

Science and Technology Center

Coppin State University
Baltimore, MD

Technical Report II



Nicholas Zitterbart
Construction Option
Faculty Advisor: Dr. Messner

Submission Date: 10/12/2012

EXECUTIVE SUMMARY

This report provides a thorough analysis of a detailed project schedule as well as a detailed structural estimate of the Science and Technology Center at Coppin State University. The \$76.2M GMP contract for Barton Malow includes two bid packages and is projected to be delivered over a two year period, with a substantial completion date in November 2014.

The detailed schedule shows a more in depth look at durations and sequencing of work. This details the scope of work for site work and the progression of the foundations. Moreover, the schedule shows the sequencing of the structural phase and the building enclosure and reveals a very logical method of operation. Overall, the total duration of this project is 24 months.

As part of this technical report, a detailed cost analysis of the building's structural system was performed. This expanded upon the Square Foot and Assemblies Estimate of Technical Report I. The building is comprised of structural cast-in-place concrete from the Foundation to Level 4. The Penthouse Level is then made up of structural steel framing with a metal roof deck. The calculated values for the structural concrete and steel were \$3,908,307 and \$387,875, respectively. This is in comparison to the actual contract costs for concrete and steel of \$7,500,000 and \$750,000, respectively. These values are believed to be reasonable through the method of estimation and quantity takeoffs.

Much like the detailed estimate, a general conditions estimate was also carried out to show the costs incurred from the project. The total cost was estimated to be \$3,244,208, or approximately 4.3% of the total GMP contract value. In addition, an evaluation of Building Information Modeling (BIM) Use was performed to reveal the benefits of BIM capabilities on this project. It was found that BIM was only used for 3D Coordination and a Record Model. Some improvements proposed include expanding the BIM Execution Plan to include 4D Modeling and Cost Estimating. Finally, constructability challenges were addressed with appropriate solutions. These include challenges of unforeseen conditions, a skewed building footprint, and site constraints/location.

TABLE OF CONTENTS

Executive Summaryi

Table of Contents ii

Detailed Project Schedule 1

Detailed Structural System Estimate..... 5

General Conditions Estimate 8

Building Information Modeling Use..... 10

Constructability Challenges..... 13

Appendix A – Detailed Project Schedule..... 16

Appendix B-1 – Detailed Structural System Estimate Takeoffs – Summary 22

Appendix B-2 – Detailed Structural System Estimate Takeoffs – Concrete Columns 28

Appendix C – General Conditions Estimate 32

Appendix D – BIM Use Evaluation 34

Appendix E – References 37

DETAILED PROJECT SCHEDULE

The project summary schedule included in Technical Report I (Published 9/21/2012 – <http://www.engr.psu.edu/ae/thesis/portfolios/2013/naz5020>) reflected the major milestones and overall durations of the critical activities for the project. A detailed project schedule has now been developed to go further into each element of the schedule. This schedule is broken down into four main headings, including design, construction, closeout and closeout for final completion.

Furthermore, the construction phase is detailed with site work, structure, site utilities & retaining walls, penthouse enclosure & roofing, perimeter enclosure, site finishes, mechanical/electrical rooms, vertical construction, rough-in, and finishes. These categories yield better details and durations in which case further cost analyses can be taken.

As a brief overview, Table 1 below shows the major dates and durations of the phases in the detailed project schedule. This gives a better understanding of the project schedule in its entirety.

***See Appendix A for the Detailed Project Schedule**

Table 1 – Project Milestone and Duration Overview

Activity	Duration (d)	Start	Finish
Design	524	5/31/2011	5/31/2013
Construction	503	8/13/2012	7/16/2014
NTP – BP1	0	8/13/2012	8/13/2012
Site Work	130	8/13/2012	2/8/2013
Structure	192	12/13/2012	9/6/2013
Site Utilities & Retaining Walls	187	11/8/2012	7/26/2013
Penthouse Enclosure & Roofing	107	8/15/2013	1/10/2014
Perimeter Enclosure	123	7/30/2013	1/16/2014
Site Finishes	338	4/1/2013	7/16/2014
Mech/Elec Rooms & Shafts	193	8/8/2013	5/5/2014
Vertical Construction	251	7/18/2013	6/19/2014
Rough-In	257	6/26/2013	6/19/2014
Finishes	211	8/27/2013	6/17/2014
Conditioned Air Available	0	2/26/2014	2/26/2014
Closeout	143	2/27/2014	9/15/2014
Subcontractor Substantial Completion	0	9/8/2014	9/8/2014
Closeout for Final Completion	76	8/14/2014	11/17/2014
Barton Malow Substantial Completion	0	11/17/2014	11/17/2014

Durations & Start and Finish Dates are taken from detailed project schedule, See Appendix A.

| DESIGN |

The Science and Technology Center began the design process at the end of May 2011 with a goal of starting construction in August 2012 and completing by August 2014. It took just under a year to issue the 100% BP 1 Construction Documents for bidding, which then could be contracted out to complete the project. Barton Malow Company, based in Southfield, MI, won Bid Package 1 and eventually Bid Package 2 for the work to be completed as the construction manager. Currently, the project completion date has been pushed back 3 months to November 2014 due to delays. Nonetheless, Barton Malow began initial site work of demolition on August 15, 2012.

| CONSTRUCTION |

Initial Site Work

After Barton Malow was issued the notice to proceed for Bid Package 1 (8/13/2012), the contractors mobilized to site and broke ground on the new Science and Technology Center. As stated above, the first step in that process was to demolish the approximate 210 row homes at the existing location. At the same time, sanitary improvements were occurring to relocate a major sanitary line through the project site. As the demolition clears the new project site, sheeting, shoring, and excavation can also begin. The excavation will follow behind the demolition crews and prepare the site for the necessary foundations to be installed. These foundations include a rammed aggregate pier system on the south end of the building footprint. This system greatly improves the soil bearing capacity of the existing clay in that location. Once, the site is cleared and the aggregate piers are installed, the rest of the foundation structure can begin construction.

Structure

In comparison to the project summary schedule, this detailed schedule gives a better description of the phasing with the structure. The substructure begins with placing the necessary footings and foundations. The north footings and foundation walls are the first to be placed. The south footings and foundation walls (on top of the rammed aggregate piers) will then lag behind by about 25 days. Each of these phases will take approximately 58 days to complete. Once these are complete, the superstructure construction begins with the lower level columns and slabs. Again, the sequencing follows a north to south flow. Each floor averages about 20 days for the concrete columns and elevated slabs to be formed and poured. This procedure continues until the penthouse level is reached, where structural steel and metal deck will be erected. After the structure is in place, the slab on grade in both the north and south can be poured. This will complete the major structural concrete and steel elements on site.

Site Utilities & Retaining Walls

As working occurs inside the building footprint, the site utilities and retaining walls are installed on the exterior of the building footprint. This part of the schedule lasts 187 days with site utilities having the longest duration. The retaining walls are mainly located along the west side of the perimeter, ranging from 6 feet to 22 feet in height. These will be placed in the spring 2013 and is followed by backfill.

Penthouse Enclosure and Roofing

Proceeding with construction inside the building, the next step includes installing the enclosure and roof on the structural steel. There are three different roof elevations spanning from the north to the south, as well as a roof for the greenhouse on the south end. The green house will be an all glass enclosure that can be seen from the ground once constructed. This phase of construction takes just over 100 days to complete.

Perimeter Enclosure

With the roof structure and penthouse level complete, work progresses to finish the rest of the enclosure around the main floors. The phasing for this is broken up mainly between the west and east working at the same time. The brick veneer is built up, and the windows are installed afterwards. At this time, the large curtain wall on the north end will also be constructed. This serves as a great architectural focal point for the building and is a major part of the design. With the exterior shell complete, the building is now weatherproof.

Site Finishes

A major part of the site work includes the restoration to North Avenue on the northeast corner of the site. Alongside this work, the quad, east and west site finishes occur. There will also be a new parking lot constructed on the south end of the site just off of North Warwick Avenue. All of these finishes are planned to be completed in 15 months.

Mechanical/Electrical Rooms & Shafts

This 9 month process involves the installation of the major equipment for MEP and Fire Protection Systems. This includes boilers, fire pumps, all AHU systems, Chillers, Cooling Towers, Exhaust Fans, Electrical units, and all rooms that correspond to these equipment.

Vertical Construction

The elevators can be installed over a 3 month period, where the two stair towers will be erected as the floors proceed up and take roughly a year of duration.

Rough-in

Once the structure is completed, the intensive process of roughing in all systems begins. This will take up about a year of time on the schedule and involves all MEP systems for all floors. When looking at the schedule in detail, Level 1 North is detailed with a typical rough-in procedure and all necessary activities. For simplification, these activities were left out of the other line items to prevent redundancy. The main purpose of the rough-in part of the schedule is to show the sequencing of the work as it flows from north to south, floor 1 to floor 4. As seen in the schedule, most of the work overlaps and is performed at nearly the same time.

Finishes

As the rough-in process occurs and the floors are being completed, the finishes can be installed to make a complete product. This process also follows from floor 1 to floor 4 and then completes with coming down the north tower area. Activities in this part of the schedule include, but are not limited to, pulling wire, hanging drywall, paint, drop ceiling, and carpet. As with the rough-ins, only Level 1 North was detailed with each finish activity. This is typical to each line item on the schedule and provides a more simplified schedule to see the work flow.

| CLOSEOUT |

As the building comes to completion, each floor proceeds through the typical punch list and can be closed out with the subcontractors. All system testing occurs during this period and the building inspection is completed. At this time, the subcontractors can issue substantial completion and final commissioning occurs. The owner, and CSU, can now move into the facility and make use of the building. There is a 35 day LEED flush-out period and then the building can be officially turned over (what is called Barton Malow substantial completion) in November 2014.

DETAILED STRUCTURAL SYSTEM ESTIMATE

| INTRODUCTION |

A quantity takeoff of the detailed structural system was performed in order to reach a final estimate for the project. The majority of the building is made up of cast-in-place structural concrete. The footings, foundations and site work were all accounted for as it was difficult to replicate a single area of the project. Floor 1 was also accounted for by itself due to the larger beams, columns and reinforcing steel found throughout. To calculate the rest of the building, takeoffs for Floor 3 were calculated and then used for Floors 2, 4 and the Penthouse due to the average quantities in Floor 3. Executing the takeoffs in this manner reflected a typical bay procedure and provided an efficient means to finding the total quantities of the remaining three floors. This completed the structural concrete takeoffs. Then, the structural steel framing and roof deck for the penthouse was calculated. Costs from RSMeans CostWorks could then be combined with the quantities to find an overall cost of the structural system. Autodesk Quantity Takeoff data was extracted into the summary sheet seen in Appendix B-1. These quantities were taken directly from the structural drawings. The major sections of the estimate are discussed below.

***See Appendix B-1 for the Detailed Structural System Estimate**

| FOUNDATION |

This part of the estimate included a number of elements that were accounted for both in concrete and reinforcing steel. There are 11 types of spread footings made up of 3000 psi normal weight concrete. The Grade 60 rebar runs full length in both directions, sometimes on both the top and bottom. Also, there are 6 different types of wall footings that have 1' thick foundation walls resting upon them.

| RETAINING WALL |

Four different types of retaining walls are found on this project and are located on the west side of the foot print. They range from 6' in height to 22' in height and are reinforced with many different sizes of rebar. Each wall type has a different footer size to accommodate the height of wall and resist the lateral earth pressures.

| FORMWORK |

Due to the large scale of structural concrete on this project, much concern is given to the formwork and how it will be utilized on site. The foundations and footings are typical job built formwork that has 4 uses each. The majority of this part of the estimate is due to the elevated slabs and the formwork necessary to contain the 1' thick floor slabs. Each floor will be supported by reshores until the concrete has fully cured, however the formwork will be taken down and used on the other floors for efficiency of material. These prefabricated panels allow for quick assembly over the 28,000SF floor area.

| CONCRETE COLUMNS AND BEAMS |

The structural elements that support the elevated floor slabs include the columns and beams. These quantities can be seen on the takeoffs in Appendix B-2. The typical beam size was 16"x24" and the typical columns size was 26"x16". Due to the intensive amount of rebar and types of columns, a separate take off summary sheet was performed to better show these calculations. These beams and columns are made up of 4000psi normal weight concrete and various rebar sizes/ties.

***See Appendix B-2 for the Detailed Concrete Column Estimate**

| SLAB ON GRADE |

A good portion of the final estimate is comprised of the concrete for the slab on grade. This is a 5" thick, 3000 psi normal weight concrete and is reinforced with 6x6 welded wire fabric. The total for this part of the project is around \$1.37M, as the majority floor area of the lower level is a slab on grade.

| STRUCTURAL STEEL |

The other element of the structure includes structural steel framing for the penthouse roof, stair towers and miscellaneous floor supports. The various sizes can be seen in the takeoff in Appendix B-1. The most common structural steel element includes a W14x61 column used in the roof frames at the penthouse level. The metal roof deck is made up 1-1/2", 20 GA galvanized deck and covers about 15,000SF.

| COST SUMMARIES AND ANALYSIS |

Table 2 – Detailed Structural System Cost Estimate Totals

System	Estimated Cost	Actual Cost
Structural Concrete	\$ 3,908,307	\$ 7,500,000
Structural Steel	\$ 387,875	\$ 750,000

Costs taken from Detailed Structural System Estimate, See Appendix B-1

When referencing Table 2, shown above, a discrepancy can be seen between the actual cost and estimated costs. After performing these detailed takeoffs there are a number of reasons that could allow this estimate to fall short of the actual contract value.

