WestEnd**25**

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1229-1231 25St. NW

Charles Miller – Construction Management

Consultant – Dr. Riley

Technical Assignment II:
Construction Project Management

Penn State Architectural Engineering

10/24/08

Executive Summary:

WestEnd**25** is a conversion of two six story office buildings to residential rental apartments. The project will add four post tensioned concrete stories to the top of the existing buildings, and will fully connect the two buildings. Technical Assignment II serves as an analysis and evaluation of the project schedule, site plans, structural estimate, and general conditions estimate of WestEnd**25**. Information for analysis came from actual project documentation, 2008 R.S. Means Cost Data, and construction knowledge gained through course work and on the job experiences.

The project schedule was produced using a more detailed contract project schedule. Durations of similar items in secession were combined into one line item for the project. Exceptions were made for the mock up and lobby area because of their early turn over. This process resulted in a detailed schedule that highlights important aspects and milestones of WestEnd**25**. Notable milestones are topping out on November 24th, 2008, building water tight on July 8th, 2009 and substantial completion on December 24th, 2009. This report finds the project schedule is appropriate for completion of the project on December 24th, 2009 as required by contract.

The critical phases of construction for this project are demolition, superstructure, enclosure, and finishes. Site layouts show locations of key site features during the each of these phases. General concerns involved in the layout are public safety, site access, and site organization. The resulting layouts take into consideration conditions of the site with the activities during each phase and are effective plans for utilizing the site.

The structural system of WestEnd**25** totals $4.8 million. This figure was calculated using a detailed estimate of quantities from structural drawings. Costs of material, labor, and equipment were taken from R.S. Means Cost Data. Given the scope of work of this project it is concluded that this cost is reasonable.

General conditions on WestEnd**25** total $2.8 million dollars. Majority of this cost is comprised of salaries of personnel staffed to the job. In fact personal cost comprise nearly 75% of the total general conditions cost. However, general conditions make up nearly 3% of the project's total cost of $75.8 million.

Every year PACE members come to Penn State to discuss critical industry issues. This report details the discussions held at this conference. This report presents findings from group deliberations on the format of a mentorship program, LEED evolution, and panel discussions. As a result of this conference the main industry issue that may affect WestEnd**25** is the idea of the owner taking a leadership role in the LEED certification of a building.

The findings of this report are unique to WestEnd**25**. Results should be cautiously applied only to similar projects. Such types of projects include renovation of existing building, additions to existing structures, an urban setting in a residential district.

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A. Detailed Project Schedule Summary:

Project Considerations on Schedule:

WestEnd**25** is a unique project because the scope of work includes demolition of existing building systems, an early turnover of first floor and a mock up unit. The purpose of the detail project schedule for WestEnd**25** is to expand on the summary schedule in Technical Assignment I. This detailed schedule is organized to show preconstruction activities along with the construction activates. The construction activities include project milestones and are separated by trades. Activates related to demolition, interior, and the mock-up are organized separate from the other activates. Included in the detailed schedule are important milestones such as:

- Top Out Structure: November 24st, 2008
- Mock Up Complete: September 23rd, 2008
- Building Water Tight: July 8th, 2009
- Sidewalk and Courtyard Complete: August 9th, 2009
- First Floor Unit Turnover: August 14th, 2009
- Substantial Completion: December 24th, 2009

Schedule Narrative:

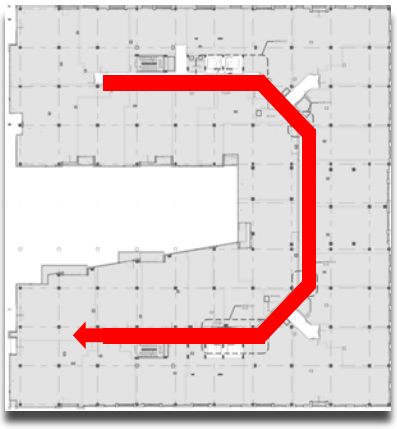
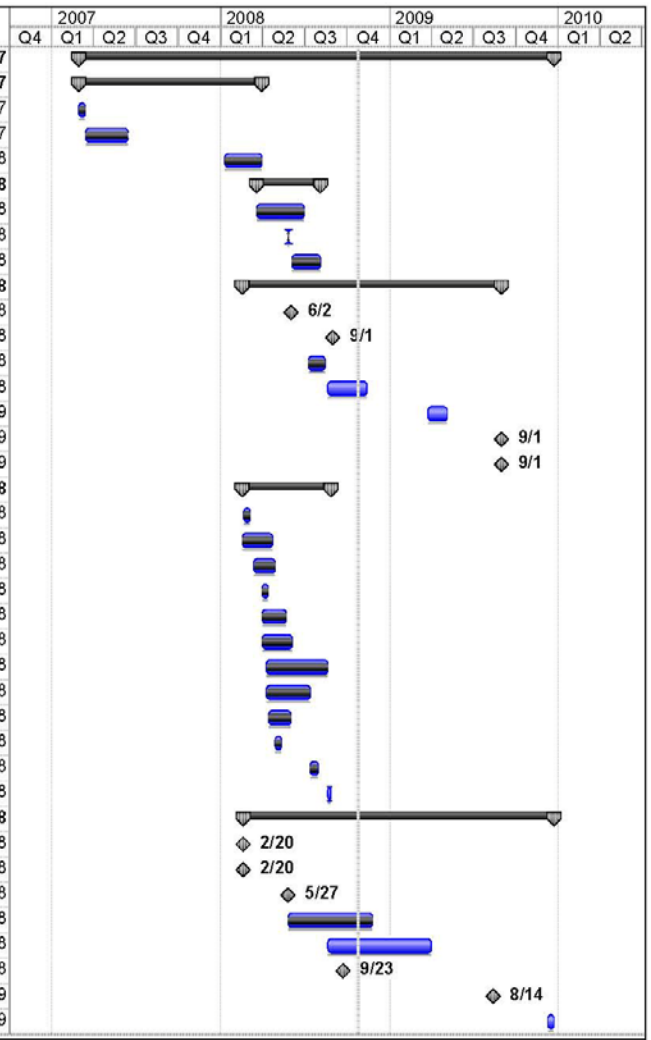


Figure show work flow for each floor.

Designs of WestEnd**25** was initiated in March of 2007 and lasted approximately a year. Mobilization and demolition started before the final competition of construction documents. Demolition of the existing façade and interior building systems commenced on February of 2008 and lasted until early June 2008. This demolition includes duration preparation of slab extensions. Work on the superstructure is sequenced by floors and starts with the first floor and continues to the roof/penthouse. For the first through the sixth floor the superstructure work includes installing supporting steel, F/R/P of the slab infills and slab extension for the existing structure. As listed above the project top out will occur on 11/24/08. The façade of WestEnd**25** is comprised of what is termed alley wrap and park wrap. The alley wrap is a brick veneer with metal stud backing and the park wrap is a curtain wall façade. The project will be water tight by 7/8/09. Interior work is sequenced to flow from the west side of the north building in a clockwise direction to the south building. This progression is followed for all activities of construction creating a substantial completion date of 12/24/09. The following five pages consist of the detailed schedule for WestEnd**25.**

