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CONSTRUCTION MANAGEMENT

Moore Building Addition & Renovation

University Park, PA 16802

Technical Assignment Two

Penn State AE Senior Thesis

Executive Summary

This technical report provides a more in depth approach to the systems developed in the preceding technical report by examining fewer topics but doing so in more detail and depth, all pertaining to the Moore Building's addition and renovation phase (named Phase I). This phase will consist of a 57,000SF addition and the renovation of the north wing, which is 16,000SF in area.

Contained in this technical report are several topics that will help provide a base for analyzing and producing suggestions for depths and breadths for the succeeding reports.

The project schedule encompasses nearly two hundred items and provides a detailed view of how the project will proceed, and what activities will be ongoing simultaneously and where each crew will be at all times of construction. A brief narrative describes the nature of some activities that include the steel, site-work, demolitions and interior fit-outs.

In creating the site layout, many items were strategically chosen to optimize the working space and areas of all subcontractors, whilst keeping material laydown locations in mind. The materials were chosen to be close enough to the structure as not to take long to move to necessary locations, yet not intrude on the day-to-day affairs at times where they were not being put in place.

A detailed structural systems estimate was performed on the structure of the building. This included the concrete, steel, formwork and labor. The estimate was done using RSMeans Costworks online software. The cost of the concrete system came out to be $855,000.00 and the structural steel estimate came out to be $718,000.00 and did not include miscellaneous steel items. The costs were within a reasonable range of the actual estimated values.

The General Conditions estimate turned out to be about 5.4% of the GMP of the project, which is in line with industry standards. The total cost was estimated to be about $1.4 Million and a few assumptions were necessary in coming up with that number. Included are the costs of temporary power, internet and other essentials as well as salaries paid to the engineers and professionals on site.

Finally, a summary of the 19th Annual PACE Roundtable meeting is provided, with major insights to the topics relating to the Building Information Modeling aspect of the industry and its benefits, costs and general improvements in the technology since its inception. This section focuses on the first and second sessions of the PACE Roundtable meeting only and pertains to the critical industry issues at the time of this report.

Contents

Detailed Project Schedule

The construction of the Moore building addition consists of removing the original brick façade of the existing building and asbestos abatement of the original structure. This will be done for all floors in the beginning and will allow for the removal of the existing concrete and asphalt on the ground level. The structure and foundation will be done in two sections; West, followed by North and East as one section. This will occur for the basement and first floors since the basement is only on the west side and the first floor consists of slab-on-grade. After the first floor is done, the building will be done together.

Although the schedule comprises of many grouped items, the general direction of work will start from the west section followed by the North and East sections of the building. This is due to the way that the new structure will tie into the existing structure. One benefit of this is that time will be freed up by the sections that are completed early, so that work can proceed in segments.

The schedule is broken down into the actual structure as a whole portion, whilst the interior fit-outs (including MEP and Electrical) being sectioned by floor.

Steel

The most important lead time in this process is the structural steel's which will take 40 days to arrive from the time in which it is ordered, making it arrive in October. So, many activities need to either be held off up until that time, or, some need to occur before the arrival of the steel.

Site-Work

One major area in the schedule, as this project is a renovation is the site-work involved, which will take about 100 days. The details of this activity are shown in the schedule.

Demolition and Asbestos Abatement

The demolition and abatement phase takes up about 45 days for the first portion to occur and the last part cannot occur until the last ten days of December.

Interiors

Interior fit-outs begin almost immediately after the final slab is poured on the fourth floor, with the first floor layout of the track being done about two weeks after pouring the slabs.

The sequencing of work from floor to floor occurs in a highly orchestrated manner; the crew working on an activity on the first floor would finish and immediately start the same work on the next floor allowing the next tradespeople to start work on the previous crew's finished activity.

SEE **APPENDIX A** FOR FULL DETAILED PROJECT SCHEDULE

Site Layout Planning

Narrative

During the superstructure phase of construction (steel erection, metal decking and pouring the slabs on the elevated decks) there will be a lot of activity on the site. The advantage of having the trailers all located directly opposite the site is that they will not be intrusive to the site, nor will they cause congestion. Also, there will be no need to move trailers around during different phases of construction.

Another major point about this layout is that apart from the crane being a material hoist, the main way for laborers to go up and down the structure is through the existing stairway that is in the north wing of the existing structure. This will be torn down after the building is complete, with the building's new stairs being utilized instead.

The excavation ramp would be located at the corner where the brick laydown is on the plan provided in appendix B. It is not shown because of cramped space on the layout, and the fact that the phase shown is the superstructure phase.

The steel laydown area has been selected so that members can be lifted directly from the ground and moved to their respective locations with as little hassle and time wasted as possible. The same is the reason for placing the Aluminum panels right beside the steel members. Also, although there are boxes designating where everything will be, this is simply a graphical representation and does not limit the laydown areas whatsoever. Other laydown areas have not been specifically shown due to redundancy and relative broad choices of areas for all the subcontractors, as there will be interior fit-outs proceeding at the time of the superstructure's assembly. Also, since there will be MEP contractors on site before the steel even arrives, it is important that the space for the steel and aluminum is reserved ahead of time.

With concrete being a crucial factor to a timely completion, the concrete pump's location has been chosen to be on the north side of the site so that in the case that the crane is required to move concrete, it is a possible option. This does not mean that the crane's sole purpose is the concrete, but this is more of a precautionary measure.

Transportation on the site itself is a little bit of an issue due to the site being somewhat congested. No traffic will be able to move throughout the north side of the site, which is why two entrances have been designated.

The portable toilets were chosen to be on the west side of the site in order to put them away from any immediate danger, and to provide the users with some privacy.

All the locations of the items on the Site Layout Plan are assumed, and do not represent what the CM firm has decided to do, and/or will do in the future in regard to the layout of the site.

Different Phases of Construction

During the different phases of construction, there will be no major changes to the site, apart from the absence of the crane during the foundations and demolition phase. Also, there will be no materials laid down in the designated laydown areas.

Another main point is the ramp, which has been discussed in the narrative section; the ramp will be at the corner that currently houses the brick laydown area, and will be used during the excavation and foundations phases of construction.

The sixth floor will be occupied for most of the construction duration and will be vacated after the building has been handed over to the university.

Contractor Layout Critique

In critiquing the contractor's layout (figure 1), it is obvious that no specific locations have been shown, except for a possible location of a crane, and vicinities in which materials and equipment may be; no specifics are documented. This makes it hard to actually critique what is being done, as no final plan has been devised at the time of this report.

A possible location for placing the crane has been shown to be around the same area that has been chosen for this report, but it is not finalized and neither the loading capacity nor the boom length have been selected yet.

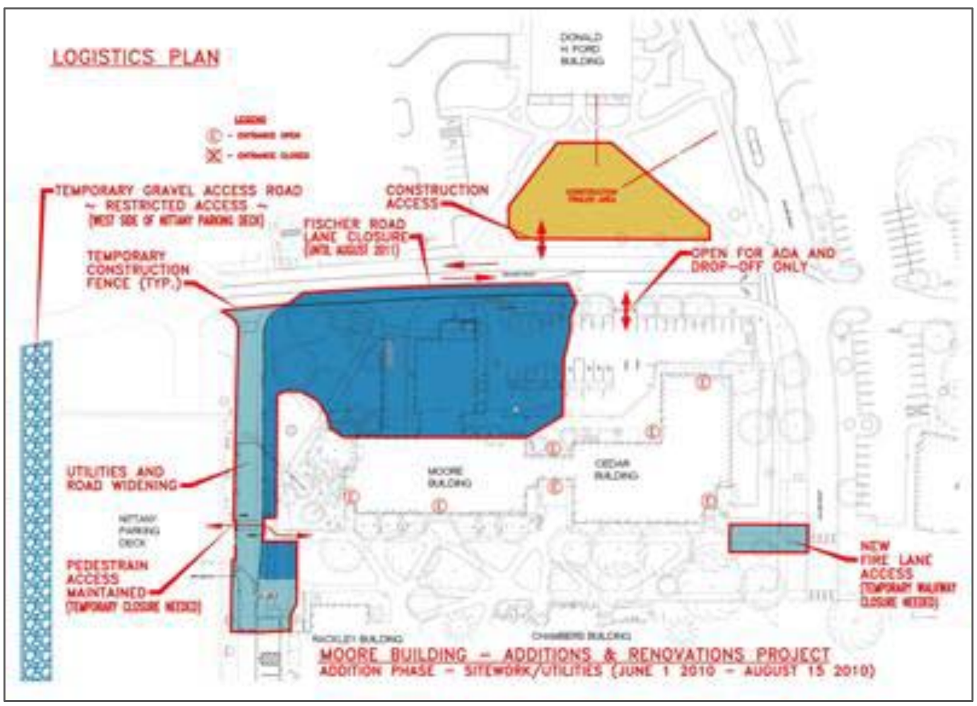


Figure 1: Site Layout Plan (110% Scaling)

SEE **APPENDIX B** FOR SITE PLAN LAYOUT

Detailed Structural Estimate

The detailed structural estimate was done using RSMeans Costworks to organize and tabulate the costs and line items of the takeoffs, which was done by hand.

	Structural Systems Estimate Summary		
System Type	**Estimated Cost**	**Estimated Cost (incl. OH&P)**	**Added Waste Factors (10%)**
Concrete System	**$687,248.47**	**$786,814.72**	**$855,539.57**
Structural Steel System	**$567,265.28**	**$661,384.49**	**$718,111.01**

Table 1: Summary of Estimated Costs for Structural Systems

There was no information provided as to the exact actual cost of the concrete system. This is due to the fact that the concrete for the Moore Building Addition is part of a larger package that includes excavation, shoring, demolition, waterproofing, landscaping, site furnishing, fences, paving and stripping. However, the rough total was around $1 Million estimated by the CM firm, and this number was stated to be inflated due to several factors including this price being part of the GMP (guaranteed maximum price). The subcontractor's prices did come in less than this, but the actual amount, as stated before, cannot be deduced. So, this estimate has come up about ~$145K short of the actual amount which could be attributable to differences in required tolerances of concrete placement, differences in waste factor calculation, and the exclusion of items such as dewatering, concrete curbs, concrete stairs and waterproofing from my estimate.

For the structural steel system, the estimate came about ~$500K short of the estimated value by the lowest bidder (~$1.2 Million). This, according to the CM Firm PJ Dick is very close to the actual cost of the structural system. This is due to the fact that no ornamental steel has been taken into account (this includes stairs, rails, steel panels and other such items and was estimated to be ~$500K) as the structural steel package for the Moore Building Addition takes into account ALL steel for the project. Metal decks have been included as part of this package as well.

Although the comparison is based on the low bidder's estimate, the rest of the bids are a bit higher and that may be because of the added cost of aligning the new structure and making sure that the floors and framing line up with the existing structure. Also, performing work in State College, PA may be a little more costly due to some "invisible" costs that may include laydown, storage and transportation to and from the site. However, although the floors may need to line up, the new structure is independent of the previous structure.

Finally, although the estimate is very close to the actual cost, it may have been slightly lower if the wide-flange members were all priced exactly based on member type. This was not possible through RS Means Costworks as not every member type is included or available with its own costs.

Assumptions & Facts

- Foundation wall heights have been averaged because the difference is minimal.
- NW Concrete on 2" 18 Gage G60 metal decks (actual).
- WWF Reinforcing W2.9xW2.9 (actual) in all slabs.
- No rebar was calculated as part of reinforcing due to time constraints and minimal amount.
- Wide flange and HSS members were grouped as not all member sizes were available for cost .purposes in RS Means Costworks (e.g. if columns were W12X20 and the nearest PLF was W12x22, all members will be estimated based on the assumption that they are W12X22 members).
- Lateral Bracing members were assumed to be 63 members at 14' each; no option for total length was given.
- New Structure and existing structure will be independent structurally speaking.

