Technical Assignment Two
Construction Management
October 28, 2009

Upper Dublin High School

Upper Dublin School District
Fort Washington, PA

Stephen Kelchaw
The Pennsylvania State University
Architectural Engineering
Construction Management Option

Faculty Adviosr(s):
Dr. David Riley
Dr. Chris Magent

Table of Contents

List of Figures

List of Tables

Introduction

Technical Assignment Two focuses on developing and analyzing a detailed project schedule, site layout plans, and detailed estimates for this project. Also, a summary of the events and lessons learned at the PACE Roundtable will be provided. The following paragraphs will describe the main ideas expressed in each of the sections of this report.

Detailed Project Schedule

For a project of this size and length of time, it is extremely difficult to condense the actual project schedule down into two-hundred or less items. In order to provide classes for students while the new high school is under construction, this project will be divided into two major phases. Since the building is so large, it has been divided into different areas. This will help to reduce confusion as to the location inside the building. This has been reflected in the schedule. Each section of the building, and the work needed to complete that area of the building is listed throughout the schedule. By doing this, the schedule is much more organized and easy to understand. The detailed project schedule can be found in **Appendix A**.

Site Layout Planning

The site for the Upper Dublin High school has two very distinct advantages. For one thing, the project site is very large, at approximately 50 acres of land. This will create much more opportunity as to the layout of the construction site. The other advantage is its close proximity to Route 309, and the low amount of traffic to get there. Taking these advantages into consideration, three site plans were creating. These site plans reflect the construction site during three different time periods of the project. Many of the items listed are in general locations, because due to the nature of this project, it is always changing as new sections of the building are being built. All of the site layout drawings can be found in **Appendix B**.

Detailed Structural Systems Estimate

The structural system for the Upper Dublin High School consists of a steel frame with cast-in-place concrete slabs. This estimate was performed using RS Means 2009 Unit Cost Data. Since there wasn't a Revit model available, all take-offs had to be performed by hand. To simplify the process, the central area of the building is symmetrical. The final total for the structural estimate came out to be just under $14M for the project. This seems like a reasonable amount for the size of this building and the type of construction. Of this total cost, materials accounted for nearly 78%, followed by labor and equipment.

General Conditions Estimate

There are many different entities on this project that will have to staff the site. Therefore, the general conditions costs reflect a basic description of the actual construction costs. The information gathered for this estimate came from discussions with the Construction Manager on the project, as well as the general contractors. The total estimate came out to be around $8,325,000, with a majority of the costs coming from staffing the project.

Critical Industry Issues

The PACE Roundtable event was a great opportunity to meet industry leaders in a much more formal setting than we're used to. It also gave us a great chance to learn about the current state of the industry, and where it is heading. One of the major topics discussed during this event was about BIM and how to implement it on a project. This was also the topic of the breakout section that I decided to attend. I chose to go to this session because of my unfamiliarity and interest in the topic of BIM. To my surprise, I found out much more about the subject than I ever knew, and many new ways it can be utilized on a project.

Summary of Schedule:

The Upper Dublin High School Project presents many different challenges with creating an effective schedule. It requires very careful and creative planning to produce a construction sequence that satisfies the expectations of the owner, and met the needs of the students and faculty at the Upper Dublin High School. The timeline for the construction of this project will take four years to complete. Also, the location is on the site of the existing Upper Dublin High School. For these reasons, multiple phases will be needed to successfully build the new high school, while ensuring that the students have a place to attend classes.

There are two major phases for this construction project, with each containing several sub-phases. The direction of each phase will flow from the north-west to the south-east of the project site. This direction has been chosen because the existing high school is situated more towards the east side of the project site. This will leave more of the existing high school standing until sections of the new high school can be completed. As sections of the existing high school are demolished and sections of the new high school are finished, students will be able to utilize that new space to make up for what they lost. Construction has already started in June, 2008, and is scheduled for final completion in August, 2012. A graphical representation of the phasing sequence can be found in **Figure 1**, on the following page. The detailed project schedule for this project can be found in **Appendix A**. Due to the long duration of this project, it is extremely hard to capture the precise planning of the original schedule in only two hundred activities. This is something to take note when viewing the detailed project schedule.

During each stage of the process, some amount a demolition will first occur. Once that specific section of the existing high school has been demolished and removed, excavation and foundation work will begin. As the substructure is completed, the superstructure will follow. In the meantime, more demolition will take place for upcoming phases of the project. This will ensure that construction flow is continuous and smooth throughout the entire length of time. Subsequent to the superstructure is the building enclosure. This is a key step in the process, because once it has been completed and that section of the building is watertight, all interior work can commence. Interior work will start with the plumbing rough-in. This will be followed by the mechanical rough-in, and the general carpentry work. Once all the interior walls have been constructed, the electrical rough-in can begin. Finally, all interior finishes can be installed to complete that phase of the project. This process will continue in a similar manner for each phase and sub-phase of the project. The entire building has been broken up into multiple sections. This will make determining a location in the building much easier, especially when reading the schedule. A diagram of the building divisions can be found following the phasing sequence, in **Figure 2**.

Commissioning and testing will take place periodically throughout most of the construction process, with a majority of the testing happening during the second phase of the project. This can significantly save time and money on the project if any major errors do occur. Due to the sustainability goals for this project, enhanced commissioning will take place. This practice will take a much deeper look into the design and functionality of the building systems, creating a much more efficient building.

