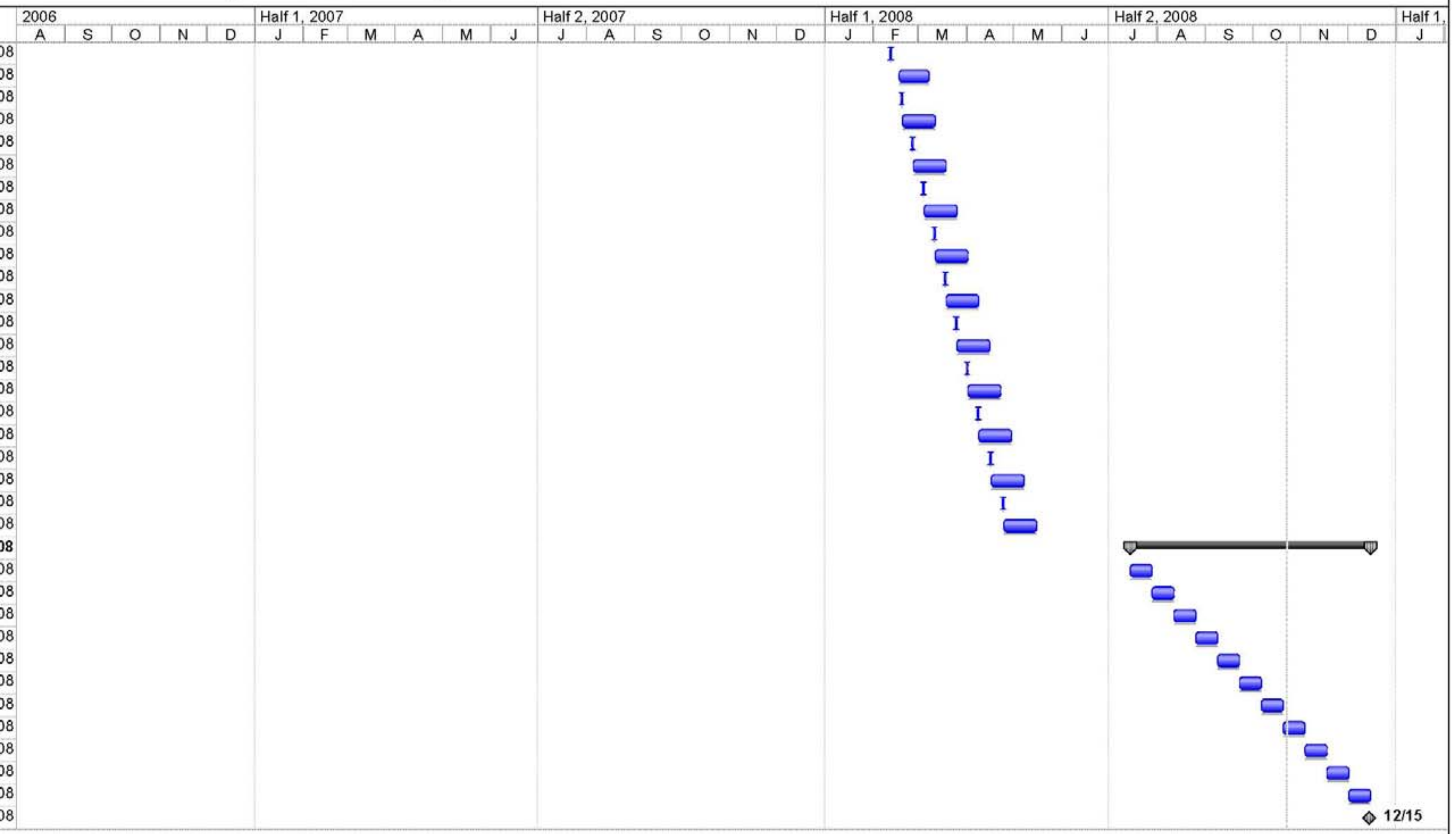
Detailed Project Schedule - Lafayette Tower