The method of taking off quantities with a “typical-bay” procedure allows for error in detail with specific material and quantity to a certain floor. For example, Floor 3 was used as an average of materials for the estimate of materials in Floors 2, 4 and the Penthouse Level. There are areas of thickened slabs that differ from floor to floor. In the same manner, beam sizes and columns also change as you proceed upwards in the building. The load cases change (get smaller with increase in height) and therefore rebar and concrete quantities will change. A column in the penthouse level has smaller rebar than one at Level 1. In addition, the contract value for concrete includes all concrete on site, and site work involving concrete was excluded from this estimate. With all of this in mind, this concrete estimate is believed to be reasonable using the takeoff method provided.

In terms of the structural steel, the “typical-bay” procedure also could have affected the outcome of the estimate. The second floor has an area to the southeast corner where additional structural steel is used. The steel package is relatively small in comparison to the concrete package, so an assumption like this could have a large effect on the estimate total. Steel accessories like anchor bolts, plates, and embeds could also contribute to the short fall with respect to the steel estimate. Another factor includes the stair tower stringers and bracing which were not included in the estimate for a typical bay. This could make up some of the deficit in costs and bring the estimate closer to the actual value. These costs are reasonable under the assumptions made during quantity takeoffs and is believed to be accurate within those limits.

GENERAL CONDITIONS ESTIMATE

| SUMMARY |

A General Conditions estimate was performed with data from the RSMeans CostWorks database. The summary cost of all the categories is \$3,244,208, as seen in Appendix C. This includes costs incurred from Project Management, Field Office, Insurance, Safety, Field Operations, Testing & Inspections and Waste Management.

The Project Management costs include all Barton Malow employees associated with the project. These roles were taken directly from the staffing plan as shown in Technical Report I (Published 9/21/2012 – <http://www.engr.psu.edu/ae/thesis/portfolios/2013/naz5020>). Each role was assumed to fulfill the entire duration of the project, or 24 months. Some of the cost information was slightly inflated to adjust for different roles within the project team. This part of the estimate also assumes that each member will work 5 days a week for the whole duration. The project managers, superintendents, and engineers will be working on site in the temporary office trailer whereas the field accountant will be working out of the regional office.

Field Office includes all costs incurred from the office trailers on site and anything associated with them. This takes into account all trailer expenses, telephone/electrical services, and office supplies and equipment. These will also be assumed to last the duration of the job, or 24 months.

Insurance is also a part of the General Conditions estimate. This involves builder's risk, liability and performance bond. These items are based off of the job as a total percentage of the contract (\$76.2M). See Appendix C for the details of these costs.

Another portion of this estimate consists of field operations, which includes items like temporary toilets, signage, and equipment rental. Depending on the phase of the project there could be more equipment or small tools necessary. The assumptions made here are for an average of the project costs.

The last item on the estimate is waste management and the dumpsters that will be on site. Due to the large demolition necessary, these dumpsters will be thoroughly used and it is mandatory for weekly pulls. During the demolition phase there may be more dumpsters on site, but it was chosen to have 3 on the general conditions as an average for total project duration.

Table 3 on the next page shows the cost summaries of each category and the percentage they represent of the entire estimate. Also on the next page, Figure 1 shows a graphical representation of those same percentages.

***See Appendix C for the General Conditions Estimate**

Table 3 - General Conditions Estimate Summary

Category	Project Cost	Percentage of GC
Project Management Team	\$ 2,262,520.00	70%
Field Office	\$ 52,983.00	2%
Insurance	\$ 629,412.00	19%
Safety	\$ 2,600.00	0%
Field Operations	\$ 40,445.00	1%
Testing & Inspections	\$ 19,440.00	1%
Waste Management	\$ 236,808.00	7%
Total	\$ 3,244,208	100%

Cost Information Taken from GC Estimate, See Appendix C

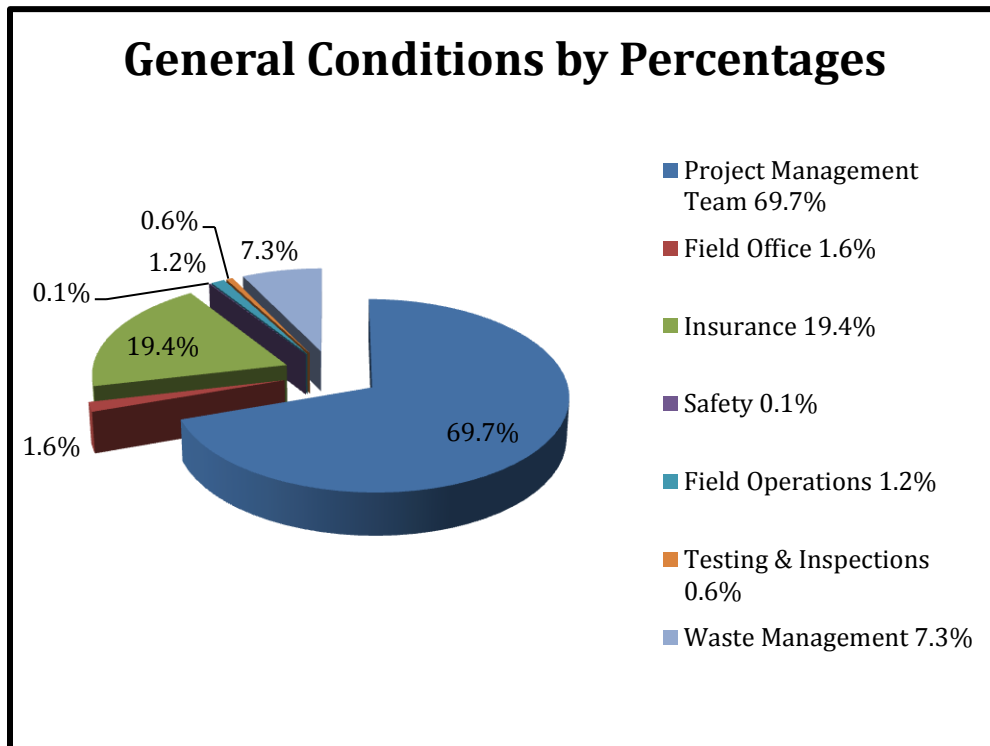


Figure 1 - General Conditions by Percentage

BUILDING INFORMATION MODELING USE

| BIM USE ON THE PROJECT |

The project team for Barton Malow on the Science and Technology Center plans to utilize Building Information Modeling (BIM) for 3D coordination purposes and a Record Model (See BIM Use, Appendix D). The final coordination model is composed of the base structural model and the base architectural model. Each subcontractor was required to submit models in order for other trades to be integrated. Barton Malow will lead the BIM Coordination Process and is the final authority on model issues. There will be weekly coordination meetings that each coordination participant is required to attend to attempt to generate a clash-free model of all systems. Required participants from each trade include the following:

- Site Utilities
- Cast-in Place Concrete
- Masonry
- Structural Steel
- Misc Metals
- Metal Wall Panels
- Windows, Entrances, Curtain Walls
- Skylights
- CFMF, Interior Partitions and Ceilings
- General Trades (Limited)
- Greenhouse
- Mechanical Plumbing & Piping/HVAC Systems and Controls
- Fire Protection
- Electrical and Special Systems

The weekly coordination meetings involve reviewing clash reports and any information necessary to resolve issues. Each subcontractor is responsible for identifying submittals required for accurate detailing of their respective coordination model. The main purpose is to resolve clashes that cannot otherwise be resolved internally for each subcontractor. Through these meetings, a final coordination model can be presented to the owner for approval. Once this is reached, it is each participant's responsibility to keep the model updated throughout the construction process.

Co-location was originally specified to be utilized on this project, however as an option of value engineering it was decided to forgo. This will be touched on later in the critical evaluation section.

Figure 2, on the following page, outlines usages for BIM and the phases of the design and construction process that it can be beneficial. By referencing these abilities, an owner (or A/E, Contractor, etc.) can outline its goals and the end product for the project. The boxes in red show the BIM uses on the Science and Technology Center at Coppin State. It can be seen that there are many

more uses for BIM that can benefit not only the owner, but each member of the process. See Appendix D for other BIM references including a BIM Use Checklist and a Level 1 Process Map.

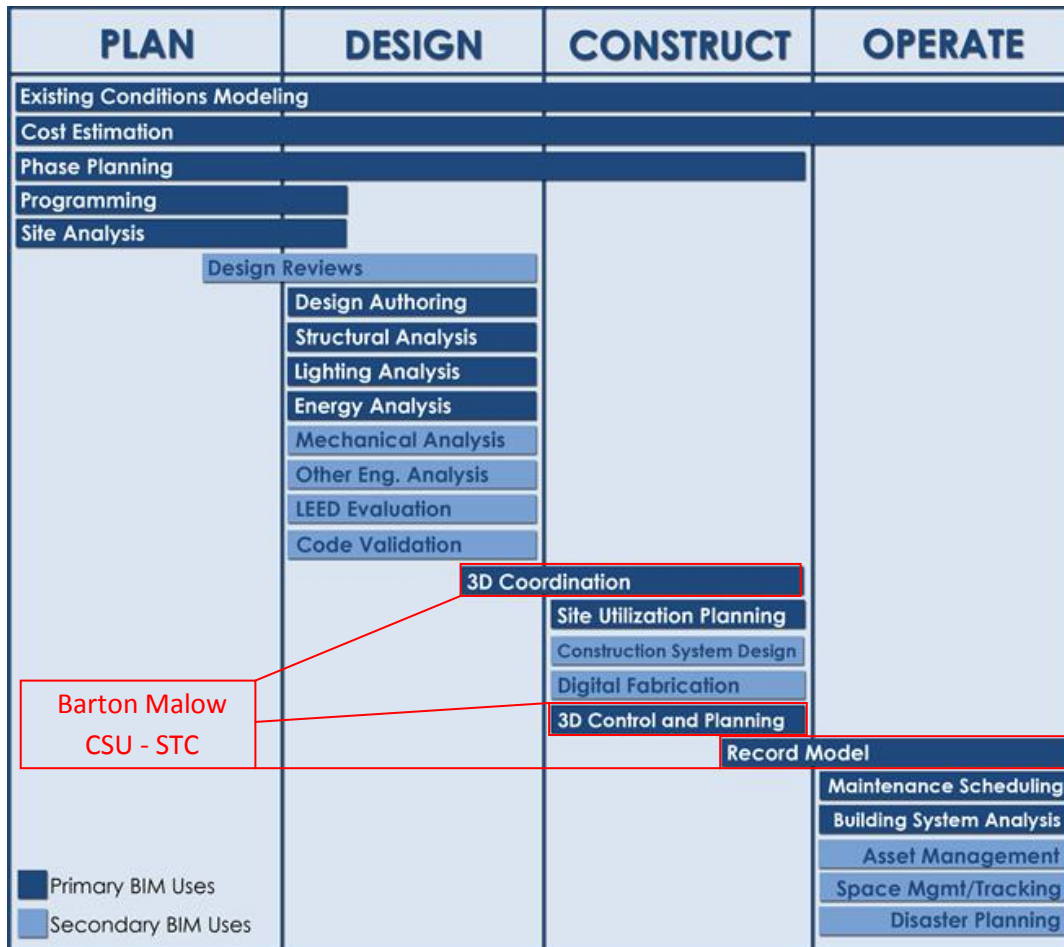


Image Courtesy of <http://bim.psu.edu/Uses/default.aspx>

Figure 2 - BIM Uses

*See Appendix D for BIM Use Checklist and Level 1 Process Map

| CRITICAL EVALUATION |

In comparison to other projects employing BIM, the Science and Technology Center Project underutilizes the capabilities of BIM. By only using the models for 3D Coordination and a Record Model, the project team is omitting many benefits to improving the process. For example, 4D Modeling has the ability to show the construction sequence and space requirements on the project site. By incorporating the schedule it also serves as a marketing technique to better show what will happen on site and at what time. Another example is the cost estimation capabilities. Much like the detailed estimate showed earlier in this report, using BIM can streamline this process and quantify materials much quicker and more efficiently than doing hand calculations.

The process that Barton Malow is choosing has been instituted in a way that will benefit the owner for a record model as well as coordination during construction. By having all subcontractors in weekly coordination meetings this allows for a working model that can accurately depict the site project conditions. The clash detections on the coordinated model can provide real-world solutions on a digital plan, thus cutting down on lost installation time in the field.

Co-location allows for a full collaborative effort with the best clash prevention possible on site. This requires all detailers to be on site for the entire duration of the coordination process. This gives full access to the working models and real-time changes without waiting on the weekly meetings. This would have been truly beneficial if it was kept in the design coordination process for this project.

BIM is being implemented correctly on the Science and Technology Center. However, there is always room to improve on BIM, and this project should expand the 3D coordination that is currently in use and consider more options for the end user.

