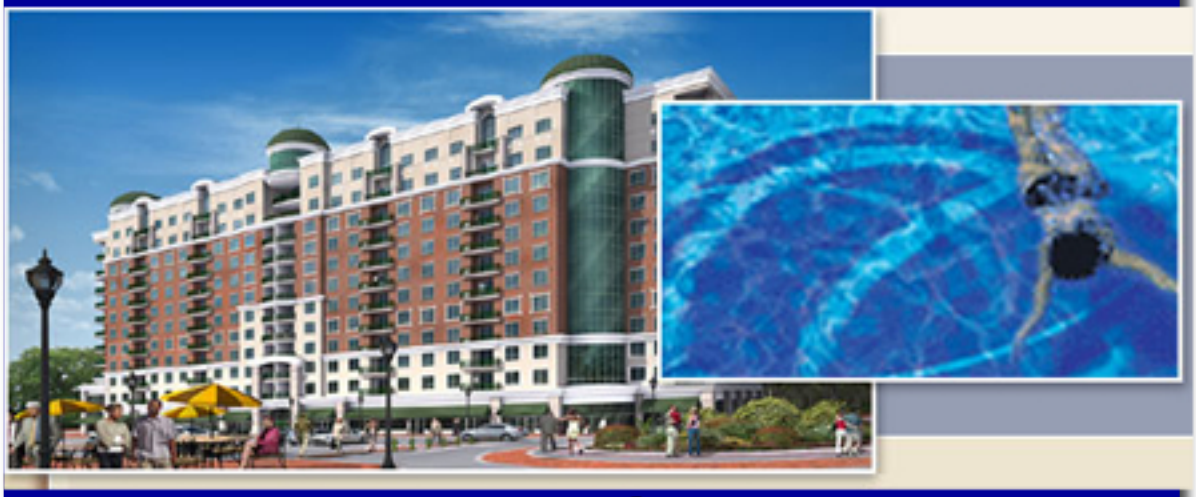
TECH 2

TECHNICAL ASSIGNMENT 2



Grand View

AT ANNAPOLIS TOWNE CENTRE AT PAROLE

ANNAPOLIS, MD

Matthew Karle
Construction Management
Dr. Chimay Anumba

Monday, October 24, 2008

Matthew Karle
Construction Management
Faculty Advisor
Grandview at Annapolis Towne Centre
1915 Towne Centre Blvd
Annapolis MD 21401

Technical Assignment #2

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Executive Summary

This Technical Assignment analyzes the key features of GrandView at Annapolis Towne Centrethat affect its construction. Time allocation and cost breakdowns are shown through the production of more detailed schedules and estimates. The goal of this report is to discover an alternate construction method or facet of the project that could be used for a thesis topic.

The detailed project schedule shows major construction activities broken down by trade. Later, this schedule coupled with the general conditions estimate will help produce a cost loading analysis. Three site plans provide critical layouts during the sites different phases. Logical flow and placement of equipment is the main concern here. By sketching out the site plan with all of its components, a better layout may sometimes be discovered. A general conditions estimate explains the costs not directly associated with the building, but significant in the planning and overall success of the project. Operational costs, supplies, project staff, bonds and insurance will be projected in order to give a general cost estimate.

Detailed Project Schedule

Major Project Milestones	
Contract Executed	1/31/2007
Owner Pad Acceptance (NTP)	3/7/2007
Parking Garage Ready to Accept Bridge Steel	9/3/2007
Concrete Top Out	10/10/2007
BGE Power	5/23/2008
Start Retail Tenant Build Out	6/3/2008
Hoist Demobilization	9/3/2008
Anticipated Retail Occupancy	10/1/2008
Building Envelope Complete	12/9/2008
Substantion Completion	3/12/2009
Final Completion	6/5/2008

Time From Notice to Proceed to Substantion Completion
24 Months

Table 1: Major Project Milestones

Figure 1: Slab Pour Breakdown

Each floor is broken into three sections to keep the pours manageable. The project specifications require that at least one floor be fully formed or shored with a minimum of 3 floors reshored at any time.

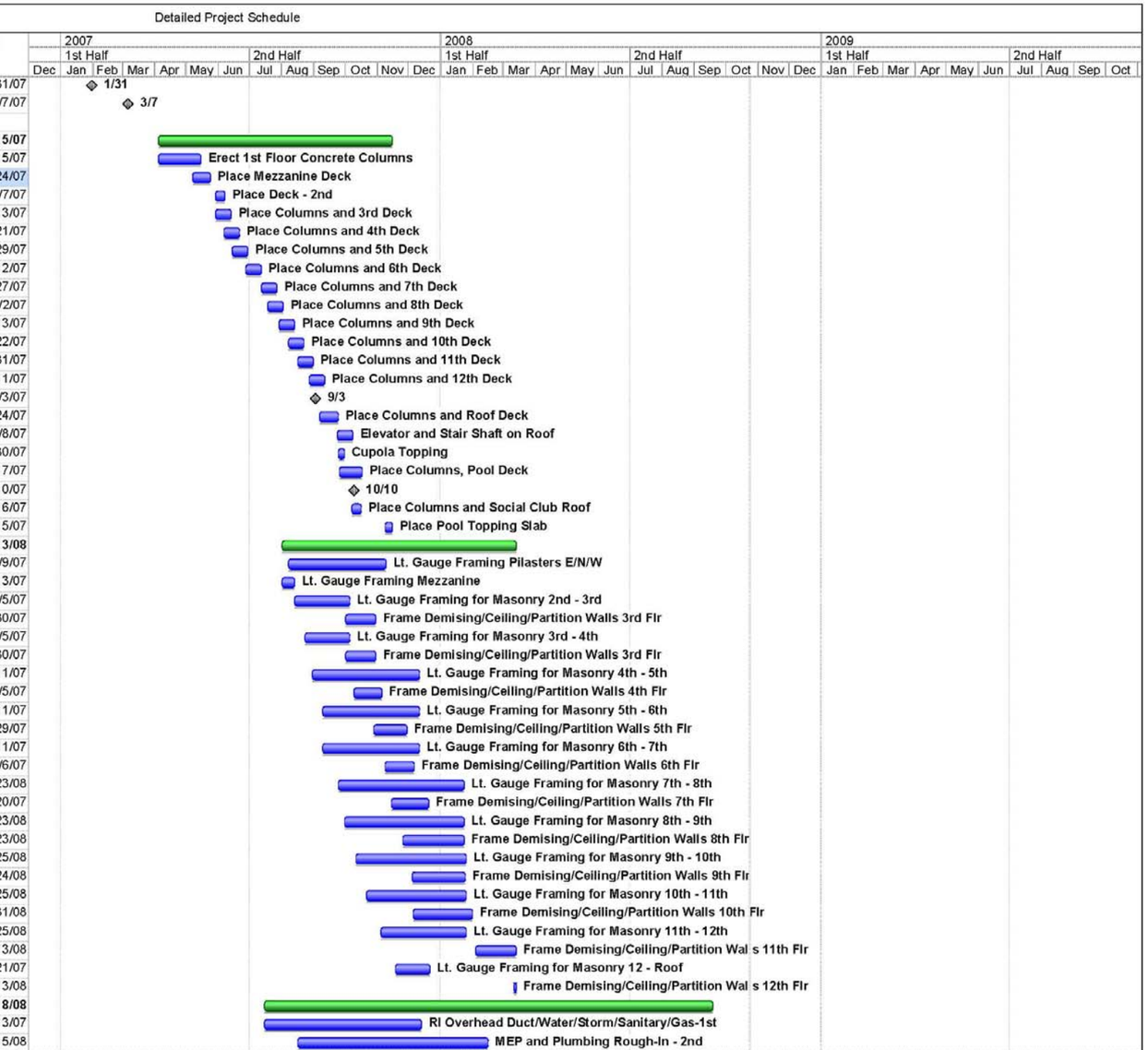
GrandView had a relatively fast paced erection of the superstructure due to simultaneous pours from 2 cranes and early start time. Pouring began at 2:00 am so by the time it was 10:00 am. workers were able to walk on the slabs in order to form columns. In order to maintain the required limit of 200 line items for the schedule, a shortened version of the actual construction sequence was used. In actuality, the sequence would include the following.

Form – Shore – Reinforce – Pour – Re-shore – Cure - Strip

This whole process took 11 days, which is reflected in the schedule. Slabs and Columns were often formed, reinforced and poured on the same day thanks to early morning pour method.