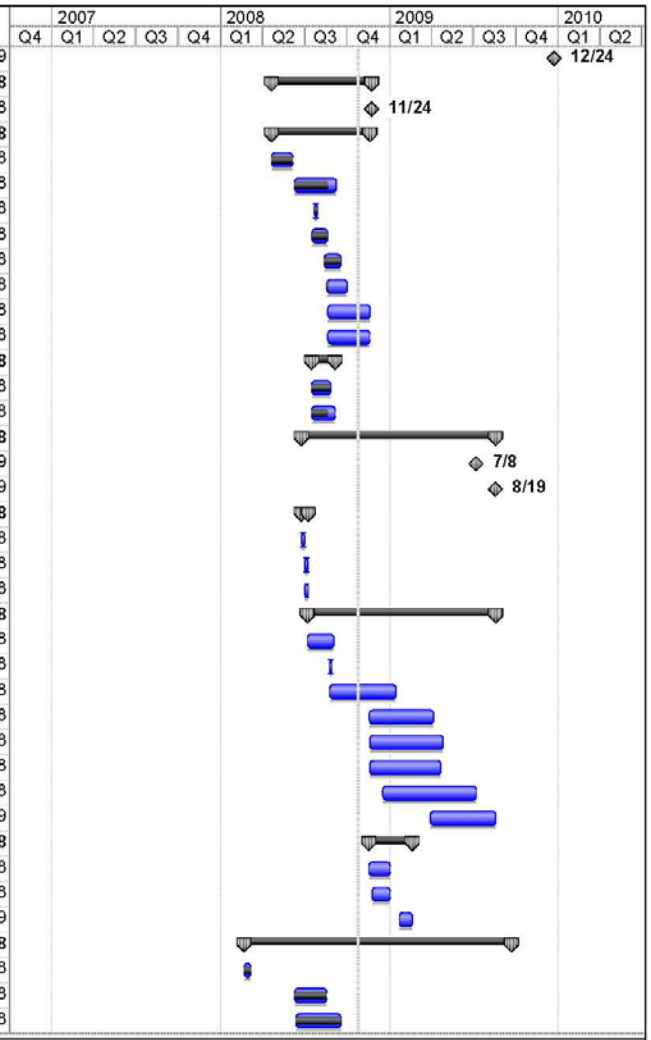
ID	Task Name	Duration	Start
1	**Schedule by Trade**	**716 days**	**Thu 3/1/07**
2	**Design**	**275 days**	**Thu 3/1/07**
3	SD Drawings	10 days	Thu 3/1/07
4	DD Drawings	64 days	Fri 3/16/07
5	CD Drawings	56 days	Fri 1/11/08
6	**Procurement**	**96 days**	**Thu 3/20/08**
7	Establish GMP	72 days	Thu 3/20/08
8	GC Award: Mason, MEP, Site Utillities, DF & H,	1 day	Tue 5/27/08
9	GC Award: Drywall, Pool, Louvers, Metal Panels, Win Wash Equ, Chute	43 days	Wed 6/4/08
10	**Permit**	**392 days**	**Mon 2/18/08**
11	Issue Building Permit	0 days	Mon 6/2/08
12	First Units Ready for Turnover	0 days	Mon 9/1/08
13	Public Space Permit for Water and Sewer Work	26 days	Thu 7/10/08
14	Owner/Subcontractor Obtain Design/Public Space Permit	60 days	Thu 8/21/08
15	Obtain Sidewalk Permit - All Utilities In	30 days	Thu 3/26/09
16	Lobby / Leasing Area Complete	0 days	Tue 9/1/09
17	Obtain Certificate of Occupancy - Building Ready to Market	0 days	Tue 9/1/09
18	**Demolition**	**136 days**	**Mon 2/18/08**
19	Abatement - NTP	10 days	Thu 2/21/08
20	Exposure Demo	47 days	Mon 2/18/08
21	Abatement	32 days	Fri 3/14/08
22	Remove Precast Penthouse	9 days	Tue 4/1/08
23	Demo Penthouse structure and Slabs	38 days	Tue 4/1/08
24	Remove Precast Elevations	46 days	Tue 4/1/08
25	Final Demo Interior	93 days	Thu 4/10/08
26	Selective demo in B1,B2	65 days	Thu 4/10/08
27	Demo Roof Slab	33 days	Tue 4/15/08
28	Demo Slab to Create Angle Cut - 2nd thru 6th Floor	9 days	Tue 4/29/08
29	Waffle Slab Demo - 2nd thru 6th Floor	13 days	Mon 7/14/08
30	Demo Existing - Plaza	5 days	Thu 8/21/08
31	**Construction**	**469 days**	**Wed 2/20/08**
32	Mobilize	0 days	Wed 2/20/08
33	Issue NTP - For Overall GMP	0 days	Wed 2/20/08
34	Install Tower Crane	0 days	Tue 5/27/08
35	Material Hoists	129 days	Tue 5/27/08
36	Install Elevators - Passenger	155 days	Thu 8/21/08
37	Mock Up Unit 213 Complete	0 days	Tue 9/23/08
38	1st Floor Complete	0 days	Fri 8/14/09
39	Final Inspections	10 days	Thu 12/10/09



Project: Schedule by Trade
Date: Fri 10/24/08

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

ID	Task Name	Duration	Start
40	Project Substantial Completion	0 days	Thu 12/24/09
41	**Structure**	**152 days**	**Mon 4/21/08**
42	Top-out Structure	0 days	Mon 11/24/08
43	**Concrete**	**151 days**	**Mon 4/21/08**
44	Reinforcing Columns & Footers B2 & B1	33 days	Mon 4/21/08
45	Frame & Pour Slab Edge Extensions, Infills - 2nd thru 6th	63 days	Tue 6/10/08
46	Pour Slab Infills - 1st Floor	4 days	Wed 7/23/08
47	Frame and Pour Connector - 2nd to 6th	23 days	Fri 7/18/08
48	F,R&P Waffle Slab Infills - 2nd thru 6th	25 days	Wed 8/13/08
49	Frame & Pour Slab Edge Extensions, Infills - Center	30.5 days	Tue 8/19/08
50	F,R&P Walls to 7th, 8th, 9th, 10th, Roof & Slab	65 days	Thu 8/21/08
51	Remove Reshores - 3rd thru PH	64 days	Thu 8/21/08
52	**Steel**	**36 days**	**Thu 7/17/08**
53	Support Steel for Infills and Structural Beams 1st to 6th Floor	29 days	Thu 7/17/08
54	Install Slab Edge Extension Steel - 2nd thru 6th	36 days	Thu 7/17/08
55	**Facade & Roof**	**293 days**	**Wed 6/25/08**
56	Building Substantially Watertight	0 days	Wed 7/8/09
57	Facade Complete	0 days	Wed 8/19/09
58	**Mockup**	**10 days**	**Wed 6/25/08**
59	Frame & Sheath Ext Wall - Mock Up	5 days	Wed 6/25/08
60	Install Punch Windows & Doors - Mock Up	4 days	Wed 7/2/08
61	Frame Walls - Mock Up	5 days	Wed 7/2/08
62	**Facade**	**285 days**	**Tue 7/8/08**
63	Curtain Wall System 100% Complete	40 days	Tue 7/8/08
64	Fraco Scaffolding - Install	5 days	Mon 8/25/08
65	Ext Framing & Sheathing - 1st to PH/Roof	98.94 days	Mon 8/25/08
66	Waterproofing Exterior Sheathing - 1st thru 10th	95 days	Wed 11/19/08
67	Install Alley Wrap Windows - 1st thru 10th Floor	108.2 days	Thu 11/20/08
68	Brick - Alley Wrap 1st to 10th	105.2 days	Thu 11/20/08
69	Install Park Wrap - 1st thru 10th Floor	140.75 days	Thu 12/18/08
70	Install Metal Panels for Curtain Wall System	100 days	Tue 3/31/09
71	**Roof**	**64 days**	**Tue 11/18/08**
72	Main Roof / Pool Work	30 days	Tue 11/18/08
73	Penthouse Roof Work	25 days	Tue 11/25/08
74	Roof Detailing / Waterproofing - Install	20 days	Fri 1/23/09
75	**MEP**	**403 days**	**Fri 2/22/08**
76	Disconnect & Make Safe MEP	10 days	Fri 2/22/08
77	Layout for MEP Penetrations thru 6th Floor	48 days	Tue 6/10/08
78	Create MEP Penetrations - 2n thru 6th	67 days	Fri 6/13/08