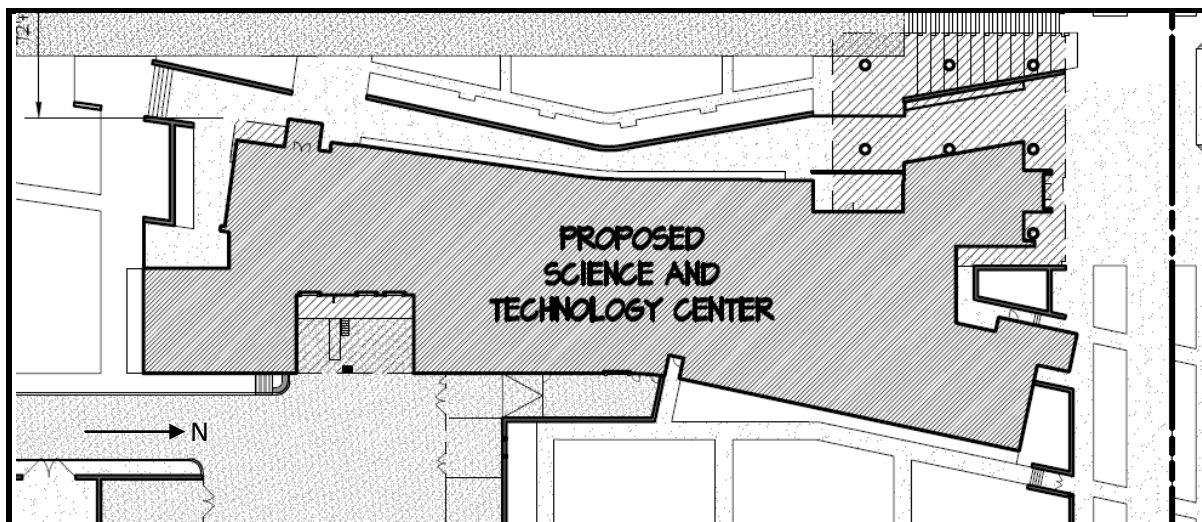
CONSTRUCTABILITY CHALLENGES

| SUMMARY |

There are three main constructability challenges that are foreseen in the future of this project. Although the project is just starting the construction process, these issues can be planned for accordingly to best prepare the project team for success. After discussion with the project team it was found that unforeseen conditions, a skewed building shape, and site constraints/location lend themselves to some of the early constructability challenges.

With it being the early stages of site construction, the main challenge that arises is unforeseen conditions. This site is unique in that it was once filled with row homes that were demolished for this construction to occur. Along with the relocation of a main sanitary line, there are many other elements that could come to be a surprise for the project team. Without knowing the full extent of the sub grade conditions, Barton Malow will have to proceed cautiously to prevent any major problems from occurring. The project has already hit a 3 month delay and the remaining schedule is crucial to remain on track. Some potential issues that could arise are differing soil conditions or possible underground site utilities that are not documented. If a gas, sanitary, or storm line were hit during excavation, a major delay could occur during the repair. It may be a simple issue, but unforeseen issues can cause major delays to a project.

A second challenge when looking at this project in the preliminary phase is the actual skewed shape of the building and its footprint. Referencing Figure 3 below, the East and West edges of the building are angled in respect the north and south faces. The lines follow inward until it meets about halfway. This can make for intricate layouts from foundations and footings to interior partitions and ceiling grids. Barton Malow will have to give much attention during layouts to make certain all elements align correctly.



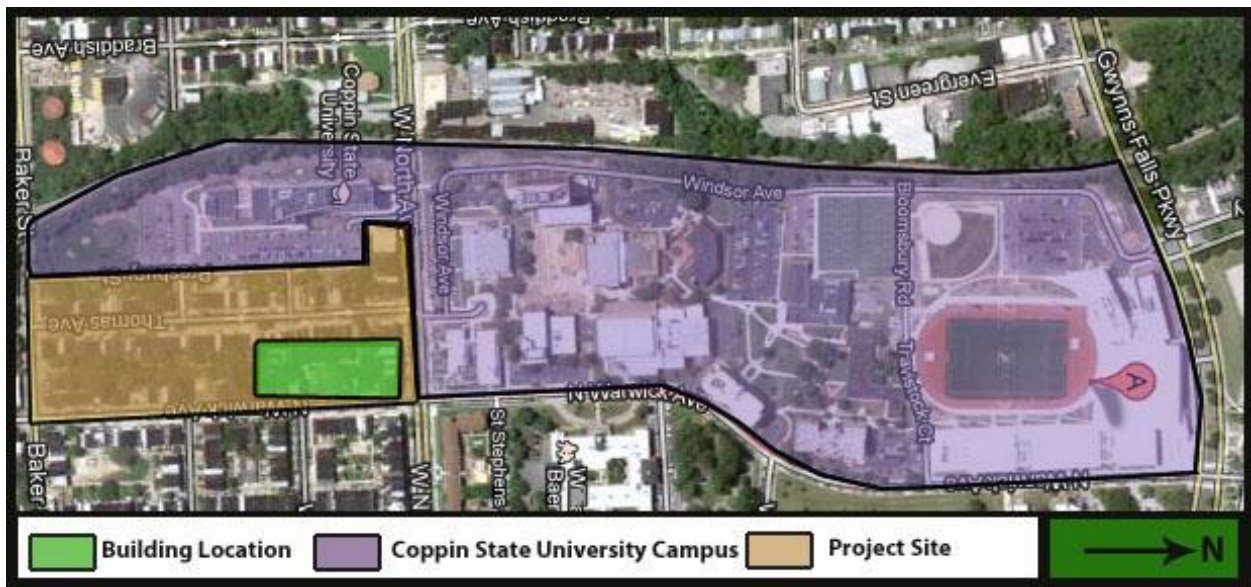
(Drawing C101)

Figure 3 - Building Footprint

The third challenge that has been foreseen by the project team is with site constraints and the actual site location itself. The project is located in the southeast corner of Coppin State’s campus (see Figure 5 below) and is surrounded by local neighborhoods to the east and south. Not only does this make it difficult to access the site with larger equipment, it also brings about a safety challenge for the local surroundings.

First the access to the site will have to be managed so that traffic flows in one direction off of West North Avenue and out onto North Warwick Avenue. This will consolidate traffic patterns and keep chaos to a minimum. Truck wash stations will also be used each and every time a piece of equipment leaves the site to maintain the cleanliness of the local roads.

Alongside the traffics concerns, there lies the challenge of keeping the public safe from the new construction as well as securing the site from outsiders. As always, safety is the first priority and a site fence must be maintained around the perimeter to keep unauthorized personnel from accessing the site where potential dangerous conditions can occur. At the same time, Barton Malow has to be mindful of the local surrounding neighborhoods. Theft or damage can always be a factor on new construction site with materials and equipment out in the open. To prevent this from occurring, Barton Malow will manage just-in-time deliveries to allow the team to put work in place right away. As an extra precaution, Barton Malow will also employ a nighttime security guard to watch over the project during non-working hours.



(Map Image Courtesy of Google Maps)

Figure 5 – Project Site Location

With these constructability challenges in mind, Barton Malow can be well prepared for the future construction process at Coppin State. There will inevitably be further challenges that arise when the construction begins and as the construction manager, Barton Malow will have to resolve those conflicts to the best of its ability.

APPENDIX A - DETAILED PROJECT SCHEDULE

ID	Task Name	Duration	Start	Finish	11																																																																																												
					Half 2, 2011					Half 1, 2012					Half 2, 2012					Half 1, 2013					Half 2, 2013					Half 1, 2014					Half 2, 2014					Half 1, 2015																																																									
					A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
1	Design	524 days	Tue 5/31/11	Fri 5/31/13																																																																																													
2	Schematic Design Submission	0 days	Tue 5/31/11	Tue 5/31/11																																																																																													
3	Design Development Approval	0 days	Wed 12/14/11	Wed 12/14/11																																																																																													
4	Issue 100% BP 1 Construction Documents	1 day	Fri 4/6/12	Fri 4/6/12																																																																																													
5	Issue 100% BP 2 Construction Documents	1 day	Fri 6/15/12	Fri 6/15/12																																																																																													
6	Procurement	210 days	Mon 8/13/12	Fri 5/31/13																																																																																													
7	Construction	503 days	Mon 8/13/12	Wed 7/16/14																																																																																													
8	Initial Sitework	130 days	Mon 8/13/12	Fri 2/8/13																																																																																													
9	BP 1 - NTP	0 days	Mon 8/13/12	Mon 8/13/12																																																																																													
10	Mobilize Critical Site Contractors	2 days	Mon 8/13/12	Tue 8/14/12																																																																																													
11	Buiding Demolition	78 days	Wed 8/15/12	Fri 11/30/12																																																																																													
12	Sanitary Sewer Relocation	40 days	Tue 9/11/12	Mon 11/5/12																																																																																													
13	Sheeting & Shoring	19 days	Thu 11/8/12	Tue 12/4/12																																																																																													
14	Excavation	23 days	Thu 11/8/12	Mon 12/10/12																																																																																													
15	South Geo Piers	18 days	Tue 12/11/12	Thu 1/3/13																																																																																													
16	Rough Grading	47 days	Thu 12/6/12	Fri 2/8/13																																																																																													
17	Structure	192 days	Thu 12/13/12	Fri 9/6/13																																																																																													
18	South LL - Footings & Foundation Walls	58 days	Fri 1/4/13	Tue 3/26/13																																																																																													
19	South Level 1 Conrete - FRP Columns & Slab	21 days	Thu 3/28/13	Thu 4/25/13																																																																																													
20	South Level 2 Conrete - FRP Columns & Slab	20 days	Fri 4/26/13	Thu 5/23/13																																																																																													
21	South Level 3 Conrete - FRP Columns & Slab	20 days	Fri 5/24/13	Thu 6/20/13																																																																																													
22	South Level 4 Conrete - FRP Columns & Slab	20 days	Fri 6/21/13	Thu 7/18/13																																																																																													
23	South Roof Concrete - FRP Columns & Slab	25 days	Fri 7/19/13	Thu 8/22/13																																																																																													
24	South Slab Cure & Reshore Removal	96 days	Fri 4/26/13	Fri 9/6/13																																																																																													
25	North LL Footings & Foundation Walls	56 days	Thu 12/13/12	Thu 2/28/13																																																																																													
26	North Level 1 - FRP SOG	58 days	Fri 1/25/13	Tue 4/16/13																																																																																													
27	North Level 1 Concrete - FRP Columns & Slabs	16 days	Fri 3/1/13	Fri 3/22/13																																																																																													
28	North Level 2 Concrete - FRP Columns & Slabs	15 days	Thu 4/18/13	Wed 5/8/13																																																																																													
29	North Level 3 Concrete - FRP Columns & Slabs	17 days	Thu 5/9/13	Fri 5/31/13																																																																																													
30	North Level 4 Concrete - FRP Columns & Slabs	14 days	Mon 6/3/13	Thu 6/20/13																																																																																													
31	North Roof Concrete - FRP Columns & Slab	22 days	Fri 6/21/13	Mon 7/22/13																																																																																													
32	North Slabe Cure & Reshore Removal	98 days	Sat 3/23/13	Tue 8/6/13																																																																																													
33	Penthouse Erect Steel & Deck	34 days	Mon 7/15/13	Thu 8/29/13																																																																																													
34	North & South SOG	45 days	Thu 6/6/13	Wed 8/7/13																																																																																													
35	Site Utilities & Retaining Walls	187 days	Thu 11/8/12	Fri 7/26/13																																																																																													
36	Site Utilities	139 days	Thu 11/8/12	Tue 5/21/13																																																																																													
37	Ductbanks	1 day	Fri 7/26/13	Fri 7/26/13																																																																																													
38	Retaining Walls	48 days	Fri 4/26/13	Tue 7/2/13																																																																																													
39	Exterior Backfill	57 days	Fri 4/26/13	Mon 7/15/13																																																																																													
40	Penthouse Enclosure & Roofing	107 days	Thu 8/15/13	Fri 1/10/14																																																																																													

