Appendix 1

This appendix contains the following referenced documents:

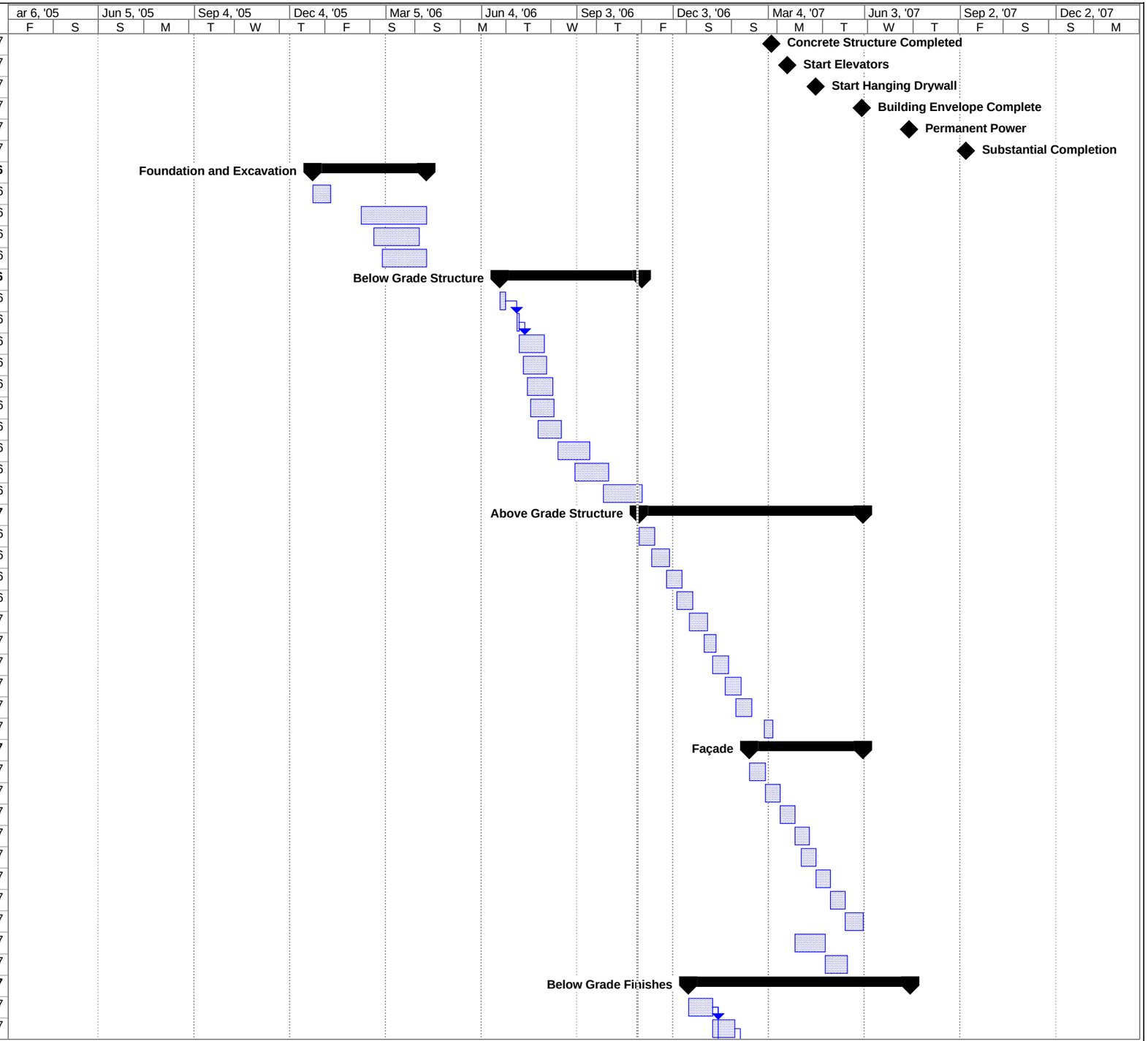
1. **Detailed Project Schedule**

2. **Detailed Parametric Estimate Reports from *D4 Cost***

3. **Detailed Square Foot Estimate Reports from *CostWorks 2005***

4. **Site Utilization Plan**

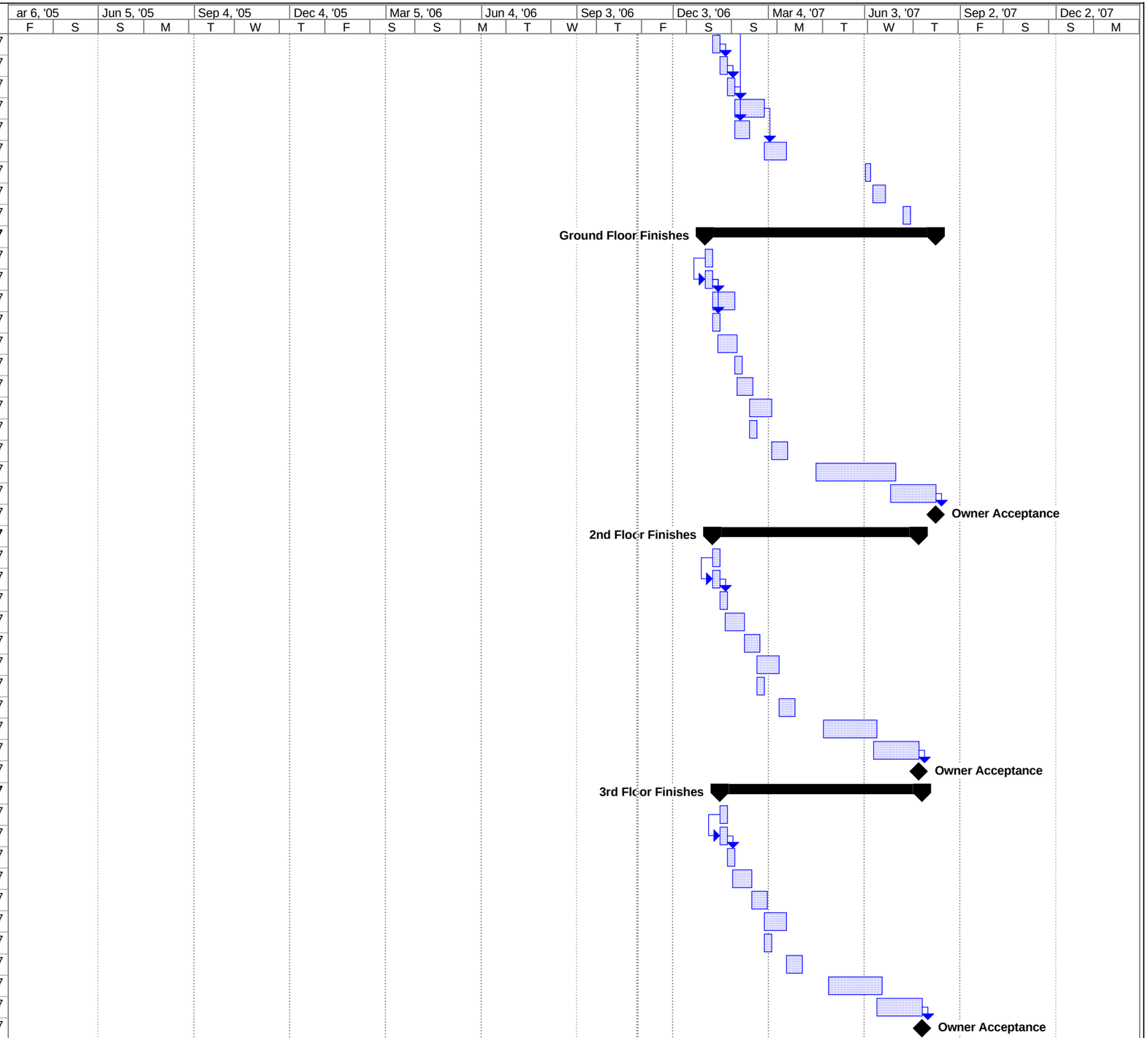
ID		Task Name	Duration	Start	Finish
1		Concrete Structure Completed	0 days	Wed 3/7/07	Wed 3/7/07
2		Start Elevators	0 days	Thu 3/22/07	Thu 3/22/07
3		Start Hanging Drywall	0 days	Wed 4/18/07	Wed 4/18/07
4		Building Envelope Complete	0 days	Fri 6/1/07	Fri 6/1/07
5		Permanent Power	0 days	Mon 7/16/07	Mon 7/16/07
6		Substantial Completion	0 days	Sat 9/8/07	Sat 9/8/07
7		**Foundation and Excavation**	**78 days**	**Mon 12/26/05**	**Wed 4/12/06**
8		Drill Piles	13 days	Mon 12/26/05	Wed 1/11/06
9		Excavate and Lag	44 days	Fri 2/10/06	Wed 4/12/06
10		Drill Tiebacks	31 days	Wed 2/22/06	Wed 4/5/06
11		Stress Tiebacks	30 days	Thu 3/2/06	Wed 4/12/06
12		**Below Grade Structure**	**98 days?**	**Thu 6/22/06**	**Fri 11/3/06**
13		Excavate and Place Tower Crane Footing	3 days?	Thu 6/22/06	Mon 6/26/06
14		Set Tower Crane	1 day?	Sat 7/8/06	Sun 7/9/06
15		B4 - Excavate and Place Footings - Pours 1-	18 days?	Mon 7/10/06	Wed 8/2/06
16		B4 - MEP Underslab Rough-in - Pours 1-5	16 days?	Fri 7/14/06	Fri 8/4/06
17		B4 - Prep subgrade - Pours 1-5	18 days?	Tue 7/18/06	Thu 8/10/06
18		B4 - Place Slab - Pours 1-5	16 days?	Fri 7/21/06	Fri 8/11/06
19		B3 - Frame and Place Slab - Pours 1-4	16 days?	Fri 7/28/06	Fri 8/18/06
20		B2 - Frame and Place Slab - Pours 1-6	22 days?	Wed 8/16/06	Thu 9/14/06
21		B1 - Frame and Place Slab - Pours 1-6	22 days?	Fri 9/1/06	Mon 10/2/06
22		Ground Floor - Frame and Place Slab - Pour	27 days?	Thu 9/28/06	Fri 11/3/06
23		**Above Grade Structure**	**153 days?**	**Wed 11/1/06**	**Fri 6/1/07**
24		2nd Floor - Frame and Place Slab - Pours 1-	11 days?	Wed 11/1/06	Wed 11/15/06
25		3rd Floor - Frame and Place Slab - Pours 1-4	13 days?	Mon 11/13/06	Wed 11/29/06
26		4th Floor - Frame and Place Slab - Pours 1-4	11 days?	Mon 11/27/06	Mon 12/11/06
27		5th Floor - Frame and Place Slab - Pours 1-4	11 days?	Thu 12/7/06	Thu 12/21/06
28		6th Floor - Frame and Place Slab - Pours 1-4	13 days?	Tue 12/19/06	Thu 1/4/07
29		7th Floor - Frame and Place Slab - Pours 1-4	9 days?	Tue 1/2/07	Fri 1/12/07
30		8th Floor - Frame and Place Slab - Pours 1-4	11 days?	Wed 1/10/07	Wed 1/24/07
31		9th Floor - Frame and Place Slab - Pours 1-4	11 days?	Mon 1/22/07	Mon 2/5/07
32		Roof Level - Frame and Place Slab - Pours 1	11 days?	Thu 2/1/07	Thu 2/15/07
33		Elevator Roof - Frame and Place Slab	6 days?	Wed 2/28/07	Wed 3/7/07
34		**Façade**	**78 days?**	**Wed 2/14/07**	**Fri 6/1/07**
35		Precast South Side	11 days?	Wed 2/14/07	Wed 2/28/07
36		Precast West Side	10 days?	Thu 3/1/07	Wed 3/14/07
37		Precast North Side	10 days?	Thu 3/15/07	Wed 3/28/07
38		Precast East Side	10 days?	Thu 3/29/07	Wed 4/11/07
39		Windows Floors 1-3	10 days?	Wed 4/4/07	Tue 4/17/07
40		Windows Floors 4-5	10 days?	Wed 4/18/07	Tue 5/1/07
41		Windows Floors 6-7	10 days?	Wed 5/2/07	Tue 5/15/07
42		Windows Floors 8-9	13 days?	Wed 5/16/07	Fri 6/1/07
43		Roof Field	21 days?	Thu 3/29/07	Thu 4/26/07
44		Roof edge and details	15 days?	Fri 4/27/07	Thu 5/17/07
45		**Below Grade Finishes**	**151 days?**	**Mon 12/18/06**	**Mon 7/16/07**
46		CMU Block	17 days?	Mon 12/18/06	Tue 1/9/07
47		Set Mechanical Equipment	15 days?	Wed 1/10/07	Tue 1/30/07



Project: Detailed Schedule
Date: Mon 10/30/06

Task | Milestone | Rolled Up Task | Rolled Up Progress | External Tasks | Group By Summary
Progress | Summary | Rolled Up Milestone | Split | Project Summary | Deadline