Detailed Project Schedule

ID	Task Name	Duration	Start	Finish
1	Contract Executed	0 days	Wed 1/31/07	Wed 1/31/07
2	Owner Pad Acceptance (NTP)	0 days	Wed 3/7/07	Wed 3/7/07
3				
4	**Concrete: Superstructure**	**161 days?**	**Thu 4/5/07**	**Thu 11/15/07**
5	Erect 1st Floor Concrete Columns	29 days?	Thu 4/5/07	Tue 5/15/07
6	Place Mezzanine Deck	13 days	Tue 5/8/07	Thu 5/24/07
7	Place Deck - 2nd	7 days	Wed 5/30/07	Thu 6/7/07
8	Place Columns and 3rd Deck	11 days	Wed 5/30/07	Wed 6/13/07
9	Place Columns and 4th Deck	11 days?	Thu 6/7/07	Thu 6/21/07
10	Place Columns and 5th Deck	11 days	Fri 6/15/07	Fri 6/29/07
11	Place Columns and 6th Deck	11 days	Thu 6/28/07	Thu 7/12/07
12	Place Columns and 7th Deck	11 days	Fri 7/13/07	Fri 7/27/07
13	Place Columns and 8th Deck	11 days	Thu 7/19/07	Thu 8/2/07
14	Place Columns and 9th Deck	11 days	Mon 7/30/07	Mon 8/13/07
15	Place Columns and 10th Deck	11 days	Wed 8/8/07	Wed 8/22/07
16	Place Columns and 11th Deck	11 days	Fri 8/17/07	Fri 8/31/07
17	Place Columns and 12th Deck	11 days?	Tue 8/28/07	Tue 9/11/07
18	Parking Garage Ready to Accept Bridge Steel	0 days	Mon 9/3/07	Mon 9/3/07
19	Place Columns and Roof Deck	12 days?	Fri 9/7/07	Mon 9/24/07
20	Elevator and Stair Shaft on Roof	11 days?	Mon 9/24/07	Mon 10/8/07
21	Cupola Topping	4 days?	Tue 9/25/07	Sun 9/30/07
22	Place Columns, Pool Deck	16 days?	Wed 9/26/07	Wed 10/17/07
23	Concrete Top Out	0 days	Wed 10/10/07	Wed 10/10/07
24	Place Columns and Social Club Roof	7 days?	Mon 10/8/07	Tue 10/16/07
25	Place Pool Topping Slab	5 days?	Fri 11/9/07	Thu 11/15/07
26	**Framing**	**161 days?**	**Thu 8/2/07**	**Thu 3/13/08**
27	Lt. Gauge Framing Pilasters E/N/W	68 days?	Wed 8/8/07	Fri 11/9/07
28	Lt. Gauge Framing Mezzanine	8 days?	Thu 8/2/07	Mon 8/13/07
29	Lt. Gauge Framing for Masonry 2nd - 3rd	39 days?	Tue 8/14/07	Fri 10/5/07
30	Frame Demising/Ceiling/Partition Walls 3rd Flr	21 days?	Tue 10/2/07	Tue 10/30/07
31	Lt. Gauge Framing for Masonry 3rd - 4th	31 days?	Fri 8/24/07	Fri 10/5/07
32	Frame Demising/Ceiling/Partition Walls 3rd Flr	21 days?	Tue 10/2/07	Tue 10/30/07
33	Lt. Gauge Framing for Masonry 4th - 5th	73 days?	Fri 8/31/07	Tue 12/11/07
34	Frame Demising/Ceiling/Partition Walls 4th Flr	19 days?	Wed 10/10/07	Mon 11/5/07
35	Lt. Gauge Framing for Masonry 5th - 6th	67 days?	Mon 9/10/07	Tue 12/11/07
36	Frame Demising/Ceiling/Partition Walls 5th Flr	24 days?	Mon 10/29/07	Thu 11/29/07
37	Lt. Gauge Framing for Masonry 6th - 7th	67 days?	Mon 9/10/07	Tue 12/11/07
38	Frame Demising/Ceiling/Partition Walls 6th Flr	20 days?	Fri 11/9/07	Thu 12/6/07
39	Lt. Gauge Framing for Masonry 7th - 8th	87 days?	Tue 9/25/07	Wed 1/23/08
40	Frame Demising/Ceiling/Partition Walls 7th Flr	26 days?	Thu 11/15/07	Thu 12/20/07
41	Lt. Gauge Framing for Masonry 8th - 9th	83 days?	Mon 10/1/07	Wed 1/23/08
42	Frame Demising/Ceiling/Partition Walls 8th Flr	43 days?	Mon 11/26/07	Wed 1/23/08
43	Lt. Gauge Framing for Masonry 9th - 10th	76 days?	Fri 10/12/07	Fri 1/25/08
44	Frame Demising/Ceiling/Partition Walls 9th Flr	37 days?	Wed 12/5/07	Thu 1/24/08
45	Lt. Gauge Framing for Masonry 10th - 11th	70 days?	Mon 10/22/07	Fri 1/25/08
46	Frame Demising/Ceiling/Partition Walls 10th Flr	41 days?	Thu 12/6/07	Thu 1/31/08
47	Lt. Gauge Framing for Masonry 11th - 12th	60 days?	Mon 11/5/07	Fri 1/25/08
48	Frame Demising/Ceiling/Partition Walls 11th Flr	29 days?	Mon 2/4/08	Thu 3/13/08
49	Lt. Gauge Framing for Masonry 12 - Roof	25 days?	Mon 11/19/07	Fri 12/21/07
50	Frame Demising/Ceiling/Partition Walls 12th Flr	2 days?	Wed 3/12/08	Thu 3/13/08
51	**MEP Rough-In**	**309 days?**	**Mon 7/16/07**	**Thu 9/18/08**
52	RI Overhead Duct/Water/Storm/Sanitary/Gas-1st	109 days?	Mon 7/16/07	Thu 12/13/07
53	MEP and Plumbing Rough-In - 2nd	131 days?	Fri 8/17/07	Fri 2/15/08



Project: Perfect Schedule
Date: Fri 10/24/08

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

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Detailed Project Schedule

ID	Task Name	Duration	Start	Finish
54	MEP and Plumbing Rough-In - 3rd	121 days?	Mon 9/10/07	Mon 2/25/08
55	MEP and Plumbing Rough-In - 4th	57 days?	Fri 9/14/07	Mon 12/3/07
56	MEP and Plumbing Rough-In - 5th	64 days?	Fri 9/14/07	Wed 12/12/07
57	MEP and Plumbing Rough-In - 6th	77 days?	Mon 9/17/07	Tue 1/1/08
58	MEP and Plumbing Rough-In - 7th	85 days?	Tue 10/2/07	Mon 1/28/08
59	MEP and Plumbing Rough-In - 8th	134 days?	Mon 10/8/07	Thu 4/10/08
60	MEP and Plumbing Rough-In - 9th	133 days?	Tue 10/16/07	Thu 4/17/08
61	MEP and Plumbing Rough-In - 10th	133 days?	Mon 10/29/07	Wed 4/30/08
62	MEP and Plumbing Rough-In - 11th	185 days?	Mon 11/12/07	Fri 7/25/08
63	MEP and Plumbing Rough-In - 12th	208 days?	Mon 11/26/07	Wed 9/10/08
64	MEP and Plumbing Rough-In - Roof	66 days?	Mon 12/17/07	Mon 3/17/08
65	MEP and Plumbing Rough-In - Pool Deck	54 days?	Mon 7/7/08	Thu 9/18/08
66	**Elevator Installation**	**276 days?**	**Mon 1/7/08**	**Mon 1/26/09**
67	Install Shafts 1,2,3	23 days?	Mon 1/7/08	Wed 2/6/08
68	Set Elevator Platforms	30 days?	Fri 2/1/08	Thu 3/13/08
69	Build Out-Elevator Cabs	5 days?	Fri 5/23/08	Thu 5/29/08
70	Trim Out Elevator Cabs	14 days?	Wed 1/7/09	Mon 1/26/09
71	**Masonry and GSFR**	**292 days?**	**Wed 8/8/07**	**Thu 9/18/08**
72	Masonry Grnd	15 days?	Wed 8/8/07	Tue 8/28/07
73	Masonry Mezz	33 days?	Wed 9/5/07	Fri 10/19/07
74	Masonry 2nd	33 days?	Wed 8/29/07	Fri 10/12/07
75	Framing and GFRC - 2nd	45 days?	Tue 6/10/08	Mon 8/11/08
76	Masonry 3rd	51 days?	Thu 10/4/07	Thu 12/13/07
77	Framing and GFRC - 3rd	46 days?	Mon 3/24/08	Mon 5/26/08
78	Masonry 4th	95 days?	Mon 10/8/07	Fri 2/15/08
79	Framing and GFRC - 4	89 days?	Mon 5/19/08	Thu 9/18/08
80	Masonry 5th	90 days?	Mon 10/22/07	Fri 2/22/08
81	Framing and GFRC - 5th	43 days?	Thu 3/27/08	Mon 5/26/08
82	Masonry 6th	90 days?	Mon 10/29/07	Fri 2/29/08
83	Framing and GFRC - 6th	41 days?	Mon 3/31/08	Mon 5/26/08
84	Masonry 7th	48 days?	Mon 12/31/07	Wed 3/5/08
85	Framing and GFRC - 7th	41 days?	Mon 3/31/08	Mon 5/26/08
86	Masonry 8th	40 days?	Tue 1/15/08	Mon 3/10/08
87	Framing and GFRC - 8th	41 days?	Mon 3/31/08	Mon 5/26/08
88	Masonry 9th	48 days?	Tue 1/15/08	Thu 3/20/08
89	Framing and GFRC - 9th	40 days?	Tue 4/1/08	Mon 5/26/08
90	Masonry 10th	67 days?	Tue 1/15/08	Wed 4/16/08
91	Framing and GFRC - 10th	39 days?	Wed 4/2/08	Mon 5/26/08
92	Masonry 4th - 11th	68 days?	Tue 1/15/08	Thu 4/17/08
93	Framing and GFRC - 11th	105 days?	Wed 4/2/08	Tue 8/26/08
94	Masonry 4th - 12th	50 days?	Fri 2/8/08	Thu 4/17/08
95	Framing and GFRC - 12th	97 days?	Fri 4/4/08	Mon 8/18/08
96	BGE Power	0 days	Fri 5/23/08	Fri 5/23/08
97	Masonry Roof and Pool	47 days?	Wed 3/19/08	Thu 5/22/08
98	**Glass and Glazing**	**173 days?**	**Tue 3/25/08**	**Thu 11/20/08**
99	Install Windows - 1st	20 days?	Fri 10/24/08	Thu 11/20/08
100	Install Windows - 2nd	92 days?	Tue 4/22/08	Wed 8/27/08
101	Install Windows - 3rd	110 days?	Thu 4/10/08	Wed 9/10/08
102	Install Windows - 4th	111 days?	Thu 4/10/08	Thu 9/11/08
103	Install Windows - 5th	119 days?	Thu 3/27/08	Tue 9/9/08
104	Install Windows - 6th	117 days?	Fri 3/28/08	Mon 9/8/08
105	Install Windows - 7th	119 days?	Tue 3/25/08	Fri 9/5/08
106	Install Windows - 8th	116 days?	Thu 3/27/08	Thu 9/4/08