SEE **APPENDIX C** FOR FULL TAKE-OFFS AND ESTIMATE DETAILS, INCLUDING ANY AND ALL ADDITIONAL ASSUMPTIONS

General Conditions Estimate

For the General Conditions Estimate, the layout was broken down into two main sections; Staff/Personnel and Office expenses/OH (including Temporary Utilities), as shown in table 2.

General Conditions Estimate Summary	
Category	***Cost***
Staff/Personnel	$1,193,900.00
Office Expenses/OH	$214,685.00
TOTAL	**$1,408,585.00**

Table 2: Summary of Estimated Costs for General Conditions

The total cost of $1.2 Million is 5.39% of the entire project cost. The costs do not necessarily reflect the costs of the CM firm PJ Dick, but some items used are accurate in comparison to the project's general conditions estimate, and were derived from the actual General Conditions Estimate, whereas a few other items were added to accommodate for this assignment's requirements. The costs of these added items were estimated.

It was assumed that there is temporary power coming in to the trailers, although this may not be completely true depending on whether the trailers are connected through an existing building or not, as the trailers are directly next to a building on the opposite side of the road to the construction side.

SEE **APPENDIX D** FOR FULL GENERAL CONDITIONS ESTIMATE DATA

Critical Industry Issues

At the 19th annual PACE Roundtable meeting there were many topics discussed that pertain to the current state of the industry. The title of this year's meeting was "Building a Collaboration Culture." This was elaborated upon through three subtopics and their respective "breakout sessions" shown in table 2.

A. Sustainability / Green Building	B. Technology Applications	C. Process Innovation
Session 1A: Educating a future workforce for delivering high performance buildings	Session 1B: Transformation: What are the innovations that will transform our industry	Session 1C: IPD: Exploring the drivers behind highly integrated delivery of projects
Session 2A: The Smart Grid: Energy impacts in the building industry	Session 2B: Carrying BIM to the field – new responsibilities, roles, & competencies	Session 2C: Operations & Maintenance process integration in new and retrofit projects

Session One Summary

The "Technology Applications" session was filled with ideas and contribution from the participants of the breakout sessions. This was the most relevant topic in today's economic state; productivity needs to increase whilst margins need to decrease in order to stay competitive.

As outlined during the sessions some of the most important topics discussed began with prefabrication. Prefabrication's implications are literally huge and it's possibilities almost limitless. Some of the benefits of prefabrication include a product created in a controlled environment and, hence, the ability to achieve higher levels of quality control. Another idea is that it can be manufactured to higher tolerances in a shorter amount of time and be installed directly into the new structure. One example about how the MEP systems were prefabricated and literally "stuck" into position in the building that they were going into, which basically cuts costs and time; the two most valuable items in the industry. This was related to BIM and how portions can be modeled before being pre-fabricated in an off-site location. BIM could be used to locate and model where each piece would eventually be hung, and allow the subcontractors on site to visualize (through 3D software) where the pieces would end up. This along with the ability to measure dimensions straight off of the 3D model would increase efficiency by a marginal amount.

Another major point that was discussed was the operations side of BIM and how BIM can be utilized after the building has been constructed with discussions including the Latista software for organizing information into stations and tablet PCs. Furthermore, the applications of this system in terms of wireless computing and the limitations/drawbacks were also mentioned, with emphasis put on who is being benefitted the most and/or how the benefits are presented (be they owner cost savings or contractors' time savings etc.). The general consensus was that all parties were to benefit from a good organization of construction documents, 3d models and up to date ones at that. So, the major idea was operations and maintenance through BIM. The beauty of this topic was that it combines every aspect of BIM and focuses on how we can achieve a project that is almost 100% BIM. This is because the project would be designed, built (and updated throughout), and operated through the same 3D Model. All the information on the building would be one click away with visually attractive, yet useful software. This does not imply, as was discussed, that all tasks would be performed through one software package, because the model may simply be too colossal a file size for it to work or be feasible. The discussion of feasibility describes whether or not it is feasible to purchase the equipment required to run such sophisticated models. However, if the required information was opened or used based on the program it is being opened with (as a possibility), model size would not be an issue, as an MEP software would only extract the necessary MEP pieces of the model to view with the exoskeleton.

BIM, in terms of the industry, cannot be achieved at a 100% level and although many people may claim to do so, it is impossible as was discussed as well during the session. This point brought about some more interesting points including how other industries have adopted the technologies that many construction specialists consider to be a “future possibility” when in actuality, these technologies are already being used in other industries. This can be related to how the automotive industry produces 3D virtual reality labs in order to literally sit down, look at and move around in a computer simulation of the end-result. Rendering shows precise details as well as the ability to “use” the features in the vehicles model. Another important idea presented was the ability to “mass-produce” or prefabricate in a similar manner to the ship-building industry, where all the rooms and walkways etc. are built off-site, shipped to the ship and literally fit in place. These methods would allow for much faster construction, bringing productivity way up in the industry. The main idea for bringing about these topics was to show that a lot of the technologies that we strive for in the building industry have been used for the most part of the last two decades through computer software.

In addition, topics such as virtual mockups and their uses were discussed. This was followed by the debate as to when certain people can work on a BIM model. This goes back to the idea that there is only one model, and the question that asks who is the person who should update. Also tied to the last question is the question of how to coordinate meetings (like BIM Coordination meetings) and how to facilitate the improvement of the BIM models when multiple trades need to use the same model.

Session Two Summary

The previous discussions paved the way for the discussion of “BIM in the Field” and this referred to the actual end users on the jobsites.

First, the uses were discussed. These include the ability to create punchlists and to organize them. This included the ability to select objects (for example, a pump) from a 3D model and have the model describe that that object is the responsibility of the Architect or MEP subcontractor (in term of punchlists). This would reduce or even eliminate the confusion involved with creating punchlist items. As a byproduct, the commissioning process becomes much simpler as well.

Another point of importance is that people who worked on the field were limited by their knowledge of how to use BIM and although they could see the benefit and uses, they would rely on a [generally] younger person to operate the computers and tablets involved with BIM. This produced a barrier between those who require the information and the information itself as the reliance on these people becomes astronomical and their presence becomes a necessity. This reduces productivity and increases costs, as the field workers need not learn the software when somebody else is doing it for them. This cost would be better managed by having mandatory training programs that teach the use of the software involved with BIM on the field as this would eliminate the middle-man of the field.

Cloud computing was a crucial topic in the second session. Cloud computing gives a portable (not necessarily portable, but used as an example) computer the ability to use the processing power of, for example, a supercomputer via a wireless connection to an intranet or even the internet. The supercomputer could even be a series of very powerful processors in a controlled environment (or room) where the portable device sends the information to the processors to process, and shows the results visually on its display. This allows for the use of much more complicated, sophisticated and large files to be utilized on site without the need to carry the processors around with the portable device. This eliminates the need for a hard-drive (it would typically be on a server), CD Drive, and sophisticated processors. This cuts down on the weight as well as the battery life and use, making the portable device much more efficient and much easily replaced in the case of damage.

The technology of cloud computing will allow much larger files to be used on site without the downtime of opening the large files or navigating them on a “slow” computer. Of the many advantages, the cost offset will be great and the only downside would be the loss of a connection, or a slow connection.

A mention of photogrammetry and an automated updating technique for buildings was quite intriguing. This photogrammetry method allowed the use of photographs to update a model, should it have been outdated. It would be achieved by locating a spot on a model and the photograph(s) and allowing the computer to try and read the differences and update based on the photograph’s features. Also laser scanning was discussed, which was just as interesting. It is a technology that has been around for a few years, but whose technology is advancing all the time. It is the process of placing a laser scanner in a room (for example) and the scanner shoots points and reads the distances, creating a 3D “image” of what it captured. When this scanner is moved to another location in the same room, it combines the first and second images and allows for a more detailed version of the images to be utilized. This device can now recognize some things like pipes, doors and walls, and, instead of simply creating an image that can be modeled off of, it will place objects itself to start you off!

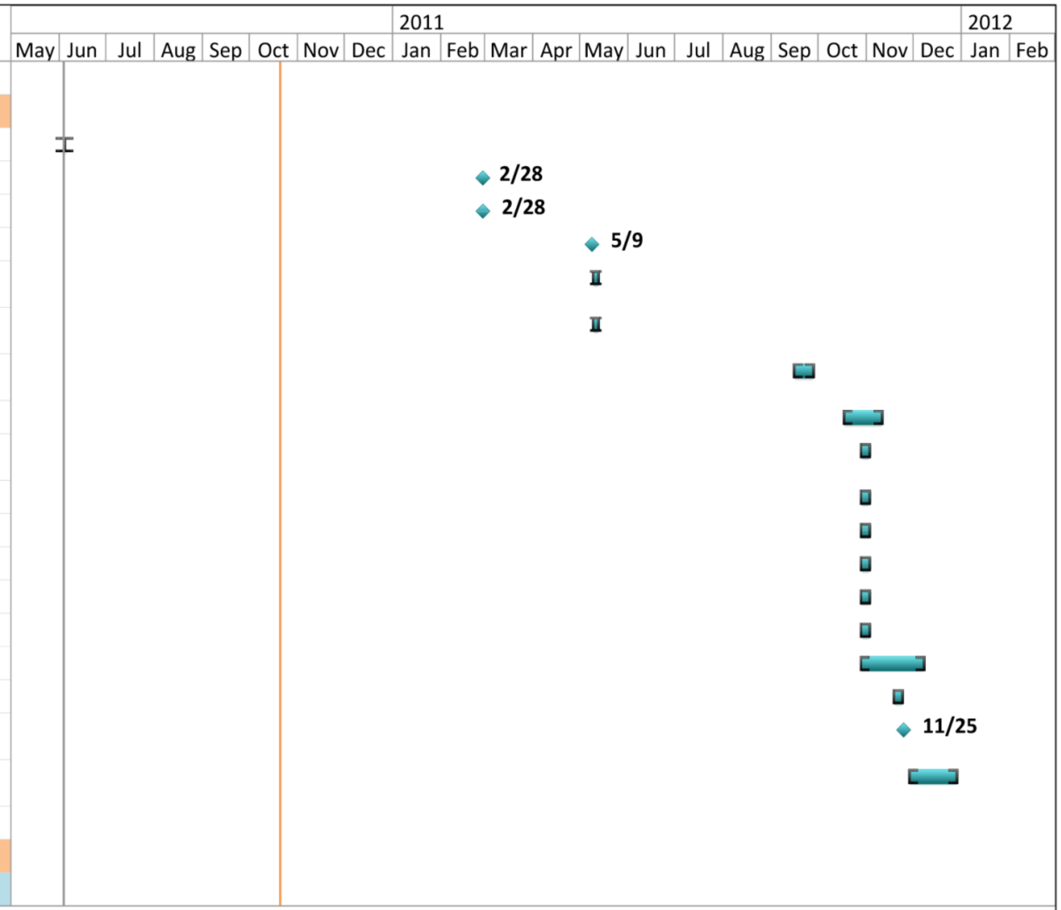
Finally, a mention of the fact that the programs are created with mainly the designer in mind is a setback. We are “primitive” when it comes to the technologies of the building industry in comparison with our counterparts in other industry. As a closing for the entire event there was a discussion about the current state of the job market as it pertains to those of us in the construction industry. Although somewhat encouraging, there is still some doubt as to the ability for one to successfully pursue a job in the field of construction engineering.

A topic of interest to pursue would be the ability to understand the measurable benefits of BIM. This includes the ability to measure the amount of BIM use on a project. Also, the ability to measure the benefits or even the losses caused by BIM's use even when it is used correctly would be a beneficial study. This is because having heard many companies' complaints about BIM or its ineffectiveness when these companies are only using a 3D model; not BIM!

The industry leaders that will be most valuable to this thesis project will be John Bechtel from the OPP, Dr. John Messner and Dr. David Riley from The Pennsylvania State University. This is mainly due to their familiarity with the Moore Building Addition and their ability to provide realistic information on the site (University Park Campus) that other participants would not have access to. Others that may be of value include Dr. Magent and Bill Moyer as they have had a great experience with the BIM side of operations.