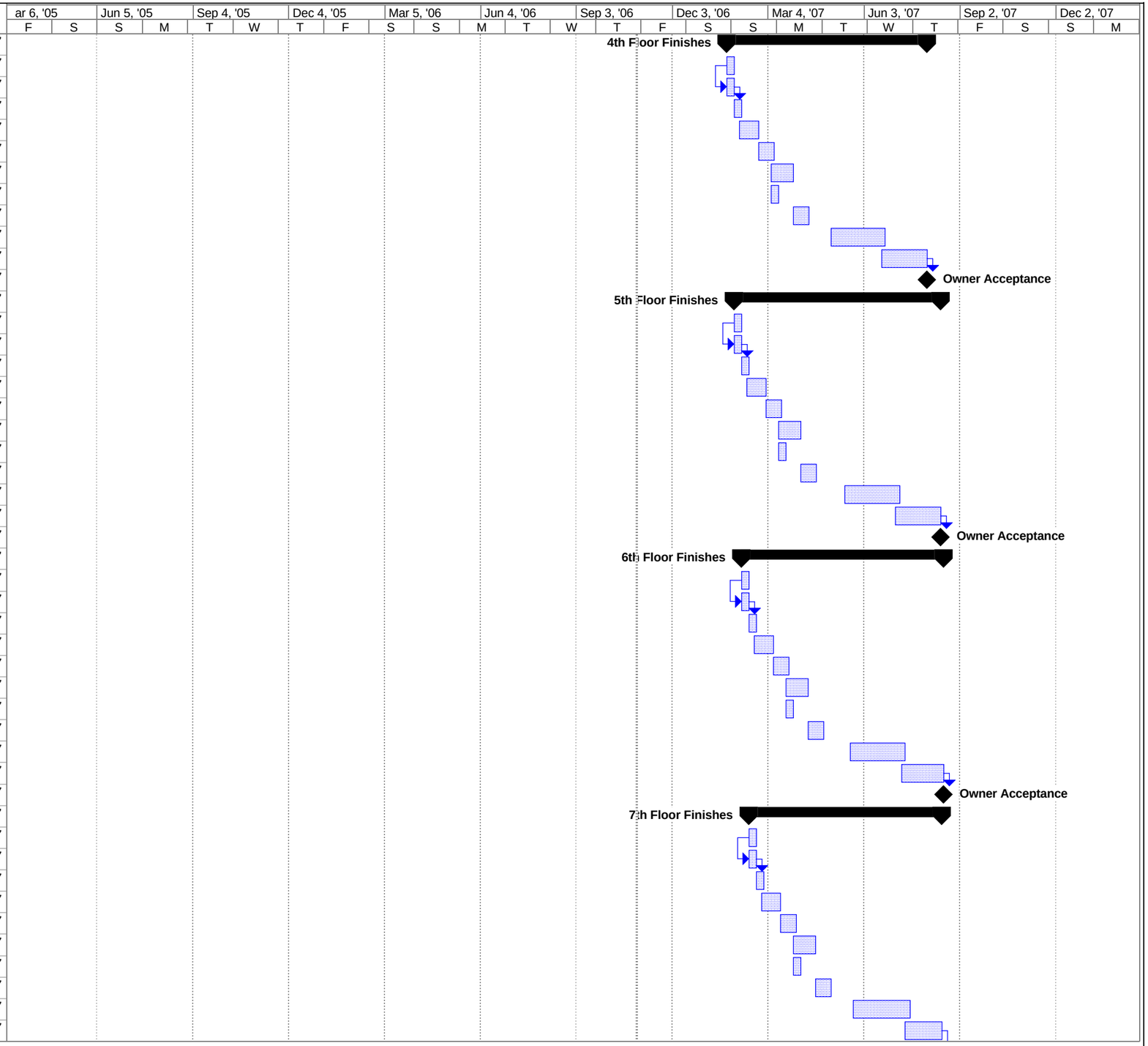
ID	Task Name	Duration	Start	Finish
50	Set Switchgear	5 days?	Wed 1/10/07	Tue 1/16/07
51	Set CT Cabinets	5 days?	Wed 1/17/07	Tue 1/23/07
52	Set Electrical Room Panels	5 days?	Wed 1/24/07	Tue 1/30/07
48	Rough In Mechanical Equipment Pipe	20 days?	Wed 1/31/07	Tue 2/27/07
53	Wire and Connect Equipment	10 days?	Wed 1/31/07	Tue 2/13/07
49	Connect Mechanical Equipment	15 days?	Wed 2/28/07	Tue 3/20/07
54	Set Transformers	5 days?	Mon 6/4/07	Fri 6/8/07
55	Pull Wire to Transformers	10 days?	Mon 6/11/07	Fri 6/22/07
56	Energize Electrical Room	5 days?	Tue 7/10/07	Mon 7/16/07
57	**Ground Floor Finishes**	**157 days?**	**Wed 1/3/07**	**Thu 8/9/07**
58	Layout	5 days?	Wed 1/3/07	Tue 1/9/07
59	MEP Risers	5 days?	Wed 1/3/07	Tue 1/9/07
60	CMU Block	15 days?	Wed 1/10/07	Tue 1/30/07
64	Install Duct	5 days?	Wed 1/10/07	Tue 1/16/07
65	Overhead MEP Rough-In	14 days?	Mon 1/15/07	Thu 2/1/07
61	Set Emergency Generator	5 days?	Wed 1/31/07	Tue 2/6/07
62	Frame Out Interior Walls	11 days?	Fri 2/2/07	Fri 2/16/07
63	MEP Wall Rough-In	15 days?	Wed 2/14/07	Tue 3/6/07
66	Install Fire-Stop	5 days?	Wed 2/14/07	Tue 2/20/07
67	MEP Close-In Inspections	11 days?	Wed 3/7/07	Wed 3/21/07
68	Finishes and Fixtures	54 days?	Wed 4/18/07	Mon 7/2/07
69	Punchlists and Cleaning	31 days?	Thu 6/28/07	Thu 8/9/07
70	Owner Acceptance	0 days	Thu 8/9/07	Thu 8/9/07
71	**2nd Floor Finishes**	**140 days?**	**Wed 1/10/07**	**Tue 7/24/07**
72	Layout	5 days?	Wed 1/10/07	Tue 1/16/07
73	MEP Risers	5 days?	Wed 1/10/07	Tue 1/16/07
76	Install Duct	5 days?	Wed 1/17/07	Tue 1/23/07
77	Overhead MEP Rough-In	14 days?	Mon 1/22/07	Thu 2/8/07
74	Frame Out Interior Walls	11 days?	Fri 2/9/07	Fri 2/23/07
75	MEP Wall Rough-In	15 days?	Wed 2/21/07	Tue 3/13/07
78	Install Fire-Stop	5 days?	Wed 2/21/07	Tue 2/27/07
79	MEP Close-In Inspections	11 days?	Wed 3/14/07	Wed 3/28/07
80	Finishes and Fixtures	37 days?	Wed 4/25/07	Thu 6/14/07
81	Punchlists and Cleaning	31 days?	Tue 6/12/07	Tue 7/24/07
82	Owner Acceptance	0 days	Tue 7/24/07	Tue 7/24/07
83	**3rd Floor Finishes**	**138 days?**	**Wed 1/17/07**	**Fri 7/27/07**
84	Layout	5 days?	Wed 1/17/07	Tue 1/23/07
85	MEP Risers	5 days?	Wed 1/17/07	Tue 1/23/07
88	Install Duct	5 days?	Wed 1/24/07	Tue 1/30/07
89	Overhead MEP Rough-In	14 days?	Mon 1/29/07	Thu 2/15/07
86	Frame Out Interior Walls	11 days?	Fri 2/16/07	Fri 3/2/07
87	MEP Wall Rough-In	15 days?	Wed 2/28/07	Tue 3/20/07
90	Install Fire-Stop	5 days?	Wed 2/28/07	Tue 3/6/07
91	MEP Close-In Inspections	11 days?	Wed 3/21/07	Wed 4/4/07
92	Finishes and Fixtures	37 days?	Mon 4/30/07	Tue 6/19/07
93	Punchlists and Cleaning	31 days?	Fri 6/15/07	Fri 7/27/07
94	Owner Acceptance	0 days	Fri 7/27/07	Fri 7/27/07



Project: Detailed Schedule.mpp
Date: Mon 10/30/06

Task | Milestone | Rolled Up Task | Rolled Up Progress | External Tasks | Group By Summary
Progress | Summary | Rolled Up Milestone | Split | Project Summary | Deadline

ID	Task Name	Duration	Start	Finish
95	**4th Floor Finishes**	**136 days?**	**Wed 1/24/07**	**Wed 8/1/07**
96	Layout	5 days?	Wed 1/24/07	Tue 1/30/07
97	MEP Risers	5 days?	Wed 1/24/07	Tue 1/30/07
100	Install Duct	5 days?	Wed 1/31/07	Tue 2/6/07
101	Overhead MEP Rough-In	14 days?	Mon 2/5/07	Thu 2/22/07
98	Frame Out Interior Walls	11 days?	Fri 2/23/07	Fri 3/9/07
99	MEP Wall Rough-In	15 days?	Wed 3/7/07	Tue 3/27/07
102	Install Fire-Stop	5 days?	Wed 3/7/07	Tue 3/13/07
103	MEP Close-In Inspections	11 days?	Wed 3/28/07	Wed 4/11/07
104	Finishes and Fixtures	37 days?	Thu 5/3/07	Fri 6/22/07
105	Punchlists and Cleaning	31 days?	Wed 6/20/07	Wed 8/1/07
106	Owner Acceptance	0 days	Wed 8/1/07	Wed 8/1/07
107	**5th Floor Finishes**	**140 days?**	**Wed 1/31/07**	**Tue 8/14/07**
108	Layout	5 days?	Wed 1/31/07	Tue 2/6/07
109	MEP Risers	5 days?	Wed 1/31/07	Tue 2/6/07
112	Install Duct	5 days?	Wed 2/7/07	Tue 2/13/07
113	Overhead MEP Rough-In	14 days?	Mon 2/12/07	Thu 3/1/07
110	Frame Out Interior Walls	11 days?	Fri 3/2/07	Fri 3/16/07
111	MEP Wall Rough-In	15 days?	Wed 3/14/07	Tue 4/3/07
114	Install Fire-Stop	5 days?	Wed 3/14/07	Tue 3/20/07
115	MEP Close-In Inspections	11 days?	Wed 4/4/07	Wed 4/18/07
116	Finishes and Fixtures	38 days?	Wed 5/16/07	Fri 7/6/07
117	Punchlists and Cleaning	31 days?	Tue 7/3/07	Tue 8/14/07
118	Owner Acceptance	0 days	Tue 8/14/07	Tue 8/14/07
119	**6th Floor Finishes**	**138 days?**	**Wed 2/7/07**	**Fri 8/17/07**
120	Layout	5 days?	Wed 2/7/07	Tue 2/13/07
121	MEP Risers	5 days?	Wed 2/7/07	Tue 2/13/07
124	Install Duct	5 days?	Wed 2/14/07	Tue 2/20/07
125	Overhead MEP Rough-In	14 days?	Mon 2/19/07	Thu 3/8/07
122	Frame Out Interior Walls	11 days?	Fri 3/9/07	Fri 3/23/07
123	MEP Wall Rough-In	15 days?	Wed 3/21/07	Tue 4/10/07
126	Install Fire-Stop	5 days?	Wed 3/21/07	Tue 3/27/07
127	MEP Close-In Inspections	11 days?	Wed 4/11/07	Wed 4/25/07
128	Finishes and Fixtures	38 days?	Mon 5/21/07	Wed 7/11/07
129	Punchlists and Cleaning	30 days?	Mon 7/9/07	Fri 8/17/07
130	Owner Acceptance	0 days	Fri 8/17/07	Fri 8/17/07
131	**7th Floor Finishes**	**131 days?**	**Wed 2/14/07**	**Wed 8/15/07**
132	Layout	5 days?	Wed 2/14/07	Tue 2/20/07
133	MEP Risers	5 days?	Wed 2/14/07	Tue 2/20/07
136	Install Duct	5 days?	Wed 2/21/07	Tue 2/27/07
137	Overhead MEP Rough-In	14 days?	Mon 2/26/07	Thu 3/15/07
134	Frame Out Interior Walls	11 days?	Fri 3/16/07	Fri 3/30/07
135	MEP Wall Rough-In	15 days?	Wed 3/28/07	Tue 4/17/07
138	Install Fire-Stop	5 days?	Wed 3/28/07	Tue 4/3/07
139	MEP Close-In Inspections	11 days?	Wed 4/18/07	Wed 5/2/07
140	Finishes and Fixtures	38 days?	Thu 5/24/07	Mon 7/16/07
141	Punchlists and Cleaning	25 days?	Thu 7/12/07	Wed 8/15/07



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Date: Mon 10/30/06

Task | Milestone | Rolled Up Task | Rolled Up Progress | External Tasks | Group By Summary
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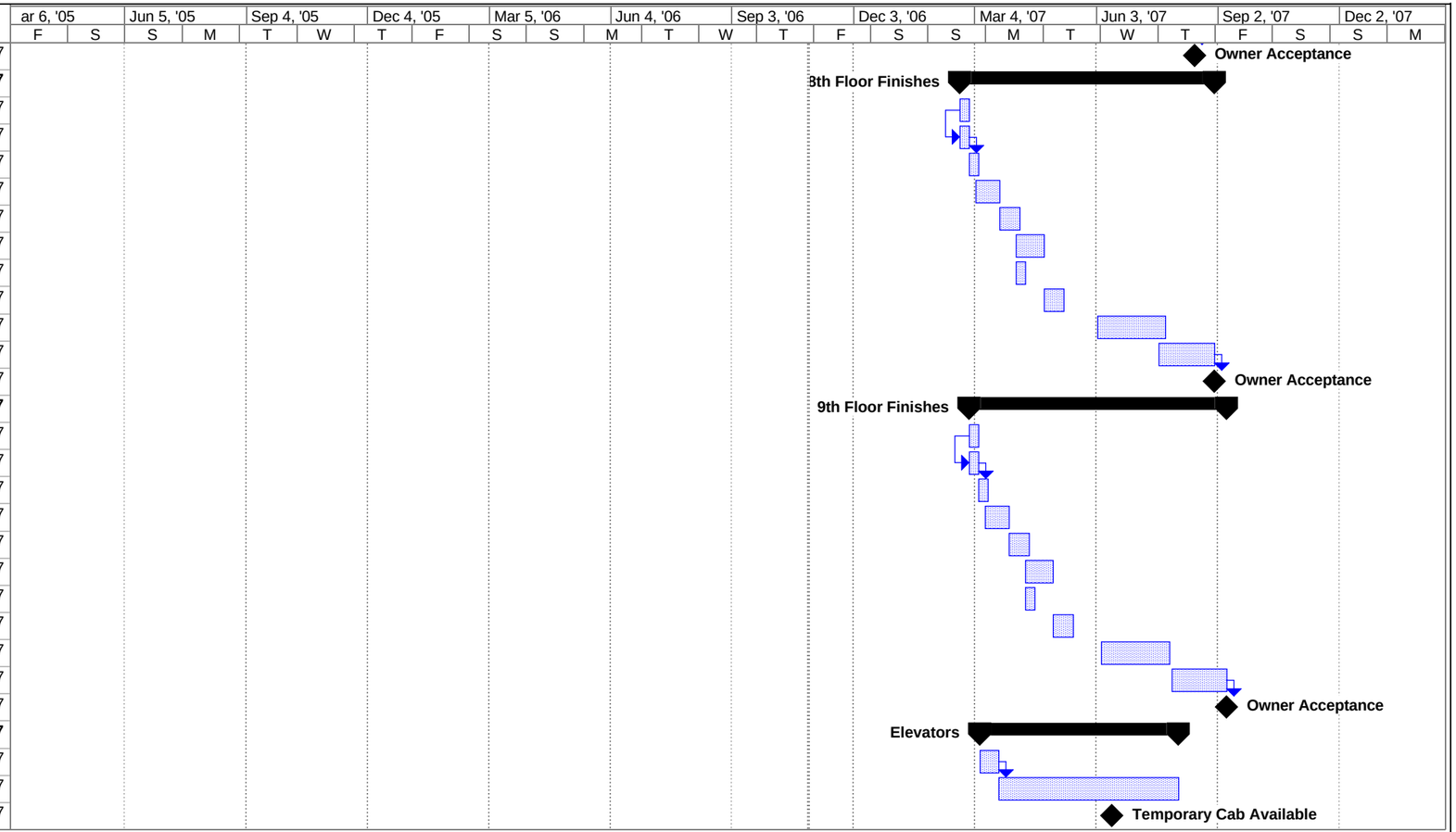
ID		Task Name	Duration	Start	Finish
142		Owner Acceptance	0 days	Wed 8/15/07	Wed 8/15/07
143		**8th Floor Finishes**	**137 days?**	**Wed 2/21/07**	**Thu 8/30/07**
144		Layout	5 days?	Wed 2/21/07	Tue 2/27/07
145		MEP Risers	5 days?	Wed 2/21/07	Tue 2/27/07
148		Install Duct	5 days?	Wed 2/28/07	Tue 3/6/07
149		Overhead MEP Rough-In	14 days?	Mon 3/5/07	Thu 3/22/07
146		Frame Out Interior Walls	11 days?	Fri 3/23/07	Fri 4/6/07
147		MEP Wall Rough-In	15 days?	Wed 4/4/07	Tue 4/24/07
150		Install Fire-Stop	5 days?	Wed 4/4/07	Tue 4/10/07
151		MEP Close-In Inspections	11 days?	Wed 4/25/07	Wed 5/9/07
152		Finishes and Fixtures	37 days?	Mon 6/4/07	Tue 7/24/07
153		Punchlists and Cleaning	30 days?	Fri 7/20/07	Thu 8/30/07
154		Owner Acceptance	0 days	Thu 8/30/07	Thu 8/30/07
155		**9th Floor Finishes**	**139 days?**	**Wed 2/28/07**	**Sat 9/8/07**
156		Layout	5 days?	Wed 2/28/07	Tue 3/6/07
157		MEP Risers	5 days?	Wed 2/28/07	Tue 3/6/07
160		Install Duct	5 days?	Wed 3/7/07	Tue 3/13/07
161		Overhead MEP Rough-In	14 days?	Mon 3/12/07	Thu 3/29/07
158		Frame Out Interior Walls	11 days?	Fri 3/30/07	Fri 4/13/07
159		MEP Wall Rough-In	15 days?	Wed 4/11/07	Tue 5/1/07
162		Install Fire-Stop	5 days?	Wed 4/11/07	Tue 4/17/07
163		MEP Close-In Inspections	11 days?	Wed 5/2/07	Wed 5/16/07
164		Finishes and Fixtures	37 days?	Thu 6/7/07	Fri 7/27/07
165		Punchlists and Cleaning	31 days?	Mon 7/30/07	Sat 9/8/07
166		Owner Acceptance	0 days	Sat 9/8/07	Sat 9/8/07
167		**Elevators**	**107 days?**	**Thu 3/8/07**	**Fri 8/3/07**
168		Temporary Watertight	10 days?	Thu 3/8/07	Wed 3/21/07
169		Install Elevators	97 days?	Thu 3/22/07	Fri 8/3/07
170		Temporary Cab Available	0 days	Fri 6/15/07	Fri 6/15/07