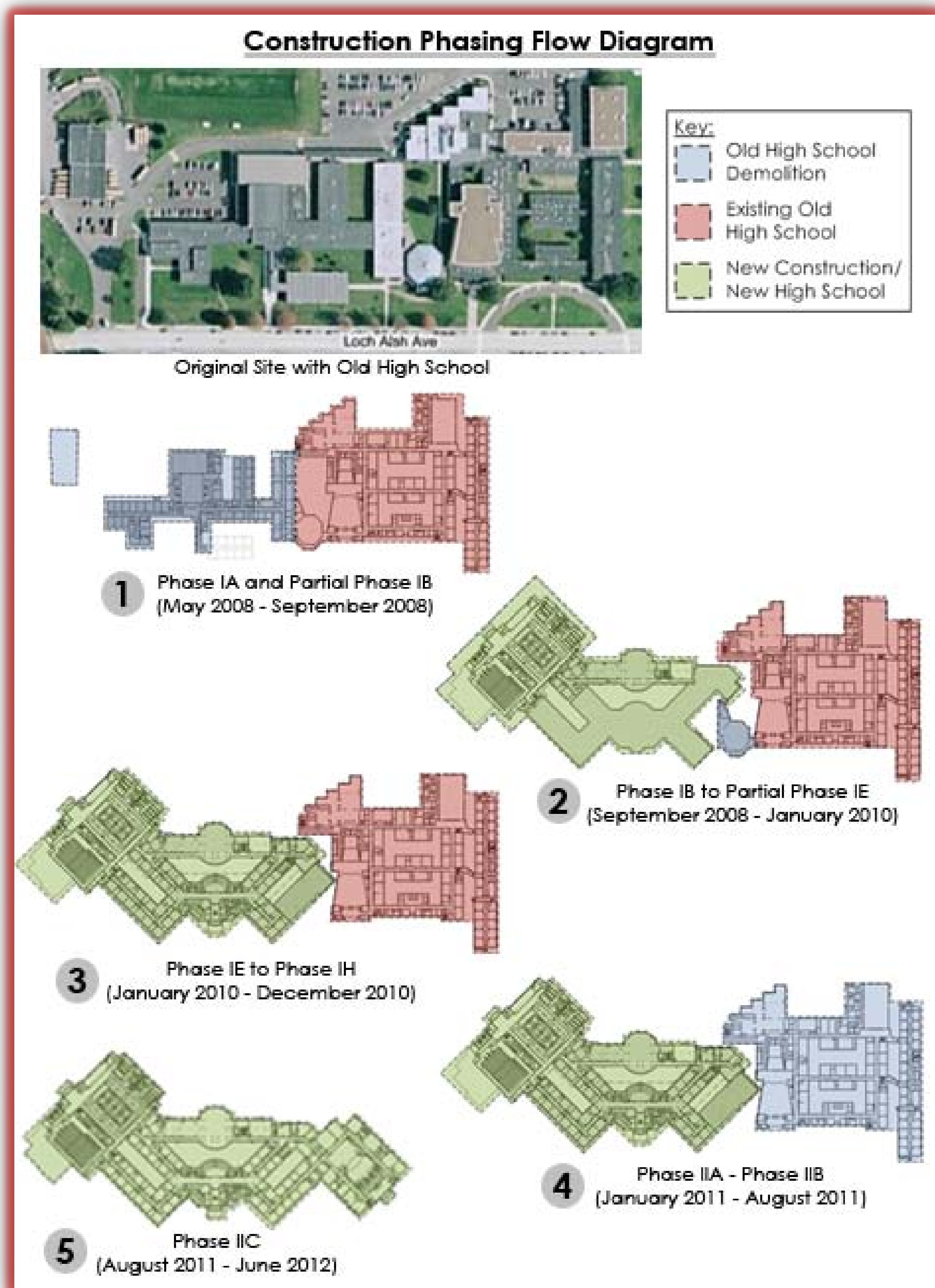


Figure 1: Phasing Sequence

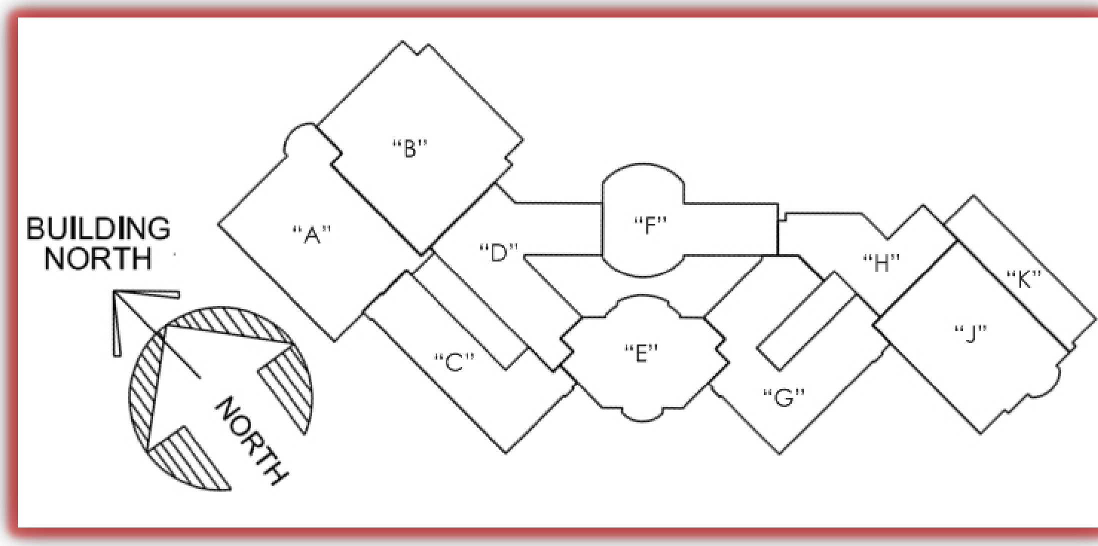


Figure 2: Building Divisions

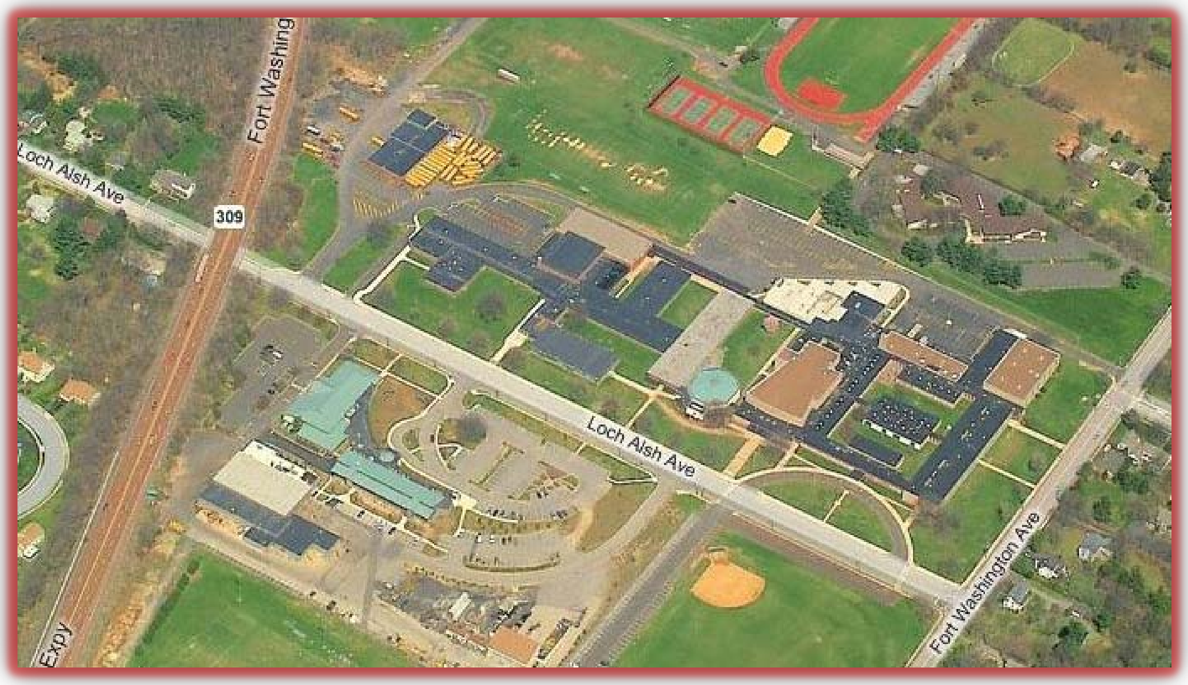


Figure 3: Aerial View of the Existing High School Building Prior to Construction

Key Advantages of the Project Site

The New Upper Dublin High School is located on approximately 50 acres of land in Fort Washington, PA. Included on this property are the existing high school, multiple athletic fields, and numerous parking areas. This is a major advantage for this project, because it creates much less site restrictions on space. Having the ability to spread out on a project site creates much less congestion. This also leads to a much safer and productive job site.

Another advantage of this site is the ease of access to the site. The high school is located just of Route 309 in a low traffic area. It is also bordered by Loch Alsh Avenue to the south and Fort Washington Avenue to the east. This will provide easier access for deliveries and construction vehicles.

Summary of the Site Layout Plans

The site layout plans being discussed in this section can be found in **Appendix B**. This project has been broken up into two main phases of construction, with each of these phases containing multiple sub-phases. The most critical phase of construction was the structural system. During this time, large equipment, such as cranes and concrete trucks will be on the job site. The position of these vehicles will constantly be changing throughout each of the phases, as well as material staging areas. For this reason, general locations are shown on the site layout plans. There are a total of three different site plans, with two for the first phase of construction and one for the second phase. The major items will be described in the next few paragraphs.

The first site layout drawing (C-01) will be used for Phases IA through IE of the project. During this time, there is construction parking available to the north of the site near the existing baseball field. Construction fencing will surround the area containing the geothermal wells, and phase one of the high school project. Temporary trailers will be settled to the north-east of the project. This location is where they will stay for the duration of the project. Construction traffic can enter the site from the west of the project site.

The next phase drawing (C-02) is for the remainder of phase one. During this time, the gymnasium and natatorium will have been completed and ready for use for the owner. This will move the construction fencing slightly to open up that area for use. Construction parking will now be available closer to the site. Since the first site layout plan, another small part of the existing high school will have been demolished, and another part of the new high school will be built in its place.

The final site layout drawing (C-03) consists of phase two of the project. At this point, a majority of the new high school has been completed and is ready for use for the school district. Also, the remainder of the old high school will be demolished, and the auditorium will be built in its place. During this phase, another access road opens up for the construction vehicles. The site fence has moved considerable to only enclose the area of the building still under construction. Although the site trailers are not located in this area, they will remain in the same place that they have been in since the beginning of the project.

Evaluation of the Contractors Site Layout Plan

The contractor did not provide a site layout plan for this project. Rather, the architect creating phasing plans to express the project site for the duration of the project. The plans described general locations for some of the items that would be on the site. Although this is a very important planning item for a project, the site layout is not a critical part of the project. This is due to the large amount of space available for the contractors to work with. Certain site layout components, such as access roads and site fences, hint at more obvious locations. Since part of the existing high school will be in use during part of the new construction, it is not possible to place fencing around the entire site.

Table 1: Structural System Estimate Summary

Detailed Structural Estimate Summary		
Description	Cost	Percentage
Total Estimate	$13,914,065.53	100.00%
Material Cost	$10,768,199.07	77.39%
Labor Cost	$2,574,907.92	18.51%
Equipment Cost	$570,958.54	4.10%

The structural system for the Upper Dublin High School consists of a structural steel frame with cast-in-place concrete slabs. The first floor contains a slab on grade, while the second floor is made up of a slab on metal deck. The roof construction consists of roof deck on steel joists. The foundation of this structure is created from a variety of different sized spread footings with concrete piers and steel columns.

Since a Revit model was not created for this project, all quantities were found from hand take-offs. This difficulty with this task was reduced by the fact that the central area of the building (the whole building minus the gymnasium and auditorium at the ends) was symmetrical. Due to this discovery, I was able to find all the quantities for the first and second floor for half of the building, and simply multiply it by two to get the totals. This significantly reduced the time needed to obtain all the needed values for this estimate.

In order to find the associated construction costs for this system, RS Means 2009 Building Construction Cost Data was utilized. The table shown above, **Table 1**, is a summary of the estimated cost for the structural system of this building. A complete listing of all the calculations used to obtain the summary values can be found in **Appendix C**. The total estimate for this project came out to be just under $14M. This seems to be a reasonable estimate, with a total building construction cost of just about $100M. For this building, the structural system costs about $37.81/SF to construct. Out of the total costs, materials account for most of it, at a total of 77.39%. Labor comes in at second, but not nearly as much as the actual materials. The reason the materials cost so much is that it is such a large building, but at the same time it doesn't require any complicated construction methods.

The General Conditions Estimate contained in this section was created through a combination of discussion with the general contractors and construction managers on the site, as well as unit cost data from RS Means. All of the calculations were based off of a four year project timeline. Depending on the units, this became 48 months or 208 total weeks. Since this project was staffed from the general contractors, rather than the construction manager, the general conditions become different for each individual entity. Therefore, the estimate I have provided is a general guideline of the costs associated with this project.

Since local contractors were involved with this project, it was deemed unnecessary to include any travel or hotel costs for this project. Also, because this project is being built on the site of the old Upper Dublin High School, all temporary utilities were tapped into existing lines. The costs associated with this were provided by the owner, and thus was also not included in the general conditions estimate.

The total general conditions estimate for this project came out to be around $8,325,000. Most of the cost associated with this estimate comes from the cost of staffing the project. This accounts for around 75% of the total costs. This is a very common occurrence when dealing with general conditions. The breakdown of the general conditions costs can be seen in **Table 2**.

Table 2: General Conditions Estimate

General Conditions Estimate				
Description	Quantity	Unit	Unit Cost	Total
Jobsite Management				
Project Director	208	Weeks	$5,114.58	$1,063,832.64
Project Management				
Senior Project Manger	208	Weeks	$4,296.25	$893,620.00
Senior Project Manger	175	Weeks	$4,296.25	$751,843.75
Project Engineer - Structural	190	Weeks	$2,230.00	$423,700.00
Project Manager - MEP	208	Weeks	$3,388.50	$704,808.00
Project Manager - Electrical	177	Weeks	$3,388.50	$599,764.50
Project Manager - GC	208	Weeks	$3,388.50	$704,808.00
Assistant Project Manager - MEP	153	Weeks	$2,600.00	$397,800.00
Assistant Project Manager - GC	154	Weeks	$2,600.00	$400,400.00
Superintendent	180	Weeks	$3,400.00	$612,000.00
Superintendent	180	Weeks	$3,400.00	$612,000.00
Superintendent	180	Weeks	$3,400.00	$612,000.00
Construction Facilities				
Office Trailer	48	Month	$432.95	$20,781.60
Office Trailer	48	Month	$432.95	$20,781.60

Office Trailer	48	Month	$432.95	$20,781.60
Office Trailer	48	Month	$432.95	$20,781.60
Office Trailer	48	Month	$432.95	$20,781.60
Office Trailer	48	Month	$432.95	$20,781.60
Tool Trailer	48	Month	$116.61	$5,597.28
Office Equipment				
Copy Machine	48	Month	$794.18	$38,120.64
Copy Machine	48	Month	$794.18	$38,120.64
Printer	1	EA	$780.00	$780.00
Printer	1	EA	$780.00	$780.00
Fax Machine	1	EA	$520.00	$520.00
Mailing	48	Month	$75.00	$3,600.00
Furniture	12	Staff	$520.00	$6,240.00
Office Supplies				
Copy Paper	48	Month	$200.00	$9,600.00
Internet	48	Month	$1,000.00	$48,000.00
Office Supplies	48	Month	$1,540.00	$73,920.00
First Aid Supplies	4	LS	$1,500.00	$6,000.00
Cell Phones	48	Month	$1,240.00	$59,520.00
Site Security/Safety				
Site Fencing	5000	LF	$12.00	$60,000.00
Construction Gate	8	EA	$300.00	$2,400.00
First Aid Kits	5	EA	$1,200.00	$6,000.00
Clean-up				
Dumpsters	48	Month	$1,339.24	$64,283.52
Total				$8,324,748.57

Summary of Events:

Introduction

The PACE Roundtable began with a brief introduction, followed by a short presentation on Building Information Modeling (BIM) related topics by Dr. John Messner. He went into detail on the current state of BIM research being conducted at Penn State and the different technologies that are on their way. As you will see, BIM was one of the major topics of discussion during the day's events. Due to the major advances in building information modeling, and its ability to create a much more successful and organized project, BIM is becoming increasingly more popular in the industry. Once this presentation was at its end, Dr. David Riley introduced the next segment of the PACE Roundtable and the industry members that would be participating in it.