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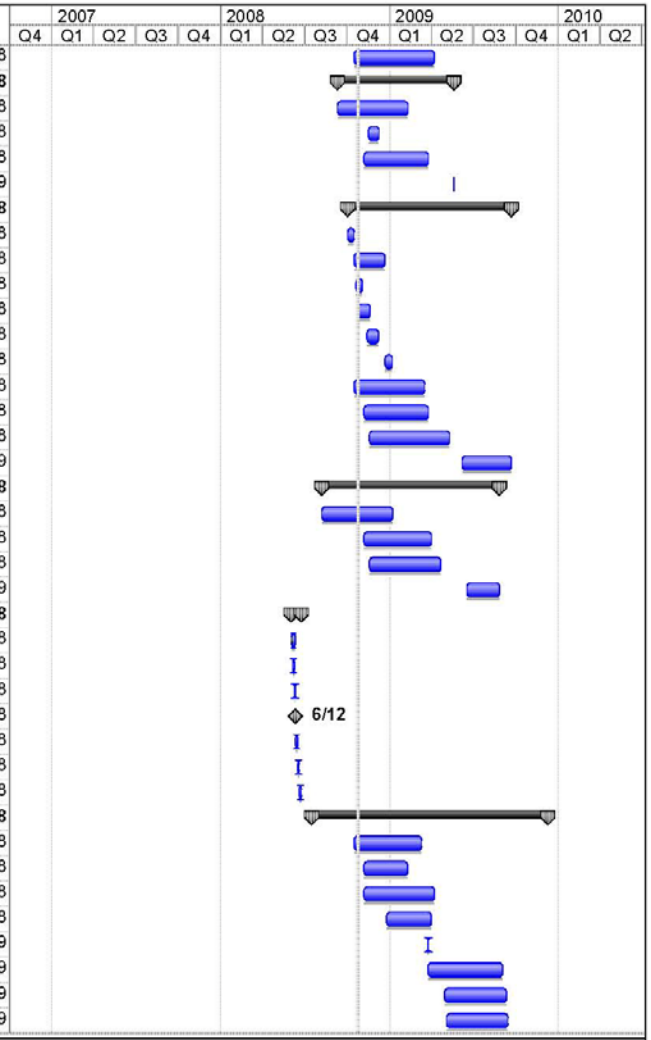
ID	Task Name	Duration	Start
79	Rough-ins & Finishes - PH	120 days	Fri 10/17/08
80	**Mechanical**	**177 days**	**Thu 9/11/08**
81	Rough-In - B2 to 10th Floor	105 days	Thu 9/11/08
82	Rough-In - Lobby	15 days	Mon 11/17/08
83	Horizontal Rough-In	96 days	Fri 11/7/08
84	Start HVAC	1 day	Thu 5/21/09
85	**Electrical**	**246 days**	**Fri 10/3/08**
86	TPF Switchgear	10 days	Fri 10/3/08
87	Pepco Transformer and Conduit Work - Primary	45 days	Fri 10/17/08
88	Building Electric Room 1229 & 1231	10 days	Tue 10/21/08
89	Install New Switch Gear	20 days	Fri 10/24/08
90	Install Conduit / Tie into Building	15 days	Fri 11/14/08
91	Energize / Turn on Permanent Power	10 days	Tue 12/23/08
92	Install Electrical Risers - B2 to 10th Floor	104.5 days	Fri 10/17/08
93	Electrical Feeder Rough-In	96 days	Fri 11/7/08
94	Electrical Wall and Ceiling Rough-In	120 days	Wed 11/19/08
95	Electric Trim Out	75 days	Mon 6/8/09
96	**Plumbing**	**268 days**	**Fri 8/8/08**
97	Plumbing & Sprinkler Risers Install - B2 to PH	104.5 days	Fri 8/8/08
98	Plumbing Run - Outs	101 days	Fri 11/7/08
99	Sprinkler Branch Lines & Drops	107 days	Wed 11/19/08
100	Install Plumbing Fixtures	50 days	Thu 6/18/09
101	**Mockup**	**16 days**	**Tue 6/3/08**
102	Layout for MEP Penetrations - Mock Up	6 days	Tue 6/3/08
103	Core Drill for Plumbing, HVAC & Sprinkler - Mock Up	2 days	Fri 6/6/08
104	Saw Cut & Demo Duct Shaft Openings - Mock Up	2 days	Tue 6/10/08
105	Begin Rough Ins Mock Up Unit	0 days	Thu 6/12/08
106	Install Duct - Mock Up	3 days	Thu 6/12/08
107	Install Plumbing & Sprinkler - Mock Up	3 days	Tue 6/17/08
108	Install Electric - Mock Up	3 days	Fri 6/20/08
109	**Interior**	**356 days**	**Thu 7/17/08**
110	Layout Interior Partitions - B2,B1,1st thru 10th Floor	100 days	Fri 10/17/08
111	Frame Ceilings	63 days	Fri 11/7/08
112	In Wall Blocking	105 days	Fri 11/7/08
113	Frame Walls	68 days	Fri 12/26/08
114	Begin Interior Finishes - 1st thru 10th Floor	1 day	Thu 3/26/09
115	Hang/Tape/Finish Drywall	114 days	Thu 3/26/09
116	Install Interior Doors and Casings	93 days	Fri 5/1/09
117	Drywall Point Up	92 days	Tue 5/5/09



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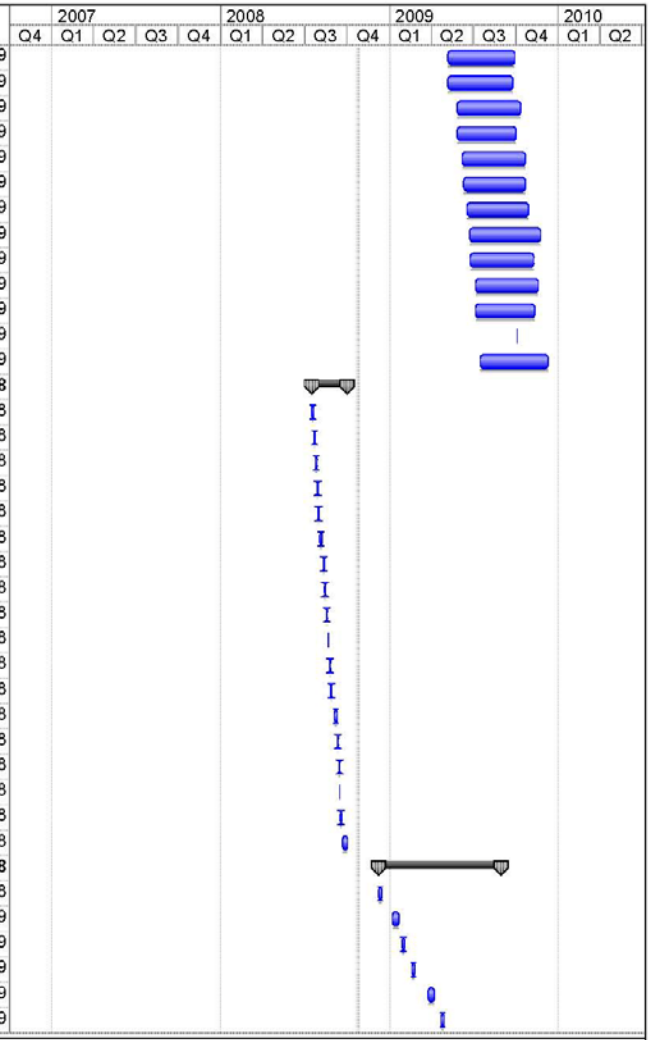
ID	Task Name	Duration	Start
118	Ceramic Tile	100 days	Fri 5/8/09
119	Install Unit Entry Doors and Secure	98 days	Fri 5/8/09
120	Set Kitchen Cabinets and Vanities	96 days	Thu 5/28/09
121	Trim Out Diffusers	90 days	Thu 5/28/09
122	Install Finish Flooring	97 days	Mon 6/8/09
123	Set Stone Tops	94 days	Thu 6/11/09
124	Install Plumbing Fixtures	94 days	Thu 6/18/09
125	Finish Paint	108 days	Wed 6/24/09
126	Install Appliances	96 days	Thu 6/25/09
127	Install Corridor Finishes	97 days	Tue 7/7/09
128	Install Door Hardware	91 days	Tue 7/7/09
129	Start HVAC - Conditioned Air	1 day	Mon 10/5/09
130	GC Final Punch Units	102 days	Fri 7/17/09
131	**Mockup**	**55 days**	**Thu 7/17/08**
132	Hang Rips at Ceiling - Mock Up	3 days	Thu 7/17/08
133	Frame Ceiling - Mock Up	3 days	Tue 7/22/08
134	Pour Gypcrete - Mock Up	2 days	Fri 7/25/08
135	Hang Drywall - Mock Up	2 days	Tue 7/29/08
136	Hang Ceiling - Mock Up	2 days	Thu 7/31/08
137	Tape/Block/Skim - Mock Up	5 days	Mon 8/4/08
138	Install Ceramic Tile - Mock Up	3 days	Mon 8/11/08
139	Install Doors & Frames - Mock Up	2 days	Thu 8/14/08
140	Install/Run Trim - Mock Up	2 days	Mon 8/18/08
141	Point Up - Mock Up	1 day	Fri 8/22/08
142	Install all Bathroom Plumbing Fixtures - Mock Up	2 days	Mon 8/25/08
143	Install all Kitchen & Bath Cabinets - Mock Up	3 days	Wed 8/27/08
144	Install Counter Tops in Kitchen & Bath - Mock Up	5 days	Thu 9/4/08
145	Install Flooring - Mock Up	2 days	Thu 9/11/08
146	Install Hardware - Mock Up	1 day	Mon 9/15/08
147	Install Appliances - Mock Up	1 day	Tue 9/16/08
148	QC Inspection - Mock Up	3 days	Wed 9/17/08
149	Paint - Mock Up	9 days	Mon 9/22/08
150	**Lobby**	**186 days**	**Tue 12/9/08**
151	Frame Walls - Lobby	5 days	Tue 12/9/08
152	Frame Ceilings - Lobby	10 days	Thu 1/8/09
153	In Wall Blocking - Lobby	3 days	Thu 1/29/09
154	Close-In Inspections - Lobby	5 days	Thu 2/19/09
155	Hang/Tape/Finish Drywall - Lobby	10 days	Thu 3/26/09
156	Ceramic Tile - Restrooms - Lobby	5 days	Thu 4/23/09