Project: Detailed Schedule.mpp
Date: Mon 10/30/06

Task | Milestone | Rolled Up Task | Rolled Up Progress | External Tasks | Group By Summary
Progress | Summary | Rolled Up Milestone | Split | Project Summary | Deadline

Estimate of Probable Cost

Two Liberty - Jun 2005 - VA - Arlington

Prepared By:	**Nathanael Paist** **Penn State AE - Construction Management** **,** **Fax:**	Prepared For:	**Existing Construction Conditions** **,** **Fax:**
Building Sq. Size:	**180000**	Site Sq. Size:	**255802**
Bid Date:		Building use:	**Office**
No. of floors:	**9**	Foundation:	**CON**
No. of buildings:	**1**	Exterior Walls:	**CUR**
Project Height:		Interior Walls:	**DRY**
1st Floor Height:	**10**	Roof Type:	**BAL**
1st Floor Size:	**20000**	Floor Type:	**CON**
		Project Type:	**NEW**

Division		Percent	Sq. Cost	Amount
00	**Bidding Requirements**	**2.22**	**4.15**	**746,187**
	Bidding Requirements	2.22	4.15	746,187
01	**General Requirements**	**7.08**	**13.25**	**2,384,488**
	General Requirements	7.08	13.25	2,384,488
02	**Site Work**	**2.01**	**3.76**	**677,686**
	Site Work	2.01	3.76	677,686
03	**Concrete**	**13.86**	**25.91**	**4,663,932**
	Concrete	13.86	25.91	4,663,932
04	**Masonry**	**1.92**	**3.59**	**646,092**
	Masonry	1.92	3.59	646,092
05	**Metals**	**6.18**	**11.56**	**2,080,251**
	Metals	6.18	11.56	2,080,251
06	**Wood & Plastics**	**0.33**	**0.61**	**110,423**
	Wood & Plastics	0.33	0.61	110,423
07	**Thermal & Moisture Protection**	**0.92**	**1.72**	**308,906**
	Thermal & Moisture Protection	0.92	1.72	308,906
08	**Doors & Windows**	**11.47**	**21.45**	**3,861,413**
	Doors & Windows	11.47	21.45	3,861,413
09	**Finishes**	**2.22**	**4.15**	**746,506**
	Finishes	2.22	4.15	746,506
10	**Specialties**	**1.72**	**3.21**	**577,348**
	Specialties	1.72	3.21	577,348
12	**Furnishings**	**0.69**	**1.29**	**232,993**
	Furnishings	0.69	1.29	232,993
13	**Special Construction**	**0.21**	**0.40**	**71,942**
	Special Construction	0.21	0.40	71,942
14	**Conveying Systems**	**2.67**	**5.00**	**900,187**
	Conveying Systems	2.67	5.00	900,187
15	**Mechanical**	**4.71**	**8.80**	**1,584,114**
	Mechanical	4.71	8.80	1,584,114
16	**Electrical**	**1.63**	**3.06**	**550,260**
	Electrical	1.63	3.06	550,260
21	**Fire Suppression**	**2.93**	**5.47**	**985,059**
	Fire Suppression	2.93	5.47	985,059
22	**Plumbing**	**2.11**	**3.95**	**711,466**
	Plumbing	2.11	3.95	711,466

23	**HVAC**	**14.58**	**27.25**	**4,905,676**
	HVAC	14.58	27.25	4,905,676
26	**Electrical**	**11.25**	**21.04**	**3,786,421**
	Electrical	11.25	21.04	3,786,421
31	**Earthwork**	**2.04**	**3.81**	**685,482**
	Earthwork	2.04	3.81	685,482
32	**Exterior Improvements**	**4.93**	**9.23**	**1,660,906**
	Exterior Improvements	4.93	9.23	1,660,906
33	**Utilities**	**2.31**	**4.33**	**778,658**
	Utilities	2.31	4.33	778,658
Total Building Costs		**100.00**	**186.98**	**33,656,395**
Total Site Costs		**100.00**	**0.00**	**0**
Total Project Costs		**--**	**--**	**33,656,395**

Estimate of Probable Cost

Woodlands Two - Aug 1998 - MD - Other

Prepared By:		Prepared For:	
	DRBrasher, Inc.		
	5560 Sterrett Place, #300		
	Coumbia, MD 21044		**,**
	Fax:		**Fax:**
Building Sq. Size:	**120000**	Site Sq. Size:	**376224**
Bid Date:	**8/1/1998**	Building use:	**Office**
No. of floors:	**4**	Foundation:	**CON**
No. of buildings:	**1**	Exterior Walls:	**PRE**
Project Height:	**65.4**	Interior Walls:	**GYP**
1st Floor Height:	**10**	Roof Type:	**EPD**
1st Floor Size:	**30000**	Floor Type:	**CON**
		Project Type:	**NEW**

Division		Percent	Sq. Cost	Amount
00	**Bidding Requirements**	**6.90**	**2.72**	**325,983**
01	**General Requirements**	**1.85**	**0.73**	**87,477**
03	**Concrete**	**14.18**	**5.58**	**670,063**
04	**Masonry**	**2.56**	**1.01**	**121,077**
05	**Metals**	**17.20**	**6.77**	**812,401**
06	**Wood & Plastics**	**1.75**	**0.69**	**82,814**
07	**Thermal & Moisture Protection**	**2.97**	**1.17**	**140,384**
08	**Doors & Windows**	**8.39**	**3.30**	**396,474**
09	**Finishes**	**9.31**	**3.67**	**439,993**
10	**Specialties**	**1.18**	**0.47**	**55,926**
12	**Furnishings**	**0.60**	**0.24**	**28,497**
14	**Conveying Systems**	**3.74**	**1.47**	**176,919**
15	**Mechanical**	**21.70**	**8.54**	**1,025,039**
16	**Electrical**	**7.65**	**3.01**	**361,574**
Total Building Costs		**100.00**	**39.37**	**4,724,621**
02	**Site Work**	**100.00**	**2.39**	**898,639**
Total Site Costs		**100.00**	**2.39**	**898,639**
Total Project Costs		**--**	**--**	**5,623,260**

Estimate of Probable Cost
Project Notes

Woodlands Two - Aug 1998 - MD - Other

*Columbia, Maryland
*Construction Period Oct 98 to Sep 99

Special Project Notes

Located within the Gateway Corporate Park in Columbia, Maryland, Woodlands Two is a 4-story, Class #A# office building. DRBrasher was hired by Corporate Development Services, LLC, a subsidiary of Corporate Office Properties Trust, one of the largest REIT developers in the Maryland area.

The challenge of this project was meeting the client#s request of designing a building that was different, yet complimentary to a previously built office building on the same property.

The site was a heavily wooded area and DRBrasher wanted to preserve as much as possible to capitalize and maximize the views that would be seen from the office windows. The storm water management was already in place between the two buildings. There were environmental wetland areas, which needed to be preserved as well. To take advantage of these areas, a walking path was designed around the natural areas for the tenant#s enjoyment and relaxation and to provide a connection for the two buildings.

Corporate Development Services requested a building designed for not only today#s technology users but for the future as well. The 30,000-square-foot large floor plates were structurally designed for 100 psf live load per floor to accommodate the dense population of office users today. These large floor plates allowed for open space plans, which are a must for many of today#s tenants. Fiber optics were installed in the building and the electrical systems were enhanced. The mechanical system was designed with multiple systems per floor to provide flexibility for tenant users.

Woodlands Two has a unique wing-shaped design, which gives it a monumental presence, emphasizing and projecting the curve of the building and provides for more exterior windows. For the exterior skin of the building, DRBrasher chose the SlenderWall# system manufactured by the Smith-Midland Corporation. The system is an integrated precast-concrete brick finish with precast accent band panels. The curved precast panels set this building apart from other buildings in the corporate park. The architect was able to achieve the desired design of combined masonry and precast in one panel, which saved significant cost over the conventional brick veneer and precast method. This system allowed the building to be constructed with a masonry appearance in the dead of winter without cold weather delays and added costs for winterized construction. The system's erection time also provided cost savings.

To coincide with the building#s exterior, the interior had to be upscale. The interior finishes included granite flooring in the lobby, with custom wood millwork and glass. These finishes continued into the elevators. But one of the most unique features of the interior is an 11-foot 6-inch ceiling height with a back-lit luminous ceiling system, which created the illusion of a skylight and of a much higher ceiling. By using this system to create an atrium effort, the architect was able to maximize the rentable square footage area per floor.

Woodlands Two recently won a NAIOP (National Association of Industrial and Office Properties) Design of Excellence Award 2000 for the office building mid-rise 3-4 floors category.

MANUFACTURERS/SUPPLIERS

DIV 03: Precast Concrete Brick Finish: SlenderWall# by Smith Midland Corporation.
DIV 07: Roof Insulation: Owens Corning; Membrane Roof: Firestone.
DIV 08: Entrances & Storefronts: YKK AP America. Wood & Plastic Doors: Marshfield DoorSystems.
DIV 09: Floor Tile: Dal-Tile; Resilient Flooring: Azrock; Carpet: Monterey Spoolcraft; Gypsum Board: United States Gypsum; Painting: Duron.
DIV 14: Elevators: Otis.

Photo Courtesy of James Parker Photography

Estimate of Probable Cost

Netplex Plaza - Nov 1999 - VA - Other

Prepared By:	**Davis Carter Scott** **1676 International Drive, #500** **McLean, VA 22102** **Fax:**	Prepared For:	**,** **Fax:**
Building Sq. Size:	**171809**	Site Sq. Size:	**151759**
Bid Date:	**11/1/1999**	Building use:	**Office**
No. of floors:	**4**	Foundation:	**CON**
No. of buildings:	**1**	Exterior Walls:	**MAS**
Project Height:	**66**	Interior Walls:	**GYP**
1st Floor Height:	**14**	Roof Type:	**BUP**
1st Floor Size:	**14629**	Floor Type:	**CON**
		Project Type:	**NEW**

Division		Percent	Sq. Cost	Amount
01	**General Requirements**	**7.58**	**3.37**	**579,730**
03	**Concrete**	**34.13**	**15.19**	**2,610,400**
04	**Masonry**	**8.55**	**3.81**	**653,970**
05	**Metals**	**4.91**	**2.19**	**375,517**
06	**Wood & Plastics**	**1.13**	**0.50**	**86,457**
07	**Thermal & Moisture Protection**	**2.19**	**0.97**	**167,223**
08	**Doors & Windows**	**5.74**	**2.56**	**439,374**
09	**Finishes**	**8.89**	**3.96**	**679,955**
10	**Specialties**	**0.38**	**0.17**	**29,437**
12	**Furnishings**	**0.43**	**0.19**	**32,523**
13	**Special Construction**	**0.68**	**0.30**	**52,000**
14	**Conveying Systems**	**3.14**	**1.40**	**240,316**
15	**Mechanical**	**16.57**	**7.38**	**1,267,098**
16	**Electrical**	**5.68**	**2.53**	**434,636**
Total Building Costs		**100.00**	**44.52**	**7,648,636**
02	**Site Work**	**100.00**	**3.32**	**504,578**
Total Site Costs		**100.00**	**3.32**	**504,578**
Total Project Costs		**--**	**--**	**8,153,214**

Estimate of Probable Cost
Project Notes

Netplex Plaza - Nov 1999 - VA - Other

*Reston, Virginia
*Construction Period May 2000 to Feb 2001

Special Project Notes:

Located along the fast-growing Dulles Airport Corridor, Netplex Plaza is at home in the edge city of Reston, Virginia. The site lies immediately adjacent to Sunset Hills Road which bounds its northern edge. The location assures a strong presence along Sunset Hills Road, not withstanding its visibility from the Dulles Airport access road.

Initiated in early 1999, the masterplan developed for this speculative office development, includes 90,000 square feet of office space and an adjacent 60,000 square feet for parking.

Contextualism plays a large role in designing buildings in the planned community of Reston. Netplex Plaza seeks to coexist with the countless low-rise commercial office buildings nearby, while re-composing the traditional elements of these buildings to create an aesthetic more in tune with this high-tech, fast-moving environment. The choice of masonry construction afforded the opportunity to design a building that has the economical leasing efficiency of a rectangular floorplate, without the visual brutality of a typical rectangular office building. Interior appointments include stone flooring, pendant and wall scone light fixtures, and stainless steel to complete the contemporary look of the building.

A long and narrow site with a strong slope along its shortest length provided the first of many challenges. Because of the slope, Netplex Plaza appears to be six stories as viewed from the west and five stories as viewed from the east. The road leading into the development provides direct access to a pedestrian drop-off at the building#s main entrance, one floor up from the entrance that serves on-grade parking on the other side. The main entrance also serves those coming from the level of structured parking to the south of the building. Fitting adequate landscaping and parking to the site was a challenge due to its narrowness and the proximity of numerous utility lines running through it and along its boundaries.

MANUFACTURERS/SUPPLIERS

DIV 07: Built-Up: Tamko; Metal: Petersen Aluminum.
DIV 08: Entrances & Storefronts, Metal Windows, Curtainwall: YKK AP America, Inc.; Metal Doors & Frames: Curries; Wood & Plastic Doors: Marshfield DoorSystems, Inc.
DIV 09: Resilient Flooring: Armstrong; Acoustical Treatment: Armstrong; Gypsum Board: United States Gypsum.
DIV 14: Elevators: Otis.

Photo Courtesy of Gunnar Westerlind

Estimate of Probable Cost

Ha-Lo Headquarters - Aug 1998 - IL - Other

Prepared By:		Prepared For:	
	Harbour Contractors, Inc.		
	215 West Main Street		
	Plainfield, IL 60544		**,**
	Fax:		**Fax:**
Building Sq. Size:	**267334**	Site Sq. Size:	**239425**
Bid Date:	**8/1/1998**	Building use:	**Office**
No. of floors:	**7**	Foundation:	**CON**
No. of buildings:	**1**	Exterior Walls:	**CUR**
Project Height:	**93.6**	Interior Walls:	**DRY**
1st Floor Height:	**12**	Roof Type:	**MEM**
1st Floor Size:	**37528**	Floor Type:	**CON**
		Project Type:	**NEW**

Division		Percent	Sq. Cost	Amount
00	**Procurement and Contracting Require**	**2.14**	**3.02**	**806,423**
01	**General Requirements**	**12.81**	**18.03**	**4,820,568**
03	**Concrete**	**19.43**	**27.36**	**7,315,381**
04	**Masonry**	**1.78**	**2.51**	**670,284**
05	**Metals**	**9.45**	**13.31**	**3,558,652**
06	**Wood, Plastics, and Composites**	**0.20**	**0.28**	**75,295**
07	**Thermal and Moisture Protection**	**1.03**	**1.45**	**388,040**
08	**Openings**	**21.43**	**30.18**	**8,068,778**
09	**Finishes**	**1.42**	**2.00**	**534,876**
10	**Specialties**	**3.32**	**4.67**	**1,248,814**
12	**Furnishings**	**1.26**	**1.78**	**475,540**
14	**Conveying Systems**	**4.37**	**6.15**	**1,643,178**
21	**Fire Suppression**	**2.02**	**2.85**	**762,128**
22	**Plumbing**	**1.46**	**2.06**	**550,453**
23	**HVAC**	**10.08**	**14.20**	**3,795,463**
26	**Electrical**	**7.78**	**10.96**	**2,929,509**
Total Building Costs		**100.00**	**140.81**	**37,643,382**
02	**Existing Conditions**	**2.93**	**0.30**	**72,946**
31	**Earthwork**	**21.29**	**2.22**	**530,349**
32	**Exterior Improvements**	**51.59**	**5.37**	**1,285,023**
33	**Utilities**	**24.19**	**2.52**	**602,438**
Total Site Costs		**100.00**	**10.40**	**2,490,756**
Total Project Costs		**--**	**--**	**40,134,138**

Estimate of Probable Cost
Project Notes

*Niles, Illinois
*Construction Period Nov 98 to Oct 00

Special Project Notes

The conceptual ideas about the Ha-Lo Headquarters deal with urban planning, function and technology. The building is arranged like a simple and clear diagram. Its components are placed in a logical, rational and constructed way. Interest is in engineering and performance, rather than design and style. The result is a building of maximum transparency. Transparency deals with light. Traditionally light has been directed at the material fabric of a building, illuminating the solid. At the Ha-Lo Headquarters they are moving into a realm, where light is the essence of the design. The building is luminous, not illuminated. The facade acts as a fabric which moderates the natural and the artificial light, it becomes a screen. The functions are within an adaptable envelope, which responds to the exterior environmental conditions and creates the desired interior environment.