Industry Panel: State of Construction

This segment of the conference consisted of different industry members giving their views on the current state of the construction industry, followed by a question and answer session. Each member of the panel began by providing a brief introduction of themselves and the type of work their companies performs. They then gave their view of where the market is now, and where it is heading. One of the problems with the market today is money. As one of the industry panel members described, many of his projects this past summer were completed late. He said that this is due to limited amounts of money, which significantly reduces the ability for the general contractors to push their subcontractors to finish. As to where the market is heading, the basic trends seem to be toward the healthcare and data center industries. With continually growth in healthcare, construction of hospitals are predicted to be on the rise in the next ten years. Also, with advances in technology comes the need for the construction of more data centers.

Another topic of discussion during the panel segment was that of surviving in the current economic conditions of today. One idea that many companies are beginning to try is a "Back to Basics" strategy. The meaning of this strategy is for a company to rethink what they did in the past that made their company successful. Often times, companies begin to grow and move into different industries. This can be a very good thing, but can also be detrimental if a company sways too far from their comfortable line of business. By rethinking what they did in the past, they're able to go back to their already proven strategies. To go along with the "Back to Basics" strategy, internal training was also discussed. By training and keeping the A-players during a recession, a company is able to come out of the recession with A+-players to create a much stronger company.

It isn't only important to keep a company strong internally during a recession, but to keep the company strong externally as well. By this I mean that a company must create and retain good relationships with their clients and subcontractors during this time. By keeping good relationships a company is more likely to have repeat business and to stay in business during hard economic times. This is a time that is very important as far as helping each other out.

As was stated in the introduction, Building Information Modeling (BIM) is becoming increasingly more prevalent in the construction industry. One of the major problems that the industry members brought up was that many of the clients and subcontractors are uneducated in this area of the ability that BIM brings to the table and how to use it properly. It is hard to gage the actual value of BIM right now because it is so new. Although, it was said that BIM is right at the cusp of being implemented on many more projects and it is well on its way. By using BIM, electronic distribution of documents, and online collaboration, millions could be saved on projects.

Finally, the last major topic that the industry panel spoke about was that of energy and energy reduction. Many new technologies are being invented that could help reduce a large percentage of energy use in buildings. Some of these new technologies are LED lighting, geothermal heating/cooling, and energy modeling.

Breakout Sessions – BIM Executive Planning:

The topic that I chose to learn more about was that of BIM Executive Planning. We began the session in our breakout room by providing a brief introduction of each of ourselves and our current skill level with BIM Technology. The average skill level in the room was intermediate, leaning closer to the beginner side. The session then broke out into a discussion of BIM in industry and the problems with implementing it. This continued throughout both of the sessions.

The biggest limitation with BIM is using the software and understanding all the tools. There is so much that can be done with BIM, but many companies don't really understand the possibilities it brings to a project. This also leads to the problem of owners not really knowing what they want when they ask for BIM on a project. One of the solutions that were thought of is the requirement of a BIM implementation plan for the project. By doing this, it is easier to provide a client with exactly what they want, as well as help the client better understand what they are able to do with the software.

Another problem with BIM is that many times on a project, the older, less technologically able, project managers push all the modeling on the younger engineers. This can become a problem because of the lower experience level associated with a younger engineer. They may not be able to successfully identify all the problems on a project that an older, more experienced, engineer might be able to. A young draftsman may have no idea how certain members go together, so modeling the connection correctly might be very difficult to do.

A common perception that owners have is that BIM is used to find errors in the construction, and make "a bad building better." They feel that the building should be correct in the first place, and that BIM is completely unnecessary. This idea ignores that fact that clash detection is only a way to help the many different entities on a project work together more efficiently. This will not only save costs on a project due to change orders, but time as well. This will create a much more successful project. Clash detection is not the only thing that BIM can do, either. BIM can be used for putting work into place, such as with surveying or laying pipe on a project. Viewing these objects in a 3-Dimensional view is much more effective that trying to decipher 2-Dimensional drawings. BIM is first and foremost for the builder, so using it for this advantage will make everything much easier.

Finally, the topic of responsibility and legal issues were discussed. Problems can very easily occur when there are multiple copies of the BIM model on a project. If changes occur, it may not be tracked, which will lead to coordination issues between construction teams. Responsibility issues will most likely arise, leading to a delayed project schedule and more costs on the project. A simple solution to this problem is to have the least amount of people touch the model as possible. By doing this, you reduce the ability for untracked work to be produced, and blame will be placed on a much smaller group of individuals for errors.

Summary of Breakout Sessions:

After lunch in The Gardens Restaurant, we reconvened for a summary of all three of the breakout sessions. One of the categories that were of interest to me was that of the Business and Networking group. They described the industry as shifting from negotiations to hard bids. Also, joint ventures present a valuable opportunity for a company to work in an area that they may not totally be familiar with. It is also gives opportunity for two companies to work together on a project rather than to compete for it. This also relates to the idea of making good relationships in the industry. The better the working relationship a company has with owners and other industry members, the better chance at creating opportunities to obtain work.

Student Panel:

Nearing the end of the PACE Roundtable, a pre-selected group of students were called up to the front of the room to provide their views on social networking sites and communication technologies in today's workplace. They expressed whether certain types of communication strategies were helping or hurting the industry and how they believe certain standards should be set. One example is that of when or when not to use e-mail. It was of the basic opinion that e-mail is good to a certain point, but it is extremely important to know when it is not effective enough to communicate job site issues. At that point, face to face communication is a much more beneficial strategy to use. A great point that one of the industry leaders brought up during this discussion was the use of e-mail as legal documentation. For this reason, it is very important to understand what is being sent through e-mail, because it could come back to harm you in the future.

The use of social networking sites, such as Twitter and Facebook, were also discussed. The basic census from the student panel on this type of communication was that there needs to be a defined line, in which social networking is kept separate from work related communication. Although it is important to keep your social life separate from your work life, for the same reason in the last paragraph it is important to be careful what information is put on the web. With more and more communication occurring electronically, there is much more information that can be used in a legal situation than was available in the past.

Group Discussion – Continuous Personal Growth:

To conclude the events at the Roundtable discussion, the final segment consisted of a brief conversation about the best way to implement continued education for alumni and industry members. In an industry that is always changing in many different ways, continually growing educationally is very important and beneficial to any individual. There is never a point at which anyone in this industry should stop learning. One of the best ways to learn is through group sessions, such as the PACE Roundtable event. Everybody has different experiences in the industry, and to be able to share those experiences with others will not only help the people in that particular session, but the industry as a whole. The foundation of engineering is built from people working together in teams and helping each other. Some of the topics of discussion were when and how to implement continuing education programs, as well as whether or not to hold these programs in a work environment. Dr. Riley concluded with a brief preview of Penn State AE's plan for continuing education.

What Was Surprising

One of the things I found to be surprising at the PACE Roundtable was the state of BIM in the industry and how beneficial it really can be on a project. Before attending this event, I had a basic understanding of what BIM was and how it could be used on projects. The Roundtable event really opened my eyes to a deeper level of understanding of how powerful of a tool BIM actually is. It is good to see that it is on the verge of becoming more widely used in the industry. Once this tool is utilized to its full extent, projects will exponentially increase in efficiency, coordination, and overall success.

Another thing I found to be interesting at the PACE Roundtable was the formal atmosphere and discussion based lectures. I have never attending this event before, so I didn't really know what to expect. I thought it would be a day of lectures on a variety of industry related topics. To my surprise, the whole day turned out to be very interactive. Both industry leaders and students were in a very laid-back setting and had the chance to speak about any industry issues on their mind. This would then lead to the input of several others. As a result, I found this event to be very rewarding and beneficial as a student, and I look forward to this type of event in the future.

What Issues Apply/Affect This Project

An issue that directly applies to my senior thesis building is the issue of energy reduction and sustainability. Buildings are responsible for a large percentage in energy use in the world. They put a large strain on the economy and the environment because of it. For these reasons, and many others, energy reduction is a major topic when it comes to building design.

This was the case for the Upper Dublin High School. Since this is such a large building, 368,000 square feet in floor area, and being publicly funded, any type of savings made possible would definitely be implemented in the design. The goal for this high school is to attain a LEED Silver Rating for its construction. One of the energy saving strategies being used on this project, and discussed during the Roundtable event is geothermal heating/cooling. Using the steady year-round temperature of the Earth, a large amount of energy costs will likely be saved by using this system. Another strategy implemented on this project is the use of occupancy sensors and photosensors around the building. This reduces the amount of wasted energy from unnecessary lights being left on. Those were only two of many energy saving strategies being utilized on this project. As was discussed during the PACE Roundtable, sustainability and energy reduction is becoming more prevalent in the construction industry. This can easily be seen in the Upper Dublin High School Project.

