

Susquehanna Sports Center | Harford Community College | Bel Air, MD



TECHNICAL ASSIGNMENT II

HAITHAM ALRASBI
ARCHITECTURAL ENGINEERING – CONSTRUCTION MANAGEMENT
FACULTY ADVISOR: DR. CHIMAY ANUMBA
10/12/2012

Executive Summary

The Susquehanna Sports Center project, *also referred to as Susquehanna Center*, was viewed from a broad construction management perspective in Technical Assignment II. To continue our journey, Technical Assignment II to essentially get into the project schedule and estimate in a little bit more detail after we viewed the big picture of the project in the first Technical Assignment. It will also relate the project to the widely spread and advanced construction technology trend of the era, Building Information Modeling. Finally, it will leave you with some construction management issues that the construction team went to, and how they handled them.

Technical Assignment II begins with a detailed project schedule, where you can find the major tasks from the beginning of preconstruction period all the way to the substantial completion of the project. It also addresses the time extension issue that happened in the project, which you can find more detail about it toward the end of the assignment, in the “Constructability Challenges” section. In this assignment, the structural systems was taken as an example estimate and look at in detail. Since the project consists of a renovation and an addition, it was impossible to take a logical module of the structural systems to analyze it and apply it throughout the building. Instead, an estimate has been conducted for all the structural systems in the project. The General Conditions Estimate comes next. It shows the staffing, safety, temporary facilities and utilities fees along with others. The general conditions total number in a project is very critical, especially for owners. Sometimes it is the first place where they look at in a bidding package, which could come down to a deciding factor for the winning bidder.

After that, Building Information Modeling (BIM) Use Evaluation is being discussed and related to the project. Unfortunately, there was no intended use of BIM in this project. However, some potential uses of BIM are discussed along with other suggested uses. This helps figuring out how BIM could have helped the construction team in different aspects in executing this project. The final section of Technical Assignment II is Constructability Challenges. It talks about some of the most interesting challenges in the project, which are: the 153’ span truss installation, weather impact on schedule, and the pool restoration.

Table of Contents

Executive Summary1

Table of Contents2

Detailed Project Schedule.....3

Detailed Structural Systems Estimate.....6

General Conditions Estimate.....8

Building Information Modeling Use Evaluation.....9

Constructability Challenges.....12

References.....15

Appendix A: Detailed Project Schedule.....16

Appendix B: Detailed Structural Systems Estimate.....22

Appendix C: General Conditions Estimate.....27

Appendix D: Staffing Plan.29

Appendix E: BIM Use Analysis Worksheet.....31

Detailed Project Schedule

The Susquehanna Center Project started construction on the 23rd of May, 2011. Before that, the preconstruction services started back on 11th of February 2011. This project was originally planned to be completed on the 17th of September 2012, but due to unforeseen conditions a 38 working days extension has been granted to the construction team for the addition part of it, the basketball arena¹. The renovation part, however, has been already turned over to the owner, HCC, by the beginning of the fall 2012 semester, the 4th of September 2012. Although the Susquehanna Center has already been turned over, it has not been completely finished. The only thing left there is the pool restoration work, which is estimated to finish sometime by the end of the year. That is why you can notice that the “Commissioning, Testing, & Balancing” task is very long to account for the delay it had. The Susquehanna center “final cleaning” and “substantial completion” tasks in the project schedule attached do not include the completion of the pool.

Table 1. Project Schedule Overview*

	Duration	Start Date	Finish Date
Preconstruction	179 days	4/25/2011	12/29/2011
Susquehanna Center's Arena (The addition)	407 days	5/23/2011	12/6/2012
Sitework	407 days	5/23/2011	12/6/2012
Structure	107 days	8/10/2011	1/5/2012
Building Envelope	81 days	11/10/2011	3/1/2012
Rough-in	70 days	12/9/2011	3/15/2012
Finishes	237 days	11/23/2011	11/7/2012
Susquehanna Center's Renovation	193 days	5/31/2011	2/23/2012
Demolition	36 days	5/31/2011	7/19/2011
Fit Out	132 days	7/20/2011	1/19/2012
Pool Restoration	280 days	8/17/2011	9/11/2012
Commissioning, Testing, & Balancing	220 days	11/29/2011	10/1/2012
Susquehanna Center Substantial Completion	0 days	12/6/2012	12/6/2012
Total	424 days	4/25/2011	12/6/2012

**Please refer to Appendix A for the Detailed Project Schedule.*

¹ The schedule delay is further explained in the “Constructability Challenges” section.

Cont'd: Detailed Project Schedule

Figure 1 shows an overview of whole project schedule including the preconstruction period. This project is estimated to take about 424 business days in total. That is about a year and 7 months. It would have taken about a year and 5 months if everything was according to the original schedule. The Sitework tasks include “Site Utilities” and “Tennis Courts” tasks as well. You will notice that it took the whole period of construction, because that Tennis Courts did not start construction until the end of the project, which is estimated to finish by the project completes.

Preconstruction services took about 2 months and a half. It included an engineering and shop drawing period, submitting them, and getting them approved. Material lead times was a part of the preconstruction services as well where the construction team makes sure all the materials arrive on time, so to avoid any delays because of that. In also included, all the critical submittals for the project, permits, and other typical preconstruction services. The detailed project schedule attached shows the preconstruction services tasks first and then it is followed up by the MEP coordination tasks. Those are put in there to show an example of coordination for one aspect of the project to help visualize its relation to the actual project construction tasks. After that you can see the “Susquehanna Center's Arena Addition” tasks followed by the “Renovation of Susquehanna Center” tasks. Each of the two project parts, addition and renovation, are broken down into the different phases that it includes to make it easier to follow.

As you might notice, there is a big gap between the “Tennis court Earthwork” and the “Retaining Walls & Steps” tasks under the Tennis Court section. That is because it has been delayed due to weather impacts as well. Tennis courts need a consistent dry weather to construct. It will not take so long, but the problem here in Maryland is that weather is not consist ant. It kept raining in April a lot that the tennis court construction has to be rescheduled to the fall. The old tennis courts has been completely demolished, but the new ones which are to be located to the east of the Susquehanna center will be constructed sometime end of September.

Cont'd: Detailed Project Schedule

The Project Schedule is based on normal weather conditions for this area of the country. The cost to make up lost time due to inclement weather is included in the work. Work hours are any consecutive between 7:30 AM and 5:00 PM Monday through Friday. With pre-approval by Turner and Owner's Harford Community College, the Subcontractor may work ten (10) hour days at its own expense to maintain the Project Schedule, if required must also notify Turner forty-eight (48) hours in advance. There will be times in keeping with the College annual schedule (such as just before and during finals) when quiet times will be observed. These times are coordinated with Turner Project Superintendent and all impacts to comply with these times are included with the Scope of Work.

Detailed Structural Systems Estimate

The structure of the building is compromised of both structural steel and cast in place concrete. Cast in place concrete has been used for the structure of the main lobby area connecting the basketball arena with the Susquehanna Center and for the Arena walls. The Arena addition uses 153' long trusses spaced 8' apart. Since the project consists of a renovation along with an addition, it is not practical to choose a logical module and base a structural system estimate on it. A detailed structural systems estimate has been developed for the concrete, masonry, steel, and roofing of the building. Table 2 shows the breakdown of the structural systems and masonry in the project with every components cost. It came up to a total of \$6,509,112.53 which is about 24.4% of the total project value.

Table 2. Structural Systems Overview*	
Structural System	Cost
Concrete	\$2,680,962.21
Masonry	\$1,646,107.11
Structural Steel	\$1,738,822.56
Roofing	\$443,220.65
Total	\$6,509,112.53

Concrete

All the walls in the Arena are cast in place concrete. Up to 24" walls have been used for the foundation. 4000 psi concrete was used and it was formed and reinforced in place. The arena's floor is a slab on grade, which has a 2' wide and 2" rigid perimeter slab insulation and vapor barrier. A slab on grade with the same properties has been used to replace the Fitness Center's slab on grade in the Susquehanna Center. The slab on grade was reinforced with 6'x6' W2.1xW2.1 welded wire fabric that came into site in sheets. The concrete beams use a ready mix, ready weight 6000 psi concrete.

**Please refer to Appendix B for the Detailed Structural Systems Estimate.*

Cont'd: Detailed Structural Systems Estimate

Masonry

The typical exterior finish in this building is brick veneer with masonry backup walls. 8" CMU back up walls are used in most of the project except for some parts of the arena lower level which uses 4" CMU back up walls. Wide roof eaves and column covers will be clad with composite metal panels. The addition has aluminum and glass entrances, storefront and clerestories.

