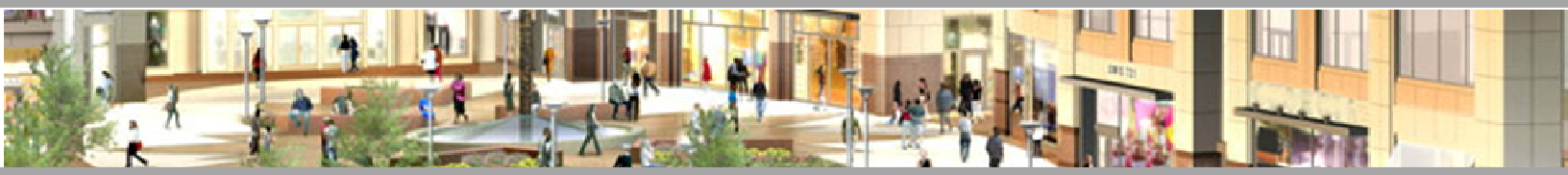
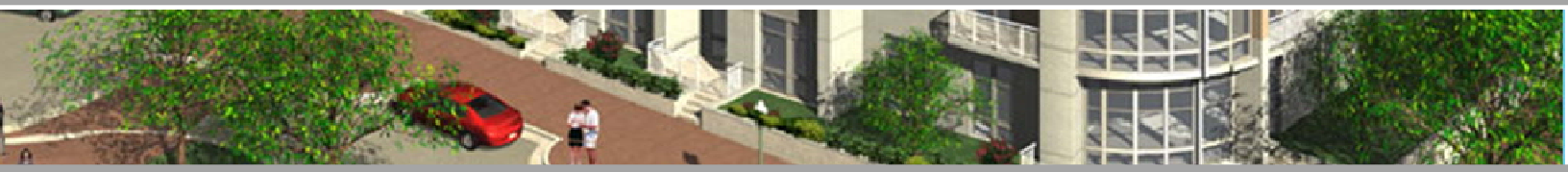
Wisconsin Place Residential

Chevy Chase, MD



Jenna Marcolina
Construction Management



Technical Assignment #2
November 2, 2007

Table of Contents

Executive Summary

This technical assignment analyzes the key features of Wisconsin Place Residential that affect its execution. More detailed schedules and estimates are performed to see where the majority of time and money are spent on the project. The hope in doing this is to discover a thesis research topic, some aspect of the project that could be done in a modified way. The detailed project schedule shows the major construction activities broken down by trade. The concrete schedule, in particular, shows the phasing of pouring columns and slabs to optimize efficiency. The site layout planning gives a snapshot of a critical phase of construction, which in this instance is the superstructure. 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 can sometimes be configured. An assemblies estimate was performed on the exterior enclosure of WPR using RS Means Construction Cost Data 2007. Further estimating of the structural system sheds more light onto the breakdown of project expenses. Finally, a general conditions estimate explains the costs not directly associated with the building, but significant all the same. These include operational costs, supplies, and project staff.

A. Detailed Project Schedule

The detailed schedule in Appendix A depicts the construction process form beginning to end with some key milestones in between. One key phase to highlight is the concrete pour schedule for floors 2 through 15. The 200 item constraint did not allow for highly detailed phasing, but a more detailed schedule of concrete production would look something like this:

Level 3
Level 3 - Part 1 Form/Pour Slabs & Columns
Level 3 - Part 1 Stress/Strip/Reshore
Level 3 - Part 2 Form/Pour Slabs & Columns
Level 3 - Part 3 Form/Pour Slabs & Columns
Level 3 - Part 2 Stress/Strip/Reshore
Level 3 - Part 3 Stress/Strip/Reshore
Remove Reshores @ 3rd Floor
Level 4
Level 4 - Part 1 Form/Pour Slabs & Columns
Level 4 - Part 2 Form/Pour Slabs & Columns
Level 4 - Part 3 Form/Pour Slabs & Columns
Level 4 - Part 1 Stress/Strip/Reshore
Level 4 - Part 2 Stress/Strip/Reshore
Level 4 - Part 4 Form/Pour Slabs & Columns
Level 4 - Part 3 Stress/Strip/Reshore
Level 4 - Part 4 Stress/Strip/Reshore
Remove Reshores @ 4th Floor

Each floor is broken into three to five 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. Some of these activities occur simultaneously, which keeps the job moving right along. Below is an excerpt from a spreadsheet that Turner keeps on record to track the amount of concrete that is placed each day. This tally sheet is a quick and easy way to monitor progress. The site layout plan in Appendix B also shows a proposed sequencing of pours for the large WPR footprint. Since they are currently in the superstructure phase of the project, concrete production has been one of Turner's top priorities of late.

Concrete Production					
Level		**Pour 1**	**Pour 2**	**Pour 3**	**Pour 4**
3	SF	9436	10286	5864	6120
	Poured	9436	10286	5864	6120
	Date	8/16/2007	8/30/2007	8/30/2007	9/11/2007
4	SF	9436	10286	5864	6120
	Poured	9436	10286	5864	6120
	Date	9/4/2007	9/10/2007	9/12/2007	9/19/2007

Please note that the slab on grade is not included in Turner's contract. The slab was poured by the parking garage contractor, who coincidentally, was run by a separate Turner team.

The WPR Turner team entered the Chevy Chase, MD site in June 2007 and began constructing this 15 story apartment building atop a four level parking garage. Therefore, no site work or foundation work was required. Also, all utilities were conveniently hooked up and delivered to the slab where Turner began building. This explains why no existing utilities are shown on the site plan. In fact, no civil drawings were issued for the Wisconsin Place project. The fact is simple: utilities are not a concern for Turner because another project has already taken care of them.

B. Site Layout Planning

The site plan in Appendix B shows the superstructure phase of the Wisconsin Place project. At first glance, it is evident that the site is very congested. Three other projects including an office tower, parking garage, and retail stores are happening concurrently on the same 1.1 million square foot plot of land. So, Turner has experienced many space and coordination issues thus far.

One potential way to divide the floor slabs into sections is shown on the layout. Most of the deliveries and staging happens in the northwest corner of the site, as there is limited space elsewhere. The concrete materials are close to the building footprint, which minimizes the swing of the crane for picking and placing forms and rebar cages. Two main entrances to the site are depicted on the plan as well. There is not a lot of room for circulation, so the idea with site access is to get in and get out as quickly as possible.

The concrete for the building structure is placed using a pump. Trucks enter at one of the gate openings and exit the other. They usually park near the concrete material laydown area. Since so many concrete trucks are needed to accomplish the massive pour areas, a steady traffic flow develops where the full truck comes in right behind the empty truck to resume placing.

The far right lane of Friendship Boulevard has been closed for construction and helps with the space constraint. Delivery trucks, however, are not allowed to unload from this section of road. It becomes dangerous when a thin metal fence is the only thing that separates passing vehicles from heavy machinery and materials. So, it is best to keep the hazardous material as far away from the public as possible.

Turner trailers are located by the northwest gate, a prime location for monitoring deliveries and controlling who enters the site. Trash chutes are a great way to manage waste on a job site. They keep debris contained until trucks haul it all away. These chutes are conveniently located along the driving path so that dump trucks can pick and go.

It would be interesting to see the tower cranes repositioned within the building footprint to increase space in the public areas. For example, the tower crane could be placed in the elevator shaft until the building tops out. Then, it can be removed and the elevators installed. As evidenced by the site photo on the previous page, the WPR construction site is extremely tight. Employees are no longer allowed to park on site due to congestion issues. To comment further, Tower Crane #1 seems to be placed in an inopportune spot, with nearly half of its boom swing wasted over Friendship Boulevard. Perhaps it could be positioned in a way that would make it more accessible to resources on site.

C. Assemblies Estimate: Building Enclosure

RS Means Assemblies Cost Data 2007 was used for all of the unit pricing, and these takeoffs and calculations can be found in Appendix C.