Project: Perfect Schedule
Date: Fri 10/24/08

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

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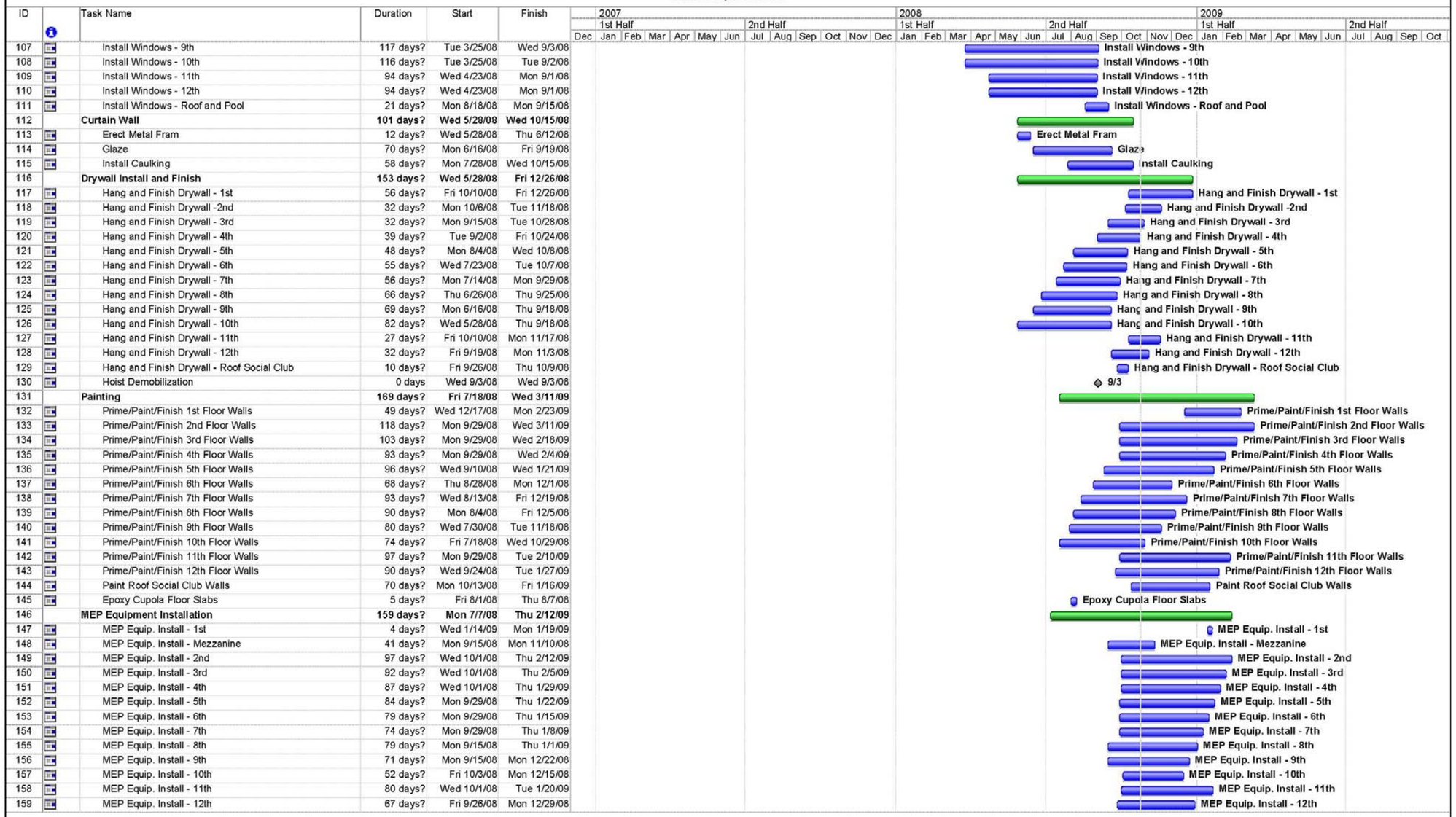
Detailed Project Schedule