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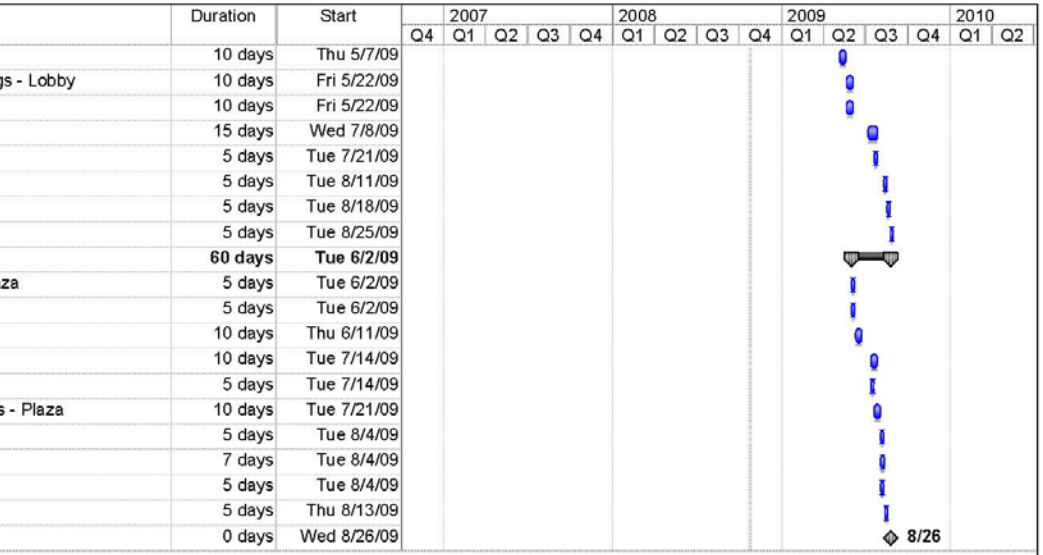
ID	Task Name	Duration	Start
157	Terrazzo Flooring - Lobby	10 days	Thu 5/7/09
158	Install Interior Millwork, Doors and Casings - Lobby	10 days	Fri 5/22/09
159	Glass Entry Vestibule - Lobby	10 days	Fri 5/22/09
160	Glass Partitions & Mirrors - Lobby	15 days	Wed 7/8/09
161	Set Stone Tops - Lobby	5 days	Tue 7/21/09
162	Finish Paint - Lobby	5 days	Tue 8/11/09
163	Install Finish Flooring - Lobby	5 days	Tue 8/18/09
164	GC Final Punch Units - Lobby	5 days	Tue 8/25/09
165	**Sitework**	**60 days**	**Tue 6/2/09**
166	Build and Pour Concrete Retaining Walls - Plaza	5 days	Tue 6/2/09
167	Fountain Walls - Plaza	5 days	Tue 6/2/09
168	Apply Waterproofing - Plaza	10 days	Thu 6/11/09
169	Install Sidewalk Pavers - Plaza	10 days	Tue 7/14/09
170	Install Pavers - Courtyard Entrance - Plaza	5 days	Tue 7/14/09
171	Install New Granite on Vertical Retaining Walls - Plaza	10 days	Tue 7/21/09
172	Install New Landscaping - Plaza	5 days	Tue 8/4/09
173	Build Colonnade - Plaza	7 days	Tue 8/4/09
174	Landscape - Leasing Area	5 days	Tue 8/4/09
175	Paint Colonnade - Plaza	5 days	Thu 8/13/09
176	Sidewalk and Courtyard Entrance Complete	0 days	Wed 8/26/09



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B. Site Layout Planning Summary:

Project Considerations for Site Layout:

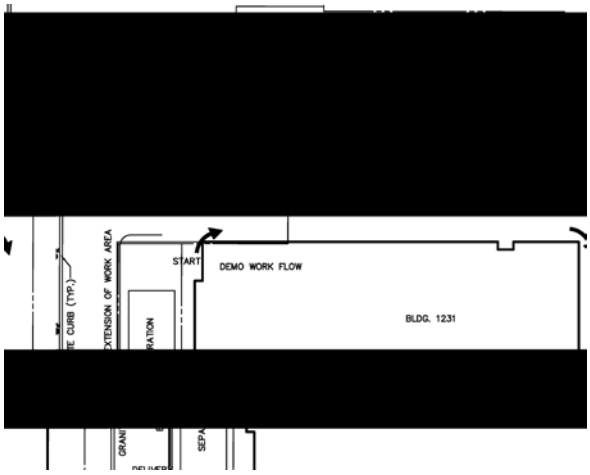
WestEnd**25** is a conversion of two six story office buildings to residential rental apartments. The scope of work includes demolishing the building systems to the structural core, erecting additional stories, enclosure and finishes. This section analyzes the site layout during these phases. Full size plans are located in Appendix A.

The procedure used to develop the following site plans:

- Develop drawing of site and surrounding area
- Determine number of site plans needed
- Locate point of ingress and egress
- Locate zones and storage locations
- Locate temporary facilities

Demolition:

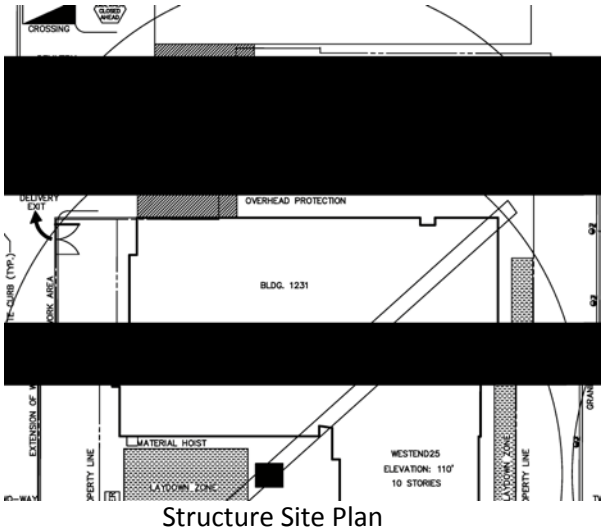
The first sequence on WestEnd25 is the demolition of existing building conditions. The demolition site plan indicates the flow of work around the perimeter of the building. A mobile crane will be used to remove the precast exterior façade panels. The demolition site plan also includes a location for separation of concrete and rebar. The purpose of this is to acquire points toward LEED certification. Also, on the site plan are two dumpsters for non recyclable material. Waste removal is of high priority during demolition. This site plan makes removal efficient with access to the site from 25th and no turn-arounds.



Demolition Site Plan

Superstructure:

During the superstructure phase of construction four additional stories, six connecting slabs and several slab infill extensions will be place. A Peiner SK 315 tower crane will be located in the center of the courtyard to place concrete. The courtyard will also serve as a laydown area for rebar. Another



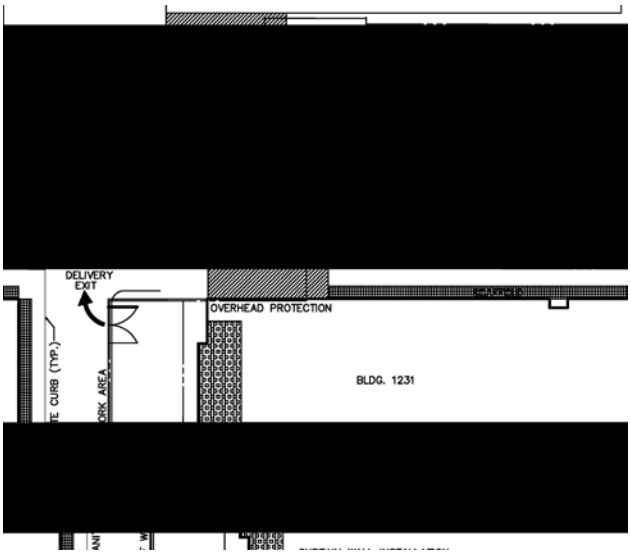
Structure Site Plan

laydown area exists on the east side of the site. Material hoists will be located on the courtyard side of both the north and south buildings and will be the primary source of vertical transportation until elevators are installed. Access to the site will be from 25th St NW. All deliveries will enter on the south end of the site and exit the north end of the site. The plan at WestEnd**25** provides easy entrance and exits for deliveries with no turn-arounds.

Enclosure:

The façade of WestEnd**25** is comprised of what is termed alley wrap and park wrap. The alley wrap is a brick veneer with metal stud backing and the park wrap is a curtain wall façade. The ally wrap about 75% of the exterior façade. A hydraulic mast climbing scaffold system will be used for the façade. The enclosure site plans shows the area of scaffold around the perimeter of the project.

Scaffold System for Masonry Installation

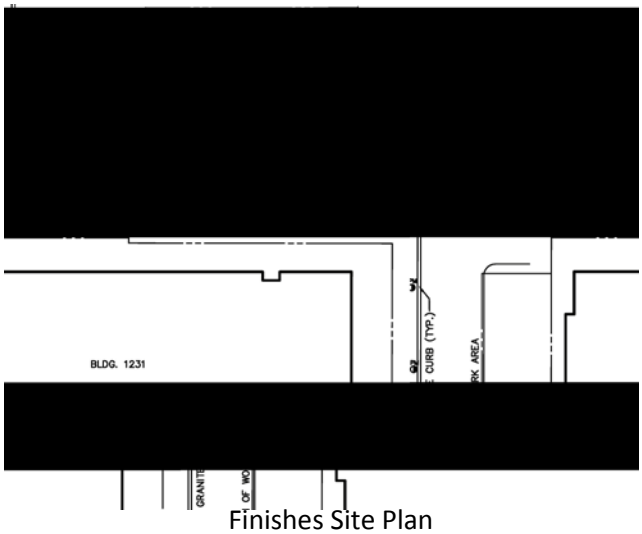


Enclosures Site Plan

The façade facing 25th St NW and the entrance courtyard is called the park wrap. The park wrap comprises about 25% of the exterior façade. The park wrap is a curtain wall is a panelized system that is installed from the interior of the building. Therefore, the enclosure site plan indicates the zones within the building for the installation of curtain wall.