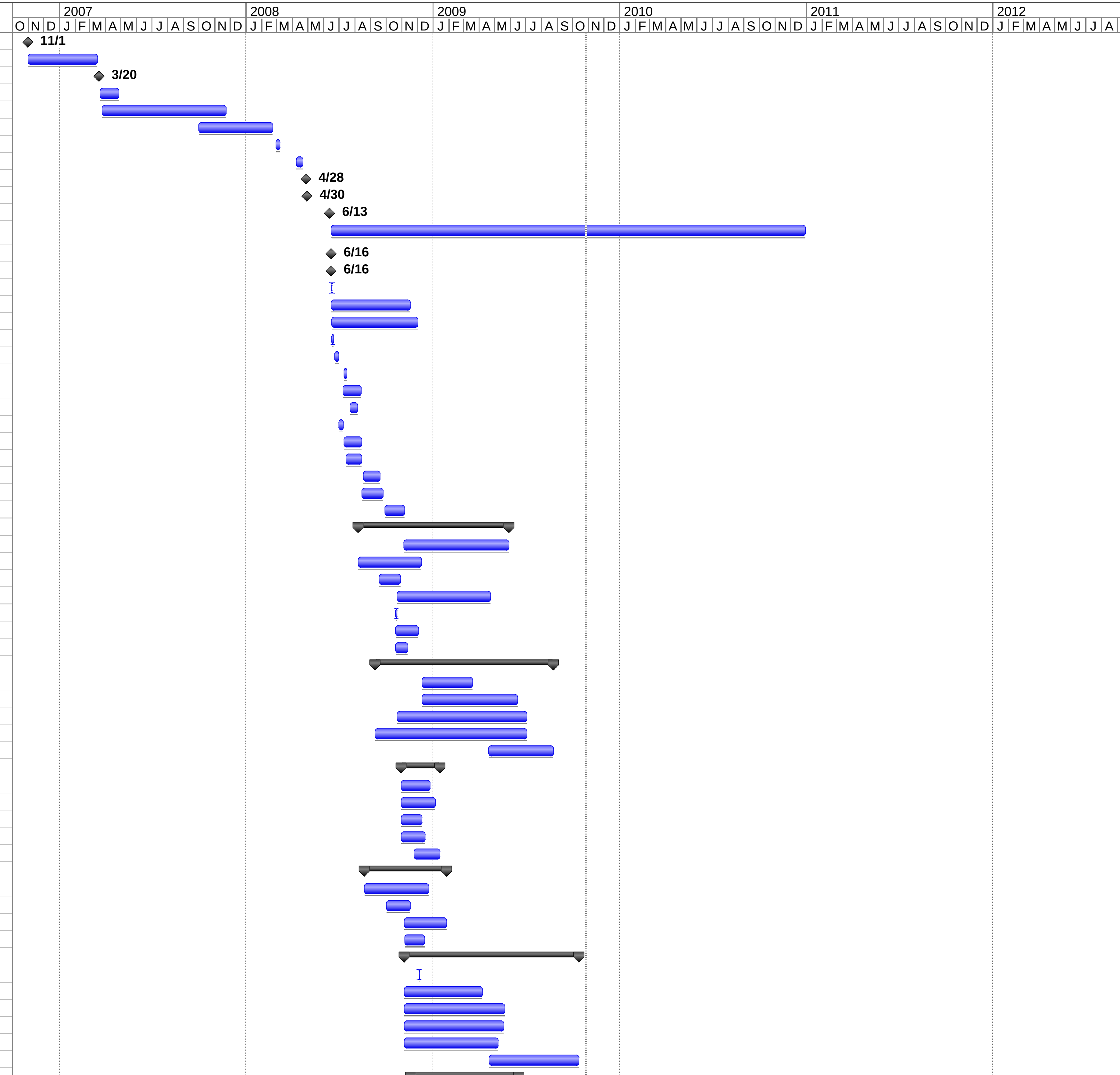
Key Contacts Made

The PACE Roundtable was a great opportunity for students to speak with industry members in a more formal atmosphere than we are accustomed to. All of the professionals were more than happy to discuss any of the topics opened during the Roundtable, or any others that we had on our mind. Most of the contacts I made were during the breakout sessions and lunch at The Gardens Restaurant. During the breakout session, I had the opportunity to meet Mr. Jerry Shaheen of Gilbane Building Company. He will be able to help me with any construction management related issues, and is a great source with a good amount of experience in his background. Craig Dubler was the moderator for the BIM session I attended. He is a great source for any BIM related topics, or how to implement it on a project. Also, with being a graduate student, he is readily available on campus, which will make communication much easier.

Appendix A

Detailed Project Schedule

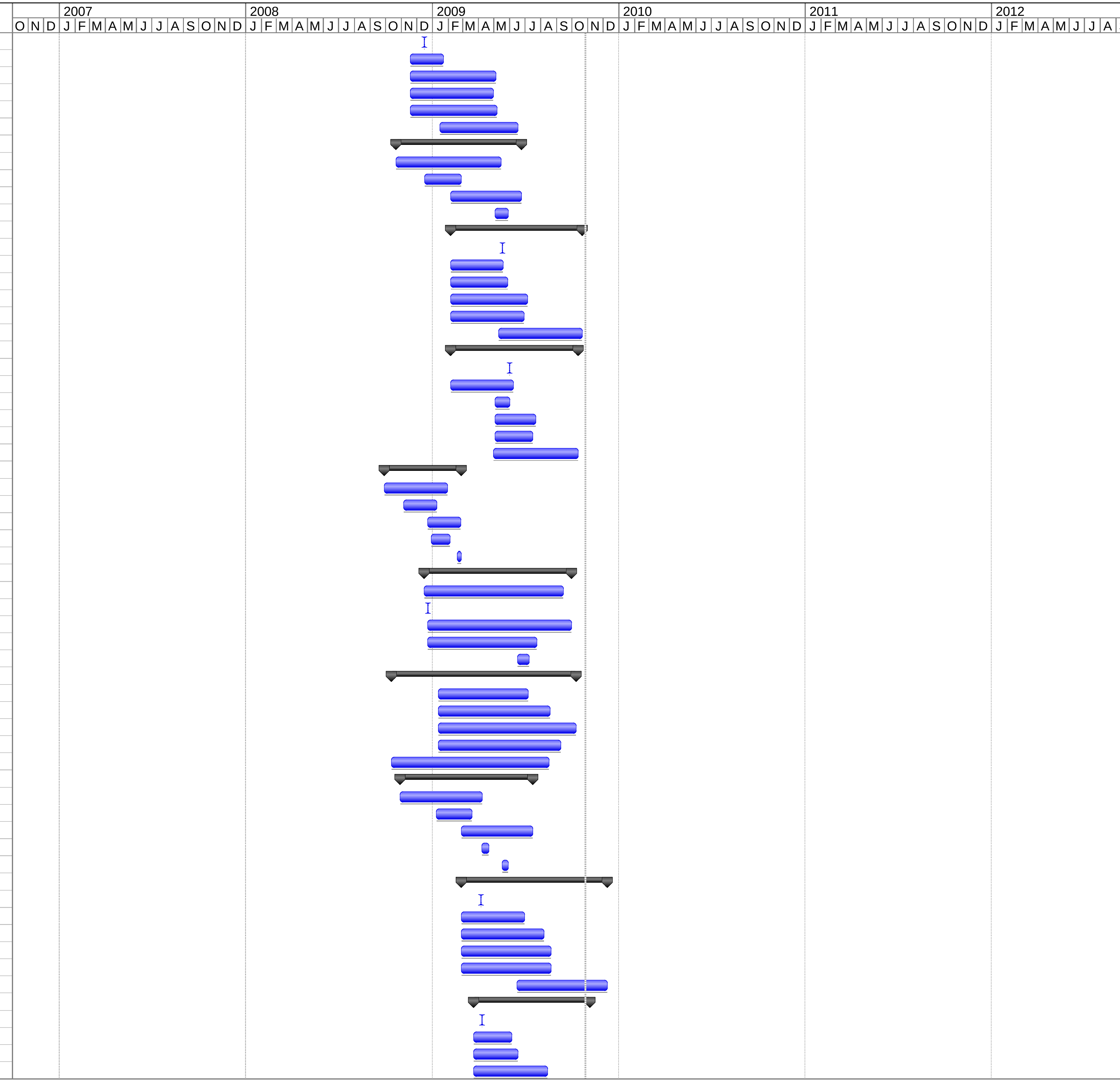
ID	Task Name	Duration	Start	Finish	Predecessors
1	Hire Architect/CM/Consultants	0 days	Wed 11/1/06	Wed 11/1/06	
2	Conceptual Design Phase	98 days	Wed 11/1/06	Fri 3/16/07	
3	Referendum Vote	0 days	Tue 3/20/07	Tue 3/20/07	
4	Schematic Design Phase	27 days	Thu 3/22/07	Fri 4/27/07	
5	Design Development Phase	175 days	Mon 3/26/07	Fri 11/23/07	
6	Construction Document Phase	105 days	Mon 10/1/07	Fri 2/22/08	
7	Bid Advertisement	6 days	Fri 2/29/08	Fri 3/7/08	
8	Receive/Review Bids	9 days	Wed 4/9/08	Mon 4/21/08	
9	School Board Approval	0 days	Mon 4/28/08	Mon 4/28/08	
10	Issue Notice of Intent Award	0 days	Wed 4/30/08	Wed 4/30/08	
11	Notice to Proceed	0 days	Fri 6/13/08	Fri 6/13/08	
12	**Begin Phase 1**	664 days	Mon 6/16/08	Thu 12/30/10	
13	Obtain Bonds/Insurance	0 days	Mon 6/16/08	Mon 6/16/08	
14	Obtain Permits	0 days	Mon 6/16/08	Mon 6/16/08	
15	Mobilize Office Trailers	1 day	Tue 6/17/08	Tue 6/17/08	
16	Prepare/Submit Shop Drawings,Submittals,etc.	111 days	Mon 6/16/08	Mon 11/17/08	
17	Review/Approve Shop Drawings, Submittals, etc.	121 days	Tue 6/17/08	Tue 12/2/08	
18	Asbestos Abatement, Transportation Garage	4 days	Tue 6/17/08	Fri 6/20/08	
19	Install Temporary Utilities	6 days	Mon 6/23/08	Mon 6/30/08	
20	Site Remediation Transportation Garage	4 days	Fri 7/11/08	Wed 7/16/08	
21	Excavate/Install Inlets/Drains/Piping	26 days	Wed 7/9/08	Wed 8/13/08	
22	Building Demolition, Transportation Garage	11 days	Wed 7/23/08	Wed 8/6/08	
23	Asbestos Abatement, Old High School "Area A"	7 days	Tue 7/1/08	Wed 7/9/08	
24	Building Demolition, Old High School "Area A"	25 days	Fri 7/11/08	Thu 8/14/08	
25	Asbestos Abatement, Old High School "Area B"	23 days	Tue 7/15/08	Thu 8/14/08	
26	Building Demolition, Old High School "Area B"	25 days	Mon 8/18/08	Fri 9/19/08	
27	Install Ground Source Heat Pumps	30 days	Fri 8/15/08	Thu 9/25/08	
28	Install Piping Heat Pumps to New Building	29 days	Mon 9/29/08	Thu 11/6/08	
29	**Area "A" General**	**211 days**	**Fri 8/8/08**	**Fri 5/29/09**	
30	Pool Construction	148 days	Wed 11/5/08	Fri 5/29/09	
31	Substructure Area A	88 days	Fri 8/8/08	Tue 12/9/08	
32	Superstructure Area A	30 days	Thu 9/18/08	Wed 10/29/08	
33	Building Enclosure Area A	131 days	Thu 10/23/08	Thu 4/23/09	
34	Rough-In Plumbing	3 days	Mon 10/20/08	Wed 10/22/08	
35	Rough-In Mechanical	33 days	Mon 10/20/08	Wed 12/3/08	
36	Rough-In Electric	18 days	Mon 10/20/08	Wed 11/12/08	
37	**Area "A" First Floor**	**249 days**	**Wed 9/10/08**	**Mon 8/24/09**	
38	Rough-In Plumbing	71 days	Thu 12/11/08	Thu 3/19/09	
39	Rough-In Mechanical	133 days	Thu 12/11/08	Mon 6/15/09	
40	Rough-In General Construction	182 days	Thu 10/23/08	Fri 7/3/09	
41	Rough-In Electric	213 days	Wed 9/10/08	Fri 7/3/09	
42	Interior Finishes	91 days	Mon 4/20/09	Mon 8/24/09	
43	**Area "A" Second Floor**	**54 days**	**Fri 10/31/08**	**Wed 1/14/09**	
44	Rough-In Plumbing	41 days	Fri 10/31/08	Fri 12/26/08	
45	Rough-In Mechanical	47 days	Fri 10/31/08	Mon 1/5/09	
46	Rough-In General Construction	29 days	Fri 10/31/08	Wed 12/10/08	
47	Rough-In Electric	33 days	Fri 10/31/08	Tue 12/16/08	
48	Interior Finishes	37 days	Tue 11/25/08	Wed 1/14/09	
49	**Area "B" General**	**115 days**	**Wed 8/20/08**	**Tue 1/27/09**	
50	Substructure Area B	90 days	Wed 8/20/08	Tue 12/23/08	
51	Superstructure Area B	33 days	Thu 10/2/08	Mon 11/17/08	
52	Building Enclosure Area B	59 days	Thu 11/6/08	Tue 1/27/09	
53	Rough-In Mechanical	27 days	Fri 11/7/08	Mon 12/15/08	
54	**Area "B" First Floor**	**244 days**	**Thu 11/6/08**	**Tue 10/13/09**	
55	Superstructure	1 day	Fri 12/5/08	Fri 12/5/08	
56	Rough-In Plumbing	109 days	Thu 11/6/08	Tue 4/7/09	
57	Rough-In Mechanical	141 days	Thu 11/6/08	Thu 5/21/09	
58	Rough-In General Construction	139 days	Thu 11/6/08	Tue 5/19/09	
59	Rough-In Electric	132 days	Thu 11/6/08	Fri 5/8/09	
60	Interior Finishes	126 days	Tue 4/21/09	Tue 10/13/09	
61	**Area "B" Second Floor**	**151 days**	**Wed 11/19/08**	**Wed 6/17/09**	