Appendix A – Detailed Project Schedule

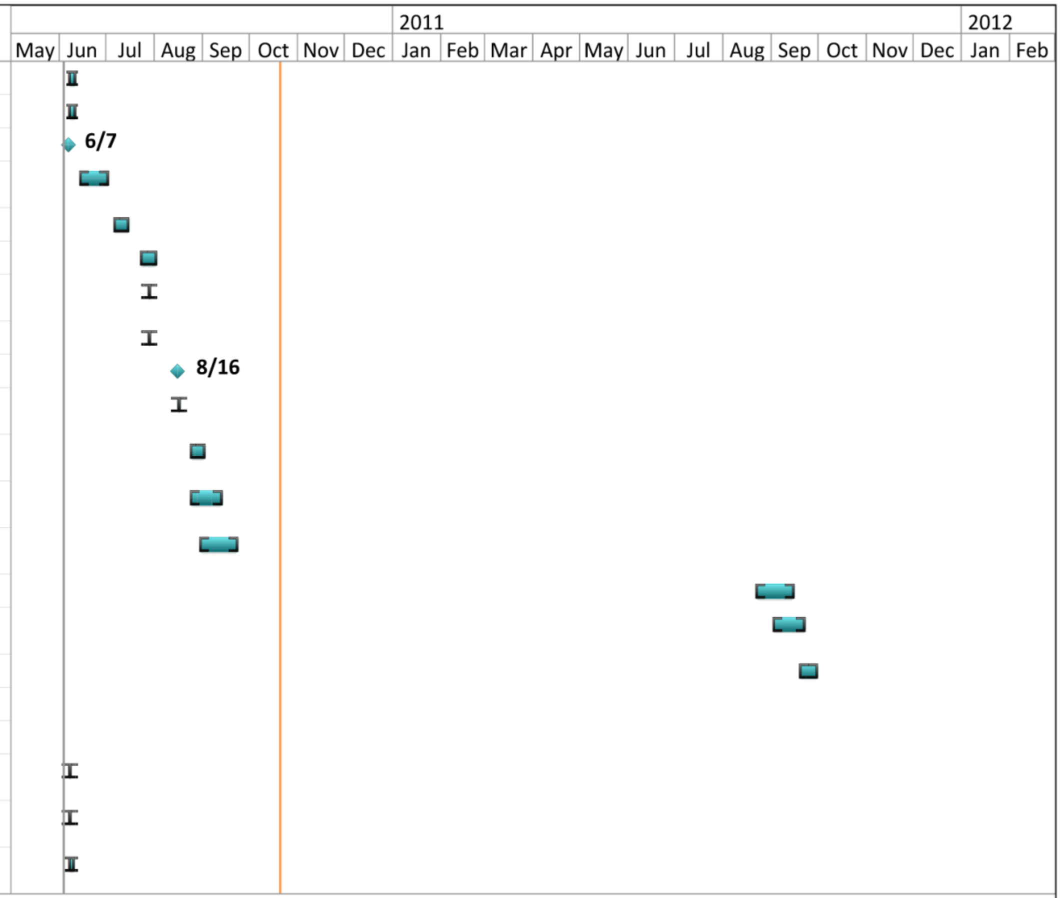
ID	Task Name	Duration	Start
1			
2	**MILESTONES**		
3	GROUND BREAKING CEREMONY	1 day	Fri 6/4/10
4	PERMANENT POWER	0 days	Mon 2/28/11
5	BUILDING DRY-IN WEST	0 days	Mon 2/28/11
6	BUILDING DRY-IN NORTH & EAST	0 days	Mon 5/9/11
7	PREFUNCTIONAL TESTING FOR AIR SIDE	5 days	Mon 5/9/11
8	PREFUNCTIONAL TESTING FOR CHILLED WATER	5 days	Mon 5/9/11
9	PREFUCNTIONAL TESTING FOR HOT WATER SYSTEM	10 days	Thu 9/15/11
10	TEST AND BALANCE	20 days	Mon 10/17/11
11	FIRE PROTECTION FINAL INSPECTION	5 days	Fri 10/28/11
12	ACCESSIBILITY FINAL INSPECTION	5 days	Fri 10/28/11
13	ENERGY FINAL INSPECTION	5 days	Fri 10/28/11
14	MECHANICAL FINAL INSPECTION	5 days	Fri 10/28/11
15	ELECTRICAL FINAL INSPECITON	5 days	Fri 10/28/11
16	PLUMBING FINAL INSPECTION	5 days	Fri 10/28/11
17	FUNCTIONAL TESTING	30 days	Fri 10/28/11
18	BUILDING FINAL INSPECTION	5 days	Fri 11/18/11
19	PROJECT SUBSTANTIAL COMPLETION	0 days	Fri 11/25/11
20	PUNCHLIST AND COMMISSIONING	24 days	Mon 11/28/11
21			
22	**CONSTRUCTION**		
23	**SITEWORK**		



Project: FULL SCHEDULE
Date: Thu 10/21/10

Task	External Milestone	Manual Summary Rollup
Split	Inactive Task	Manual Summary
Milestone	Inactive Milestone	Start-only
Summary	Inactive Summary	Finish-only
Project Summary	Manual Task	Deadline
External Tasks	Duration-only	Progress

ID	Task Name	Duration	Start
24	INSTALL SITE FENCING	5 days	Mon 6/7/10
25	TREE REMOVAL	5 days	Mon 6/7/10
26	CLOSE ALLEY	0 days	Mon 6/7/10
27	INSTALL CHILLED WATER LINES (ALLEY)	15 days	Mon 6/14/10
28	INSTALL WATER LINES (ALLEY)	8 days	Tue 7/6/10
29	INSTALL STORM SEWER (ALLEY)	7 days	Fri 7/23/10
30	INSTALL TEMPORARY WATER HEATERS	2 days	Wed 7/28/10
31	RESTORE ALLEY	2 days	Wed 7/28/10
32	REOPEN ALLEY	0 days	Mon 8/16/10
33	RELOCATE SITE FENCE & CLOSE MOORE/CEDAR PKG LOT	2 days	Mon 8/16/10
34	INSTALL TEMP. CA PIPING (SITE & BASEMENT)	8 days	Tue 8/24/10
35	INSTALL TEMP. STEAM PIPING (SITE & BASEMENT)	15 days	Tue 8/24/10
36	INSTALL PERMANENT SITE UTILITES	19 days	Mon 8/30/10
37	INSTALL SITE CONCRETE	19 days	Mon 8/22/11
38	INSTALL SITE LIGHTING/ELECTRICAL	15 days	Fri 9/2/11
39	INSTALL LANDSCAPING	10 days	Mon 9/19/11
40			
41	ABATEMENT & DEMOLITION		
42	PREP 3RD FLOOR ASBESTOS ABATEMENT	2 days	Mon 6/7/10
43	PREP CRAWL SPACE ASBESTOS ABATEMENT	2 days	Mon 6/7/10
44	ASBESTOS ABATEMENT CONTAINMENT SET-UP	4 days	Mon 6/7/10



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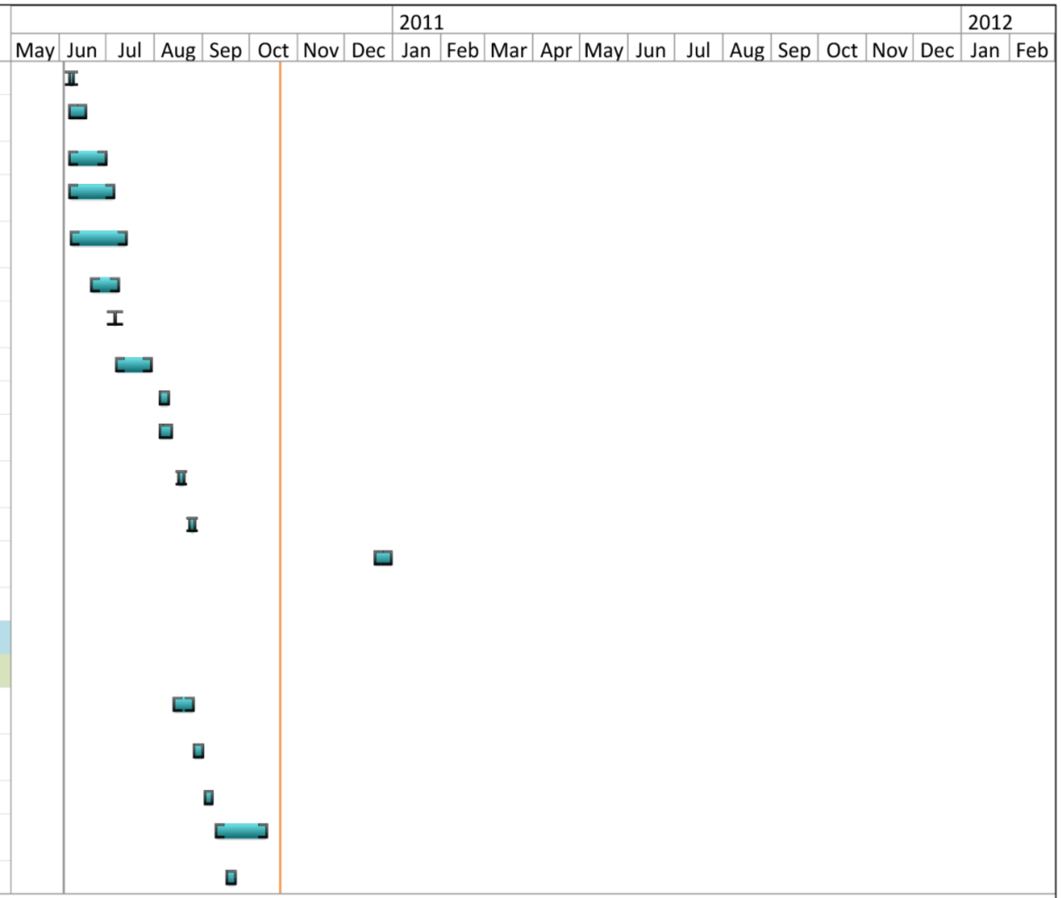
Milestone	Inactive Milestone	Start-only
Summary	Inactive Summary	Finish-only
Project Summary	Manual Task	Deadline
External Tasks	Duration-only	Progress

ID	Task Name	Duration	Start
45	PREP 2N FL ASBESTOS ABATEMENT	4 days	Mon 6/7/10
46	ASBESTOS ABATEMENT EXTERIOR PANEL REMOVAL	10 days	Mon 6/7/10
47	ASBESTOS ABATEMENT TRANSITE	19 days	Mon 6/7/10
48	ASBESTOS ABATEMENT 3RD FL THEN SERVER	22 days	Mon 6/7/10
49	ASBESTOS ABATEMENT CRAWL SPACE	27 days	Tue 6/8/10
50	ASBESTOS ABATEMENT 2ND FL	15 days	Mon 6/21/10
51	PREP 4TH FL ASBESTOS ABATEMENT	2 days	Tue 7/6/10
52	ASBESTOS ABATEMENT 4TH FL	18 days	Wed 7/7/10
53	DEMO 1ST FL INTERIOR WALLS	5 days	Wed 8/4/10
54	DEMO WEST ELEVATION BRICK EXTERIOR	7 days	Wed 8/4/10
55	DEMO NORTH ELEV BRIC EXTERIOR	5 days	Mon 8/16/10
56	DEMO EAST ELEV BRICK EXTERIOR	5 days	Mon 8/23/10
57	EXISTING MOORE BSMT ASBESTOS ABATEMENT	10 days	Mon 12/20/10
58			
59	**BUILDING CONSTRUCTION**		
60	**STRUCTURE THRU SLOCURE**		
61	EXCAV WEST BASEMENT & SHORE /UNDERPIN EXISTING STEEL	10 days	Fri 8/13/10
62	DEMO SLABS AND AREAWAY WALLS & WEST GRADE BEAMS	5 days	Thu 8/26/10
63	STABILIZE EXCAVATION	4 days	Thu 9/2/10
64	F/R/P BSMT FOOTINGS/WALLS - WEST	24 days	Thu 9/9/10
65	BELOW SLAB EXCAVATION	5 days	Thu 9/16/10