ID	Task Name	Duration	Start	Finish
107	Install Windows - 9th	117 days?	Tue 3/25/08	Wed 9/3/08
108	Install Windows - 10th	116 days?	Tue 3/25/08	Tue 9/2/08
109	Install Windows - 11th	94 days?	Wed 4/23/08	Mon 9/1/08
110	Install Windows - 12th	94 days?	Wed 4/23/08	Mon 9/1/08
111	Install Windows - Roof and Pool	21 days?	Mon 8/18/08	Mon 9/15/08
112	**Curtain Wall**	**101 days?**	**Wed 5/28/08**	**Wed 10/15/08**
113	Erect Metal Fram	12 days?	Wed 5/28/08	Thu 6/12/08
114	Glaze	70 days?	Mon 6/16/08	Fri 9/19/08
115	Install Caulking	58 days?	Mon 7/28/08	Wed 10/15/08
116	**Drywall Install and Finish**	**153 days?**	**Wed 5/28/08**	**Fri 12/26/08**
117	Hang and Finish Drywall - 1st	56 days?	Fri 10/10/08	Fri 12/26/08
118	Hang and Finish Drywall -2nd	32 days?	Mon 10/6/08	Tue 11/18/08
119	Hang and Finish Drywall - 3rd	32 days?	Mon 9/15/08	Tue 10/28/08
120	Hang and Finish Drywall - 4th	39 days?	Tue 9/2/08	Fri 10/24/08
121	Hang and Finish Drywall - 5th	48 days?	Mon 8/4/08	Wed 10/8/08
122	Hang and Finish Drywall - 6th	55 days?	Wed 7/23/08	Tue 10/7/08
123	Hang and Finish Drywall - 7th	56 days?	Mon 7/14/08	Mon 9/29/08
124	Hang and Finish Drywall - 8th	66 days?	Thu 6/26/08	Thu 9/25/08
125	Hang and Finish Drywall - 9th	69 days?	Mon 6/16/08	Thu 9/18/08
126	Hang and Finish Drywall - 10th	82 days?	Wed 5/28/08	Thu 9/18/08
127	Hang and Finish Drywall - 11th	27 days?	Fri 10/10/08	Mon 11/17/08
128	Hang and Finish Drywall - 12th	32 days?	Fri 9/19/08	Mon 11/3/08
129	Hang and Finish Drywall - Roof Social Club	10 days?	Fri 9/26/08	Thu 10/9/08
130	Hoist Demobilization	0 days	Wed 9/3/08	Wed 9/3/08
131	**Painting**	**169 days?**	**Fri 7/18/08**	**Wed 3/11/09**
132	Prime/Paint/Finish 1st Floor Walls	49 days?	Wed 12/17/08	Mon 2/23/09
133	Prime/Paint/Finish 2nd Floor Walls	118 days?	Mon 9/29/08	Wed 3/11/09
134	Prime/Paint/Finish 3rd Floor Walls	103 days?	Mon 9/29/08	Wed 2/18/09
135	Prime/Paint/Finish 4th Floor Walls	93 days?	Mon 9/29/08	Wed 2/4/09
136	Prime/Paint/Finish 5th Floor Walls	96 days?	Wed 9/10/08	Wed 1/21/09
137	Prime/Paint/Finish 6th Floor Walls	68 days?	Thu 8/28/08	Mon 12/1/08
138	Prime/Paint/Finish 7th Floor Walls	93 days?	Wed 8/13/08	Fri 12/19/08
139	Prime/Paint/Finish 8th Floor Walls	90 days?	Mon 8/4/08	Fri 12/5/08
140	Prime/Paint/Finish 9th Floor Walls	80 days?	Wed 7/30/08	Tue 11/18/08
141	Prime/Paint/Finish 10th Floor Walls	74 days?	Fri 7/18/08	Wed 10/29/08
142	Prime/Paint/Finish 11th Floor Walls	97 days?	Mon 9/29/08	Tue 2/10/09
143	Prime/Paint/Finish 12th Floor Walls	90 days?	Wed 9/24/08	Tue 1/27/09
144	Paint Roof Social Club Walls	70 days?	Mon 10/13/08	Fri 1/16/09
145	Epoxy Cupola Floor Slabs	5 days?	Fri 8/1/08	Thu 8/7/08
146	**MEP Equipment Installation**	**159 days?**	**Mon 7/7/08**	**Thu 2/12/09**
147	MEP Equip. Install - 1st	4 days?	Wed 1/14/09	Mon 1/19/09
148	MEP Equip. Install - Mezzanine	41 days?	Mon 9/15/08	Mon 11/10/08
149	MEP Equip. Install - 2nd	97 days?	Wed 10/1/08	Thu 2/12/09
150	MEP Equip. Install - 3rd	92 days?	Wed 10/1/08	Thu 2/5/09
151	MEP Equip. Install - 4th	87 days?	Wed 10/1/08	Thu 1/29/09
152	MEP Equip. Install - 5th	84 days?	Mon 9/29/08	Thu 1/22/09
153	MEP Equip. Install - 6th	79 days?	Mon 9/29/08	Thu 1/15/09
154	MEP Equip. Install - 7th	74 days?	Mon 9/29/08	Thu 1/8/09
155	MEP Equip. Install - 8th	79 days?	Mon 9/15/08	Thu 1/1/09
156	MEP Equip. Install - 9th	71 days?	Mon 9/15/08	Mon 12/22/08
157	MEP Equip. Install - 10th	52 days?	Fri 10/3/08	Mon 12/15/08
158	MEP Equip. Install - 11th	80 days?	Wed 10/1/08	Tue 1/20/09
159	MEP Equip. Install - 12th	67 days?	Fri 9/26/08	Mon 12/29/08



Project: Perfect Schedule
Date: Fri 10/24/08

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

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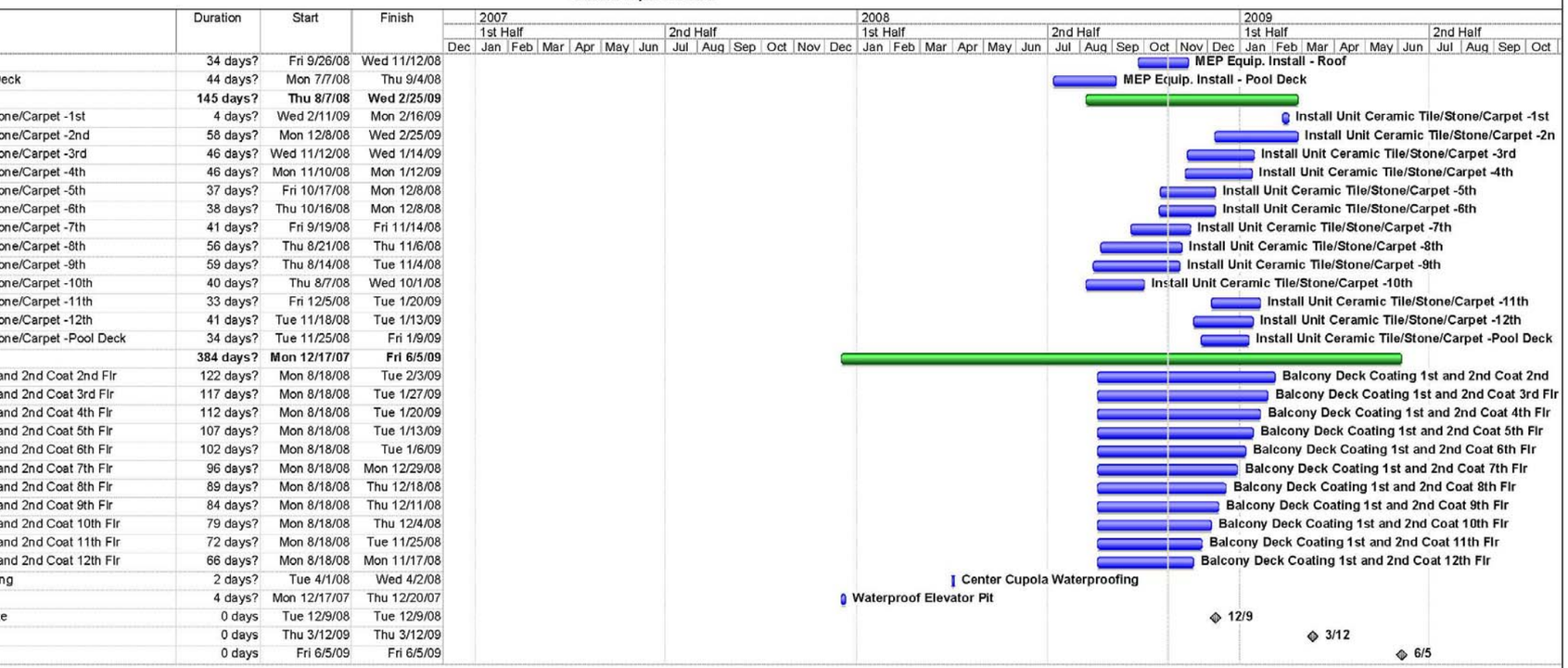
Detailed Project Schedule