Task | Progress | Summary | External Tasks | Deadline

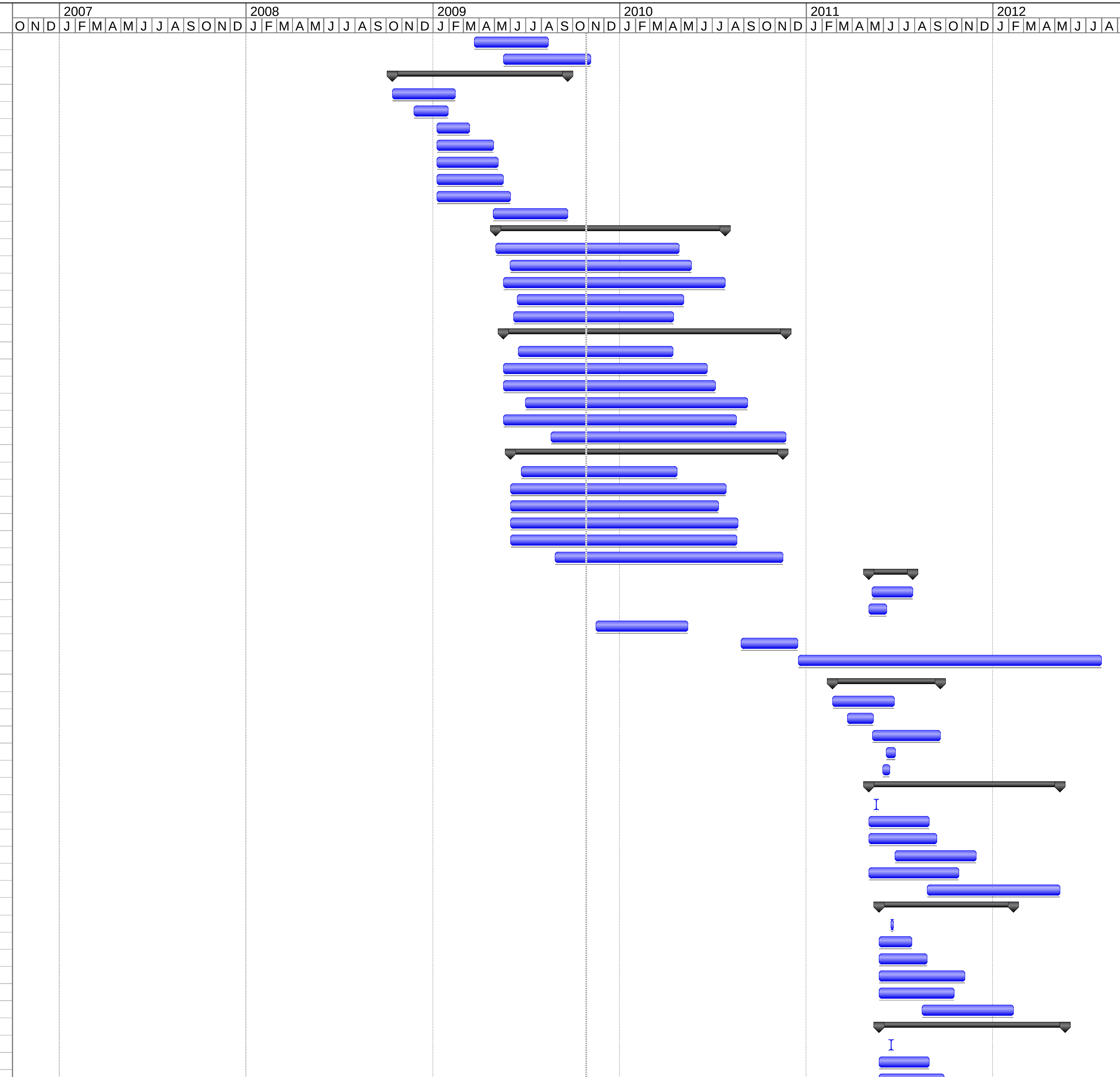
Split | Milestone | Project Summary | External Milestone

ID	Task Name	Duration	Start	Finish	Predecessors
62	Superstructure	1 day	Tue 12/16/08	Tue 12/16/08	
63	Rough-In Plumbing	47 days	Wed 11/19/08	Thu 1/22/09	
64	Rough-In Mechanical	120 days	Wed 11/19/08	Tue 5/5/09	
65	Rough-In General Construction	117 days	Wed 11/19/08	Thu 4/30/09	
66	Rough-In Electric	122 days	Wed 11/19/08	Thu 5/7/09	
67	Interior Finishes	109 days	Fri 1/16/09	Wed 6/17/09	
68	**Area "C" General**	**176 days**	**Wed 10/22/08**	**Wed 6/24/09**	
69	Substructure Area C	148 days	Wed 10/22/08	Fri 5/15/09	
70	Superstructure Area C	52 days	Wed 12/17/08	Thu 2/26/09	
71	Building Enclosure Area C	99 days	Fri 2/6/09	Wed 6/24/09	
72	Rough-In Mechanical	20 days	Mon 5/4/09	Fri 5/29/09	
73	**Area "C" First Floor Classroms**	**184 days**	**Fri 2/6/09**	**Wed 10/21/09**	
74	Superstructure	1 day	Mon 5/18/09	Mon 5/18/09	
75	Rough-In Plumbing	73 days	Fri 2/6/09	Tue 5/19/09	
76	Rough-In Mechanical	80 days	Fri 2/6/09	Thu 5/28/09	
77	Rough-In General Construction	107 days	Fri 2/6/09	Mon 7/6/09	
78	Rough-In Electric	102 days	Fri 2/6/09	Mon 6/29/09	
79	Interior Finishes	118 days	Mon 5/11/09	Wed 10/21/09	
80	**Area "C" Second Floor Labs/Classrooms**	**178 days**	**Fri 2/6/09**	**Tue 10/13/09**	
81	Superstructure	1 day	Mon 6/1/09	Mon 6/1/09	
82	Rough-In Plumbing	87 days	Fri 2/6/09	Mon 6/8/09	
83	Rough-In Mechanical	21 days	Mon 5/4/09	Mon 6/1/09	
84	Rough-In General Construction	58 days	Mon 5/4/09	Wed 7/22/09	
85	Rough-In Electric	54 days	Mon 5/4/09	Thu 7/16/09	
86	Interior Finishes	118 days	Fri 5/1/09	Tue 10/13/09	
87	**Area "D" General**	**109 days**	**Mon 9/29/08**	**Thu 2/26/09**	
88	Substructure Area D	90 days	Mon 9/29/08	Fri 1/30/09	
89	Superstructure Area D	47 days	Thu 11/6/08	Fri 1/9/09	
90	Building Enclosure Area D	47 days	Tue 12/23/08	Wed 2/25/09	
91	Rough-In Mechanical	27 days	Tue 12/30/08	Wed 2/4/09	
92	Rough-In General Construction	6 days	Thu 2/19/09	Thu 2/26/09	
93	**Area "D" First Floor Kitchen/Classrooms**	**207 days**	**Tue 12/16/08**	**Wed 9/30/09**	
94	Rough-In Plumbing	195 days	Tue 12/16/08	Mon 9/14/09	
95	Rough-In Mechanical	1 day	Tue 12/23/08	Tue 12/23/08	
96	Rough-In General Construction	202 days	Tue 12/23/08	Wed 9/30/09	
97	Rough-In Electric	154 days	Tue 12/23/08	Fri 7/24/09	
98	Interior Finishes	17 days	Wed 6/17/09	Thu 7/9/09	
99	**Area "D" Second Floor Classrooms**	**260 days**	**Mon 10/13/08**	**Fri 10/9/09**	
100	Rough-In Plumbing	126 days	Tue 1/13/09	Tue 7/7/09	
101	Rough-In Mechanical	157 days	Tue 1/13/09	Wed 8/19/09	
102	Rough-In General Construction	194 days	Tue 1/13/09	Fri 10/9/09	
103	Rough-In Electric	172 days	Tue 1/13/09	Wed 9/9/09	
104	Interior Finishes	221 days	Mon 10/13/08	Mon 8/17/09	
105	**Area "E" General**	**186 days**	**Thu 10/30/08**	**Thu 7/16/09**	
106	Substructure Area E	115 days	Thu 10/30/08	Wed 4/8/09	
107	Superstructure Area E	50 days	Fri 1/9/09	Thu 3/19/09	
108	Building Enclosure Area E	100 days	Fri 2/27/09	Thu 7/16/09	
109	Rough-In Mechanical	10 days	Wed 4/8/09	Tue 4/21/09	
110	Rough-In Electric	10 days	Mon 5/18/09	Fri 5/29/09	
111	**Area "E" First Floor**	**204 days**	**Fri 2/27/09**	**Wed 12/9/09**	
112	Superstructure	1 day	Mon 4/6/09	Mon 4/6/09	
113	Rough-In Plumbing	88 days	Fri 2/27/09	Tue 6/30/09	
114	Rough-In Mechanical	116 days	Fri 2/27/09	Fri 8/7/09	
115	Rough-In General Construction	126 days	Fri 2/27/09	Fri 8/21/09	
116	Rough-In Electric	126 days	Fri 2/27/09	Fri 8/21/09	
117	Interior Finishes	127 days	Tue 6/16/09	Wed 12/9/09	
118	**Area "E" Second Floor**	**164 days**	**Mon 3/23/09**	**Thu 11/5/09**	
119	Superstructure	1 day	Wed 4/8/09	Wed 4/8/09	
120	Rough-In Plumbing	55 days	Mon 3/23/09	Fri 6/5/09	
121	Rough-In Mechanical	63 days	Mon 3/23/09	Wed 6/17/09	
122	Rough-In General Construction	105 days	Mon 3/23/09	Fri 8/14/09	