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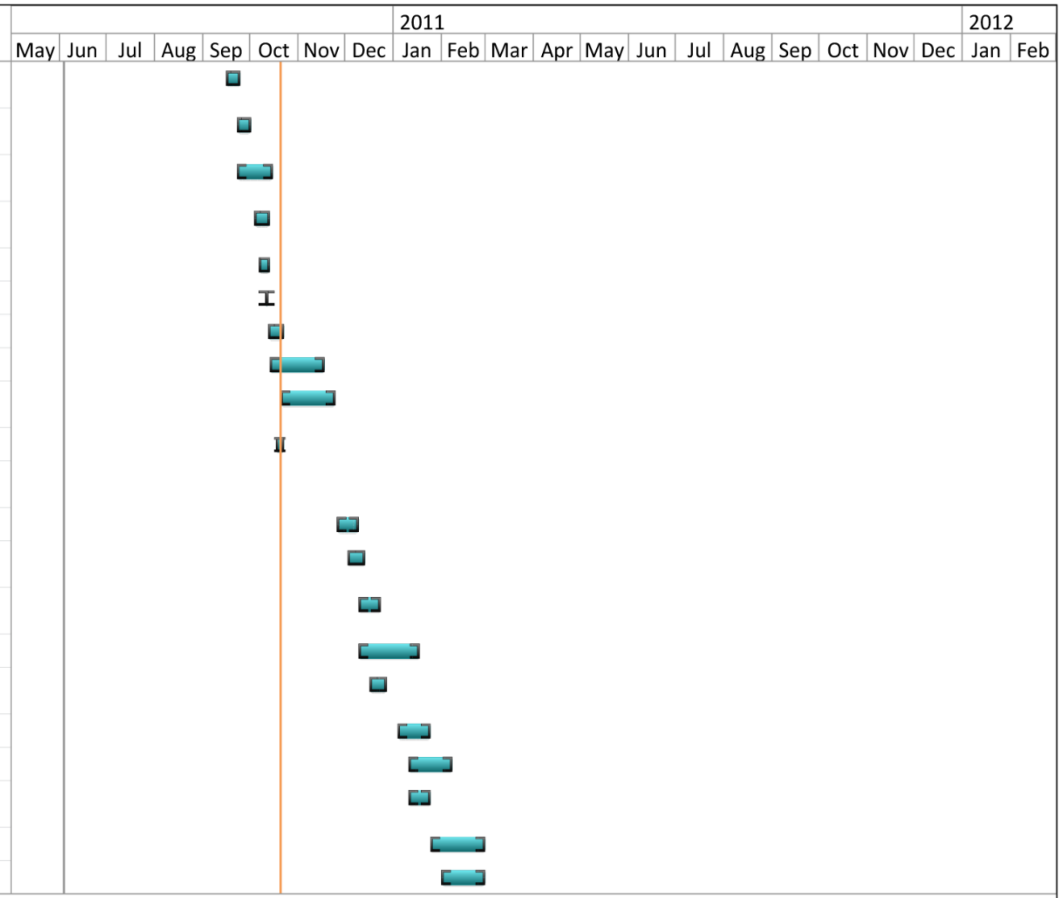
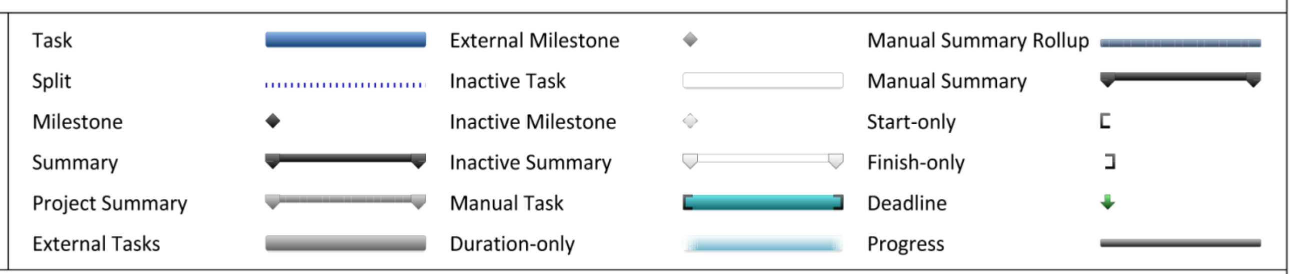
Task	External Milestone	Manual Summary Rollup
Split	Inactive Task	Manual Summary
Milestone	Inactive Milestone	Start-only
Summary	Inactive Summary	Finish-only
Project Summary	Manual Task	Deadline
External Tasks	Duration-only	Progress

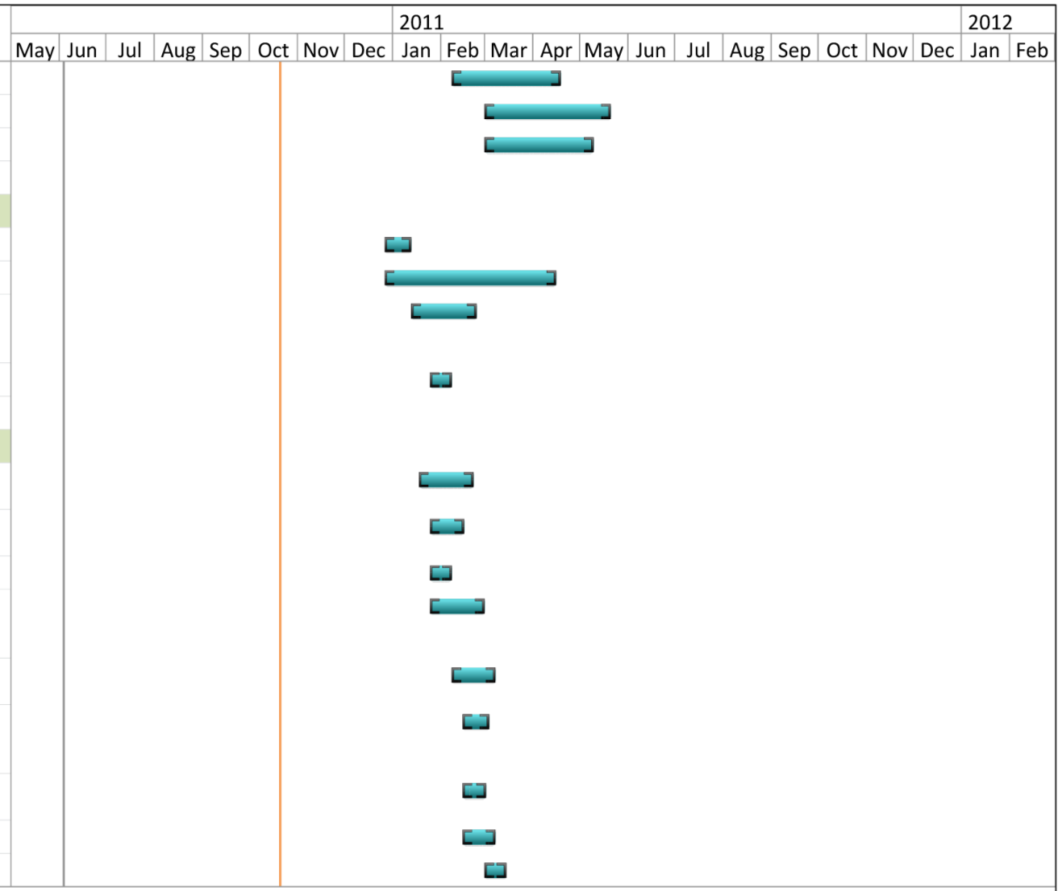
ID	Task Name	Duration	Start
66	BELOW SLAB ELECTIRCAL - WEST & EAST	7 days	Thu 9/16/10
67	BELOW SLAB PLUMBING - WEST & EAST	7 days	Thu 9/23/10
68	F/R/P FOOTINGS/WALLS NORTH & EAST	17 days	Thu 9/23/10
69	FLOOR DRAINS, EXCAV SITE SANITARY, BACKFILL PIPING	8 days	Mon 10/4/10
70	CANTILEVER GRADE BEAM	5 days	Thu 10/7/10
71	INSTALL SITE SANITARY PIPING	2 days	Mon 10/11/10
72	BASEMENT WATER PROOFING	8 days	Wed 10/13/10
73	ERECT STEEL WEST TO EAST	25 days	Thu 10/14/10
74	DECKING/DETAIL/IN SLAB PREP WEST TO EAST	25 days	Thu 10/21/10
75	BASEMENT SLAB ON GRADE WEST	5 days	Mon 10/18/10
76	SLAB ON DECK POURS -WEST 5 LEVELS	10 days	Mon 10/26/20
77	SLAB ON GRADE NORTH & EAST	10 days	Fri 11/26/10
78	BACKFILL FOUNDATION WALLS - WEST	7 days	Fri 12/3/10
79	SLAB ON DECK POURS - N&E 4 LEVELS	10 days	Fri 12/10/10
80	SOFP - WEST NORTH AND EAST	27 days	Fri 12/10/10
81	BACKFILL FOUNDATION WALLS - NORTH AND EAST	7 days	Fri 12/17/10
82	ROOFING - WEST	15 days	Tue 1/4/11
83	MASONRY - WEST	20 days	Tue 1/11/11
84	EXT FRAMING AND SHEATHING - NORTH & EAST	10 days	Tue 1/11/11
85	ROOFING - NORTH AND EAST	25 days	Tue 1/25/11
86	CURTAINWALL - WEST	20 days	Tue 2/1/11



Project: FULL SCHEDULE
Date: Thu 10/21/10



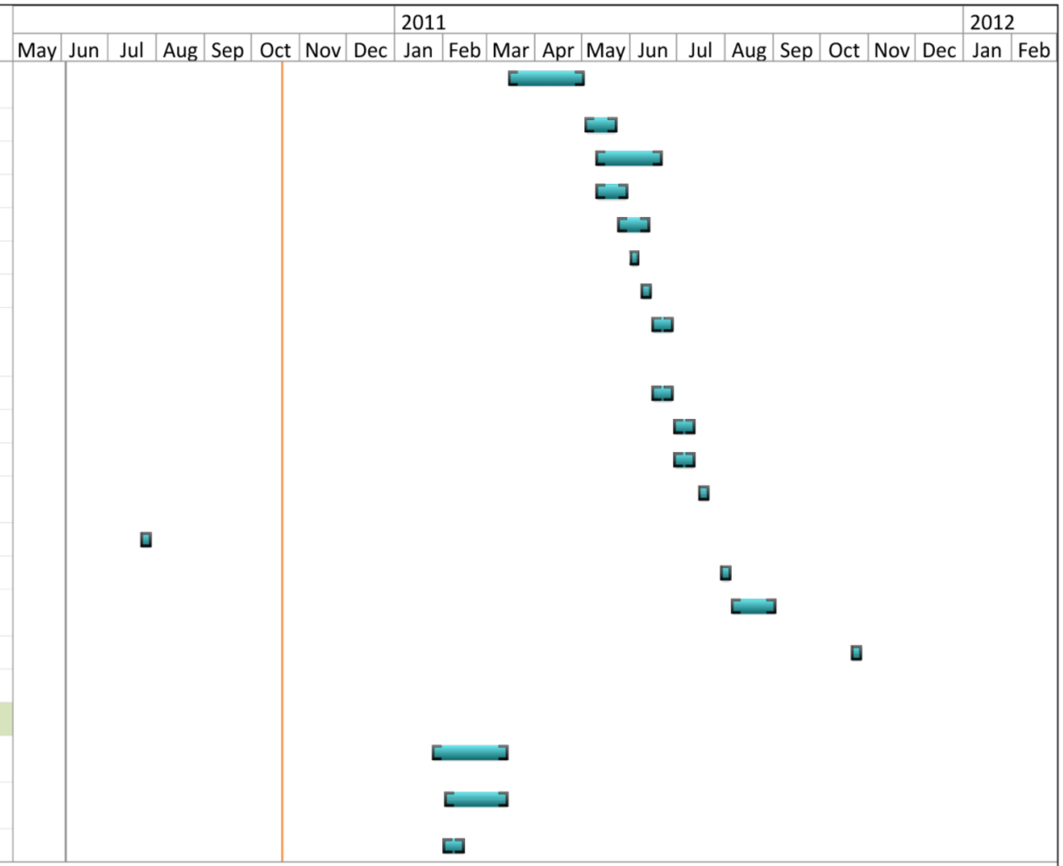
ID	Task Name	Duration	Start
87	MASONRY - NORTH AND EAST	50 days	Tue 2/8/11
88	INSTALL ELEVATOR EQUIPMENT	59 days	Tue 3/1/11
89	CURTAINWALL - NORTH AND EAST	50 days	Tue 3/1/11
90			
91	**BASEMENT**		
92	SANITARY/STORM RI	13 days	Mon 12/27/10
93	BSMT MER RI & RISERS	80 days	Mon 12/27/10
94	BSMT PUMPS/SEWAGE/DOMESTIC WTR/WATER HEATERS	30 days	Thu 1/13/11
95	BSMT FIRE PROTECTION	10 days	Tue 1/25/11
96			
97	**1ST FLOOR**		
98	FLOOR LAYOUT/TRACK/STUD FRAMING & INSTALL	25 days	Tue 1/18/11
99	FLOOR STORM PIPING/SANITARY RI/DRAINS	16 days	Tue 1/25/11
100	FIRE PROTECTION RI	10 days	Tue 1/25/11
101	O/H ELECTRICAL ROUGH IN & ELECTRICAL IN-WALL STUD ROUGH-IN	25 days	Tue 1/25/11
102	HVAC PIPING RI/DUCTWORK INSTALL	20 days	Tue 2/8/11
103	IN-WALL DOMESTIC WATER RI/OH DOMESTIC WATER RI/REC WATER RI	13 days	Tue 2/15/11
104	WALL INSULATION/HANG DRYWALL	11 days	Tue 2/15/11
105	INSTALL FAN COIL UNITS	15 days	Tue 2/15/11
106	DUCT/PIPE INSULATION	10 days	Tue 3/1/11