ID	Task Name	Duration	Start	Finish
109	Stock 2nd Floor	1 day	Tue 2/12/08	Tue 2/12/08
110	Install 2nd Floor	15 days	Mon 2/18/08	Fri 3/7/08
111	Stock 3rd Floor	1 day	Tue 2/19/08	Tue 2/19/08
112	Install 3rd Floor	15 days	Wed 2/20/08	Tue 3/11/08
113	Stock 4th Floor	1 day	Tue 2/26/08	Tue 2/26/08
114	Install 4th Floor	15 days	Wed 2/27/08	Tue 3/18/08
115	Stock 5th Floor	1 day	Tue 3/4/08	Tue 3/4/08
116	Install 5th Floor	15 days	Wed 3/5/08	Tue 3/25/08
117	Stock 6th Floor	1 day	Tue 3/11/08	Tue 3/11/08
118	Install 6th Floor	15 days	Wed 3/12/08	Tue 4/1/08
119	Stock 7th Floor	1 day	Tue 3/18/08	Tue 3/18/08
120	Install 7th Floor	15 days	Wed 3/19/08	Tue 4/8/08
121	Stock 8th Floor	1 day	Tue 3/25/08	Tue 3/25/08
122	Install 8th Floor	15 days	Wed 3/26/08	Tue 4/15/08
123	Stock 9th Floor	1 day	Tue 4/1/08	Tue 4/1/08
124	Install 9th Floor	15 days	Wed 4/2/08	Tue 4/22/08
125	Stock 10th Floor	1 day	Tue 4/8/08	Tue 4/8/08
126	Install 10th Floor	15 days	Wed 4/9/08	Tue 4/29/08
127	Stock 11th Floor	1 day	Wed 4/16/08	Wed 4/16/08
128	Install 11th Floor	15 days	Thu 4/17/08	Wed 5/7/08
129	Stock Main Roof	1 day	Thu 4/24/08	Thu 4/24/08
130	Install Main Roof	15 days	Fri 4/25/08	Thu 5/15/08
131	**Interior Finishes**	**110 days**	**Tue 7/15/08**	**Mon 12/15/08**
132	1st Floor Finishes	10 days	Tue 7/15/08	Mon 7/28/08
133	2nd Floor Finishes	10 days	Tue 7/29/08	Mon 8/11/08
134	3rd Floor Finishes	10 days	Tue 8/12/08	Mon 8/25/08
135	4th Floor Finishes	10 days	Tue 8/26/08	Mon 9/8/08
136	5th Floor Finishes	10 days	Tue 9/9/08	Mon 9/22/08
137	6th Floor Finishes	10 days	Tue 9/23/08	Mon 10/6/08
138	7th Floor Finishes	10 days	Tue 10/7/08	Mon 10/20/08
139	8th Floor Finishes	10 days	Tue 10/21/08	Mon 11/3/08
140	9th Floor Finishes	10 days	Tue 11/4/08	Mon 11/17/08
141	10th Floor Finishes	10 days	Tue 11/18/08	Mon 12/1/08
142	11th Floor Finishes	10 days	Tue 12/2/08	Mon 12/15/08
143	Substantial Completion	0 days	Mon 12/15/08	Mon 12/15/08



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Task | Progress | Summary | External Tasks | Deadline
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Site Layout Planning

The three critical phases of the project that need to be analyzed for the site layout of Lafayette Tower are demolition, superstructure and finishes. On the whole, the layouts are fairly similar for all three phases but there are some differences that will be explained below.