ID	Task Name	Duration	Start	Finish
160	MEP Equip. Install - Roof	34 days?	Fri 9/26/08	Wed 11/12/08
161	MEP Equip. Install - Pool Deck	44 days?	Mon 7/7/08	Thu 9/4/08
162	**Flooring**	**145 days?**	**Thu 8/7/08**	**Wed 2/25/09**
163	Install Unit Ceramic Tile/Stone/Carpet -1st	4 days?	Wed 2/11/09	Mon 2/16/09
164	Install Unit Ceramic Tile/Stone/Carpet -2nd	58 days?	Mon 12/8/08	Wed 2/25/09
165	Install Unit Ceramic Tile/Stone/Carpet -3rd	46 days?	Wed 11/12/08	Wed 1/14/09
166	Install Unit Ceramic Tile/Stone/Carpet -4th	46 days?	Mon 11/10/08	Mon 1/12/09
167	Install Unit Ceramic Tile/Stone/Carpet -5th	37 days?	Fri 10/17/08	Mon 12/8/08
168	Install Unit Ceramic Tile/Stone/Carpet -6th	38 days?	Thu 10/16/08	Mon 12/8/08
169	Install Unit Ceramic Tile/Stone/Carpet -7th	41 days?	Fri 9/19/08	Fri 11/14/08
170	Install Unit Ceramic Tile/Stone/Carpet -8th	56 days?	Thu 8/21/08	Thu 11/6/08
171	Install Unit Ceramic Tile/Stone/Carpet -9th	59 days?	Thu 8/14/08	Tue 11/4/08
172	Install Unit Ceramic Tile/Stone/Carpet -10th	40 days?	Thu 8/7/08	Wed 10/1/08
173	Install Unit Ceramic Tile/Stone/Carpet -11th	33 days?	Fri 12/5/08	Tue 1/20/09
174	Install Unit Ceramic Tile/Stone/Carpet -12th	41 days?	Tue 11/18/08	Tue 1/13/09
175	Install Unit Ceramic Tile/Stone/Carpet -Pool Deck	34 days?	Tue 11/25/08	Fri 1/9/09
176	**Waterproofing**	**384 days?**	**Mon 12/17/07**	**Fri 6/5/09**
177	Balcony Deck Coating 1st and 2nd Coat 2nd Flr	122 days?	Mon 8/18/08	Tue 2/3/09
178	Balcony Deck Coating 1st and 2nd Coat 3rd Flr	117 days?	Mon 8/18/08	Tue 1/27/09
179	Balcony Deck Coating 1st and 2nd Coat 4th Flr	112 days?	Mon 8/18/08	Tue 1/20/09
180	Balcony Deck Coating 1st and 2nd Coat 5th Flr	107 days?	Mon 8/18/08	Tue 1/13/09
181	Balcony Deck Coating 1st and 2nd Coat 6th Flr	102 days?	Mon 8/18/08	Tue 1/6/09
182	Balcony Deck Coating 1st and 2nd Coat 7th Flr	96 days?	Mon 8/18/08	Mon 12/29/08
183	Balcony Deck Coating 1st and 2nd Coat 8th Flr	89 days?	Mon 8/18/08	Thu 12/18/08
184	Balcony Deck Coating 1st and 2nd Coat 9th Flr	84 days?	Mon 8/18/08	Thu 12/11/08
185	Balcony Deck Coating 1st and 2nd Coat 10th Flr	79 days?	Mon 8/18/08	Thu 12/4/08
186	Balcony Deck Coating 1st and 2nd Coat 11th Flr	72 days?	Mon 8/18/08	Tue 11/25/08
187	Balcony Deck Coating 1st and 2nd Coat 12th Flr	66 days?	Mon 8/18/08	Mon 11/17/08
188	Center Cupola Waterproofing	2 days?	Tue 4/1/08	Wed 4/2/08
189	Waterproof Elevator Pit	4 days?	Mon 12/17/07	Thu 12/20/07
190	Building Envelope Complete	0 days	Tue 12/9/08	Tue 12/9/08
191	Substantion Completion	0 days	Thu 3/12/09	Thu 3/12/09
192	Final Completion	0 days	Fri 6/5/09	Fri 6/5/09



Project: Perfect Schedule
Date: Fri 10/24/08

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

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Site Layout Planning

Figure 2: Current Site Layout

Gilbane Main Office Building | Field Office and Parking | GrandView Project | Laydown and Material Storage | Labor Parking | Traffic

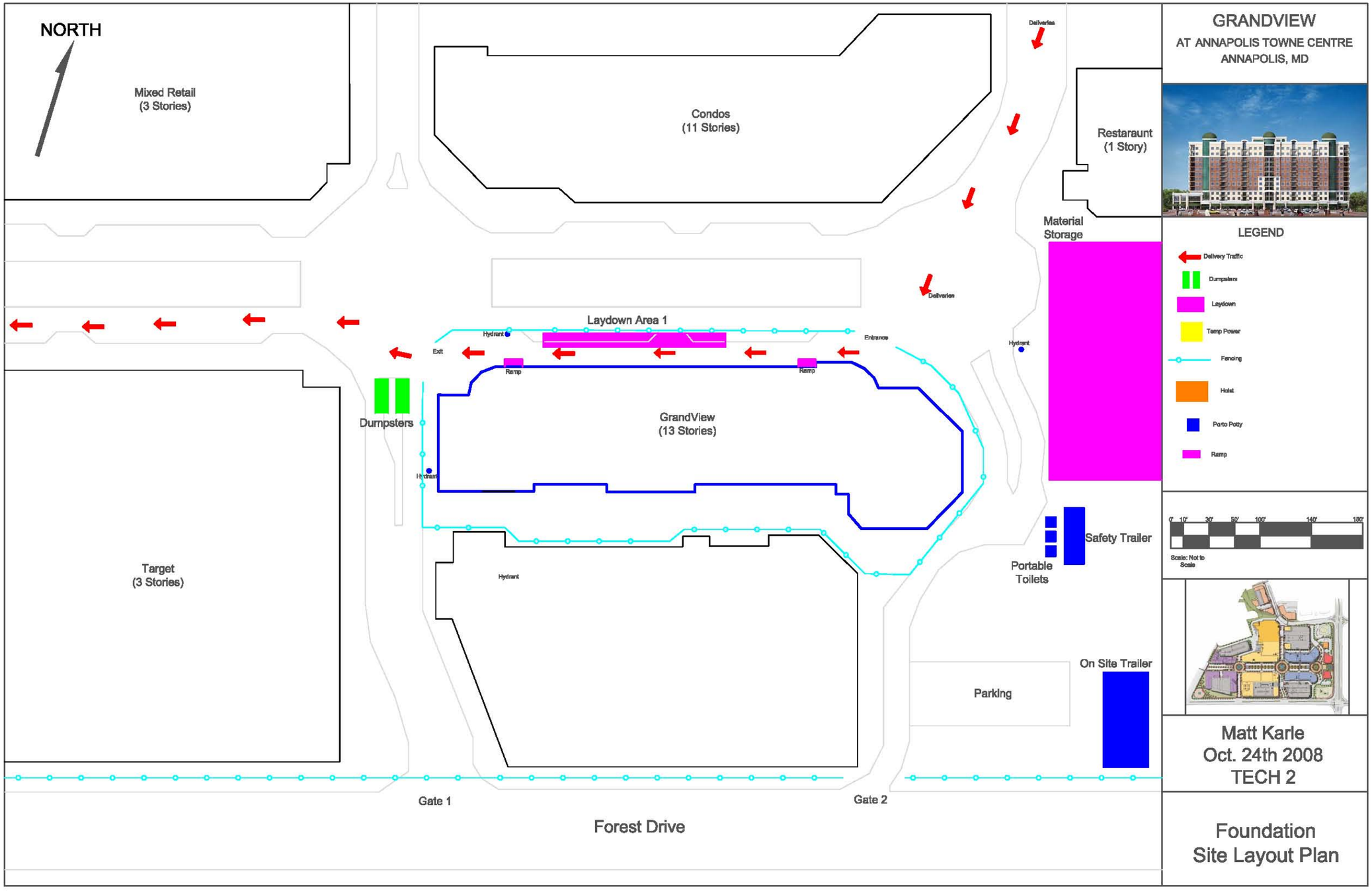
Layout Critique

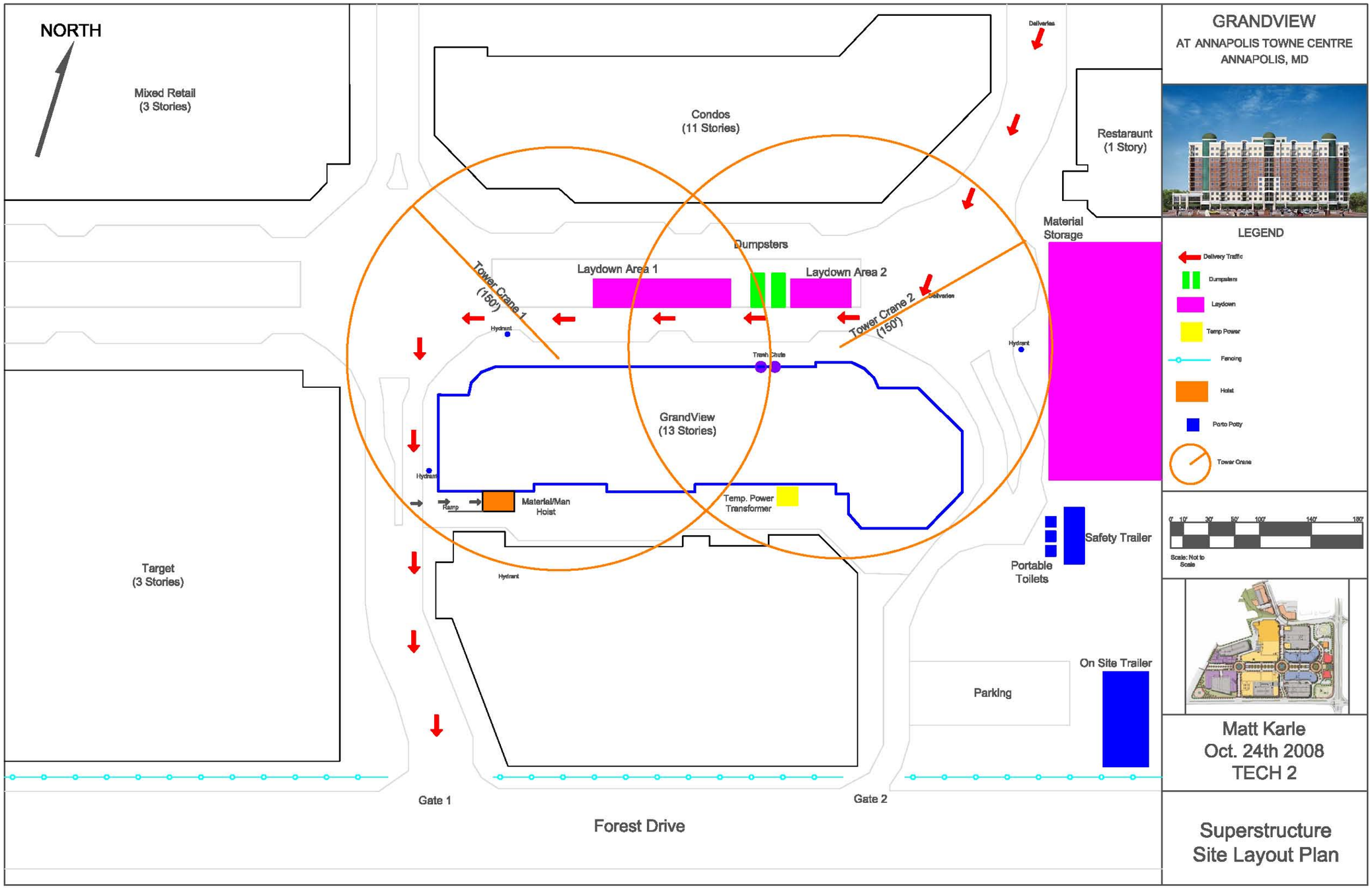
Figure 1: Shown above is the current site layout of GrandView at Annapolis Towne Centre. While it is extremely effective, there are some things that could be improved. The GC office is located relatively far away from the actual construction site as show by the dark green square. By re-locating it to the light green square, a closer proximity to both the site and material storage area would be achieved. Also, deliveries could be received and monitored from the Forest Drive Gate located directly above the proposed site office. A simple one way traffic pattern would provide easy flow of traffic and ease congestion. However, taking general conditions into account, the following site plans during three key phases of construction have held the current office location.