The 7-story building establishes the desired identity at Touhy and Leigh. Projecting loggias from entries at both ends. Building, parking and warehouse are organized through the landscaping like a collage of shifted geometries.

The functions are placed around a 7-story open court. The low floors are loft-type offices. The top 2 floors are showrooms and executive offices around a 2-story skycourt. This clear stacking is readable at the entry facade and contributes to the building's transparency.

Technology is not added, it is an integral part of the design. Technology is not exhibited, but working towards meeting the building's functional, spatial and environmental goals. Technology is advanced, but more in the way that proven and tested materials and components are put together than through invention. Newness is achieved through the elimination of the inessential.

The only way architecture can be new today is through assuming responsibility for more than form and aesthetic. Responsible architecture has to control its environment through design not solely through added technical and mechanical systems. Otherwise technology becomes self-purpose.

Daylight, solar energy and the idea that the skin of a building modulates its own climate have not yet been integrated as essential components in commercial design. The inclusion of these methodologies is a desirable goal. Through this, we can rededicate ourselves towards our natural reflexes and intuitive actions. The result: Buildings with high technology and low energy.

This meets an "eco-tech" approach. A building in harmony between people, technology and nature.

MANUFACTURERS/SUPPLIERS

DIV 07: Skylights: ASI Advanced Structural Systems; Modified Bituminous Membrane: The Garland Company.
DIV 08: Curtainwall: Gardner Metal Products; Insulated Glass Units: Viracon; Structural Glazing: ASI Advanced Structural Systems; Low Iron Glass: Eckelt; Hollow Metal Doors: Curries; Sliding Fire Doors: American Metal Door Co.; Glass Revolving Doors: Boon-Edam; Wood Doors: VT Industries.
DIV 09: Ceramic Tile: Dal-Tile; Drywall, Metal Studs: United States Gypsum.
DIV 10: Access Flooring: Tate Access Floor; Toilet Partitions: Flush Metal Corp.; Toilet & Bath Accessories: American Specialties, Inc.
DIV 14: Elevators: Fujitec Co. Limited; Glass Cabs: Hauenstein & Burmeister Custom Cabs.

Photo Courtesy of Doug Snower

Office Building Cost Report

Project Name: Two Liberty Center

Model Type: Office, 5-10 Story, Precast Concrete Panel / R/Conc. Frame

Stories (Ea.): 9
Story Height (L.F.): 12
Floor Area (S.F.): 180000
Basement: Not Included

Location: Arlington, VA
Data Release 2005
Wage Rate: Union

Costs are derived from a building model with basic components. Scope differences and local market conditions can cause costs to vary.

			$Cost/ Per S.F.	$ Total Cost	% Of Sub-Total	
A Substructure					2.7%	
A1010	Standard Foundations		1.36	244,000.00		
A1030	Slab on Grade		0.45	81,000.00		
A2010	Basement Excavation		0.03	4,700.00		
A2020	Basement Walls		0.24	42,600.00		
B Shell					30.4%	
B1010	Floor Construction		13.01	2,341,000.00		
B1020	Roof Construction		1.36	245,000.00		
B2010	Exterior Walls		6.26	1,126,000.00		
B2020	Exterior Windows		1.69	303,500.00		
B2030	Exterior Doors		0.15	27,100.00		
B3010	Roof Coverings		0.44	78,500.00		
C Interiors					19.8%	
C1010	Partitions		1.77	319,500.00		
C1020	Interior Doors		1.38	248,000.00		
C1030	Fittings		0.63	112,500.00		
C2010	Stair Construction		1.24	223,000.00		
C3010	Wall Finishes		0.71	128,500.00		
C3020	Floor Finishes		5.47	985,500.00		
C3030	Ceiling Finishes		3.71	667,500.00		
D Services					45.9%	
D1010	Elevators and Lifts		10.38	1,869,000.00		
D2010	Plumbing Fixtures		1.28	231,000.00		
D2020	Domestic Water Distribution		0.09	16,000.00		
D2040	Rain Water Drainage		0.04	7,975.00		
D3050	Terminal & Package Units		12.79	2,302,000.00		
D4020	Standpipes		0.08	14,500.00		
D5010	Electrical Service/Distribution		0.54	97,000.00		
D5020	Lighting and Branch Wiring		8.46	1,523,000.00		
D5030	Communications and Security		0.51	92,500.00		
D5090	Other Electrical Systems		0.41	73,500.00		
E Equipment & Furnishings					1.2%	
E1090	Other Equipment		0.93	166,500.00		
		Sub-Total	75.39	13,570,875.00	100%	
	GENERAL CONDITIONS (Overhead & Pr	**25%**	18.85	3,392,500.00		
	ARCHITECTURAL FEES	**6%**	5.66	1,018,000.00		
	USER FEES	**0%**	0.00	0.00		
	TOTAL BUILDING COST		**99.90**	**17,981,375.00**		

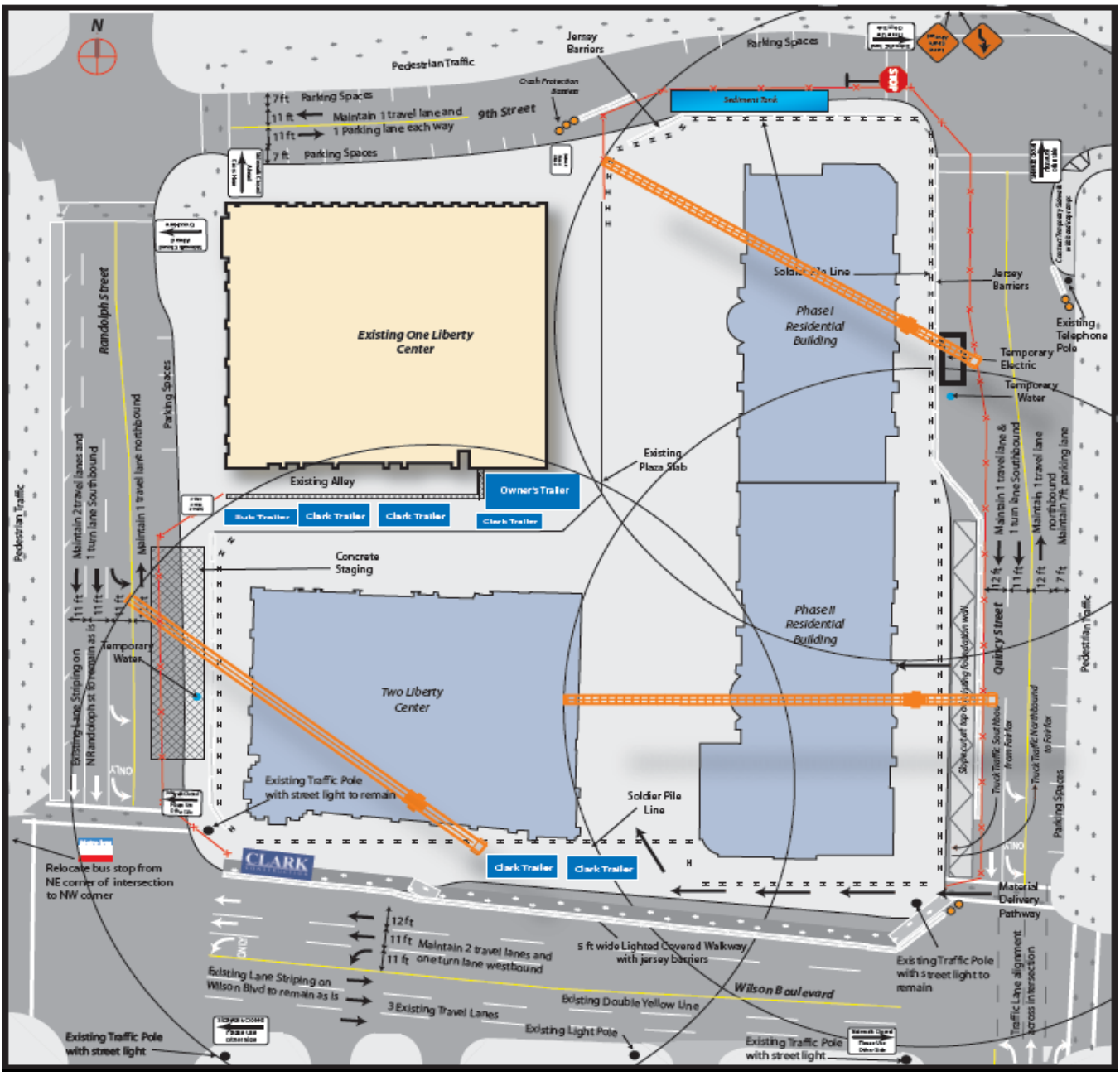
Garage Cost Report

Project Name: Two Liberty Center

Model Type: Garage, Underground Parking, Reinforced Concrete / R/Conc. Frame			
Stories (Ea.): 4	**Location:**	Arlington, VA	
Story Height (L.F.): 10	**Data Release**	2005	
Floor Area (S.F.): 130000	**Wage Rate:**	Union	
Basement: Not Applicable			

Costs are derived from a building model with basic components. Scope differences and local market conditions can cause costs to vary.

			$Cost/ Per S.F.	$ Total Cost	% Of Sub-Total	
A Substructure					22.0%	
A1010	Standard Foundations		2.47	321,500.00		
A1030	Slab on Grade		2.33	302,500.00		
A2010	Basement Excavation		3.52	457,000.00		
B Shell					63.1%	
B1010	Floor Construction		10.00	1,300,500.00		
B1020	Roof Construction		9.27	1,205,500.00		
B2010	Exterior Walls		2.90	376,500.00		
B2030	Exterior Doors		0.12	15,600.00		
B3010	Roof Coverings		1.57	203,500.00		
C Interiors					2.0%	
C1010	Partitions		0.41	53,500.00		
C1020	Interior Doors		0.03	4,400.00		
C2010	Stair Construction		0.25	33,000.00		
C3010	Wall Finishes		0.05	6,725.00		
D Services					11.9%	
D1010	Elevators and Lifts		1.07	139,500.00		
D2010	Plumbing Fixtures		0.23	29,800.00		
D2020	Domestic Water Distribution		0.06	7,650.00		
D2040	Rain Water Drainage		0.62	80,500.00		
D3050	Terminal & Package Units		0.09	11,700.00		
D4020	Standpipes		0.07	8,650.00		
D5010	Electrical Service/Distribution		0.09	11,100.00		
D5020	Lighting and Branch Wiring		1.90	247,500.00		
D5030	Communications and Security		0.32	41,700.00		
D5090	Other Electrical Systems		0.04	5,800.00		
E Equipment & Furnishings					1.1%	
E1030	Vehicular Equipment		0.29	37,500.00		
E1090	Other Equipment		0.14	17,700.00		
		Sub-Total	37.84	4,919,325.00	100%	
	GENERAL CONDITIONS (Overhead & Pr	**25%**	9.46	1,230,000.00		
	ARCHITECTURAL FEES	**8%**	3.78	492,000.00		
	USER FEES	**0%**	0.00	0.00		
	TOTAL BUILDING COST		**51.09**	**6,641,325.00**		


N
Pedestrian Traffic
Jersey Barriers
Parking Spaces
7 ft Parking Spaces
11 ft Maintain 1 travel lane and
11 ft 1 Parking lane each way
7 ft parking Spaces
9th Street
Crash Protection Barrier
Sediment Tank
Existing One Liberty Center
Phase I Residential Building
Soldier Pile Line
Jersey Barriers
Existing Telephone Pole
Temporary Electric
Temporary Water
Existing Plaza Slab
Existing Alley
Owner's Trailer
Clark Trailer
Clark Trailer
Clark Trailer
Concrete Staging
Randolph Street
Maintain 2 travel lanes and 1 turn lane Southbound
Maintain 1 travel lane northbound
Parking Spaces
Pedestrian Traffic
Existing Lane Striping on NRandolph st to remain as is
Temporary Water
Two Liberty Center
Phase II Residential Building
Quincy Street
Maintain 1 travel lane & 1 turn lane Southbound
Maintain 1 travel lane northbound
Maintain 7ft parking lane
Pedestrian Traffic
Existing Traffic Pole with street light to remain
Soldier Pile Line
Clark Trailer
Clark Trailer
CLARK
Relocate bus stop from NE corner of intersection to NW corner
Material Delivery Pathway
12 ft
11 ft Maintain 2 travel lanes and
11 ft one turn lane westbound
5 ft wide Lighted Covered Walkway with jersey barriers
Existing Traffic Pole with street light to remain
Existing Lane Striping on Wilson Blvd to remain as is
3 Existing Travel Lanes
Existing Double Yellow Line
Wilson Boulevard
Existing Light Pole
Existing Traffic Pole with street light
Existing Traffic Pole with street light
Traffic Lane alignment across intersection

Appendix 2

This appendix contains the following referenced documents

1. **Interview responses from Person 1**

2. **Interview responses from Person 2**

1. Currently, what are the three most common types of development in the Washington, DC area?
    a. *Commercial Office*
    b. *Multi-Family Residential*
    c. *Federal Government facilities*

2. For each of the three types of development above, describe the most common leasing structures being used for the tenants of these buildings.
    a. *Commercial Office – Leases are generally long term agreements with tenants based on $/SF per month. Leases can be anywhere from 3 to 30 years in length but are generally in the 5-10 years range.*
    b. *Multi-Family Residential – Condominiums are for sale units. Apartment buildings are generally short term lease agreements with monthly lump sum payments. Terms of the lease are usually one year with options to renew.*
    c. *Federal Government Development covers a wide range of facilities with development services directed by many different government organizations such as GSA, USCOE, VA, etc. The lease arrangements are generally internally handled within the agency where the government is the owner of the facility. However, privatized developments are becoming more common where a private developer owns the facility with a guaranteed long term lease agreement with the government. This is currently the case with the privatized military housing where the private developer owns the housing which is used for the military personnel on or off government property with certain lease guarantees provided by the government.*

3. For each of the three types of development above, describe the emphasis placed on the efficiency of the buildings being constructed.