The building enclosure was analyzed for the assemblies estimate. The enclosure includes:

- Standard face brick backed w/ 16 gage steel studs @ 16" o.c.
- Aluminum and glass w/o transom wide stile doors
- Aluminum and glass revolving stock design doors
- Double hung aluminum standard glass windows
- Ashlar veneer w/ metal stud backup
- Insulated glazing panel, ½" thick, tinted

Assumptions:

- Use location factor for Baltimore, MD = 0.93
- Precast and aluminum panels were excluded because they comprise such a small portion of the façade
- Typical window size of 3' x 6'
- Typical door size of 3' x 7'
- Substitute ashlar veneer for cast stone – closest match
- Pricing includes waterproofing and sealants

Assemblies Estimate Summary	
Building Enclosure	
Component	**Cost**
Brick Veneer	$1,311,000
Aluminum Doors	$442,000
Aluminum Windows	$1,871,100
Cast Sone Veneer	$274,950
Glass Curtainwall Panels	$413,228
Subtotal	$4,312,278
Location Factor	0.93
Total Assemblies Estimate	**$4,010,418**

D. Detailed Structural Systems Estimate

The superstructure of Wisconsin Place Residential was estimated using RS Means Facilities Cost Data 2007. This is slightly different from "Assemblies" because it breaks building materials into their most basic units. Since none of the predefined structural systems in "Assemblies" were a close match to the post-tensioned system of WPR, "Facilities" was used to estimate the building more accurately. These calculations and takeoffs can be found in Appendix D.

Assumptions:

- Typical floor to ceiling height of 9' used for column and shear wall heights
- Use location factor for Baltimore, MD = 0.93
- Concrete strength = 5,000 psi for all components
- Concrete CY calculations do not subtract out the volume of the rebar
- Rebar was calculated on the basis of length – for ease of calculation it was assumed to run from one face of a column/beam/slab to the other – cover was not accounted for
- The 5th Floor was used as a "typical floor" for the takeoff since floors 5 through 11 are more or less the same – the estimate was then multiplied by 15 floor and the roof slab added to get the final number

Detailed Structural Estimate Summary			
Component	**Cost/Floor**	**x # Floors**	**Cost**
Floor Slab	$156,561	x 15 floors	$2,348,415
Beams	$16,005	x 15 floors	$240,075
Columns	$89,102	x 15 floors	$1,336,530
Shear Walls	$11,394	x 15 floors	$170,910
Roof Slab	$28,022	x 1 floor	$28,022
Subtotal			$4,123,952
Location Factor			0.93
Total Structural Estimate			**$3,835,275**

E. General Conditions Estimate

The General Conditions Estimate can be found on the next page.

Some of the unit costs from the general conditions estimate were taken from RS Means 2007 while others were ballpark figures from Turner. The general conditions for Wisconsin Place Residential come out around $4 million. This figure does not include insurance, bonding, fee, or contingency. Those items are all handled under separate cover.

A project duration of 30 months was used for most of the GC estimate. This is the time from the Notice to Proceed to Substantial completion. The temporary electric service is only needed for 8 months because permanent power will be available to the building in March 2008.

Turner pays for employee relocation and travel expenses to make the job transition easier. Since their project executive is from Texas, his living and travel expenses are fully covered by Turner. This includes his apartment rent, utilities, mileage, flights, and vehicle. The superintendent and project manager also drive company vehicles and are reimbursed for them, as indicated in the estimate.

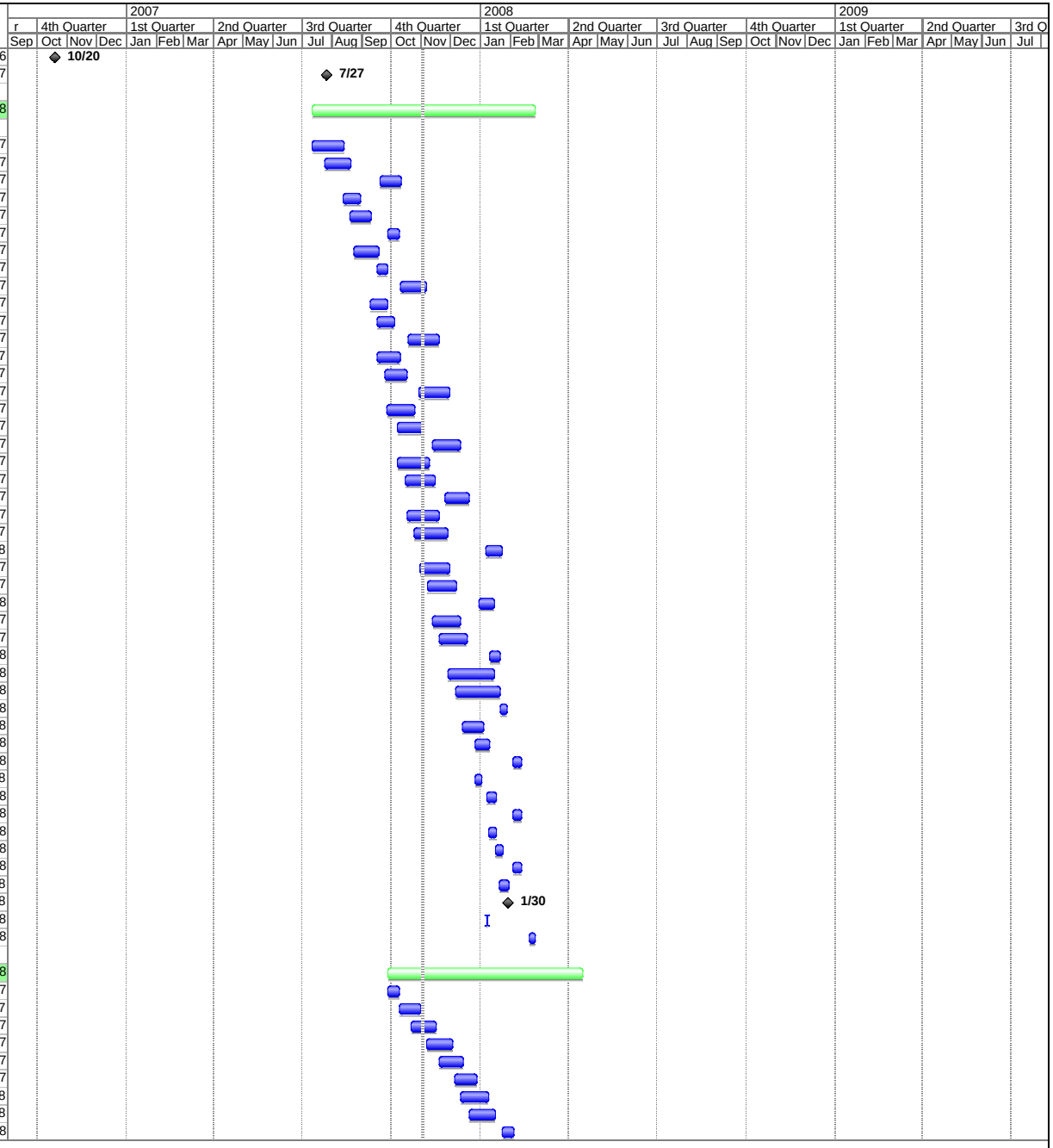
The staffing costs make up the bulk of the general conditions estimate at around 75%. Because WPR is such an immense undertaking, both the project manager and project executive are on site 100% of the time. In addition to this close supervision, the owner, Archstone-Smith, has a representative permanently placed on site at all times. Archstone-Smith pays for their GC costs like their trailer and temporary utilities.

Turner does not have a cleaning crew for their trailers. They purchased 1500 hours of cleaning from the concrete subcontractor and use some of these hours towards cleaning the trailers as well as for site cleanup. The General Conditions Estimate is around 4% of the total project cost.