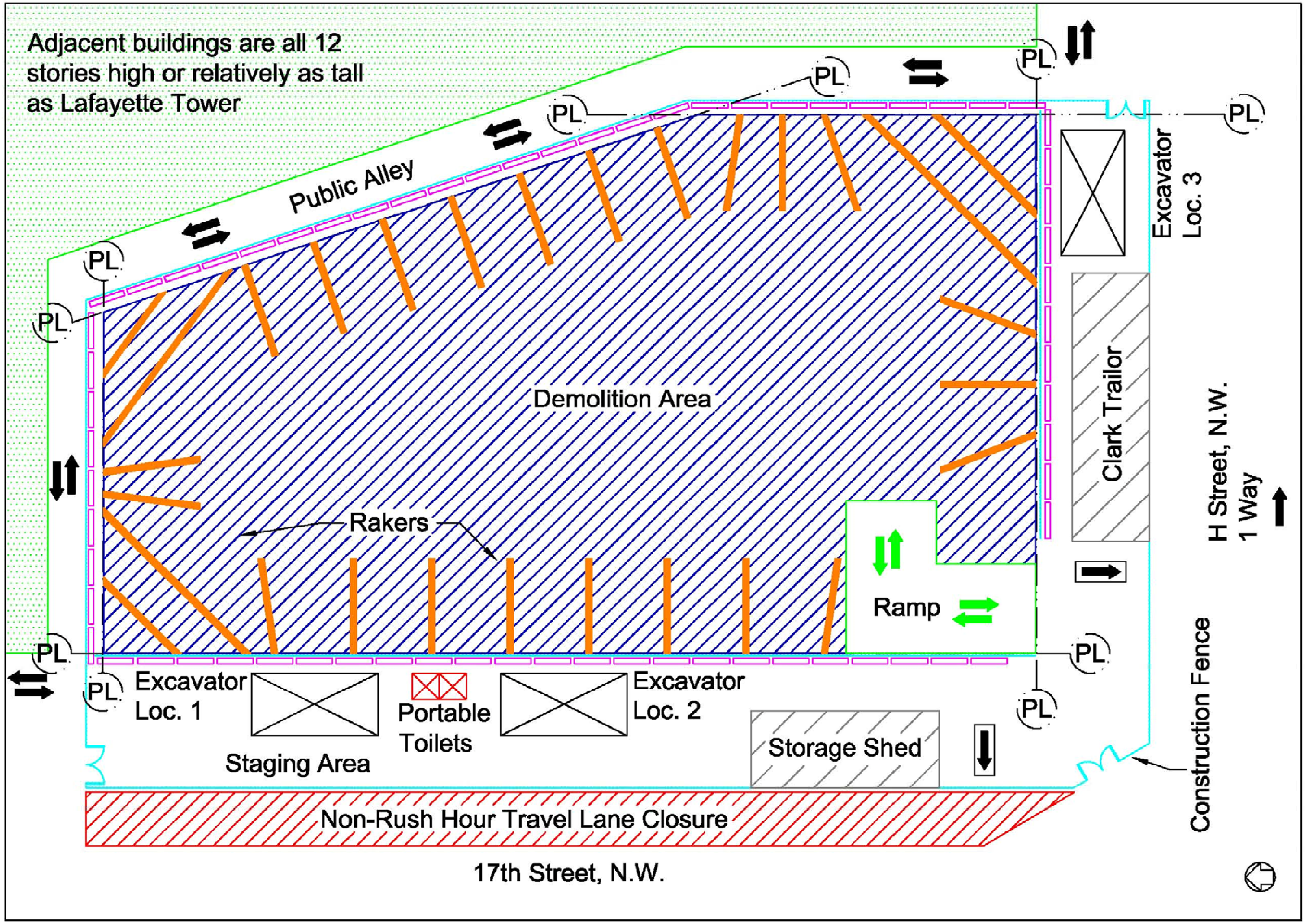
Demolition

The first phase that took place was the demolition of the existing building. The picture below illustrates what the site looked like once the demolition was complete. It gives a great view of all of the support of the foundation walls in place. You can also see Clark's site trailer, storage sheds, and various pieces of equipment around the site.

Figure 1 - Demolition Site Picture

The only problems that I noticed with Clark's site layout is that the south-west corner of the site was extremely congested which would make it hard for equipment and materials to be moved around in that area and also occasionally when materials were being hauled from site, extra lanes of traffic had to be shut down. This could potentially cause some problems with the local authorities especially considering the White House is a few blocks away.

The site plan that follows gives a good depiction of how the foundation walls were supported in plan view. There of 3 layers of rakers, tiebacks, and corner bracing associated with each shown in the drawing. It also shows the different locations of the excavator throughout the demolition process and other important items such as the site trailer, shed and fencing.



Lafayette Tower 801 17th St. NW Washington, DC 20006	Justin Wingenfield Construction Management	Demolition Site Plan 24 October 2008 Sheet 1 of 1