Project: Detailed Proj. Schedule

Summary Task Milestone

ID	Task Name	Duration	Start	Finish	2011												2012												2013												2014												2015																																															
					Half 2, 2011			Half 1, 2012			Half 2, 2012			Half 1, 2013			Half 2, 2013			Half 1, 2014			Half 2, 2014			Half 1, 2015																																																																										
					A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J																																													
41	Enclosure & High Roof	40 days	Fri 8/30/13	Thu 10/24/13																																																																																																
42	North Low Roof Area	67 days	Fri 8/23/13	Mon 11/25/13																																																																																																
43	South Low Roof Area	58 days	Tue 9/3/13	Thu 11/21/13																																																																																																
44	Greenhouse Low Roofing	107 days	Thu 8/15/13	Fri 1/10/14																																																																																																
45	Perimeter Enclosure	123 days	Tue 7/30/13	Thu 1/16/14																																																																																																
46	Perimeter Studs & Sheathing	58 days	Tue 7/30/13	Thu 10/17/13																																																																																																
47	Exterior Brick Veneer	45 days	Tue 9/24/13	Mon 11/25/13																																																																																																
48	Exterior Windows & Curtain Walls	83 days	Tue 9/24/13	Thu 1/16/14																																																																																																
49	Perimter Metal Roofing at Penthouse	50 days	Mon 11/4/13	Fri 1/10/14																																																																																																
50	Site Finishes	338 days	Mon 4/1/13	Wed 7/16/14																																																																																																
51	North Avenue - Start Restoration	0 days	Mon 4/1/13	Mon 4/1/13																																																																																																
52	North Avenure Improvements	142 days	Mon 4/1/13	Tue 10/15/13																																																																																																
53	North Avenue - Complete Restoration	0 days	Tue 10/15/13	Tue 10/15/13																																																																																																
54	Quad and West Site Finishes	157 days	Fri 10/25/13	Mon 6/2/14																																																																																																
55	Parking Lot	173 days	Fri 8/23/13	Tue 4/22/14																																																																																																
56	East Site Finishes	245 days	Wed 7/3/13	Tue 6/10/14																																																																																																
57	South Meadow Improvements	110 days	Fri 1/24/14	Thu 6/26/14																																																																																																
58	Final Site Finishes and Paving	14 days	Fri 6/27/14	Wed 7/16/14																																																																																																
59	Mechanical/Electrical Rooms & Shafts	193 days	Thu 8/8/13	Mon 5/5/14																																																																																																
60	Lower Level North	118 days	Thu 8/8/13	Mon 1/20/14																																																																																																
61	Bolier Room	81 days	Wed 10/30/13	Wed 2/19/14																																																																																																
62	SCUP	109 days	Wed 10/30/13	Mon 3/31/14																																																																																																
63	Lower Level Electric Room	98 days	Mon 9/23/13	Wed 2/5/14																																																																																																
64	Emergency Power Electric Room	124 days	Fri 9/27/13	Wed 3/19/14																																																																																																
65	UPS Electric Room	130 days	Thu 10/3/13	Wed 4/2/14																																																																																																
66	Fire Pump Room	91 days	Wed 10/9/13	Wed 2/12/14																																																																																																
67	Penthouse General Rough-In	119 days	Fri 8/30/13	Wed 2/12/14																																																																																																
68	Penthouse AHU System	64 days	Mon 1/20/14	Thu 4/17/14																																																																																																
69	Penthouse Air Cooled Chiller System	90 days	Wed 10/16/13	Tue 2/18/14																																																																																																
70	Penthouse ACC Computer Unit System	92 days	Thu 10/24/13	Fri 2/28/14																																																																																																
71	Penthouse Cooling Tower System	134 days	Wed 9/11/13	Mon 3/17/14																																																																																																
72	Penthouse Exhaust Fans	46 days	Wed 1/22/14	Wed 3/26/14																																																																																																
73	Penthouse Plumbing Systems	66 days	Mon 2/3/14	Mon 5/5/14																																																																																																
74	Penthouse Boilers	42 days	Fri 2/7/14	Mon 4/7/14																																																																																																
75	Risers	87 days	Wed 10/2/13	Thu 1/30/14																																																																																																
76	Vertical Construction	251 days	Thu 7/18/13	Thu 7/3/14																																																																																																
77	Stairs	251 days	Thu 7/18/13	Thu 7/3/14																																																																																																
78	Elevators	65 days	Thu 2/6/14	Wed 5/7/14																																																																																																
79	Rough-In	257 days	Wed 6/26/13	Thu 6/19/14																																																																																																
80	Level 1 North	134 days	Wed 6/26/13	Mon 12/30/13																																																																																																

Project: Detailed Proj. Schedule

Summary Task Milestone

ID	Task Name	Duration	Start	Finish	2011												2012												2013												2014												2015											
					Half 2, 2011			Half 1, 2012			Half 2, 2012			Half 1, 2013			Half 2, 2013			Half 1, 2014			Half 2, 2014			Half 1, 2015																																						
					A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J									
81	Layout Walls	3 days	Wed 6/26/13	Fri 6/28/13	<ul style="list-style-type: none"> ┃ Layout Walls 																																																											
82	Mechanical Duct & Hangers	6 days	Mon 7/1/13	Mon 7/8/13	<ul style="list-style-type: none"> ┃ Mechanical Duct & Hangers 																																																											
83	OH Electrical Power & Lighting Conduit	8 days	Tue 7/9/13	Thu 7/18/13	<ul style="list-style-type: none"> ┃ OH Electrical Power & Lighting Conduit 																																																											
84	OH Plumbing Waste & Vent	6 days	Fri 7/19/13	Fri 7/26/13	<ul style="list-style-type: none"> ┃ OH Plumbing Waste & Vent 																																																											
85	OH Fire Alarm Conduit	6 days	Fri 7/19/13	Fri 7/26/13	<ul style="list-style-type: none"> ┃ OH Fire Alarm Conduit 																																																											
86	OH Plumbing Domestic & Lab Water	8 days	Mon 7/29/13	Wed 8/7/13	<ul style="list-style-type: none"> ┃ OH Plumbing Domestic & Lab Water 																																																											
87	Set VAV's	6 days	Thu 8/1/13	Thu 8/8/13	<ul style="list-style-type: none"> ┃ Set VAV's 																																																											
88	OH Plumbing Gas	6 days	Thu 8/8/13	Thu 8/15/13	<ul style="list-style-type: none"> ┃ OH Plumbing Gas 																																																											
89	Sprinkler Mains	5 days	Fri 8/9/13	Thu 8/15/13	<ul style="list-style-type: none"> ┃ Sprinkler Mains 																																																											
90	Insulate Plumbing	5 days	Mon 8/12/13	Fri 8/16/13	<ul style="list-style-type: none"> ┃ Insulate Plumbing 																																																											
91	Plumbing Wall Rough-Ins	6 days	Mon 8/19/13	Mon 8/26/13	<ul style="list-style-type: none"> ┃ Plumbing Wall Rough-Ins 																																																											
92	Electrical Wall Rough-Ins	2 days	Tue 8/27/13	Wed 8/28/13	<ul style="list-style-type: none"> ┃ Electrical Wall Rough-Ins 																																																											
93	Insulate Plumbing Wall Rough-Ins	4 days	Thu 8/29/13	Tue 9/3/13	<ul style="list-style-type: none"> ┃ Insulate Plumbing Wall Rough-Ins 																																																											
94	Electrical Data/Tele Rough-Ins	5 days	Thu 8/29/13	Wed 9/4/13	<ul style="list-style-type: none"> ┃ Electrical Data/Tele Rough-Ins 																																																											
95	MEP Wall Close-In Inspection	5 days	Thu 9/5/13	Wed 9/11/13	<ul style="list-style-type: none"> ┃ MEP Wall Close-In Inspection 																																																											
96	Hang Drywall	10 days	Tue 11/26/13	Mon 12/9/13	<ul style="list-style-type: none"> ┃ Hang Drywall 																																																											
97	Finish Partitions	10 days	Tue 12/17/13	Mon 12/30/13	<ul style="list-style-type: none"> ┃ Finish Partitions 																																																											
98	Level 1 North Electrical Room	201 days	Tue 7/30/13	Tue 5/6/14	<ul style="list-style-type: none"> ┃ Level 1 North Electrical Room 																																																											
99	Level 1 North Bathroom	130 days	Fri 8/23/13	Thu 2/20/14	<ul style="list-style-type: none"> ┃ Level 1 North Bathroom 																																																											
100	Level 1 South	130 days	Wed 7/24/13	Tue 1/21/14	<ul style="list-style-type: none"> ┃ Level 1 South 																																																											
101	Level 1 South Teledata Room	184 days	Fri 8/23/13	Wed 5/7/14	<ul style="list-style-type: none"> ┃ Level 1 South Teledata Room 																																																											
102	Level 1 South Teledata Operational	0 days	Wed 5/7/14	Wed 5/7/14	<ul style="list-style-type: none"> ◆ Level 1 South Teledata Operational 																																																											
103	Level 1 South Lecture Hall	127 days	Wed 7/31/13	Thu 1/23/14	<ul style="list-style-type: none"> ┃ Level 1 South Lecture Hall 																																																											
104	Level 2 North	119 days	Tue 8/6/13	Fri 1/17/14	<ul style="list-style-type: none"> ┃ Level 2 North 																																																											
105	Level 2 North Electrical Room	209 days	Wed 8/28/13	Mon 6/16/14	<ul style="list-style-type: none"> ┃ Level 2 North Electrical Room 																																																											
106	Level 2 North Bathrooms	122 days	Fri 10/4/13	Mon 3/24/14	<ul style="list-style-type: none"> ┃ Level 2 North Bathrooms 																																																											
107	Level 2 South	125 days	Tue 8/20/13	Mon 2/10/14	<ul style="list-style-type: none"> ┃ Level 2 South 																																																											
108	Level 2 South Teledata Room	181 days	Fri 10/4/13	Fri 6/13/14	<ul style="list-style-type: none"> ┃ Level 2 South Teledata Room 																																																											
109	Level 3 North	130 days	Fri 8/9/13	Thu 2/6/14	<ul style="list-style-type: none"> ┃ Level 3 North 																																																											
110	Level 3 North Electrical Room	199 days	Fri 8/30/13	Wed 6/4/14	<ul style="list-style-type: none"> ┃ Level 3 North Electrical Room 																																																											
111	Level 3 North Bathrooms	136 days	Fri 10/18/13	Fri 4/25/14	<ul style="list-style-type: none"> ┃ Level 3 North Bathrooms 																																																											
112	Level 3 South	134 days	Tue 8/27/13	Fri 2/28/14	<ul style="list-style-type: none"> ┃ Level 3 South 																																																											
113	Level 3 Data Center	171 days	Fri 10/18/13	Fri 6/13/14	<ul style="list-style-type: none"> ┃ Level 3 Data Center 																																																											
114	Level 4 North	141 days	Wed 8/14/13	Wed 2/26/14	<ul style="list-style-type: none"> ┃ Level 4 North 																																																											
115	Level 4 North Electrical Room	194 days	Fri 9/20/13	Wed 6/18/14	<ul style="list-style-type: none"> ┃ Level 4 North Electrical Room 																																																											
116	Level 4 Bathrooms	133 days	Fri 11/1/13	Tue 5/6/14	<ul style="list-style-type: none"> ┃ Level 4 Bathrooms 																																																											
117	Level 4 South	139 days	Mon 9/9/13	Thu 3/20/14	<ul style="list-style-type: none"> ┃ Level 4 South 																																																											
118	Level 4 South Teledata Room	165 days	Fri 11/1/13	Thu 6/19/14	<ul style="list-style-type: none"> ┃ Level 4 South Teledata Room 																																																											
119	Level 4 North Tower	152 days	Mon 8/19/13	Tue 3/18/14	<ul style="list-style-type: none"> ┃ Level 4 North Tower 																																																											
120	Level 3 North Tower	157 days	Thu 8/22/13	Fri 3/28/14	<ul style="list-style-type: none"> ┃ Level 3 North Tower 																																																											

Project: Detailed Proj. Schedule

Summary Task Milestone

ID	Task Name	Duration	Start	Finish	2011												2012												2013												2014												2015											
					Half 2, 2011			Half 1, 2012			Half 2, 2012			Half 1, 2013			Half 2, 2013			Half 1, 2014			Half 2, 2014			Half 1, 2015																																						
					A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J									
121	Level 2 North Tower	162 days	Tue 8/27/13	Wed 4/9/14																																																												
122	Finishes	211 days	Tue 8/27/13	Tue 6/17/14																																																												
123	Level 1 North Classroom	152 days	Tue 8/27/13	Wed 3/26/14																																																												
124	Corridor Frame	6 days	Tue 8/27/13	Tue 9/3/13																																																												
125	Pull Control Wire	4 days	Tue 9/3/13	Fri 9/6/13																																																												
126	Pull Power and Lighting	7 days	Tue 9/3/13	Wed 9/11/13																																																												
127	Electrica Connetions to VAVs	3 days	Thu 9/12/13	Mon 9/16/13																																																												
128	Pull Fire Alarm Wire	3 days	Thu 9/12/13	Mon 9/16/13																																																												
129	Hang Drywall	4 days	Tue 12/10/13	Fri 12/13/13																																																												
130	Finish Drywall	6 days	Mon 12/16/13	Mon 12/23/13																																																												
131	Prime & Paint Drywall	2 days	Thu 12/26/13	Fri 12/27/13																																																												
132	Install Ceiling A/V Equip	4 days	Thu 1/2/14	Tue 1/7/14																																																												
133	1st Coat Walls	4 days	Thu 1/9/14	Tue 1/14/14																																																												
134	Elec Switches & Receptacles	3 days	Wed 1/15/14	Fri 1/17/14																																																												
135	Ceiling Grid	4 days	Mon 1/20/14	Thu 1/23/14																																																												
136	Sprinkler Adjustments	3 days	Fri 1/24/14	Tue 1/28/14																																																												
137	Lights	1 day	Sun 1/19/14	Sun 1/19/14																																																												
138	HVAC G/R/D's	4 days	Fri 1/24/14	Wed 1/29/14																																																												
139	Above Grid Inspections	3 days	Wed 2/12/14	Fri 2/14/14																																																												
140	Conditioned Air Available	0 days	Wed 2/26/14	Wed 2/26/14																																																												
141	VCT Flooring	2 days	Thu 2/27/14	Fri 2/28/14																																																												
142	Final Paint	4 days	Thu 3/6/14	Tue 3/11/14																																																												
143	Elec Covers & Plates	3 days	Wed 3/12/14	Fri 3/14/14																																																												
144	Drop Ceiling Tile	4 days	Wed 3/12/14	Mon 3/17/14																																																												
145	Doors & Hardware	5 days	Fri 3/14/14	Thu 3/20/14																																																												
146	Carpet	4 days	Fri 3/21/14	Wed 3/26/14																																																												
147	South Comp Lab	145 days	Fri 10/18/13	Thu 5/8/14																																																												
148	South Lecture Hall	125 days	Fri 11/8/13	Thu 5/1/14																																																												
149	Level 2 North Lab	149 days	Mon 10/7/13	Thu 5/1/14																																																												
150	Level 2 South Lab	173 days	Wed 9/18/13	Fri 5/16/14																																																												
151	Level 3 North Data Center	147 days	Thu 10/17/13	Fri 5/9/14																																																												
152	Level 3 South Lab	124 days	Mon 12/16/13	Thu 6/5/14																																																												
153	Level 4 Offices	146 days	Tue 10/29/13	Tue 5/20/14																																																												
154	Level 4 South Lab	118 days	Fri 1/3/14	Tue 6/17/14																																																												
155	Level 4 North Tower	109 days	Mon 12/30/13	Thu 5/29/14																																																												
156	Level 3 North Tower	107 days	Thu 1/9/14	Fri 6/6/14																																																												
157	Level 2 North Tower	107 days	Fri 1/17/14	Mon 6/16/14																																																												
158	Closeout	143 days	Thu 2/27/14	Mon 9/15/14																																																												
159	Lower Level	124 days	Thu 2/27/14	Tue 8/19/14																																																												
160	Level 1	32 days	Fri 5/2/14	Mon 6/16/14																																																												