General Conditions Estimate for Wisconsin Place Residential				
Description	**Quantity**	**Unit**	**Price/Unit**	**Amount**
Protection & Safety				
Security Guard	30	MO	$4,000	$120,000
First Aid Supplies	1	LS	$1,000	$1,000
Safety Signs	1	LS	$1,000	$1,000
Hardhats, Gloves, Goggles	1	LS	$2,000	$2,000
Perimeter Fence	1	LS	$60,000	$60,000
General Expenses				
Living & Travel	30	MO	$2,000	$60,000
Trailers (3)	30	MO	$900	$81,000
Office Furnishings	1	LS	$5,000	$5,000
Office Supplies	1	LS	$4,000	$4,000
IT Equipment	1	LS	$50,000	$50,000
Parking	30	MO	$1,000	$30,000
Employee Vehicles (3)	30	MO	$1,000	$90,000
Telephones	30	MO	$750	$67,500
Dumpsters	30	MO	$2,000	$60,000
Toilets	30	MO	$1,300	$39,000
Project Staff				
Project Executive	30	MO	$30,000	$900,000
Project Manager	30	MO	$20,000	$600,000
Superintendent	30	MO	$15,000	$450,000
Project Engineer	30	MO	$10,000	$300,000
Field Engineer	30	MO	$10,000	$300,000
Accounting	30	MO	$5,000	$150,000
Scheduling	30	MO	$7,500	$225,000
Purchasing	30	MO	$7,500	$225,000
Safety	30	MO	$7,500	$225,000
Temporary Utilities				
Temporary Electric Service	8	MO	$200	$1,600
Temporary Water/Sewer Service	30	MO	$300	$9,000
Temporary Heat Service	5	MO	$300	$1,500
Total GC Estimate				**$4,057,600**

Appendix A: Detailed Project Schedule

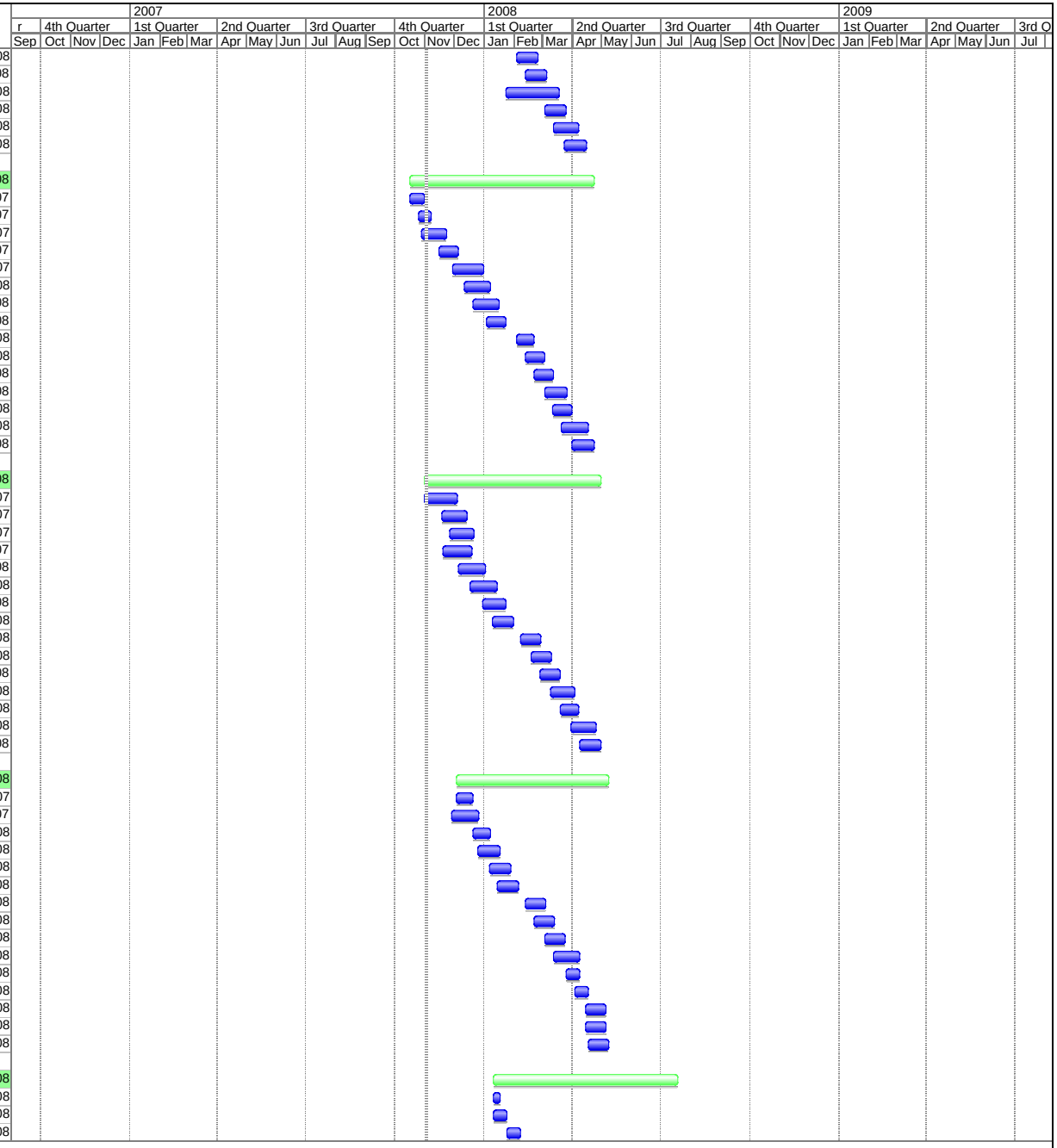
ID	Task Name	Duration	Start	Finish
1	Notice to Proceed	0 days	Fri 10/20/06	Fri 10/20/06
2	Ready to Start Structure	0 days	Fri 7/27/07	Fri 7/27/07
3				
4	**Concrete**	164 days	Thu 7/12/07	Tue 2/26/08
5				
6	Form/Pour 2nd Floor Slabs & Columns	23 days	Thu 7/12/07	Mon 8/13/07
7	Stress/Strip/Reshore 2nd Floor	19 days	Wed 7/25/07	Mon 8/20/07
8	Remove Reshores @ 2nd Floor	16 days	Thu 9/20/07	Thu 10/11/07
9	Form/Pour 3rd Floor Slabs & Columns	14 days	Mon 8/13/07	Thu 8/30/07
10	Stress/Strip/Reshore 3rd Floor	16 days	Mon 8/20/07	Mon 9/10/07
11	Remove Reshores @ 3rd Floor	8 days	Fri 9/28/07	Tue 10/9/07
12	Form/Pour 4th Floor Slabs & Columns	18 days	Fri 8/24/07	Tue 9/18/07
13	Stress/Strip/Reshore 4th Floor	9 days	Mon 9/17/07	Thu 9/27/07
14	Remove Reshores @ 4th Floor	19 days	Thu 10/11/07	Tue 11/6/07
15	Form/Pour 5th Floor Slabs & Columns	14 days	Mon 9/10/07	Thu 9/27/07
16	Stress/Strip/Reshore 5th Floor	14 days	Mon 9/17/07	Thu 10/4/07
17	Remove Reshores @ 5th Floor	22 days	Fri 10/19/07	Mon 11/19/07
18	Form/Pour 6th Floor Slabs & Columns	18 days	Mon 9/17/07	Wed 10/10/07
19	Stress/Strip/Reshore 6th Floor	17 days	Tue 9/25/07	Wed 10/17/07
20	Remove Reshores @ 6th Floor	24 days	Tue 10/30/07	Fri 11/30/07
21	Form/Pour 7th Floor Slabs & Columns	21 days	Thu 9/27/07	Thu 10/25/07
22	Stress/Strip/Reshore 7th Floor	20 days	Mon 10/8/07	Fri 11/2/07