Finishes:

The site plan during the finishing phase of the project is important for two main reasons. The first is to manage material deliveries and the second is to avoid interaction of construction personnel with residents. To accomplish these goals the field office will be relocated to the garage. This is an adequate location to manage deliveries, use the garage to store materials and to use the south elevators for construction transportation. Also, the dumpsters will be relocated to the east alley to provide easy access without damage to finished streetscape. The construction personnel will be able to enter the site via an entrance on the south side of building 1229.

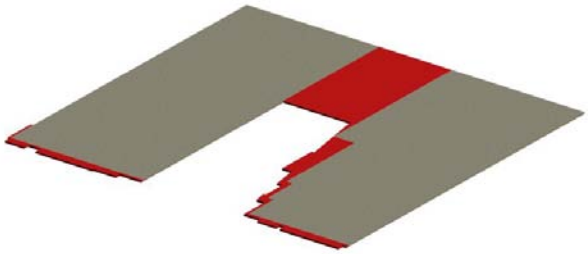


Finishes Site Plan

C. Detailed Structural Systems Estimate:

Structural Conditions:

The existing structure of WestEnd**25** consists of conventionally reinforced two way concrete slabs with various sections of waffle slabs. The typical slab thickness of the existing structure is 7.5". Included in this take off are the slab extensions for the six existing floors. See figure below.



Concrete infills for the existing floors.

The six connection slabs are post-tensioned concrete with a typical slab thickness of 7.5". The project's additional four stories are also post-tensioned concrete slabs with a thickness that varies between 6" and 9". Columns are 10' high and maintain a 20' by 20' grid throughout WestEnd**25**.

Structural Takeoff:

Floors:

The detailed structural estimate includes costs for the floors, columns, and beams that will be added to the existing structure. The data below is organized by floors and shows the quantity of concrete in a given location of that floor. The total estimated concrete for the floors is 3,700 cubic yards.

	Area(sqft)	Thickness(“)	Total
Floor 2			
Center	3380	7.5	2112.5
1229	683	7.5	426.87
1229	250	3.25	67.708
1231	347	3.25	93.98
Floor 3			
Center	3380	7.5	2112.5
1229	683	7.5	426.87
1229	250	3.25	67.708
1231	347	3.25	93.97917
Floor 4			
Center	3380	7.5	2112.5
1229	683	7.5	426.87
1229	250	3.25	67.708
1231	347	3.25	93.98
Floor 5			
Center	3380	7.5	2112.5
1229	683	7.5	426.87
1229	250	3.25	67.708
1231	347	3.25	93.98

	Area(sqft)	Thickness(“)	Total	
Floor 6				
Center	3380	7.5	2112.5	
1229	683	7.5	426.87	
1229	250	3.25	67.708	
1231	347	3.25	93.98	
Floor 7				
	32460	6	16230	
Floor 8				
	32460	6	16230	
Floor 9				
	6660	9	4995	
	25010	6	12505	
Floor 10				
	7941	9	5955.75	
	22190	6	11095	
Floor 11				
	11250	7	6562.5	
	14550	8	9700	
Floor 12				
	7240	8	4826.67	
		Total=	101605	cf
		div 27	3763	cy

Columns:

The concrete for the columns is calculated using dimension from the column schedules. There are three primary column dimensions, 18” x 18”, 20” x 20” and 24” x24”. Other columns with different dimension are assumed to have one of the three primary dimensions. The details of the column concrete are in the table on the next page.

Column								Formwork
Location	Size (in.)			Height (ft.)	Amount	Total		Contact Area
1231	18	x	18	10	61	1372		43920
1231	20	x	20	10	60	1667		48000
Center	18	x	18	10	88	1980		63360
Center	24	x	24	10	23	920		22080
1229	18	x	18	10	48	1080		34560
1229	20	x	20	10	80	2222		64000
					Total =	9241	cf	275920
					div 27	342	cy	
								*assume 3 uses

Summary:

Also included in this estimate is the reinforcing steel, tensioning cables, and structural steel for slab infill. Quantities were taken from the structural plans for WestEnd**25**. Once all quantities were gathered they were multiplied by material, labor, and equipment costs from R.S. Means 2008. These results can be found in the table below.

		Quantity	Unit	Cost ($)					
				Material	Labor	Equipment	Total	OH & Profit	WestEnd25
	Floors								
03 31 05.35	5 ksi Concrete	3763.16	CY	114			114	125	470,395
03 21 10.60	Reinforcing Steel #4-#7	20.33	Ton	950	455		1405	1800	36,603
03 23 05.50	Post Tensioning	61164	lb.	1.98	1.43	0.06	3.47	4.53	277,073
03 31 05.70	Placement	3763.16	CY	20.5	10.2	30	70	42.5	159,934
03 11 13.25	Formwork	183060	sfca	1.97	3.22		5.19	7.15	1,308,879
05 12 23.40	L 5"x3.5#x3/8"	6000	lb.	1.23	0.36	0.04	1.63	2.05	12,300
05 12 23.75	W6x25	240	lf	24.5	3.77	2.58	31.85	35.5	8,520
05 12 23.75	W6x15	1400	lf	18.05	3.77	2.58	24.4	29	40,600
05 12 23.75	W12x40	240	lf	44.5	2.79	1.91	48.2	52	12,480
05 12 23.75	W8x24	240	lf	27	4.11	2.81	33.92	40	9,600
03 22 05.50	WWF 6x6	1616.9	csf	12.75	18.9		31.65	45	72,759
05 31 13.50	20 Ga Decking	5970	sf	1.78	0.35	0.3	2.16	2.63	15,701
	Columns								
03 31 05.35	4 ksi Concrete	342.27	CY	108			108	121	41,415
03 21 10.60	Reinforcing Steel #3-#7	2.63	Ton	895	880		1775	2425	6,377

03 21 10.60	Reinforcing Steel #8-#18	23.24	Ton	895	575		1470	1925	44,745
03 11 13.25	Formwork	275920.0	sfca	1.03	4.83		5.86	8.65	2,386,708
03 31 05.70	Placement	342.27	CY	32.5	16		48.5	67	22,932
	Beams								
03 31 05.35	4 ksi Concrete	35	CY	108			108	121	4,235
03 21 10.60	Reinforcing Steel #3-#7	1.34	Ton	895	880		1775	2425	3,250
03 21 10.60	Reinforcing Steel #8-#18	0.875	Ton	895	575		1470	1925	1,684
05 12 23.75	W12x85	80	lf	98	3.53	2.42	103.95	117	9,360
05 12 23.75	W14x398	80	lf	405	9.42	6.45	420.87	445	35,600
05 12 23.75	W14x283	40	lf	290	6.58	5.3	301.88	320	12,800
05 12 23.75	W14x233	40	lf	270	6.28	4.3	280.58	298	11,920
05 12 23.75	W14x176	120	lf	202.5	4.71	3.25	210.46	230	27,600
									5,033,470
								L.F.	0.96
								Total =	$4,832,131

The detailed structural estimate comes to $4.8 million which provides a ratio of $14.92 per square foot. This is less than the project's actual structural budget estimated at $7 million. Reasons for the difference in price come from decisions of what to include in this estimate. Items such as grouting of walker ducts and existing site concrete restoration were not taken into consideration. Architectural features like roof top trellis, tubular steel on the street façade, were not included in this estimate. Furthermore, it should be expected that labor rates are higher than R.S. Means cost data because this is a restoration project with several unknowns and many concrete infills.

D. General Conditions Estimate:

The general conditions of WestEnd**25** total $2.8 million. The costs are dispersed among three categories: personnel, jobsite operations, and safety/cleanup/health. These general conditions costs will be distributed throughout the duration of the project. The general conditions are a combination of industry standards provided by James G. Davis Construction Corporation and cost values from R.S. Means 2008 Cost Data. The results of the general conditions estimate are in the table below.