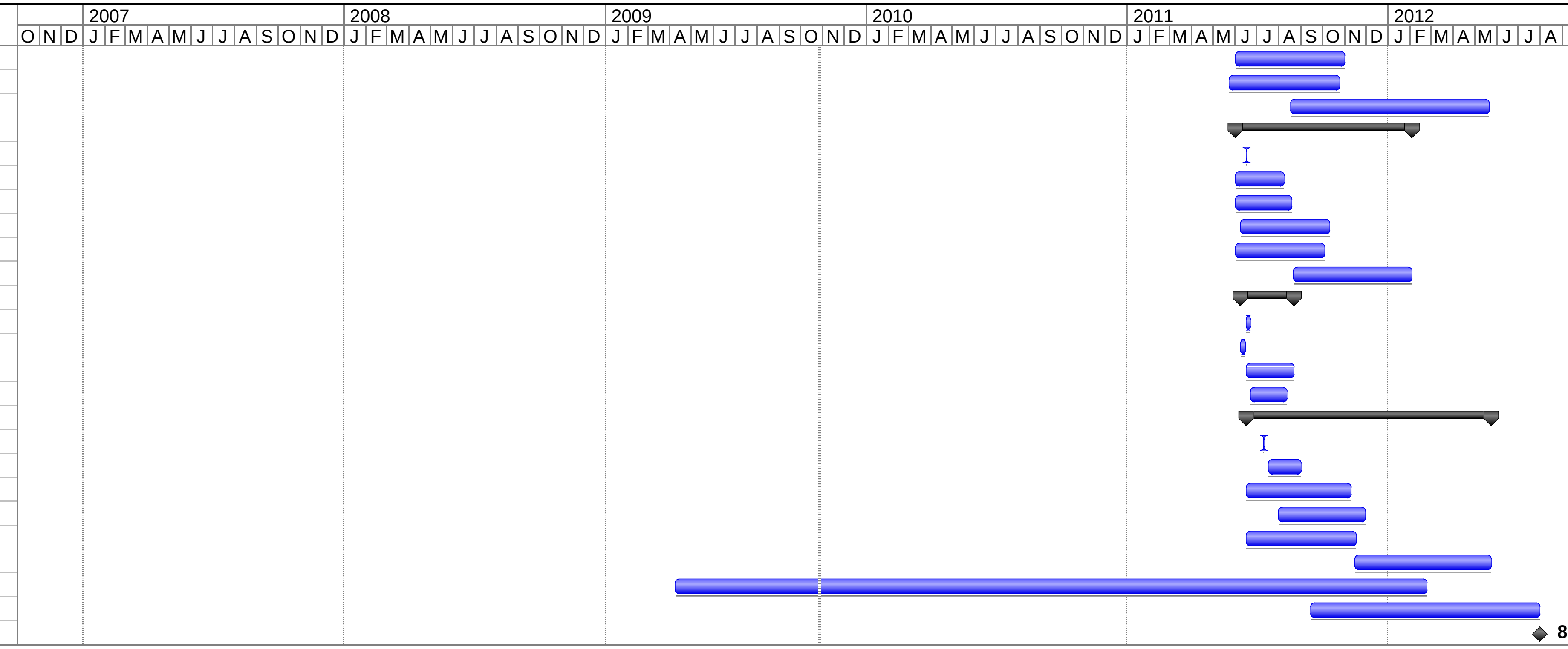
Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

ID	Task Name	Duration	Start	Finish	Predecessors
123	Rough-In Electric	105 days	Mon 3/23/09	Fri 8/14/09	
124	Interior Finishes	123 days	Tue 5/19/09	Thu 11/5/09	
125	**Area "F" General**	**245 days**	**Tue 10/14/08**	**Mon 9/21/09**	
126	Substructure Area F	89 days	Tue 10/14/08	Fri 2/13/09	
127	Superstructure Area F	49 days	Tue 11/25/08	Fri 1/30/09	
128	Building Enclosure Area F	46 days	Fri 1/9/09	Fri 3/13/09	
129	Rough-In Plumbing	79 days	Fri 1/9/09	Wed 4/29/09	
130	Rough-In Mechanical	86 days	Fri 1/9/09	Fri 5/8/09	
131	Rough-In General Construction	92 days	Fri 1/9/09	Mon 5/18/09	
132	Rough-In Electric	102 days	Fri 1/9/09	Mon 6/1/09	
133	Interior Finishes	104 days	Wed 4/29/09	Mon 9/21/09	
134	**Area "G" General**	**321 days**	**Mon 5/4/09**	**Mon 7/26/10**	
135	Substructure Area G	257 days	Mon 5/4/09	Tue 4/27/10	
136	Superstructure Area G	255 days	Mon 6/1/09	Fri 5/21/10	
137	Building Enclosure Area G	310 days	Tue 5/19/09	Mon 7/26/10	
138	Rough-In Mechanical	234 days	Mon 6/15/09	Thu 5/6/10	
139	Rough-In Electric	225 days	Mon 6/8/09	Fri 4/16/10	
140	**Area "G" First Floor**	**395 days**	**Tue 5/19/09**	**Mon 11/22/10**	
141	Superstructure	217 days	Wed 6/17/09	Thu 4/15/10	
142	Rough-In Plumbing	285 days	Tue 5/19/09	Mon 6/21/10	
143	Rough-In Mechanical	297 days	Tue 5/19/09	Wed 7/7/10	
144	Rough-In General Construction	311 days	Wed 7/1/09	Wed 9/8/10	
145	Rough-In Electric	326 days	Tue 5/19/09	Tue 8/17/10	
146	Interior Finishes	328 days	Thu 8/20/09	Mon 11/22/10	
147	**Area "G" Second Floor**	**381 days**	**Tue 6/2/09**	**Tue 11/16/10**	
148	Superstructure	219 days	Tue 6/23/09	Fri 4/23/10	
149	Rough-In Plumbing	302 days	Tue 6/2/09	Wed 7/28/10	
150	Rough-In Mechanical	291 days	Tue 6/2/09	Tue 7/13/10	
151	Rough-In General Construction	319 days	Tue 6/2/09	Fri 8/20/10	
152	Rough-In Electric	317 days	Tue 6/2/09	Wed 8/18/10	
153	Interior Finishes	318 days	Fri 8/28/09	Tue 11/16/10	
154	**Area "K" General**	**62 days**	**Wed 5/4/11**	**Thu 7/28/11**	
155	Substructure Area K	58 days	Tue 5/10/11	Thu 7/28/11	
156	Superstructure Area K	25 days	Wed 5/4/11	Tue 6/7/11	
157	Testing	130 days	Mon 11/16/09	Fri 5/14/10	
158	Project Closeout - Phase 1	79 days	Fri 8/27/10	Wed 12/15/10	
159	**Begin Phase 2**	423 days	Fri 12/17/10	Tue 7/31/12	
160	**Area "H" General**	**151 days**	**Tue 2/22/11**	**Tue 9/20/11**	
161	Substructure Area H	87 days	Tue 2/22/11	Wed 6/22/11	
162	Superstructure Area H	37 days	Wed 3/23/11	Thu 5/12/11	
163	Building Enclosure Area H	95 days	Wed 5/11/11	Tue 9/20/11	
164	Rough-In Mechanical	14 days	Tue 6/7/11	Fri 6/24/11	
165	Rough-In Electric	10 days	Tue 5/31/11	Mon 6/13/11	
166	**Area "H" First Floor**	**268 days**	**Wed 5/4/11**	**Fri 5/11/12**	
167	Superstructure	1 day	Wed 5/18/11	Wed 5/18/11	
168	Rough-In Plumbing	84 days	Wed 5/4/11	Mon 8/29/11	
169	Rough-In Mechanical	95 days	Wed 5/4/11	Tue 9/13/11	
170	Rough-In General Construction	113 days	Fri 6/24/11	Tue 11/29/11	
171	Rough-In Electric	126 days	Wed 5/4/11	Wed 10/26/11	
172	Interior Finishes	186 days	Fri 8/26/11	Fri 5/11/12	
173	**Area "H" Second Floor**	**189 days**	**Tue 5/24/11**	**Fri 2/10/12**	
174	Superstructure	3 days	Thu 6/16/11	Mon 6/20/11	
175	Rough-In Plumbing	46 days	Tue 5/24/11	Tue 7/26/11	
176	Rough-In Mechanical	68 days	Tue 5/24/11	Thu 8/25/11	
177	Rough-In General Construction	120 days	Tue 5/24/11	Mon 11/7/11	
178	Rough-In Electric	105 days	Tue 5/24/11	Mon 10/17/11	
179	Interior Finishes	129 days	Tue 8/16/11	Fri 2/10/12	
180	**Area "J" First Floor Rooms and Auditorium**	**260 days**	**Tue 5/24/11**	**Mon 5/21/12**	
181	Superstructure	1 day	Thu 6/16/11	Thu 6/16/11	
182	Rough-In Plumbing	70 days	Tue 5/24/11	Mon 8/29/11	
183	Rough-In Mechanical	91 days	Tue 5/24/11	Tue 9/27/11	