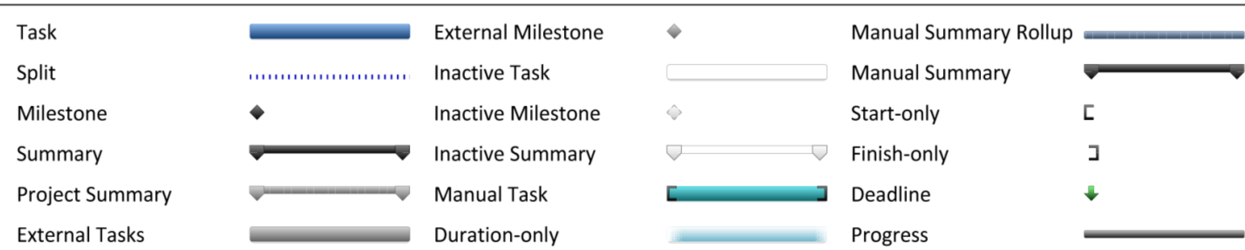
Project: FULL SCHEDULE
Date: Thu 10/21/10

Task, Split, Milestone, Summary, Project Summary, External Tasks, External Milestone, Inactive Task, Inactive Milestone, Inactive Summary, Manual Task, Duration-only, Manual Summary Rollup, Manual Summary, Start-only, Finish-only, Deadline, Progress

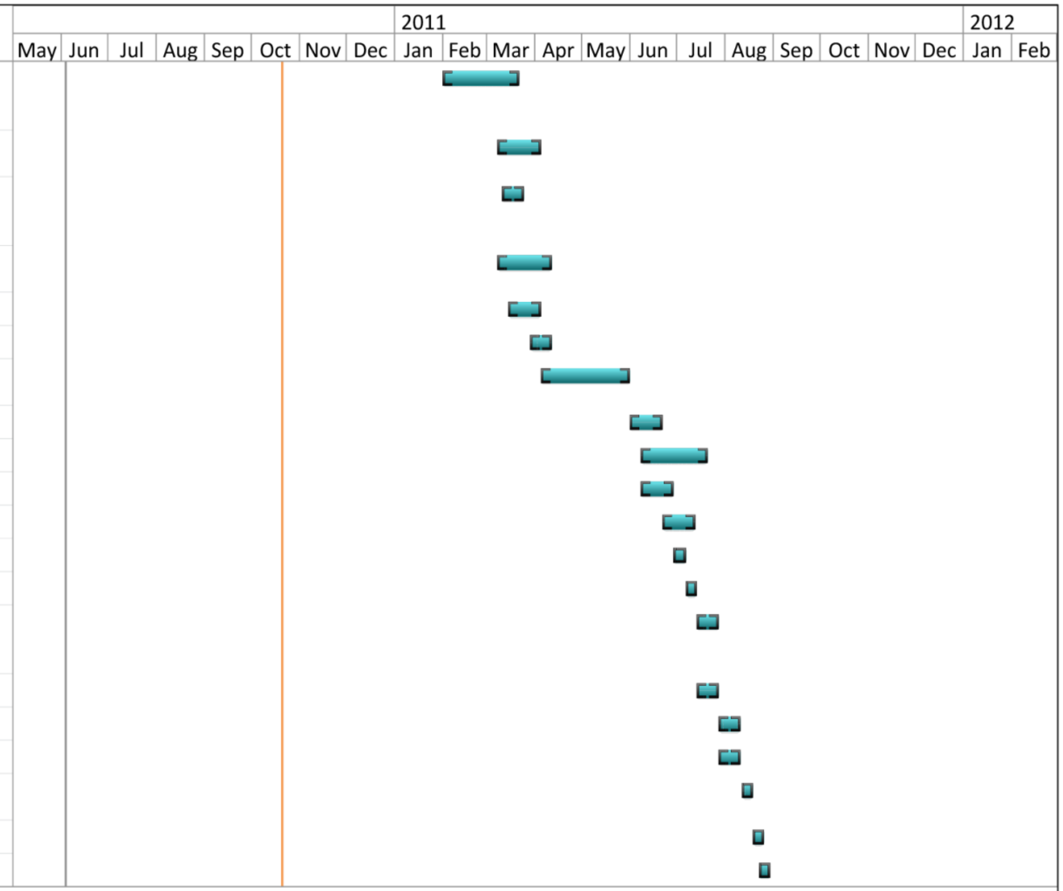
ID	Task Name	Duration	Start
107	FRAME/HANG/TAPE & FINISH DRYWALL	35 days	Tue 3/15/11
108	PRIME/PAINT WALLS & CEILINGS	15 days	Tue 5/3/11
109	INSTALL ACOUSTIC GRID & TILE	31 days	Tue 5/10/11
110	CERAMIC TILE	15 days	Tue 5/10/11
111	LIGHT FIXTURES	15 days	Tue 5/24/11
112	FIRE PROTECTION TRIM	4 days	Wed 6/1/11
113	INSTALL PLUMBING FIXTURES	5 days	Wed 6/8/11
114	INSTALL TOILET PARTITIONS/TOILET & BATH ACCESSORIES	10 days	Wed 6/15/11
115	FINISH PAINT & WALL COVERING	10 days	Wed 6/15/11
116	INSTALL CARPET/BASE	10 days	Wed 6/29/11
117	ELECTRICAL DEVICES & TRIM	10 days	Wed 6/29/11
118	INSTALL WOOD DOORS / HARDWOOD	5 days	Fri 7/15/11
119	PAIN TOUCHUPS	5 days	Thu 7/22/10
120	FINAL CLEANING	5 days	Fri 7/29/11
121	PUNCHLISTS (IN-HOUSE/ARCH/WORKOFF)	21 days	Fri 8/5/11
122	INSTALL FURNITURE	5 days	Fri 10/21/11
123			
124	**2ND FLOOR**		
125	FLOOR LAYOUT/TRACK/STUD FRAMING & INSTALL	35 days	Tue 1/25/11
126	FLOOR STORM PIPING/SANITARY RI/DRAINS	29 days	Wed 2/2/11
127	FIRE PROTECTION RI	10 days	Tue 2/1/11



Project: FULL SCHEDULE
Date: Thu 10/21/10



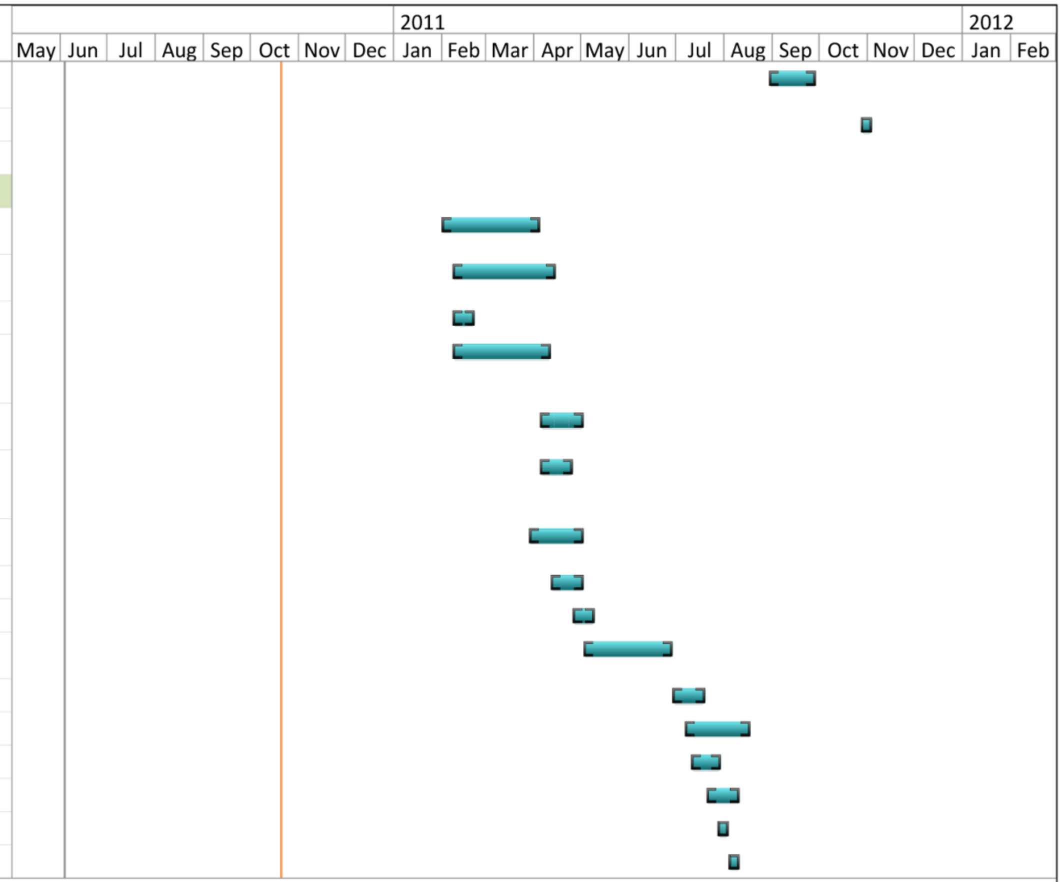
ID	Task Name	Duration	Start
128	O/H ELECTRICAL ROUGH IN & ELECTRICAL IN-WALL STUD ROUGH-IN	35 days	Tue 2/1/11
129	HVAC PIPING RI/DUCTWORK INSTALL	20 days	Tue 3/8/11
130	IN-WALL DOMESTIC WATER RI/OH DOMESTIC WATER RI/REC WATER RI	10 days	Fri 3/11/11
131	WALL INSULATION/HANG DRYWALL	25 days	Tue 3/8/11
132	INSTALL FAN COIL UNITS	15 days	Tue 3/15/11
133	DUCT/PIPE INSULATION	10 days	Tue 3/29/11
134	FRAME/HANG/TAPE & FINISH DRYWALL	41 days	Tue 4/5/11
135	PRIME/PAINT WALLS & CEILINGS	15 days	Wed 6/1/11
136	INSTALL ACOUSTIC GRID & TILE	31 days	Wed 6/8/11
137	CERAMIC TILE	15 days	Wed 6/8/11
138	LIGHT FIXTURES	15 days	Wed 6/22/11
139	FIRE PROTECTION TRIM	6 days	Wed 6/29/11
140	INSTALL PLUMBING FIXTURES	5 days	Thu 7/7/11
141	INSTALL TOILET PARTITIONS/TOILET & BATH ACCESSORIES	10 days	Thu 7/14/11
142	FINISH PAINT & WALL COVERING	10 days	Thu 7/14/11
143	INSTALL CARPET/BASE	10 days	Thu 7/28/11
144	ELECTRICAL DEVICES & TRIM	10 days	Thu 7/28/11
145	INSTALL WOOD DOORS / HARDWOOD	5 days	Fri 8/12/11
146	PAIN TOUCHUPS	5 days	Fri 8/19/11
147	FINAL CLEANING	5 days	Tue 8/23/11