Structural Steel

A total of almost 500 tons of structural steel has been used in this project. They are mainly used for the Arena roof trusses and the support of the new Susquehanna center façade. HSS12x12 and HSS16x16 columns are used in the façade, and HSS4x4 and HSS6x8 are used throughout as outriggers. There are 10 rainwater conductor pipe columns used right under the roof eave in the south side of the building.

Roofing

The 153' 96SLHSP trusses support 1.5" deep galvanized roof metal decks in the Arena roof. The metal deck is sheathed and insulated throughout. Roof with same properties is used in the new fitness center roof which extends out to the canopy.

General Conditions Estimate

In the Susquehanna Center Renovation and Addition project, the general conditions costs were split into four main categories: Project Staffing, Temporary Facilities, Temporary Utilities, and Protection and Safety. The home office overhead and contingency are not included. The total of general conditions came to a total of \$907,645.54, which means a total weekly rate of \$11,345.57.

Table 3. General Conditions Estimate Overview*

Categories	Unit Rate	Unit	Quantity	Total Cost
Staffing	\$6,889.82	Week	80	\$551,185.74
Temporary Facilities	\$1,593.23	Week	80	\$127,458.40
Temporary Utilities	\$1,397.69	Week	80	\$111,815.00
Protection and Safety	\$1,464.83	Week	80	\$117,186.40
TOTAL	\$11,345.57		80	\$907,645.54

Staffing** includes the fee for the staff for both the preconstruction and construction phases. The divisions involved in this are the Management, Estimating/Purchasing, Superintendence, Engineering, Financial, and Administration. While developing the General Conditions Estimate, it was taken into account that there was a time extension, so the total would be less if it was to finish on time. Temporary Facilities and Temporary Utilities* include all the costs related to mobilization, maintenance, temporary heat, light, plumbing...etc . Protection and Safety category includes anything related to safety in general such as sidewalk fences, safety program, railings,...etc.

The percentage of general conditions to the total project cost is about %3.3. This is lower than what typically seen in construction. There are a couple of reasons behind this. The contingency, home overhead and general requirements are not included. General requirements include general cleaning, general office expenses, financing processing fee.. .etc.

**Please refer to Appendix C for the General Conditions Estimate.*

***Please refer to Appendix D for a detailed Staffing plan.*

Building Information Modeling Use Evaluation

Building Information Modeling (BIM) objective is to digitally represent the physical and functional characteristic of a facility. It is a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle, which is defined as existing from earliest conception to demolition. In the Susquehanna Center project, however, there is no intentional use of BIM. One of the main reasons is the cost of using it. Although, it will pay itself in the long run and it will definitely be worth it, it was decided not to use BIM. Being a donation dependent project is another factor. Despite the fact that BIM is now very widely spread in the building industry around the nation, some marketplaces lack the sufficient knowledge about it. In addition to all of this, since the existing building dates back to 1966, its documentation was not available in a format that would make the BIM process run smoothly. Although BIM was not evidently pursued in this project, there are some areas of this project process that we could label them as BIM areas. Some of them might not be completely executed as it would have been it was under a BIM process. For instance, there was phase planning in this project but it was not 4D modeled. These areas include but not limited to: cost estimation, existing condition modeling, and LEED evaluation. After getting into every one of these, I would like to suggest some of the best BIM areas that are a good fit for this project and could have been implemented. Table 3 shows a preliminary assessment of some of the BIM uses that could be potentially used in this project.

Table 3. BIM Goals Worksheet*		
Priority (1-3)	Goal Description	Potential BIM Uses
1- Most Important	Value added objectives	
1	Quickly assesses cost associated with design changes	Cost Estimation
1	Enhances the efficiency and accuracy of existing conditions documentation	Existing Conditions Analysis, 3D coordination
3	Increases the emphasis on environmentally friendly and sustainable design.	LEED Evaluation
1	Eliminate field conflicts	3D Modeling
2	Accurate 3D Record Model for FM Team	Record Model, 3D Coordination
3	Increase the efficiency of transition planning and management	Space Management and Tracking, 3D coordination

***Please refer to Appendix E for BIM Use Analysis Worksheet.*

Cont'd: Building Information Modeling Use Evaluation

Potential BIM Uses:

Cost Estimation

In this project, the estimation team provided a reasonable and accurate quantity take-off and cost estimate early in the design process. Also, they provided value engineering services to further cut down the cost of the project. Since it was a renovation and addition project, it was essential to find the best and most efficient way to execute this project and had to happen early in the design process.

Existing Conditions Modeling

The design and project team along with the help of the owner did an existing conditions analysis where they analyzed where are the areas they need to demolish and how is the existing building going to connect to the addition. They also addressed other existing conditions issues such as: Is the arena going to use the same mechanical and electrical equipment as the old building? And how is mechanical and electrical power is provided through out all the phases of the construction? However, all that has been solved without the use of a 3D model as it is originally done in BIM Existing Conditions Modeling processes.

LEED Evaluation

The owner originally had a plan to pursue a Silver LEED, but then they decided not to. It was mainly because of the cost of that. They did evaluate the project and it seems they might get a Certified LEED. A more thorough explanation about where this project stands in the LEED chart in terms of points will follow in the Third Technical Assignment.

Suggested BIM Uses:

3D Modeling

3D Modeling is a process in which Clash Detection software is used during the coordination process to determine field conflicts by comparing 3D models of building systems. The goal of clash detection is to eliminate the major system conflicts prior to installation. This makes the coordination process much more efficient and helps avoid any problems that could occur because of any conflicts in the future.

Cont'd: Building Information Modeling Use Evaluation

Record Modeling

Record Modeling is the process used to depict an accurate representation of the physical conditions, environment, and assets of a facility. The record model usually contains information relating to the main architectural, structural, and MEP elements. It is the culmination of all the BIM Modeling throughout the project, including linking Operation, Maintenance, and Asset data to the As-Built model (created from the Design, Construction, 4D Coordination Models, and Subcontractor Fabrication Models) to deliver a record model to the owner or facility manager. Record Modeling would be very useful in the case the owner wanted to use it for future uses such as renovating the building again.

Space Management and Tracking

Since one of the two parts of this project is renovation of the Susquehanna Center, Space Management and Tracking could be a very useful tool in this project. This tool utilizes BIM to effectively distribute, manage, and track appropriate spaces and related resources within a facility. A facility building information model allows the facility management team to analyze the existing use of the space and effectively apply transition planning management towards any applicable changes. In this project case, there will be many transitions during construction. First, renovation and addition parts starts and then the renovation part gets turned over and occupied while the addition part construction is still in progress. Space Management and Tracking ensures the appropriate allocation of spatial resources throughout the life of the facility. This use benefits from the utilization of the record model. This application often requires integration with spatial tracking software.

Constructability Challenges

Truss Installation

One of the most unique constructability challenges in this project is the installation of the 153' trusses in the basketball arena. It is an interesting challenge because the trusses are of an unusual length that cannot be simply put into place. The walls has been already been constructed so that it can hold the trusses, but the crane has to work from inside the arena to install the trusses, especially the trusses that sit in the middle of the arena. That is why a hole has been made into the southern wall of the arena so that the crane can get into the arena and lift the trusses. Also a building pad has been constructed before the crane went in, so that it can sit on it. Each of these trusses came in two pieces from the manufacturer. The ironworkers would use spreaders to lift each truss into place and then bolt each part together.