Project: Detailed Proj. Schedule

Summary Task Milestone

APPENDIX B-1 - DETAILED STRUCTURAL SYSTEM ESTIMATE TAKEOFFS

SUMMARY

Division\Item\Item Type	Description	Quantity 1	Quantity 2	Total O&P*	Total Cost	Cost Code*
Concrete\Spread Footings						*RS Means 2012 - meanscostworks.com
Concrete\Spread Footings\F1A	5'x5'x1', 3000 PSI NW	4.000 ea	3.704 CY	\$ 360.63	\$ 1,335.67	033053403825
Concrete\Spread Footings\F1B	5'x5'x1.5', 3000 PSI NW	1.000 ea	1.389 CY	\$ 360.63	\$ 500.88	033053403825
Concrete\Spread Footings\F1C	5'x5'x2'2", 3000 PSI NW	8.000 ea	16.052 CY	\$ 279.86	\$ 4,492.27	033053403850
Concrete\Spread Footings\F2A	6'x6'x1'2", 3000 PSI NW	1.000 ea	1.556 CY	\$ 360.63	\$ 561.14	033053403825
Concrete\Spread Footings\F2B	6'x6'x1'10", 3000 PSI NW	2.000 ea	4.888 CY	\$ 360.63	\$ 1,762.76	033053403825
Concrete\Spread Footings\F2C	6'x6'x2'4", 3000 PSI NW	8.000 ea	24.853 CY	\$ 279.86	\$ 6,955.45	033053403850
Concrete\Spread Footings\F3B	7'x7'x2'4", 3000 PSI NW	3.000 ea	12.686 CY	\$ 279.86	\$ 3,550.18	033053403850
Concrete\Spread Footings\F4B	8'x8'x2'6", 3000 PSI NW	6.000 ea	35.556 CY	\$ 279.86	\$ 9,950.58	033053403850
Concrete\Spread Footings\F5A	9'x9'x1'10", 3000 PSI NW	1.000 ea	7.980 CY	\$ 279.86	\$ 2,233.28	033053403850
Concrete\Spread Footings\F6B	10'x10'x3'2", 3000 PSI NW	2.000 ea	23.459 CY	\$ 279.86	\$ 6,565.31	033053403850
Concrete\Spread Footings\F5B	9'x9'x2'8", 3000 PSI NW	6.000 ea	47.880 CY	\$ 279.86	\$ 13,399.70	033053403850
Concrete\Spread Footings\F7A	11'x11'x2'4", 3000 PSI NW	2.000 ea	20.884 CY	\$ 279.86	\$ 5,844.51	033053403850
Concrete\Spread Footings\F8A	14'x14'x3', 3000 PSI NW	1.000 ea	21.778 CY	\$ 279.86	\$ 6,094.73	033053403850
Concrete\Spread Footings\F9A	See Plan, 3000 PSI NW, 3' thick	1.000 ea	100.000 CY	\$ 279.86	\$ 27,986.00	033053403850
Concrete\Spread Footings\F9A_1 L	Length	50.921 ft	-	\$ -		
Concrete\Spread Footings\F9A_1 W	Width	18.713 ft	-	\$ -		
Concrete\Spread Footings\F10A	See Plan, 3000 PSI NW, 4' thick	1.000 ea	113.333 CY	\$ 279.86	\$ 31,717.47	033053403850
Concrete\Spread Footings\F10A_1 L	Length	45.993 ft	-	\$ -		
Concrete\Spread Footings\F10A_1 W	Width	17.102 ft	-	\$ -		
Concrete\Spread Footings\F10B	See Plan, 3000 PSI NW, 4' thick	1.000 ea	51.852 CY	\$ 279.86	\$ 14,511.26	033053403850
Concrete\Spread Footings\F10B_1 L	Length	35.067 ft	-	\$ -		
Concrete\Spread Footings\F10B_1 W	Width	10.119 ft	-	\$ -		
Concrete\Spread Footings\F11A	4'x4'x1', 3000 PSI NW	9.000 ea	5.333 CY	\$ 279.86	\$ 1,492.59	033053403850
Concrete\Spread Footings\F11B	See Plan, 3000 PSI NW, 4' thick	1.000 ea	142.519 CY	\$ 279.86	\$ 39,885.23	033053403850
Concrete\Spread Footings\F11B_1 L	Length	37.316 ft	-	\$ -		
Concrete\Spread Footings\F11B_1 W	Width	26.936 ft	-	\$ -		
Equipment - Concrete Pump	Pump		635.701 CY	\$ 62.15	\$ 39,508.80	033105702450
Subtotal - Concrete Footing					\$ 218,347.80	
Concrete\Spread Footings\F1A Rebar	5'x5'x1', 6-#5 each way B	60.000 ft	0.0313 ton	\$ 2,050.00	\$ 64.14	032110600500
Concrete\Spread Footings\F1B Rebar	5'x5'x1.5', 8-#6 each way B	80.000 ft	0.0601 ton	\$ 2,050.00	\$ 123.16	032110600500
Concrete\Spread Footings\F1C Rebar	5'x5'x2'2", 8-#7 each way B	80.000 ft	0.0818 ton	\$ 2,050.00	\$ 167.61	032110600500
Concrete\Spread Footings\F2A Rebar	6'x6'x1'2", 8-#6 each way B	96.000 ft	0.0721 ton	\$ 2,050.00	\$ 147.80	032110600500
Concrete\Spread Footings\F2B Rebar	6'x6'x1'10", 10-#6 each way B	120.000 ft	0.0901 ton	\$ 2,050.00	\$ 184.75	032110600500
Concrete\Spread Footings\F2C Rebar	6'x6'x2'4", 10-#7 each way B	120.000 ft	0.1226 ton	\$ 2,050.00	\$ 251.41	032110600500
Concrete\Spread Footings\F3B Rebar	7'x7'x2'4", 12-#7 each way B	168.000 ft	0.1717 ton	\$ 2,050.00	\$ 351.98	032110600500
Concrete\Spread Footings\F4B Rebar	8'x8'x2'6", 12-#8 each way B	192.000 ft	0.2563 ton	\$ 1,550.00	\$ 397.30	032110600550
Concrete\Spread Footings\F5A Rebar	9'x9'x1'10", 12-#7 each way B	216.000 ft	0.2208 ton	\$ 2,050.00	\$ 452.54	032110600500
Concrete\Spread Footings\F6B Rebar	10'x10'x3'2", 18-#8 each way B	360.000 ft	0.4806 ton	\$ 1,550.00	\$ 744.93	032110600550
Concrete\Spread Footings\F5B Rebar	9'x9'x2'8", 14-#8 each way B	252.000 ft	0.3364 ton	\$ 1,550.00	\$ 521.45	032110600550
Concrete\Spread Footings\F7A Rebar	11'x11'x2'4", 18-#7 each way B	396.000 ft	0.4047 ton	\$ 2,050.00	\$ 829.66	032110600500
Concrete\Spread Footings\F8A Rebar	14'x14'x3', 24-#8 each way B	672.000 ft	2.3953 ton	\$ 1,550.00	\$ 3,712.72	032110600550
Concrete\Spread Footings\F9A Rebar	See Plan, #7 at 12"o.c. each way T&B	1,800.000 ft	1.8396 ton	\$ 2,050.00	\$ 3,771.18	032110600500
Concrete\Spread Footings\F9A_1 L Rebar	Length, #7 at 12"o.c. each way T&B	-	-	\$ -		
Concrete\Spread Footings\F9A_1 W Rebar	Width, #7 at 12"o.c. each way T&B	-	-	\$ -		
Concrete\Spread Footings\F10A Rebar	See Plan, #10 at 12"o.c. each way T&B	1,530.000 ft	3.2918 ton	\$ 1,550.00	\$ 5,102.29	032110600550
Concrete\Spread Footings\F10A_1 L Rebar	Length, #10 at 12"o.c. each way T&B	-	-	\$ -		
Concrete\Spread Footings\F10A_1 W Rebar	Width, #10 at 12"o.c. each way T&B	-	-	\$ -		
Concrete\Spread Footings\F10B Rebar	See Plan, #10 at 12"o.c. each way T&B	750.000 ft	1.5061 ton	\$ 1,550.00	\$ 2,334.38	032110600550
Concrete\Spread Footings\F10B_1 L Rebar	Length, #10 at 12"o.c. each way T&B	-	-	\$ -		
Concrete\Spread Footings\F10B_1 W Rebar	Width, #10 at 12"o.c. each way T&B	-	-	\$ -		
Concrete\Spread Footings\F11A Rebar	4'x4'x1', 6-#4 each way B	48.000 ft	0.0160 ton	\$ 2,050.00	\$ 32.87	032110600500
Concrete\Spread Footings\F11B Rebar	See Plan, #11 at 9"o.c. each way T&B	3,050.000 ft	8.1023 ton	\$ 1,550.00	\$ 12,558.61	032110600550
Concrete\Spread Footings\F11B_1 L Rebar	Length, #11 at 9"o.c. each way T&B	-	-	\$ -		
Concrete\Spread Footings\F11B_1 W Rebar	Width, #11 at 9"o.c. each way T&B	-	-	\$ -		