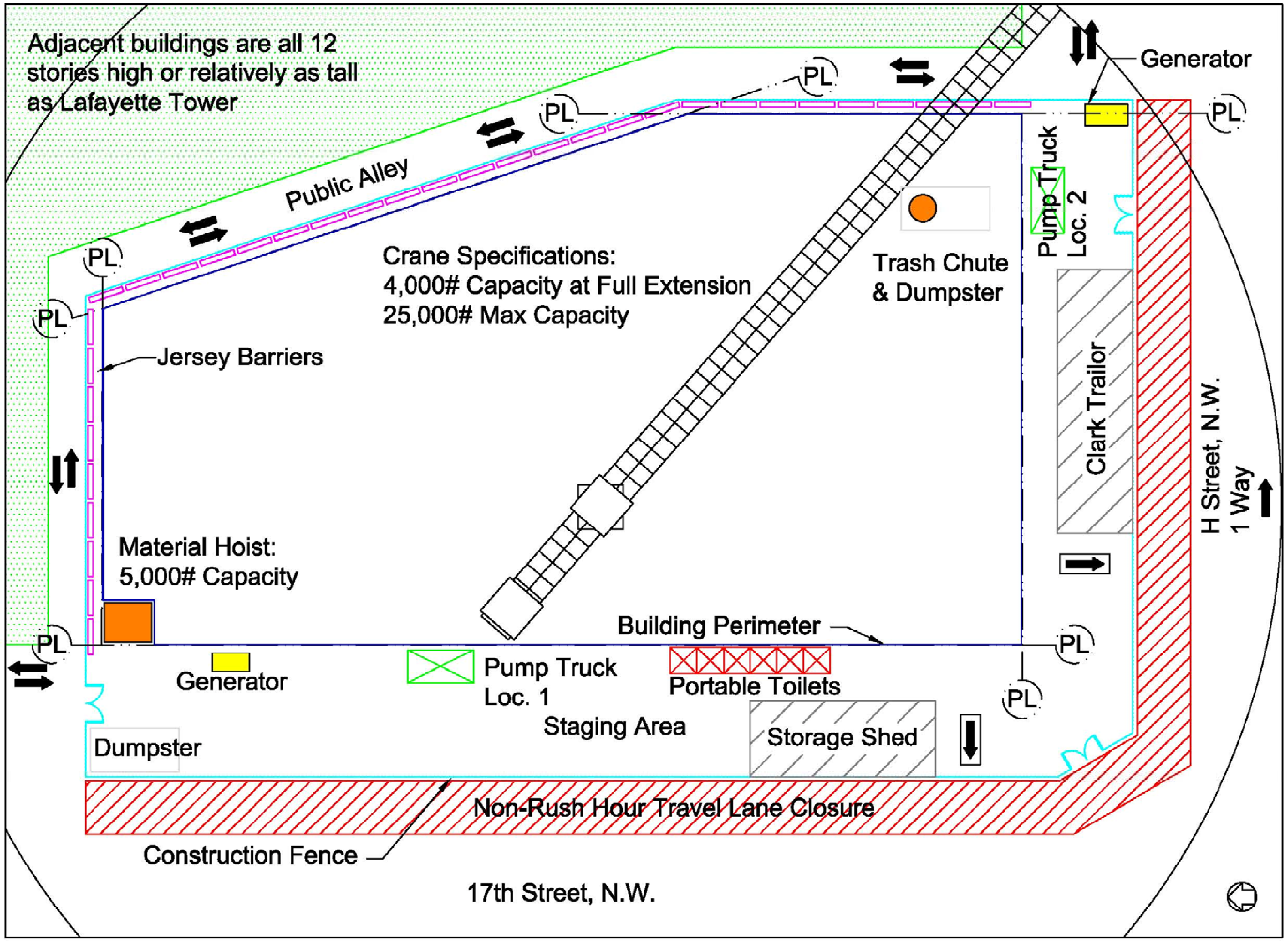
Superstructure

The second key phase to be analyzed was the layout while the superstructure was being constructed. Below, you can see what the site looked like while concrete was being placed. In the picture, you can see the pump truck distributing concrete for 4th floor deck. Along with that, you can see three concrete trucks either fueling or waiting to fuel the pump truck and the crane which won't be used for placing concrete until the building reaches its upper floors.

Figure 2 - Superstructure Site Picture

I think Clark's site layout is very functional for this stage of construction. Site cleanliness is somewhat of an issue in the above picture and needs to be kept under control better.

The site plan on the next page shows the project a little more progressed than in figure 2. The main differences are that the material hoist and trash chute/dumpster are pictured. They weren't installed until the building reached the upper floors and post-shoring was removed for the lower floors. Along with that, the plan shows the additional generator that is on site to power the hoist and take some of the load of the main generator with increase in electrical and lighting demands as more trades arrive on site and the square footage of the building continues to grow. It also shows the weight capacities of the crane and hoist.



Lafayette Tower 801 17th St. NW Washington, DC 20006	Justin Wingenfield Construction Management	Superstructure Site Plan 24 October 2008 Sheet 1 of 1