    More and more emphasis is being placed on the efficiency of buildings for several reasons as noted below:

a. *Commercial Office – Long term tenants who pay to operate the building or at a minimum pay for utilities, want a building that operates efficiently. Some even consider more up front costs for peak shaving systems*
b. *Residential – Condominiums must be designed and constructed with efficiency in mind as the purchasers will not be happy with excessive utility bills for poorly designed building envelopes. Inefficient condominium buildings lead to law suits and disputes. On rental apartment buildings, inefficient buildings will lead to higher utility usage and maintenance costs which will be borne by the building owner for common space and each renter for his unit. In either case, condominium or rental, the negative impact of owning an inefficient building will result in lower value at resale, whether you are talking about a single unit or an entire apartment building.*
c. *Government Facilities – The government remains deeply concerned about the efficiency of its facilities. As they are generally the long term operator and owner of the majority of their facilities, they are more focused on the long term operating costs than the initial cost of construction.*

4. For each of the three types of development above, identify the popularity of sustainable, or LEED rated, construction.
    a. *In general, LEED rated construction is gaining momentum. Locally in the Washington area, Arlington County, VA has already adopted its own version of LEED requirements for green construction. The District of Columbia will enact its own requirements in 2008 and Montgomery County, MD is not far behind. Most private developers are also engaged and willing to participate as they see it as a marketing tool now and moving quickly toward a requirement. The federal government has not completely embraced the concepts yet as they are generally not influenced by the positive "marketing" aspects. However, they have and will continue to be focused on energy efficient designs and will likely embrace the sustainable design concepts when it is politically necessary.*

5. In your professional opinion, have the recent changes in the cost of energy had a significant effect on the decisions made about building efficiency and sustainability for developers?
    a. *Most of the drive toward sustainable designs has little to do with the cost of energy but is more the result of the ability to market the fact that they are focused on the environmental issues and can market and sell their buildings as "Green" buildings. Most of the designs are fairly energy efficient designs and the systems are generally designed with economics in mind anyway. Most designs are evaluated with the first cost/operating cost analysis to determine the most cost efficient approach, depending on the type of building, use, and ownership duration (strictly a business/financial decision). In general, I do not believe that the recent rise in energy costs has resulted in significant changes in the efficiency of building designs as they have always been focused on the best financial approach for the Owner.*

6. Are developers becoming more willing to spend more money upfront to produce a building with lower lifecycle costs?
    a. *Again, this depends on what the Owner intends to do with the building. If they intend to hold the property, they are more likely to consider spending upfront in order to lower the operating costs and maintenance costs. If the Owner intends to sell or turn over the project quickly, they lean toward minimizing the upfront costs as they will not be responsible for the lifecycle costs down the road. However, with the rising popularity and emphasis on sustainable and Green buildings, this approach may be changing as it will now affect the salability and price of their buildings.*

7. In your professional opinion, are more efficient and sustainable buildings significantly more attractive to potential tenants? If so, does the marketability of these buildings make up for the additional money invested in the construction?
    a. *I think that the sustainable buildings are more attractive to potential tenants but I don't believe that they are yet willing to pay a large premium for it. I do believe that all other things being equal, a sustainable building will lease up before a building that has no consideration towards sustainability. The tenants who are responsible for operating costs would certainly perform their analysis of operating costs when making a decision about where to sign a lease. Therefore, more efficient buildings with lower operating costs will have an advantage over less efficient buildings.*

8. In your professional opinion, are LEED rated buildings significantly more attractive to potential tenants? If so, does the marketability of these buildings make up for the additional money invested in the construction?
    a. *LEED rated buildings are becoming more popular and the label is being used as a marketing tool. However, I do not believe that most tenants are willing to pay a premium for the label at this time. Again, the focus remains on economics. If the tenant feels that a LEED rated building will provide financial advantages such as lower utility charges, increased productivity of its employees, etc., then they may pay more for it. If the LEED rated building can not be demonstrated to provide such concrete advantages, I believe there are very few tenants who would pay extra just to have the LEED label.*

9. Please provide any further insight into the relationship between building efficiency/sustainability and development options.
    a. *Developments in recent years have and will continue to revolve around economics. Efficient and sustainable design elements will continue to be introduced as technology and processes are refined. These advances will be fueled by the desire to minimize operating costs. Where these elements*

can be feasibly incorporated and will reduce operating costs and energy consumption, they will be used extensively. All such efficiency/sustainable improvements will continue to be evaluated financially and to the extent they make financial sense; they will become mainstream in future developments.

b. *The other factor that will affect future development relative to efficiency and sustainability is future jurisdictional regulations. As local jurisdictions begin to implement and enforce sustainable and efficiency requirements in future developments, the developers will be forced to comply, regardless of cost. These costs will eventually be borne by the tenants or end users of the developments.*

1. Currently, what are the three most common types of development in the Washington, DC area?
    a. *Multi-family (apartments)*
    b. *office*
    c. *high bay industrial*

2. For each of the three types of development above, describe the most common leasing structures being used for the tenants of these buildings.
    a. *all inclusive except electrical;*
    b. *full-service (all costs included);*
    c. *Triple-net (tenant pays for all costs above the base rent)*

3. For each of the three types of development above, describe the emphasis placed on the efficiency of the buildings being constructed.
    a. *HIGH Emphasis through all three types.*

4. For each of the three types of development above, identify the popularity of sustainable, or LEED rated, construction.
    a. *In a nutshell, all developers today include LEED 'rated' construction techniques, however, a minute few are interested in achieving a fully compliant LEED building – too expensive and time consuming.*

5. In your professional opinion, have the recent changes in the cost of energy had a significant effect on the decisions made about building efficiency and sustainability for developers?
    a. *Without a doubt. Helps attract tenants.*

6. Are developers becoming more willing to spend more money upfront to produce a building with lower lifecycle costs?
    a. *Yes, but only too a certain extent. There is a point of diminishing return for developers in today's market. This 'point' will move to a more LEED*

tolerant position as time goes by. Maybe within 5-10 years we'll vastly increase the efficiency of our buildings in a more holistic manner. Seems that in today's construction we're mainly focusing on reducing electrical usage and in providing cleaner air.

7. In your professional opinion, are more efficient and sustainable buildings significantly more attractive to potential tenants? If so, does the marketability of these buildings make up for the additional money invested in the construction?
    a. *Yes, easier to attract tenants from a marketing point of view. However, I do not believe that additional $'s spent today to create more efficient and sustainable buildings offsets the predominant decision that tenants make re: their space: what's the price? What will this lease cost be in the short and long terms? Price dictates all! [At least most of the time…]*

8. In your professional opinion, are LEED rated buildings significantly more attractive to potential tenants? If so, does the marketability of these buildings make up for the additional money invested in the construction?
    a. *See #7 above.*

9. Please provide any further insight into the relationship between building efficiency/sustainability and development options.
    a. *COST, COST, COST*

Appendix 3

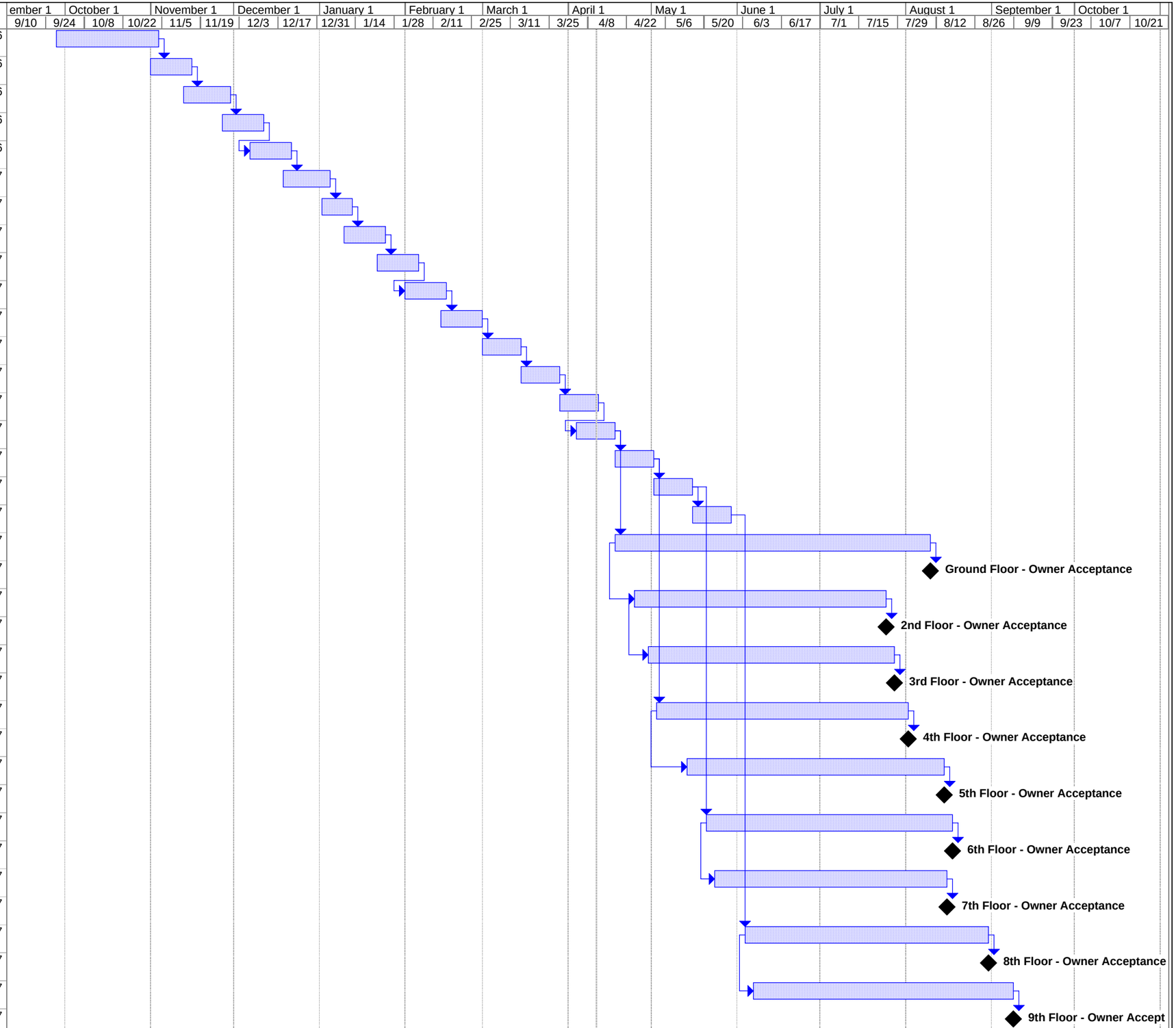
This appendix contains the following referenced documents:

1. **Existing Schedule – Detailed Façade Schedule**

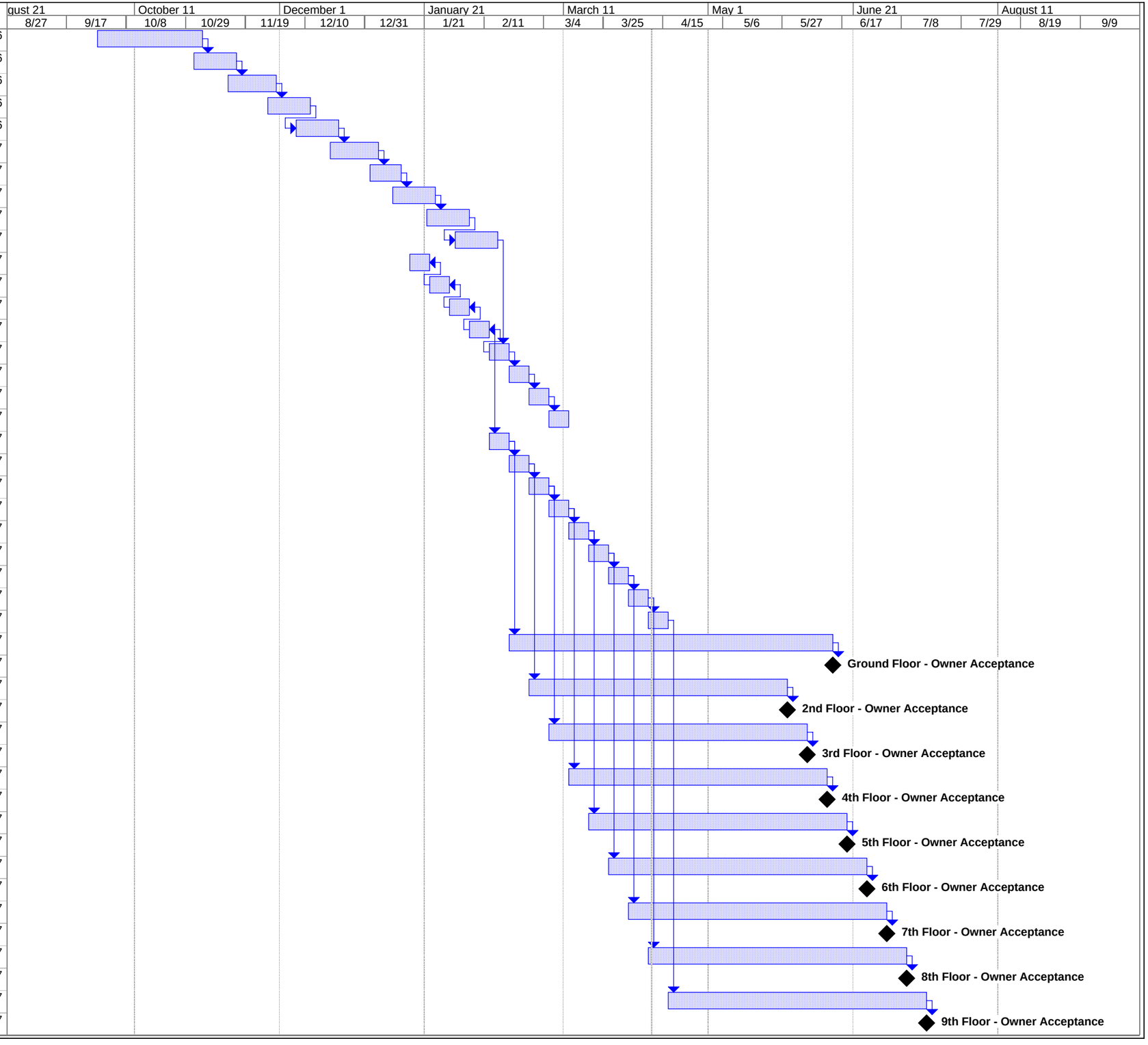
2. **Alternate 1 – Detailed Façade Schedule**