	Description	Staff Assignment	% on job	Start of Cost	End of Cost	Quantity	Unit	Unit Cost		Line Item Totals
A. Personnel										
	Senior Superintendent	Frank Whorton	100%	04-Mar-08	20-Dec-09	93.7	Wk	$ 1,875		**$ 175,714**
	Superintendent	Tim Trumbull	100%	22-Feb-08	01-Sep-09	79.6	Wk	$ 1,650		**$ 131,293**
	Superintendent	Randy Guertler	100%	01-Aug-08	20-Dec-09	72.3	Wk	$ 1,650		**$ 119,271**
	Ass't Superintendent	Wayne Aust	100%	01-Jul-08	20-Dec-09	76.7	Wk	$ 1,500		**$ 115,071**
	Ass't Superintendent	Bill Trost	100%	07-May-08	01-Oct-09	73.1	Wk	$ 1,500		**$ 109,714**
	Site Safety Coordinator	Rudy Monterroso	10%	22-Feb-08	20-Dec-09	95.3	Wk	$ 200		**$ 19,057**
	Layout Engineer	Jim Black	50%	22-Feb-08	30-Dec-08	44.6	Wk	$ 1,085		**$ 48,360**
	Assistant Layout Engineer	Benjamin Doucet	70%	22-Feb-08	30-Dec-08	44.6	Wk	$ 835		**$ 37,217**
	Project Executive	Tom Gnecco	25%	22-Feb-08	20-Dec-09	95.3	Wk	$ 2,200		**$ 209,629**
	Senior Project Manager	Peter Ege	100%	01-May-08	20-Dec-09	85.4	Wk	$ 2,025		**$ 172,993**
	Project Manager	Diana Shirey	100%	22-Feb-08	20-Dec-09	95.3	Wk	$ 1,775		**$ 169,132**
	Project Coordinator	Susan Nawrocki	70%	22-Feb-08	20-Dec-09	95.3	Wk	$ 1,550		**$ 147,693**
	Purchasing Project Manager	Gabe Thompson	100%	22-Feb-08	01-Jul-08	18.6	Wk	$ 1,775		**$ 32,964**
	Residential Construction Direct	David Mensh	10%	22-Feb-08	20-Dec-09	95.3	Wk	$ 2,025		**$ 192,954**
	Assistant Project Manager - A	Greg Medsker	100%	22-Feb-08	01-Oct-09	83.9	Wk	$ 1,550		**$ 129,979**
	Assistant Project Manager - B	Dan Ressler	100%	22-Feb-08	20-Dec-09	95.3	Wk	$ 1,550		**$ 147,693**
	Project Administrator		20%	22-Feb-08	20-Dec-09	95.3	Wk	$ 350		**$ 33,350**
	Project Accounting		10%	22-Feb-08	20-Dec-09	95.3	Wk	$ 200		**$ 19,057**
	Misc. Labor		100%	22-Feb-08	20-Dec-09	95.3	Wk	$ 1,150		**$ 109,579**
										$ 2,120,720

B. Cost of Jobsite Operations

Temp. Facility									
	Owner Office Expense/ Trailer Rental		20-Feb-08	20-Dec-09	1.0	ls	$ 3,000		$ 3,173
	Misc Job Expense - Office		20-Feb-08	20-Dec-09	22.1	Mo	$ 625		$ 14,588
	Misc Job Expense - Field		20-Feb-08	20-Dec-09	22.1	Mo	$ 1,050		$ 24,508
	Copier / Fax / Printer - Monthly		20-Feb-08	20-Dec-09	22.1	Mo	$ 500		$ 11,671
	IT / Network - Set Up System				1	Ls	$ 500		$ 500
	Field Telephone - Hook-Up				1	Ls	$ 8,795		$ 8,795
	Field Telephone - Monthly (DSL + regular)		20-Feb-08	20-Dec-09	22.1	Mo	$ 450		$ 10,503
	Security - ADT for field office		20-Feb-08	20-Dec-09	22.1	Mo	$ 75		$ 1,751
	DAVIS Construction Signage				1	Ls	$ 1,500		$ 1,500
	Other Temp. Construction Signage				1	Ls	$ 1,500		$ 1,586
	Document Reproduction - Construction				1	Ls	$ 20,000		$ 21,150
	Overnight & Hand Delivery		20-Feb-08	20-Dec-09	22.1	Mo	$ 250		$ 5,518
	Construction Site Fence				1,500.0	Lf	$ 6.00		$ 9,000
	Barricades				19.0	Mo	$ 25		$ 475
Temp. Utility									
	Electric-PEPCO		20-Feb-08	09-Apr-09	14.8	Mo	$ 5,000		$ 74,000
	Electric-Generators		20-Feb-08	09-Apr-09	14.8	Mo	$ 3,250		$ 48,100
	Fuel		20-Feb-08	09-Apr-09	14.8	Mo	$ 10,000		$ 148,000
Rental									
	Vehicle		20-Feb-08	20-Dec-09	22.1	Mo	$ 8,000		$ 176,575
	Cell Phone		20-Feb-08	20-Dec-09	22.1	Mo	$ 800		$ 17,658
	Minor Tools & Equipment		20-Feb-08	20-Dec-09	22.1	Mo	$ 350		$ 7,725
									$ 586,776

C. Safety, Clean Up, Health

	Trash Carts		20-Feb-08	20-Dec-09	22.1	Mo	$ 75		$ 1,751
	Misc. Clean-Up Expense - Material		20-Feb-08	20-Dec-09	95.6	Wk	$ 20		$ 2,021
	Dumpster Totals	82 weeks	pulls./week	2.0	164	Ld	$ 385		$ 63,140
	General Health & Safety		20-Feb-08	20-Dec-09	22.1	Mo	$ 275		$ 6,419
	First Aid Kit & Supplies		20-Feb-08	20-Dec-09	22.1	Mo	$ 50		$ 1,167
	Fire Extinguishers		20-Feb-08	20-Dec-09	1.0	LS	$ 5,200		$ 5,499
	Temp Toilets		20-Feb-08	20-Dec-09	22.1	Mo	$ 1,850		$ 43,181
	Potable Water		20-Feb-08	20-Dec-09	22.1	Mo	$ 200		$ 4,668
									$ 127,846

Total	**$ 2,835,342**

A majority, $2.1 million, of the general condition cost covers the salaries for the project management and site supervision teams. A comparison of the three categories is in the table below.

SUMMARY		TOTAL	% of GCs	% of Budg.
A. Personnel	$	2,120,720	74.8%	2.79%
B. Cost of Jobsite Operations	$	586,776	20.7%	0.77%
C. Safety, Clean Up, Health	$	127,846	4.5%	0.17%
TOTAL	$	2,835,342	100%	3.88%

These costs can be broken down to see the financial impact per week and per work day.

- Cost per Week: $ 29, 623
- Cost per Work Day: $ 5,925

Given the staffing required to manage the site and the duration of the project these costs are reasonable.

E. Critical Industry Issues:

The Annual PACE Roundtable Meeting is a great opportunity to meet professionals in the industry and gain their perspective about critical topics in the industry. At this year's Roundtable I attended three meetings the mentorship model, LEED evolution, and the panel discussions.

Mentorship Mixer:

The mentorship mixer was design to have students and industry members brainstorm ideas to determine the benefits of mentor to a students, the benefits of a mentee to a professional, the best way to match students and mentors and the how the program should be assessed. My mentorship mixer was with Raj Vora of Southland and two other students. After the mixer the smaller groups joined together to share the ideas developed during the mixers.

Mixer:

At this meeting we determined the benefits of the students are an established relationship with an industry member. From this relationship we felt that students would be more comfortable in initiating conversations with others in the industry and therefore accelerate their interpersonal skills. Furthermore, we expected this mentorship to continue beyond college and provide a resource the transition to a professional. In our discussions we determined that the benefits for the industry would be a more well rounded and informed graduate, a chance to stay up to date on the changes in the AE program and a sense of pride. Because everyone has different personalities and the best way to create a meaningful relationship would be to match mentor and mentee using a speed-dating system or a personality assessment. Finally, the best way to assess the mentorship program would be a questionnaire that rates the effectiveness of the relationship, the amount of communication and the means of communication.

Discussion Summary:

In the discussion summary other groups seem to have reached similar conclusions. Some surprising comments that also came from the discussion summary were that benefits for students included money and employment opportunity. I feel that these are misconstrued goals for a mentorship program. I was not surprised to hear the idea of a lottery system to match mentors and students, although this would be a simple process, I feel that it would create less meaningful relationships. Furthermore, I was flabbergasted to hear a student mention that an assessment should be part of course work in the form of a report. My view on this matter is that a questionnaire is better, because it provides standard answers that can be quickly expressed and interpreted.

LEED Evolution:

The breakout session, LEED evolution, addressed how the changing of green building requirements will affect future projects. The conversations of this session surrounded LEED point depreciation, owner intelligence and involvement with the LEED certification process, and the impact of regional credits. The industry members that made substantial contributions to this breakout discussion and would be able to provide advice and guidance for my senior thesis in the area of LEED management are:

- Todd Vovhinsky – Suffolk Construction
- Jumanne Smith – Clark Construction Group
- Michael Miller – Southland Industries
- Aaron Bernett – Zelienople

Point Depreciation:

One of the topics discussed in this breakout session focused on the changing of what credits historically were awarded and what is being awarded today. The industry members expressed their frustration with LEED from the standpoint that there is a lack of consistency on what points are awarded, form project to project. Both Mike and Jumanne specifically pointed out that innovation credits that are awarded to one project are often not awarded to future projects. This makes management difficult because there is no reliance on previous credits. Mike extended this topic by adding that it also hard for the design team, because there is always uncertainty in what points you will get and therefore it is hard to plan for them. This discussion concluded that the best result for green buildings would be making certain performance requirements law and not have a ranking system. Therefore, the requirements would be salient and management would be straightforward.

Owner Intelligence/Involvement:

The industry members strongly felt that owners needed to take a more prominent role in ascertaining LEED certification. Furthermore, the breakout session came to a consensus that a point should be awarded for owner involvement in the LEED certification process. The main shortfall of the owner is their ignorance of the certification process. Owners need to be aware of the decisions and actions they can make to save money and have better management of the certification process. Owners especially must be more active role in understanding and training facility personnel on the building system's equipment. It would be interesting to see how many professionals on the ownership side of construction are accredited or would be interested in becoming accredited. I think this would be a critical issue worth investigating.