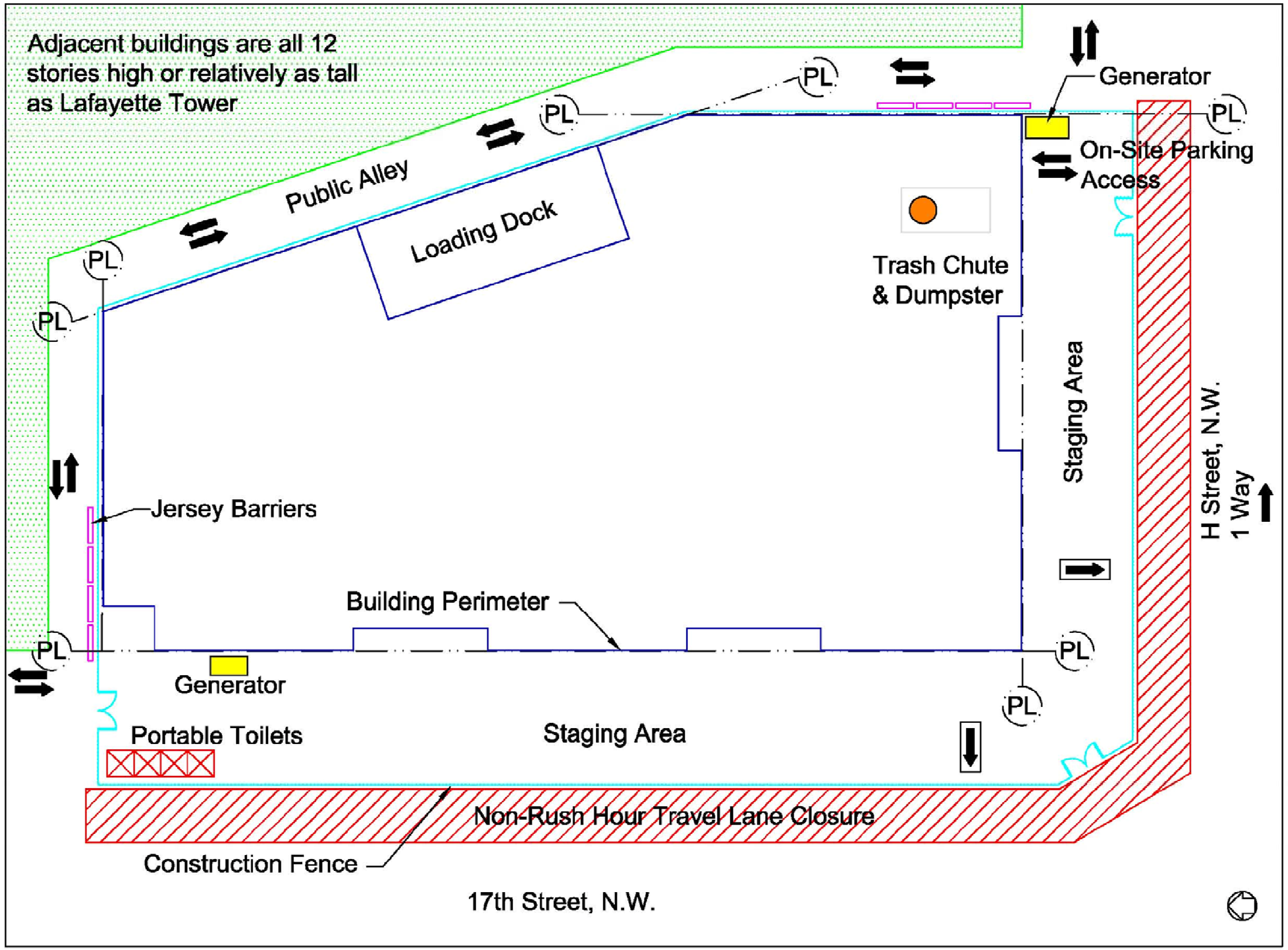
Finishes

The final phase examined was the finishes layout which shows what the site will look like after the building becomes water tight and interiors are the main concern. This is presently the current phase the project is in. As you can see in the picture below, the façade is entirely erected and there is a very minimal amount of activity going on outside of the building. Once the superstructure reached about the 8th or 9th floor, Clark's office was moved inside so there was no need for a trailer outside.

Figure 3 - Finishes Site Picture

The only thing that surprises me about the current state of the site is that there is still a lift and a concrete truck on the premise in this picture. Other than that, everything seems to be in order.

The site layout on the following page shows the site very similar to how it is pictured above. For this phase, the permanent loading dock of the building is now in use for most of the deliveries. Parking has been a problem for workers on this project throughout all phases. Public parking is available but at a rather steep cost. After the building became watertight and the stored materials in the garage levels were moved to their respective floors, space became available for on-site parking. The plan also shows the step-backs in the façade at the ground floor. Also, the majority of the alley has a brick façade for the 1st and 2nd floor except for a section of curtain wall at either end. Jersey barriers are used to protect the small section of curtain wall from vehicles and any equipment being used.



Lafayette Tower 801 17th St. NW Washington, DC 20006	Justin Wingenfield Construction Management	Finishes Site Plan 24 October 2008 Sheet 1 of 1

Detailed Structural Systems Estimate

The structural system of Lafayette Tower was estimated by performing quantity take-offs and consulting RS Means Building Construction Costs 2008 and industry professionals to determine unit costs. The estimate includes the following items: beams, columns, grade beams and slabs.

<u>Assumptions & Reasoning</u>

- Location Factor for Washington, D.C. = 99.7%
- No time factor was used because the version of RS Means is up to date
- Beams – 5 kip per L.F., 25' Span
- Average beam sizes for each area were determined by analyzing the beam schedule and systematically determining a mean
- The beam layouts from the 3rd floor to the roof are assumed to be typical
- Columns – 24" x 24", Average reinforcing
- 11'-6" heights were assumed for all columns
- Grade Beams – Due to the fact that grade beams aren't available in RS Means, costs were extrapolated from values for strip footings which is the most comparable entity in Means
- Slabs – Flat slabs w/ drops, 125psf load, 30' spans
- Labor costs for slabs were increased from the RS Means value to adjust for post-tensioning system as suggested by industry professional
- The slabs from P2-concourse along with the slabs from the 3rd-11th were considered to be typical throughout those 3 and 9 floors respectively

Take-offs and a cost analysis are on the following pages.