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

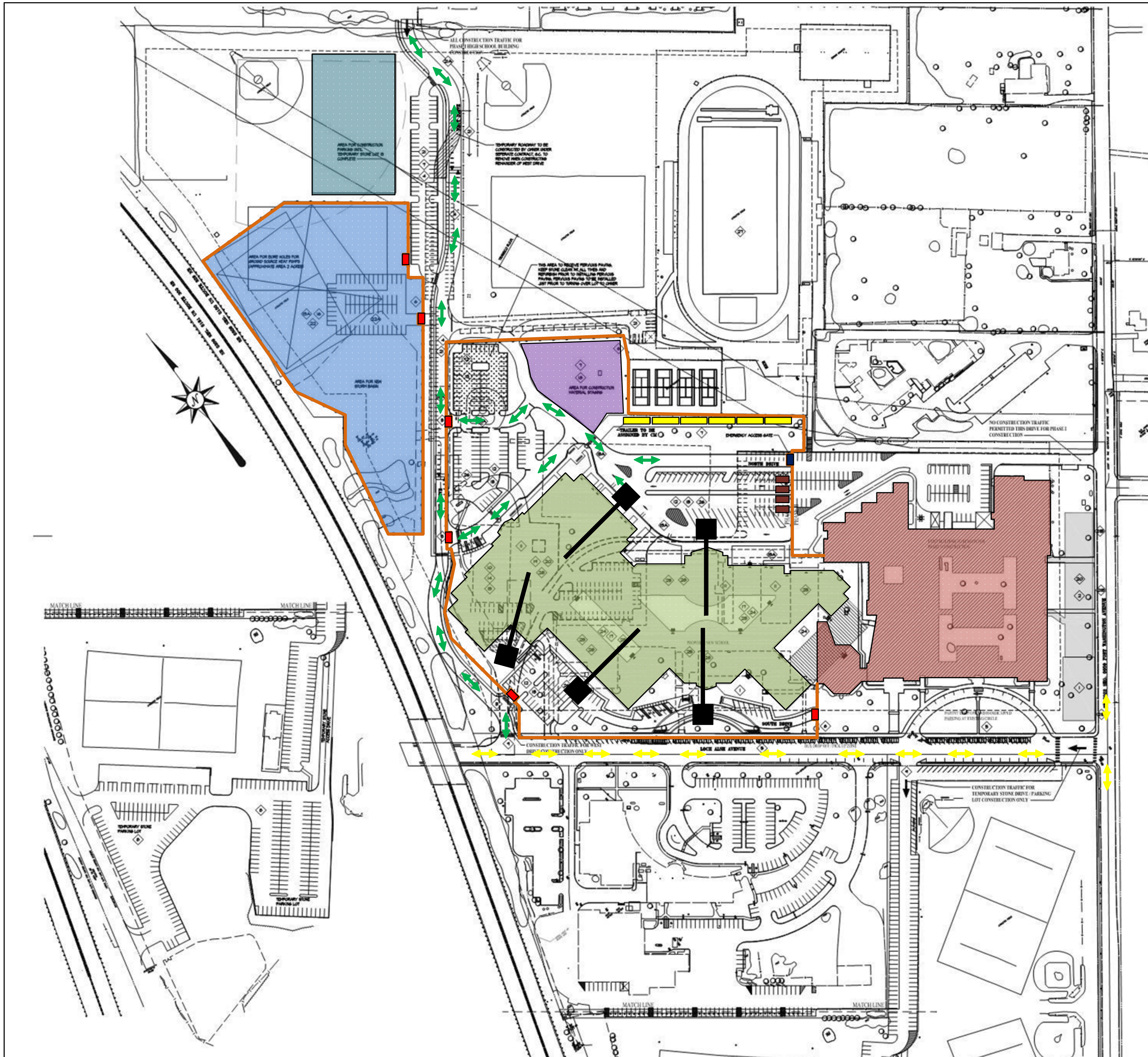
ID	Task Name	Duration	Start	Finish	Predecessors
184	Rough-In General Construction	109 days	Thu 6/2/11	Tue 11/1/11	
185	Rough-In Electric	111 days	Tue 5/24/11	Tue 10/25/11	
186	Interior Finishes	198 days	Thu 8/18/11	Mon 5/21/12	
187	**Area "J" Second Floor Rooms and Auditorium**	**177 days**	**Thu 6/2/11**	**Fri 2/3/12**	
188	Superstructure	1 day	Fri 6/17/11	Fri 6/17/11	
189	Rough-In Plumbing	48 days	Thu 6/2/11	Mon 8/8/11	
190	Rough-In Mechanical	57 days	Thu 6/2/11	Fri 8/19/11	
191	Rough-In General Construction	89 days	Thu 6/9/11	Tue 10/11/11	
192	Rough-In Electric	89 days	Thu 6/2/11	Tue 10/4/11	
193	Interior Finishes	120 days	Mon 8/22/11	Fri 2/3/12	
194	**Area "K" General**	**53 days**	**Thu 6/9/11**	**Mon 8/22/11**	
195	Substructure Area K	4 days	Fri 6/17/11	Wed 6/22/11	
196	Superstructure Area K	5 days	Thu 6/9/11	Wed 6/15/11	
197	Building Enclosure Area K	47 days	Fri 6/17/11	Mon 8/22/11	
198	Rough-In Mechanical	37 days	Thu 6/23/11	Fri 8/12/11	
199	**Area "K" First Floor**	**245 days**	**Fri 6/17/11**	**Thu 5/24/12**	
200	Superstructure	1 day	Mon 7/11/11	Mon 7/11/11	
201	Rough-In Plumbing	34 days	Mon 7/18/11	Thu 9/1/11	
202	Rough-In Mechanical	105 days	Fri 6/17/11	Thu 11/10/11	
203	Rough-In General Construction	88 days	Mon 8/1/11	Wed 11/30/11	
204	Rough-In Electric	110 days	Fri 6/17/11	Thu 11/17/11	
205	Interior Finishes	137 days	Wed 11/16/11	Thu 5/24/12	
206	Testing	752 days	Thu 4/9/09	Fri 2/24/12	
207	Project Closeout	229 days	Thu 9/15/11	Tue 7/31/12	
208	Final Completion	0 days	Wed 8/1/12	Wed 8/1/12	



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

Appendix B

Site Layout Planning



Key:

- Construction Entrance
- Emergency Entrance
- Site Fence
- New Construction
- Existing Building
- Two-Way Construction Traffic
- Area for Geothermal Wells
- Room for Material Staging Area
- Construction Parking
- Construction Trailers
- Two-Way General Traffic
- General Crane/Concrete Truck Locations
- Waste and Recycling

Technical Assignment 2

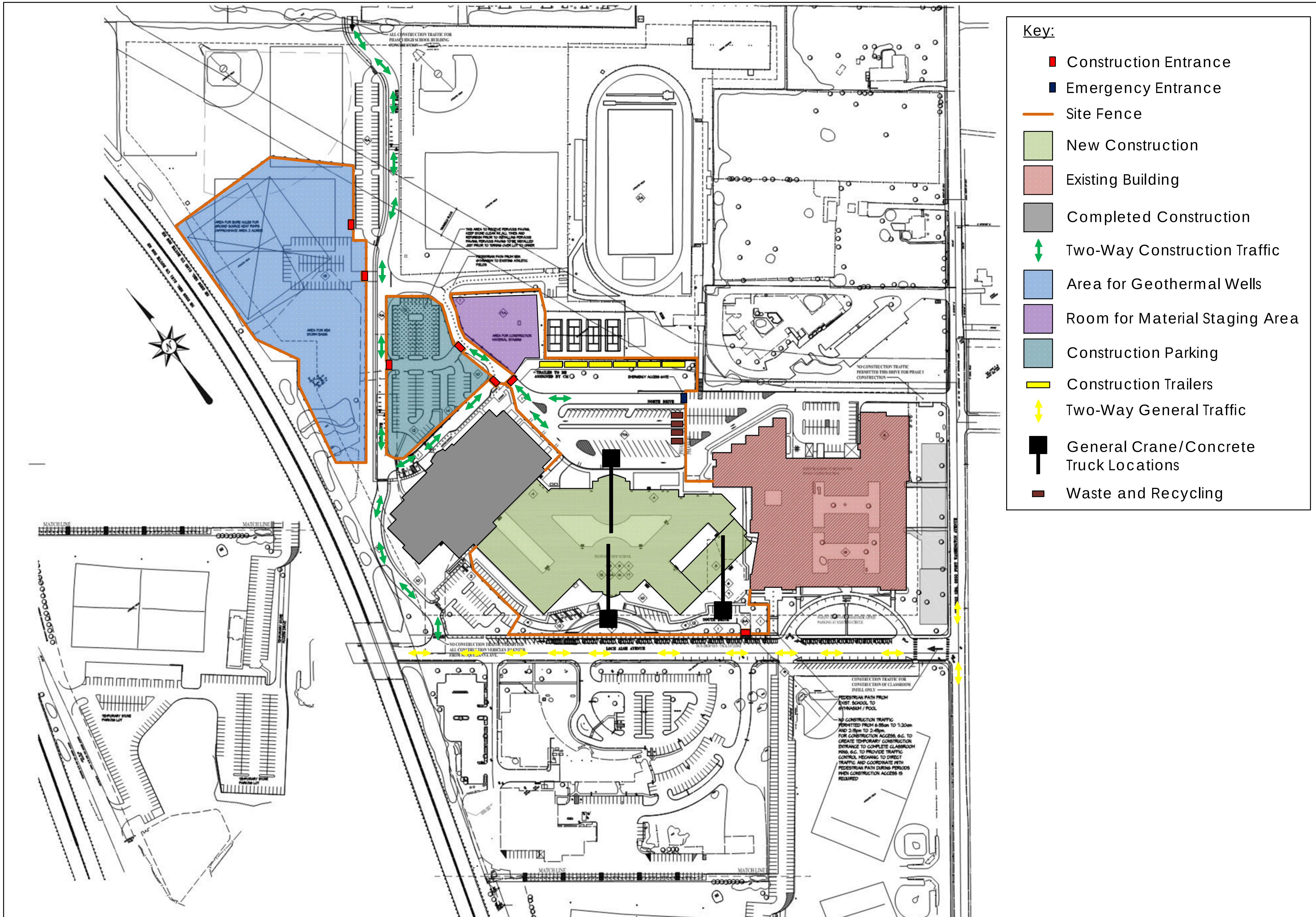
Stephen Kelchaw

Upper Dublin School District

Phase IA – IE Structural Plan
Upper Dublin High School Project

Site Layout Plan

C-01



Technical Assignment 2

Stephen Kelchaw

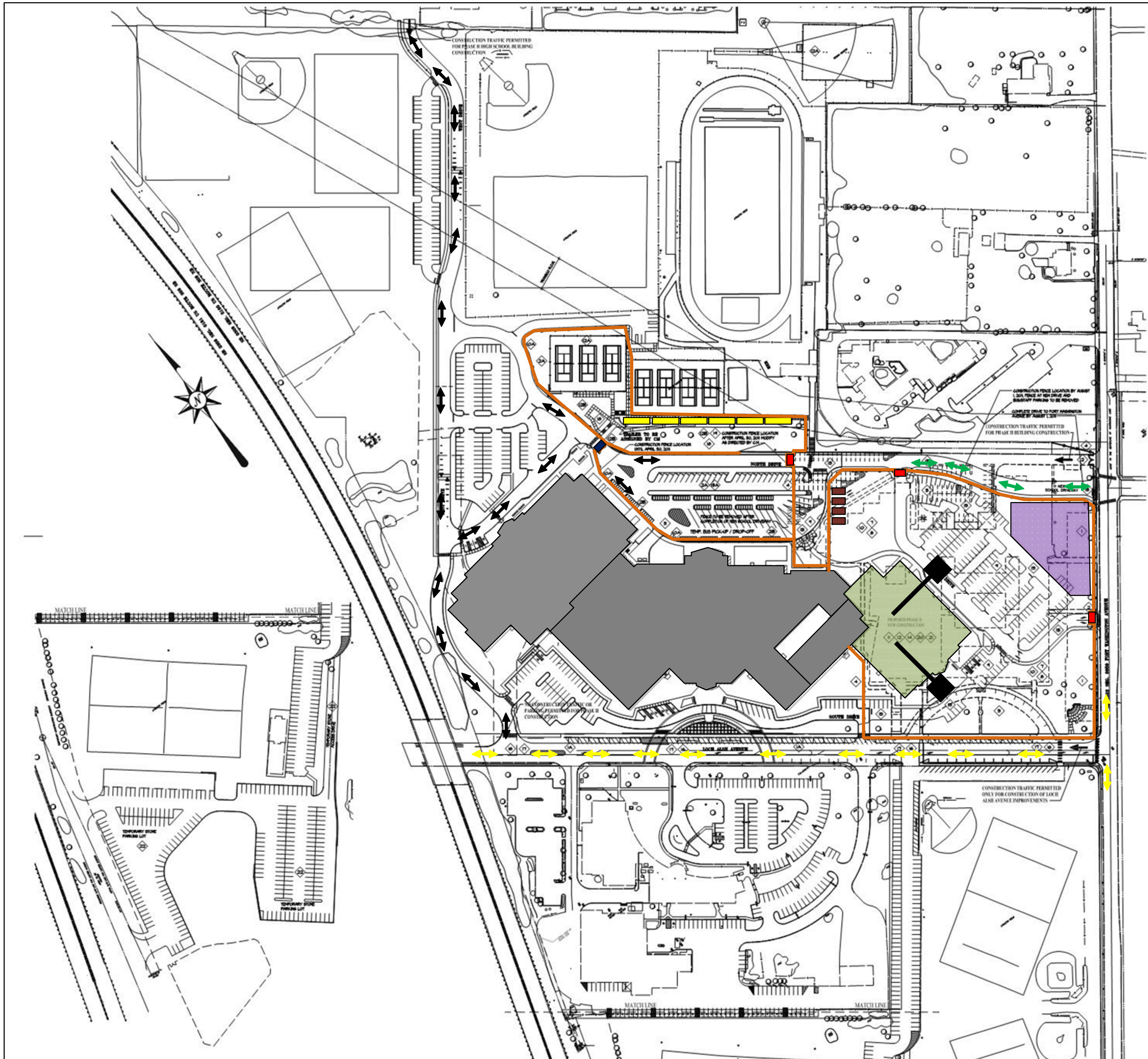
Upper Dublin School District

Phase IE – IH Structural Plan

Upper Dublin High School Project

Site Layout Plan

C-02



Key:

- Construction Entrance
- Construction/Public Entrance
- Site Fence
- New Construction
- Completed Construction
- Two-Way Construction Traffic
- Two-Way Construction/ General Traffic
- Room for Material Staging Area
- Construction Parking
- Construction Trailers
- Two-Way General Traffic
- General Crane/Concrete Truck Locations
- Waste and Recycling

Technical Assignment 2

Stephen Kelchaw

Upper Dublin School District

Phase II Structural Plan

Upper Dublin High School Project

Site Layout Plan

C-03

Appendix C

Detailed Structural Estimate

Detailed Structural Estimate											
Page #	Item Code	Description	Quantity	Unit	Unit Cost			Total			
					Material	Labor	Equipment	Material	Labor	Equipment	Total
Concrete											
45	03 11 13.40 0020	Wall Forms	90477.7	SQFT	$3.60	$11.65	$0.00	$325,719.72	$1,054,065.21	$0.00	$1,379,784.93
44	03 11 13.25 6550	Pier Forms	10752	SQFT	$1.37	$5.60	$0.00	$14,730.24	$60,211.20	$0.00	$74,941.44
59	03 21 10.60 0500	Footing Rebar	69.55	Tons	$1,475.00	$680.00	$0.00	$102,586.25	$47,294.00	$0.00	$149,880.25
60	03 22 05.50 0300	WWF Sheets W2.1 x 2.1	3,994	SQFT	$26.50	$23.00	$0.00	$105,833.58	$91,855.56	$0.00	$197,689.14
62	03 30 53.40 3935	Footing Concrete	1269.04	CY	$116.00	$65.00	$0.47	$147,208.64	$82,487.60	$596.45	$230,292.69
61	03 30 53.40 0920	Pier Concrete	199.12	CY	$455.00	$43.00	$1,068.00	$90,599.60	$8,562.16	$212,660.16	$311,821.92
63	03 30 53.40 4760	SOG Concrete	294793.3	SQFT	$1.35	$0.76	$0.01	$397,970.93	$224,042.89	$2,947.93	$624,961.75
62	03 30 53.40 3250	SOD Concrete	104579	SQFT	$0.87	$0.73	$0.27	$90,983.73	$76,342.67	$28,236.33	$195,562.73
Steel Framing											
113	05 12 23.75 0300	W8X10	800	LNFT	$16.50	$4.06	$2.90	$13,200.00	$3,248.00	$2,320.00	$18,768.00
113	05 12 23.75 0320	W8x15	1950	LNFT	$25.00	$4.06	$2.90	$48,750.00	$7,917.00	$5,655.00	$62,322.00
113	05 12 23.75 0350	W8x21	65	LNFT	$34.50	$4.06	$2.90	$2,242.50	$263.90	$188.50	$2,694.90
113	05 12 23.75 0360	W8x24	35	LNFT	$39.50	$4.43	$3.17	$1,382.50	$155.05	$110.95	$1,648.50
113	05 12 23.75 0500	W8x31	6000	LNFT	$51.00	$4.43	$3.17	$306,000.00	$26,580.00	$19,020.00	$351,600.00
113	05 12 23.75 1100	W12x16	620.15	LNFT	$26.50	$2.77	$1.98	$16,433.98	$1,717.82	$1,227.90	$19,379.69
113	05 12 23.75 1300	W12x22	1033.4	LNFT	$36.50	$2.77	$1.98	$37,719.10	$2,862.52	$2,046.13	$42,627.75
113	05 12 23.75 1500	W12x26	2231.7	LNFT	$43.00	$2.77	$1.98	$95,963.10	$6,181.81	$4,418.77	$106,563.68
113	05 12 23.75 1900	W14x22	4792.5	LNFT	$43.00	$2.46	$1.76	$206,077.50	$11,789.55	$8,434.80	$226,301.85
113	05 12 23.75 2700	W16x26	8232.85	LNFT	$43.00	$2.44	$1.74	$354,012.55	$20,088.15	$14,325.16	$388,425.86
113	05 12 23.75 2900	W16x31	3995	LNFT	$51.00	$2.71	$1.93	$203,745.00	$10,826.45	$7,710.35	$222,281.80
114	05 12 23.75 3300	W18x35	8213.85	LNFT	$58.00	$3.67	$1.95	$476,403.30	$30,144.83	$16,017.01	$522,565.14
114	05 12 23.75 3500	W18x40	10615.65	LNFT	$66.00	$3.67	$1.95	$700,632.90	$38,959.44	$20,700.52	$760,292.85
114	05 12 23.75 3520	W18x46	765.45	LNFT	$76.00	$3.67	$1.95	$58,174.20	$2,809.20	$1,492.63	$62,476.03
114	05 12 23.75 4100	W21x44	3541.8	LNFT	$72.50	$3.32	$1.76	$256,780.50	$11,758.78	$6,233.57	$274,772.84
114	05 12 23.75 4300	W21x50	780.85	LNFT	$82.50	$3.32	$1.76	$64,420.13	$2,592.42	$1,374.30	$68,386.84
114	05 12 23.75 4700	W21x68	725.1	LNFT	$112.00	$3.41	$1.81	$81,211.20	$2,472.59	$1,312.43	$84,996.22
114	05 12 23.75 4900	W24x55	8000	LNFT	$91.00	$3.18	$1.69	$728,000.00	$25,440.00	$13,520.00	$766,960.00
114	05 12 23.75 5100	W24x62	1075	LNFT	$102.00	$3.18	$1.69	$109,650.00	$3,418.50	$1,816.75	$114,885.25
114	05 12 23.75 5500	W24x76	200	LNFT	$125.00	$3.18	$1.69	$25,000.00	$636.00	$338.00	$25,974.00
114	05 12 23.75 5740	W24x104	175	LNFT	$172.00	$3.36	$1.79	$30,100.00	$588.00	$313.25	$31,001.25
114	05 12 23.75 5800	W27x84	8050	LNFT	$139.00	$2.96	$1.58	$1,118,950.00	$23,828.00	$12,719.00	$1,155,497.00
114	05 12 23.75 5900	W27x94	443.35	LNFT	$155.00	$2.96	$1.58	$68,719.25	$1,312.32	$700.49	$70,732.06
114	05 12 23.75 6100	W30x90	431.65	LNFT	$163.00	$2.94	$1.56	$70,358.95	$1,269.05	$673.37	$72,301.38
114	05 12 23.75 6100	W30X99	183.35	LNFT	$163.00	$2.94	$1.56	$29,886.05	$539.05	$286.03	$30,711.13
Steel Columns											
110	05 12 23.17 4550	HSS6x6x.3125	1220	LNFT	$33.50	$2.90	$1.56	$40,870.00	$3,538.00	$1,903.20	$46,311.20
110	05 12 23.17 4550	HSS8x8x.250	14940	LNFT	$52.00	$3.24	$2.36	$776,880.00	$48,405.60	$35,258.40	$860,544.00
110	05 12 23.17 4550	HSS8x8x.375	1426.5	LNFT	$52.00	$3.24	$2.36	$74,178.00	$4,621.86	$3,366.54	$82,166.40
110	05 12 23.17 4550	HSS8x8x.500	1674	LNFT	$52.00	$3.24	$2.36	$87,048.00	$5,423.76	$3,950.64	$96,422.40

110	05 12 23.17 4550	HSS8x8x.3125	1572	LNFT	$52.00	$3.24	$2.36	$81,744.00	$5,093.28	$3,709.92	$90,547.20
110	05 12 23.17 4550	HSS12x8x.625	220	LNFT	$72.60	$5.26	$3.12	$15,972.00	$1,157.20	$686.40	$17,815.60
Steel K-Series Joists											
121	05 21 19.10 0140	10K1	480	LNFT	$5.10	$2.94	$1.67	$2,448.00	$1,411.20	$801.60	$4,660.80
121	05 21 19.10 0160	12K1	480	LNFT	$5.80	$2.35	$1.34	$2,784.00	$1,128.00	$643.20	$4,555.20
121	05 21 19.10 0240	18K4	112	LNFT	$7.85	$1.76	$1.00	$879.20	$197.12	$112.00	$1,188.32
121	05 21 19.10 0500	20K4	5268	LNFT	$8.20	$1.76	$1.00	$43,197.60	$9,271.68	$5,268.00	$57,737.28
121	05 21 19.10 0540	22K4	1932	LNFT	$8.80	$1.76	$1.00	$17,001.60	$3,400.32	$1,932.00	$22,333.92
121	05 21 19.10 0540	22K5	1408	LNFT	$9.00	$1.76	$1.00	$12,672.00	$2,478.08	$1,408.00	$16,558.08
121	05 21 19.10 0580	24K6	4680	LNFT	$9.70	$1.60	$0.91	$45,396.00	$7,488.00	$4,258.80	$57,142.80
121	05 21 19.10 0620	26K6	136	LNFT	$10.60	$1.60	$0.91	$1,441.60	$217.60	$123.76	$1,782.96
121	05 21 19.10 0660	28K8	3404	LNFT	$12.70	$1.47	$0.84	$43,230.80	$5,003.88	$2,859.36	$51,094.04
Steel LH/DLH Joists											
121	05 31 16.50 2500	44LH16	3761.32	LNFT	$47.50	$1.60	$0.91	$178,662.70	$6,018.11	$3,422.80	$188,103.61
120	05 21 16.50 2220	18LH08	2299.05	LNFT	$21.50	$2.52	$1.44	$49,429.58	$5,793.61	$3,310.63	$58,533.81
Metal Deck											
123	05 31 13.50 3250	Metal Deck	307780	SQFT	$2.83	$0.38	$0.04	$871,017.40	$116,956.40	$12,311.20	$1,000,285.00
124	05 31 23.50 2650	Metal Deck	102552	SQFT	$2.43	$0.35	$0.03	$249,201.36	$35,893.20	$3,076.56	$288,171.12
Sub-Total								$8,973,499.22	$2,145,756.60	$475,798.78	$11,595,054.61
Design Contingency							1.50%	$134,602.49	$32,186.35	$7,136.98	$173,925.82
Escalation Contingency							3.50%	$314,072.47	$75,101.48	$16,652.96	$405,826.91
Insurance							3.00%	$269,204.98	$64,372.70	$14,273.96	$347,851.64
Bonds							2.00%	$179,469.98	$42,915.13	$9,515.98	$231,901.09
Overhead & Profit							10.00%	$897,349.92	$214,575.66	$47,579.88	$1,159,505.46
Total								$10,768,199.07	$2,574,907.92	$570,958.54	$13,914,065.53