Technical Assignment #2

Marriott Hotel at Penn Square and Lancaster County Convention Center

Trevor J. Sullivan

Construction Management
AE Faculty Consultant: Dr. Horman
November 2, 2007

Table of Contents

Trevor J. Sullivan
Construction Management
AE Faculty Consultant: Dr. Horman

Executive Summary

The enclosed report encompasses an analysis of the cost and methods for the Marriott Hotel and Lancaster County Convention center project. A detailed project schedule, a site plan for the superstructure sequence, an assemblies estimate for the building enclosure, a detailed structural system estimate and a general conditions estimate are analyzed in this report.

Key elements of the schedule for this project are the demolition/façade stabilization of the existing building, the deep foundations and the erection of the structure. The demolition and façade stabilization were complete in September, 2006. Removing the existing building was critical to the start of the caisson foundations as the site conditions were not well known due to the inability to perform boring samples under the existing buildings footprint. The schedule is sequenced very tight, and as soon as one trade finishes in an area another trade is scheduled to start immediately after (or concurrently in some critical areas). The project is broken down into areas A-J, and then floors 6-19 for the tower. The turnover time for each floor of the tower during construction of the concrete structure is 13 days. Substantial completion for the project is Dec. 31st, 2008.

A site plan was developed for the superstructure sequence of the building, due to its importance in meeting the schedule. The site plan shows the flow of concrete trucks and steel trucks to the site, along with the location of the cranes and pumps used to place the steel and concrete. An initial critique of the site plan is to relocate the concrete deliveries to King St. along with relocating the standpipe used to pump the concrete vertically through the tower.

An assemblies estimate was performed to calculate the cost for the buildings envelope. It determined that the cost of the exterior walls came to be $10,869,073, while the roof construction totaled $1,990,000. Thus the total for the building envelope is $12,859,073 with the $175/SF façade stabilization and restoration costing four times what the precast architectural panels costs. Brick, EIFS and metal panels are also used to cover the exterior of the Convention Center. EPDM is used for all the flat roofs costing $20/SF ontop of cast-in-place concrete and metal decking. A PVC roof material is used to cover the large bowstring trusses over the exhibit floor and is comparable to the EPDM at $22/SF.

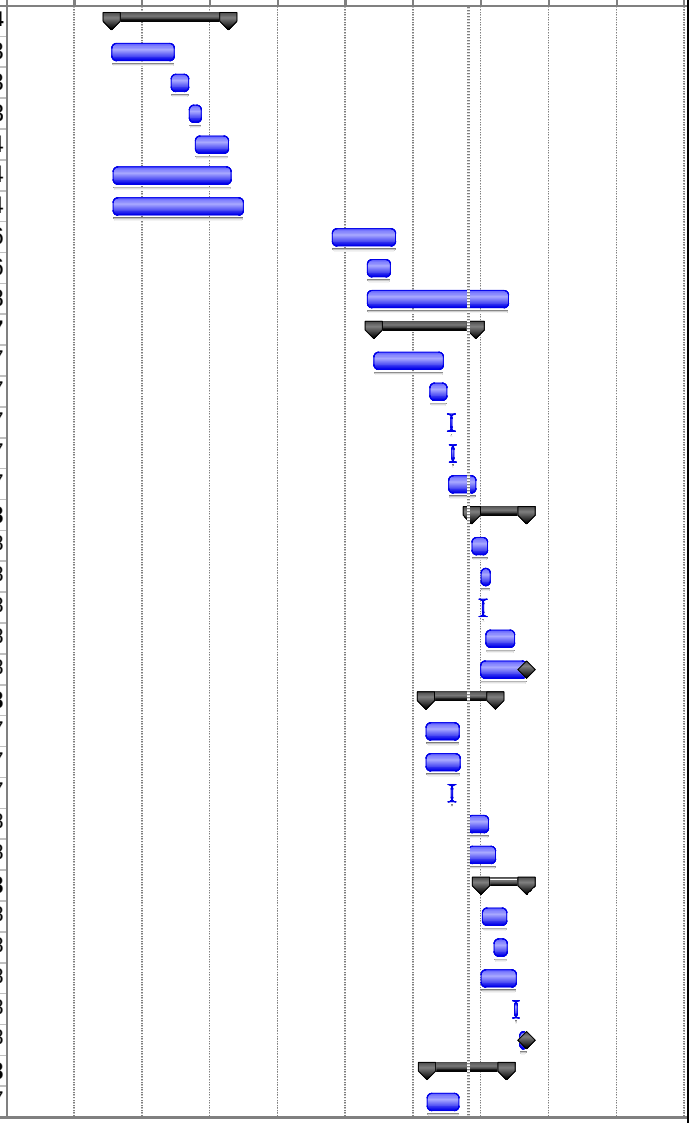
The detailed estimate of the structural system shows that the structure cost $48.60/SF with a few exclusions. The total cost came out to be $20,023,258 with concrete totaling $15,149,130 and thus steel totaling $4,874,128. RS Means building cost data 2008 was used as a reference to obtain unit costs for the detailed structural estimate.

Lastly, a general conditions estimate was created for the CM along with an estimate for total job general conditions costs. The CM's total cost came out to be $2,888,770, of which $2,658,980 was staffing costs (92%). Comparing the CM's costs to typical CM fees for projects it falls within the typical 2.5-4% range. The project "general conditions" estimate was created as a reference to total costs that are directly related to job duration. These costs are included in the respective prime contractor's contract.

Detailed Project Schedule

See the following six pages for the detailed project schedule.

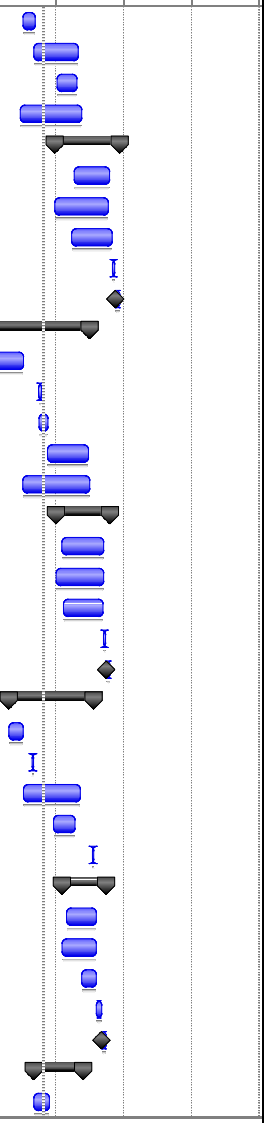
ID	Task Name	Duration	Start	Finish
1	**Design Phase**	**449 days**	**Wed 7/24/02**	**Mon 4/12/04**
2	Conceptual Design	241 days	Wed 7/24/02	Wed 6/25/03
3	Schematic Design	68 days	Mon 6/9/03	Wed 9/10/03
4	Design Development	46 days	Mon 9/15/03	Mon 11/17/03
5	Construction Documents	127 days	Fri 10/17/03	Mon 4/12/04
6	Permits and Approvals	454 days	Wed 7/31/02	Mon 4/26/04
7	Procurement of Construction Services	502 days	Wed 7/31/02	Thu 7/1/04
8	Abatement and Demolition	245 days	Mon 10/24/05	Fri 9/29/06
9	Façade Stabilization	90 days	Mon 5/1/06	Fri 9/1/06
10	Site Work	545 days	Mon 5/1/06	Fri 5/30/08
11	**Area A Museum Level Shell**	**393 days**	**Tue 6/6/06**	**Thu 12/6/07**
12	Excavation	268 days	Tue 6/6/06	Thu 6/14/07
13	F/R/P Foundations	66 days	Tue 4/3/07	Tue 7/3/07
14	F/R/P Columns	5 days	Tue 7/24/07	Mon 7/30/07
15	F/R/P Structural Slab	10 days	Mon 7/30/07	Fri 8/10/07
16	MEP Rough In	105 days	Fri 7/13/07	Thu 12/6/07
17	**Area A Museum Level Finishes**	**211 days**	**Fri 11/16/07**	**Fri 9/5/08**
18	Electrical Distribution and Termination	60 days	Fri 11/16/07	Thu 2/7/08
19	Mechanical/Plumbing Equipment and Devices	35 days	Fri 1/4/08	Thu 2/21/08
20	Painting	5 days	Fri 1/11/08	Thu 1/17/08
21	HVAC Startup	110 days	Wed 1/30/08	Tue 7/1/08
22	Area Punchlist Substantial Completion	178 days	Wed 1/2/08	Fri 9/5/08
23	**Area B Convention Entry Shell**	**268 days**	**Wed 3/14/07**	**Fri 3/21/08**
24	Excavation and Foundations	128 days	Wed 3/14/07	Fri 9/7/07
25	F/R/P Columns	131 days	Wed 3/14/07	Wed 9/12/07
26	F/R/P Structural Slab	6 days	Fri 7/27/07	Fri 8/3/07
27	MEP Equipment and Rough In	80 days	Wed 10/24/07	Tue 2/12/08
28	Aluminum Entrance	107 days	Thu 10/25/07	Fri 3/21/08
29	**Area B Convention Entry Finishes**	**176 days**	**Fri 1/4/08**	**Fri 9/5/08**
30	Electrical Distribution and Termination	93 days	Fri 1/11/08	Tue 5/20/08
31	Mechanical/Plumbing Equipment and Devices	51 days	Fri 3/14/08	Fri 5/23/08
32	Finishes	136 days	Fri 1/4/08	Fri 7/11/08
33	HVAC Startup	11 days	Wed 7/2/08	Wed 7/16/08
34	Area Punchlist and Substantial Completion	29 days	Tue 7/29/08	Fri 9/5/08
35	**Area D Exhibit Hall Shell**	**306 days**	**Tue 3/20/07**	**Tue 5/20/08**
36	Excavation and Foundations	122 days	Tue 3/20/07	Wed 9/5/07



Marriott Hotel at Penn Square and
Lancaster County Convention Center
Lancaster, PA

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

ID	Task Name	Duration	Start	Finish
37	F/R/P Shear Walls and Columns	47 days	Tue 7/10/07	Wed 9/12/07
38	Exterior Walls	171 days	Thu 9/6/07	Thu 5/1/08
39	Interior Walls	77 days	Wed 1/9/08	Thu 4/24/08
40	MEP Rough In	237 days	Mon 6/25/07	Tue 5/20/08
41	**Area D Exhibit Hall Finishes**	**250 days**	**Fri 12/28/07**	**Thu 12/11/08**
42	Electrical Distribution and Termination	136 days	Fri 4/11/08	Fri 10/17/08
43	Mechanical/Plumbing Equipment and Devices	206 days	Fri 12/28/07	Fri 10/10/08
44	Finishes	156 days	Fri 3/28/08	Fri 10/31/08
45	HVAC Startup	10 days	Mon 11/3/08	Fri 11/14/08
46	Area Punchlist and Substantial Completion	17 days	Wed 11/19/08	Thu 12/11/08
47	**Area C Exhibit Hall "B" Level Shell**	**399 days**	**Fri 12/22/06**	**Wed 7/2/08**
48	Excavation and Foundations	144 days	Fri 12/22/06	Wed 7/11/07
49	F/R/P Structural Concrete	13 days	Mon 10/1/07	Wed 10/17/07
50	Erect Steel	34 days	Thu 10/4/07	Tue 11/20/07
51	Exterior Skin	158 days	Mon 11/19/07	Wed 6/25/08
52	MEP Rough In	258 days	Mon 7/9/07	Wed 7/2/08
53	**Area C Exhibit Hall "B" Level Finishes**	**207 days**	**Fri 1/4/08**	**Mon 10/20/08**
54	Electrical Distribution and Termination	161 days	Mon 2/4/08	Mon 9/15/08
55	Mechanical/Plumbing Equipment and Devices	182 days	Fri 1/4/08	Mon 9/15/08
56	Finishes	153 days	Wed 2/13/08	Fri 9/12/08
57	HVAC Startup	10 days	Mon 9/15/08	Fri 9/26/08
58	Area Punchlist and Substantial Completion	14 days	Wed 10/1/08	Mon 10/20/08
59	**Area E Mech. Room and Laundry Area Shell**	**327 days**	**Wed 4/25/07**	**Thu 7/24/08**
60	Excavation and Foundations	55 days	Wed 4/25/07	Tue 7/10/07
61	F/R/P Columns	6 days	Tue 8/28/07	Tue 9/4/07
62	MEP Rough In	218 days	Thu 7/12/07	Mon 5/12/08
63	Interior Wall Framing	82 days	Fri 12/21/07	Mon 4/14/08
64	Place Laundry Equipment Pads	5 days	Fri 7/18/08	Thu 7/24/08
65	**Area E Mech. Room and Laundry Area Finishes**	**170 days**	**Tue 2/5/08**	**Mon 9/29/08**
66	Electrical Distribution and Termination	115 days	Fri 2/29/08	Thu 8/7/08
67	Mechanical/Plumbing Equipment and Devices	133 days	Tue 2/5/08	Thu 8/7/08
68	Finishes	57 days	Wed 5/21/08	Thu 8/7/08
69	HVAC Startup	21 days	Fri 8/8/08	Fri 9/5/08
70	Area Punchlist and Substantial Completion	17 days	Fri 9/5/08	Mon 9/29/08
71	**Area F Hotel Lobby Area Shell**	**191 days**	**Thu 9/6/07**	**Thu 5/29/08**
72	F/R/P Structural Concrete	60 days	Thu 9/6/07	Wed 11/28/07