Beams						
Mark	**Width(in)**	**Depth(in)**	**Length(LF)**	**Qty**	**Total CF**	**Total CY**
PB	12	24	615	2	2460	91.1
CB	12	24	665	1	1330	49.3
1B	12	24	570	1	1140	42.2
2B	12	24	425	1	850	31.5
TB	12	24	225	10	4500	166.7
PH	12	24	267	1	534	19.8
PTB	36	24	30	3	540	20.0
				Subtotal	11354	420.5

Figure 4 - Beam Take-offs

Columns					
Length(in)	**Width(in)**	**Vol (CF)**	**Qty**	**Total CF**	**Total CY**
24	24	46	244	11,224	415.7
30	12	29	217	6,239	231.1
30	24	58	79	4,543	168.2
24	12	23	77	1,771	65.6
36	12	35	40	1,380	51.1
36	24	69	26	1,794	66.4
42	12	40	8	322	11.9
40	24	77	7	537	19.9
28	28	63	7	438	16.2
44	12	42	6	253	9.4
40	12	38	6	230	8.5
52	12	50	5	249	9.2
48	14	54	5	268	9.9
48	12	46	5	230	8.5
32	24	61	5	307	11.4
36	16	46	4	184	6.8
33	24	63	4	253	9.4
36	18	52	3	155	5.8
		Subtotal	748	30,377	1,125.1

Figure 5 - Column Take-offs

Grade Beams						
Mark	**Width(in)**	**Depth(in)**	**Length(LF)**	**Qty**	**Total CF**	**Total CY**
GB-1	48	36	30	1	360	13.3
GB-2	60	60	44	1	1,100	40.7
GB-3	72	60	44	1	1,320	48.9
GB-4	60	48	40	1	800	29.6
GB-5	64	44	36	2	1,408	52.1
GB-6	60	60	24	1	600	22.2
GB-7	30	36	22	1	165	6.1
GB-8	36	42	20	1	210	7.8
			Subtotal	9	5,963	220.9

Figure 6 - Grade Beam Take-offs

Slabs					
Description	Area (SF)	Thickness (ft)	Qty	Total CF	Total CY
P3					
4" Slab on Grade	17750	0.33	1	5,917	219.1
5" Slab on Grade	1000	0.42	1	417	15.4
P2-Concourse					
8 1/2 " Slab	17750	0.71	3	37,719	1,397.0
10 1/2" Slab	1000	0.88	3	2,625	97.2
Ground Floor					
9" Slab	13,896	0.75	1	10,422	386.0
12" Slab	2,450	1	1	2,450	90.7
14" Slab	1,503	1.17	1	1,759	65.1
2nd Floor					
10" P.T. Slab	14,732	0.83	1	12,228	452.9
3rd-11th Floor					
10" P.T. Slab	16,892	0.83	9	126,183	4,673.5
12" P.T. Slab	3,110	1	9	27,990	1,036.7
Main Roof					
10" P.T. Slab	9,302	0.83	1	7,721	286.0
12" P.T. Slab	10,644	1	1	10,644	394.2
Penthouse Roof					
8" P.T. Slab	4,761	0.66	1	3,142	116.4
		Subtotal		249,215	9,230

Figure 7 - Slab Take-offs

Cost							
			2009 Bare Costs				
Component	Unit	Qty	Material	Labor	Equipment	Total/CY	Total
Slabs	CY	9,230	$340.00	$216.00	$19.85	$575.85	$5,315,208.82
Columns	CY	1,125.1	$570.00	$455.00	$43.00	$1,068.00	$1,201,563.73
Beams	CY	420.5	$430.00	$430.00	$41.00	$901.00	$378,887.19
Grade Beams	CY	220.9	$141.00	$71.50	$9.00	$221.50	$48,918.69
	Subtotal	10,997	$3,991,514.00	$2,702,238.53	$250,825.90		$6,944,578.42
						Location Factor	99.7
						Total	$6,923,744.69
						% of Job	14.7

Figure 8 - Cost Analysis

The total cost of the structural system came out low according to the professionals I talked to. Historical data shows that the structural system for a concrete office building in D.C. should cost around $24/SF which would mean Lafayette Tower's should be around $7.8 million. Some of the reasons my number might be low are either the take-offs or choices of price were low. Another reason might be that because the existing foundation was salvaged and therefore less concrete/work was needed, the cost of concrete for the job would go down substantially.