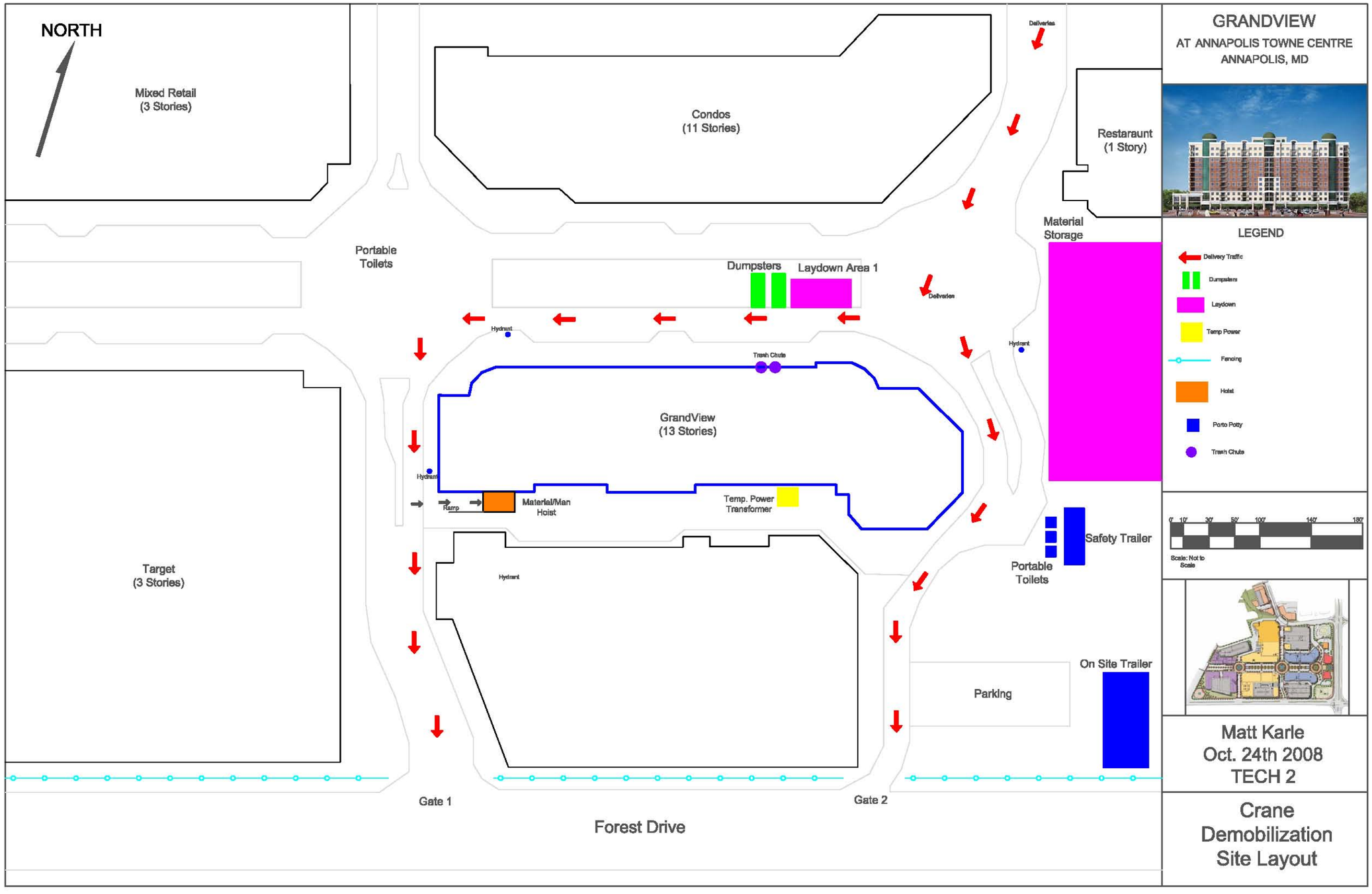
The Site Layout of GrandView will undergo three major changes throughout the duration of construction. During the foundation construction phase of the project, a tight perimeter fence was established around the building footprint with an approximate 40 foot allowance. This allowed for small construction vehicle traffic and limited the deliveries of materials to the front of the building only. This confined fencing was implemented to ensure site security as adjacent structures were completed.

Once the foundation was established, the temporary fencing was taken down and the full site fence was utilized by employing security at the gates. Multiple projects are now protected by the large perimeter fence that runs along the major roads surrounding the site. This allows for constant delivery and personnel monitoring without compromising the security of the project. Two tower cranes and a hoist were erected on the north end of the building for the remainder of the superstructure construction. The free space around the building made it possible for the two tower cranes to easily access the lay down area located north of the project, between the two service roads.

Finally, a demobilized crane site layout is implemented in order to relocate some of the laydown areas and allow for use of both gates located near the building.


NORTH
Mixed Retail
(3 Stories)
Condos
(11 Stories)
Deliveries
Restaraunt
(1 Story)
Material
Storage
Laydown Area 1
Hydrant
Exit
Entrance
Ramp
Ramp
Deliveries
Hydrant
Dumpsters
GrandView
(13 Stories)
Hydrant
Target
(3 Stories)
Hydrant
Safety Trailer
Portable
Toilets
On Site Trailer
Parking
Gate 1
Gate 2
Forest Drive
GRANDVIEW
AT ANNAPOLIS TOWNE CENTRE
ANNAPOLIS, MD
LEGEND
Delivery Traffic
Dumpsters
Laydown
Temp Power
Fencing
Hoist
Porto Potty
Ramp
0' 10' 30' 50' 100' 140' 180'
Scale: Not to Scale
Matt Karle
Oct. 24th 2008
TECH 2
Foundation
Site Layout Plan


NORTH
Mixed Retail
(3 Stories)
Condos
(11 Stories)
Deliveries
Restaraunt
(1 Story)
Material
Storage
Dumpsters
Laydown Area 1
Laydown Area 2
Tower Crane 1
(150')
Tower Crane 2
(150')
Hydrant
Trash Chute
GrandView
(13 Stories)
Ramp
Material/Man
Hoist
Temp. Power
Transformer
Safety Trailer
Portable
Toilets
Target
(3 Stories)
On Site Trailer
Parking
Gate 1
Gate 2
Forest Drive
GRANDVIEW
AT ANNAPOLIS TOWNE CENTRE
ANNAPOLIS, MD
LEGEND
Delivery Traffic
Dumpsters
Laydown
Temp Power
Fencing
Hoist
Porta Potty
Tower Crane
0' 10' 30' 50' 100' 140' 180'
Scale: Not to Scale
Matt Karle
Oct. 24th 2008
TECH 2
Superstructure
Site Layout Plan