Regional Credits:

Our final topic of discussion was about the LEED system and its effectiveness in different regions. The main concern addressed was that LEED certification is more difficult in rural settings

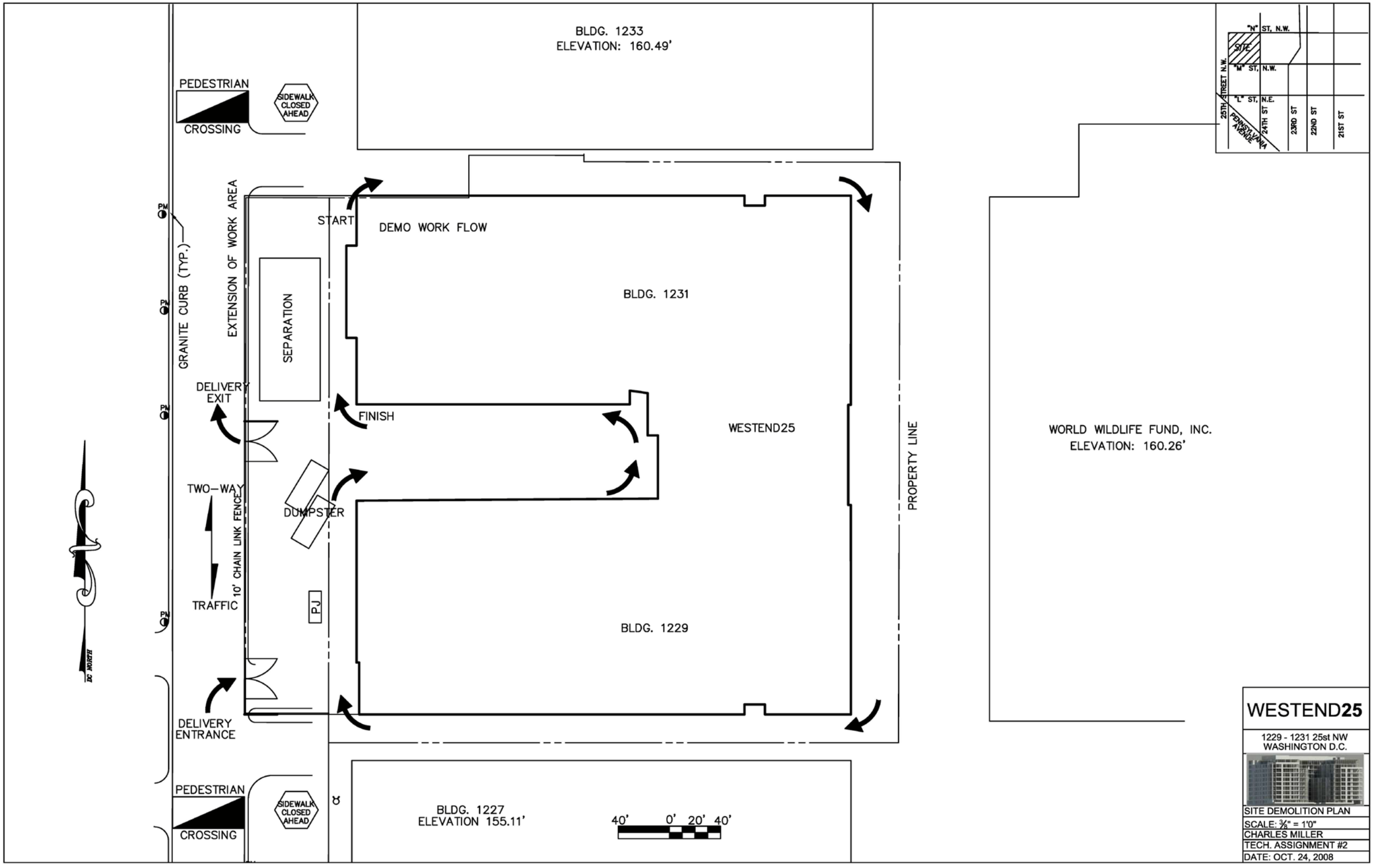
compared to an urban environment. Many time rural projects lack the access to public transportation points, site selection points, and regional material points. Aaron expressed personal experience that in Ohio owners feel LEED certification is too costly and therefore are not even attempting certification. The case for legalized building system standards was made again. This time a comparison to ADA requirements was used to show that owners do not complain about the price of making a building handicap accessible because its law. Therefore, if certain building system efficiencies were law owners would have no choice and more buildings would be green.

Panel Discussion:

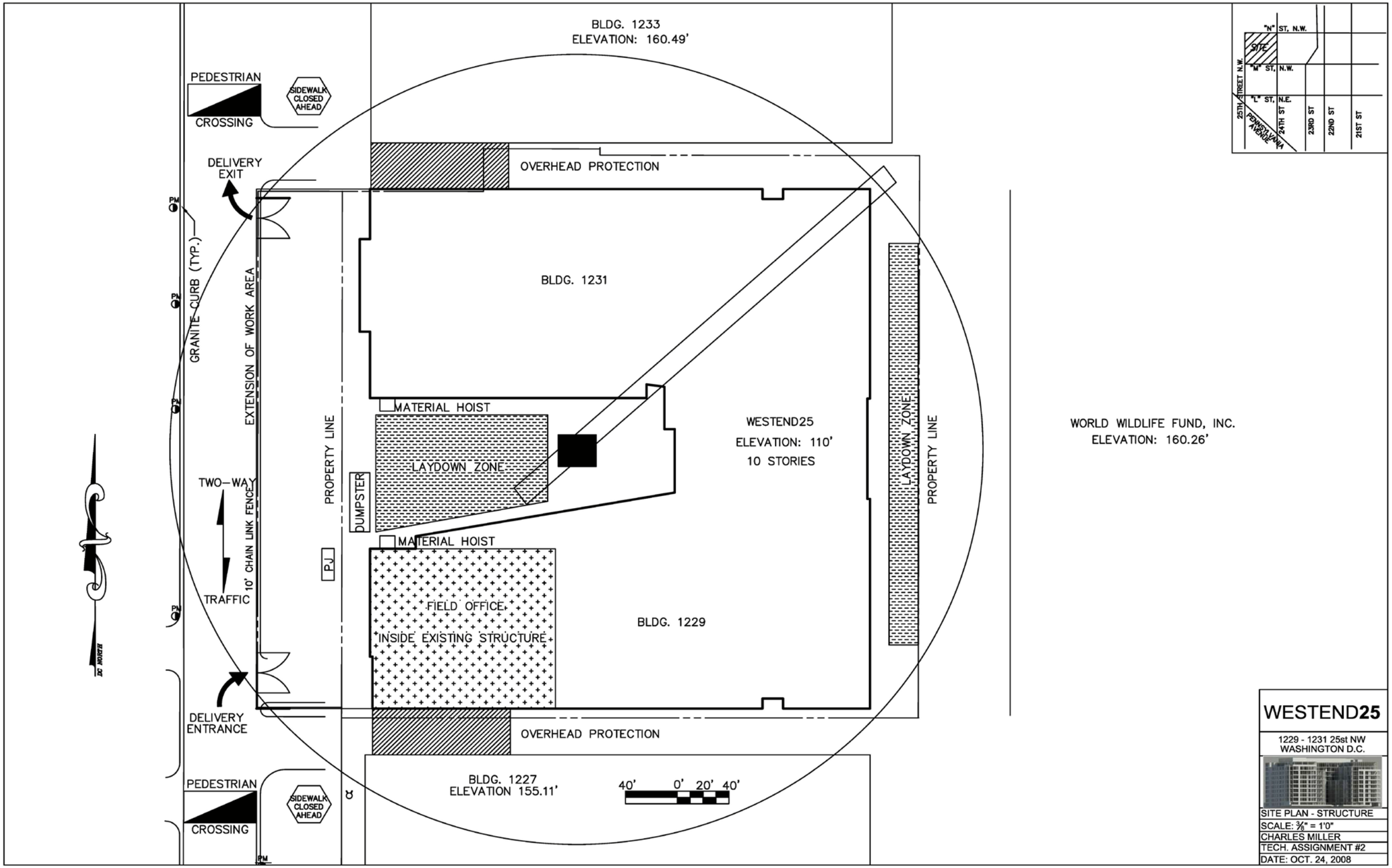
The final activity of the day was a series of panel discussions. The first panel discussion focused on the industry and the changing roles in the industry. I found the concept of student experts to be enlightening. Younger generations are exposed to more technology than ever before. As students we learn and practice how technology may be applied to benefit a project. Even though student may be experts companies still look for a good fit into the company culture. Employers look for graduates that have knowledge of personalities to help them lead teams, organizational skills and humanity. The second panel discussion focused on the challenges of balancing work and life. I thought the student panel was a successful indication of how complicated and stressed the average student life is. It also addressed the difficulty of balancing a course load with extra-curricular activities and relaxation.