General Conditions Estimate

For the General Conditions estimate, most of the unit costs for the items were taken from RS Means Building Construction Costs 2008. For items that were not in RS Means, ball park figures were provided by either Clark or estimated using prior knowledge. The General Conditions estimate for Lafayette Tower ended up being approximately $3.1million or 6.7% of the total project cost. After consulting industry professions, I discovered that General Conditions usually make up anywhere from 5-8% of the total cost so 6.7% appears to be a reasonable estimate.

The project duration varied depending on the item but for anything that was necessary on site for the duration of the project, 90 weeks or 21 months was used as the duration. This is the time from start of demolition, which took place almost immediately after the project was awarded, until substantial completion.

The estimate was broken down into five main categories: Supervision/project management, administrative facilities and supplies, and safety. Their cost breakout is displayed below.

Description	Total	%
Supervision/Project Management	$1,494,900.00	47.6%
Administrative Facilities and Supplies	$179,595.00	5.7%
Safety	$6,000.00	0.2%
Cleanup	$248,072.56	7.9%
Jobsite Work Requirements	$1,208,728.05	38.5%
Total	$3,137,295.61	100.0%

Figure 9 - Compact General Conditions

Supervision and project management made up a large portion of the general condition at approximately 48%. That percentage is classically slightly higher which could mean a couple things. One explanation is that the project is understaffed or I assumed low salaries for the team members. Another explanation could be that other parts of the estimate are overvalued. Licenses & permits and liability insurance were included in jobsite work requirements and could have possibly been left out. If that was the case, it would have put project staffing almost exactly at its historical value of around 65% of the GCs. After a lot of consideration, they were kept because it made the general conditions more accurate as a whole.

The entire General Conditions spreadsheet is listed on the next two pages.

General Conditions - Lafayette Tower

DESCRIPTION	Qty.	Amount	Units	Unit Price	Total
SUPERVISION/PROJECT MANAGEMENT					
Project Executive	1	90	WK	$2,350.00	**$211,500.00**
Superintendent	1	90	WK	$2,025.00	**$182,250.00**
Project Manager	1	90	WK	$1,925.00	**$173,250.00**
Assistant Superintendent	1	90	WK	$1,600.00	**$144,000.00**
Project Engineer	2	90	WK	$1,350.00	**$243,000.00**
Safety Manager	1	90	WK	$1,350.00	**$121,500.00**
Field Engineer	2	90	WK	$1,165.00	**$209,700.00**
Office Engineer	1	90	WK	$1,165.00	**$104,850.00**
Quality Control Engineer	1	90	WK	$1,165.00	**$104,850.00**
				Subtotal	**$1,494,900.00**
ADMINSTRATIVE FACILITIES AND SUPPLIES					
Trailer Set-Up and Rental	1	18	MO	$375.00	**$6,750.00**
Relocate Field Office	1	1	LS	$1,000.00	**$1,000.00**
Office Equipment Rental	1	21	MO	$155.00	**$3,255.00**
Office Supplies	1	21	MO	$85.00	**$1,785.00**
IT Expenses	11	21	MO	$75.00	**$17,325.00**
Cell Phones / Office Telephone	11	21	MO	$80.00	**$18,480.00**
Drawings & Specifications	1	1	LS	$5,000.00	**$5,000.00**
Motor Vehicle Expenses	3	21	MO	$1,000.00	**$63,000.00**
Living & Travel Expenses	1	21	MO	$3,000.00	**$63,000.00**
				Subtotal	**$179,595.00**
SAFETY					
Job Safety Materials Expenses	1	1	LS	$5,000.00	**$5,000.00**
Personal Protection Equipment	1	1	LS	$1,000.00	**$1,000.00**
				Subtotal	**$6,000.00**

DESCRIPTION	Qty.	Amount	Units	Unit Price	Total
CLEANUP					
Periodic Cleanup	21	328	MSF/MO	$27.23	**$187,560.24**
Final Cleanup	1	328	MSF	$56.44	**$18,512.32**
Dumpster Service	1	21	MO	$2,000.00	**$42,000.00**
				Subtotal	**$248,072.56**
JOBSITE WORK REQUIREMENTS					
Temporary Fencing	2	735	LF	$3.95	**$5,806.50**
Barricades	1	1	LS	$5,000.00	**$5,000.00**
Signage	1	1	LS	$1,000.00	**$1,000.00**
Misc. Tools & Equipment	1	1	LS	$2,500.00	**$2,500.00**
Generators (includes fuel)	2	18	MO	$980.00	**$35,280.00**
Temporary Hoist	1	12	MO	$10,000.00	**$120,000.00**
Drinking Water	1	21	MO	$75.00	**$1,575.00**
Temporary Lighting	1	3277	CFS	$15.00	**$49,155.00**
Temporary Power	21	3277	CSF/MO	$2.15	**$147,956.55**
Temporary Toilets	5	21	MO	$171.00	**$17,955.00**
Licenses & Permits	-	-	% Job	0.75	**$352,500.00**
Liability Insurance	-	-	% Job	1	**$470,000.00**
				Subtotal	**$1,208,728.05**
TOTALS					
				Sub-Total:	**$3,137,295.61**
				Location Factor:	**99.7**
				Total:	**$3,127,883.72**
				% of Job:	**6.7%**