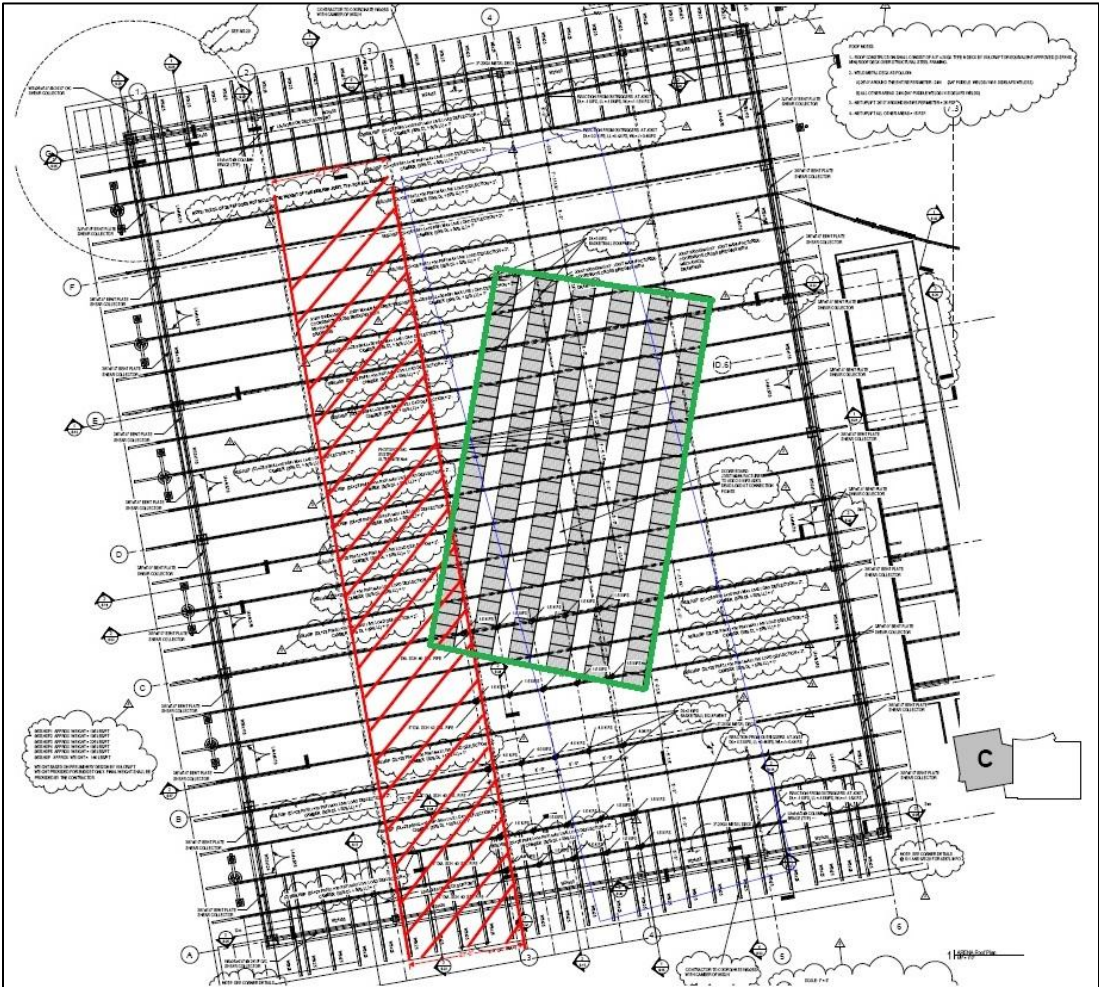


Figure 1. Crane Path in the Arena Addition

Cont'd: Constructability Challenges

The crane is approximately 35' long and it is 25' wide with outriggers extended, but the counterweight swing requires at least 27' of width. The actual width of the carrier is only 12'. All that has been taken under account which let the construction team choose the area in red in Figure 1 as the area where the crane to maneuver. The area in green shows where it is used to assemble the trusses prior to erection. The crane started putting trusses from the North side of the arena, and worked its way out till it reached the last truss at the South side of the arena. Each day they would put 3 to 4 trusses into place.

The weather impact on schedule

Weather was also a great challenge to the site team. It was the main cause for the schedule delay which has put back the completion date till mid-November 2012. It was originally scheduled to complete at September 17th, 2012. The only part that was affected by the delay is the basketball arena. The renovation was already turned over to the owner on the 4th of September 2012. The only part that is not been completely renovated yet in the Susquehanna Center is the pool, and I will get into the pool issue later at the end of the Constructability Challenges section.

Once the campus re-feed of the domestic water was finished to remove the existing domestic line that ran along the south end of the building, there was an underpinning work scheduled to start at August 4th 2011. Footing excavation along the south face and extended up the west face of the arena addition was scheduled on August 16th. A 10" rainfall opposed to the anticipated 3" rain had fallen into site which caused a delay in placement of footings. Only the south spread footing had been placed by the end of August. Turner has submitted a change of order for an extension to the project schedule of 32 work days. Turner has also considered working time in some critical path activities and usage of concrete accelerators to make up for the schedule delay. At the end, they have been granted a 38 working day extension after a series of discussions and meetings with the owner reps and different parties in the project.

Cont'd: Constructability Challenges

Pool Restoration

Another Challenge that is actually facing the construction team right now is the restoration of the pool in the Susquehanna center. The pool is over 30 years old and the owner wanted to completely restore it. The only thing is left to finish the pool restoration right now is the installation of pool tiles and testing it. The pool was tested beginning of September prior to installation of pool tiles and it turned out it was leaking.

The site team was not surprised because for a pool this old, leakage is very possible. Also, pool tiles have some water proof characteristics to it, so that would help prevent water from leaking if it were to be installed. The pool originally had about 17" of concrete at the bottom and about 1" of mortar on top of it. A COR has been approved in order to add some mortar to eliminate the water leakage in the pool, although it would decrease the pool's depth a little bit, but this was the best solution.

There was a second test going on just last week when I visited the site, 28th of September 2012. It appeared that pool is not leaking, but they will know for sure next week. It takes a couple days for the pool to fill of water and another couple days to drain it. Also, the COR took some time to fulfill, which caused some delay in the completion of the pool restoration.

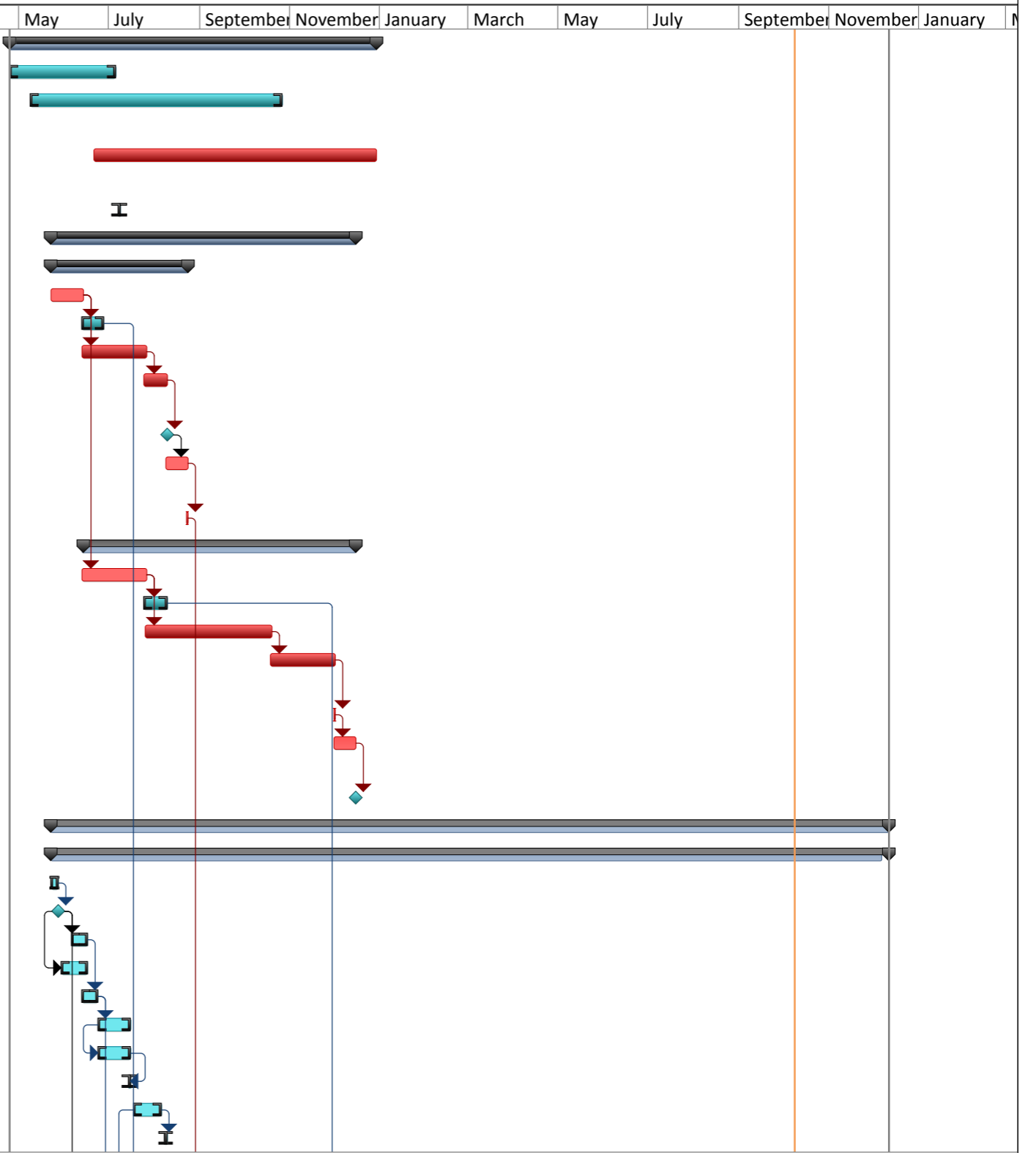
References

Computer Integrated Construction Research Program. (2010). "BIM Project Execution Planning Guide – Version 2.0." July, The Pennsylvania State University, University Park, PA, USA.