23	Remove Reshores @ 7th Floor	21 days	Tue 11/13/07	Tue 12/11/07
24	Form/Pour 8th Floor Slabs & Columns	25 days	Mon 10/8/07	Fri 11/9/07
25	Stress/Strip/Reshore 8th Floor	23 days	Tue 10/16/07	Thu 11/15/07
26	Remove Reshores @ 8th Floor	19 days	Mon 11/26/07	Thu 12/20/07
27	Form/Pour 9th Floor Slabs & Columns	23 days	Thu 10/18/07	Mon 11/19/07
28	Stress/Strip/Reshore 9th Floor	25 days	Thu 10/25/07	Wed 11/28/07
29	Remove Reshores @ 9th Floor	13 days	Mon 1/7/08	Wed 1/23/08
30	Form/Pour 10th Floor Slabs & Columns	23 days	Wed 10/31/07	Fri 11/30/07
31	Stress/Strip/Reshore 10th Floor	22 days	Thu 11/8/07	Fri 12/7/07
32	Remove Reshores @ 10th Floor	12 days	Mon 12/31/07	Tue 1/15/08
33	Form/Pour 11th Floor Slabs & Columns	21 days	Tue 11/13/07	Tue 12/11/07
34	Stress/Strip/Reshore 11th Floor	21 days	Tue 11/20/07	Tue 12/18/07
35	Remove Reshores @ 11th Floor	7 days	Fri 1/11/08	Mon 1/21/08
36	Form/Pour 12th Floor Slabs & Columns	34 days	Thu 11/29/07	Tue 1/15/08
37	Stress/Strip/Reshore 12th Floor	32 days	Fri 12/7/07	Mon 1/21/08
38	Remove Reshores @ 12th Floor	5 days	Tue 1/22/08	Mon 1/28/08
39	Form/Pour 13th Floor Slabs & Columns	16 days	Fri 12/14/07	Fri 1/4/08
40	Stress/Strip/Reshore 13th Floor	11 days	Thu 12/27/07	Thu 1/10/08
41	Remove Reshores @ 13th Floor	7 days	Mon 2/4/08	Tue 2/12/08
42	Form/Pour 14th Floor Slabs & Columns	5 days	Thu 12/27/07	Wed 1/2/08
43	Stress/Strip/Reshore 14th Floor	8 days	Tue 1/8/08	Thu 1/17/08
44	Remove Reshores @ 14th Floor	7 days	Mon 2/4/08	Tue 2/12/08
45	Form/Pour 15th Floor Slabs & Columns	6 days	Thu 1/10/08	Thu 1/17/08
46	Stress/Strip/Reshore 15th Floor	6 days	Thu 1/17/08	Thu 1/24/08
47	Remove Reshores @ 15th Floor	7 days	Mon 2/4/08	Tue 2/12/08
48	Form/Pour Roof Slabs & Columns	8 days	Mon 1/21/08	Wed 1/30/08
49	Top Out Structure	0 days	Wed 1/30/08	Wed 1/30/08
50	Stress/Strip/Reshore Roof	1 day	Tue 1/8/08	Tue 1/8/08
51	Remove Reshores @ Roof	4 days	Thu 2/21/08	Tue 2/26/08
52				
53	**Exterior Studs**	143 days	Fri 9/28/07	Tue 4/15/08
54	Layout/Install 1st Floor Exterior Studs	8 days	Fri 9/28/07	Tue 10/9/07
55	Layout/Install 2nd Floor Exterior Studs	16 days	Wed 10/10/07	Wed 10/31/07
56	Layout/Install 3rd Floor Exterior Studs	20 days	Mon 10/22/07	Fri 11/16/07
57	Layout/Install 4th Floor Exterior Studs	19 days	Wed 11/7/07	Mon 12/3/07
58	Layout/Install 5th Floor Exterior Studs	19 days	Tue 11/20/07	Fri 12/14/07
59	Layout/Install 6th Floor Exterior Studs	17 days	Thu 12/6/07	Fri 12/28/07
60	Layout/Install 7th Floor Exterior Studs	21 days	Wed 12/12/07	Wed 1/9/08
61	Layout/Install 8th Floor Exterior Studs	19 days	Fri 12/21/07	Wed 1/16/08
62	Layout/Install 9th Floor Exterior Studs	8 days	Thu 1/24/08	Mon 2/4/08