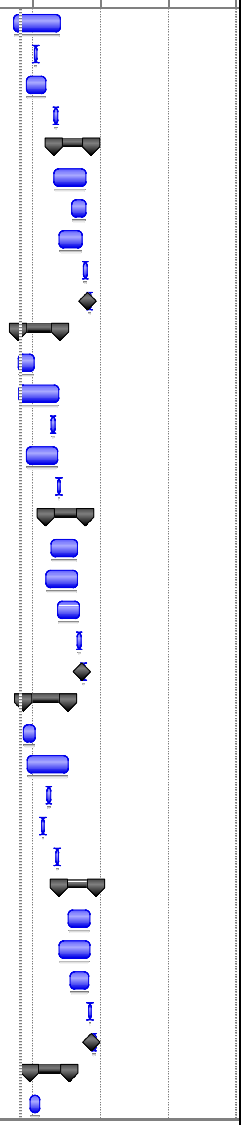


Marriott Hotel at Penn Square and Lancaster County Convention Center

Lancaster, PA

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

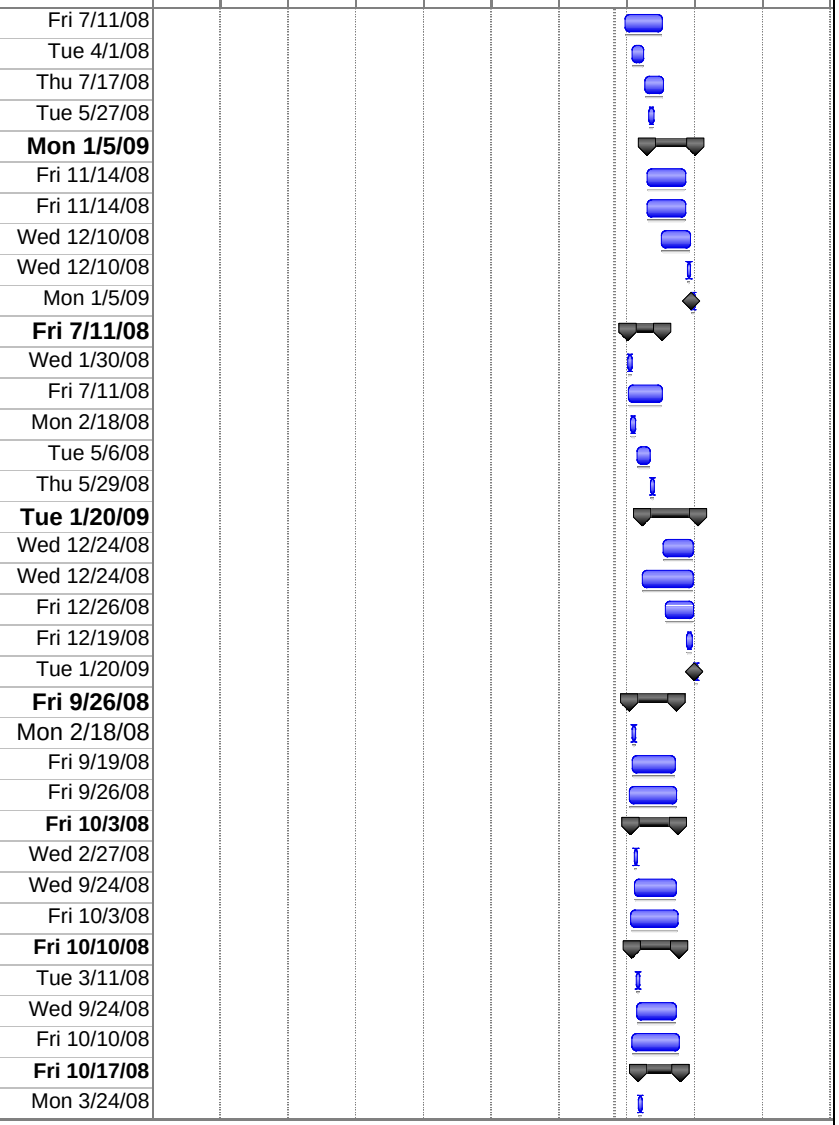
ID	Task Name	Duration	Start	Finish
73	MEP Rough In	180 days	Fri 9/21/07	Thu 5/29/08
74	Mechanical Equipment	10 days	Fri 1/11/08	Thu 1/24/08
75	Exterior Skin	74 days	Thu 11/29/07	Tue 3/11/08
76	Interior Wall Framing	15 days	Fri 4/25/08	Thu 5/15/08
77	**Area F Hotel Lobby Area Finishes**	**144 days**	**Fri 4/25/08**	**Wed 11/12/08**
78	Electrical Distribution and Termination	123 days	Fri 4/25/08	Tue 10/14/08
79	Mechanical/Plumbing Devices	55 days	Wed 7/30/08	Tue 10/14/08
80	Finishes	88 days	Fri 5/23/08	Tue 9/23/08
81	HVAC Startup	15 days	Wed 10/1/08	Tue 10/21/08
82	Area Punchlist and Substantial Completion	14 days	Fri 10/24/08	Wed 11/12/08
83	**Area G Ballroom "A" Shell**	**162 days**	**Tue 10/16/07**	**Wed 5/28/08**
84	F/R/P Structural Concrete	61 days	Tue 10/16/07	Tue 1/8/08
85	MEP Rough In	153 days	Fri 10/19/07	Tue 5/20/08
86	Mechanical Equipment	15 days	Thu 4/10/08	Wed 4/30/08
87	Metal Stud Walls and Windows	120 days	Thu 11/29/07	Wed 5/14/08
88	Curtainwall at Exhibit Hall	10 days	Thu 5/15/08	Wed 5/28/08
89	**Area G Ballroom "A" Finishes**	**152 days**	**Thu 3/13/08**	**Fri 10/10/08**
90	Electrical Distribution and Termination	102 days	Thu 4/10/08	Fri 8/29/08
91	Mechanical/Plumbing Devices	122 days	Thu 3/13/08	Fri 8/29/08
92	Finishes	83 days	Thu 5/15/08	Mon 9/8/08
93	HVAC Startup	16 days	Thu 8/28/08	Thu 9/18/08
94	Area Punchlist and Substantial Completion	14 days	Tue 9/23/08	Fri 10/10/08
95	**Area G Ballroom "B" Shell**	**173 days**	**Tue 11/13/07**	**Thu 7/10/08**
96	F/R/P Structural Concrete	45 days	Tue 11/13/07	Mon 1/14/08
97	MEP Rough In	159 days	Mon 12/3/07	Thu 7/10/08
98	Mechanical Equipment	15 days	Tue 3/18/08	Mon 4/7/08
99	Metal Stud Walls	10 days	Tue 2/19/08	Mon 3/3/08
100	Interior Metal Stud Framing	10 days	Tue 5/6/08	Mon 5/19/08
101	**Area G Ballroom "B" Finishes**	**142 days**	**Fri 5/23/08**	**Mon 12/8/08**
102	Electrical Distribution and Termination	83 days	Fri 7/11/08	Tue 11/4/08
103	Mechanical/Plumbing Devices	118 days	Fri 5/23/08	Tue 11/4/08
104	Finishes	72 days	Mon 7/21/08	Tue 10/28/08
105	HVAC Startup	10 days	Wed 10/29/08	Tue 11/11/08
106	Area Punchlist and Substantial Completion	17 days	Fri 11/14/08	Mon 12/8/08
107	**Area I Meeting and Admin Area Shell**	**152 days**	**Wed 12/19/07**	**Thu 7/17/08**
108	F/R/P Structural Concrete	38 days	Wed 12/19/07	Fri 2/8/08



Marriott Hotel at Penn Square and
Lancaster County Convention Center
Lancaster, PA

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

ID	Task Name	Duration	Start	Finish
109	MEP Rough In	145 days	Mon 12/24/07	Fri 7/11/08
110	Roof	44 days	Thu 1/31/08	Tue 4/1/08
111	Metal Stud Framing	72 days	Wed 4/9/08	Thu 7/17/08
112	Exterior Windows	20 days	Wed 4/30/08	Tue 5/27/08
113	**Area I Meeting and Admin Area Finishes**	**186 days**	**Mon 4/21/08**	**Mon 1/5/09**
114	Electrical Distribution and Termination	150 days	Mon 4/21/08	Fri 11/14/08
115	Mechanical/Plumbing Devices	150 days	Mon 4/21/08	Fri 11/14/08
116	Finishes	113 days	Mon 7/7/08	Wed 12/10/08
117	HVAC Startup	13 days	Mon 11/24/08	Wed 12/10/08
118	Area Punchlist and Substantial Completion	16 days	Mon 12/15/08	Mon 1/5/09
119	**Area J Health Club Level Shell**	**134 days**	**Tue 1/8/08**	**Fri 7/11/08**
120	F/R/P Structural Concrete	17 days	Tue 1/8/08	Wed 1/30/08
121	MEP Rough In	131 days	Fri 1/11/08	Fri 7/11/08
122	Swimming Pool Concrete	20 days	Tue 1/22/08	Mon 2/18/08
123	Ballroom B Roof	50 days	Wed 2/27/08	Tue 5/6/08
124	Metal Stud Walls	15 days	Fri 5/9/08	Thu 5/29/08
125	**Area J Health Club Level Finishes**	**215 days**	**Wed 3/26/08**	**Tue 1/20/09**
126	Electrical Distribution and Termination	116 days	Wed 7/16/08	Wed 12/24/08
127	Mechanical/Plumbing Devices	196 days	Wed 3/26/08	Wed 12/24/08
128	Finishes	110 days	Mon 7/28/08	Fri 12/26/08
129	HVAC Startup	23 days	Wed 11/19/08	Fri 12/19/08
130	Area Punchlist and Substantial Completion	15 days	Wed 12/31/08	Tue 1/20/09
131	**Hotel Tower Level 6**	**183 days**	**Wed 1/16/08**	**Fri 9/26/08**
132	F/R/P Structural Concrete	13 days	Thu 1/31/08	Mon 2/18/08
133	MEP Systems	166 days	Fri 2/1/08	Fri 9/19/08
134	Finishes	183 days	Wed 1/16/08	Fri 9/26/08
135	**Hotel Tower Level 7**	**183 days**	**Wed 1/23/08**	**Fri 10/3/08**
136	F/R/P Structural Concrete	12 days	Tue 2/12/08	Wed 2/27/08
137	MEP Systems	161 days	Wed 2/13/08	Wed 9/24/08
138	Finishes	183 days	Wed 1/23/08	Fri 10/3/08
139	**Hotel Tower Level 8**	**183 days**	**Wed 1/30/08**	**Fri 10/10/08**
140	F/R/P Structural Concrete	13 days	Fri 2/22/08	Tue 3/11/08
141	MEP Systems	153 days	Mon 2/25/08	Wed 9/24/08
142	Finishes	183 days	Wed 1/30/08	Fri 10/10/08
143	**Hotel Tower Level 9**	**163 days**	**Wed 3/5/08**	**Fri 10/17/08**
144	F/R/P Structural Concrete	14 days	Wed 3/5/08	Mon 3/24/08

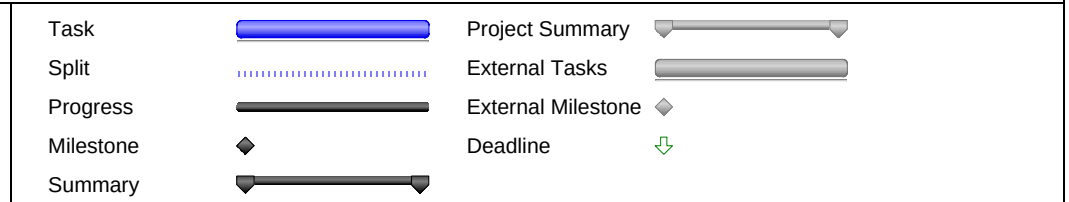


Marriott Hotel at Penn Square and Lancaster County Convention Center

Lancaster, PA

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

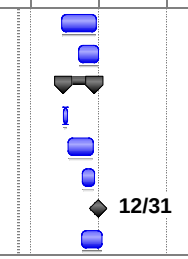
ID	Task Name	Duration	Start	Finish
145	MEP Systems	154 days	Thu 3/6/08	Tue 10/7/08
146	Finishes	74 days	Tue 7/8/08	Fri 10/17/08
147	**Hotel Tower Level 10**	**160 days**	**Mon 3/17/08**	**Fri 10/24/08**
148	F/R/P Structural Concrete	12 days	Mon 3/17/08	Tue 4/1/08
149	MEP Systems	151 days	Tue 3/18/08	Tue 10/14/08
150	Finishes	74 days	Tue 7/15/08	Fri 10/24/08
151	**Hotel Tower Level 11**	**157 days**	**Thu 3/27/08**	**Fri 10/31/08**
152	F/R/P Structural Concrete	13 days	Thu 3/27/08	Mon 4/14/08
153	MEP Systems	148 days	Fri 3/28/08	Tue 10/21/08
154	Finishes	74 days	Tue 7/22/08	Fri 10/31/08
155	**Hotel Tower Level 12**	**154 days**	**Tue 4/8/08**	**Fri 11/7/08**
156	F/R/P Structural Concrete	11 days	Tue 4/8/08	Tue 4/22/08
157	MEP Systems	145 days	Wed 4/9/08	Tue 10/28/08
158	Finishes	74 days	Tue 7/29/08	Fri 11/7/08
159	**Hotel Tower Level 14**	**151 days**	**Fri 4/18/08**	**Fri 11/14/08**
160	F/R/P Structural Concrete	12 days	Fri 4/18/08	Mon 5/5/08
161	MEP Systems	142 days	Mon 4/21/08	Tue 11/4/08
162	Finishes	88 days	Wed 7/16/08	Fri 11/14/08
163	**Hotel Tower Level 15**	**148 days**	**Wed 4/30/08**	**Fri 11/21/08**
164	F/R/P Structural Concrete	13 days	Wed 4/30/08	Fri 5/16/08
165	MEP Systems	139 days	Thu 5/1/08	Tue 11/11/08
166	Finishes	74 days	Tue 8/12/08	Fri 11/21/08
167	**Hotel Tower Level 16**	**167 days**	**Mon 5/12/08**	**Tue 12/30/08**
168	F/R/P Structural Concrete	12 days	Mon 5/12/08	Tue 5/27/08
169	MEP Systems	157 days	Tue 5/13/08	Wed 12/17/08
170	Finishes	77 days	Mon 9/15/08	Tue 12/30/08
171	**Hotel Tower Level 17**	**145 days**	**Thu 5/22/08**	**Wed 12/10/08**
172	F/R/P Structural Concrete	13 days	Thu 5/22/08	Mon 6/9/08
173	MEP Systems	133 days	Fri 5/23/08	Tue 11/25/08
174	Finishes	77 days	Tue 8/26/08	Wed 12/10/08
175	**Hotel Tower Level 18**	**143 days**	**Wed 6/4/08**	**Fri 12/19/08**
176	F/R/P Structural Concrete	13 days	Wed 6/4/08	Fri 6/20/08
177	MEP Systems	139 days	Thu 6/5/08	Tue 12/16/08
178	Finishes	71 days	Fri 9/12/08	Fri 12/19/08
179	**Hotel Tower Level 19 (Presidential Suite)**	**143 days**	**Mon 6/16/08**	**Wed 12/31/08**
180	F/R/P Structural Concrete	12 days	Mon 6/16/08	Tue 7/1/08



Marriott Hotel at Penn Square and Lancaster County Convention Center

Lancaster, PA

ID	Task Name	Duration	Start	Finish
181	MEP Systems	134 days	Tue 6/17/08	Fri 12/19/08
182	Finishes	77 days	Tue 9/16/08	Wed 12/31/08
183	**Tower Mechanical Roof Plan**	**120 days**	**Thu 6/26/08**	**Wed 12/10/08**
184	F/R/P Structural Concrete	16 days	Thu 6/26/08	Thu 7/17/08
185	Mechanical Systems	98 days	Mon 7/21/08	Wed 12/3/08
186	Finishes	48 days	Mon 10/6/08	Wed 12/10/08
187	Project Substantial Completion	0 days	Wed 12/31/08	Wed 12/31/08
188	Tower Punchlist Work	77 days	Fri 10/3/08	Mon 1/19/09



Marriott Hotel at Penn Square and Lancaster County Convention Center

Lancaster, PA

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

Detailed Project Schedule Summary

A detailed project schedule was developed for the Marriott Hotel at Penn Square and Lancaster County Convention Center project to provide a graphic approach towards the phasing and sequencing of construction activities used for the project.