Appendix A

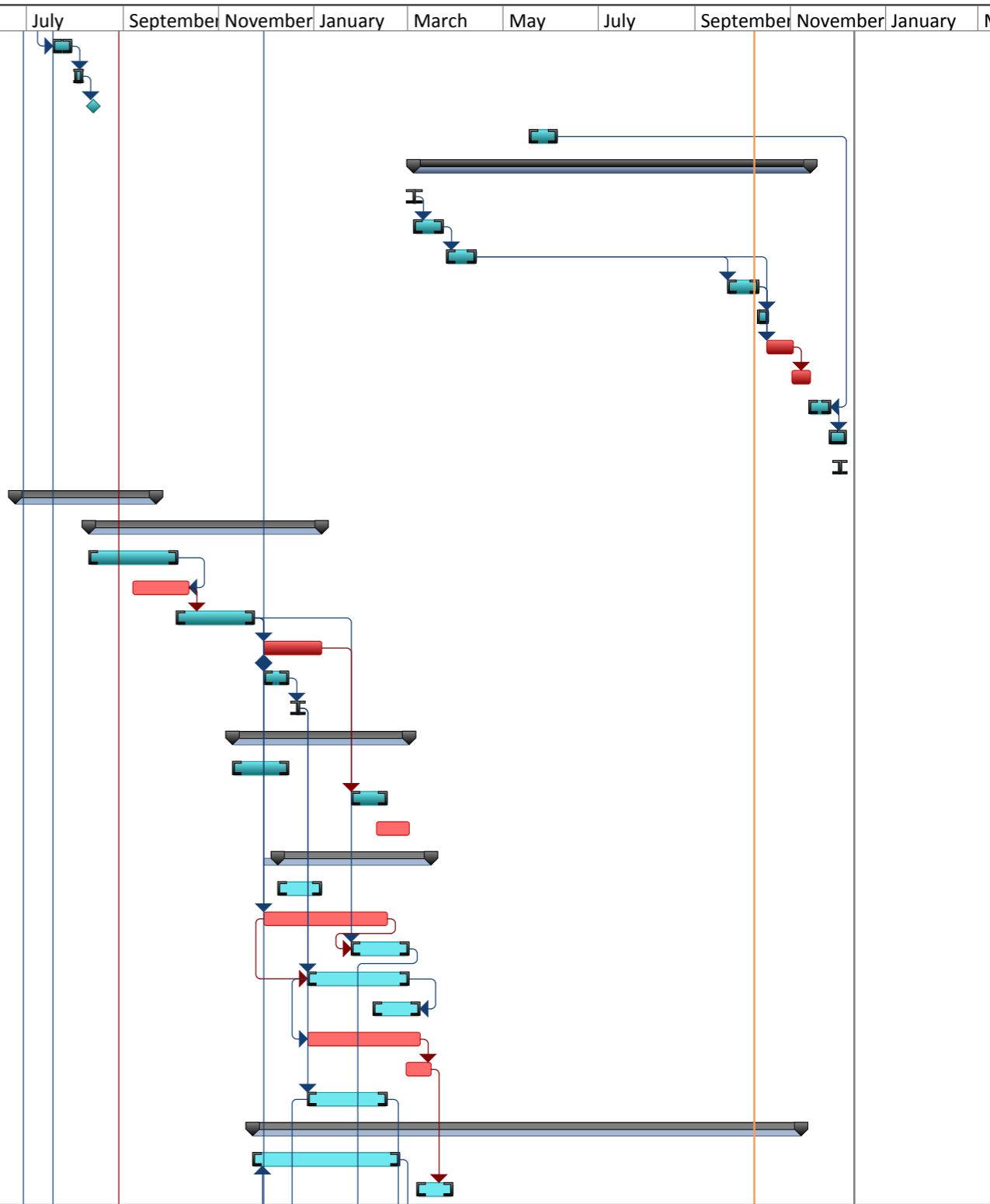
Detailed Project Schedule

ID	Task	Name	Duration	Start	Finish	January	March	May	July	September	November	January	March	May	July	September	November	January
1		Preconstruction	179 days	Mon 4/25/11	Thu 12/29/11													
2		Descope/Award Recommendations	52 days	Mon 4/25/11	Tue 7/5/11													
3		Engineering/Shop Drawing Period - Submittal and Approval	123 days	Mon 5/9/11	Wed 10/26/11													
4		Material Lead Times After Procurement and Approvals	138 days	Tue 6/21/11	Thu 12/29/11													
5		Susquehanna Center Critical Submittals Complete	1 day	Fri 7/8/11	Fri 7/8/11													
6		MEP Coordination	149 days	Mon 5/23/11	Thu 12/15/11													
7		Susquehanna Center MEP Coordination	67 days	Mon 5/23/11	Tue 8/23/11													
8		Underslab Coordination	3.2 wks	Mon 5/23/11	Mon 6/13/11													
9		Underslab Coordination Submittal and Approval	2.2 wks	Mon 6/13/11	Mon 6/27/11													
10		Renovation Coordinated Drawing for Approval	6.4 wks	Mon 6/13/11	Tue 7/26/11													
11		Design Team Review / Approval Period (1st release)	2.4 wks	Mon 7/25/11	Tue 8/9/11													
12		Release Subcontractor (1st area)	0 days	Tue 8/9/11	Tue 8/9/11													
13		Sheet Metal Material Lead Time/ Fabrication (1st release)	11 days	Tue 8/9/11	Tue 8/23/11													
14		Begin Sheet Metal Work on Site (1st release)	1 day	Tue 8/23/11	Tue 8/23/11													
15		Arena MEP Coordination	133 days	Tue 6/14/11	Thu 12/15/11													
16		Underslab Coordination	6.4 wks	Mon 6/13/11	Tue 7/26/11													
17		Underslab Coordination Submittal and Approval	2.4 wks	Mon 7/25/11	Tue 8/9/11													
18		Arena Coordinated Drawings for Approval	12.4 wks	Tue 7/26/11	Wed 10/19/11													
19		Design Team Review / Approval Period (1st release)	6.4 wks	Wed 10/19/11	Thu 12/1/11													
20		Release Subcontractor (1st area)	1 day	Thu 12/1/11	Thu 12/1/11													
21		Sheet Metal Material Lead Time/ Fabrication (1st release)	2.2 wks	Thu 12/1/11	Thu 12/15/11													
22		Begin Sheet Metal Work on Site (1st release)	0 days	Thu 12/15/11	Thu 12/15/11													
23		Susquehanna Center's Arena Addition	407 days	Mon 5/23/11	Tue 12/11/12													
24		Sitework	407 days	Mon 5/23/11	Tue 12/11/12													
25		Mobilization	1 wk	Mon 5/23/11	Fri 5/27/11													
26		Construction Entrance and Site Fencing	0 days	Fri 5/27/11	Fri 5/27/11													
27		Excavate Test Pits	9 days	Mon 6/6/11	Thu 6/16/11													
28		Install Sedimentation Basin & E & S Controls	14 days	Mon 5/30/11	Thu 6/16/11													
29		Site Prep Clearing	9 days	Mon 6/13/11	Thu 6/23/11													
30		Bulk Excavation (Strip, Stockpile, Cuts & Fills)	16 days	Fri 6/24/11	Fri 7/15/11													
31		Site Utilities Cut, Cap and Divert & Demo	16 days	Fri 6/24/11	Fri 7/15/11													
32		Temporary Roadways	1 day	Fri 7/15/11	Fri 7/15/11													
33		Underpinning	15 days	Mon 7/18/11	Fri 8/5/11													
34		Building Pad Subgrade	2 days	Mon 8/8/11	Tue 8/9/11													