F. Appendix A: Site Plan Layouts

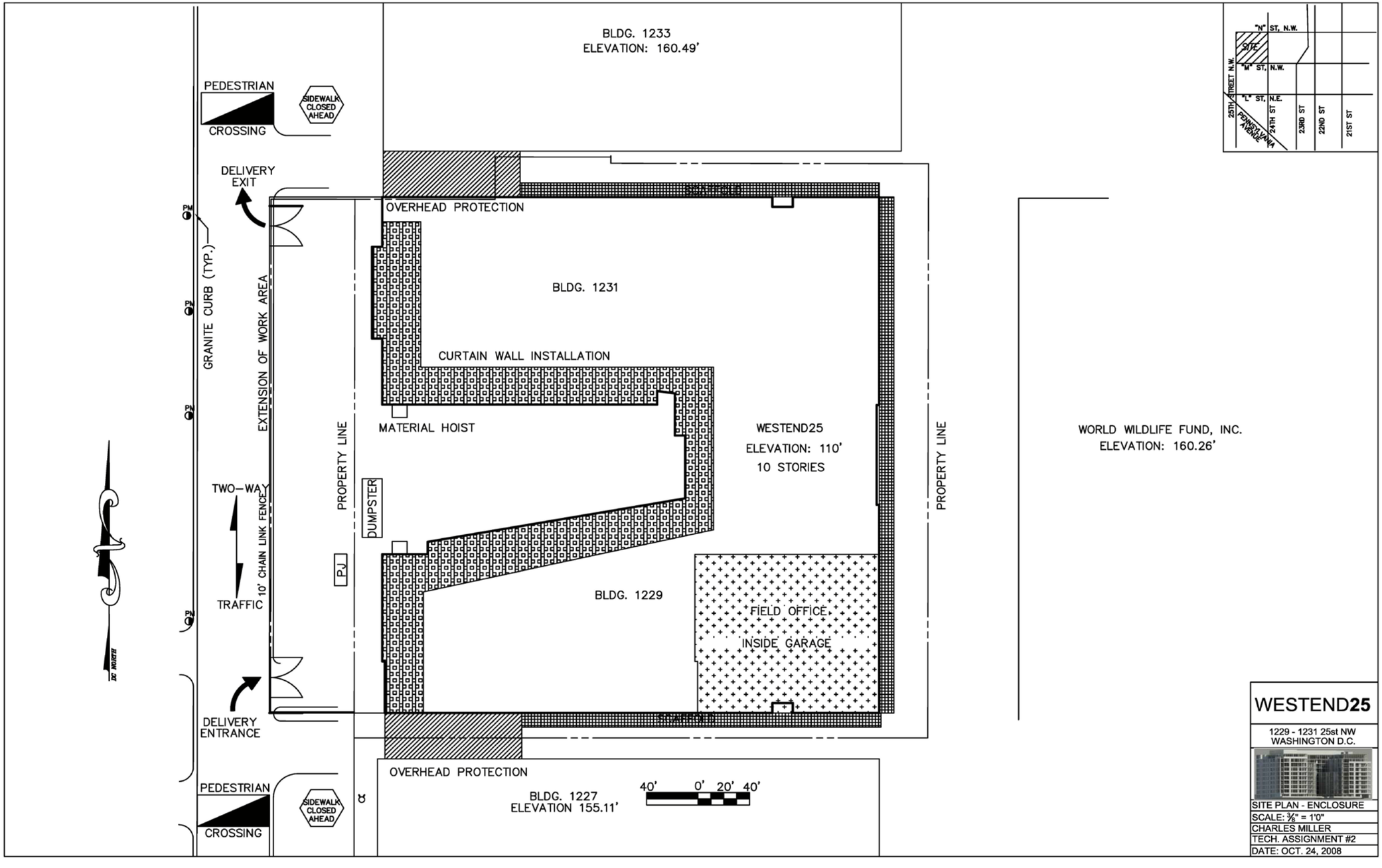
Site Demolition Plan

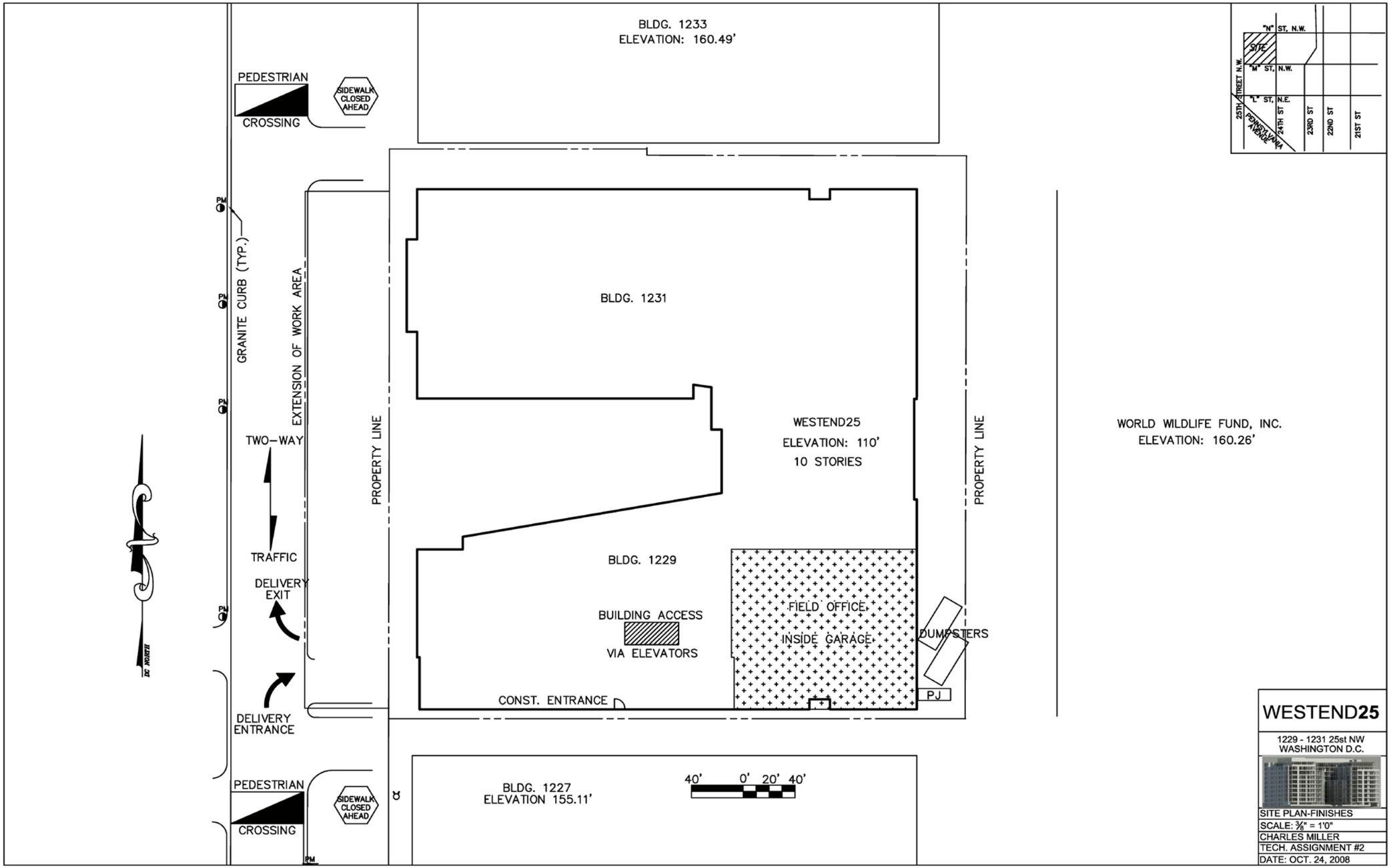


Site Structure Plan



Site Enclosure Plan




BLDG. 1233
ELEVATION: 160.49'
PEDESTRIAN CROSSING
SIDEWALK CLOSED AHEAD
GRANITE CURB (TYP.)
EXTENSION OF WORK AREA
TWO-WAY TRAFFIC
DELIVERY EXIT
DELIVERY ENTRANCE
PROPERTY LINE
BLDG. 1231
WESTEND25
ELEVATION: 110'
10 STORIES
BLDG. 1229
BUILDING ACCESS VIA ELEVATORS
FIELD OFFICE INSIDE GARAGE
DUMPSTERS
CONST. ENTRANCE
PJ
WORLD WILDLIFE FUND, INC.
ELEVATION: 160.26'
BLDG. 1227
ELEVATION 155.11'
40' 0' 20' 40'
"N" ST, N.W.
SITE
"M" ST, N.W.
"L" ST, N.E.
25TH STREET N.W.
PENNSYLVANIA AVENUE
24TH ST
23RD ST
22ND ST
21ST ST
WESTEND25
1229 - 1231 25st NW
WASHINGTON D.C.
SITE PLAN-FINISHES
SCALE: 3/8" = 1'0"
CHARLES MILLER
TECH. ASSIGNMENT #2
DATE: OCT. 24, 2008