Wisconsin Place Residential
Detailed Project Schedule by Trade
November 2, 2007

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

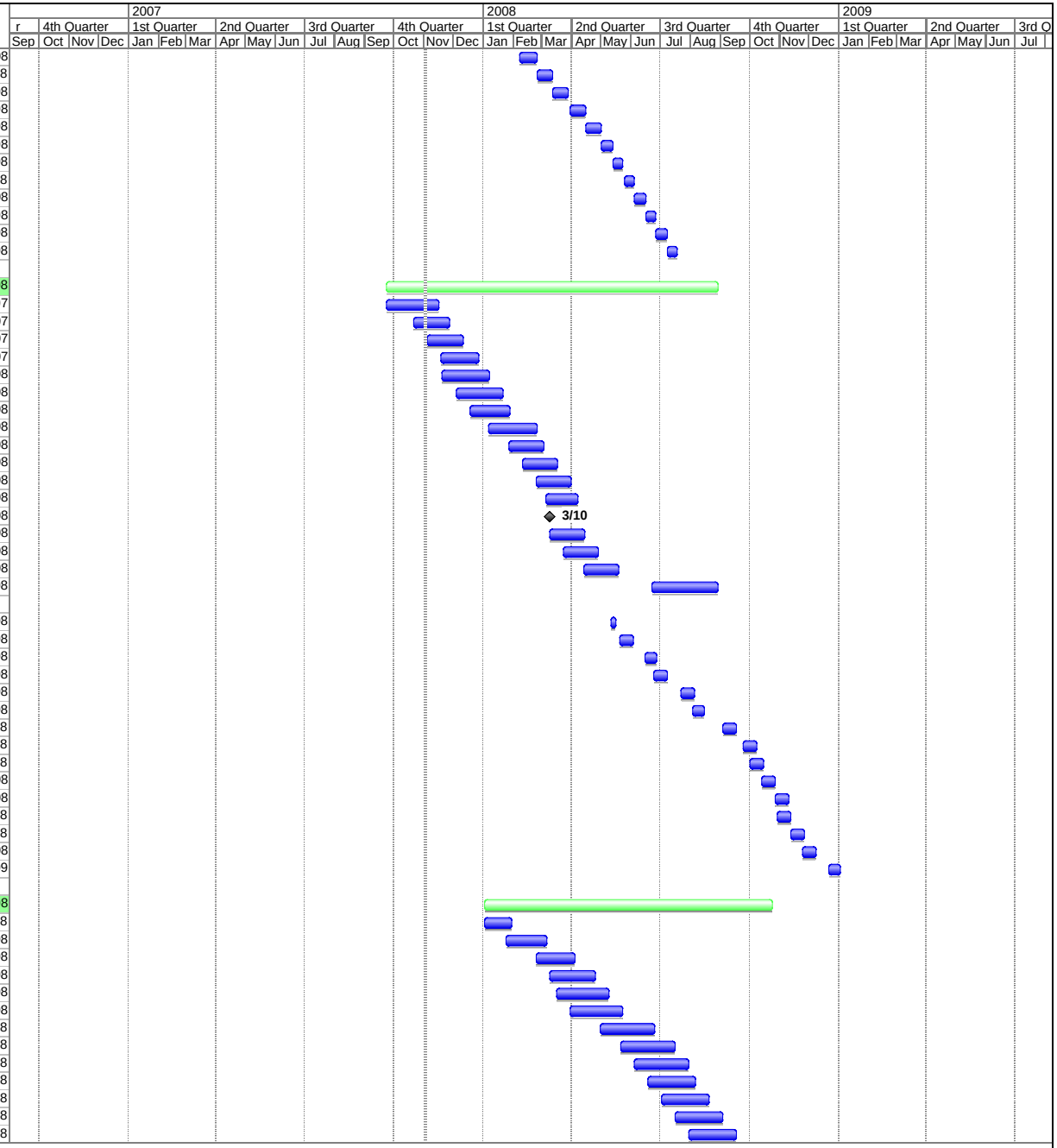
ID	Task Name	Duration	Start	Finish
63	Layout/Install 10th Floor Exterior Studs	16 days	Mon 2/4/08	Mon 2/25/08
64	Layout/Install 11th Floor Exterior Studs	16 days	Wed 2/13/08	Wed 3/5/08
65	Layout/Install 12th Floor Exterior Studs	39 days	Thu 1/24/08	Tue 3/18/08
66	Layout/Install 13th Floor Exterior Studs	16 days	Tue 3/4/08	Tue 3/25/08
67	Layout/Install 14th Floor Exterior Studs	18 days	Thu 3/13/08	Mon 4/7/08
68	Layout/Install 15th Floor Exterior Studs	17 days	Mon 3/24/08	Tue 4/15/08
69				
70	**Waterproofing**	136 days	Wed 10/17/07	Wed 4/23/08
71	Apply 1st Floor Waterproofing	11 days	Wed 10/17/07	Wed 10/31/07
72	Apply 2nd Floor Waterproofing	9 days	Fri 10/26/07	Wed 11/7/07
73	Apply 3rd Floor Waterproofing	20 days	Mon 10/29/07	Fri 11/23/07
74	Apply 4th Floor Waterproofing	14 days	Fri 11/16/07	Wed 12/5/07
75	Apply 5th Floor Waterproofing	22 days	Fri 11/30/07	Mon 12/31/07
76	Apply 6th Floor Waterproofing	19 days	Wed 12/12/07	Mon 1/7/08
77	Apply 7th Floor Waterproofing	19 days	Fri 12/21/07	Wed 1/16/08
78	Apply 8th Floor Waterproofing	14 days	Fri 1/4/08	Wed 1/23/08
79	Apply 9th Floor Waterproofing	14 days	Mon 2/4/08	Thu 2/21/08
80	Apply 10th Floor Waterproofing	14 days	Wed 2/13/08	Mon 3/3/08
81	Apply 11th Floor Waterproofing	14 days	Fri 2/22/08	Wed 3/12/08
82	Apply 12th Floor Waterproofing	17 days	Tue 3/4/08	Wed 3/26/08
83	Apply 13th Floor Waterproofing	14 days	Wed 3/12/08	Mon 3/31/08
84	Apply 14th Floor Waterproofing	20 days	Fri 3/21/08	Thu 4/17/08
85	Apply 15th Floor Waterproofing	17 days	Tue 4/1/08	Wed 4/23/08
86				
87	**Brick & Precast/Cast Stone**	130 days	Thu 11/1/07	Wed 4/30/08
88	Layout/Install 1st Floor Brick & Precast/Stone	24 days	Thu 11/1/07	Tue 12/4/07
89	Layout/Install 2nd Floor Brick & Precast/Stone	20 days	Mon 11/19/07	Fri 12/14/07
90	Layout/Install 3rd Floor Brick & Precast/Stone	19 days	Tue 11/27/07	Fri 12/21/07
91	Layout/Install 4th Floor Brick & Precast/Stone	22 days	Tue 11/20/07	Wed 12/19/07
92	Layout/Install 5th Floor Brick & Precast/Stone	20 days	Thu 12/6/07	Wed 1/2/08
93	Layout/Install 6th Floor Brick & Precast/Stone	20 days	Tue 12/18/07	Mon 1/14/08
94	Layout/Install 7th Floor Brick & Precast/Stone	18 days	Mon 12/31/07	Wed 1/23/08
95	Layout/Install 8th Floor Brick & Precast/Stone	16 days	Thu 1/10/08	Thu 1/31/08
96	Layout/Install 9th Floor Brick & Precast/Stone	15 days	Fri 2/8/08	Thu 2/28/08
97	Layout/Install 10th Floor Brick & Precast/Stone	15 days	Tue 2/19/08	Mon 3/10/08
98	Layout/Install 11th Floor Brick & Precast/Stone	15 days	Thu 2/28/08	Wed 3/19/08
99	Layout/Install 12th Floor Brick & Precast/Stone	19 days	Mon 3/10/08	Thu 4/3/08
100	Layout/Install 13th Floor Brick & Precast/Stone	13 days	Thu 3/20/08	Mon 4/7/08
101	Layout/Install 14th Floor Brick & Precast/Stone	20 days	Mon 3/31/08	Fri 4/25/08
102	Layout/Install 15th Floor Brick & Precast/Stone	16 days	Wed 4/9/08	Wed 4/30/08
103				
104	**Aluminum Windows & Doors**	113 days	Tue 12/4/07	Thu 5/8/08
105	Install 1st Floor Aluminum Windows & Doors	13 days	Tue 12/4/07	Thu 12/20/07
106	Install 2nd Floor Aluminum Windows & Doors	20 days	Thu 11/29/07	Wed 12/26/07
107	Install 3rd Floor Aluminum Windows & Doors	12 days	Fri 12/21/07	Mon 1/7/08
108	Install 4th Floor Aluminum Windows & Doors	17 days	Wed 12/26/07	Thu 1/17/08
109	Install 5th Floor Aluminum Windows & Doors	16 days	Mon 1/7/08	Mon 1/28/08
110	Install 6th Floor Aluminum Windows & Doors	16 days	Tue 1/15/08	Tue 2/5/08
111	Install 7th Floor Aluminum Windows & Doors	15 days	Wed 2/13/08	Tue 3/4/08
112	Install 8th Floor Aluminum Windows & Doors	15 days	Fri 2/22/08	Thu 3/13/08
113	Install 9th Floor Aluminum Windows & Doors	15 days	Tue 3/4/08	Mon 3/24/08
114	Install 10th FloorAluminum Windows & Doors	19 days	Thu 3/13/08	Tue 4/8/08
115	Install 11th Floor Aluminum Windows & Doors	10 days	Wed 3/26/08	Tue 4/8/08
116	Install 12th FloorAluminum Windows & Doors	10 days	Fri 4/4/08	Thu 4/17/08
117	Install 13th FloorAluminum Windows & Doors	15 days	Tue 4/15/08	Mon 5/5/08
118	Install 14th Floor Aluminum Windows & Doors	15 days	Tue 4/15/08	Mon 5/5/08
119	Install 15th FloorAluminum Windows & Doors	15 days	Fri 4/18/08	Thu 5/8/08
120				
121	**MEP/Sprinkler Risers**	136 days	Fri 1/11/08	Fri 7/18/08
122	Install 1st Floor MEP/Sprinkler Risers	5 days	Fri 1/11/08	Thu 1/17/08
123	Install 2nd Floor MEP/Sprinkler Risers	10 days	Fri 1/11/08	Thu 1/24/08
124	Install 3rd Floor MEP/Sprinkler Risers	10 days	Fri 1/25/08	Thu 2/7/08