The design phase for the project took place from July '02 – April '04. The project faced challenges from April '04 till approximately May '06, where controversy and opposition tried to derail the construction of the public/private project, along with Owners obtaining permanent financing for the project. After the design phase and procurement of construction activities, and the year and a half of dormancy the project faced due to the challenges, the demolition of the old Watt & Shand department store took place from Oct. '05 – Sept. '06. The construction is scheduled to be substantially complete by Dec. 31st 2008. Below is a brief summary of the attached detailed project schedule. Also see Appendix A for the project phasing plans to help understand the methodology of construction. The project is broken down into areas and floors (for the hotel tower) of construction due to the size of the project and the different crews and systems used for the Hotel versus the Convention Center. Each area or floor is assigned a completion date to allow for areas of the project to be complete without relying on other areas that will be constructed later, this approach facilitates testing of equipment, final cleaning and acceptance of work in place during construction.

Design Phase: **July 24, 2002 – May 12, 2004**

Phase 1: Site Prep: **Oct. 10, 2005 – Sept. 29, 2006**

- Abatement and Demolition
- Façade Stabilization

Phase 2: Construction: **June 6, 2006 – Dec. 31, 2008**

- Area A – Museum Level
- Area B – Convention Entry
- Area D – Exhibit Hall
- Area C – Exhibit Hall "B"
- Area E – Mechanical Room and Laundry Area
- Area F – Hotel Lobby Area
- Area G – Ballroom "A"
- Area H – Ballroom "B"
- Area I – Meeting and Admin Area
- Area J – Health Club Level
- Hotel Tower Level 6

  - Thru -

- Hotel Tower Level 19
- Tower Mechanical Roof Level
- Substantial Completion
- Punchlist Work

Site Plan for Superstructure Phase

See the following 11x17 sheet for the site plan of the superstructure construction phase.

EXISTING OFFICE BUILDING

EAST MIFFLIN STREET

EXISTING PARKING GARAGE

EXISTING BUILDING

SIDEWALK

RAMP TO PARKING GARAGE

S. CHRISTIAN ST.

EAST KING STREET

TEMP. ELECTRIC SERVICE

Concrete Pump Truck

- HOTEL TOWER -

Location 2

Location 1

DROP OFF CIRCLE (TO BE BUILT)

SOUTH QUEEN STREET

PENN SQUARE

EAST VINE STREET

EXISTING BUILDING

SITE PLAN OF SUPERSTRUCTURE SEQUENCE

MARRIOTT HOTEL AT PENN SQUARE AND LANCASTER COUNTY CONVENTION CENTER

0 5 10 20 40 80

LEGEND

- CHAIN FENCE
- JERSEY BARRIER
- EXISTING/HISTORICAL STRUCTURE
- CONSTRUCTION ENTRANCE
- MATERIAL HOISTS (APPROX. LOCATION)
- TRAILER
- CONCRETE TRUCK
- STEEL TRUCK

Site Plan Summary

The attached site plan briefly shows how the contractors will erect the superstructure for the project. Not shown on the plan is an off-site material storage area that the contractors use to store and stage material prior to delivery to the site. This off-site material storage area is located east of the site, approximately one mile east on E. King. St, see Appendix B.

"Two Half's" to the Project

The project can be discussed in terms of the "North Half" of the site and the "South Half" of the site. The "North Half" is the hotel part of the project which is entirely a cast-in-place post-tensioned concrete structure except for the roof over the podium, which is made of deep long span joist. The "South Half" of the site is the convention center part of the project. The convention center is a cast-in-place concrete structure for the museum and convention entry levels, once to the exhibit levels it becomes a structural steel structure. The different materials of the structure greatly influence the means and methods of construction.

Superstructure Sequence

For the "North Half" of the site, a tower crane is to be used to handle materials to erect the cast-in-place concrete structure. The tower crane was sized and to enable a reach to the north-west corner of the building. Along with the tower crane, two material hoists will be used to also help transport men and materials up the tower during construction. The tower crane and hoists will be used to transport the forms and men to form the structure, which is to be all stick-formed. The concrete will be placed by a boom style pump truck for the lower floors of the building, then when it is no longer applicable to use a boom style concrete pump truck a permanent stand pipe will be installed into the tower of the building and concrete will be pumped up the building through the standpipe and then placed with a hose at the end of the stand pipe. During the placing of concrete for the lower floors the boom style pump truck will need to move around the site depending on the location of the required concrete pour. For the attached site plan, the concrete pump is located near the tower which will be near the location of the concrete standpipe.

The "South Half" of the site utilizes both a concrete and steel structure. As stated above, the museum and convention entry levels are cast-in place concrete. To erect the concrete in this area, a 100 ton mobile crane is used to transport formwork, and place concrete with a bucket for small pours (columns). A concrete pump truck is primarily used to place the concrete for the "South Half". Above the Exhibit hall floor the superstructure transitions to steel, to enable the open floor plan and long spans. To erect this steel the steel contractor will use a 240 Ton crane. The erection will require multiple mobilizations due to the project configuration. The first series of mobilizations will be to erect sequences 01 thru 10 (see Figure 1 below). The crane will mobilize at sequence 02 to erect sequence 01 and 02, then remobilize where sequence 03 is located to erect sequences 03 and 04, then the crane will move out of the building footprint to finish erecting sequences 05 thru 10, remobilizing as necessary. The second series of crane mobilizations will be required to erect the steel for the roof of the podium, sequences 11-13 and the Convention Center roof that is sloped away from the tower, sequences 14, 15, 16 and 17. Sequence 17 is located above the north-east corner of sequence 16. The attached site plan reflects the period when the 240 ton mobile crane mobilizes in sequence 02 to erect sequences 01 and 02. The deliveries of steel for the project will arrive on South Queen St. The steel will be picked directly from the truck when applicable and the trucks will need to back onto the site to allow the crane to reach them. A smaller crane/lift will also be used to remove the steel from the trucks to

shake it out to field assemble larger pieces of steel mainly the large bow-string trusses that will arrive on site in three pieces.

Figure 1. Steel Erection Sequence

Critique of the Contractor Layout

The "North Half" of the site is very congested in having the material hoists, tower crane, and concrete standpipe and thus concrete deliveries all to the same area. The situation came about due to the design locating the material hoists on an elevated structural concrete slab, and thus could not support the loads of the material hoists without shoring being in place throughout the material hoist duration. The only other feasible location for the material hoist was determined to be near the tower crane, to allow for the hoists to be near the tower. To help alleviate some of the congestion of these three activities the concrete standpipe could be moved to the north-east corner of the tower (where the hoists were originally located). This would require the concrete trucks to come in on King St, a lane of King. St. would need to be closed to allow for the trucks maintain a steady flow of concrete.

Assemblies Estimate

The building enclosure cost was estimated for the project using an assemblies estimate for each type of exterior wall and roof construction. The Hotel utilizes two types of exterior walls; the architectural precast panels with 3-5/8" metal stud back up, and the existing terracotta and marble Watt and Shand façade which is to be stabilized and restored. On top of the hotel tower, the roof assembly is comprised EPDM with 4" of rigid insulation on a cast in place concrete slab, along with EPDM roofing with rigid insulation on acoustical metal deck on top of the joists on the podium roof. On the other hand, the Convention Center uses four main wall types and two types of roof construction. A face brick assembly with metal studs comprises the majority of the façade, there is also EIFS and metal panels both on metal studs. Mixed in amongst the various wall types are Traco series windows and glass curtain wall systems at all the major entrances.

See the following sheet for the building enclosure estimate.

Upon review of the assemblies estimate it can clearly be seen that restoring an existing façade is extremely expensive – 10x more expensive then constructing a new wall with EIFS and metal studs. Due to the façade's historical importance to the Lancaster area as being part of the streetscape for over 100 years the cost can be justified to maintain and restore it. As part of maintaining a high level of quality on the project the owner's decided to keep the architectural precast façade even when presented with potential large cost savings by switching to an alternative such as a brick façade that is almost half the cost, or the EIFS which is approximately one-third the cost of the architectural precast. The cheaper facades of EIFS and metal panels are less used on the project and located on the rear of the building near the loading docks where they will not be seen by the public. In using these lower cost alternatives it does help reduce the overall cost of the building enclosure.

See Appendix E for notes of take off quantities.

Assumptions:

1. Precast panels price is based off 10x10 panel size, aggregate finish, 2in of rigid insulation, for high rise construction.
2. A standard 4" metal stud size is used for the Convention Center wall types.
3. An averaged allowance was used to estimate the cost of the glass and glazing in the façade ($50/sf)

Marriott Hotel at Penn Square and Lancaster County Convention Center
Assemblies Estimate of Building Enclosure

	Wall Types	Quantity (SF)	Cost/SF	Cost
B2010	Architectural precast concrete panels welded to embeds in cast in place concrete floor slabs with 3 5/8" metal stud back up, batt insulation (R-19)	54,753	$45	$2,463,885
F1020	Existing façade of Watt & Shand department store, to be restored. (includes stabilization)	30,572	$175	$5,350,100
B2010	Brick face with 4" metal stud backup with bituminous damproofing on 5/8" glass mat gysum sheating with batt insulation (R-19)	35,322	$24	$847,728
B2010	EIFS 3" thick on 5/8" glass mat gysum sheathing with 3 5/8" batt insulation (R-19) on 4" metal studs	14,660	$17.50	$256,550
B2010	Metal panels on 4" metal studs with bituminous damproofing on 5/8" glass mat gysum sheating and batt insulation (R-19)	1,894	$15	$28,410
B2020	Traco Windows (7900 series) / Glass curtainwall system	38,448	$50	$1,922,400
	Wall Total:	175,649	$61.88	$10,869,073

	Roof Types	Quantity (SF)	Cost/SF	Cost
B1020	EPDM roofing - 4" minimum rigid insulation (R-22) with additional tapered insulation for drainage on painted acoustical metal deck	38,000	$20	$760,000
B1020	EPDM roofing - 4" minimum rigid insulation (R-22) with additional tapered insulation for drainage on cast-in-place concrete slab	12,000	$20	$240,000
B1020	PVC roofing, applied decorative rib at 5' oc, 4" of rigid insulation (R-22) on 3 1/2" acoustical metal deck with acoustical batts; painted	45,000	$22	$990,000
	Roof Total:	95,000	$21	$1,990,000
	Building Enclosure Total:	**270649**	**$47.51**	**$12,859,073**

Detailed Structural System Estimate

A detailed estimate of the structural system was performed. The cost information associated with the quantities from the estimate is provided by RS Means – Building Construction Cost Data – 2008. The Hotel and Convention Center is a combination of a steel frame and cast-in-place concrete structure, thus the estimate is broken down accordingly. Below is a summary of totals from the structural estimate.

Concrete	
Caissons	$1,338,180
Retaining Walls	$1,491,769
Slab on Grade	$396,753
Footings	$171,668
Shear walls (Foundation)	$190,008
Elevator/Shear Walls	$1,737,709
Concrete Beams	$694,783
Columns	$2,522,568
Elevated Structural Slabs	$6,605,692
Concrete Total:	$15,149,130

Steel	
Columns	$384,600
Base Plates	$8,750
Braces	$73,530
Beams	$999,200
Trusses	$1,453,788
Joists	$1,459,260
Acoustical Metal Decking	$495,000
Steel Total:	$4,874,128
Total:	**$20,023,258**

The steel contract for the project has a value of $7,986,000 (original contract value). The difference between the estimated total below and the contract value can be attributed to several reasons. First, the estimate above excludes the portico steel as a final design for the portico steel around the entrances has not been made available in time to be included in this estimate, though it should be noted that the allowance for the portico steel is substantial. Secondly, the multiple mobilizations needed to erect the steel increases the costs for the project, as mentioned previously. Lastly, the nelson studs for the project were excluded from the estimate.

The caisson contract for the project has a value of $1,085,000 (original contract value), and the total for the estimate below is $1,338,180. The difference can be attributed to the assumption made that all caissons are 60” diameter and 40’ deep, while the caissons actually varied in size from 36”- 90” diameter and varied in depth (to meet intact rock requirements).

The concrete contract for the project has a value of $16,200,000 (original contract value), and the total concrete estimate below is $15,149,130. The difference between these values is attributable to the exclusions made; the pool construction, embeds, and rock anchors in the caissons.