3. **Alternate 2 – Detailed Façade Schedule**

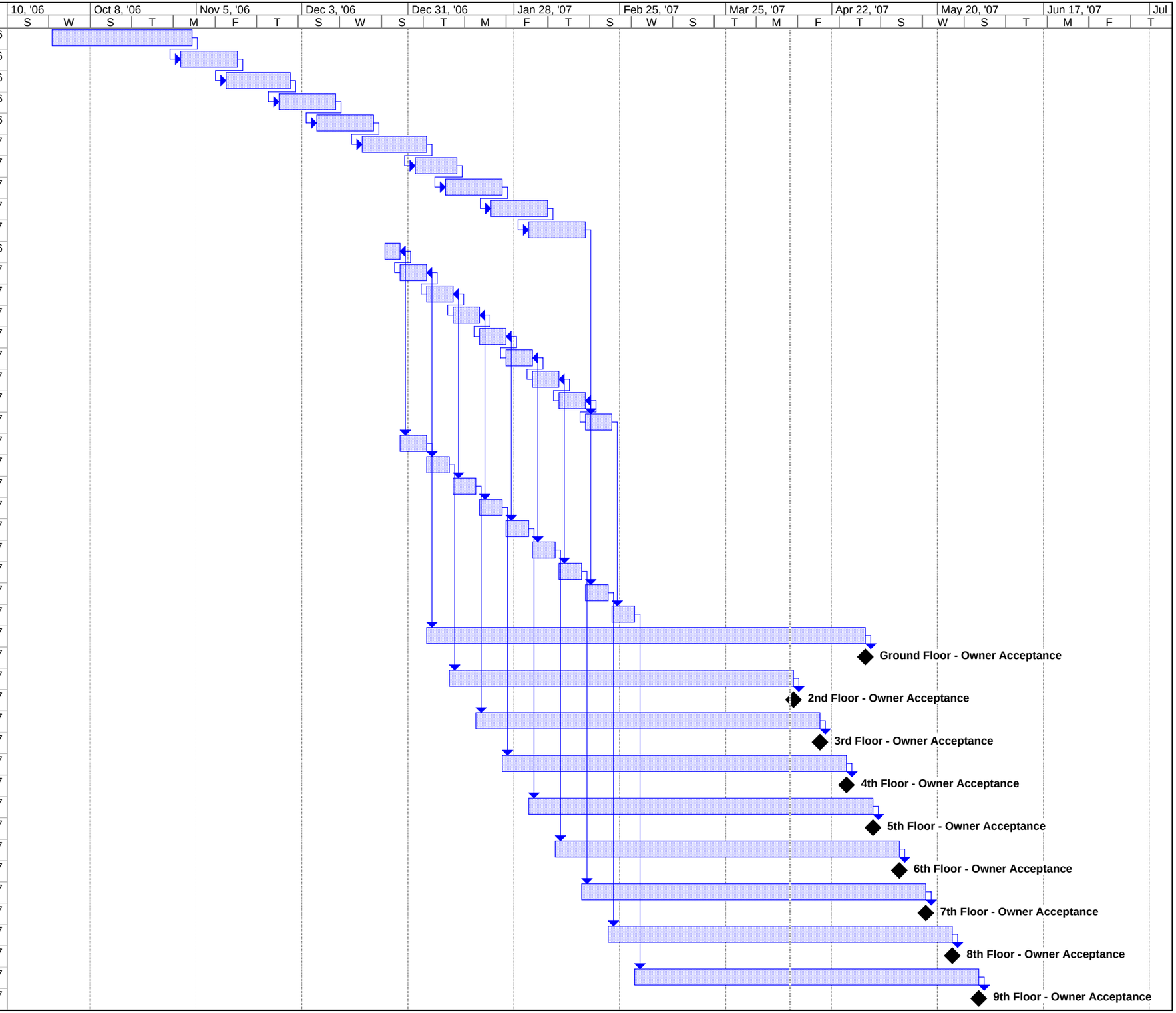
ID	Task Name	Duration	Start	Finish
1	Ground Floor - Frame and Place Slab	27 days	Thu 9/28/06	Fri 11/3/06
2	2nd Floor - Frame and Place Slab - Pc	11 days	Wed 11/1/06	Wed 11/15/06
3	3rd Floor - Frame and Place Slab - Po	13 days	Mon 11/13/06	Wed 11/29/06
4	4th Floor - Frame and Place Slab - Po	11 days	Mon 11/27/06	Mon 12/11/06
5	5th Floor - Frame and Place Slab - Po	11 days	Thu 12/7/06	Thu 12/21/06
6	6th Floor - Frame and Place Slab - Po	13 days	Tue 12/19/06	Thu 1/4/07
7	7th Floor - Frame and Place Slab - Po	9 days	Tue 1/2/07	Fri 1/12/07
8	8th Floor - Frame and Place Slab - Po	11 days	Wed 1/10/07	Wed 1/24/07
9	9th Floor - Frame and Place Slab - Po	11 days	Mon 1/22/07	Mon 2/5/07
10	Roof Level - Frame and Place Slab - F	11 days	Thu 2/1/07	Thu 2/15/07
11	Precast - Office South Side	11 days	Wed 2/14/07	Wed 2/28/07
12	Precast - Office West Side	10 days	Thu 3/1/07	Wed 3/14/07
13	Precast - Office North Side	10 days	Thu 3/15/07	Wed 3/28/07
14	Precast - Office East Side	10 days	Thu 3/29/07	Wed 4/11/07
15	Windows - Office Floors 1-2-3	10 days	Wed 4/4/07	Tue 4/17/07
16	Windows - Office Floors 4-5	10 days	Wed 4/18/07	Tue 5/1/07
17	Windows - Office Floors 6-7	10 days	Wed 5/2/07	Tue 5/15/07
18	Windows Office Floors 8-9	10 days	Wed 5/16/07	Tue 5/29/07
19	Ground Floor - Finishes and Punchlist	82 days	Wed 4/18/07	Thu 8/9/07
20	Ground Floor - Owner Acceptance	0 days	Thu 8/9/07	Thu 8/9/07
21	2nd Floor - Finishes and Punchlists	65 days	Wed 4/25/07	Tue 7/24/07
22	2nd Floor - Owner Acceptance	0 days	Tue 7/24/07	Tue 7/24/07
23	3rd Floor - Finishes and Punchlists	65 days	Mon 4/30/07	Fri 7/27/07
24	3rd Floor - Owner Acceptance	0 days	Fri 7/27/07	Fri 7/27/07
25	4th Floor - Finishes and Punchlists	65 days	Thu 5/3/07	Wed 8/1/07
26	4th Floor - Owner Acceptance	0 days	Wed 8/1/07	Wed 8/1/07
27	5th Floor - Finishes and Puchlists	67 days	Mon 5/14/07	Tue 8/14/07
28	5th Floor - Owner Acceptance	0 days	Tue 8/14/07	Tue 8/14/07
29	6th Floor - Finishes and Punchlists	65 days	Mon 5/21/07	Fri 8/17/07
30	6th Floor - Owner Acceptance	0 days	Fri 8/17/07	Fri 8/17/07
31	7th Floor - Finishes and Punchlists	60 days	Thu 5/24/07	Wed 8/15/07
32	7th Floor - Owner Acceptance	0 days	Wed 8/15/07	Wed 8/15/07
33	8th Floor - Finishes and Punchlists	64 days	Mon 6/4/07	Thu 8/30/07
34	8th Floor - Owner Acceptance	0 days	Thu 8/30/07	Thu 8/30/07
35	9th Floor - Finishes and Punchlists	67 days	Thu 6/7/07	Sat 9/8/07
36	9th Floor - Owner Acceptance	0 days	Sat 9/8/07	Sat 9/8/07



ID	Task Name	Duration	Start	Finish
1	Ground Floor - Frame and Place Slab - Pou	27 days	Thu 9/28/06	Fri 11/3/06
2	2nd Floor - Frame and Place Slab - Pours 1	11 days	Wed 11/1/06	Wed 11/15/06
3	3rd Floor - Frame and Place Slab - Pours 1	13 days	Mon 11/13/06	Wed 11/29/06
4	4th Floor - Frame and Place Slab - Pours 1	11 days	Mon 11/27/06	Mon 12/11/06
5	5th Floor - Frame and Place Slab - Pours 1	11 days	Thu 12/7/06	Thu 12/21/06
6	6th Floor - Frame and Place Slab - Pours 1	13 days	Tue 12/19/06	Thu 1/4/07
7	7th Floor - Frame and Place Slab - Pours 1	9 days	Tue 1/2/07	Fri 1/12/07
8	8th Floor - Frame and Place Slab - Pours 1	11 days	Wed 1/10/07	Wed 1/24/07
9	9th Floor - Frame and Place Slab - Pours 1	11 days	Mon 1/22/07	Mon 2/5/07
10	Roof Level - Frame and Place Slab - Pours	11 days	Thu 2/1/07	Thu 2/15/07
11	Precast - South Office Floors 1-5	5 days	Tue 1/16/07	Tue 1/23/07
12	Precast - West Office Floors 1-5	5 days	Tue 1/23/07	Tue 1/30/07
13	Precast - North Office Floors 1-5	5 days	Tue 1/30/07	Tue 2/6/07
14	Precast - East Office Floors 1-5	5 days	Tue 2/6/07	Tue 2/13/07
15	Precast - South Office Floors 6-9	5 days	Tue 2/13/07	Mon 2/19/07
16	Precast - West Office Floors	5 days	Tue 2/20/07	Mon 2/26/07
17	Precast - North Office Floors 6-9	5 days	Tue 2/27/07	Mon 3/5/07
18	Precast - East Office Floors 6-9	5 days	Tue 3/6/07	Mon 3/12/07
19	Windows - Ground Floor	5 days	Tue 2/13/07	Mon 2/19/07
20	Windows - 2nd Floor	5 days	Tue 2/20/07	Mon 2/26/07
21	Windows - 3rd Floor	5 days	Tue 2/27/07	Mon 3/5/07
22	Windows - 4th Floor	5 days	Tue 3/6/07	Mon 3/12/07
23	Windows - 5th Floor	5 days	Tue 3/13/07	Mon 3/19/07
24	Windows - 6th Floor	5 days	Tue 3/20/07	Mon 3/26/07
25	Windows - 7th Floor	5 days	Tue 3/27/07	Mon 4/2/07
26	Windows - 8th Floor	5 days	Tue 4/3/07	Mon 4/9/07
27	Windows - 9th Floor	5 days	Tue 4/10/07	Mon 4/16/07
28	Ground Floor - Finishes and Punchlists	82 days	Tue 2/20/07	Wed 6/13/07
29	Ground Floor - Owner Acceptance	0 days	Wed 6/13/07	Wed 6/13/07
30	2nd Floor - Finishes and Punchlists	65 days	Tue 2/27/07	Mon 5/28/07
31	2nd Floor - Owner Acceptance	0 days	Mon 5/28/07	Mon 5/28/07
32	3rd Floor - Finishes and Punchlists	65 days	Tue 3/6/07	Mon 6/4/07
33	3rd Floor - Owner Acceptance	0 days	Mon 6/4/07	Mon 6/4/07
34	4th Floor - Finishes and Punchlists	65 days	Tue 3/13/07	Mon 6/11/07
35	4th Floor - Owner Acceptance	0 days	Mon 6/11/07	Mon 6/11/07
36	5th Floor - Finishes and Puchlists	65 days	Tue 3/20/07	Mon 6/18/07
37	5th Floor - Owner Acceptance	0 days	Mon 6/18/07	Mon 6/18/07
38	6th Floor - Finishes and Punchlists	65 days	Tue 3/27/07	Mon 6/25/07
39	6th Floor - Owner Acceptance	0 days	Mon 6/25/07	Mon 6/25/07
40	7th Floor - Finishes and Punchlists	65 days	Tue 4/3/07	Mon 7/2/07
41	7th Floor - Owner Acceptance	0 days	Mon 7/2/07	Mon 7/2/07
42	8th Floor - Finishes and Punchlists	65 days	Tue 4/10/07	Mon 7/9/07
43	8th Floor - Owner Acceptance	0 days	Mon 7/9/07	Mon 7/9/07
44	9th Floor - Finishes and Punchlists	65 days	Tue 4/17/07	Mon 7/16/07
45	9th Floor - Owner Acceptance	0 days	Mon 7/16/07	Mon 7/16/07



ID	Task Name	Duration	Start	Finish
1	Ground Floor - Frame and Plac	27 days	Thu 9/28/06	Fri 11/3/06
2	2nd Floor - Frame and Place Sl	11 days	Wed 11/1/06	Wed 11/15/06
3	3rd Floor - Frame and Place Sla	13 days	Mon 11/13/06	Wed 11/29/06
4	4th Floor - Frame and Place Sla	11 days	Mon 11/27/06	Mon 12/11/06
5	5th Floor - Frame and Place Sla	11 days	Thu 12/7/06	Thu 12/21/06
6	6th Floor - Frame and Place Sla	13 days	Tue 12/19/06	Thu 1/4/07
7	7th Floor - Frame and Place Sla	9 days	Tue 1/2/07	Fri 1/12/07
8	8th Floor - Frame and Place Sla	11 days	Wed 1/10/07	Wed 1/24/07
9	9th Floor - Frame and Place Sla	11 days	Mon 1/22/07	Mon 2/5/07
10	Roof Level - Frame and Place S	11 days	Thu 2/1/07	Thu 2/15/07
11	Precast - Office Floor G	4 days	Mon 12/25/06	Fri 12/29/06
12	Precast - Office Floor 2	5 days	Fri 12/29/06	Fri 1/5/07
13	Precast - Office Floor 3	5 days	Fri 1/5/07	Fri 1/12/07
14	Precast - Office Floor 4	5 days	Fri 1/12/07	Fri 1/19/07
15	Precast - Office Floor 5	5 days	Fri 1/19/07	Fri 1/26/07
16	Precast Office Floor 6	5 days	Fri 1/26/07	Fri 2/2/07
17	Precast - Office Floor 7	5 days	Fri 2/2/07	Fri 2/9/07
18	Precast - Office Floor 8	5 days	Fri 2/9/07	Fri 2/16/07
19	Precast - Office Floor 9	5 days	Fri 2/16/07	Thu 2/22/07
20	Windows - Office Floor G	5 days	Fri 12/29/06	Thu 1/4/07
21	Windows - Office Floor 2	4 days	Fri 1/5/07	Wed 1/10/07
22	Windows - Office Floor 3	4 days	Fri 1/12/07	Wed 1/17/07
23	Windows - Office Floor 4	4 days	Fri 1/19/07	Wed 1/24/07
24	Windows - Office Floor 5	4 days	Fri 1/26/07	Wed 1/31/07
25	Windows - Office Floor 6	4 days	Fri 2/2/07	Wed 2/7/07
26	Windows - Office Floor 7	4 days	Fri 2/9/07	Wed 2/14/07
27	Windows - Office Floor 8	4 days	Fri 2/16/07	Wed 2/21/07
28	Windows - Office Floor 9	4 days	Fri 2/23/07	Wed 2/28/07
29	Ground Floor - Finishes and Pu	82 days	Fri 1/5/07	Mon 4/30/07
30	Ground Floor - Owner Acceptar	0 days	Mon 4/30/07	Mon 4/30/07
31	2nd Floor - Finishes and Punch	65 days	Thu 1/11/07	Wed 4/11/07
32	2nd Floor - Owner Acceptance	0 days	Wed 4/11/07	Wed 4/11/07
33	3rd Floor - Finishes and Punchl	65 days	Thu 1/18/07	Wed 4/18/07
34	3rd Floor - Owner Acceptance	0 days	Wed 4/18/07	Wed 4/18/07
35	4th Floor - Finishes and Punchl	65 days	Thu 1/25/07	Wed 4/25/07
36	4th Floor - Owner Acceptance	0 days	Wed 4/25/07	Wed 4/25/07
37	5th Floor - Finishes and Puchlis	65 days	Thu 2/1/07	Wed 5/2/07
38	5th Floor - Owner Acceptance	0 days	Wed 5/2/07	Wed 5/2/07
39	6th Floor - Finishes and Punchl	65 days	Thu 2/8/07	Wed 5/9/07
40	6th Floor - Owner Acceptance	0 days	Wed 5/9/07	Wed 5/9/07
41	7th Floor - Finishes and Punchl	65 days	Thu 2/15/07	Wed 5/16/07
42	7th Floor - Owner Acceptance	0 days	Wed 5/16/07	Wed 5/16/07
43	8th Floor - Finishes and Punchl	65 days	Thu 2/22/07	Wed 5/23/07
44	8th Floor - Owner Acceptance	0 days	Wed 5/23/07	Wed 5/23/07
45	9th Floor - Finishes and Punchl	65 days	Thu 3/1/07	Wed 5/30/07
46	9th Floor - Owner Acceptance	0 days	Wed 5/30/07	Wed 5/30/07



Appendix 4

This appendix contains the following referenced documents:

1. **Air Handling Units – Mechanical Specifications**

2. **Air Handling Units – Product Report**

3. **Air Handling Units – Dimension Drawing**

GENERAL
The units must be rigged and lifted in strict accordance with the Installation Operation and Maintenance manual (CLCH-IM-16). The units are to be installed in strict accordance with the specifications.

Units may be shipped fully assembled up to nominal 25,000 cfm units or disassembled to the minimum component size according to shipping or jobsite requirements. Units shipped in one piece will have no more than 6 points of lift required. These lift points will be permanently attached to the unit base and be designed to accept standard rigging devices. Units shipped in sections will have no more than 4 points of lift required. Units are UL and CUL listed L1995, CSA C-22.2 as manufactured by the factory. Modifications to the units at the job site or by a third party may void this listing. Refer to the Product Data Sheet for door and drain pan connection locations. This mechanical specification describes options selected from all or just one of the T-Series units on the job.