Subtotal - Concrete Footing Rebar						\$	31,748.77	
Concrete\Wall Footings								
Concrete\Wall Footings\WF1	2' cont. x 1', 2-#5 Cont. B	1,161.569 ft	86.042 CY	\$	222.49	\$	19,143.52	033053403935
Concrete\Wall Footings\WF3	2'6" cont. x 1'4", 4-#5 Cont. B	690.074 ft	84.981 CY	\$	222.49	\$	18,907.50	033053403935
Concrete\Wall Footings\WF4	5' cont. x 2', 5-#7 Cont. T&B, #7 @ 6"o.c. Traverse T&B	68.785 ft	25.476 CY	\$	222.49	\$	5,668.14	033053403935
Concrete\Wall Footings\WF5	5'6" cont. x 1'4", See wall section	69.726 ft	18.891 CY	\$	222.49	\$	4,202.97	033053403935
Concrete\Wall Footings\WF6	3' cont. x 1'4", 4-#6 Cont. B, #4 @16"o.c. Traverse B	37.123 ft	5.486 CY	\$	222.49	\$	1,220.57	033053403935
Equipment - Concrete Pump	Pump		220.876 CY	\$	62.15	\$	13,727.44	033105702450
Subtotal - Concrete Wall Footings						\$	62,870.13	
Concrete\Wall Footings\WF1\Rebar	2' cont. x 1', 2-#5 Cont. B	2,323.138 ft	1.212 ton	\$	2,050.00	\$	2,483.61	032110600500
Concrete\Wall Footings\WF3\Rebar	2'6" cont. x 1'4", 4-#5 Cont. B	2,760.296 ft	1.439 ton	\$	2,050.00	\$	2,950.96	032110600500
Concrete\Wall Footings\WF4\Rebar	5' cont. x 2', 5-#7 Cont. T&B, #7 @ 6"o.c. Traverse T&B	687.849 ft	0.703 ton	\$	2,050.00	\$	1,441.11	032110600500
Concrete\Wall Footings\WF5\Rebar	5'6" cont. x 1'4", See wall section	139.452 ft	0.073 ton	\$	2,050.00	\$	149.08	032110600500
Concrete\Wall Footings\WF6\Rebar	3' cont. x 1'4", 4-#6 Cont. B, #4 @16"o.c. Traverse B	296.981 ft	0.223 ton	\$	2,050.00	\$	457.22	032110600500
Subtotal - Concrete Wall Footing Rebar						\$	7,481.99	
Concrete\Foundation Walls								
Concrete\Foundation Walls\WF1	1'-3" thick, 3000 PSI, 8' High	2,027.276 ft	750.843 CY	\$	305.48	\$	229,367.52	033053404050
Concrete\Foundation Walls\WF1\Rebar	#5@12"o.c. horiz, #8@12"o.c. vert	32,436.418 ft	43.303 ton	\$	1,730.00	\$	74,913.53	032110600700
Equipment - Concrete Pump	Pump		750.843 CY	\$	62.15	\$	46,664.89	033105702450
Subtotal - Concrete Foundation Walls						\$	350,945.95	
Concrete\Piers								
Concrete\Piers\PI1	22"x22"x3' 8-#5 Vertical, #3 Ties @ 12"o.c.	3.000 ea	1.116 CY	\$	799.00	\$	891.92	033053400900
Concrete\Piers\PI2	22"x26"x3' 8-#6 Vertical, Standard Hook at Top, #3 Ties @ 12"o.c.	20.000 ea	8.784 CY	\$	799.00	\$	7,018.42	033053400900
Concrete\Piers\PI3	20"x26"x3' 8-#6 Vertical, Standard Hook at Top, #3 Ties @ 12"o.c.	2.000 ea	0.803 CY	\$	799.00	\$	641.40	033053400900
Concrete\Piers\PI4	20"x20"x3' 8-#5 Vertical, #3 Ties @ 12"o.c.	9.000 ea	2.779 CY	\$	799.00	\$	2,220.33	033053400900
Subtotal - Concrete Piers						\$	10,772.07	
Concrete\Piers\PI1\Rebar	22"x22"x3' 8-#5 Vertical, #3 Ties @ 12"o.c.	138.000 ft	0.072 ton	\$	2,525.00	\$	181.72	032110600200
Concrete\Piers\PI2\Rebar	22"x26"x3' 8-#6 Vertical, Standard Hook at Top, #3 Ties @ 12"o.c.	920.000 ft	0.691 ton	\$	2,525.00	\$	1,744.57	032110600200
Concrete\Piers\PI3\Rebar	20"x26"x3' 8-#6 Vertical, Standard Hook at Top, #3 Ties @ 12"o.c.	92.000 ft	0.069 ton	\$	2,525.00	\$	174.46	032110600200
Concrete\Piers\PI4\Rebar	20"x20"x3' 8-#5 Vertical, #3 Ties @ 12"o.c.	414.000 ft	0.216 ton	\$	2,525.00	\$	545.15	032110600200
Subtotal Concrete Pier Rebar						\$	2,645.90	
Concrete\Retaining Walls								
Concrete\Retaining Walls\RTW1	Footer - 4'8"x1', Wall - 1'x6'	196.812 ft	78.360 CY	\$	346.50	\$	27,151.84	033053406200
Concrete\Retaining Walls\RTW2	Footer - 6'4"x1'4", Wall - 1'x10'	73.202 ft	49.937 CY	\$	346.50	\$	17,303.17	033053406200
Concrete\Retaining Walls\RTW3	Footer - 9'x1'8", Wall - 1'6"x1'4'	52.324 ft	71.219 CY	\$	346.50	\$	24,677.31	033053406200
Concrete\Retaining Walls\RTW5	Footer - 14'10"x2'6", Wall - 2'x22'	25.201 ft	75.680 CY	\$	346.50	\$	26,223.12	033053406200
Subtotal Concrete Retaining Wall						\$	95,355.45	
Concrete\Retaining Walls\RTW1 Rebar	Per LF - 1-#4 (4'8"), 19-#5 (1'), 2-#4 (6'), 8-#5 (5')	-	7.173 ton	\$	1,540.00	\$	11,046.74	032110600750
Concrete\Retaining Walls\RTW2 Rebar	Per LF - 3-#6 (6'4"), 27-#5 (1'), #4 (20'), 4-#7 (8')	-	5.691 ton	\$	1,540.00	\$	8,764.84	032110600750
Concrete\Retaining Walls\RTW3 Rebar	Per LF - 3-#7 (9'), 10-#6(1'), 30-#5, #4(28'), 4-#8 (10')	-	5.939 ton	\$	1,540.00	\$	9,145.79	032110600750
Concrete\Retaining Walls\RTW5 Rebar	Per LF - 3-#8 (14'), 18-#6 (1'), 40-#5 (1'), #4-(40'), 4#10(15')	-	8.599 ton	\$	1,540.00	\$	13,241.82	032110600750
Subtotal - Concrete Retaining Wall Rebar						\$	42,199.19	
Concrete\Formwork								
Concrete\Formwork\Floor Slab Formwork	1st Floor Slab Formwork_1, Re-use for 2, 4, Penthouse	11,443.445 ft²	11,443.445 SFCA	\$	7.30	\$	83,537.15	031113351500
Concrete\Formwork\Floor Slab Formwork	1st Floor Slab Formwork_2, Re-use for 2, 4, Penthouse	7,744.664 ft²	7,744.664 SFCA	\$	7.30	\$	56,536.05	031113351500
Concrete\Formwork\Floor Slab Formwork	3rd Floor Slab Formwork_1, Re-use for 2, 4, Penthouse	16,508.279 ft²	16,508.279 SFCA	\$	7.30	\$	120,510.43	031113351500
Concrete\Formwork\Floor Slab Formwork	3rd Floor Slab Formwork_2, Re-use for 2, 4, Penthouse	11,419.740 ft²	11,419.740 SFCA	\$	7.30	\$	83,364.10	031113351500
Concrete\Formwork\Foundation Wall Formwork	Use 25% Perimeter, 4 Uses	-	8,000.000 SFCA	\$	5.59	\$	44,720.00	031113450150
Concrete\Formwork\Retaining Wall Formwork	4 Uses	-	1,176.000 SFCA	\$	5.59	\$	6,573.84	031113450150
Concrete\Formwork\Wall Footing Formwork	4 Uses	-	2,323.000 SFCA	\$	5.59	\$	12,985.57	031113450150
Concrete\Formwork\Beam Form Work	Based on Level 1 and 3 Beam, Re-use	-	2,158.832 SFCA	\$	7.98	\$	17,227.48	031113202650
Subtotal - Concrete Formwork						\$	425,454.62	
Concrete\Concrete Beams								
Concrete\Concrete Beams\1B1	38"x30"	22.194 ft	6.508 CY	\$	117.00	\$	761.38	033105350300
Concrete\Concrete Beams\1B2	38"x30"	16.364 ft	4.798 CY	\$	117.00	\$	561.37	033105350300
Concrete\Concrete Beams\1B3	18"x36"	7.866 ft	1.311 CY	\$	117.00	\$	153.39	033105350300
Concrete\Concrete Beams\1B4	18"x24"	27.254 ft	3.028 CY	\$	117.00	\$	354.30	033105350300

Concrete\Concrete Beams\1B5	12"x16"	11.487 ft	0.567 CY	\$ 117.00	\$ 66.37	033105350300
Concrete\Concrete Beams\1B6	16"x20"	11.487 ft	0.945 CY	\$ 117.00	\$ 110.62	033105350300
Concrete\Concrete Beams\1B7	20"x24"	41.284 ft	5.097 CY	\$ 117.00	\$ 596.31	033105350300
Concrete\Concrete Beams\1B8	20"x24"	31.256 ft	3.859 CY	\$ 117.00	\$ 451.47	033105350300
Concrete\Concrete Beams\1B9	20"x24"	30.693 ft	3.789 CY	\$ 117.00	\$ 443.34	033105350300
Concrete\Concrete Beams\1B10	16"x24"	18.052 ft	1.783 CY	\$ 117.00	\$ 208.60	033105350300
Concrete\Concrete Beams\1B11	16"x48"	26.142 ft	5.164 CY	\$ 117.00	\$ 604.17	033105350300
Concrete\Concrete Beams\1B12	16"x20"	25.776 ft	2.121 CY	\$ 117.00	\$ 248.21	033105350300
Equipment - Concrete Pump	Pump		38.970 CY	\$ 45.00	\$ 1,753.66	033105700200
Concrete\Concrete Beams\3B1	20"x24"	22.450 ft	2.772 CY	\$ 117.00	\$ 324.28	033105350300
Concrete\Concrete Beams\3B4	20"x24"	41.591 ft	5.135 CY	\$ 117.00	\$ 600.76	033105350300
Concrete\Concrete Beams\3B5	18"x24"	29.450 ft	3.272 CY	\$ 117.00	\$ 382.85	033105350300
Concrete\Concrete Beams\3B5A	18"x24"	31.416 ft	3.491 CY	\$ 117.00	\$ 408.41	033105350300
Concrete\Concrete Beams\3B5B	18"x24"	31.780 ft	3.531 CY	\$ 117.00	\$ 413.13	033105350300
Concrete\Concrete Beams\3B6	20x24"	30.410 ft	3.754 CY	\$ 117.00	\$ 439.26	033105350300
Concrete\Concrete Beams\3B7	16"x24"	25.928 ft	2.561 CY	\$ 117.00	\$ 299.61	033105350300
Concrete\Concrete Beams\3B8	16"x24"	30.511 ft	3.013 CY	\$ 117.00	\$ 352.57	033105350300
Concrete\Concrete Beams\3B9	16"x24"	27.551 ft	2.721 CY	\$ 117.00	\$ 318.37	033105350300
Concrete\Concrete Beams\3B10	20"x24"	29.306 ft	3.618 CY	\$ 117.00	\$ 423.31	033105350300
Concrete\Concrete Beams\3B11	16"x24"	17.925 ft	1.770 CY	\$ 117.00	\$ 207.13	033105350300
Concrete\Concrete Beams\3B12	16"x24"	25.955 ft	2.563 CY	\$ 117.00	\$ 299.92	033105350300
Concrete\Concrete Beams\3B13	16"x24"	24.844 ft	2.454 CY	\$ 117.00	\$ 287.09	033105350300
Concrete\Concrete Beams\3B14	18"x18"	8.770 ft	0.731 CY	\$ 117.00	\$ 85.51	033105350300
Concrete\Concrete Beams\Floors 2, 4, Penthouse	Assumption: Same as Level 3 Beams	-	124.159 CY	\$ 117.00	\$ 14,526.56	033105350300
Equipment - Concrete Pump	Pump		165.545 CY	\$ 45.00	\$ 7,449.52	033105700200
Subtotal - Concrete Beams					\$ 33,131.46	
Concrete\Concrete Beams\1B1 Rebar	8#8, 4#7, #4 Stirrup	22.194 ft	0.372 ton	\$ 2,450.00	\$ 911.03	032110600100
Concrete\Concrete Beams\1B2 Rebar	8#8, 4#7, #4 Stirrup	16.364 ft	0.274 ton	\$ 2,450.00	\$ 672.19	032110600100
Concrete\Concrete Beams\1B3 Rebar	6#5, 3#7, #4 Stirrup	7.866 ft	0.503 ton	\$ 2,450.00	\$ 1,232.43	032110600100
Concrete\Concrete Beams\1B4 Rebar	6#6, 4#8, #4 Stirrup	27.254 ft	0.261 ton	\$ 2,450.00	\$ 640.35	032110600100
Concrete\Concrete Beams\1B5 Rebar	4#5, 3#5, #4 Stirrup	11.487 ft	0.272 ton	\$ 2,450.00	\$ 665.60	032110600100
Concrete\Concrete Beams\1B6 Rebar	4#6, 4#7, #4 Stirrup	11.487 ft	0.838 ton	\$ 2,450.00	\$ 2,052.20	032110600100
Concrete\Concrete Beams\1B7 Rebar	6#6, 4#8, #4 Stirrup	41.284 ft	1.232 ton	\$ 2,450.00	\$ 3,018.80	032110600100
Concrete\Concrete Beams\1B8 Rebar	6#6, 4#8, #4 Stirrup	31.256 ft	0.370 ton	\$ 2,450.00	\$ 907.11	032110600100
Concrete\Concrete Beams\1B9 Rebar	6#6, 3#7, #4 Stirrup	30.693 ft	0.362 ton	\$ 2,450.00	\$ 887.40	032110600100
Concrete\Concrete Beams\1B10 Rebar	6#7, 4#8, #4 Stirrup	18.052 ft	0.243 ton	\$ 2,450.00	\$ 595.58	032110600100
Concrete\Concrete Beams\1B11 Rebar	8#6, 4#8, #4 Stirrup	26.142 ft	0.349 ton	\$ 2,450.00	\$ 854.21	032110600100
Concrete\Concrete Beams\1B12 Rebar	6#6, 3#6, #4 Stirrup	25.776 ft	0.226 ton	\$ 2,450.00	\$ 553.14	032110600100
Concrete\Concrete Beams\3B1 Rebar	6#6, 3#6, #4 Stirrup	22.450 ft	0.197 ton	\$ 2,450.00	\$ 481.77	032110600100
Concrete\Concrete Beams\3B4 Rebar	6#6, 4#8, #4 Stirrup	41.591 ft	0.493 ton	\$ 2,450.00	\$ 1,207.08	032110600100
Concrete\Concrete Beams\3B5 Rebar	6#7, 3#7, #4 Stirrup	29.450 ft	0.330 ton	\$ 2,450.00	\$ 807.96	032110600100
Concrete\Concrete Beams\3B5A Rebar	6#7, 3#7, #4 Stirrup	31.416 ft	0.351 ton	\$ 2,450.00	\$ 859.86	032110600100
Concrete\Concrete Beams\3B5B Rebar	6#7, 3#7, #4 Stirrup	31.780 ft	0.356 ton	\$ 2,450.00	\$ 871.89	032110600100
Concrete\Concrete Beams\3B6 Rebar	6#6, 4#8, #4 Stirrup	30.410 ft	0.359 ton	\$ 2,450.00	\$ 880.57	032110600100
Concrete\Concrete Beams\3B7 Rebar	6#7, 3#7, #4 Stirrup	25.928 ft	0.757 ton	\$ 2,450.00	\$ 1,854.69	032110600100
Concrete\Concrete Beams\3B8 Rebar	6#6, 3#8, #4 Stirrup	30.511 ft	0.321 ton	\$ 2,450.00	\$ 785.72	032110600100
Concrete\Concrete Beams\3B9 Rebar	6#6, 4#8, #4 Stirrup	27.551 ft	0.326 ton	\$ 2,450.00	\$ 799.60	032110600100
Concrete\Concrete Beams\3B10 Rebar	6#7, 3#7, #4 Stirrup	29.306 ft	0.395 ton	\$ 2,450.00	\$ 967.26	032110600100
Concrete\Concrete Beams\3B11 Rebar	6#7, 4#8, #4 Stirrup	17.925 ft	0.241 ton	\$ 2,450.00	\$ 591.64	032110600100
Concrete\Concrete Beams\3B12 Rebar	6#7, 3#8, #4 Stirrup	25.955 ft	0.315 ton	\$ 2,450.00	\$ 771.79	032110600100
Concrete\Concrete Beams\3B13 Rebar	6#6, 3#6, #4 Stirrup	24.844 ft	0.218 ton	\$ 2,450.00	\$ 533.14	032110600100
Concrete\Concrete Beams\3B14 Rebar	6#8, 3#6, #4 Stirrup	8.770 ft	0.910 ton	\$ 2,450.00	\$ 2,230.53	032110600100
Concrete\Concrete Beams\Rebar Floors 2, 4,Pent	Assumption: Same as Level 3 Beams	-	16.706 ton	\$ 2,450.00	\$ 40,930.52	032110600100
Subtotal - Concrete Beam Rebar					\$ 67,564.05	
Concrete\Shear Wall						
Concrete\Shear Wall\Shear Wall Concrete	1' thick, 3000PSI NW	17,986.253 ft ²	666.158 CY	\$ 110.00	\$ 73,277.33	033105350150
Concrete\Shear Wall\Shear Wall Rebar	Reinforced with 4LF of #5 Rebar Per SF, 1' thick	-	37.519 ton	\$ 1,730.00	\$ 64,907.87	032110600700