Wisconsin Place Residential
Detailed Project Schedule by Trade
November 2, 2007

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

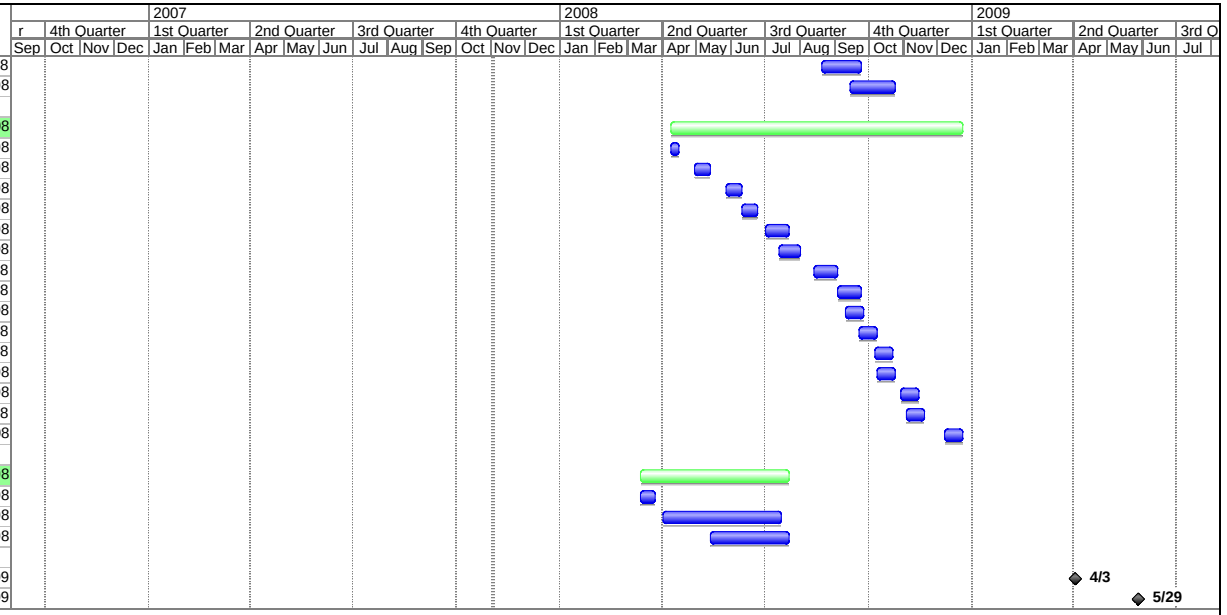
ID	Task Name	Duration	Start	Finish
125	Install 4th Floor MEP/Sprinkler Risers	12 days	Fri 2/8/08	Mon 2/25/08
126	Install 5th Floor MEP/Sprinkler Risers	12 days	Tue 2/26/08	Wed 3/12/08
127	Install 6th Floor MEP/Sprinkler Risers	12 days	Thu 3/13/08	Fri 3/28/08
128	Install 7th Floor MEP/Sprinkler Risers	12 days	Mon 3/31/08	Tue 4/15/08
129	Install 8th Floor MEP/Sprinkler Risers	12 days	Wed 4/16/08	Thu 5/1/08
130	Install 9th Floor MEP/Sprinkler Risers	8 days	Fri 5/2/08	Tue 5/13/08
131	Install 10th Floor MEP/Sprinkler Risers	8 days	Wed 5/14/08	Fri 5/23/08
132	Install 11th Floor MEP/Sprinkler Risers	8 days	Mon 5/26/08	Wed 6/4/08
133	Install 12th Floor MEP/Sprinkler Risers	8 days	Thu 6/5/08	Mon 6/16/08
134	Install 13th Floor MEP/Sprinkler Risers	8 days	Tue 6/17/08	Thu 6/26/08
135	Install 14th Floor MEP/Sprinkler Risers	8 days	Fri 6/27/08	Tue 7/8/08
136	Install 15th Floor MEP/Sprinkler Risers	8 days	Wed 7/9/08	Fri 7/18/08
137				
138	**MEP Overhead Rough-In**	245 days	Mon 9/24/07	Fri 8/29/08
139	1st Floor MEP Rough-In	40 days	Mon 9/24/07	Fri 11/16/07
140	2nd Floor MEP Rough-In	27 days	Mon 10/22/07	Tue 11/27/07
141	3rd Floor MEP Rough-In	27 days	Mon 11/5/07	Tue 12/11/07
142	4th Floor MEP Rough-In	29 days	Mon 11/19/07	Thu 12/27/07
143	5th Floor MEP Rough-In	35 days	Tue 11/20/07	Mon 1/7/08
144	6th Floor MEP Rough-In	34 days	Wed 12/5/07	Mon 1/21/08
145	7th Floor MEP Rough-In	29 days	Wed 12/19/07	Mon 1/28/08
146	8th Floor MEP Rough-In	36 days	Mon 1/7/08	Mon 2/25/08
147	9th Floor MEP Rough-In	26 days	Mon 1/28/08	Mon 3/3/08
148	10th Floor MEP Rough-In	26 days	Mon 2/11/08	Mon 3/17/08
149	11th Floor MEP Rough-In	26 days	Mon 2/25/08	Mon 3/31/08
150	Set Roof MEP Equipment	23 days	Thu 3/6/08	Mon 4/7/08
151	Permanent Power Available	0 days	Mon 3/10/08	Mon 3/10/08
152	12th Floor MEP Rough-In	26 days	Mon 3/10/08	Mon 4/14/08
153	13th Floor MEP Rough-In	26 days	Mon 3/24/08	Mon 4/28/08
154	14th Floor MEP Rough-In	26 days	Mon 4/14/08	Mon 5/19/08
155	15th Floor MEP Rough-In	50 days	Mon 6/23/08	Fri 8/29/08
156				
157	1st Floor MEP Trimout	5 days	Mon 5/12/08	Fri 5/16/08
158	2nd Floor MEP Trimout	10 days	Wed 5/21/08	Tue 6/3/08
159	3rd Floor MEP Trimout	10 days	Mon 6/16/08	Fri 6/27/08
160	4th Floor MEP Trimout	10 days	Wed 6/25/08	Tue 7/8/08
161	5th Floor MEP Trimout	10 days	Wed 7/23/08	Tue 8/5/08
162	6th Floor MEP Trimout	10 days	Mon 8/4/08	Fri 8/15/08
163	7th Floor MEP Trimout	10 days	Thu 9/4/08	Wed 9/17/08
164	8th Floor MEP Trimout	10 days	Thu 9/25/08	Wed 10/8/08
165	9th Floor MEP Trimout	10 days	Thu 10/2/08	Wed 10/15/08
166	10th Floor MEP Trimout	10 days	Tue 10/14/08	Mon 10/27/08
167	11th Floor MEP Trimout	10 days	Tue 10/28/08	Mon 11/10/08
168	12th Floor MEP Trimout	10 days	Thu 10/30/08	Wed 11/12/08
169	13th Floor MEP Trimout	10 days	Thu 11/13/08	Wed 11/26/08
170	14th Floor MEP Trimout	10 days	Tue 11/25/08	Mon 12/8/08
171	15th Floor MEP Trimout	10 days	Mon 12/22/08	Fri 1/2/09
172				
173	**Install/Finish Drywall**	212 days	Thu 1/3/08	Fri 10/24/08
174	Install/Finish 1st Floor Drywall	20 days	Thu 1/3/08	Wed 1/30/08
175	Install/Finish 2nd Floor Drywall	30 days	Fri 1/25/08	Thu 3/6/08
176	Install/Finish 3rd Floor Drywall	30 days	Mon 2/25/08	Fri 4/4/08
177	Install/Finish 4th Floor Drywall	35 days	Mon 3/10/08	Fri 4/25/08
178	Install/Finish 5th Floor Drywall	40 days	Mon 3/17/08	Fri 5/9/08
179	Install/Finish 6th Floor Drywall	40 days	Mon 3/31/08	Fri 5/23/08
180	Install/Finish 7th Floor Drywall	40 days	Thu 5/1/08	Wed 6/25/08
181	Install/Finish 8th Floor Drywall	40 days	Thu 5/22/08	Wed 7/16/08
182	Install/Finish 9th Floor Drywall	40 days	Thu 6/5/08	Wed 7/30/08
183	Install/Finish 10th Floor Drywall	35 days	Thu 6/19/08	Wed 8/6/08
184	Install/Finish 11th Floor Drywall	35 days	Thu 7/3/08	Wed 8/20/08
185	Install/Finish 12th Floor Drywall	35 days	Thu 7/17/08	Wed 9/3/08
186	Install/Finish 13th Floor Drywall	35 days	Thu 7/31/08	Wed 9/17/08