Since The Trane Company has a policy of continuous product improvement, it reserves the right to change design and specification without notice.

Unit Construction
The unit panels feature galvanized steel double wall construction. The casing is able to withstand up to 6 inches of static pressure with no more than 0.005 inch (0.127mm) deflection per inch (25.4mm) of panel span. The entire length and width under the base is sealed for additional water management protection.

Single Point Power Wiring motor only
For airhandling units requiring both a supply and return/exhaust fan, the unit manufacturer shall supply single point power wiring to both factory installed and tested fan motor starters or variable frequency drives. On units supplied with starters on both fan motors, both motor starters shall be installed in the supply fan high voltage electrical enclosure. If both fans do not have starters, then individual high voltage enclosures will be supplied for both the supply and return/exhaust fans. Single point power wiring shall include a high voltage distribution block and main unit disconnect with lockout/tagout capabilities. Single point power wiring shall not compromise the UL or ETL certification of the unit. Single point power wiring is not available to either (or both) electric heat, or a rotary energy recovery wheel. Separate power supplies for these options must be field supplied.

Motor Wiring Conduit
High voltage wiring from either a wiring raceway/trough or directly from a motor starter or variable frequency drive to the air handling unit motor(s) shall be done through flexible conduit. Wiring through conduit shall not compromise the UL or ETL certification of the unit.

Switch Option
No light switches or 115 volt power receptacle supplied with unit.

Panel Construction
Panels feature solid double wall construction with totally enclosed closed-cell insulation providing a minimum R-value of 12. The insulation conforms to NFPA 90 requirements.

Access Doors
Access doors are fully insulated double-wall construction (with solid galvanized steel interior panels). Automotive style neoprene gasketing around the full perimeter of the access doors minimize air leakage. All access doors have a single door handle system. The first handle movement relives unit pressure.

Galvanized IAQ Drain Pan
Drain pans have two-way sloping galvanized IAQ drain pan to allow for proper condensate removal in sections specified.

Unit Roof
Unit roof is constructed of two pieces. Inner roof is installed in such a manner as to prevent air bypass between internal components. Outer roof is sloped either from one side of unit to other, or from center to sides of the unit. Roof assembly overhangs all walls of units by 2" (50.8mm) minimum.

Unit Paint
External surface of unit casing is coated with water based polyurethane paint. Color to be standard "Slate Gray". Units painted in the factory are able to withstand a salt spray test in accordance with ASTM B117 for a minimum of 500 consecutive hours.

Factory Supplied Roof Curb
Unit to be mounted to factory supplied 14-inch tall roof curb. Curb will be shipped to jobsite disassembled. Contractor will be responsible for assembly and mounting to roof structure per T-Series Climate Changer Roof Curb IOM (CLCH-IN-18). On units requiring external piping cabinet(s), factory supplied curb to include curb for external pipe cabinet(s) and pipe cabinet curb(s) to main unit curb gutter(s).

MIXING SECTION
A section is provided that supports damper assembly for outside, return, and/or exhaust air.

Dampers
Dampers modulate the volume of outside, return, or exhaust air. Dampers are Ruskin CD-60 with double skin air foil blades, ultra low-leak metal compressible jamb seals, and extruded vinyl blade edge seals. The dampers are rated for a maximum leakage rate of 3 (cfm)/(foot squared) at 1" wg and 8 (cfm)/(foot squared) at 4" wg. Blades rotate on stainless steel sleeve bearings. Dampers are arranged in parallel or opposed blade configuration.

Mixing Box Damper Actuators
Spring return actuators are mounted with the outside air damper linked normally closed and the return air damper linked normally open.

EXHAUST SECTION
This section supports damper assemblies for exhaust air.

ANGLED FILTERS
Filter sections have filter racks, an access door for filter installation & removal, and block-offs as required to prevent air bypass around filters. Units can be supplied with 2-inch (51.8mm) or 4-inch (103.6mm) flat filters.

Pleated Media
Filters are 2-inch or 4-inch thick non-woven fabric, treated with adhesive and continuously laminated to a supported steel wire grid. Filters are capable of operating up to 625 fpm face velocity without loss of filter efficiency and holding capacity. Filters have a rated average dust spot efficiency of not less than 25 to 35 percent when tested in accordance with ASHRAE 52.1 atmospheric dust spot method, and MERV 7 based on ASHRAE Standard 52.2.

Filter Status Switch
A differential pressure switch piped to both sides of the filter will indicate filter status.

COILS
Coils have aluminum plate fins and seamless copper tubes. (Copper fins are available on 5/8 inch (15.9mm) tube coils.) Fin collars are drawn, belled, and firmly bonded to the tubes by mechanical expansion of the tubes. Capacities, pressure drops and selection procedure are certified in accordance with ARI Standard 410.

Coils are installed such that headers and return bends are enclosed by unit casings. Coil casings are a minimum of 16-gauge galvanized steel formed end supports, top, and bottom channels. If two or more coils are stacked in the unit, intermediate drain channels are installed between coils to drain condensate to the main drain pans without flooding the lower coils or passing condensate through the airstream of the lower coil.

Water Coils
Supply and return headers are clearly labeled on the outside of the unit to ensure that direction of coil water flow is counter to direction of unit airflow. Coils are burst tested to 300 psig and proof tested under water to 200 psig. Coil types are UW,UU,W,WD,D,DD,K,P,5A,5W and TT coils.

Tube Material
Tubes are 5/8 inch (15.9mm) OD, 0.020 inch (0.51m) thick copper. (Refer to the Product Data Sheet)

External Pipe Cabinet
Piping cabinet is supplied by the manufacturer factory assembled and constructed the same as the main unit casing. Piping cabinet is mounted external to the unit and shipped separate to be field installed. Piping cabinet has separate access door of the same construction as the unit casing door.

External Pipe Cabinet
Piping cabinet is supplied by the manufacturer factory assembled and constructed the same as the main unit casing. Piping cabinet is mounted external to the unit and shipped separate to be field installed.

Averaging Temperature Sensor
The averaging temperature sensor is a 1000 OHM @ 0 degree Celsius, platinum 385 curve, resistive temperature detector (RTD). Each capillary is serpentined across the coil module frame. Bends of the capillaries are curved and fastened with capillary clips to prevent crimping and minimize wear.

Control Valves
Control valves are shipped separately from the air handling unit. The valves must be field piped by the piping contractor. Please ensure the valves are piped within the 4' reach of the flexible conduit quick connect. Valves, flex conduit, and quick connects are rated for indoor use only. We recommend imstalling them in an oversized pipe cabinet or inside the building.

BLANK / ACCESS / INSPECTION
Additional unit length is provided to allow extra interior space for, access to, or inspection of unit components. This section may also be used for field installed components.

External Pipe Cabinet
A piping cabinet with access door is supplied factory assembled of the same construction as the main unit casing. Piping cabinets are shipped separately for field installion on the side of the unit.

FAN SECTION
Fans are factory balanced. Fan shafts are solid, protectively coated with lubricating oil, and designed so fan will not exceed 75 percent of the first critical speed at any cataloged rpm. Fan wheels are keyed to the shaft to prevent slipping. Access doors are provided on the drive side of the fan section. A separate power source is required for each fan section without single point power. Units with single point power require one power source in the supply fan section.

Forward Curved Fan
The forward curved (FC) fan is a double-width, double-inlet, multiblade type as required for stable operation and optimum energy efficiency. Bearings are self-aligning, antifriction bearings with a L-50 life of 200,000 hours. For any bearing requiring relubrication, the grease line shall be extended to the fan support bracket on the drive side. Refer to Product Data Sheets. Fan performance is certified in accordance with ARI Standard 430-89.

Motor Voltage
460 Volt / 3 Phase / 60 Hz.(Refer to the Product Data Sheet)

Open Drip-Proof Motor
The motor is a T-frame, squirrel cage, open drip-proof with horsepower, type, and electrical characteristics as shown on equipment schedule. Motor is mounted inside the unit casing integral to an isolated fan assembly. A slide base permits adjustment of drive belt tension..(Refer to the Product Data Sheet)

Fixed Pitch Drives
Sheaves are fixed pitch for constant speed at the specified rpm.

Fan Isolation
Two Inch (51.8mm) Spring Isolators - Fan and motor assembly (sizes #10 - #100) is internally isolated from the unit casing with 2 inch (51.8mm) deflection spring isolators. The fan discharge is also isolated from unit casing by a flexible canvas duct. The isolation system is designed to resist loads produced by external forces such as earthquakes and conform to the current requirements for Seismic Zone IV.

Fan Options
Inverter balancing. Fan systems will be checked with a variable frequency drive for resonant frequencies. Fans, shafts, and drives will meet vibrations tolerance specs from 25% to 100% of selected RPM.

Starter / Disconnect Package
Combination starter / disconnect packages are factory mounted inside a weather-tight cabinet and include:
a) Line break switch
b) starter
c) Hand-Off-Auto (HOA) selector switch
d) one N.O. auxiliary contact
e) 120V control transformer
f) power wiring from starter to motor

Starter Options
The starter includes a control transformer to power the factory mounted temperature control system. Power wiring from the starter transformer to the controls, start/stop relay, and start/stop wiring to the HOA switch are wired and tested at the factory.

VFD Options
The VFD includes an oversized control transformer to power the factory mounted control system. Power wiring from the VFD transformer to the controls, start/stop relay, start/stop wiring to the VFD, and analog speed signal are wired and tested at the factory.

Airflow Switch
A differential pressure switch piped to the discharge and suction sides of the fan indicates fan status.

DISCHARGE PLENUM
A discharge plenum is provided to efficiently turn air and/or provide sound attenuation. A protective covering will be provided over bottom openings.

FACTORY MOUNTED DIRECT DIGITAL CONTROL (DDC) SYSTEM
"Turn-key" control systems are engineered, mounted, wired, and tested in the factory to reduce installed costs, save time, and improve reliability. Each control system is fully functional as a standalone unit or can be tied to a Tracer building automation system.

Unit Mounted Controller
The DDC controller is factory mounted in the unit.

Outside Air Sensor
Thermistor type outside air sensor (10,000 ohm @ 77 degrees F) is provided for field mounting and wiring.

Low Limit
Low limits are double pole low limit switches wired to a momentary push button reset circuit. Capillaries are serpentined across the leaving side of the coil. Bends of the capillaries are curved and fastened with capillary clips to prevent crimping and minimize wear. A separate low limit is provided for each coil in a coil stack.

VFD / Disconnect Package
Combination VFD / disconnect packages are factory mounted and wired in a weather-tight cabinet and include:
a) circuit breaker disconnect
b) Pulse Width Modulated (PWM) VFD w/ intelligent power modules
c) LCD display and keypad
d) English language electrical values, parameters, self test, faults, and diagnostics
e) form C fault contacts
f) 0-10 V speed input signal
g) VFD-Hand-Off keypad switch
h) Electronic manual speed control
i) auto restart after momentary power loss
j) critical frequency avoidance
k) power wiring from VFD to motor
l) voltage and FLA are factory-set for the exact motor used in the air handler
m) Factory commissioning

Control Valve
Control valves are provided by the air handling unit manufacturer and field piped by the piping contractor. Power and signal wiring is of a simple quick connect provided by the air handler manufacturer.

Outdoor T-Series Climate Changer air handler

Job Name	Breadth Analysis 1
User Name	
Address	Washington DC

Outdoor T-Series Climate Changer air handler **RTAHU-1**

Quantity 2

Job Comments

Coil performance data is certified in accordance with ARI standard 410. Propylene glycol and calcium chloride, or mixtures thereof, are not covered under the scope of ARI 410.

Air-handling performance data is certified in accordance with ARI standard 430. Air handlers with Q-fans, air handlers with plenum fans, and vertical draw-thru air handlers where the coil is mounted immediately below the fan module are not covered under the scope of ARI 430.

All weights and dimensions are approximate. Certified prints on request.

Outdoor T-Series Climate Changer air handler

Unit level **Module Position:** 0

Actual airflow	51500 cfm	Single or front discharge - 125 Hz	93 dB
Elevation relative to sea level	0.00 ft	Single or front discharge - 250 Hz	99 dB
Size criteria component	Largest 1/2" coil	Single or front discharge - 500 Hz	92 dB
Target face velocity	500 ft/min	Single or front discharge - 1K Hz	88 dB
Run acoustics	Yes	Single or front discharge - 2K Hz	86 dB
Inlet type (for acoustics)	Ducted	Single or front discharge - 4K Hz	83 dB
Unit size	100	Single or front discharge - 8K Hz	77 dB
Unit coil - max face velocity	600 ft/min	Side discharge - 63 Hz	0 dB
Unit coil - min face velocity	250 ft/min	Side discharge - 125 Hz	0 dB
Shipping coil - max face velocity	600 ft/min	Side discharge - 250 Hz	0 dB
Shipping coil - min face velocity	250 ft/min	Side discharge - 500 Hz	0 dB
Face & bypass coil - max face velocity	600 ft/min	Side discharge - 1 kHz	0 dB
Face & bypass coil - min face velocity	250 ft/min	Side discharge - 2 kHz	0 dB
Flat filter - max face velocity	625 ft/min	Side discharge - 4 kHz	0 dB
Flat filter - min face velocity	0 ft/min	Side discharge - 8 kHz	0 dB
Angled filter - max face velocity	625 ft/min	Ducted inlet - 63 Hz	97 dB
Angled filter - min face velocity	0 ft/min	Ducted inlet - 125 Hz	93 dB
Bag/cartridge - max face velocity	625 ft/min	Ducted inlet - 250 Hz	97 dB
Bag/cartridge - min face velocity	0 ft/min	Ducted inlet - 500 Hz	91 dB
HEPA filter - max face velocity	500 ft/min	Ducted inlet - 1 kHz	89 dB
HEPA filter - min face velocity	0 ft/min	Ducted inlet - 2 kHz	86 dB
Unit shipping split type	Maximum Size Splits	Ducted inlet - 4 kHz	80 dB
Roof curb type	14" tall roof curb	Ducted inlet - 8 kHz	74 dB
Paint	Factory painted - gray	Casing - 63 Hz	90 dB
Light wiring	No light wiring	Casing - 125 Hz	92 dB
Power wiring	Single point power (2-fan motors	Casing - 250 Hz	92 dB
UL listed unit	Yes	Casing - 500 Hz	84 dB
Unit length (less hoods)	494.000 in	Casing - 1 kHz	78 dB
Roof curb weight	1061.7 lb	Casing - 2 kHz	73 dB
Rigging unit weight	25975.1 lb	Casing - 4 kHz	68 dB
Installed unit weight	28115.0 lb	Casing - 8 kHz	64 dB
Single or front discharge - 63 Hz	93 dB		

Controls package **Module Position:** 0

Factory controls package	Variable volume	LCD screen and keypad	No
Controls mounting	Unit (drive side #66-100)	AH540 valid unit	Non-valid arrangement
Automatic control selection type	Validation only	Outside air sensors	Yes
DDC controller	MP580 controller		

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All weights and dimensions are approximate. Certified prints on request.