Project: FULL SCHEDULE
Date: Thu 10/21/10

Task	External Milestone	Manual Summary Rollup
Split	Inactive Task	Manual Summary
Milestone	Inactive Milestone	Start-only
Summary	Inactive Summary	Finish-only
Project Summary	Manual Task	Deadline
External Tasks	Duration-only	Progress

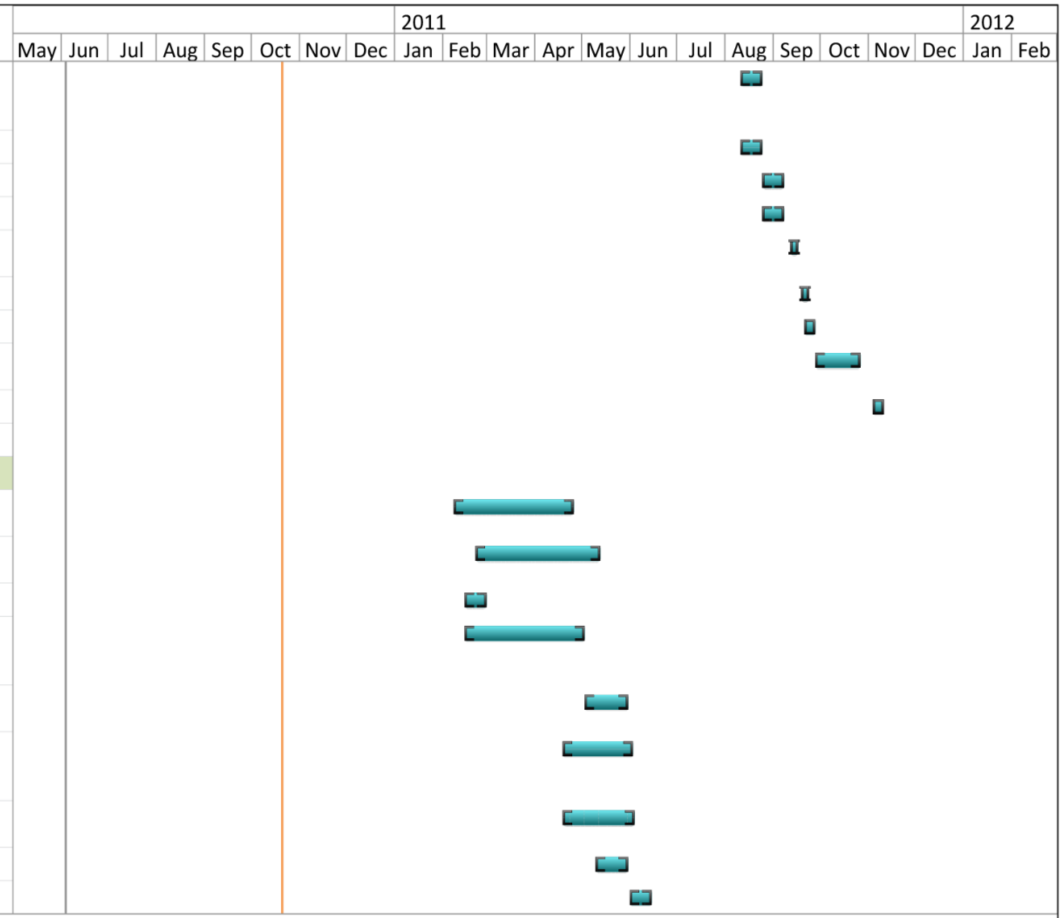
ID	Task Name	Duration	Start
148	PUNCHLISTS (IN-HOUSE/ARCH/WORKOFF)	22 days	Tue 8/30/11
149	INSTALL FURNITURE	5 days	Fri 10/28/11
150			
151	**3RD FLOOR**		
152	FLOOR LAYOUT/TRACK/STUD FRAMING & INSTALL	45 days	Tue 2/1/11
153	FLOOR STORM PIPING/SANITARY RI/DRAINS	48 days	Tue 2/8/11
154	FIRE PROTECTION RI	10 days	Tue 2/8/11
155	O/H ELECTRICAL ROUGH IN & ELECTRICAL IN-WALL STUD ROUGH-IN	45 days	Tue 2/8/11
156	HVAC PIPING RI/DUCTWORK INSTALL	20 days	Tue 4/5/11
157	IN-WALL DOMESTIC WATER RI/OH DOMESTIC WATER RI/REC WATER RI	15 days	Tue 4/5/11
158	WALL INSULATION/HANG DRYWALL	25 days	Tue 3/29/11
159	INSTALL FAN COIL UNITS	15 days	Tue 4/12/11
160	DUCT/PIPE INSULATION	10 days	Tue 4/26/11
161	FRAME/HANG/TAPE & FINISH DRYWALL	41 days	Tue 5/3/11
162	PRIME/PAINT WALLS & CEILINGS	15 days	Wed 6/29/11
163	INSTALL ACOUSTIC GRID & TILE	30 days	Thu 7/7/11
164	CERAMIC TILE	15 days	Mon 7/11/11
165	LIGHT FIXTURES	15 days	Thu 7/21/11
166	FIRE PROTECTION TRIM	5 days	Thu 7/28/11
167	INSTALL PLUMBING FIXTURES	5 days	Thu 8/4/11



Project: FULL SCHEDULE
Date: Thu 10/21/10

Task	External Milestone	Manual Summary Rollup
Split	Inactive Task	Manual Summary
Milestone	Inactive Milestone	Start-only
Summary	Inactive Summary	Finish-only
Project Summary	Manual Task	Deadline
External Tasks	Duration-only	Progress

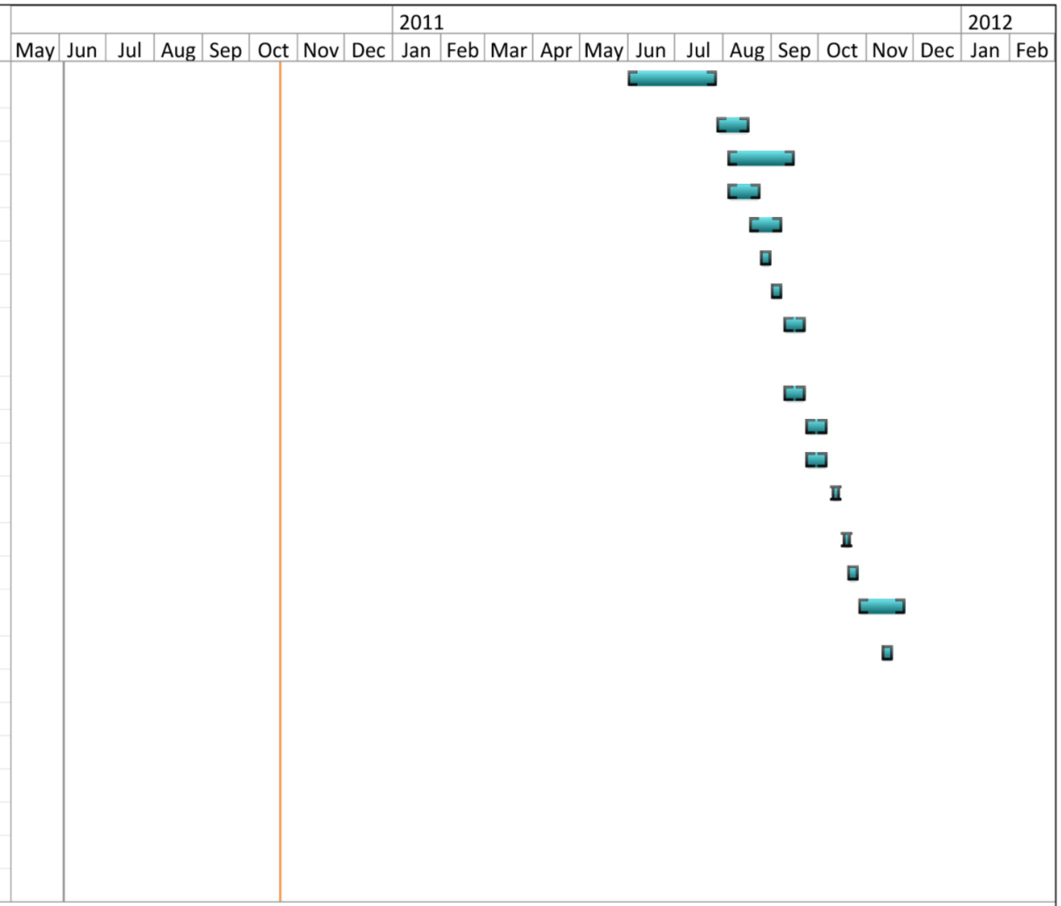
ID	Task Name	Duration	Start
168	INSTALL TOILET PARTITIONS/TOILET & BATH ACCESSORIES	10 days	Thu 8/11/11
169	FINISH PAINT & WALL COVERING	10 days	Thu 8/11/11
170	INSTALL CARPET/BASE	10 days	Thu 8/25/11
171	ELECTRICAL DEVICES & TRIM	10 days	Thu 8/25/11
172	INSTALL WOOD DOORS / HARDWOOD	5 days	Mon 9/12/11
173	PAIN TOUCHUPS	5 days	Mon 9/19/11
174	FINAL CLEANING	5 days	Wed 9/21/11
175	PUNCHLISTS (IN-HOUSE/ARCH/WORKOFF)	21 days	Wed 9/28/11
176	INSTALL FURNITURE	5 days	Fri 11/4/11
177			
178	**4TH FLOOR**		
179	FLOOR LAYOUT/TRACK/STUD FRAMING & INSTALL	55 days	Tue 2/8/11
180	FLOOR STORM PIPING/SANITARY RI/DRAINS	58 days	Tue 2/22/11
181	FIRE PROTECTION RI	10 days	Tue 2/15/11
182	O/H ELECTRICAL ROUGH IN & ELECTRICAL IN-WALL STUD ROUGH-IN	55 days	Tue 2/15/11
183	HVAC PIPING RI/DUCTWORK INSTALL	20 days	Tue 5/3/11
184	IN-WALL DOMESTIC WATER RI/OH DOMESTIC WATER RI/REC WATER RI	33 days	Tue 4/19/11
185	WALL INSULATION/HANG DRYWALL	34 days	Tue 4/19/11
186	INSTALL FAN COIL UNITS	15 days	Tue 5/10/11
187	DUCT/PIPE INSULATION	10 days	Wed 6/1/11



Project: FULL SCHEDULE
Date: Thu 10/21/10

Task	External Milestone	Manual Summary Rollup
Split	Inactive Task	Manual Summary
Milestone	Inactive Milestone	Start-only
Summary	Inactive Summary	Finish-only
Project Summary	Manual Task	Deadline
External Tasks	Duration-only	Progress