Wisconsin Place Residential
Detailed Project Schedule by Trade
November 2, 2007

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

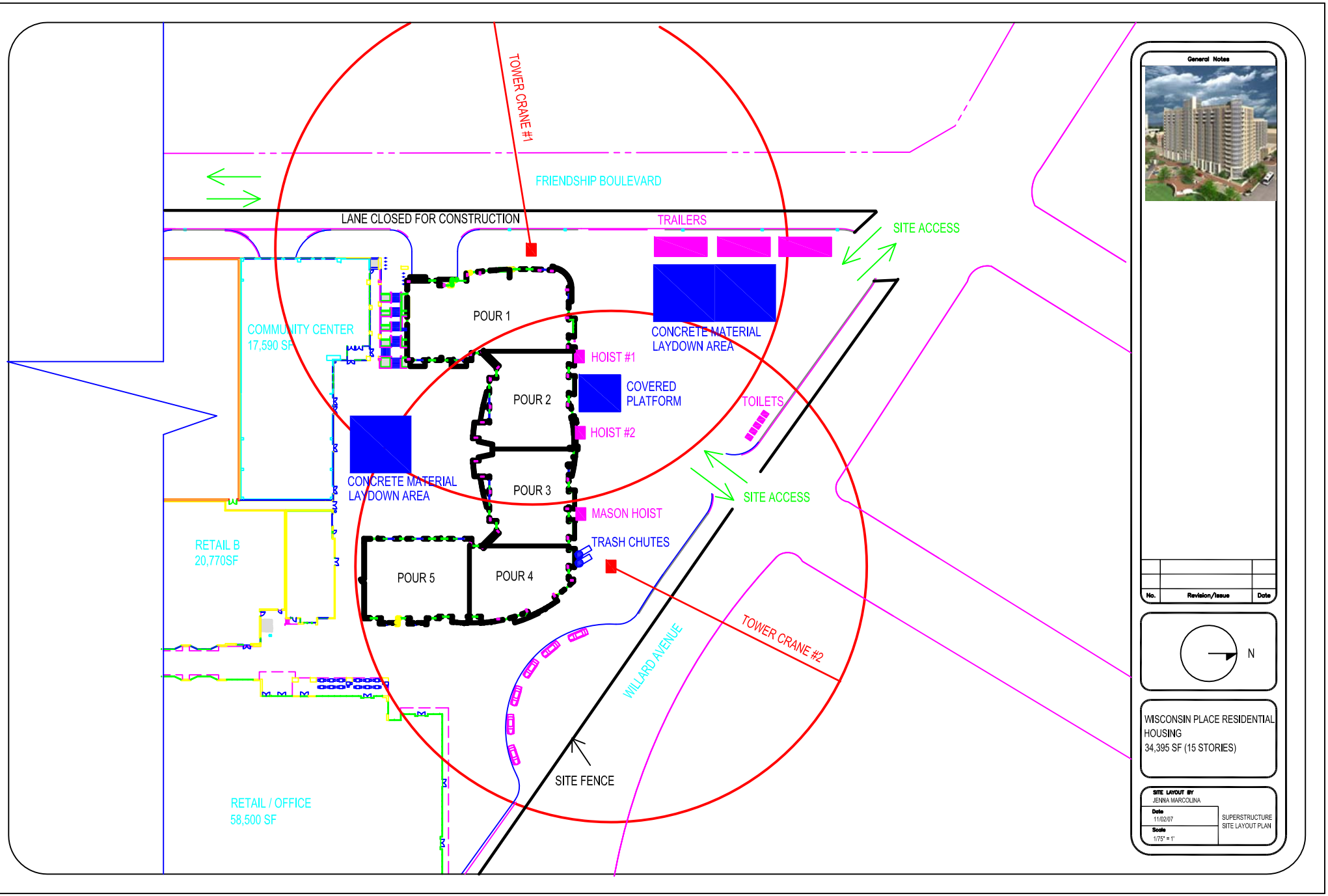
ID	Task Name	Duration	Start	Finish
187	Install/Finish 14th Floor Drywall	25 days	Thu 8/21/08	Wed 9/24/08
188	Install/Finish 15th Floor Drywall	30 days	Mon 9/15/08	Fri 10/24/08
189				
190	**Painting**	185 days	Wed 4/9/08	Tue 12/23/08
191	Paint 1st Floor Walls	5 days	Wed 4/9/08	Tue 4/15/08
192	Paint 2nd Floor Walls	10 days	Wed 4/30/08	Tue 5/13/08
193	Painr 3rd Floor Walls	10 days	Wed 5/28/08	Tue 6/10/08
194	Paint 4th Floor Walls	10 days	Wed 6/11/08	Tue 6/24/08
195	Paint 5th Floor Walls	15 days	Wed 7/2/08	Tue 7/22/08
196	Paint 6th Floor Walls	15 days	Mon 7/14/08	Fri 8/1/08
197	Paint 7th Floor Walls	15 days	Thu 8/14/08	Wed 9/3/08
198	Paint 8th Floor Walls	15 days	Thu 9/4/08	Wed 9/24/08
199	Paint 9th Floor Walls	12 days	Thu 9/11/08	Fri 9/26/08
200	Paint 10th Floor Walls	12 days	Tue 9/23/08	Wed 10/8/08
201	Paint 11th Floor Walls	12 days	Tue 10/7/08	Wed 10/22/08
202	Paint 12th Floor Walls	12 days	Thu 10/9/08	Fri 10/24/08
203	Paint 13th Floor Walls	12 days	Thu 10/30/08	Fri 11/14/08
204	Paint 14th Floor Walls	12 days	Tue 11/4/08	Wed 11/19/08
205	Paint 15th Floor Walls	12 days	Mon 12/8/08	Tue 12/23/08
206				
207	**Elevators**	94 days	Thu 3/13/08	Tue 7/22/08
208	Set Rooftop Elevator Equipment	9 days	Thu 3/13/08	Tue 3/25/08
209	Install Shaftwork for Elevators 1-5	75 days	Wed 4/2/08	Tue 7/15/08
210	Install Cabs 1-5	50 days	Wed 5/14/08	Tue 7/22/08
211				
212	Substantial Completion	0 days	Fri 4/3/09	Fri 4/3/09
213	Final Completion	0 days	Fri 5/29/09	Fri 5/29/09



Wisconsin Place Residential
Detailed Project Schedule by Trade
November 2, 2007

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

Appendix B: Site Layout Plan


TOWER CRANE #1
FRIENDSHIP BOULEVARD
LANE CLOSED FOR CONSTRUCTION
TRAILERS
SITE ACCESS
COMMUNITY CENTER
17,590 SF
POUR 1
CONCRETE MATERIAL
LAYDOWN AREA
HOIST #1
COVERED
PLATFORM
POUR 2
TOILETS
HOIST #2
CONCRETE MATERIAL
LAYDOWN AREA
POUR 3
SITE ACCESS
MASON HOIST
TRASH CHUTES
RETAIL B
20,770SF
POUR 5
POUR 4
TOWER CRANE #2
WILLARD AVENUE
SITE FENCE
RETAIL / OFFICE
58,500 SF
General Notes
No.
Revision/Issue
Date
N
WISCONSIN PLACE RESIDENTIAL
HOUSING
34,395 SF (15 STORIES)
SITE LAYOUT BY
JENNA MARCOLINA
Date
11/02/07
Scale
1/75" = 1'
SUPERSTRUCTURE
SITE LAYOUT PLAN

Appendix C: Assemblies Estimate Calculations and Takeoffs

See also hand calculations attached.