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

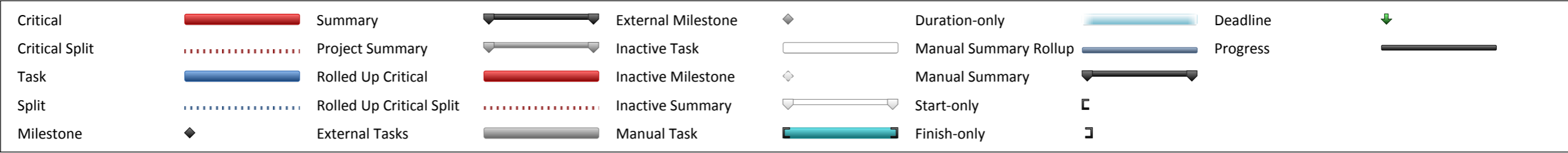
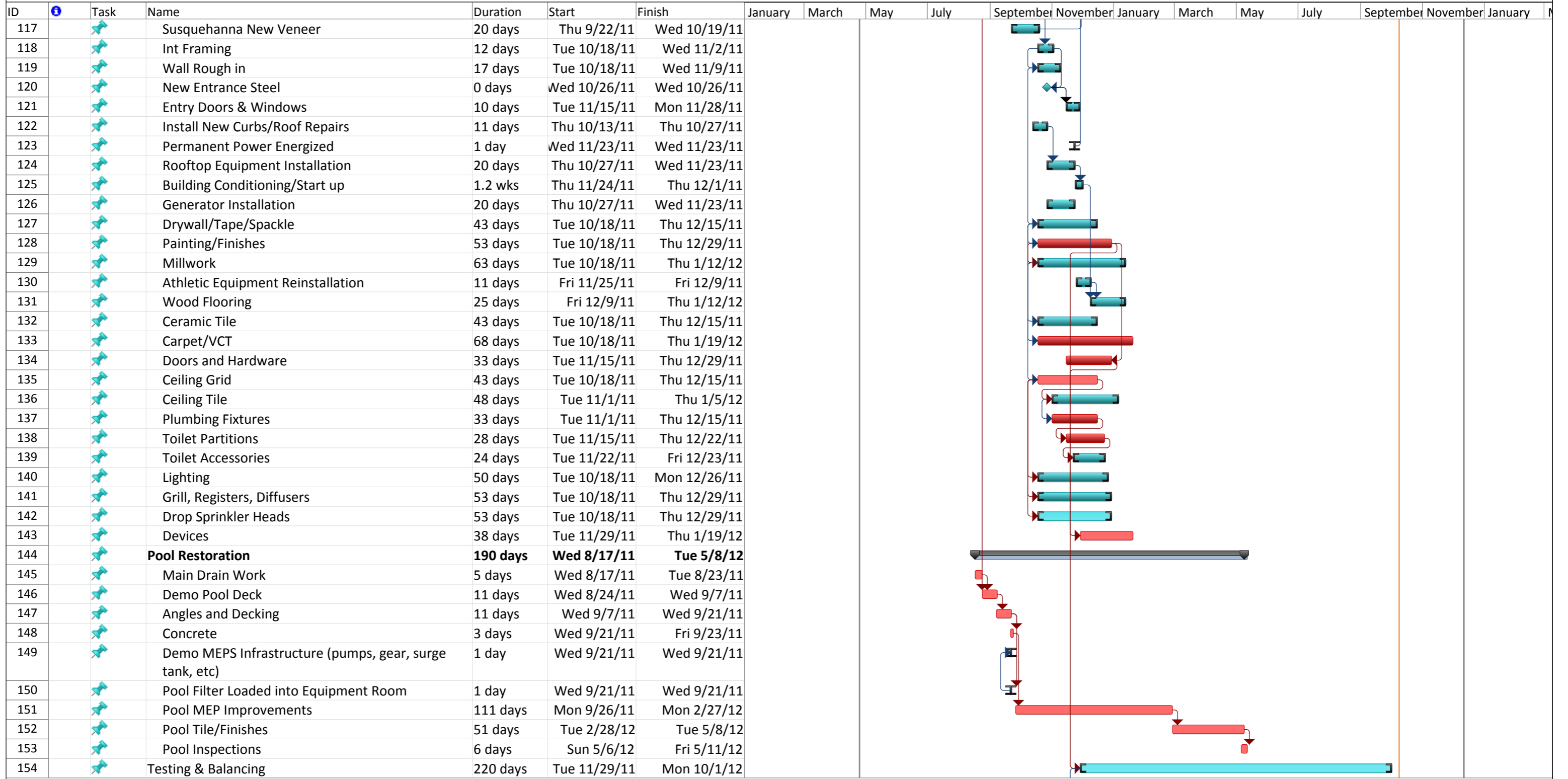
ID	Task	Name	Duration	Start	Finish	January	March	May	July	September	November	January	March	May	July	September	November	January
35		Parking Lot Subase	10 days	Mon 7/18/11	Fri 7/29/11													
36		Curbs	5 days	Mon 8/1/11	Fri 8/5/11													
37		Base Course Paving	0 days	Fri 8/12/11	Fri 8/12/11													
38		Repairs and Wearing Course Installation	12 days	Fri 5/18/12	Mon 6/4/12													
39		Tennis Courts	182 days	Mon 3/5/12	Tue 11/13/12													
40		WWTP Certified and Connected (By HCC)	1 day	Mon 3/5/12	Mon 3/5/12													
41		Remove Existing Sanitary Drain Field	15 days	Mon 3/5/12	Fri 3/23/12													
42		Tennis Court Earthwork	15 days	Mon 3/26/12	Fri 4/13/12													
43		Retaining Walls & Steps	15 days	Sat 9/22/12	Thu 10/11/12													
44		Fencing	5 days	Thu 10/11/12	Wed 10/17/12													
45		Court Installation	13 days	Wed 10/17/12	Fri 11/2/12													
46		Railings	8 days	Fri 11/2/12	Tue 11/13/12													
47		Sand Filter/Pocket Wetland	10 days	Tue 11/13/12	Mon 11/26/12													
48		Landscaping	9 days	Mon 11/26/12	Thu 12/6/12													
49		Signage	2 days	Sun 12/2/12	Mon 12/3/12													
50		Site utilities	64 days	Fri 6/24/11	Wed 9/21/11													
56		Structure	107 days	Wed 8/10/11	Thu 1/5/12													
57		Foundations Exc/concrete	41 days	Wed 8/10/11	Wed 10/5/11													
58		CMU Foundations	26 days	Wed 9/7/11	Wed 10/12/11													
59		Steel Framing	36 days	Wed 10/5/11	Wed 11/23/11													
60		Exterior CMU Walls	27 days	Wed 11/30/11	Thu 1/5/12													
61		Underslab MEP Rough in	12 days	Wed 11/30/11	Thu 12/15/11													
62		Slab on Grade	2 days	Wed 12/21/11	Thu 12/22/11													
63		Building Envelope	81 days	Thu 11/10/11	Thu 3/1/12													
64		Roofing	26 days	Thu 11/10/11	Thu 12/15/11													
65		Curtainwall	17 days	Wed 1/25/12	Thu 2/16/12													
66		Storefront Entrances	15 days	Fri 2/10/12	Thu 3/1/12													
67		Rough - in	70 days	Fri 12/9/11	Thu 3/15/12													
68		Install and Rough in Roof top Equipment	20 days	Fri 12/9/11	Thu 1/5/12													
69		MEP Rough In	57 days	Wed 11/30/11	Thu 2/16/12													
70		Structural Painting (off hours)	27 days	Wed 1/25/12	Thu 3/1/12													
71		Interior CMU Partitions	47 days	Wed 12/28/11	Thu 3/1/12													
72		Stud Framing	22 days	Wed 2/8/12	Thu 3/8/12													
73		Wall Rough-in	52 days	Wed 12/28/11	Thu 3/8/12													
74		Close Walls	12 days	Wed 2/29/12	Thu 3/15/12													
75		Metal Pan Stairs & Risers	37 days	Wed 12/28/11	Thu 2/16/12													
76		Finishes	251 days	Wed 11/23/11	Wed 11/7/12													
77		Building Conditioning Available	68 days	Wed 11/23/11	Fri 2/24/12													
78		Drywall Finishing	17 days	Wed 3/7/12	Thu 3/29/12													