Outdoor T-Series Climate Changer air handler

Exhaust dampers **Module Position:** 1

Exhaust module PD	1.32 in H2O	Exhaust damper module airflow	51500 cfm
Module	Exhaust fan damper module	Exhaust module ASP	0.00 in H2O
Insulation	Solid dble wall	Exhaust damper area	24.67 sq ft
Access door	Right	Exhaust damper PD	0.76 in H2O
Exhaust damper hood	Yes	Exhaust hood area	20.06 sq ft
Actuator	Electronic normally closed	Exhaust hood PD	0.55 in H2O

Fan **Module Position:** 2

Fan [2]-1

Fan airflow	41500 cfm	Single or front discharge - 500 Hz	81 dB
Fan size and type	A100 - 40" FC	Single or front discharge - 1K Hz	81 dB
Fan discharge	Back - top	Single or front discharge - 2K Hz	80 dB
Drive location	Right	Single or front discharge - 4K Hz	75 dB
Motor HP	40	Single or front discharge - 8K Hz	67 dB
Motor voltage	460/3	Inlet and casing - 63 Hz	94 dB
ESP	0.75 in H2O	Inlet and casing - 125 Hz	85 dB
Total static pressure	2.23 in H2O	Inlet and casing - 250 Hz	88 dB
BHP	31.644 hp	Inlet and casing - 500 Hz	89 dB
Speed	407 rpm	Inlet and casing - 1 kHz	88 dB
Module	Fan	Inlet and casing - 2 kHz	83 dB
Insulation	Solid dble wall	Inlet and casing - 4 kHz	79 dB
Access door	Right	Inlet and casing - 8 kHz	72 dB
Inlet location	Vertical exhaust fan	Ducted inlet - 63 Hz	96 dB
Fan isolation	Spring	Ducted inlet - 125 Hz	86 dB
Fan wheel balance	Inverter balance	Ducted inlet - 250 Hz	87 dB
Motor class	ODP E+ motor	Ducted inlet - 500 Hz	88 dB
Motor frame type	T-frame	Ducted inlet - 1 kHz	88 dB
Cycle	60 cycle/sec	Ducted inlet - 2 kHz	83 dB
Drive service factor and type	1.5 fixed	Ducted inlet - 4 kHz	78 dB
Starter or VFD mounted and wired	TR1 VFD / disconnect	Ducted inlet - 8 kHz	72 dB
Airflow switch	Yes	Casing - 63 Hz	80 dB
Elevation	0.00 ft	Casing - 125 Hz	69 dB
Min temperature	10.00 F	Casing - 250 Hz	62 dB
Design temperature	70.00 F	Casing - 500 Hz	56 dB
Max BHP	35.687 hp	Casing - 1 kHz	48 dB
Fan module PD	0.91 in H2O	Casing - 2 kHz	43 dB
Unit controller	MP580 Unit Controller	Casing - 4 kHz	35 dB
Unit low limit	Unit Low Limit	Casing - 8 kHz	33 dB
Single or front discharge - 63Hz	90 dB	Design sequence	L
Single or front discharge - 125Hz	83 dB	Fan discharge loss PD	0.16 in H2O
Single or front discharge - 250 Hz	84 dB		

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Outdoor T-Series Climate Changer air handler

Mixing **Module Position: 3**

Module	Mixing	Left opening airflow	25200 cfm
Mix module type	W/O filter frame	Bottom opening airflow	0 cfm
Insulation	Solid dble wall	Filter condition	Clean
Door	Right	Customer supplied filter PD	0.00 in H2O
Back damper	Parallel	Customer supplied filter area	0.00 sq ft
Inlet hood back	No	Back opening/damper area	41.76 sq ft
Back inlet type	Unducted	Back opening/damper PD	0.24 in H2O
Right side damper	No	Left side opening/damper area	24.67 sq ft
Inlet hood right hand	No	Left opening/damper PD	0.18 in H2O
Left side damper	Parallel	Left inlet hood area	26.57 sq ft
Inlet hood left hand	Yes	Left hood PD	0.37 in H2O
Left inlet type	Unducted	Total filter PD	0.00 in H2O
Bottom damper	No	Total mixing box PD	0.55 in H2O
Design sequence	G	Bottom entry PD	0.00 in H2O
Mixing box damper actuator(s)	Electronic	Back entry PD	0.24 in H2O
Outside air location	Left side	Right side entry PD	0.00 in H2O
Back opening airflow	51500 cfm	Left side entry pressure drop	0.55 in H2O
Right opening airflow	26300 cfm	Greatest entry PD	0.55 in H2O

Flat or angled filters **Module Position: 4**

Filter module PD	0.58 in H2O	Unit filter type	Pleated media - MERV 7
Filter condition	Mid-Life	Dirty filter switch	Yes
Module	Angled or flat filter	Filter airflow	51500 cfm
Angled or flat filter module	Angled	Customer supplied filter PD	0.00 in H2O
Insulation	Solid dble wall	Filter area	161.10 sq ft
Access door	Right	Filter PD - mid-life	0.58 in H2O
Filter frame	2" (51mm)	Filter PD	0.58 in H2O

Access **Module Position: 5**

Module	Access/blank	Access inspection door	Right
Access/blank module size	Medium	ASP	0.00 in H2O
Insulation	Solid dble wall		

Access **Module Position: 6**

Module	Access/blank	Access inspection door	Right
Access/blank module size	Large	ASP	0.20 in H2O
Insulation	Solid dble wall		

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Outdoor T-Series Climate Changer air handler

Access **Module Position: 7**

Module	Access/blank	External piping/service module	Std depth
Access/blank module size	Medium	External pipe cabinet door	Yes
Insulation	Solid dble wall	ASP	0.00 in H2O
External piping cabinet location	Right		

Horizontal coil **Module Position: 8**

Horizon [8]-1

Horizontal coil module	Medium large	Electronic coil control valve type	3-way valve water
Module	Horizontal coil	Valve normal position	Normally Closed
Insulation	Solid dble wall	Coil height	Unit - Max Face Area
Drain pan	RH galvanized	Coil type	W
Coil application	Cooling	Rows	10
Coil system type	Chilled water	Fin type	Prima flo H
Coil supply/cabinet side	Right	Fin material	Aluminum
External piping/service module	Std depth	Tube matl/wall thickness	.020" (0.508mm) copper
External pipe cabinet door	Yes	Turbulators	No
Coil casing	Galvanized	Coil coating	No
Apply ARI ranges	Yes	Face area	99.88 sq ft
Actual airflow	51500 cfm	Face velocity	516 ft/min
Elevation	0.00 ft	Air PD	1.32 in H2O
EDB	78.00 F	Coil module PD	1.32 in H2O
EWB	65.00 F	ARI 410-01 classification	ARI rated and certified
LDB	51.00 F	System type (old)	Chilled Water
LWB	50.90 F	Leaving fluid temp	66.42 F
Sensible capacity	1530.10 MBh	Fluid PD	9.84 ft H2O
Total capacity	2119.76 MBh	Fluid velocity	2.60 ft/sec
Fin spacing	136 Per Foot	Volume	128.99 gal
Max fluid PD	20.00 ft H2O	Reynolds number	9965.08 Each
ASP	0.00 in H2O	Coil installed weight	4680.5 lb
Entering fluid temp	40.00 F	Coil rigging weight	3602.3 lb
Fluid temp rise	26.42 F	Finned width top or single coil	51" (1295 mm)
Standard fluid flow rate	160.00 gpm	Finned width middle coil	51" (1295 mm)
Fouling factor	0.00000 hr-sq ft-deg F/Btu	Total cap ent coil type #1	1059.88 MBh
Fluid type	Water	Total cap ent coil type #2	1059.88 MBh
Averaging temperature sensor	Entering	Actual valve pressure drop	3.54 psig
Low limit switch	Leaving	Target CV rate	77.52 Each
Target valve pressure drop	4.00 psig	Electronic coil control valve size	3" NPT 85.0 CV 68 psig

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Outdoor T-Series Climate Changer air handler

Fan **Module Position: 9**

Fan [9]-1

Fan airflow	51500 cfm	Single or front discharge - 500 Hz	92 dB
Fan size and type	G100 - 40" AF	Single or front discharge - 1K Hz	88 dB
Fan discharge	Front - top	Single or front discharge - 2K Hz	86 dB
Drive location	Right	Single or front discharge - 4K Hz	83 dB
Motor HP	100	Single or front discharge - 8K Hz	77 dB
Motor voltage	460/3	Inlet and casing - 63 Hz	94 dB
ESP	3.50 in H2O	Inlet and casing - 125 Hz	96 dB
Total static pressure	7.36 in H2O	Inlet and casing - 250 Hz	98 dB
BHP	88.087 hp	Inlet and casing - 500 Hz	90 dB
Speed	1217 rpm	Inlet and casing - 1 kHz	85 dB
Module	Fan	Inlet and casing - 2 kHz	84 dB
Insulation	Solid dble wall	Inlet and casing - 4 kHz	77 dB
Access door	Right	Inlet and casing - 8 kHz	72 dB
Inlet location	Supply fan	Ducted inlet - 63 Hz	91 dB
Fan isolation	Spring	Ducted inlet - 125 Hz	93 dB
Motor class	ODP E+ motor	Ducted inlet - 250 Hz	97 dB
Motor frame type	T-frame	Ducted inlet - 500 Hz	89 dB
Cycle	60 cycle/sec	Ducted inlet - 1 kHz	84 dB
Drive service factor and type	1.5 fixed	Ducted inlet - 2 kHz	83 dB
Starter or VFD mounted and wired	Starter / disconnect	Ducted inlet - 4 kHz	77 dB
Elevation	0.00 ft	Ducted inlet - 8 kHz	71 dB
Min temperature	10.00 F	Casing - 63 Hz	90 dB
Design temperature	70.00 F	Casing - 125 Hz	92 dB
Bearing type	Standard heavy duty	Casing - 250 Hz	92 dB
Max BHP	99.342 hp	Casing - 500 Hz	84 dB
Fan module PD	4.24 in H2O	Casing - 1 kHz	78 dB
Unit controller	MP580 Unit Controller	Casing - 2 kHz	73 dB
Unit low limit	Unit Low Limit	Casing - 4 kHz	68 dB
Single or front discharge - 63Hz	93 dB	Casing - 8 kHz	64 dB
Single or front discharge - 125Hz	93 dB	Design sequence	L
Single or front discharge - 250 Hz	99 dB	Fan discharge loss PD	0.74 in H2O

Discharge plenum **Module Position: 10**

Module	Discharge Plenum	Pressure drop - front	0.00 in H2O
Insulation	Solid dble wall	Pressure drop - right	0.00 in H2O
Discharge plenum - bottom opening	Yes	Pressure drop - left	0.00 in H2O
ASP - front	0.00 in H2O	Bottom discharge area	55.48 sq ft
ASP - right	0.00 in H2O	Pressure drop - bottom	0.03 in H2O
ASP- left	0.00 in H2O	Discharge loss - bottom	0.03 in H2O
Discharge airflow - bottom	51500 cfm	Total discharge plenum PD	0.03 in H2O
ASP - bottom	0.00 in H2O		

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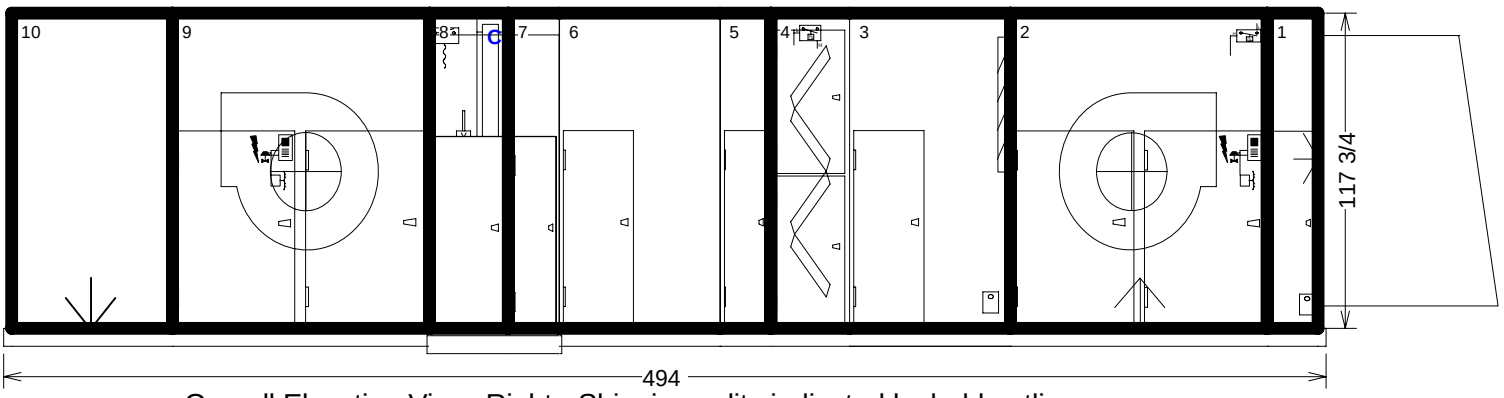
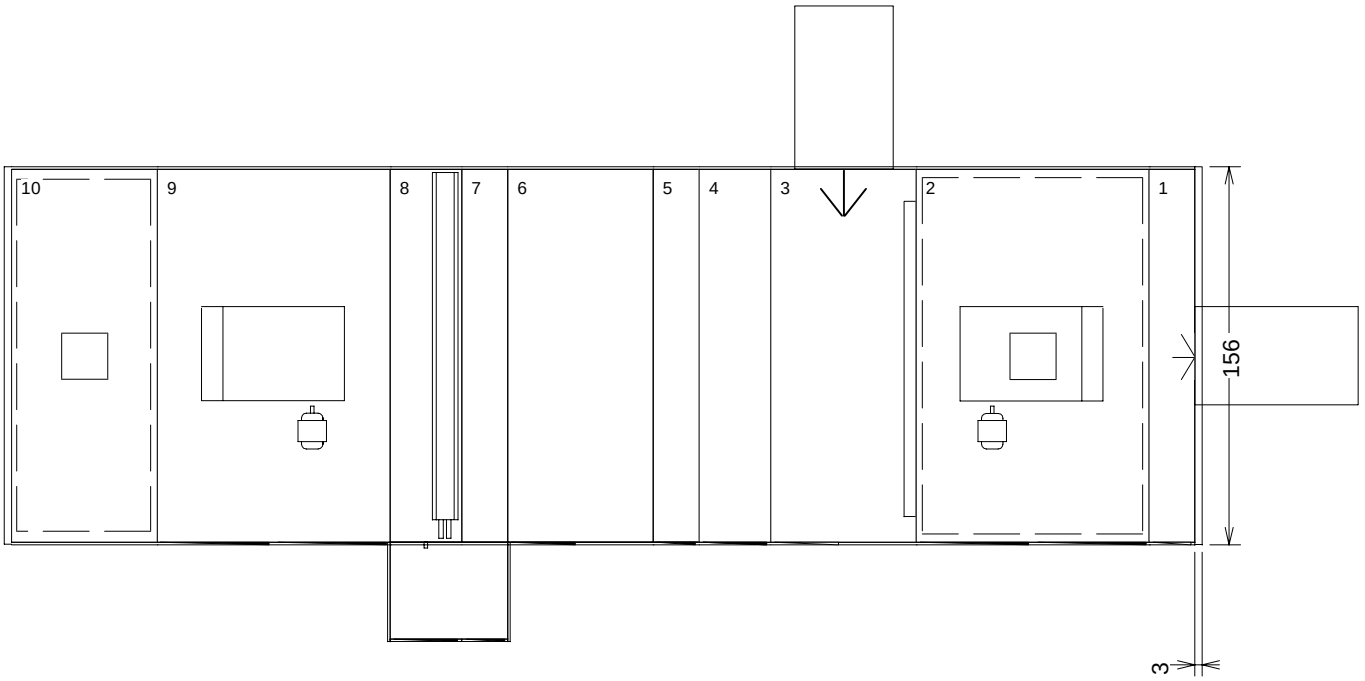


Overall Elevation View: Right - Shipping splits indicated by bold outline. - Measurements in inches

Pos #	Module	Length	Weight
1	Exhaust dampers	19	1565.00
2	Fan	96	5457.40
3	Mixing	60	1803.00
4	Flat or angled filters	29 1/2	1162.33
5	Access	19	516.00
6	Access	60	1137.00
7	Access	19	966.00
8	Horizontal coil	29 1/2	6184.12
9	Fan	96	6509.40
10	Discharge plenum	60	1753.00

Installed Unit Weight 27053.25 lbs



Overall Plan View: Top - Measurements in inches