Brick Veneer w/ Metal Stud Backup					
Qty	Unit	Material	Install	Total	Cost
60000	SF	7.45	14.4	21.85	$1,311,000

Aluminum Doors						
Type	Qty	Unit	Material	Install	Total	Cost
Wide Stile	160	each	1575	855	2430	$388,800
Revolving	2	each	22600	4000	26600	$53,200
					Subtotal	$442,000

Aluminum Windows					
Qty	Unit	Material	Install	Total	Cost
1925	each	735	237	972	$1,871,100

Cast Stone Veneer w/ Metal Stud Backup					
Qty	Unit	Material	Install	Total	Cost
9000	SF	14.9	15.65	30.55	$274,950

Curtainwall Panels					
Qty	Unit	Material	Install	Total	Cost
17850	SF	13.95	9.2	23.15	$413,228

Appendix D: Detailed Structural Systems Estimate Calculations and Takeoffs

See also hand calculations attached.

Floor Slabs

Floor Slab				
Perimeter (LF)	Area (SF)	Vol. (CF)	Vol. (CY)	SFCA
1350	41416	25885	958.7037	1687.5

Floor Slab Sressing Tendons #4 @ 24" sp				
No.	Qty	Length	Unit Wt (lb/ft)	Wt (lb)
4	160	65	0.67	6968
4	35	300	0.67	7035
4	65	230	0.67	10016.5
4	80	70	0.67	3752
			Subtotal	27771.5

Floor Slab Stressing Tendons #4 @ 12" sp				
No.	Qty	Length	Unit Wt (lb/ft)	Wt (lb)
4	65	10	0.67	435.5
4	80	10	0.67	536
4	150	10	0.67	1005
4	230	10	0.67	1541
4	160	10	0.67	1072
			Subtotal	4589.5

Elevated Slabs #4-#7					
Total (lb)	Material	Labor	Equipment	Total Cost/lb	Cost
32361	0.49	0.23	0	0.72	$23,300

Columns

Columns						
L (in)	W (in)	Vol (CF)	Qty	Total CF	Total CY	SFCA
16	28	28	42	1176	43.55556	2772
28	16	28	32	896	33.18519	2112
16	36	36	4	144	5.333333	312
16	32	32	8	256	9.481481	576
10	84	52.5	2	105	3.888889	282
32	16	32	4	128	4.740741	288
28	18	31.5	4	126	4.666667	276
12	108	81	2	162	6	360
40	14	35	2	70	2.592593	162
12	24	18	4	72	2.666667	216
24	12	18	4	72	2.666667	216
18	28	31.5	2	63	2.333333	138
36	10	22.5	4	90	3.333333	276
36	16	36	2	72	2.666667	156
24	28	42	2	84	3.111111	156
12	28	21	2	42	1.555556	120
20	12	15	2	30	1.111111	96
26	20	32.5	2	65	2.407407	138
12	36	27	2	54	2	144
12	24	18	2	36	1.333333	108
Subtotal		637.5	128	3743	138.6296	8904

Columns #3-#7					
Total (lb)	Material	Labor	Equipment	Total Cost/lb	Cost
9400.32	0.47	0.44	0	0.91	$8,554

Columns #8-#18					
Total (lb)	Material	Labor	Equipment	Total Cost/lb	Cost
15227.82	0.47	0.29	0	0.76	$11,573

Beams

Beams							
Mark	Width (in)	Depth (in)	Length (LF)	Qty	Vol. (CF)	Vol. (CY)	SFCA
5B-1	32	30	20	2	266.6667	9.876543	413.3333
5B-2	30	18	20	3	225	8.333333	480
TB-1	8	20	16	1	17.77778	0.658436	74.66667
TB-3	8	20	16	1	17.77778	0.658436	74.66667
TB-4	8	24	16	1	21.33333	0.790123	85.33333
TB-5	12	18	28	1	42	1.555556	140
TB-6	12	18	22	1	33	1.222222	110
TB-7	8	20	16	2	35.55556	1.316872	149.3333
TB-8	8	20	9	2	20	0.740741	84
Subtotal					679.1111	25.15226	1611.333

Beam Rebar				
No.	Qty	Length (ft)	Unit Wt. (lb/ft)	Wt. (lb)
6	8	9	1.502	108.144
7	12	20	2.04	489.6
7	10	20	2.04	408
8	12	16	2.67	512.64
8	14	16	2.67	598.08
9	6	28	3.4	571.2
			Subtotal	2687.664

Beams #3-#7					
Total (lb)	Material	Labor	Equipment	Total Cost/lb	Cost
1005.744	0.47	0.41	0	0.88	$885

Beams #8-#18					
Total (lb)	Material	Labor	Equipment	Total Cost/lb	Cost
1681.92	0.47	0.24	0	0.71	$1,194

Shear Walls

Shear Walls		
Mark	Vol. (CF)	Vol. (CY)
SW 1	90	3.333333
SW 2	234	8.666667
SW 3	90	3.333333
SW 4	90	3.333333
SW 5	180	6.666667
SW 6	90	3.333333
Subtotal	774	28.66667

Shear Wall Rebar				
No.	Qty	Length (ft)	Unit Wt. (lb/ft)	Wt. (lb)
4	124	9	0.67	747.72
4	108	10	0.67	651.24
4	18	22	0.67	108.54
4	18	28	0.67	108.54
6	92	9	1.5	1242
7	32	9	2.04	587.52
			Subtotal	3445.56

Shear Walls #3-#7					
Total (lb)	Material	Labor	Equipment	Total Cost/lb	Cost
3445.56	0.47	0.22	0	0.69	$2,377

Roof Slab

Roof Slab					
Slab Thickness	Perimeter (LF)	Area (SF)	Vol. (CF)	Vol. (CY)	SFCA
6	65	230	115	4.259259	65
7	400	4250	2479.167	91.82099	466.6667
12	150	1100	1100	40.74074	300
Subtotal	615	5580	3694.167	136.821	831.6667

Roof Slab Rebar				
No.	Qty	Length	Unit Wt	Total Wt (lb)
4	75	55	0.67	2763.75
4	55	75	0.67	2763.75
4	55	15	0.67	552.75
4	15	20	0.67	201
4	15	35	0.67	351.75
5	35	30	1.04	1092
5	30	35	1.04	1092
			Subtotal	8817

Elevated Slabs #4-#7					
Total (lb)	Material	Labor	Equipment	Total Cost/lb	Cost
8817	0.49	0.23	0	0.72	$6,348

Total Concrete

Total Concrete - Typical Floor			
Component	CY	Cost/CY	Cost/Floor
Slabs	958.70	$114	$109,292
Beams	25.15	$114	$2,867
Columns	138.63	$114	$15,804
Shear Walls	28.67	$114	$3,268
		Subtotal	$131,231
Plus Roof	136.82	$114	$15,598

Total Formwork

Total Formwork - Typical Floor						
Component	SFCA	Material	Labor	Equipment	Total Cost/SFCA	Cost/Floor
Floor Slab	1687	1.43	3.06	0	$4	$7,575
Beams	1612	0.9	5.25	0	$6	$9,914
Columns	8904	0.84	4.67	0	$6	$49,061
Shear Walls	1656	0.87	2.17	0	$3	$5,034
					Subtotal	$71,584
Plus Roof	832	1.43	3.06		$4	$3,736

Total Concrete Placing

Total Concrete Placing - Typical Floor						
Component	CY	Material	Labor	Equipment	Total Cost/CY	Cost/Floor
Floor Slab	958.7037	0	12.4	4.7	17.1	$16,394
Beams	25.15226	0	33	12.5	45.5	$1,144
Columns	138.6296	0	21.5	8.15	29.65	$4,110
Shear Walls	28.66667	0	18.05	6.85	24.9	$714
					Subtotal	$22,362
Roof Slab	136.821		12.4	4.7	17.1	$2,340