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

ID	Task	Name	Duration	Start	Finish	January	March	May	July	September	November	January	March	May	July	September	November	January
79		Blockfill CMU Walls	27 days	Wed 2/8/12	Thu 3/15/12													
80		Ceramic Tile	22 days	Wed 2/29/12	Thu 3/29/12													
81		Misc Metals/Railings	57 days	Wed 12/28/11	Thu 3/15/12													
82		Plumbing Fixtures	27 days	Wed 3/14/12	Thu 4/19/12													
83		Toilet partitions	17 days	Wed 4/4/12	Thu 4/26/12													
84		Paint	42 days	Wed 2/29/12	Thu 4/26/12													
85		Ceiling Grid	32 days	Wed 2/29/12	Thu 4/12/12													
86		Millwork	47 days	Wed 2/29/12	Thu 5/3/12													
87		Wood Flooring	30 days	Fri 2/24/12	Thu 4/5/12													
88		Carpet/VCT	37 days	Wed 3/28/12	Thu 5/17/12													
89		Seat Installation	25 days	Fri 2/10/12	Thu 3/15/12													
90		Court Fixture install	16 days	Fri 2/10/12	Fri 3/2/12													
91		Grills, Registers, Diffusers	37 days	Wed 3/14/12	Thu 5/3/12													
92		Lighting	25 days	Fri 3/30/12	Thu 5/3/12													
93		Drop Heads	10 days	Fri 4/13/12	Thu 4/26/12													
94		Ceiling Tile	38 days	Wed 3/14/12	Fri 5/4/12													
95		Fixtures & Devices	32 days	Sun 5/13/12	Mon 6/25/12													
96		Testing and Balancing	37 days	Fri 6/22/12	Mon 8/13/12													
97		Commissioning	38 days	Wed 8/1/12	Fri 9/21/12													
98		Arena Substantial Completion	23 days	Wed 8/1/12	Fri 8/31/12													
99		Punch List	59 days	Wed 8/1/12	Mon 10/22/12													
100		Final Completion	70.5 days	Wed 8/1/12	Wed 11/7/12													
101		Renovation of Susquehanna Center	193 days	Tue 5/31/11	Thu 2/23/12													
102		Demolition	36 days	Tue 5/31/11	Tue 7/19/11													
103		Cut, Cap & Safe-off all Utilities	1 day	Mon 6/6/11	Mon 6/6/11													
104		Install Temporary Lighting	0 days	Mon 6/6/11	Mon 6/6/11													
105		Install Bypass Utilities (HW & Elec)	12 days	Mon 6/20/11	Tue 7/5/11													
106		Remove and Store Scoreboards & Athletic Equipment for Reuse	1 day	Mon 6/13/11	Mon 6/13/11													
107		Install Temporary Barricades and Protection	1 day	Mon 6/6/11	Mon 6/6/11													
108		Demo Ceilings & Ceiling Hung Equipment	6 days	Mon 6/13/11	Mon 6/20/11													
109		Demo Walls	7 days	Mon 6/27/11	Tue 7/5/11													
110		Sawcut and Remove SOG for Demo & New Work	12 days	Mon 6/27/11	Tue 7/12/11													
111		Demo Underslab Utilities	7 days	Mon 7/11/11	Tue 7/19/11													
112		Fit Out	132 days	Wed 7/20/11	Thu 1/19/12													
113		Underslab MEPS Work	17 days	Mon 7/18/11	Tue 8/9/11													
114		Slab Infills	7 days	Mon 8/8/11	Tue 8/16/11													
115		Partition layout	7 days	Mon 8/15/11	Tue 8/23/11													
116		Above Ceiling MEPS	42 days	Tue 8/23/11	Wed 10/19/11													

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



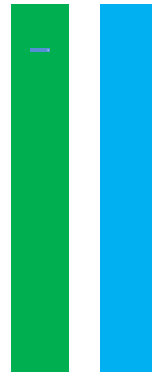
ID	Task	Name	Duration	Start	Finish	January	March	May	July	September	November	January	March	May	July	September	November	January
155		Commissioning	43 days	Tue 11/29/11	Thu 1/26/12													
156		Final Cleaning	38 days	Tue 12/6/11	Thu 1/26/12													
157		Owner FF & E	16 days	Thu 1/26/12	Thu 2/16/12													
158		Punch List	21 days	Thu 1/26/12	Thu 2/23/12													
159		Closeout Activities	124 days	Fri 5/18/12	Wed 11/7/12													
160		Susquehanna Center Substantial Completion	0 days	Thu 12/6/12	Thu 12/6/12													



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

Appendix B

Detailed Structural Systems Estimate



Detailed Structural Systems Estimate					
Code	Item	Quantity	Unit	Unit Cost	Estimate
3310.01	Column Footings				
	Forms in place	1660	SFCA	7.92	13147.2
	Reinforcing in place	3.63	TON	2070.11	7514.4993
	Concrete, ready mix, regular weight	95	CY	126.85	12050.75
	Placing conc, incl vib, footings	95	CY	20.3	1928.5
3310.02	Wall Footings				
	Forms in place	3763	SFCA	7.86	29577.18
	Reinforcing in place, footings	42	TON	2070.11	86944.62
	Concrete, ready mix, regular weight	785	CY	126.85	99577.25
	Placing conc, incl vib, footings	785	CY	20.3	15935.5
	Elevator pit bottom	9	CY	20.29	182.61
3310.1	Foundation Walls - 24"				
	Keyway, top of wall, 4 use, tapered wood, 2" x 4"	650	LF	3.31	2151.5
	Forms in place, wall, steel framed plywood, to 16' high, 3 use/month	22200	SFCA	7.61	168942
	Reinforcing in place	36.63	TON	1968.64	72111.2832
	Concrete, ready mix, regular weight, 4000 psi, walls, cols, beams	822	CY	116.7	95927.4
	Placing conc, incl vib, walls, pumped	822	CY	34.6	28441.2
	Finishing: break ties & patch voids (walls, cols or beams)	22200	SFCA	0.71	15762
3310.101	Foundation Walls - to 18"				
	Keyway, top of wall, 4 use, tapered wood, 2" x 4"	450	LF	3.31	1489.5
	Forms in place, wall, steel framed plywood, to 16' high, 3 use/month	14400	SFCA	7.61	109584
	Reinforcing in place	24.12	TON	1968.64	47483.5968
	Concrete, ready mix, regular weight, 4000 psi, walls, cols, beams	400	CY	116.7	46680
	Placing conc, incl vib, walls, pumped	400	CY	34.6	13840
	Finishing: break ties & patch voids (walls, cols or beams)	14400	SFCA	0.71	10224
3310.102	Foundation Walls - to 12"				
	Keyway, top of wall, 4 use, tapered wood, 2" x 4"	207	LF	3.16	654.12
	Forms in place, wall, steel framed plywood, to 16' high, 3 use/month	1248	SFCA	8.98	11207.04
	Reinforcing in place	2.17	TON	1968.66	4271.9922
	Concrete, ready mix, regular weight, 4000 psi, walls, cols, beams	23	CY	116.7	2684.1
	Placing conc, incl vib, walls, pumped	23	CY	34.6	795.8
	Finishing: break ties & patch voids (walls, cols or beams)	1248	SFCA	0.71	886.08
3310.129	Concrete Superstructure Walls - Arena Lower Level				
	Keyway, top of wall, 4 use, tapered wood, 2" x 4"	540	LF	3.28	1771.2
	Forms in place, wall, steel framed plywood, to 16' high, 3 use/month	17300	SFCA	9.57	165561
	Reinforcing in place	12.96	TON	1968.64	25513.5744
	Concrete, ready mix, regular weight, 4000 psi, walls, cols, beams	214	CY	116.7	24973.8
	Placing conc, incl vib, walls, pumped	214	CY	34.6	7404.4
	Finishing: break ties & patch voids (walls, cols or beams)	17300	SF	0.71	12283
3310.13	Concrete Superstructure Walls - Arena Concourse Level				
	Forms in place, wall, steel framed plywood, to 16' high, 3 use/month	17828	SFCA	9.5	169366
	Reinforcing in place	13.37	TON	1968.64	26320.7168
	Concrete, ready mix, regular weight, 4000 psi, walls, cols, beams	232.26	CY	116.7	27104.742
	Placing conc, incl vib, walls, pumped	232	CY	34.6	8027.2
	Finishing: break ties & patch voids (walls, cols or beams)	17828	SF	0.71	12657.88
3310.21	Rectangular Concrete Columns				
	Forms in place, wall	8714	SFCA	7.61	66313.54
	Reinforcing in place	20	TON	1968.64	39372.8
	Concrete, ready mix, regular weight, 4000 psi, walls, cols, beams	160	CY	116.7	18672
	Placing conc, incl vib, walls, pumped	160	CY	34.6	5536
	Finishing: break ties & patch voids (walls, cols or beams)	8714	SF	0.71	6186.94
3310.3	Slab On Grade at Arena				
	2" rigid perimeter slab insulation, 2' wide	2000	SF	10.12	20240
	Wall insul, rigid extruded polystyrene	2000	SF	1.84	3680
	Welded wire fabric, sheets, 6 x 6 - W2.1 x W2.1 (8 x 8), 30 lb/CSF	35000	SF	0.28	9800
	Concrete, ready mix, regular weight	571.67	CY	126.85	72516.3395
	Concrete, for thickened slabs at partitions	60	CY	126.85	7611
	Placing concrete, labor	631	CY	20.3	12809.3
	Finishing floors SOG	35000	SF	0.76	26600