NORTH
Mixed Retail
(3 Stories)
Condos
(11 Stories)
Deliveries
Restaraunt
(1 Story)
Material
Storage
Portable
Toilets
Dumpsters
Laydown Area 1
Deliveries
Hydrant
Trash Chute
GrandView
(13 Stories)
Hydrant
Ramp
Material/Man
Hoist
Temp. Power
Transformer
Hydrant
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(3 Stories)
Safety Trailer
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GRANDVIEW
AT ANNAPOLIS TOWNE CENTRE
ANNAPOLIS, MD
LEGEND
Delivery Traffic
Dumpsters
Laydown
Temp Power
Fencing
Hoist
Porto Potty
Trash Chute
0' 10' 30' 50' 100' 140' 180'
Scale: Not to Scale
Matt Karle
Oct. 24th 2008
TECH 2
Crane
Demobilization
Site Layout

Detailed Structural Systems Estimate

Two different analysis of the concrete superstructure were taken in order to ensure accuracy of the estimate. The first dealt with breaking the structure down into formwork, reinforcement, concrete, and placement. The second method is what is now considered to be the 'Cast-in-Place method', which takes into account concrete, reinforcement, formwork, and labor all at once . Total cubic yards were utilized in this estimate. Both obtained a similar result which were within 15% of the actual structural value. However, the first method proved to be extremely accurate. A 3D structural model of the building was created to take basic volume and area calculations as well as rebar tonnage. This will be utilized in the following Tech report.

Assumptions

- Augured piles not included in the estimate due to insufficient knowledge and available cost data
- 1st Floor Height : 21'
- Floors 2-12 Height: 11.5'
- Slabs were broken up into 3 different pours in order maintain
- Concrete strength = 5,000 psi for all components
- Concrete CY calculations do not subtract out the volume of the rebar
- Concrete Strength = 400 PSI for all components
- 3D Model was utilized to
- Location Factor: 0.84 for Annapolis, MD

GrandView: Building Systems Cost		
Building System	**Cost**	**Cost / SF**
Structure	$8,610,000.00	$22.33

Table 2: Actual GrandView Structural System Cost

From the flowing calculations it was found that:

- The Detailed Structural Estimate Produced a figure that was within 3% of the actual Structural cost
- The CIP Estimate Method Produced a figure that was 14% off the actual structural cost which is unfavorable when dealing with estimating.

Detailed Structural Estimate											
Description		Quantity	Unit	Material	Labor	Equipment	Cost/Unit	Material Cost	Labor Cost	Equip. Cost	Total Cost
Code	**031113 - Forms in Place**										
25-6650	Columns	91925	SFCA	$0.85	$5.15		$6.00	$78,135.97	$473,412.03		$551,548.00
35-1100	Elevated Slabs Form (3 use)	10780	SFCA	$1.81	$3.43		$5.24	$19,511.80	$36,975.40		$56,487.20
35-1100	Roof Slab	980	SFCA	$1.81	$3.43		$5.24	$1,773.80	$3,361.40		$5,135.20
65-1410	Slab on Grade	1144	LF	$3.23	$1.10		$4.33	$3,695.12	$1,258.40		$4,953.52
50-0150	Grade Beams	8335	SFCA	$1.06	$3.09		$4.15	$8,835.10	$25,755.15		$34,590.25
45-5150	Pile Caps	3215	SFCA	$0.80	$3.16		$3.96	$2,572.00	$10,159.40		$12,731.40
45-3151	Spread Footings	4467	SFCA	$0.70	$2.93		$3.63	$3,126.90	$13,088.31		$16,215.21
85-2550	Shear Walls 10" Thick	31500	SFCA	$0.78	$4.73		$5.51	$24,570.00	$148,995.00		$173,565.00
40-0050	Crane Pad	256	SFCA	$1.98	$9.80		$11.78	$506.88	$2,508.80		$3,015.68
						TOTALS		$142,727.57	$715,513.89	$0.00	$858,241.46
	032110 - Reinforcement in Place										
60-0200	Columns	574	Ton	$1,550.00	$950.00		$2,500.00	$889,688.75	$545,293.11		$1,434,981.86
60-0400	Elevated Slabs	1123	Ton	$1,650.00	$490.00		$2,140.00	$1,852,950.00	$550,270.00		$2,403,220.00
60-0600	Slab On Grade	100	Ton	$1,475.00	$620.00		$2,095.00	$147,500.00	$62,000.00		$209,500.00
60-0100	Grade Beams	196	Ton	$1,550.00	$890.00		$2,440.00	$303,800.00	$174,440.00		$478,240.00
60-0500	Pile Caps #4-#7	120	Ton	$1,475.00	$680.00		$2,155.00	$177,000.00	$81,600.00		$258,600.00
60-0500	Footings #4-#7	10	Ton	$1,475.00	$680.00		$2,155.00	$14,381.25	$6,630.00		$21,011.25
60-0550	Footings #8-#18	396	Ton	$1,400.00	$395.00		$1,795.00	$554,678.70	$156,498.63		$711,177.34
60-0700	Shear Walls #3-#7 Rebar	215	Ton	$1,475.00	$475.00		$1,950.00	$317,125.00	$102,125.00		$419,250.00
60-0900	Crane Pad	22	Ton	$1,400.00	$395.00		$1,795.00	$30,800.00	$8,690.00		$39,490.00
						TOTALS		$4,287,923.71	$1,687,546.74	$0.00	$5,975,470.45
	033105 - Normal Weight Concrete										
	4000 PSI	14733	CY	$106.00			$106.00	$1,561,709.61	$0.00		$1,561,709.61
						TOTALS		$1,561,709.61	$0.00	$0.00	$1,561,709.61
	033105 - Concrete Placement										
70-0800	Columns	1390	CY		$23.50	$8.60	$32.10	$0.00	$32,659.71	$11,952.06	$44,611.77
70-1500	Slabs 8"-10" Thick	10747	CY		$13.55	$4.94	$18.49	$0.00	$145,624.36	$53,091.09	$198,715.45
70-3250	Grade Beams	348	CY		$12.05	$4.39	$16.44	$0.00	$4,193.40	$1,527.72	$5,721.12
70-4300	Slab on Grade	599	CY		$16.70	$6.10	$22.80	$0.00	$10,004.79	$3,654.45	$13,659.24
70-2650	Spread Footings over 5 CY	406	CY		$14.45	$5.25	$19.70	$0.00	$5,865.96	$2,131.23	$7,997.20
70-3900	Pile Caps	162	CY		$10.85	$3.95	$14.80	$0.00	$1,757.70	$639.90	$2,397.60
70-4900	Shear Walls 10" Thick	955	CY		$18.25	$7.55	$25.80	$0.00	$17,430.78	$7,211.09	$24,641.87
70-2650	Crane Pad	126	CY		$14.45	$5.25	$19.70	$0.00	$1,820.70	$661.50	$2,482.20
125	Floor Finish	386254	SF		$0.43		$0.43	$0.00	$166,089.22	$0.00	$166,089.22
						TOTALS		$0.00	$385,446.62	$80,869.04	$466,315.67

Table 3: Detailed Structural Estimate

	Material	Labor	Equipment	**Final**
Grand Totals	$5,992,360.89	$2,788,507.26	$80,869.04	**$8,861,737.19**

Detailed Structural Estimate : Cast-in Place Concrete										
033053 -CIP Concrete	Quantity	Unit	Material	Labor	Equipment	Cost/Unit	Material Cost	Labor Cost	Equip. Cost	Total Cost
Columns	1390	CY	595	545	52	1192	$826,915.94	$757,427.21	$30,940.00	$1,615,283.15
Slabs 8"-10" Thick	10747	CY	300	168	15.4	483.4	$3,224,155.56	$1,805,527.11	$4,620.00	$5,034,302.67
Grade Beams	348	CY	136	57	0.34	193.34	$47,328.00	$19,836.00	$46.24	$67,210.24
Slab on Grade	599	CY	124	47.5	0.36	171.86	$74,276.00	$28,452.50	$44.64	$102,773.14
Spread Footings over 5 CY	406	CY	198	57	0.34	255.34	$80,377.92	$23,139.10	$67.32	$103,584.33
Pile Caps	162	CY	172	79	0.48	251.48	$27,864.00	$12,798.00	$82.56	$40,744.56
Shear Walls 10" Thick	955	CY	194	185	23.2	402.2	$185,291.56	$176,695.56	$4,500.80	$366,487.91
Crane Pad	126	CY	218	76	0.46	294.46	$27,468.00	$9,576.00	$100.28	$37,144.28

Table 4: CIP Structural Estimate

	Material Cost	Labor Cost	Equip. Cost	**Total Cost**
Grand Totals	$4,493,676.97	$2,833,451.47	$40,401.84	**$7,367,530.28**

General Conditions Estimate

Values for the general conditions estimate were taken from RS Means 2008, Gilbane-ballpark figures, as well as general estimates not given by these two sources. A total value of $4.6 million accounts for %6.7 percent of the total value of the project which is well within the 5 to 8 percent norm. This figure includes bonding and insurance estimated to be 2.8% and 1.2% respectively.