For the estimate performed the overall the structural system comes out to be **$48.60 / SF**. (Keep in mind the exclusions that are made in this estimate.)

The following sheet includes a more detailed summary for the costs associated with the items listed above. The concrete costs are broken down to include the following items; concrete, placing, finishing, formwork, rebar, (re)shoring and PT cable costs.

Appendix C includes a listing of quantities associated with the concrete estimate. Appendix C is separated into three categories, category one is the foundation system (which includes caissons, retaining walls, slab on grade, footings and shear wall), category two includes beams and shear walls, and category three includes columns and elevated structural slabs. Appendix D includes a detailed listing of the steel for the estimate. The steel is categorized into columns, base plates, braces, beams, trusses, joists, and acoustical metal decking. R.S. Means cost data needed to be adjusted for the steel beams for the project, due to some of the complexities in the curved floor plans, which require curved beams.

Assumptions:

1. All concrete columns were assumed to be 24”x24” and a representative reinforcement layout was assumed typical for each story.
2. Each concrete column was assumed to have a drop panel of a size of 10’x10’x1’.
3. The concrete beams were assumed to be typical for each designation by a representative member size from the beam schedule. All beams were assumed to be 20’ long.
4. The slab floor thicknesses were assumed constant throughout a floor for each story.
5. The shoring was based off a 6’x6’ support layout pattern – 36SF/shore.
6. Waste factors applied to the quantities were;
   formwork 15%, concrete 10%, rebar 5%.
7. The shear walls were assumed typical for the four that run the full height of the structure and the four that do not.
8. Caissons were assumed to be typical in having a 60” diameter and a depth of 40’.
9. The 19th floor (Presidential Suite) was assumed typical of the other tower floors.

Exclusions:

1. Pool construction
2. Embeds, waterstops, keyways, expansion joints in concrete
3. Nelson studs
4. Rock anchors
5. Portico steel

Marriott Hotel at Penn Square and Lancaster County Convention Center
Structural System Detailed Estimate

Concrete

	Concrete	Placing	Finishing	Formwork	Rebar	Shoring	Reshoring	Slab Hardener	PT Cables	Totals
Caissons	$704,000	$113,920	-	$0	$520,260	-	-	-	-	$1,338,180
Retaining Walls	$293,520	$90,502	-	$1,055,134	$52,613	-	-	-	-	$1,491,769
Slab on Grade	$190,000	$53,568	$19,220	$0	$133,965	-	-	-	-	$396,753
Footings	$71,760	$16,146	-	$57,727	$26,035	-	-	-	-	$171,668
Shearwalls (Foundation)	$92,640	$48,597	-	$26,863	$21,908	-	-	-	-	$190,008
Elevator/Shear Walls	$327,600	$154,000	-	$1,208,154	$47,955	-	-	-	-	$1,737,709
Concrete Beams	$157,080	$85,085	-	$319,000	$133,618	-	-	-	-	$694,783
Columns	$713,359	$335,852	-	$1,119,357	$354,000	-				$2,522,568
Elevated Structural Slabs	$1,337,355	$535,534	$145,133	$2,686,919	$693,750	$172,155	$627,602	$198,000	$209,244	$6,605,692
								Concrete Total:		**$15,149,130**

Steel

	Columns	Base Plates	Braces	Beams	Trusses	Joists	Acoustical Metal Decking	
Cost	$384,600	$8,750	$73,530	$999,200	$1,453,788	$1,459,260	$495,000	$4,874,128
							Steel Total:	**$4,874,128**
							Total Structural System:	**$20,023,258**

General Conditions Estimate

A general conditions estimate was performed for the project duration for the costs incurred by the Construction Manager. Below is a summary of the staffing costs, office costs and other operating costs.

Staffing Cost	% on Project	Quantity	Unit	Total/Unit	Total
Project Executive	25	22	Month	$20,800	$114,400
Sr. Project Manager	100	22	Month	$15,800	$347,600
Project Manager	100	22	Month	$11,800	$259,600
Assistant Project Manager	100	22	Month	$9,200	$202,400
Quality Assurance Project Manager	100	22	Month	$11,800	$259,600
Cost Engineer	75	22	Month	$9,200	$151,800
Project Scheduler	10	22	Month	$10,000	$22,000
Project Coordinator	100	22	Month	$7,500	$165,000
V.P. Operations	80	22	Month	$18,300	$322,080
Sr. Project Superintendent	100	22	Month	$15,000	$330,000
Area Superintendent (Hotel)	100	15	Month	$12,500	$187,500
Area Superintendent (Convention Center)	100	22	Month	$12,500	$275,000
Safety Director	10	22	Month	$10,000	$22,000
Office Costs					
Jobsite Trailer		22	Month	$500	$11,000
Field Office Expenses; office equipment, supplies, telephone bill, lights and HVAC		22	Month	$625	$13,750
Rental Office for Management Staff		22	Month	$3,500	$77,000
Rental Office Expenses; office equipment, supplies, telephone bill, lights and HVAC		22	Month	$625	$13,750
Other Costs					
Printing		412000	SF	$0.22	$90,640
Mailing/Shipping		22	Month	$500	$11,000
Travel	500 Miles	22	Month	0.45/Mile	$4,950
Parking	5 Passes	22	Month	$70/Pass	$7,700

Totals	
Staffing Costs:	$2,658,980
Office Costs:	$115,500
Other Costs:	$114,290
Total:	**$2,888,770**

Typical "general conditions" type costs for the project have been distributed and assigned to the most suitable prime contractor. For example; the concrete contractor has the tower crane, the general trades contractor has the material hoists and clean-up, the electrical contractor has the temporary power and lighting, etc… Additionally the owner has taken the responsibility for the costs of the building permit and testing agency.

The following pages include an estimate for these "general conditions" type costs for the project. The costs associated with these items span across several different prime contractors' general conditions. These costs are worth consideration as many of them are directly related to the duration of the project. Typical fees and contingency allowances are also included in this chart as reference to judge the values used on the project. From above, the CM's cost total is $2,888,770, which is equal to 2.75% of the construction cost for the project. Based on the range given in the chart, this is in the typical range for a CM's fee.

Marriott Hotel at Penn Square and Lancaster County Convention Center
Typical General Conditions Costs

015113 - Temporary Utilities		Quantity	Unit	Cost/Unit	Total
015113.80.0100	Heat, incl. fuel and operation, per week, 12 hrs. per day	4,120	C.S.F.	$16.25	$401,700
015113.80.0350	Lighting, incl. service lamps, wiring & outliers, avg.	4,120	C.S.F.	$27.75	$114,330
015113.80.0400	Power for job duration incl. lighting, elevator, etc. avg.	4,120	C.S.F.	$75.00	$309,000
015213 - Field Offices and Sheds					
015213.20.0200	Trailer, furnishes, no hookups, 50'x12' per month	8	Each	$410	$3,280
015213.20.1200	Storage boxes, 20'x8', rent per month	8	Each	$80.50	$644
015213.40.0010	Field Office Expenses; office equipment, supplies, telephone bill, lights and HVAC	8 @ 20	Month	$622.00	$99,520
015416 - Temporary Hoists					
015416.50.0100	Weekly Forklift Crew: All-terrain forklift, 45' lift, 35' reach, 9000lb. Capacity	10	Month	$4,675	$46,750
015419 - Temporary Cranes					
015419.50.0500	80-ton	80	Day	$2,800	$224,000
015419.50.0600	100-ton	80	Day	$4,625	$370,000
015419.60.0100	Tower Crane, excludes concrete footing, Static tower crane, 130' high, 106' job, 6200lb. capacity	10	Month	$34,700	$347,000
015423 - Temporary Scaffolding and Platforms					
015423.70.0090	Scaffolding: Building exterior, wall face, 1 to 5 stories, 6'-4" x 5' frames	500	C.S.F.	$178	$89,000
015436 - Equipment Mobilization					
015436.50.2300	Over 75 ton equipment	25	Each	$1,125	$28,125
015439.70.0010	Small tools (as % of contractor's work, avg.)	$50,000,000		1.25%	$625,000
0156 - Temporary Barriers and Enclosures					
015613.60.0200	Reinforced polyethylene 3 mils thick, white	60,000	SF	$0.17	$10,200
015613.90.0200	Winter protection; tarpaulins hung over scaffolding, 8 uses, not including scaffolding	40,000	SF	$0.78	$31,200
015623.10.0300	Stock units, 6' high, 8' wide, plain, buy	20	Each	$480.00	$9,600
015629.50.2200	Protection, sidewalks, 2"x12" planks	5,000	SF	$2.04	$10,200
0158 - Temporary Project Signage					
015813.50.0020	High intensity reflectorized, no posts, buy	100	SF	$19.70	$1,970
0171 - Examination and Preparation					
017123.13.1200	Construction Layout; crew for layout of building, 3 person crew	8	Day	$1,625	$13,000

0174 - Construction and Waste Management

017413.20.0050	Cleanup of floor area, continuous, per day, during construction	10,300	M.S.F.	$39.00	$401,700
017413.20.0100	Final cleaning by GC at end of job	$16,000,000	%	0.65%	$104,000

019113 - Commissioning

019113.50.0100	Commissioning: Including performance verification, O&M, training	$105,000,000		0.50% of project cost	$525,000

			Total		**$3,765,219**

Typical Fees and Contingency Allowances

011131 - Fees

011131.10.0010	Architectural Fees	6-16%
011131.20.0010	Construction Management Fees	2.5-4%
011131.30.0010	Engineering Fees	
	Electrical	4.1-10.1%
	Elevator	2.5-5%
	Food Service	8-12%
	Landscaping	2.5-6%
	Mechanical (Plumbing & HVAC)	4.1-10.1%
	Structural	1-2.5%

012116 - Contingency Allowances

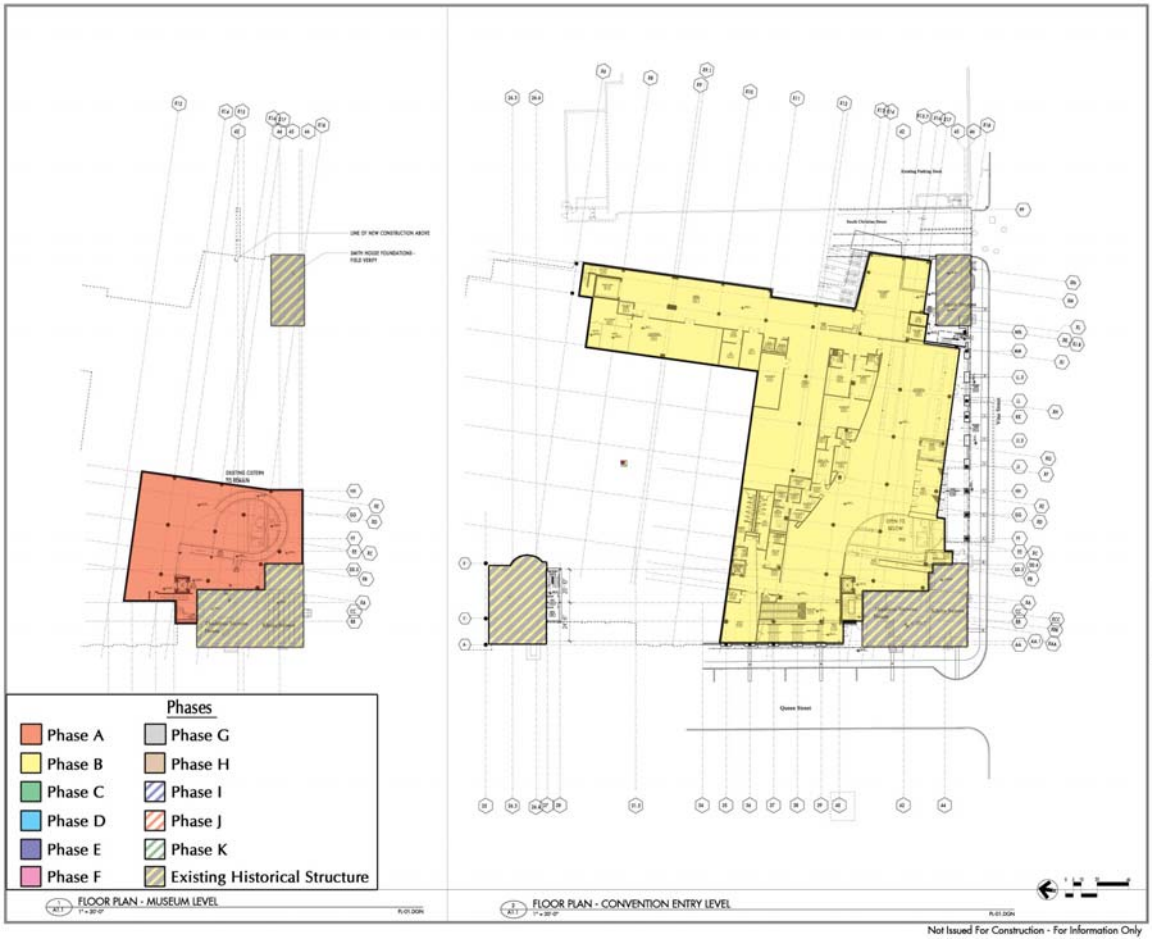
012116.50.0020	Conceptual stage	20%
012116.50.0050	Schematic stage	15%
012116.50.0100	Preliminary working drawings	10%
012116.50.0150	Final working drawings	3%

013113 - Project Coordination

013113.90.0010	Performance Bond	.60-2.5%

Appendix A

Attached are the color coded phasing plans.