Equipment - Concrete Pump	Pump		666.158 CY	\$	45.00	\$	29,977.09	033105700200
Subtotal - Concrete Shear Wall						\$	168,162.29	
Concrete\Elevated Floor Slab								
Concrete\Elevated Floor Slab\Floor 1	12" Thick, NW, 5000 PSI, #4 @ 9"o.c.	19,047.398 ft²	705.459 CY	\$	120.00	\$	84,655.10	033105350400
Concrete\Elevated Floor Slab\Floor 1 #4 @9"o.c.	assume 18" of #4 in 1SF of slab area	19,115.254 ft²	9.577 ton	\$	1,880.00	\$	18,004.28	032110600400
Concrete\Elevated Floor Slab\Floor 3 #4 @9"o.c.	assume 18" of #4 in 1SF of slab area	27,984.679 ft²	14.020 ton	\$	1,880.00	\$	26,358.21	032110600400
Concrete\Elevated Floor Slab\Floor 3	12" Thick, NW, 5000 PSI, #4 @ 9"o.c.	28,029.572 ft²	1,038.132 CY	\$	120.00	\$	124,575.88	033105350400
Concrete\Floor 1 Additional Rebar\#5	#5 Rebar	6,102.894 ft	3.183 ton	\$	1,880.00	\$	5,983.40	032110600400
Concrete\Floor 1 Additional Rebar\#6	#6 Rebar	8,700.155 ft	6.535 ton	\$	1,880.00	\$	12,285.21	032110600400
Concrete\Floor 3 Additional Rebar\#5	#5 Rebar	8,147.943 ft	4.249 ton	\$	1,880.00	\$	7,988.41	032110600400
Concrete\Floor 3 Additional Rebar\#6	#6 Rebar	19,360.362 ft	14.540 ton	\$	1,880.00	\$	27,334.51	032110600400
Concrete\Elevated Slab\Floor 2,4,Pent	Assumption: Same as Level 3 Floor Slab	-	3,114.397 CY	\$	120.00	\$	373,727.63	033105350400
Concrete\Elevated Slab\Rebar\Floor 2,4,Pent	Assumption: Same as Level 3 Floor Slab Rebar	-	42.061 ton	\$	1,880.00	\$	79,074.63	032110600400
Concrete\Additional Rebar\Floor 2,4,Pent	Assumption: Same as Level 3 Floor Slab Additional Rebar	-	56.366 ton	\$	1,880.00	\$	105,968.74	032110600400
Equipment - Concrete Pump	Pump		4,857.988 CY	\$	22.50	\$	109,304.74	033105701600
Subtotal - Concrete Elevated Slabs						\$	865,955.99	
Slab on Grade								
Slab on Grade\SOG	5" Thick, NW, 3000PSI, 6x6-W2.1xW2.1 WWF on 15 mil Vapor Barrier over	23,249.998 ft²	9,687.577 CY	\$	110.00	\$	1,065,633.44	033105350150
Slab on Grade\SOG WWF	6x6-W2.1xW2.1 WWF	23,249.998 ft²	232.500 CSF	\$	53.70	\$	12,485.25	032205500200
Equipment - Concrete Pump	Pump		9,687.577 CY	\$	31.10	\$	301,283.64	033105704350
Subtotal - Concrete SOG						\$	1,379,402.33	
Concrete\Columns -- **See Attached Column Takeoff for details								
Concrete\Columns\Rebar\Level 1	#4	5,750.400 ft	1.9206 ton	\$	2,030.00	\$	3,898.89	032110600200
Concrete\Columns\Rebar\Level 1	#8	992.000 ft	1.3243 ton	\$	1,665.00	\$	2,204.99	032110600250
Concrete\Columns\Rebar\Level 1	#9	1,344.000 ft	2.2848 ton	\$	1,665.00	\$	3,804.19	032110600250
Concrete\Columns\Rebar\Level 1	#10	1,504.000 ft	3.2359 ton	\$	1,665.00	\$	5,387.70	032110600250
Concrete\Columns\Rebar\Level 1	#11	704.000 ft	1.8702 ton	\$	1,665.00	\$	3,113.84	032110600250
Concrete\Columns\Rebar\Level 3	#4	5,323.550 ft	1.778 ton	\$	2,030.00	\$	3,609.47	032110600200
Concrete\Columns\Rebar\Level 3	#8	2,160.000 ft	2.884 ton	\$	1,665.00	\$	4,801.19	032110600250
Concrete\Columns\Rebar\Level 3	#9	1,170.000 ft	1.989 ton	\$	1,665.00	\$	3,311.69	032110600250
Concrete\Columns\Rebar\Level 3	#10	840.000 ft	1.807 ton	\$	1,665.00	\$	3,009.09	032110600250
Concrete\Columns\Rebar\Level 3	#11	630.000 ft	1.674 ton	\$	1,665.00	\$	2,786.54	032110600250
Concrete\Columns\Rebar\Level 2,4,Penthouse	Assumption: Same as Level 3 Column Rebar	-	Varies		Varies	\$	52,553.93	Varies
Concrete\Columns\Level 1	4,000 PSI	-	108.143 CY	\$	103.00	\$	11,138.73	033105350300
Equipment - Concrete Pump	Pump	-	108.143 CY	\$	22.75	\$	2,460.25	033105701000
Concrete\Columns\Level 3	4,000 PSI	-	87.850 CY	\$	103.00	\$	9,048.55	033105350300
Equipment - Concrete Pump	Pump	-	87.850 CY	\$	22.75	\$	1,998.59	033105701000
Concrete\Columns\Level 2,4,Penthouse	Assumption: Same as Level 3 Column	-	263.550 CY	\$	103.00	\$	27,145.65	033105350300
Equipment - Concrete Pump	Pump	-	263.550 CY	\$	22.75	\$	5,995.76	033105701000
Subtotal - Concrete Columns						\$	146,269.05	
Structural Steel								
Structural Steel\EP1	12"x12"x5/8"	21.000 ea	1.000 SF	\$	37.00	\$	37.00	051223650450
Structural Steel\EP2	10"x8"x5/8"	1.000 ea	1.000 SF	\$	37.00	\$	37.00	051223650450
Structural Steel\HSS 6x4x5/16	New Item Description	-	106.311 ft	\$	36.00	\$	3,827.18	051223174550
Structural Steel\HSS 8x4x3/8	New Item Description	-	46.495 ft	\$	58.96	\$	2,741.37	051223174600
Structural Steel\S8x18.4	New Item Description	-	16.068 ft	\$	64.89	\$	1,042.68	051223400672
Structural Steel\NC10x15.3	New Item Description	-	24.555 ft	\$	64.89	\$	1,593.39	051223400672
Structural Steel\NC12x25	New Item Description	-	22.295 ft	\$	64.89	\$	1,446.74	051223400672
Structural Steel\HSS 16x8x3/8	New Item Description	-	101.335 ft	\$	129.06	\$	13,078.58	051223174650
Structural Steel\W14x22	New Item Description	-	4.860 ft	\$	40.33	\$	196.02	051223751900
Structural Steel\HSS 5x5x1/4	New Item Description	-	23.060 ft	\$	36.00	\$	830.17	051223174550
Structural Steel\Roof Framing\HSS 5x5x1/4	New Item Description	-	172.705 ft	\$	36.00	\$	6,217.38	051223174550
Structural Steel\Roof Framing\HSS 12x6x5/16	New Item Description	-	367.415 ft	\$	90.31	\$	33,181.22	051223174650
Structural Steel\Roof Framing\HSS 18x6x5/16	New Item Description	-	88.044 ft	\$	110.31	\$	9,712.13	051223174650
Structural Steel\Roof Framing\W14x22	New Item Description	-	823.580 ft	\$	40.33	\$	33,215.00	051223751900
Structural Steel\Roof Framing\W12x16	New Item Description	-	264.113 ft	\$	25.21	\$	6,658.28	051223751100
Structural Steel\Roof Framing\W18x35	New Item Description	-	614.626 ft	\$	54.65	\$	33,589.28	051223753300

Structural Steel\Roof Framing\W10x15	New Item Description	-	28.983 ft	\$ 29.57	\$ 857.01	051223750620
Structural Steel\Roof Framing\W18x40	New Item Description	-	40.187 ft	\$ 61.15	\$ 2,457.46	051223753500
Structural Steel\Roof Framing\W8x28	Elevator Hoist Beam	-	17.021 ft	\$ 47.98	\$ 816.65	051223750370
Structural Steel\Roof Framing\W16x26	New Item Description	-	190.075 ft	\$ 40.27	\$ 7,654.32	051223752700
Structural Steel\Roof Framing\W18x50	New Item Description	-	126.138 ft	\$ 75.05	\$ 9,466.67	051223753700
Structural Steel\Roof Framing\HSS 10x10x5/16	New Item Description	-	152.051 ft	\$ 90.34	\$ 13,736.25	051223174650
Structural Steel\Roof Framing\HSS 10x8x5/16	New Item Description	-	77.974 ft	\$ 90.34	\$ 7,044.21	051223174650
Structural Steel\Roof Framing\W14x61	New Item Description	-	460.589 ft	\$ 106.12	\$ 48,877.72	051223752360
Structural Steel\Roof Framing\HSS 5x5x5/16	New Item Description	-	80.065 ft	\$ 36.00	\$ 2,882.34	051223174550
Structural Steel\Roof Framing\L 3x3x1/4	New Item Description	-	74.758 ft	\$ 40.80	\$ 3,050.12	051223400476
Structural Steel\Roof Framing\HSS 16x8x3/8	New Item Description	-	73.177 ft	\$ 129.06	\$ 9,444.43	051223174650
Structural Steel\Roof Deck\Roof Deck	1-1/2", 20 GA, Type B Galv. Metal Deck (3 Span Min.)	-	15,015.125 ft ²	\$ 2.30	\$ 34,534.79	053123502650
Subtotal - Structural Steel Framing					\$ 288,225.40	
Structural Steel\Steel Columns						
Structural Steel\Steel Columns\C1	Penthouse Level, W10x33, Base Plate 16"x14"x5/8", (4)-3/4" A.B.	8.000 ea	128.000 ft	\$ 54.48	\$ 6,973.44	051223750740
Structural Steel\Steel Columns\C2	Penthouse Level, W14x61, See S220 for details	20.000 ea	320.000 ft	\$ 106.12	\$ 33,958.40	051223752360
Structural Steel\Steel Columns\C3	Penthouse Level, W14x61, See S220 for details	2.000 ea	32.000 ft	\$ 106.12	\$ 3,395.84	051223752360
Structural Steel\Steel Columns\C4	Penthouse Level, W10x33, Base Plate 12"x12"x5/8", (4)-3/4" A.B.	1.000 ea	16.000 ft	\$ 54.48	\$ 871.68	051223750740
Structural Steel\Steel Columns\C5	Full Height, HSS 6x6x3/8, Base Plate 14"x14"x3/4", (4)-3/4" A.B.	2.000 ea	168.000 ft	\$ 36.00	\$ 6,048.00	051223174550
Structural Steel\Steel Columns\C6	Penthouse, HSS 5x5x5/16, Base Plate 12"x12"x5/8", (4)-3/4" A.B.	4.000 ea	64.000 ft	\$ 36.00	\$ 2,304.00	051223174550
Structural Steel\Steel Columns\C7	Penthouse, HSS 6x6x3/8, Base Plate 8"x14"x3/4", (4)-3/4" A.B.	2.000 ea	32.000 ft	\$ 36.00	\$ 1,152.00	051223174550
Structural Steel\Steel Columns\C8	Full Height, HSS 6x4x3/8, Base Plate 14"x14"x3/4", (4)-3/4" A.B.	8.000 ea	672.000 ft	\$ 36.00	\$ 24,192.00	051223174550
Structural Steel\Steel Columns\C9	Full Height, HSS 8x8x5/8, Base Plate 14"x14"x3/4", (4)-3/4" A.B.	4.000 ea	336.000 ft	\$ 58.96	\$ 19,810.56	051223174600
Structural Steel\Steel Columns\C10	Penthouse, HSS 8x6x1/2, Base Plate 8"x16"x3/4", (4)-3/4" A.B.	1.000 ea	16.000 ft	\$ 58.96	\$ 943.36	051223174600
Subtotal - Structural Steel Columns					\$ 99,649.28	
Totals						
					Concrete	\$ 3,908,307.03
					Structural Steel	\$ 387,874.68