A 24 month schedule was the base timeframe for calculating values per unit cost. This is the assumed timeframe from the notice to proceed to substantial completion. Consistent with most construction projects, staffing salaries make up the bulk of the GC estimate for GrandView comprising 32% of the total.

General Conditions Estimate: GrandView at Annapolis Towne Center				
Description	**Quantity**	**Unit**	**Unit Price**	**Total**
Protection and Saftey				
Security	24	Month	$400	$9,600
First Aid	1	LS	$850	$850
Hardhats, Gloves, Goggles	1	LS	$2,500	$2,500
Perimeter Fencing	1	LS	$40,000	$40,000
Site Sinage	1	LS	$3,000	$3,000
General Expenses				
Job Office	24	Months	$850	$20,400
Office Supplies	1	Lump	$3,500	$3,500
IT Equipment	1	Lump	$50,000	$50,000
Parking	24	Months	$500	$12,000
Telephones	22	Months	$210	$4,620
Project Staff				
Project Executive	24	Months	$10,000	$240,000
Project Accountant	24	Months	$5,500	$132,000
Sr. Project Engineer	24	Months	$8,330	$199,920
Assistant P.E.	24	Months	$5,600	$134,400
Assistant P.E.	24	Months	$5,600	$134,400
Sr. Office Engineer	24	Months	$7,200	$172,800
Sr. General Superintendent	24	Months	$7,500	$180,000
Assistant Superintendent	24	Months	$6,350	$152,400
Assistant Superintendent	24	Months	$6,350	$152,400
Assistant Superintendent	24	Months	$6,300	$151,200
Temporary Utilities				
Electric Service	12	Months	$300	$3,600
Heat Service	8	Months	$200	$1,600
Water/Sewage	24	Months	$250	$6,000
Cleaning and Waste Management				$0
Clean Up	24	Week	$120	$2,880
Dumpsters (2)	22	Months	$2,400	$52,800
Toilets (4)	22	Months	$685	$15,070
Bonds and Insurance				
Bonds	Job Value	%	2.8%	$1,918,000
Insurance	Job Value	%	1.2%	$822,000
	$68.5M			
Total				**$4,608,340**

Table 5: General Conditions Estimate

Critical Issues: PACE Roundtable

PACE Roundtable was developed to immerse collegiate and industry members into an environment in such a way that benefits everyone as a whole. Students gain knowledge and meet future contacts, while industry representatives essentially meet the future of their companies. It provides insight into the working world and allows students and industry members to ask questions about what to expect from each other and how careers are formed. This event is by far the best and most important feature that the Construction Management department of AE runs for 5th year and graduate students.

The event takes place every year over a period of two days. An open dinner on the first night allows for people to meet and become acquainted in a relaxed atmosphere. This is extremely important in the construction industry considering how many 'meet-and-greets' go on when developing relationships with clients. I was fortunate enough to sit at what must have been the head table where Dr. Anumba and Bill Moyer introduced me to what they are involved in and future ideas for the industry.

Day two was aimed at developing constructive discussion groups in which ideas were thrown around about how to improve the AE program and what is going on in today's construction market. The first of three different discussion exercises focused on the development of a new Mentor Program enacted by Dr. Anumba. A program such as this would provide key contacts to the students and allow them to interact and ask questions that they otherwise would not be able to do in a strict school environment. Some of the results that I agreed with most in the discussion are as follows:

- Allow students to pick their own mentor. This would enable good relationships and students would not get stuck with someone that they did not feel comfortable with.
- Students are to make a mandatory trip to the mentor's company or site in order to experience how school learned learning are applied in real world situations. This also allows for face time.
- Establish a code that states that student mentor relationships be separated from recruiting and other job related activities. While it may be an advantage, it may also pressure students and limit them as to job opportunities in the future.

Larger groups were deployed in order to discuss issues such as BIM and Energy and Economy, which I attended. In today's marketplace, energy and the economy struck me as the most important, both for the future of the industry and job placement opportunities. It has forever been the goal of construction to provide the cheapest, fastest, and most energy efficient building method. Solar Energy, streamlined logistics, recycling opportunities, and striving for LEED certification made up the bulk of the energy discussion. The failing economy and how necessary adaptations must be made in order to keep businesses afloat were the topics that enthralled me. As a future employee, I am very concerned as to how the economy will affect my job placement and growth within the industry. Where will I end up? What sacrifices must be made? What can I do to help? These were all questions that came to mind.

Construction is a very up and down type business. In an economy such as this, tighter budgets must be kept which mean more advanced planning and strategic marketing. Residential construction is at an all

time low because of the real estate and credit market, which has a direct correlation to GrandView at the moment.

The favorite portion of the day came at the end when a panel of both industry members and students took the front of the room and were bombarded by questions. They ranged anywhere from where do you see the industry in five years, to how do keep up with school and the pressures of college. It was fun to see what each side brought to the table and allowed me to gain insight as to what to expect upon graduation.

GrandView has many direct links to the topics that were discussed throughout Roundtable. Since GrandView is a residential and retail type project, obviously the housing market and poor economy affect it greatly. Unfortunately, the retail space and condominiums have not fully been filled. If these are not filled by the time the project is finished, the owner may take a cost hit that was not expected. However, because of its location near Washington D.C. and other governmental parts of the US, Annapolis has been relatively isolated from the burdening economy. As Bill Moyer suggested, 'The construction industry often has an 18 month lag on the economy'. So we are to expect worse things to come in the future.

In order to become a more successful project, GrandView must adapt its logistics in order to accommodate rising delivery costs and material cost. One thing that the designers did take into account with the topic of energy is the barrier system. They used a higher effective, high energy saving moisture and insulation barrier. This will help to control heating and cooling and will ultimately save money on energy.

Pace Roundtable provided an excellent forum for networking and meeting contacts that may be able to help with thesis and career paths. Among the elite was Bill Moyer, whom I sat next to during dinner and was able to discuss what life is like working for a large company. I finally was able to meet the head of our department, Dr. Anumba, and share a discussion as to how BIM helps the construction industry and its future role in building coordination. Mike Grobaski, a representative of Gilbane (the CM firm of GrandView), helped with the mentor discussion. Finally, Chuck Tomasco, a Sr. Project Manager at Truland, lent a hand in aiding with electrical work on my thesis.

The most interesting thing that I found during all of this is that the most useful and fun parts of the whole roundtable experience came during the break periods. I was able to talk to industry members face to face about the real world and was actually able to communicate better than an organized discussion. This is a good sign that Construction Management is the right option for me and I look forward to pursuing my career in it.

Appendix A

Detailed Structural Takeoff Calculations

Floor Slabs						
Type	**Perimeter (LF)**	**Depth (in)**	**Area(SF)**	**Volume (CF)**	**Volume (CY)**	**SFCA**
SOG						
Pour 1	466	5	10223	4260	158	194
Pour 2	519	5	14635	6098	226	216
Pour 3	485	5	13963	5818	215	202
Total			38821	16175	599	613
Elevated Slab (1 Floor)						
Pour 1	466	8	9234	6156	228	311
Pour 2	519	8	14635	14636	542	346
Pour 3	367	8	5117	3411	126	245
Total			28986	24203	896	901
Total for 11 Floors			318846	266237	9861	9915
Roof						
Pour 1	466	8	8835	5890	218	311
Pour 2	519	8	14635	14636	542	346
Pour 3	367	8	5117	3411	126	245
Total			28587	23937	887	901

Final Totals			**386254**		**11346**	**11429**

SOG: Formwork			
Pour	Perimeter (LF)	Depth (in)	SFCA
1	466	5	194
2	519	5	216
3	485	5	202
Total			613
Elevated Slab: Formwork (1 Floor)			
Pour	Perimeter (LF)	Depth (in)	SFCA
1	466	8	311
2	519	8	346
3	485	8	323
Total			980
Total for 11 Floors			10780
Roof: Formwork			
Pour	Perimeter (LF)	Depth (in)	SFCA
1	466	8	311
2	519	8	346
3	485	8	323
Total			980
Final Total			12373

Total Columns: Concrete						
Type	Amount	Width (in)	Depth (in)	Height	SFCA	Volume (CY)
18x18	2	18	18	10	120	2
16x24	946	16	24	11.5	72527	1074
18x24	124	18	24	21	18228	289
30x30	35	30	30	3	1050	24
Totals	1107				91925	1390