Not Issued For Construction - For Information Only

PENN SQUARE CENTER
MARRIOTT HOTEL AND
LANCASTER COUNTY
CONVENTION CENTER

Lancaster, Pennsylvania

PENN SQUARE PARTNERS
LANCASTER COUNTY CONVENTION
CENTER AUTHORITY

FLOOR PLAN
MUSEUM LEVEL
AND CONVENTION
ENTRY LEVEL

A1.1

Not Issued For Construction - For Information Only

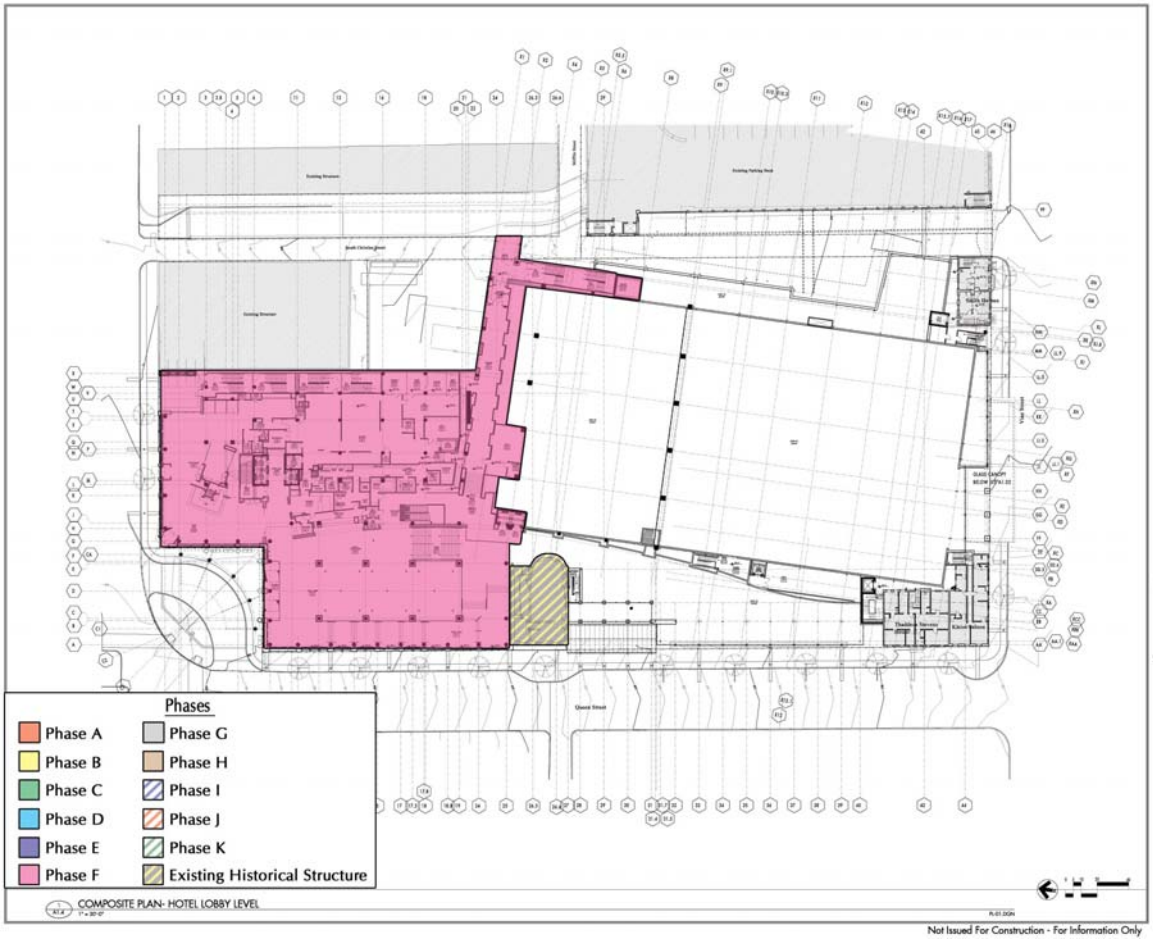
PENN SQUARE CENTER
MARRIOTT HOTEL AND
LANCASTER COUNTY
CONVENTION CENTER

Lancaster, Pennsylvania

PENN SQUARE PARTNERS
LANCASTER COUNTY CONVENTION
CENTER AUTHORITY

FLOOR PLAN
EXHIBIT HALL
LEVEL

A1.3



COMPOSITE PLAN- HOTEL LOBBY LEVEL

PENN SQUARE CENTER
MARRIOTT HOTEL AND
LANCASTER COUNTY
CONVENTION CENTER

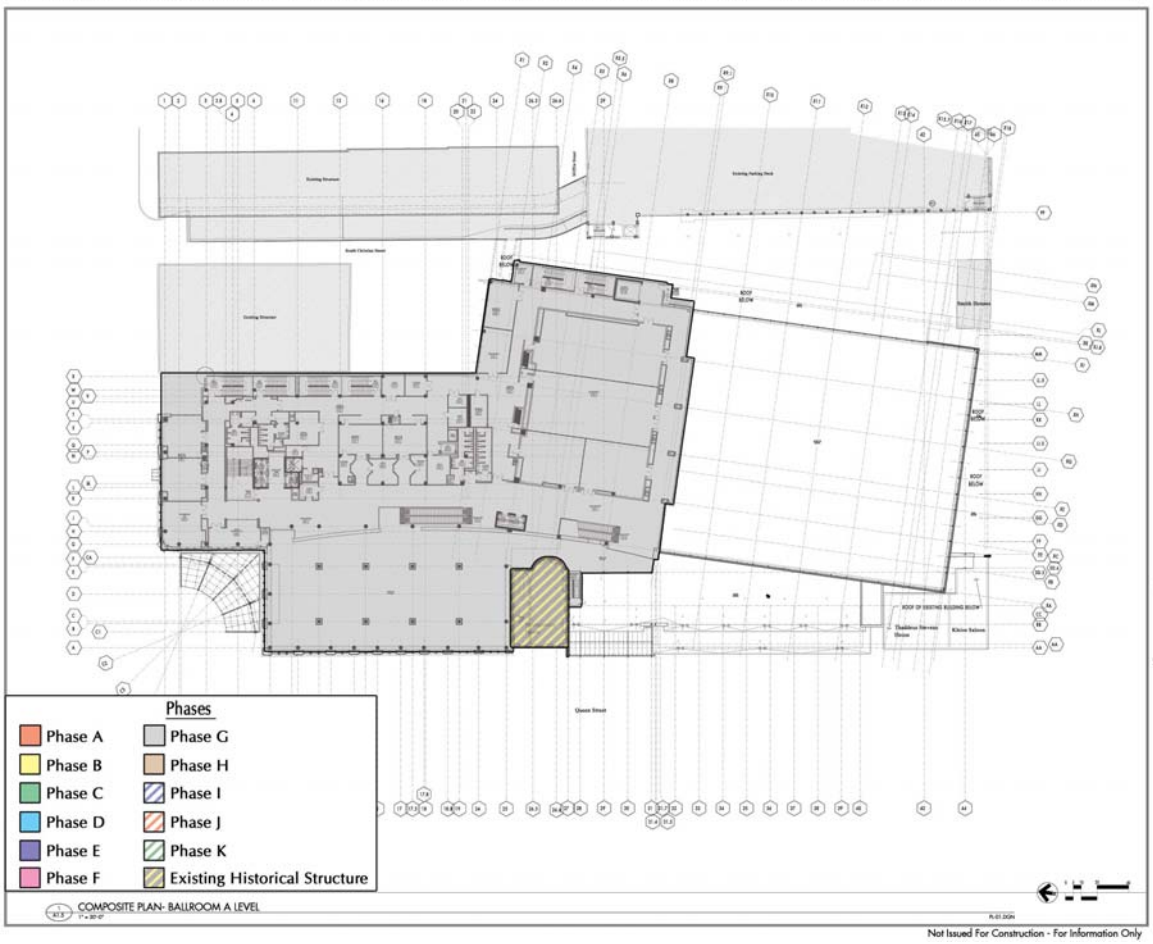
Lancaster, Pennsylvania

PENN SQUARE PARTNERS
LANCASTER COUNTY CONVENTION
CENTER AUTHORITY

FLOOR PLAN
HOTEL LOBBY
LEVEL

A1.4

Not Issued For Construction - For Information Only



COMPOSITE PLAN- BALLROOM A LEVEL

PENN SQUARE CENTER
MARRIOTT HOTEL AND
LANCASTER COUNTY
CONVENTION CENTER

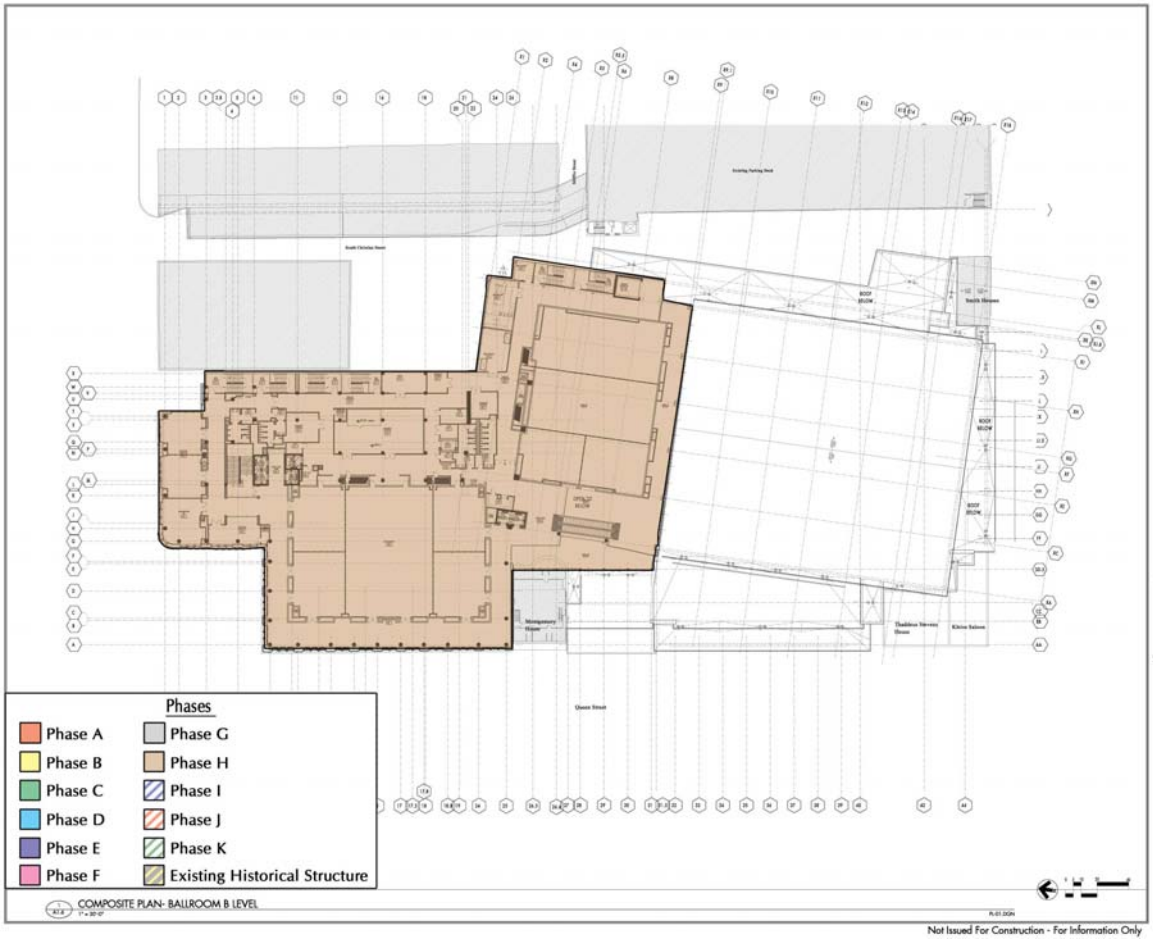
Lancaster, Pennsylvania

PENN SQUARE PARTNERS
LANCASTER COUNTY CONVENTION
CENTER AUTHORITY

FLOOR PLAN
BALLROOM A LEVEL

A1.5

Not Issued For Construction - For Information Only



COMPOSITE PLAN- BALLROOM B LEVEL

PENN SQUARE CENTER
MARRIOTT HOTEL AND
LANCASTER COUNTY
CONVENTION CENTER

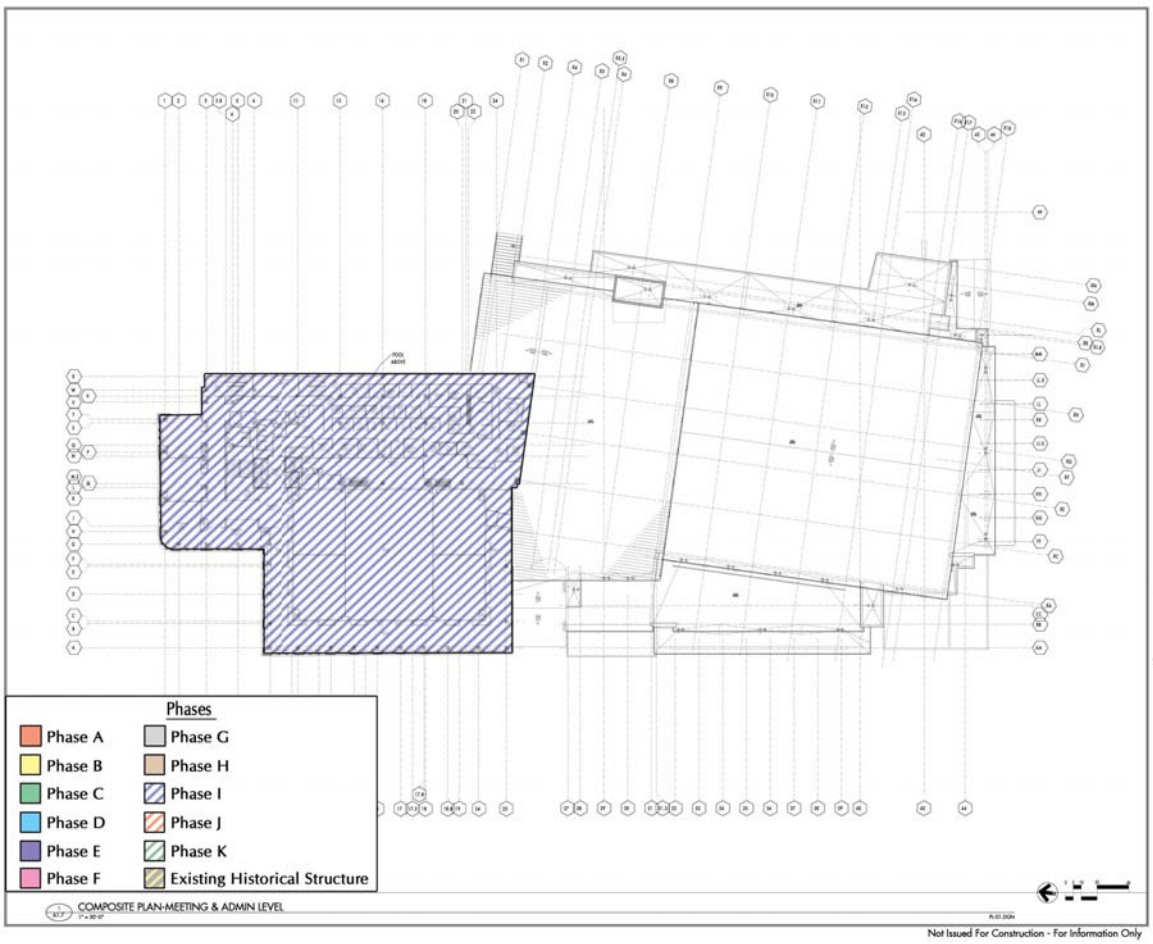
Lancaster, Pennsylvania

PENN SQUARE PARTNERS
LANCASTER COUNTY CONVENTION
CENTER AUTHORITY

FLOOR PLAN
BALLROOM B LEVEL

A1.6

Not Issued For Construction - For Information Only



COMPOSITE PLAN-MEETING & ADMIN LEVEL

PENN SQUARE CENTER
MARRIOTT HOTEL AND
LANCASTER COUNTY
CONVENTION CENTER

Lancaster, Pennsylvania

PENN SQUARE PARTNERS
LANCASTER COUNTY CONVENTION
CENTER AUTHORITY

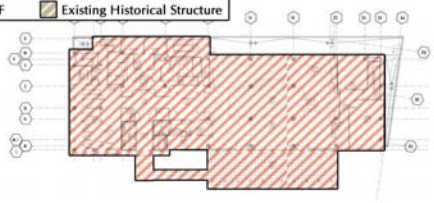
FLOOR PLAN
MEETING AND ADMIN
LEVEL

A1.7

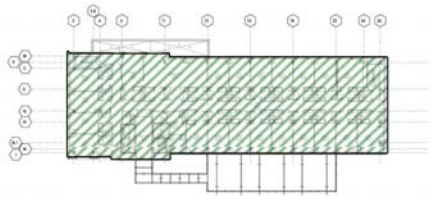
Not Issued For Construction - For Information Only

Phases

- Phase A
- Phase B
- Phase C
- Phase D
- Phase E
- Phase F
- Phase G
- Phase H
- Phase I
- Phase J
- Phase K
- Existing Historical Structure

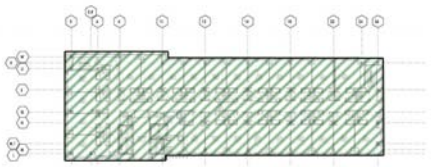


COMPOSITE PLAN- HEALTH CLUB LEVEL



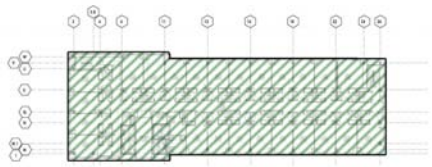
NOTE:
ROOM 640 EXP.
ROOM 740 STORAGE.

COMPOSITE PLAN- GUESTROOM TOWER LEVELS 6TH & 7TH



NOTE:
ROOM 840 STORAGE.
ROOM 940 EXP.
ROOM 1040 STORAGE.
ROOM 1140 STORAGE.
ROOM 1240 EXP.

COMPOSITE PLAN- GUESTROOM TOWER LEVELS 8TH THROUGH 11TH



NOTE:
ROOM 1340 EXP.
ROOM 1340 STORAGE.
ROOM 1440 STORAGE.
ROOM 1540 EXP.
ROOM 1640 STORAGE.

COMPOSITE PLAN- GUESTROOM TOWER LEVELS 12TH THROUGH 16TH

PENN SQUARE CENTER
MARRIOTT HOTEL AND
LANCASTER COUNTY
CONVENTION CENTER

Lancaster, Pennsylvania

PENN SQUARE PARTNERS
LANCASTER COUNTY CONVENTION
CENTER AUTHORITY

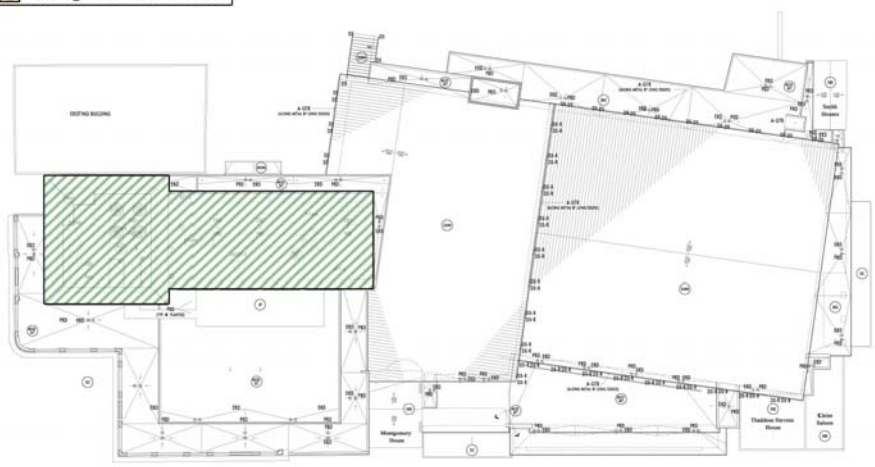
FLOOR PLAN
HEALTH CLUB &
GUESTROOM
LEVELS 6TH THRU 16TH

A1.8

Not Issued For Construction - For Information Only

Phases

- Phase A
- Phase B
- Phase C
- Phase D
- Phase E
- Phase F
- Phase G
- Phase H
- Phase I
- Phase J
- Phase K
- Existing Historical Structure



ROOF LEGEND

MODIFIED BITUMEN ROOFING WITH GRAVELLES IN SEAMS		PAVERS ON 2" MIN. SAND BED OVER WATER PROOFING UNDERLAYMENT	CND	CONDUCTOR HEAD TO DOWN SPOUT	S FAN	SMOKE EXHAUST FAN - SEE MECHANICAL DRAWINGS	
MEMBRANE ROOFING		EXISTING ROOF TO REMAIN	DS-E	DOWN SPOUT TO RAIN LEADER	P FAN	STAIR PRESSURIZATION FAN - SEE MECHANICAL DRAWINGS	
FACTORY FINISHED STANDING SEAM METAL ROOF PANEL WITH SNAP LOCK SEAM - CUSTOM COLOR SELECTED BY ARCHITECT		PRIMARY ROOF DRAIN - SEE PLUMBING FOR SIZING CRITERIA	DS	DOWN SPOUT TO STORM SYSTEM	RTU	ROOF TOP UNIT - SEE MECHANICAL DRAWINGS	
		EMERGENCY OVERFLOW ROOF DRAIN - SEE PLUMBING FOR SIZING CRITERIA	MECH E	MECHANICAL EQUIPMENT - SEE MECHANICAL DRAWINGS	C FAN	COOLING TOWER - SEE MECHANICAL DRAWINGS	
GLASS CANOPY		SCUPPER THROUGH WALL TYPE (MIN. 4"H X 8"W)	V VENT	PLUMBING VENT - SEE PLUMBING DRAWINGS	A-GTR	ALUMINUM GUTTER - CUSTOM COLOR SELECTED BY ARCHITECT	

COMPOSITE ROOF PLAN

PENN SQUARE CENTER
MARRIOTT HOTEL AND
LANCASTER COUNTY
CONVENTION CENTER