	Vapor barrier	35000		0.61	21350
3310.305	Replace Slab On Grade at Fitness				
	2" rigid perimeter slab insulation, 2' wide	50	SF	7.07	353.5
	Wall insul, rigid extruded polystyrene	50	SF	1.84	92
	Welded wire fabric, sheets, 6 x 6 - W2.1 x W2.1 (8 x 8), 30 lb/CSF	550	SF	0.28	154
	Concrete, ready mix, regular weight	9	CY	126.85	1141.65
	Concrete, for thickened slabs at partitions	0.75	CY	126.87	95.1525
	Placing concrete, labor	9.75	CY	20.29	197.8275
	Finishing floors SOG	550	SF	0.76	418
	Vapor barrier	550	SF	2.44	1342
3310.31	New Slab On Grade at Fitness				
	2" rigid perimeter slab insulation, 2' wide	200	SF	10.12	2024
	Wall insul, rigid extruded polystyrene	200	SF	1.84	368
	Welded wire fabric, sheets, 6 x 6 - W2.1 x W2.1 (8 x 8), 30 lb/CSF	2200	SF	0.28	616
	Concrete, ready mix, regular weight	36	CY	156.84	5646.24
	Concrete, for thickened slabs at partitions	3	CY	126.85	380.55
	Placing concrete, labor	39	CY	20.29	791.31
	Finishing floors SOG	2200	SF	0.76	1672
	Vapor barrier	2200	SF	0.61	1342
03395.250	Concrete Beams - Main Level				
	Form beam sides	2400	SFCA	12.47	29928
	Form beam bottoms	850	SF	8.03	6825.5
	Shores, reshoring	1200	SF	0.93	1116
	Reinforcing in place, beams	7	TON	1968.64	13780.48
	Concrete, ready mix, regular weight, 6000 psi, walls, cols, beams	64	CY	116.7	7468.8
	Placing conc, beam, elevated	64	CY	51.62	3303.68
	Finishing: break ties & patch voids	3600	SF	0.71	2556
03395.250	Concrete Beams - Low Roof				
	Form beam sides	3,700.00	SFCA	12.47	46139
	Form beam bottoms	460	LF	8.03	3693.8
	Shores, reshoring	700	SF	0.93	651
	Reinforcing in place, beams	13.5	TON	1,968.64	26576.64
	Concrete, ready mix, regular weight, 6000 psi, walls, cols, beams	100	CY	116.7	11670
	Placing conc, beam, elevated	100	CY	51.62	5162
	Finishing: break ties & patch voids	4,400.00	SF	0.71	3124
03395.310	Elevated Floor Slabs				
	Form elevated slab, main	17,861.00	SF	10.91	194863.51
	Form slab openings and perimeter	1830.00	LF	9.59	17549.7
	Perimeter working platform/rail	1830.00	LF	21.54	39418.2
	Reshoring at elevated decks	17860.00	SF	0.93	16609.8
	Reinforcing in place, elevated slabs, black	62.00	TON	1,968.64	122055.68
	Concrete, ready mix, regular weight, 4000 psi, elevated decks	465.00	CY	116.7	54265.5
	Place elevated concrete slabs, pump	465.00	CY	31.59	14689.35
	Finishing floors, machine trowel, elevated slabs	17861.00	SF	0.61	10895.21
	Curing, sprayed membrane curing compound	178.61	CSF	14.05	2509.4705
	Protect perimeters, exterior and interior	1830.00	LF	4.42	8088.6
	Protect openings, plywood	1000.00	SF	2.33	2330
03395.310	Elevated Roof Slabs				
	Form elevated slab, main	5,666.00	SF	10.91	61816.06
	Form slab openings and perimeter	585.6	LF	9.59	5615.904
	Perimeter working platform/rail	585.6	LF	21.54	12613.824
	Reshoring at elevated decks	5,666.00	SF	0.7	3966.2
	Reinforcing in place, elevated slabs, black	20	TON	1,968.64	39372.8
	Concrete, ready mix, regular weight, 4000 psi, elevated decks	148.8	CY	116.7	17364.96
	Place elevated concrete slabs, pump	148.8	CY	31.59	4700.592
	Finishing floors, machine trowel, elevated slabs	5,666.00	SF	0.61	3456.26
	Curing, sprayed membrane curing compound	56.66	CSF	14.05	796.073
	Protect perimeters, exterior and interior	585.6	LF	4.42	2588.352
	Protect openings, plywood	320	SF	2.33	745.6
3395.310.3	Elevated Floor Slab (Pool Deck)				
	Form elevated slab, main	3,200.00	SF	10.91	34912

	Form slab openings and perimeter	243	LF	9.59	2330.37
	Perimeter working platform/rail	243	LF	21.54	5234.22
	Reshoring at elevated decks	3,200.00	SF	0.7	2240
	Reinforcing in place, elevated slabs, black	11	TON	1,968.64	21655.04
	Concrete, ready mix, regular weight, 4000 psi, elevated decks	66	CY	116.7	7702.2
	Place elevated concrete slabs, pump	66	CY	31.59	2084.94
	Finishing floors, machine trowel, elevated slabs	3,200.00	SF	0.61	1952
	Curing, sprayed membrane curing compound	32	CSF	14.05	449.6
	Protect perimeters, exterior and interior	243	LF	4.52	1098.36
03395.400	Elevated Concrete Stairs				0
	Concrete stairs and landings - elevated concrete, interior steps	809	LF	57.15	46234.35
	Concrete stairs and landings - elevated concrete, interior landing	271	SF	57.15	15487.65
	Concrete stairs and landings - elevated concrete, exterior steps	541	LF	57.15	30918.15
	Concrete stairs and landings - elevated concrete, exterior landing	36	SF	57.15	2057.4
4200.1	CMU Backup Walls				
	8" CMU back-up - Fitness Addition	1,126.00	SF	10.88	12250.88
	8" CMU back-up - Infill existing	348	SF	16.42	5714.16
	8" CMU back-up - Arena	0	SF	0	0
	8" CMU back-up - Demising Wall	2,288.00	SF	10.88	24893.44
	12" CMU back-up - Arena Lower Level	540	SF	13.17	7111.8
	8" CMU back-up - Arena Lower Level	4,134.00	SF	10.88	44977.92
	4" CMU back-up - Arena Lower Level	4,844.00	SF	9.33	45194.52
4200.15	Cavity Insulation and Misc Masonry				
	Scaffolding at Renovation	1,000.00	SF	3.38	3380
	Scaffolding at Arena Expansion	20,000.00	SF	3.38	67600
	On site wall mock-up 100 sf (incl fdn, structure, back-up, masonry, window)	1	EA	21,114.05	21114.05
	Rigid insulation in cavity - Fitness Addition	1,735.00	SF	2.45	4250.75
	Rigid insulation in cavity - Infills	444	SF	2.45	1087.8
	Rigid insulation in cavity - Arena	7,592.00	SF	2.45	18600.4
	Rigid insulation in cavity - Arena Lower Level	4,844.00	SF	2.45	11867.8
	Rigid insulation in cavity - Demising Walll	2,288.00	SF	2.45	5605.6
4200.2	Masonry Veneer				
	Masonry veneer - Fitness Additon	1,735.00	SF	23.87	41414.45
	Masonry veneer - Infills	444	SF	23.87	10598.28
	Masonry veneer - Arena	7,592.00	SF	23.87	181221.04
	Masonry veneer - Demising Wall Interior	512	SF	23.87	12221.44
	Masonry veneer - Stone veneer on foundation	64	SF	23.87	1527.68
	Masonry veneer - Demising Wall Exterior	4,516.00	SF	23.87	107796.92
	Masonry veneer - Arena Lower Level	4,844.00	SF	23.87	115626.28
4810.25	Concrete Masonry Unit Walls				
	U3-3 - CMU partition 3-hr rated 10 thk to 15' h "	896	SF	11.16	9999.36
	U3-3 - CMU partition 3-hr rated 10 thk to 26'-8" h "	4,774.00	SF	16.24	77529.76
	U3-3 - CMU partition 3-hr rated 10 thk to 15' h "	2,512.00	SF	11.16	28033.92
	T1 - CMU partition 4 thk to 10' h "	2,500.00	SF	9.64	24100
	T1 - CMU partition 4 thk to 15' h "	1,860.00	SF	9.64	17930.4
	T1 - CMU partition 4 thk to 12' h "	2,198.00	SF	9.64	21188.72
	T1 - CMU partition 4 thk to 15' h "	2,370.00	SF	11.16	26449.2
	T2 - CMU partition 6 thk to 10' h "	950	SF	9.64	9158
	T2 - CMU partition 6 thk to 12' h "	728	SF	10.15	7389.2
	T2 - CMU partition 6 thk to 15' h "	2,880.00	SF	11.16	32140.8
	T3 - CMU partition 8 thk to 10' h "	2,272.00	SF	10.15	23060.8
	T3 - CMU partition 8 thk to 15' h "	4,485.00	SF	12.18	54627.3
	T3 - CMU partition 8 thk to 16'-8" h "	533	SF	12.43	6625.19
	T3 - CMU partition 8 thk to 19'-8" h "	1,200.00	SF	13.95	16740
	T3 - CMU partition 8 thk to 26'-8" h "	24,563.00	SF	15.22	373848.86
	T3 - CMU partition 8 thk to 12' h "	980	SF	10.65	10437
	T3 - CMU partition 8 thk to 15' h "	6,330.00	SF	12.18	77099.4
	U2-1 - CMU partition 8 thk 1-hr rated to 12' to 16' h "	1,764.00	SF	13.45	23725.8
	U2-2 - CMU partition 8 thk 2-hr rated to 12' to 16' h "	1,004.00	SF	14.21	14266.84
	T5 - CMU partition 12 thk to 15' h "	570	SF	13.45	7666.5