ID	Task Name	Duration	Start
188	FRAME/HANG/TAPE & FINISH DRYWALL	41 days	Wed 6/1/11
189	PRIME/PAINT WALLS & CEILINGS	15 days	Thu 7/28/11
190	INSTALL ACOUSTIC GRID & TILE	31 days	Thu 8/4/11
191	CERAMIC TILE	15 days	Thu 8/4/11
192	LIGHT FIXTURES	15 days	Thu 8/18/11
193	FIRE PROTECTION TRIM	5 days	Thu 8/25/11
194	INSTALL PLUMBING FIXTURES	5 days	Thu 9/1/11
195	INSTALL TOILET PARTITIONS/TOILET & BATH ACCESSORIES	10 days	Fri 9/9/11
196	FINISH PAINT & WALL COVERING	10 days	Fri 9/9/11
197	INSTALL CARPET/BASE	10 days	Fri 9/23/11
198	ELECTRICAL DEVICES & TRIM	10 days	Fri 9/23/11
199	INSTALL WOOD DOORS / HARDWOOD	5 days	Mon 10/10/11
200	PAIN TOUCHUPS	5 days	Mon 10/17/11
201	FINAL CLEANING	5 days	Thu 10/20/11
202	PUNCHLISTS (IN-HOUSE/ARCH/WORKOFF)	22 days	Thu 10/27/11
203	INSTALL FURNITURE	5 days	Fri 11/11/11
204			
205			
206			
207			
208			
209			
210			



Project: FULL SCHEDULE
Date: Thu 10/21/10

Task	External Milestone	Manual Summary Rollup
Split	Inactive Task	Manual Summary
Milestone	Inactive Milestone	Start-only
Summary	Inactive Summary	Finish-only
Project Summary	Manual Task	Deadline
External Tasks	Duration-only	Progress

Appendix B – Site Plan Layout (Superstructure Phase)

Legend

Symbols

- Subcontractor Trailer
- CM Trailer
- Tool & Material Storage
- Crane (Tower)
- Temp. Power Xformer
- Construction Fence
- Roads
- Walkways
- Existing Stairway
- Dumpsters
- Portable Toilets
- Concrete Pump

50ft

Moore Building Addition

C-110

Site & Materials Layout Plan - Superstructure Phase

Mohammad Alhusaini (CM)

10/27/2010

Appendix C – Material Take-Offs and Detailed Structural Estimate

Spread Footings									
	Footing Size								Formwork
Mark	Length, L (ft)	Width, W (ft)	Thickness (in)	Bottom Reinforcing Each Way		QTY of Type	Volume ft3	Volume CY	SFCA
F50	5	5	12	7 #4		1	25	0.93	20.00
F70	7	7	24	6 #8		1	98	3.63	56.00
F80	8	8	24	6 #7		3	384.00	14.22	192.00
F90	9	9	24	10 #6		3	486.00	18.00	216.00
F100	10	10	24	9 #7		9	1800.00	66.67	720.00
F110	11	11	26	8 #8		3	786.50	29.13	286.00
F120	12	12	27	10 #8		2	648.00	24.00	216.00
F130	13	13	29	12 #8		7	2858.92	105.89	879.67
F140	14	14	31	11 #9		5	2531.67	93.77	723.33
F150	15	15	33	12 #9		2	1237.50	45.83	330.00
F10080	8	10	24	9 #7		0	0.00	0.00	0.00
F11080	8	11	26	8 #8		3	572.00	21.19	247.00
F13070	7	13	29	12 #8		1	219.92	8.15	96.67
F13090	9	13	29	12 #8		1	282.75	10.47	106.33
F14080	8	14	31	11 #9		2	578.67	21.43	227.33
F120100	10	12	27	10 #8		2	540.00	20.00	198.00
F130100	10	13	29	12 #8		1	314.17	11.64	111.17
F150100	10	15	33	12 #9		1	412.50	15.28	137.50
						Total	13775.58	510.21	4763.00

Strip Footing							Formwork
Mark	Length, L (ft)	Width, W (ft)	Thickness (ft)		Volume ft3	Volume CY	SFCA
2,3,6,4	195.266	2.167	1.000		423.076	15.669	850.485
2 (First Floor)	260.500	2.167	1.000		564.417	20.904	1133.167
5,8	93.083	1.500	1.000		139.625	5.171	282.250
				Total	1127.117	41.745	2265.901

SOG						Formwork
Mark	Area (ft2)	Thickness (ft)	Perimeter	Volume ft3	Volume CY	SFCA
SOG1	5970.491	0.500	288.333	2985.246	110.565	144.167
SOG2 (Strip)	283.877	0.417	276.167	118.282	4.381	115.069
SOG2	5285.972	0.417	459.250	2202.488	81.574	191.354
			Total	5306.016	196.519	450.590

Slab on Deck						Formwork
Mark	Area (ft2)	Thickness (ft)	Perimeter	Volume ft3	Volume CY	SFCA
S1 (first floor)	5970.491	0.375	288.333	2238.934	82.923	108.125
S1 (second floor)	11305.271	0.375	832.333	4239.477	157.018	312.125
S1 (third floor)	11306.271	0.375	832.333	4239.852	157.032	312.125
S1 (fourth floor)	11306.271	0.375	832.333	4239.852	157.032	312.125
S1 (low roof)	2418.979	0.375	341.458	907.117	33.597	128.047
S1 (high roof)	11306.271	0.375	832.333	4239.852	157.032	312.125
			Total	20105.083	744.633	1484.672

Foundation Wall							Formwork
Mark	Length, L (ft)	Width, W (ft)	Thickness (ft)		Volume ft3	Volume CY	SFCA
4,5,6,8 (Basement)	298.083	1.167	5.000		1738.819	64.401	2992.500
2 (First Floor)	260.500	1.167	4.850		1473.996	54.592	2538.167
				Total	3212.815	118.993	5530.667

Piers							Formwork
Mark	Length, L (ft)	Width, W (ft)	Cumul. Depths (ft)		Volume ft3	Volume CY	SFCA
P1	2.000	2.000	69.000		276.000	10.222	552.000
P2	1.167	2.000	14.500		33.833	1.253	91.833
				Total	309.833	11.475	643.833

GRADE BEAMS							Formwork
Mark	Length, L (ft)	Width, W (in)	Depth (in)		Volume ft3	Volume CY	SFCA
GB1	19.280	24.000	36.000		115.677	4.284	127.677
GB2	10.814	24.000	36.000		64.885	2.403	76.885
				Total	180.562	6.687	204.562

TOTAL			
Volume of Concrete		Area of Formwork	Metal Decks
Ft3	CY	SFCA	SF
43836.448	1630.260	15343.225	53613.555

Steel Beams

Beam Type	Total Length (ft)	Weight (PLF)	Total Member Weight (lb)
W16X40	103.333	40	4133.333
W16X36	478.583	36	17229.000
W14X22	165.500	22	3641.000
W14X34	42.000	34	1428.000
W12X14	167.042	14	2338.583
W24X62	19.667	62	1219.333
W24X68	9.833	68	668.667
W14X34	21.083	34	716.833
W14X43	21.333	43	917.333
W16X67	49.667	67	3327.667
W16X26	81.000	26	2106.000
W10X12	21.333	12	256.000
W12X19	24.000	19	456.000
W21X44	0.000	44	0.000
W16X45	0.000	45	0.000
W21X83	0.000	83	0.000
W21X73	0.000	73	0.000
W16X57	0.000	57	0.000
W8X35	0.000	35	0.000
W16X31	0.000	31	0.000
		TOTAL	**38437.750**

Beam Type	Total Length (ft)	Weight (PLF)	Total Member Weight (lb)
W21X48	11.083	48	532.000
W10X12	80.083	12	961.000
W12X14	63.000	14	882.000
W8X21	10.667	21	224.000
W21X44	103.500	44	4554.000
W14X22	73.667	22	1620.667
W18X40	40.333	40	1613.333
W16X45	40.333	45	1815.000
W10X26	19.667	26	511.333
		TOTAL	**12713.333**

Beam Type	Total Length (ft)	Weight (PLF)	Total Member Weight (lb)
W16X40	251.583	40	10063.333
W16X36	613.500	36	22086.000
W14X22	648.083	22	14257.833
W14X34	0.000	34	0.000
W12X14	105.333	14	1474.667
W24X62	0.000	62	0.000
W24X68	0.000	68	0.000
W14X34	42.000	34	1428.000
W14X43	0.000	43	0.000
W16X67	71.667	67	4801.667
W16X26	262.083	26	6814.167
W10X12	46.500	12	558.000
W12X19	0.000	19	0.000
W21X44	465.417	44	20478.333
W16X45	21.083	45	948.750
W21X83	21.000	83	1743.000
W21X73	56.167	73	4100.167
W16X57	223.250	57	12725.250
W8X35	161.792	35	5662.708
W16X31	17.333	31	537.333
		TOTAL	**107679.208**

TOTAL BEAM WEIGHT	
lb	**Tons**
158830.292	79.415

Steel Columns			
Total			
Beam Type	Total Length (ft)	Weight (PLF)	Total Member Weight (lb)
W10X33	652.125	33	21520.125
W12X65	224.000	65	14560.000
W12X72	132.708	72	9555.000
W10X45	211.500	45	9517.500
W10X39	169.917	39	6626.750
W12X58	157.500	58	9135.000
W10X77	41.500	77	3195.500
W10X68	116.000	68	7888.000
W10X54	74.500	54	4023.000
W10X49	365.000	49	17885.000
W12X40	250.625	40	10025.000
W12X53	58.000	53	3074.000
W10X60	29.000	60	1740.000
		TOTAL (lbs)	**118744.875**
		TOTAL (tons)	**59.372**

Steel Bracing			
Total			
Beam Type	Total Length (ft)	Weight (PLF)	Total Member Weight (lb)
HSS7X7X1/4	374.9963	22.4200	8407.4175
HSS8X8X1/4	289.9619	25.8200	7486.8157
HSS8X8X5/16	149.3689	31.8400	4755.9042
HSS6X6X1/4	66.6155	19.0200	1267.0260
		TOTAL (lbs)	**21917.163**
		TOTAL (tons)	**10.959**

Cost Estimate Report
CostWorks®
RSMeans

Unit Detail Report

State College,
PA, 16802
Year 2010 Quarter 3

Date: 15-Oct-10

Moore Building Addition Concrete

Prepared By:
Mohammad alhussaini
PSU

LineNumber			Description	Quantity	Unit	Total Incl. O&P	Ext. Total Incl. O&P
Division 03 Concrete							
031113000000			Structural Cast-In-Place Concrete Forming	0.00			$0.00
031113050010			FORMS, BUY OR RENT	0.00			$0.00
031113050100			C.I.P. concrete forms, aluminum, smooth face, buy, 6" x 8', includes material only	15,343.23	SFCA	$30.31	$465,053.15
032200000000			Welded Wire Fabric Reinforcing	0.00			$0.00
032205000000			Uncoated Welded Wire Fabric	0.00			$0.00
032205500010			WELDED WIRE FABRIC	0.00			$0.00
032205500030			Welded wire fabric, from recycled materials	0.00			$0.00
032205500050			Welded wire fabric, sheets	0.00			$0.00
032205500300			Welded wire fabric, sheets, 6 x 6 - W2.9 x W2.9 (6 x 6) 42 lb. per C.S.F., A185	570.00	C.S.F.	$65.15	$37,135.50
033105000000			Normal Weight Structural Concrete	0.00		$0.00	$0.00
033105300010			CONCRETE, FIELD MIX	0.00			$0.00
033105350300			Structural concrete, ready mix, normal weight, 4000 PSI, includes local aggregate, sand, Portland cement and water, delivered, excludes all additives and treatments	1,630.26	C.Y.	$94.81	$154,564.95
033105701400			Structural concrete, placing, elevated slab, pumped, less than 6" thick, includes strike off & consolidation, excludes material	744.63	C.Y.	$24.72	$18,407.33
033105701450			Structural concrete, placing, elevated slab, with crane and bucket, less than 6" thick, includes strike off & consolidation, excludes material	744.63	C.Y.	$46.47	$34,603.10
033105701950			Structural concrete, placing, continuous footing, shallow, pumped, includes strike off & consolidation, excludes material	41.75	C.Y.	$23.14	$965.98
033105702650			Structural concrete, placing, spread footing, pumped, over 5 C.Y., includes strike off & consolidation, excludes material	510.21	C.Y.	$23.14	$11,806.26
033105703250			Structural concrete, placing, grade beam, pumped, includes strike off & consolidation, excludes material	6.69	C.Y.	$19.32	$129.19
033105704350			Structural concrete, placing, slab on grade, pumped, up to 6" thick, includes strike off & consolidation, excludes material	196.52	C.Y.	$26.67	$5,241.16
033105705300			Structural concrete, placing, walls, direct chute, 15" thick, includes strike off & consolidation, excludes material	118.99	C.Y.	$17.83	$2,121.65