Lancaster, Pennsylvania

PENN SQUARE PARTNERS
LANCASTER COUNTY CONVENTION
CENTER AUTHORITY

ROOF PLAN

A1.10

Not Issued For Construction - For Information Only

Appendix B

Attached is the map of the off site storage location used for the project.

Site Map

Off-Site Storage & Staging Area

- Off-Site Storage & Staging Area
- Project Site

Appendix C

Attached are the spreadsheets used for the detailed structural concrete estimate.

Marriott Hotel at Penn Square and Lancaster County Convention Center
Structural Concrete Quantity Take Off and Estimate

Foundation System

Caissons

Quantity	Diameter (in)	Length (ft)	Volume (ft^3)	Concrete (CY)	Vertical	Ties	Rebar (lbs)
200	60	40	157079	5818	12 #10	#3 @12"	455600

Retaining Wall

Quantity	Width (ft)	Length (ft)	Height (ft)	Volume (ft^3)	Concrete (CY)	Formwork (SF)	Side A	Side B	Rebar (lbs)
1	1	280	14	47040	1742	94080	#7 @ 18"	#7 @ 9"	32050
1	1	200	9	1800	67	3600	#4 @ 9"	#4 @ 9"	4755
1	1.166	1200	8	11200	415	19200	#4 @ 10"	#4 @ 10"	21375

Slab On Grade

Quantity	Area (ft^2)	Depth (ft)	Volume (ft^3)	Concrete (CY)	Horizontal	Rebar (lbs)
1	12191	0.25	4064	151	#4 @12" EW	16336
1	21850	0.333	7283	270	#4 @12" EW	29279
1	29500	0.667	19667	729	#4 @12" EW	39530
1	34100	0.333	11367	421	#4 @12" EW	45694

Footings

Quantity	Width (ft)	Length (ft)	Depth (ft)	Volume (ft^3)	Concrete (CY)	Formwork (SF)	Top Layer	Bot. Layer	Rebar (lbs)
6	5	5	1.1667	175	6.5	140	5 #6 H	5 #6	900
1	2.5	280	1	700	26	1400	2 #6 H	2 #6 H	1682
1	2.5	1200	1	3000	111	6000	2 #6 H	2 #6 H	7210
1	3	1200	3	10800	400	2400	4 #6 H	4 #6 H	14420

Shearwalls

Quantity	Width (ft)	Length (ft)	Depth (ft)	Volume (ft^3)	Concrete (CY)	Formwork (SF)	Vertical	Horizontal	Ties	Rebar (lbs)
4	17	17	15	17340	642	2176	50 #10	3 #5 @ 8"	#3	22000
5	8	8	5	1600	60	800	50 #10	3 #5 @ 8"	#3	2200

Marriott Hotel at Penn Square and Lancaster County Convention Center
Structural Concrete Quantity Take Off and Estimate

Foundation System

	True Totals			With Waste Factors		
Item	**Concrete (CY)**	**Formwork (SF)**	**Rebar(tons)**	**Concrete (CY)**	**Formwork (SF)**	**Rebar(tons)**
Caissons	5818	0	227.8	6400	0	239.2
Retaining Wall	2224	116880	29.1	2446	134412	30.5
Slab On Grade	1571	0	65.4	1728	0	68.7
Footings	543.5	9940	12.1	598	11431	12.7
Shearwalls	702	2976	12.1	772	3422	12.7

Foundation System

	Item	Concrete (CY)	$/CY	Total
033105.35.0150	**Caissons**	6400	110	$704,000
033105.35.0350	**Retaining Wall**	2446	120	$293,520
033105.35.0150	**Slab On Grade**	1728	110	$190,080
033105.35.0350	**Footings**	598	120	$71,760
033105.35.0350	**Shearwalls**	772	120	$92,640

	Item	Placing (CY)	$/CY	Total
033105.70.2100	**Caissons**	6400	17.80	$113,920
033105.70.5100	**Retaining Wall**	2446	37.00	$90,502
033105.70.4350	**Slab On Grade**	1728	31.00	$53,568
033105.70.1950	**Footings**	598	27.00	$16,146
033105.70.2650	**Shearwalls**	772	62.95	$48,597

	Item	Finishing (SF)	$/SF	Total
	Caissons			$0
	Retaining Wall			$0
033529.30.0125	**Slab On Grade**	31000	0.62	$19,220
	Footings			$0
	Shearwalls			$0

	Item	Formwork (SF)	$/SF	Total
	Caissons			$0
031113.85.2550	**Retaining Wall**	134412	7.85	$1,055,134
	Slab On Grade			$0
031113.45.5150	**Footings**	11431	5.05	$57,727
031113.85.2550	**Shearwalls**	3422	7.85	$26,863

	Item	Rebar(tons)	$/Ton	Total
032110.60.0360	**Caissons**	239.2	2175	$520,260
032110.60.0700	**Retaining Wall**	30.5	1725	$52,613
032110.60.0600	**Slab On Grade**	68.7	1950	$133,965
032110.60.0500	**Footings**	12.7	2050	$26,035
032110.60.0700	**Shearwalls**	12.7	1725	$21,908

Item	Total
Caissons	$1,338,180
Retaining Wall	$1,491,769
Slab On Grade	$396,833
Footings	$171,668
Shearwalls	$190,008
Total	**$3,588,457**

Marriott Hotel at Penn Square and Lancaster County Convention Center
Structural Concrete Quantity Take Off and Estimate

Elevator / Shear Walls

Elevator / Shear Walls

Quantity	Length (ft)	Width (ft)	No. Sides	Height (ft)	Volume (ft^3)	Concrete (CY)	Formwork (SF)	Vertical	Horizontal	Rebar (lbs)
4	15	1	4	210	50400	1867	100800	48#5	#4 @ 12"	18933
4	15	1	4	50	12000	445	24000	53#8	3 #5@12"	16463
1	20	1.5		210	6300	233	9030	20#5	3 #5@12"	17522