	T5 - CMU partition 12 thk to 15' h "	735	SF	13.45	9885.75
	U4-4 - CMU partition 12 thk 1-hr rated to 15' h "	2,085.00	SF	14.46	30149.1
5210.01	Structural Steel - Arena Roof				
	Pipe columns, 8 dia - rainwater conductors "	10	tons	2,740	27398.5
	HSS12x12 and HSS16x16 columns	12	tons	2,740	32878.2
	HSS4x4 and HSS6x8 outriggers	52.5	tons	2,740	143842.125
	Miscellaneous Connections	40	tons	2,740	109594
	Steel plate, 1/4 "	30	tons	2,740	82195.5
	W12x26	2.48	tons	2,740	6794.828
	W21x44	7.04	tons	2,740	19288.544
	W30x116	4.8	tons	2,740	13151.28
	Open web joists, 80SLH20, 75 Lb	253.8	tons	3,552	901411.308
5210.02	Structural Steel - Fitness and Canopy				
	HSS canopy columns, girders and beams	20	tons	5,074	101476.2
	Miscellaneous Connections	3.5	ton	4,566	15982.505
	WF framing for new fitness roof	15	tons	4,059	60885.6
5210.03	Structural Steel - Misc				
	Modify existing structure to accept new framing	5	CD	6,088.57	30442.85
	Exterior wall support framing	2	TON	4,059.06	8118.12
	Structural steel not sized or detailed for openings	5	TON	4,059.04	20295.2
	Dunnage for rooftop AHU's	10	TON	3,805.36	38053.6
5310	Steel Deck				
	Metal deck, open, galv, 1.5 deep	38,780.50	SF	2.77	107421.985
	Metal deck, open, galv, 1.5 deep	2,838.00	SF	2.77	7861.26
	Metal deck, open, galv, 1.5 deep	4,235.00	SF	2.77	11730.95
7510.01	Main Arena Roof				
	Roof deck sheathing	35,255.00	SF	1.75	61696.25
	Roof deck insulation, polyisocyanurate 2#/CF density, 2-1/2 thick R16 "	70,510.00	SF	1.95	137494.5
	Edge and base flashings	760	LF	24.38	18528.8
	CSPE roof, XX mil, fully adhered	35,255.00	SF	3.1	109290.5
7510.02	Wedge Addition Roof				
	Roof deck sheathing	4,750.00	SF	1.75	8312.5
	Roof deck insulation, polyisocyanurate 2#/CF density, 2-1/2 thick R16 "	9,500.00	SF	1.95	18525
	Edge and base flashings	465	LF	24.38	11336.7
	CSPE roof, XX mil, fully adhered	4,750.00	SF	3.1	14725
7510.03	Low Infill Roof				
	Roof deck sheathing	580	SF	1.75	1015
	Roof deck insulation, polyisocyanurate 2#/CF density, 2-1/2 thick R16 "	1,160.00	SF	1.95	2262
	Edge and base flashings	110	LF	24.38	2681.8
	CSPE roof, XX mil, fully adhered	580	SF	3.1	1798
7510.035	New Fitness Roof				
	Roof deck sheathing	2,000.00	SF	1.75	3500
	Roof deck insulation, polyisocyanurate 2#/CF density, 2-1/2 thick R16 "	4,000.00	SF	1.95	7800
	Edge and base flashings	320	LF	24.38	7801.6
	CSPE roof, XX mil, fully adhered	2,000.00	SF	3.1	6200
7510.04	Canopy Roof				
	Roof deck sheathing	3,850.00	SF	1.75	6737.5
	Edge and base flashings	475	LF	24.38	11580.5
	CSPE roof, XX mil, fully adhered	3,850.00	SF	3.1	11935
	TOTAL				6509112.525

Appendix C

General Conditions Estimate

General Conditions Estimate	
ITEM	COST
TEMPORARY FACILITIES	
Tools & Supplies	2,100
Job Office/Job Office Cleaning	21,120
Job Office Setup/Removal/Alteration	14,400
Temporary Buildings	18,000
Temporary Roads	49,300
Construction/Maintenance	8,000
Snow Removal/Rainwater Control	3,200
Temporary Stairs/Ladders	3,000
	119,120
TEMPORARY UTILITIES	
Temporary Heat/Install/Remove/Maintenance/Usage	50,000
Temporary Light & Power/Install/Remove/Maintenance/Usage	4,800
Temporary Plumbing & Toilets/Install/Remove/Maintenance/Usage	49,700
	104,500
PROTECTION AND SAFETY	
General Protection & Safety	14,600
Barricades/Railings/Perimeter Cable/Toe Boards	16,000
Safety Program/Watchman/Traffic Control/Drug Testing	27,600
Protect Finished Work In Place	8,000
Sidewalk Bridges/Fences	38,200
First Aid Facilities	5,120
	109,520

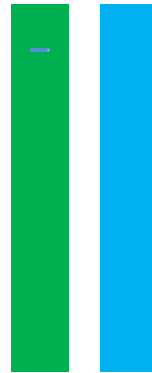
Appendix D

Staffing Plan

STAFFING PLAN					
STAFF	Quantity	Unit	% of Time	Rate/Mo.	Extension
Preconstruction					
Estimating/Purchasing					
Chief Estimator	5	months	0.1	\$18,000.00	\$9,000.00
Secretary	5	months	0.2	\$5,000.00	\$5,000.00
Sr. Estimator	5	months	0.25	\$12,500.00	\$15,625.00
Superintendent	5	months	0.148846	\$10,122.00	\$7,533.10
Sr. Mechanical Estimator	3	months	0.2	\$10,000.00	\$6,000.00
Project Manager	5	months	0.2	\$12,000.00	\$12,000.00
Superintendent	5	months	0.15	\$10,122.00	\$7,591.50
				Subtotal: Pre	\$62,749.60
Construction					
Management					
Operations Manager	16	months	0.039663	\$19,500.00	\$12,375.00
Project Executive	16	months	0.04	\$18,750.00	\$12,000.00
Project Manager	16	months	0.5	\$12,000.00	\$96,000.00
Estimating/Purchasing					
Purchasing Manager	3	months	0.1	\$12,000.00	\$3,600.00
Purchasing Agent	2	months	1	\$8,444.00	\$16,888.00
Purchasing Clerical	2	months	0.25	\$5,000.00	\$2,500.00
Superintendence					
Project Superintendent	14	months	1	\$10,122.00	\$141,708.00
PM MEP / Commissioning	1	months	1	\$12,000.00	\$12,000.00
Asst Super /Engineer	14	months	1	\$6,000.00	\$84,000.00
Safety Director	14	months	0.08	\$10,500.00	\$11,760.00
Engineering					
Project Engineer	16	months	0.5	\$7,000.00	\$56,000.00
Financial					
Accountant	16	months	0.18	\$13,259.75	\$38,188.07
Cost Engineer	16	months	0.05	\$13,259.75	\$10,607.80
Other					
Administrative Assistant	14	months	0.25	\$5,000.00	\$17,500.00
TOTAL					\$515,126.90

Appendix E

BIM Use Analysis Worksheet



BIM USE ANALYSIS WORKSHEET

BIM Use*	Value to Project	Responsible Party	Value to Resp Party	Capability Rating			Additional Resources / Competencies Required to Implement	Notes	Proceed with Use
				Scale 1-3 (1 = Low)	Resources	Competency			
	High / Med / Low		High / Med / Low						YES / NO / MAYBE
Cost Estimation	MED	Contractor	HIGH	2	2	3			MAYBE
Existing Conditions Analysis	HIGH	Contractor	HIGH	2	2	2	Knowledge of conventional surveying tools and equipment		MAYBE
		Facility Manager	MED	3	2	2			
		Designer	MED	2	3	3			
LEED Evaluation	MED	Designer	MED	2	3	2	Knowledge of up-to-date LEED Credit Information		MAYBE
3D Modeling	HIGH	Contractor	HIGH	3	3	3	Knowledge of BIM model applications for facility updates		NO
		Subcontractors	HIGH	1	3	3			
		Designer	HIGH	2	3	3			
Record Modeling	HIGH	Contractor	MED	2	2	2	3D Model Manipulation Tools		NO
		Facility Manager	HIGH	1	2	1			
		Designer	MED	3	3	3			
Space Management and Tracking	MED	Designer	HIGH	3	2	1	Knowledge of facility management applications		NO
		Contractor	MED	2	3	2			
		Subcontractor	LOW	1	2	2			