Figure 10 - General Conditions Estimate

Critical Industry Issues

The 2008 PACE Roundtable meeting was held at the Penn Stater on October 15th and 16th with the theme of "Investing in People". A banquet was held Wednesday night which was an excellent opportunity for students to mingle with industry members and dine on some really good food at the same time. The following day, everyone came back together for the actual seminar.

After a short kick-off by Professor Holland and some of the graduate student, it was time for the first breakout session in which students and industry members paired up and discussed a mentoring model that could be put in place for future architectural engineering students. Myself and two of my classmates sat down with Bill Moyer from James G. Davis Construction and discussed how we thought the program should be conducted and the benefits it would provide to the people involved.

As a group, we decided that the best way to facilitate a a mentoring relationship between industry members and students would be to use some sort of a personality survey to pair up compatible people. Things like similar interests and backgrounds would also be considered. We felt that the goal of the mentoring project would not just be for students to learn a few things about the construction industry from their mentors but to form a long-lasting relationship that would be rewarding for both parties.

Throughout our discussion, we talked about the benefits that that could be attained by both parties. Here are a few examples that we came up with.

Benefits For Students:

- Learning about industry from someone who is actually in industry and comes from a similar background (Penn State AE)
- Develope communication skills
- Start networking early
- Gain insight and help with career choices

Benefits For Industry Members:

- The opportunity to feel young again/ a good excuse to come back to Happy Valley
- Aquire insight into a new generation of people who will soon be entering the workforce
- Gain personal satisfaction by helping out the students

Another point that we found important was that the program shouldn't be used specifically as a recruiting tool for companies. If the student ends up meshing well with their mentor and is a good fit for their company, then that is great but nothing should be forced.

For the second break-out session, there were three possible topics to attend; LEED Evolution, BIM Strategies, and Energry &Economy. I chose the last of the three because I felt that I've had the least amount of experience with it and also the current state of the economy has been something that has interested me given my rapidly approaching graduation. The session was hosted by Dr. Riley and was focused on how are energy prices affecting business and what sectors will flourish in the current economic downturn.

We started out by diving into the topic of energy. Most of the discussion was carried by the industry members because they deal with these issues on a day-to-day basis and have much more experience. The volatility of materials and dependancy on oil were our first topics. Possible solutions we discussed were using alternative, less well known materials to try to save in product costs or using materials from a local vender to try to save in transportation.

Some of the other ways we focused on to fight the rising enegry costs were to spend a little extra money up front and invest in an upgraded mechanical system. With the more sophisticated controls and continuous commissing throughout the life of the building, a better mechanical system will rapidly pay for itself and save money over the life of the building. Another building component that was stressed was the integrationg of TP-1 transformers due to the fact that they are more energy efficient and environmentally friendly then old transformers.

Regardless of the state of the economy, there are still some construction markets that will continue to thrive. Federal work will be maintained due to the Base Realignment and Closure (BRAC) Commission and the renovation/restoration of historic buildings. There will always be a need for new data centers due to the fact that they are dependent on ever changing technical innovations. Additionally, healthcare facilities are becoming necessary to accommodate for the growing demographic of senior citizens as the baby boomers become of age.

The final topic directly correlates to the title of the Roundtable, investing in people. Everyone knows there will obviously be some downsizing as the well of jobs slowly dries up during the economic crisis but as relayed by the professionals, good companies, such as PACE members, will persevere through the hard times and come out stronger in the end. The phrase "cleaning the pipes" was mention and the general consensus was that competent people have nothing to worry about.

By far the most surprising thing I saw at the meeting was how optimistic the professions were about the current economic state. As a soon to be graduate and member of the construction industry, it was nice to get some reassurance that there will be jobs waiting for me by the time I graduate in May. A good piece of advice that was delivered was to keep working hard and learn as much as possible so that when the economy turns we'll be prepared to take on the explosion of new jobs.

Over the 2 days that everyone joined together, I was fortunate enough to meet a lot of new people and see many that I had met previously. One in particular that stands out as someone who would be able to advise me in the future would be Bill Moyer from Davis. Throughout the course of events, I talked to Bill on three separate occasions and every time I learned something new. Mr. Moyer would also be someone good to talk to about my project because a large portion of Davis's work is large office buildings in the D.C. area which is exactly what my building is.