Concrete Beams

Concrete Beams

Designation	Quantity	Width (in)	Height (in)	Length (ft)	Volume (ft^3)	Concrete (CY)	Formwork (SF)	Bot. Bars	Top Bars	Stirrups	Rebar (lbs)
TBM 1-2	2	15	14	20	58	2.2	100	2#7	2#5	#3 @ 12	250
GBM 1-3	3	36	24	20	360	13.3	360	2#9	2#9	#3 @ 12	792
CBM 1-12	12	24	24	20	960	35.6	1440	4#8	4#8	#3 @ 12	4394
EBM 1-12	12	24	30	20	1200	44.4	1680	6#9	4#6	#3 @ 12	6157
BM 1-64	64	24	24	20	5120	189.6	7680	4#10	4#8	#3 @ 12	31689
2BM1-2BM31	31	24	24	20	2480	91.9	3720	4#8	4#6	#3 @ 12	9893
3BM1-3BM36	36	24	36	20	4320	160.0	5040	4#8	4#6	#3 @ 12	11489
4BM1-4BM21	21	24	24	20	1680	62.2	2520	4#8	4#6	#3 @ 12	6702
5BM1-5BM50	50	36	60	20	15000	555.6	11000	6#9	4#7	#3 @ 12	30212
6BM1-6BM5	5	20	20	20	278	10.3	600	2#9	2#5	#3 @ 12	1156
HRBM 1-5	5	38	26	20	686	25.4	534	4#9	4#9	#3 @ 12	2303

Marriott Hotel at Penn Square and Lancaster County Convention Center
Structural Concrete Quantity Take Off and Estimate

Beams and Shear Walls

	True Totals			With Waste Factors		
Item	**Concrete (CY)**	**Formwork (SF)**	**Rebar(tons)**	**Concrete (CY)**	**Formwork (SF)**	**Rebar(tons)**
Elevator/Shear Walls	2545	133830	26.5	2800	153905	27.8
Concrete Beams	1190.5	34674	52.5	1309	39875	55.1

Beams and Shear Walls

	Item	Concrete (CY)	$/CY	Total
033105.35.0300	**Elevator/Shear Walls**	2800	117	$327,600
033105.35.0400	**Concrete Beams**	1309	120	$157,080

	Item	Formwork (SF)	$/SF	Total
031113.85.2550	**Elevator/Shear Walls**	153905	7.85	$1,208,154
031113.20.2650	**Concrete Beams**	39875	8	$319,000

	Item	Rebar (Ton)	$/Ton	Total
032110.60.0700	**Elevator/Shear Walls**	27.8	1725	$47,955
032110.60.0100	**Concrete Beams**	55.1	2425	$133,618

	Item	Placing (CY)	$/CY	Total
033105.70.5100	**Elevator/Shear Walls**	2800	55	$154,000
033105.70.0200	**Concrete Beams**	1309	65	$85,085

Item	Total
Elevator/Shear Walls	$1,737,709
Concrete Beams	$694,783
Total	**$2,432,492**

Marriott Hotel at Penn Square and Lancaster County Convention Center
Structural Concrete Quantity Take Off and Estimate

Slabs and Columns

	Column (Quantity)	Column Height (ft)	Column Rebar Vertical	Column Rebar Ties	Column Formwork (SF)	Elevated Slab (SF)	Elevated Slab Thickness (in)	Elevated Slab Formwork (SF)	Elevated Slab Rebar (E.W.)	PT Tendons (No. @ Length)	PT Tendons (No. @ Length)
Museum Level	9	15.75	8 #8	#3 @ 16"	1368	-	-	-	-	-	-
Convention Enrty	25	14	8 #8	#3 @ 16"	3600	3500	13	3500	#5 @ 12"	-	-
Exhibit Level	80	12	8 #8	#3 @ 16"	7240	30000	13	30000	#6 @ 12"	-	-
Lobby Level	87	17	12 #10	#3 @ 16"	15312	31230	12	31230	#6 @ 12"	-	-
Ballroom "A"	84	15.167	12 #10	#3 @ 16"	13440	39172	12	39172	#6 @ 12"	-	-
Ballroom "B"	75	13	12 #10	#3 @ 16"	10800	39981	12	39981	#6 @ 12"	-	-
Meeting/Admin	60	16	8 #8	#3 @ 16"	10800	18400	12	18400	#6 @ 12"	-	-
Health Club	64	14	8 #8	#3 @ 16"	9728	10385	12	10385	#6 @ 12"	-	-
Typ. Tower Floor	29	9	8 #8	#3 @ 16"	3248	12030	7	12030	#4 @ 24"	15 @ 200'	80 @ 50'
Roof Plan	-	-	-	-	-	12030	7	12030	#4 @ 24"	15 @ 200'	80 @ 50'

Slabs and Columns Totals With Waste Factors

	Column Concrete (CY)	Column Rebar (Tons)	Column Formwork (SF)	Slab Concrete (CY)	Slab Rebar (Tons)	Slab Formwork (SF)	Slab PT Tendons (lbs.)
Museum Level	60	1.61	1573	-	-	-	-
Convention Entry	159	3.98	4140	155	3.65	4025	-
Exhibit Level	482	10.91	8326	1324	45.06	34500	-
Lobby Level	595	40.13	17609	1520	46.91	35915	-
Ballroom "A"	550	34.19	15456	1596	58.84	45048	-
Ballroom "B"	464	26.45	12420	1222	60.05	45978	-
Meeting/Admin	401	10.91	12420	562	27.64	21160	-
Health Club	407	10.18	11187	318	15.60	11943	-
Typ. Tower Floor	161	2.97	3735	367	8.04	13835	4700
Roof Plan	-	-	-	367	8.04	13835	4700

Columns and Elevated Structural Slabs

	Item	Concrete (CY)	$/CY	Total
033105.35.0411	**Columns**	5207	$137.00	$713,359
033105.35.0200	**Elevated Structural Slabs**	11835	$113.00	$1,337,355

	Item	Placing (CY)	$/CY	Total
033105.70.0800	**Columns**	5207	$64.50	$335,852
033105.70.1500	**Elevated Structural Slabs**	11835	$45.25	$535,534

	Item	Finishing (SF)	$/SF	Total
033529.30.0350	**Elevated Structural Slabs**	392251	$0.37	$145,133

	Item	Surface Hardener (SF)	$/CY	Total
033529.30.2100	**Elevated Structural Slabs**	100000	$1.98	$198,000

	Item	Formwork (SF)	$/CY	Total
031113.25.6650	**Columns**	131689	$8.50	$1,119,357
031113.35.2150	**Elevated Structural Slabs**	392251	$6.85	$2,686,919

	Item	Shoring (Each)	$/Each	Total
031505.70.0500	**Elevated Structural Slabs**	10896	$15.80	$172,155

	Item	Reshoring (SF)	$/SF	Total
031505.70.1500	**Elevated Structural Slabs**	392251	$1.60	$627,602

	Item	Rebar (Tons)	$/Ton	Total
032110.60.0250	**Columns**	177	$2,000.00	$354,000
032110.60.0400	**Elevated Structural Slabs**	370	$1,875.00	$693,750

	Item	PT Cables (lbs)	$/lbs	Total
032305.50.0550	**Columns**	65800	$3.18	$209,244

Item	Total
Columns	$2,731,811
Elevated Structural Slabs	$6,396,447
Total	**$9,128,258**

Appendix D

Attached are the spreadsheets used for the detailed structural steel estimate.

Marriott Hotel at Penn Square and Lancaster County Convention Center
Structural Steel Quantity Take Off and Estimate

	Member	Quantity	lb/ft	Length (ft)	Weight (lbs)	Weight (Tons)
Convention Entry						
Columns	HSS10x10x3/8	3	47.8	43	6166.2	3.08
	HSS6x6x3/8	2	27.4	43	2356.4	1.18
Base Plates	1"x16"x16"	3	490 (lb/ft^3)	0.148 ft^3	217.56	0.11
	3/4"x12"x12"	2	490 (lb/ft^3)	0.0625	61.25	0.03
				Column Subtotal:	8522.60	4.26
				Base Plate Subtotal:	278.81	0.14

	Member	Quantity	lb/ft	Length (ft)	Weight (lbs)	Weight (Tons)
Exhibit Level						
Columns	W14x90	5	90	44	19800	9.90
	W14x159	3	159	44	20988	10.49
	W14x82	5	82	44	18040	9.02
	HSS8x8x3/8	10	37.6	29	10904	5.45
	HSS10x10x1/2	5	62.3	29	9033.5	4.52
	HSS6x6x1/4	4	19	29	2204	1.10
	W10x39	3	39	12	1404	0.70
	HSS10x10x3/8	6	47.8	29	8317.2	4.16
	W10x33	2	33	12	792	0.40
	W12x65	8	65	12	6240	3.12
	W10x39	2	39	12	936	0.47
	HSS6x6x1/4	2	19	34	1292	0.65
	HSS8x8x3/8	1	37.6	57	2143.2	1.07
	HSS8x8x1/4	4	25.8	34	3508.8	1.75
	W14x132	2	132	44	11616	5.81
Braces	HSS8x8x1/4	10	25.8	53	13674	6.84
Base Plates	1"x22"x22"	12	490 (lb/ft^3)	0.28	1646.4	0.82
	1"x17"x21"	5	490 (lb/ft^3)	0.207	507.15	0.25
	3/4"x14"x14"	10	490 (lb/ft^3)	0.085	416.5	0.21
	1"x16"x16"	11	490 (lb/ft^3)	0.148	797.72	0.40
	3/4"x12"x12"	4	490 (lb/ft^3)	0.0625	122.5	0.06
	1"x14"x14"	3	490 (lb/ft^3)	0.113	166.11	0.08
	3/4"x14"x16"	2	490 (lb/ft^3)	0.0972	95.256	0.05
	1"x18"x19"	8	490 (lb/ft^3)	0.198	776.16	0.39
	3/4"x14"x14"	2	490 (lb/ft^3)	0.085	83.3	0.04
	3/4"x12"x12"	2	490 (lb/ft^3)	0.0625	61.25	0.03
	3/4"x14"x14"	5	490 (lb/ft^3)	0.085	208.25	0.10
				Column Subtotal:	117218.70	58.61
				Base Plate Subtotal:	4880.60	2.44
				Braces Subtotal:	13674.00	6.84

	Member	Quantity	lb/ft	Length (ft)	Weight (lbs)	Weight (Tons)
Lobby Level						
Columns	HSS5x5x1/4	4	15.6	17	1060.8	0.53
	HSS6x6x1/4	1	19	17	323	0.16
Base Plates	3/4"x11"x11"	4	490 (lb/ft^3)	0.0525	102.9	0.05
	3/4"x12"x12"	1	490 (lb/ft^3)	0.0625	30.625	0.02

Beams	W14x22	1	22	8.5	187	0.09
	W21x50	1	50	8.5	425	0.21
	W12x19	23	19	8.5	3714.5	1.86
	W24x68	1	68	8.5	578	0.29
	W25x55	2	55	8.5	935	0.47
	W24x76	2	76	8.5	1292	0.65
	W12x19	7	19	10	1330	0.67
	W12x19	13	19	16	3952	1.98
	W12x19	4	19	12	912	0.46
	W24x55	2	55	16	1760	0.88
	W24x76	2	76	16	2432	1.22
	W27x84	1	84	12	1008	0.50
	W16x26	1	26	25	650	0.33
	W18x35	5	35	39	6825	3.41
	W16x26	1	26	39	1014	0.51
	W30x90	1	90	48	4320	2.16
	W18x35	1	35	32	1120	0.56
	W16x26	1	26	15	390	0.20
	W14x22	1	22	15	330	0.17
	W18x35	1	35	30	1050	0.53
	W16x26	5	26	30	3900	1.95
	W21x44	5	44	30	6600	3.30
	W16x40	1	40	21	840	0.42
	W18x35	2	35	21	1470	0.74
	W24x62	1	62	30	1860	0.93
	W18x35	3	35	30	3150	1.58
	W8x10	2	10	10	200	0.10
	W14x22	1	22	20	440	0.22
	W16x26	2	26	30	1560	0.78
	W14x22	4	22	12	1056	0.53
	W12x14	1	14	12	168	0.08
	W14x22	1	22	30	660	0.33
	W14x22	3	22	16	1056	0.53
	W12x19	11	19	16	3344	1.67
	W21x44	2	44	30	2640	1.32
	W18x35	1	35	20	700	0.35
	W18x40	2	40	30	2400	1.20
	W12x19	2	19	8	304	0.15
	W24x55	1	55	30	1650	0.83
	W16x40	2	40	30	2400	1.20
	W14x22	2	22	15	660	0.33
	W10x12	1	12	10	120	0.06
	W12x19	9	19	15	2565	1.28
	W12x48	1	48	20	960	0.48
	W14x22	1	22	15	330	0.17
	HSS12x6x3/16	2	22.2	15	666	0.33
	HSS8x8x3/8	14	37.6	15	7896	3.95
	HSS6x6x1/4	3	19	15	855	0.43
	HSS8x8x3/8	4	37.6	30	4512	2.26
	L3x3x1/4	1	4.89	15	73.35	0.04
	L4x4x1/4	4	6.6	16	422.4	0.21
				Column Subtotal:	1383.80	0.69
				Base Plate Subtotal:	133.53	0.07