LineNumber			Description	Quantity	Unit	Total Incl. O&P	Ext. Total Incl. O&P
033105705350			Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	118.99	C.Y.	$29.15	$3,468.65
033529000000			Tooled Concrete Finishing	0.00			$0.00
033529300010			FINISHING FLOORS	0.00			$0.00
033529300012			Concrete finishing, requires that concrete first be placed, struck off & consolidated, excludes placing, striking off & consolidating	0.00			$0.00
033529300015			Concrete finishing, floors, basic finishing for unspecified flatwork, excludes placing, striking off & consolidating	0.00			$0.00
033529300200			Concrete finishing, floors, basic finishing for unspecified flatwork, bull float, manual float & manual steel trowel, excludes placing, striking off & consolidating	57,000.00	S.F.	$0.75	$42,750.00
033900000000			Concrete Curing	0.00			$0.00
033913000000			Water Concrete Curing	0.00			$0.00
033913500010			WATER CURING	0.00			$0.00
033913500015			Curing, burlap, 7.5 oz., 4 uses assumed	570.00	C.S.F.	$18.54	$10,567.80
Division 03 Subtotal							**$786,814.72**

PSU

University Park,
PA, 16802
Year 2010 Quarter 3

Date: 14-Oct-10

Unit Detail Report

Cost Estimate Report CostWorks RSMeans

Prepared By:
Mohammad alhussaini
PSU

Moore Building Addition Steel

LineNumber			Description	Quantity	Unit	Total Incl. O&P	Ext. Total Incl. O&P
Division 05 Metals							
050513506000			Paints and protective coatings, galvanizing structural steel in shop, over 20 tons, hot dip	150.00	Ton	$427.17	$64,075.50
051223170010			COLUMNS, STRUCTURAL	0.00			$0.00
051223170015			Columns, structural steel, made from recycled materials	0.00			$0.00
051223174600			Column, structural tubing, 8" x 8" x 3/8" x 14'-0", incl shop primer, cap & base plate, bolts	63.00	Ea.	$750.47	$47,279.61
051223176850			Column, structural, 2-tier, W8x31, A992 steel, incl shop primer, splice plates, bolts	652.13	L.F.	$42.15	$27,487.07
051223176900			Column, structural, 2-tier, W8x48, A992 steel, incl shop primer, splice plates, bolts	615.63	L.F.	$61.73	$38,002.53
051223176950			Column, structural, 2-tier, W8x67, A992 steel, incl shop primer, splice plates, bolts	543.00	L.F.	$83.53	$45,356.79
051223177000			Column, structural, 2-tier, W10x45, A992 steel, incl shop primer, splice plates, bolts	381.42	L.F.	$58.30	$22,236.61
051223177050			Column, structural, 2-tier, W10x68, A992 steel, incl shop primer, splice plates, bolts	116.00	L.F.	$84.82	$9,839.12
051223177200			Column, structural, 2-tier, W12x87, A992 steel, incl shop primer, splice plates, bolts	41.50	L.F.	$106.70	$4,428.05
051223177350			Column, structural, 2-tier, W14x74, A992 steel, incl shop primer, splice plates, bolts	132.71	L.F.	$91.68	$12,166.67
051223750010			STRUCTURAL STEEL MEMBERS	0.00			$0.00
051223750015			Structural steel members, made from recycled materials	0.00			$0.00
051223750120			Structural steel member, 100-ton project, 1 to 2 story building, W6x15, A992 steel, shop fabricated, incl shop primer, bolted connections	336.00	L.F.	$28.87	$9,700.32
051223750140			Structural steel member, 100-ton project, 1 to 2 story building, W6x20, A992 steel, shop fabricated, incl shop primer, bolted connections	0.00	L.F.	$34.49	$0.00
051223750350			Structural steel member, 100-ton project, 1 to 2 story building, W8x21, A992 steel, shop fabricated, incl shop primer, bolted connections	11.00	L.F.	$35.77	$393.47
051223750500			Structural steel member, 100-ton project, 1 to 2 story building, W8x31, A992 steel, shop fabricated, incl shop primer, bolted connections	18.00	L.F.	$48.42	$871.56

LineNumber			Description	Quantity	Unit	Total Incl. O&P	Ext. Total Incl. O&P
051223750540			Structural steel member, 100-ton project, 1 to 2 story building, W8x48, A992 steel, shop fabricated, incl shop primer, bolted connections	12.00	L.F.	$67.72	$812.64
051223750600			Structural steel member, 100-ton project, 1 to 2 story building, W10x12, A992 steel, shop fabricated, incl shop primer, bolted connections	148.00	L.F.	$25.44	$3,765.12
051223750700			Structural steel member, 100-ton project, 1 to 2 story building, W10x22, A992 steel, shop fabricated, incl shop primer, bolted connections	888.00	L.F.	$37.06	$32,909.28
051223750720			Structural steel member, 100-ton project, 1 to 2 story building, W10x26, A992 steel, shop fabricated, incl shop primer, bolted connections	435.00	L.F.	$41.35	$17,987.25
051223751520			Structural steel member, 100-ton project, 1 to 2 story building, W12x35, A992 steel, shop fabricated, incl shop primer, bolted connections	1,254.00	L.F.	$48.62	$60,969.48
051223751580			Structural steel member, 100-ton project, 1 to 2 story building, W12x58, A992 steel, shop fabricated, incl shop primer, bolted connections	224.00	L.F.	$75.46	$16,903.04
051223751700			Structural steel member, 100-ton project, 1 to 2 story building, W12x72, A992 steel, shop fabricated, incl shop primer, bolted connections	57.00	L.F.	$93.38	$5,322.66
051223751740			Structural steel member, 100-ton project, 1 to 2 story building, W12x87, A992 steel, shop fabricated, incl shop primer, bolted connections	22.00	L.F.	$110.54	$2,431.88
051223752300			Structural steel member, 100-ton project, 1 to 2 story building, W14x34, A992 steel, shop fabricated, incl shop primer, bolted connections	64.00	L.F.	$47.76	$3,056.64
051223752320			Structural steel member, 100-ton project, 1 to 2 story building, W14x43, A992 steel, shop fabricated, incl shop primer, bolted connections	22.00	L.F.	$57.63	$1,267.86
051223753100			Structural steel member, 100-ton project, 1 to 2 story building, W16x40, A992 steel, shop fabricated, incl shop primer, bolted connections	396.00	L.F.	$54.28	$21,494.88
051223753140			Structural steel member, 100-ton project, 1 to 2 story building, W16x67, A992 steel, shop fabricated, incl shop primer, bolted connections	132.00	L.F.	$85.66	$11,307.12
051223753520			Structural steel member, 100-ton project, 1 to 2 story building, W18x46, A992 steel, shop fabricated, incl shop primer, bolted connections	631.00	L.F.	$62.31	$39,317.61
051223753920			Structural steel member, 100-ton project, 1 to 2 story building, W18x65, A992 steel, shop fabricated, incl shop primer, bolted connections	20.00	L.F.	$84.86	$1,697.20
053100000000			Steel Decking	0.00			$0.00
053113000000			Steel Floor Decking	0.00			$0.00
053113500010			FLOOR DECKING	0.00			$0.00
053113500015			Metal floor decking, steel, made from recycled materials	0.00			$0.00

LineNumber			Description	Quantity	Unit	Total Incl. O&P	Ext. Total Incl. O&P
053113505400			Metal floor decking, steel, non-cellular, composite, galvanized, 2" D, 18 gauge	53,613.56	S.F.	$2.99	$160,304.53
Division 05 Subtotal							**$661,384.49**

Appendix D – General Conditions Estimate

General Conditions Estimate							
Activity	**Quantity**	**Units**	**Unit Labor**	**Total Labor**	**Unit Material Cost**	**Total Material Cost**	**Total Cost**
PRIMARY PERSONNEL							
Project Executive	610.00	MHR	140.00	85,400.00			$85,400.00
Project Manager	3,800.00	MHR	90.00	342,000.00			$342,000.00
Project Superintendent	3,800.00	MHR	90.00	342,000.00			$342,000.00
Project Engineer	3,800.00	MHR	50.00	190,000.00			$190,000.00
						TOTAL	**$959,400.00**
SUPPORT STAFF							
Secretary	3,800.00	MHR	35.00	133,000.00			$133,000.00
Scheduling Manager	500.00	MHR	90.00	45,000.00			$45,000.00
Safety Engineer	500.00	MHR	50.00	25,000.00			$25,000.00
MEP Support	350.00	MHR	90.00	31,500.00			$31,500.00
						TOTAL	**$234,500.00**
OFFICE EXPENSES/OH & Temporary Utilities							
Living Expenses	10.00	MONTHLY			3,000.00	30,000.00	$30,000.00
Moving Expenses	1.00	LS			15,000.00	15,000.00	$15,000.00
Travel/Parking (STAFF)	1.00	LS			0.00	0.00	$0.00
Office Set-Up	1.00	LS	1,500.00	1,500.00	250.00	250.00	$1,750.00
Contractors Office	10.00	MONTHLY			1,600.00	16,000.00	$16,000.00
Contractors Office Furnishings	1.00	LS			3,000.00	3,000.00	$3,000.00
Clean Office	10.00	MONTHLY			255.00	2,550.00	$2,550.00
Telephone Set-Up	1.00	LS			310.00	310.00	$310.00
Telephone Service	15.00	MONTHLY			285.00	4,275.00	$4,275.00
Cell Phones	15.00	MONTHLY			270.00	4,050.00	$4,050.00
Computers & Supplies	2.00	EA			1,750.00	3,500.00	$3,500.00
Copy Machine	1.00	EA			6,000.00	6,000.00	$6,000.00
Copy Machine Maintenance	12.50	MONTHLY			300.00	3,750.00	$3,750.00
Potable Water	5.00	MONTHLY			200.00	1,000.00	$1,000.00
Safety Equipment	1.00	LS			2,000.00	2,000.00	$2,000.00
Mail and Postage	15.00	MONTHLY			350.00	5,250.00	$5,250.00
Constructware Usage FEES	12.50	MONTHLY			850.00	10,625.00	$10,625.00
First Aid	25.00	MONTHLY			150.00	3,750.00	$3,750.00
Office Supplies	20.00	MONTHLY			300.00	6,000.00	$6,000.00
Photographs	22.50	MONTHLY			100.00	2,250.00	$2,250.00
Plans & Specs	1.00	LS			25,000.00	25,000.00	$25,000.00
BIM Services	1.00	ALLOW	40,000.00	40,000.00	0.00	0.00	$40,000.00
Internet Set-Up	1.00	LS			1,000.00	1,000.00	$1,000.00
Internet Service	7.50	MONTHLY			250.00	1,875.00	$1,875.00
General Clean-Up	1.00	ALLOW	25,000.00	25,000.00	0.00	0.00	$25,000.00
Printers	1.00	EA			750.00	750.00	$750.00
Temporary Power Set-Up	1.00	LS			12,500.00	12,500.00	$12,500.00
Temporary Power Service	22.50	MONTHLY			2,000.00	45,000.00	$45,000.00
Temporary Sanitation Set-Up	1.00	LS			3,000.00	3,000.00	$3,000.00
Temporary Sanitation Service	1.00	MONTHLY			50.00	50.00	$50.00
						TOTAL	**$214,685.00**
						CUM. TOTAL	**$1,408,585.00**