				Beam Subtotal:	89682.25	44.84
	Member	Quantity	lb/ft	Length (ft)	Weight (lbs)	Weight (Tons)
Ballroom A Level						
Columns	W12x53	1	53	28	1484	0.74
	HSS10x10x1/2	2	62.3	28	3488.8	1.74
	HSS8x8x3/8	1	37.6	28	1052.8	0.53
	W12x72	4	72	15	4320	2.16
	HSS10x10x3/8	2	47.8	28	2676.8	1.34
Base Plates	1"x19"x19"	7	490 (lb/ft^3)	0.209	716.87	0.36
	3/4"x12"x18"	1	490 (lb/ft^3)	0.0938	45.962	0.02
	3/4"x16"x16"	5	490 (lb/ft^3)	0.111	271.95	0.14
Braces	HSS8x8x1/4	3	25.8	35	2709	1.35
	HSS8x8x5/16	1	31.8	42	1335.6	0.67
Beams	HSS8x8x1/4	6	25.8	30	4644	2.32
	W30x90	6	90	30	16200	8.10
	HSS12x8x5/16	5	40.4	30	6060	3.03
	HSS12x8x1/4	1	32.6	20	652	0.33
	W14x22	1	22	20	440	0.22
	W12x19	1	19	16	304	0.15
	HSS16x4x3/8	10	39.5	10	3950	1.98
	HSS12x8x1/2	16	62.3	15	14952	7.48
	HSS6x6x1/4	8	19	15	2280	1.14
	HSS20x12x5/8	5	127	25	15875	7.94
	HSS6x4x1/4	5	15.6	25	1950	0.98
	W18x40	2	40	40	3200	1.60
	W12x19	6	19	10	1140	0.57
	HSS10x6x1/4	2	25.8	8	412.8	0.21
	HSS6x6x1/4	9	19	15	2565	1.28
	W21x50	5	50	15	3750	1.88
	HSS8x2x1/4	9	14.5	15	1957.5	0.98
	HSS6x6x1/4	17	19	15	4845	2.42
	HSS8x2x1/4	8	14.5	15	1740	0.87
	HSS8x8x3/8	9	37.6	15	5076	2.54
	HSS10x2x1/4	3	9.7	15	436.5	0.22
	HSS20x12x5/16	6	65.8	15	5922	2.96
	HSS6x4x5/16	5	19.1	25	2387.5	1.19
	HSS20x12x5/16	5	65.8	25	8225	4.11
	W8x24	9	24	5	1080	0.54
	HSS20x12x1/2	8	103	40	32960	16.48
	HSS12x5x5/16	2	43	40	3440	1.72
	L4x4x1/4	1	6.6	20	132	0.07
	HSS10x6x1/4	1	25.8	15	387	0.19
	HSS10x6x3/8	5	37.6	25	4700	2.35
	HSS6x6x3/8	6	27.4	15	2466	1.23
				Column Subtotal:	13022.40	6.51
				Base Plate Subtotal:	1034.78	0.52
				Braces Subtotal:	4044.60	2.02
				Beam Subtotal:	154129.30	77.06
	Member	Quantity	lb/ft	Length (ft)	Weight (lbs)	Weight (Tons)
Ballroom B Level						
Columns	HSS12x12x1/2	4	75.9	29	8804.4	4.40

	W10x49	3	49	13	1911	0.96
	HSS9x9x5/16	1	36	13	468	0.23
	HSS10x10x3/8	1	47.8	13	621.4	0.31
	HSS4x4x1/4	3	12.2	13	475.8	0.24
	HSS6x6x1/4	2	19	13	494	0.25
Base Plates	1"x18"x18"	4	490 (lb/ft^3)	0.1875	367.5	0.18
	3/4"x12"x14"	1	490 (lb/ft^3)	0.073	35.77	0.02
	3/4"x15"x15"	1	490 (lb/ft^3)	0.098	48.02	0.02
	3/4"x16"x16"	1	490 (lb/ft^3)	0.1111	54.439	0.03
	3/4"x12"x16"	2	490 (lb/ft^3)	0.0833	81.634	0.04
	3/4"x7.5"x10"	3	490 (lb/ft^3)	0.0325	47.775	0.02
Braces	HSS4x4x5/16	1	14.8	23	340.4	0.17
	L5x5x3/8	72	12.4	10	8928	4.46
	L6x6x3/8	24	14.9	10	3576	1.79
Beams	HSS8x8x1/2	1	48.7	15	730.5	0.37
	W36x150	1	150	30	4500	2.25
	W30x90	10	90	30	27000	13.50
	W21x44	10	44	30	13200	6.60
	W36x150	1	150	30	4500	2.25
	HSS8x8x1/4	5	25.8	30	3870	1.94
Trusses		17	15885.12	1	270047.04	135.02
Materials for one Truss						
	WT12x47	30	47	10	14100	
	L3x3x5/16	15	6.04	8	724.8	
	HSS10x6x1/4	2	25.8	6	309.6	
	L3.5x3.5x5/16	8	7.2	8	460.8	
	L3x3x5/16	8	6.04	6	289.92	
			lbs for one truss:	15885.12		

Column Subtotal:	12774.60	6.39
Base Plate Subtotal:	635.14	0.32
Braces Subtotal:	12844.40	6.42
Beam Subtotal:	53800.50	26.90
Truss Subtotal:	270047.04	135.02

	Member	Quantity	lb/ft	Length (ft)	Weight (lbs)	Weight (Tons)
Meeting/Admin Level						
Columns	HSS6x6x1/4	3	19	16	912	0.46
Base Plates	3/4"x12"x12"	1	490 (lb/ft^3)	0.0625	30.625	0.02
Braces	HSS4x4x5/16	1	14.8	27	399.6	0.20
Beams	W12x16	3	16	19	912	0.46
	W21x44	5	44	40	8800	4.40
	W14x22	4	22	15	1320	0.66
	L4x4x1/4	2	6.6	15	198	0.10
	W18x50	3	50	25	3750	1.88
	W18x35	1	35	30	1050	0.53
	W18x35	1	35	15	525	0.26
	W16x26	1	26	30	780	0.39
	W27x84	10	84	30	25200	12.60
	W24x58	2	58	25	2900	1.45
	W14x61	1	61	30	1830	0.92
	W30x90	1	90	30	2700	1.35
	W16x31	2	31	20	1240	0.62

Joists	26K5	9	9.8	35	3087	1.54
	W14x22	27	22	30	17820	8.91
	SPJoists	21	17029	1	357609	178.80
Materials for one SP Joist						
	WT12x103.5	30	103.5	5	15525	
	L3x3x1/2	15	9.35	5	701.25	
	L3x3x3/8	16	7.17	7	803.04	
			lbs for one joist/truss:	17029		
				Column Subtotal:	912.00	0.46
				Base Plate Subtotal:	30.63	0.02
				Braces Subtotal:	399.60	0.20
				Beam Subtotal:	51205.00	25.60
				Joist Subtotal:	378516.00	189.26

	Member	Quantity	lb/ft	Length (ft)	Weight (lbs)	Weight (Tons)
Health Club Level						
Beams	W18x35	1	35	26	910	0.46
	HSS6x4x1/4	8	15.6	30	3744	1.87
	W16x26	3	26	30	2340	1.17
	W24x55	2	55	30	3300	1.65
	W18x35	3	35	30	3150	1.58
	W12x19	3	19	20	1140	0.57
	W14x22	2	22	20	880	0.44
	W16x26	2	26	20	1040	0.52
	W14x22	3	22	20	1320	0.66
	W30x99	1	99	20	1980	0.99
	W14x22	9	22	15	2970	1.49
	HSS6x4x1/4	10	15.6	15	2340	1.17
	W18x35	10	35	20	7000	3.50
	W30x99	5	99	30	14850	7.43
	W16x26	2	26	20	1040	0.52
	W18x40	1	40	30	1200	0.60
	W24x55	1	55	30	1650	0.83
Trusses	24K5SP1	12	9.3	26	2901.6	1.45
	28K9SP1	4	13	30	1560	0.78
	28LH06SP1	9	16	30	4320	2.16
	60DLH18SP1	36	59	84	178416	89.21
	16K2	19	5.5	16	1672	0.84
	14K1	6	5.2	16	499.2	0.25
	48LH12	1	25	84	2100	1.05
				Beams Subtotal:	50854.00	25.43
				Trusses Subtotal:	191468.80	95.73

Totals	Column Total:	153834.10	76.92
	Base Plate Total:	6993.48	3.50
	Braces Total:	30962.60	15.48
	Beam Total:	399671.05	199.84
	Truss Total:	461515.84	230.76
	Joist Total:	648563.04	324.28
	Total:	**1701540.11**	**850.77**

Acoustical Metal Decking = 90,000SF

Marriott Hotel at Penn Square and Lancaster County Convention Center
Structural Steel Quantity Take Off and Estimate

	Item	Amount (Tons)	Unit Cost ($/Ton)	Total
051223.77.0500	**Column Total:**	**76.92**	**$5,000**	**$384,600**
051223.73.0400	**Base Plate Total:**	**3.5**	**$2,500**	**$8,750**
051223.75.1000	**Braces Total:**	**15.48**	**$4,750**	**$73,530**
051223.76.0500	**Beam Total:**	**199.84**	**$5,000**	**$999,200**
052123.50.8000	**Truss Total:**	**230.76**	**$6,300**	**$1,453,788**
052123.50.7100	**Joist Total:**	**324.28**	**$4,500**	**$1,459,260**
053113.50.3400	**Acoustical Metal Decking:**	**90,000 SF**	**$5.50/SF**	**$495,000**
		Total Steel:		**$4,379,128**
		Total Steel with Metal Decking:		**$4,874,128**

*Exludes Portico Steel

Appendix E

Attached are the hand notes created in calculating the square footages for the building enclosure assemblies estimate.

EXTERIOR WALL : ASSEMBLIES ESTIMATE

LEVEL (6 - THRU 18)

(9' HEIGHT x 60' + 9' HEIGHT x 200') x 2

- 61 WINDOWS (4x6) = 3216 SF PRECAST / FLOOR

× 12 FLOORS

38592 SF

LEVEL 19 + [illegible] SCREEN

(11' HEIGHT x (60 + 200) x 2 [illegible])

- 61 WINDOWS (4x6) = 4256 SF

ROOF SCREEN

15' - 10" HEIGHT x (65' + 60') 2 = 3958 SF

TOWER PRECAST = 46806 SF

TOWER WINDOWS = 793 WINDOWS (4x6)

TOWER ROOF = 12,000 SF

1/A4.11 1/4.12 1/A4.13 1/A4.14
2/A4.11 2/A4.13

[ASSUMPTION = EXCLUDED EXISTING HISTORICAL STRUCTURES]

A4.11 - 1 WEST PODIUM

PRECAST = $(12 \times 12) + (12 \times 2) + (90 + 20 + 90)(12) =$

$- 1\ \text{DOOR}\ (3 \times 7) - 10\ \text{WINDOWS}\ (4 \times 8) - (23 \times 10 + 7 \times 10)$
GLASS DOORS

EXISTING FACADE (RESTORATION)

$(68' \times 224')$

A4.11 - 2 WEST PODIUM

BR-1

$(10 \times 12) + (17 \times 10) + (24 \times 4) + (4 \times 115) + 8(4 \times 14) + (15 \times 46) + (15 \times 44) + (15 \times 8) + (9 \times 9)$ 2845

PC-1

$(26 \times 2)\,3 + 9(5 \times 8) + (130 \times 1)$ 646

M-3

$4(25 \times 1) + 15(4 \times 1) + (130 \times 3) + (20 \times 1)$ 570

M-2

$(28 \times 20) + (3 \times 52) + (5 \times 120) + (25 \times 20)$ 1030

GLAZING

$2(28 \times 10) + (4 \times 130) + (4 \times 115) + 7(8 \times 20) + 3(40 \times 12) + (15 \times 5)\,2 + (45 \times 10)$

4700

A 4.12 - 1 SOUTH ELEVATION - PODIUM

BR-1

$(54 \times 15) + (41 \times 2) + (36 \times 9) + [(36 + 5) + 3(5 \times 12)]2$
$+ (15 \times 28) + (16 \times 5) + (75 \times 10) + (4 \times 41) + (31 \times 20) - (14 \times 17)$ OVERHEAD DOOR

3970

GLAZING

$(9 \times 15) + (50 \times 36) + (70 \times 4) + (3 \times 35) + 4(4 \times 8)$

2448

PC-1

$3(32 \times 3) + 6(5 \times 14) + 4(8 \times 17) + (80 \times 1)$ 1332

M-2

$(125 \times 10) + (200 \times 15) + (16 \times 115)$ 6090

BR-2

(50×36) 1800

M-3

(16×5) 80

A 4.12 - 2 SOUTH ELEVATION - PODIUM

GLAZING

$(50 \times 20) + (55 + 10)2 + (40 \times 10) + (42 \times 25) + (42 \times 28)$ 4726

BR-1

$(10 \times 44) + (13 * 10)$ 570

M-2

(42×7) 294

PC-1

$2(2 \times 26)$ 104

A 4.13 - 1 EAST ELEVATION PODIUM

BR-1

(58 × 42) - 2226

M-2 (EIFS)

~~(42 × 125)~~ + (60 × 80) 4800

PC-1

(42 × 125) 5250

A4.13 - 2 + 3 - EAST ELEVATION - PODIUM

BR-1

(7 × 66) + (15 × 15) 687

GLAZING

(20 × 62) + 2 (4 × 8) ~~- 12 (4 × 8)~~ 920

PC-1

(88 × 40) + (88 × 65) + (30 × 12) + (80 × 12) + (72 × 50) 14160

EIFS

(72 × 20) + (85 × 10) + 2 (32 × 10) 2930

A 4.

A 4.14 - 1 - NORTH ELEVATION PODIUM

PC-1

(25 x 65) + (10 x 60) 2250

GLAZING

11 (4x8) 352

EXISTING FACADE / RESTORATION

(66 x 150) 9900

A 4.14 - 2 + 3 N. ELEV. PODIUM

EXISTING FACADE

(80 x 68) 5440

GLAZING

(25 x 10) + 3 (4x8) 346

EIFS

(88 x 10) 880

PC-1

(60 x 44) + (18 x 26) 3108

A 4.15 PARTIAL ELEVATIONS

BR-1

(18 x 20) + (6x14) + (16x4) + (36x4) + (6 x 12) 724

PC-1

(4x32) + (12 x 16) + (24 x 16) + 2 (2 x 26) 808

EIFS

(40 x 20) 800

GLAZING

(4x8) + (14 x 36) + (14x22) + (14x10) 984

A 1.10 - ROOF PLAN

TOWER ROOF

EPDM ON CONCRETE SLAB = (60 x 200) = 12,000 SF

PODIUM ROOM

EPDM ON ACOUSTICAL METAL DECK ON JOISTS

(20 x 50) + (60 x 35) + (100 x 160) = 19,100 SF

CONVENTION CENTER

PVC ROOFING W/ INTERNAL BATTENS ON ACOUSTICAL METAL DECK ON BOWSTRING TRUSSES.

(160 x 180) + (180 x 150) = 45,000 SF

EPDM ON AC. METAL DECK ON JOISTS.

(220 x 30) + (20 x 120) + (140 x 60) + (50 x 30) = 18,900 SF