APPENDIX B-2 - DETAILED STRUCTURAL SYSTEM ESTIMATE TAKEOFFS
CONCRETE COLUMNS

Concrete\Columns	Size	Area (SF)	Rebar Qty	Rebar(#)	LF of Rebar/F T	Tie Rebar #	Tie Length	Ties/LF	Height (FT)	Total Rebar		Total Ties		CF	CY
										LF	#	LF	#		
Level One															
1-A.1	26"x16"	2.89	6	8	6	4	7.00	1	16	96	8	112	4	46.22	1.712
1-B	20"x20"	2.78	4	9	4	4	6.67	1	16	64	9	106.667	4	44.44	1.646
2-A.1	26"x16"	2.89	6	8	6	4	7.00	1	16	96	8	112	4	46.22	1.712
2-B	22"x22"	3.36	8	11	8	4	7.33	1	16	128	11	117.333	4	53.78	1.992
3-A.1	26"x16"	2.89	6	9	6	4	7.00	1	16	96	9	112	4	46.22	1.712
3-B	22"x22"	3.36	4	10	4	4	7.33	1	16	64	10	117.333	4	53.78	1.992
3-A-EE	16"x26"	2.89	6	8	6	4	7.00	1	16	96	8	112	4	46.22	1.712
4-A.1	26"x16"	2.89	6	8	6	4	7.00	1	16	96	8	112	4	46.22	1.712
4-B	32" Dia.	5.58	6	11	6	4	8.37	1	16	96	11	133.973	4	89.32	3.308
4A-CC	20"x20"	2.78	4	9	4	4	6.67	1	16	64	9	106.667	4	44.44	1.646
4A-EE	16"x26"	2.89	6	8	6	4	7.00	1	16	96	8	112	4	46.22	1.712
5-A.1	26"x16"	2.89	6	9	6	4	7.00	1	16	96	9	112	4	46.22	1.712
5-B	26"x26"	4.69	8	10	8	4	8.67	1	16	128	10	138.667	4	75.11	2.782
5-DD	28" Dia.	4.27	8	11	8	4	7.33	1	16	128	11	117.227	4	68.38	2.533
5A-EE	26"x18"	3.25	6	9	6	4	7.33	1	16	96	9	117.333	4	52.00	1.926
6-A.1	26"x18"	3.25	6	9	6	4	7.33	1	16	96	9	117.28	4	52.00	1.926
6-B	26"x26"	4.69	8	10	8	4	8.67	1	16	128	10	138.667	4	75.11	2.782
6-DD	28"x28"	5.44	8	10	8	4	9.33	1	16	128	10	149.333	4	87.11	3.226
6A-EE	26"x16"	2.89	6	9	6	4	7.00	1	16	96	9	112	4	46.22	1.712
7-A.1	26"x16"	2.89	6	10	6	4	7.00	1	16	96	10	112	4	46.22	1.712
7-B	26"x26"	4.69	8	10	8	4	8.67	1	16	128	10	138.72	4	75.11	2.782
7A-DD	24"x24"	4.00	8	10	8	4	8.00	1	16	128	10	128	4	64.00	2.370
7A-EE	26"x16"	2.89	6	8	6	4	7.00	1	16	96	8	112	4	46.22	1.712
8.1-AA.1	20"x20"	2.78	4	9	4	4	6.67	1	16	64	9	106.667	4	44.44	1.646
8.1-BB	26" Dia.	3.69	6	10	6	4	6.80	1	16	96	10	108.853	4	58.96	2.184
8A-B.2	32" Dia.	5.58	8	10	8	4	8.37	1	16	128	10	133.973	4	89.32	3.308
8A-D	26"x16"	2.89	6	8	6	4	7.00	1	16	96	8	112	4	46.22	1.712
9A-B.2	20"x20"	2.78	4	9	4	4	6.67	1	16	64	9	106.72	4	44.48	1.647
9A-D	20"x20"	2.78	4	9	4	4	6.67	1	16	64	9	106.72	4	44.48	1.647
9-AA.1	26"x16"	2.89	6	9	6	4	7.00	1	16	96	9	112	4	46.24	1.713
9-BB	28"x28"	5.44	8	10	8	4	9.33	1	16	128	10	149.28	4	87.04	3.224
9B-B.2	20"x20"	2.78	4	9	4	4	6.67	1	16	64	9	106.72	4	44.48	1.647
9B-D	20"x20"	2.78	4	9	4	4	6.67	1	16	64	9	106.72	4	44.48	1.647
9C-B.2	20"x20"	2.78	4	9	4	4	6.67	1	16	64	9	106.72	4	44.48	1.647
9C-D	20"x20"	2.78	4	9	4	4	6.67	1	16	64	9	106.72	4	44.48	1.647
9C-D.2	24"x38"	6.33	10	8	10	4	10.33	1	16	160	8	165.333	4	101.33	3.753
10-AA.1	26"x16"	2.89	6	9	6	4	7.00	1	16	96	9	112	4	46.24	1.713
10-BB	28"x28"	5.44	8	10	8	4	9.33	1	16	128	10	149.28	4	87.04	3.224
10A-B.1	28" Dia.	4.27	6	10	6	4	7.33	1	16	96	10	117.28	4	68.32	2.530
10A-C.8	32" Dia.	5.58	6	11	6	4	8.37	1	16	96	11	133.92	4	89.28	3.307
10A-D.2	32" Dia.	5.58	6	11	6	4	8.37	1	16	96	11	133.92	4	89.28	3.307
10A-E	32" Dia.	5.58	6	11	6	4	8.37	1	16	96	11	133.92	4	89.28	3.307
10B-D.2	24"x38"	6.33	10	8	10	4	10.33	1	16	160	8	165.333	4	101.33	3.753
11-AA.1	26"x16"	2.89	6	9	6	4	7.00	1	16	96	9	112	4	46.24	1.713
11-BB	28"x28"	5.44	8	10	8	4	9.33	1	16	128	10	149.28	4	87.04	3.224
11A-E	32" Dia.	5.58	6	11	6	4	8.37	1	16	96	11	133.92	4	89.28	3.307
11B-E	32" Dia.	5.58	6	11	6	4	8.37	1	16	96	11	133.92	4	89.28	3.307
Level Three															
1-A.1	26"x16"	2.89	6	8	6	4	7.00	1	15	90	8	105	4	43.33	1.605
1-B	20" Dia	2.18	4	9	4	4	5.23	1	15	60	9	78.5	4	32.71	1.211
2-A.1	26"x16"	2.89	6	8	6	4	7.00	1	15	90	8	105	4	43.33	1.605
2-B	20"x20"	2.78	4	9	4	4	6.67	1	15	60	9	100	4	41.67	1.543
3-A	26"x16"	2.89	6	8	6	4	7.00	1	15	90	8	105	4	43.33	1.605
3-B	22" Dia.	2.64	4	9	4	4	5.76	1	15	60	9	86.35	4	39.58	1.466
3-A-EE	16"x26"	2.89	6	8	6	4	7.00	1	15	90	8	105	4	43.33	1.605
4-A	26"x16"	2.89	12	8	12	4	7.00	1	15	180	8	105	4	43.35	1.606
4-B	22" Dia.	2.64	6	10	6	4	5.76	1	15	90	10	86.4	4	39.60	1.467
4A-CC	20"x20"	2.78	4	9	4	4	6.67	1	15	60	9	100.05	4	41.70	1.544
4A-EE	16"x26"	2.89	6	8	6	4	7.00	1	15	90	8	105	4	43.35	1.606
5-A	26"x16"	2.89	12	8	12	4	7.00	1	15	180	8	105	4	43.35	1.606
5-B	24" Dia.	3.14	6	10	6	4	6.28	1	15	90	10	94.2	4	47.10	1.744
5-DD	20"x20"	2.78	4	10	4	4	6.67	1	15	60	10	100.05	4	41.70	1.544
5A-EE	26"x16"	2.89	6	8	6	4	7.00	1	15	90	8	105	4	43.35	1.606
6-A	26"x16"	2.89	12	8	12	4	7.00	1	15	180	8	105	4	43.35	1.606
6-B	24" Dia.	3.14	6	9	6	4	6.28	1	15	90	9	94.2	4	47.10	1.744
6-DD	20"x20"	2.78	4	9	4	4	6.67	1	15	60	9	100.05	4	41.70	1.544
6A-EE	26"x16"	2.89	6	8	6	4	7.00	1	15	90	8	105	4	43.35	1.606
7-A	26"x16"	2.89	12	8	12	4	7.00	1	15	180	8	105	4	43.35	1.606
7-B	24" Dia.	3.14	6	9	6	4	6.28	1	15	90	9	94.2	4	47.10	1.744
7A-DD	20"x20"	2.78	4	9	4	4	6.67	1	15	60	9	100.05	4	41.70	1.544
7A-EE	26"x16"	2.89	6	8	6	4	7.00	1	15	90	8	105	4	43.35	1.606
8.1-AA	20"x20"	2.78	8	9	8	4	6.67	1	15	120	9	100.05	4	41.70	1.544
8.1-BB	24" Dia.	3.14	6	9	6	4	6.28	1	15	90	9	94.2	4	47.10	1.744

8A-B.2	22"x22"	3.36	8	10	8	4	7.33	1	15	120	10	110	4	50.42	1.867
8A-D	26"x16"	2.89	6	8	6	4	7.00	1	15	90	8	105	4	43.35	1.606
9A-B.2	20"x20"	2.78	4	9	4	4	6.67	1	15	60	9	100.05	4	41.70	1.544
9A-D	20"x20"	2.78	4	9	4	4	6.67	1	15	60	9	100.05	4	41.70	1.544
9-AA	26"x16"	2.89	12	8	12	4	7.00	1	15	180	8	105	4	43.35	1.606
9-BB	24" Dia.	3.14	8	11	8	4	6.28	1	15	120	11	94.2	4	47.10	1.744
9B-B.2	20"x20"	2.78	4	9	4	4	6.67	1	15	60	9	100.05	4	41.70	1.544
9B-D	20"x20"	2.78	4	9	4	4	6.67	1	15	60	9	100.05	4	41.70	1.544
9C-B.2	20"x20"	2.78	4	9	4	4	6.67	1	15	60	9	100.05	4	41.70	1.544
9C-D	20"x20"	2.78	4	9	4	4	6.67	1	15	60	9	100.05	4	41.70	1.544
10-AA	26"x16"	2.89	12	8	12	4	7.00	1	15	180	8	105	4	43.35	1.606
10-BB	24" Dia.	3.14	6	10	6	4	6.28	1	15	90	10	94.2	4	47.10	1.744
10A-B.1	28" Dia.	4.27	6	10	6	4	7.33	1	15	90	10	109.95	4	64.05	2.372
10A-C.8	28" Dia.	4.27	6	10	6	4	7.33	1	15	90	10	109.95	4	64.05	2.372
10A-D.2	22"x22"	3.36	4	11	4	4	7.33	1	15	60	11	109.95	4	50.40	1.867
10A-E	22"x22"	3.36	4	11	4	4	7.33	1	15	60	11	109.95	4	50.40	1.867
11-AA	26"x16"	2.89	12	8	12	4	7.00	1	15	180	8	105	4	43.35	1.606
11-BB	26" Dia.	3.69	6	11	6	4	6.80	1	15	90	11	102.05	4	55.28	2.047
11A-B.1	28" Dia.	4.27	6	10	6	4	7.33	1	15	90	10	109.95	4	64.05	2.372
11A-C.8	22"x22"	3.36	4	11	4	4	7.33	1	15	60	11	109.95	4	50.40	1.867
11A-D.2	22"x22"	3.36	8	10	8	4	7.33	1	15	120	10	109.95	4	50.40	1.867
11A-E	22"x22"	3.36	4	11	4	4	7.33	1	15	60	11	109.95	4	50.40	1.867
11B-C.8	22"x22"	3.36	4	11	4	4	7.33	1	15	60	11	109.95	4	50.40	1.867
11B-D.2	22"x22"	3.36	4	11	4	4	7.33	1	15	60	11	109.95	4	50.40	1.867
11B-E	22"x22"	3.36	4	11	4	4	7.33	1	15	60	11	109.95	4	50.40	1.867
12-AA.1	28"x14"	2.72	6	8	6	4	7.00	1	15	90	8	105	4	40.83	1.512
12-BB	20"x20"	2.78	4	9	4	4	6.67	1	15	60	9	100.05	4	41.70	1.544
Total CY														87.850	

Totals									
Total Rebar									
Level 1	LF	LB/FT	LB	Ton	Cost Code	Description	Total O&P (\$)	Total Cost	
#4	5750	0.668	3841.27	1.9206336	032110600200	Columns, #3-#7, Grade 60	\$ 2,030.00	\$ 3,898.89	
#8	992	2.670	2648.64	1.32432	032110600250	Columns, #8-#18, Grade 60	\$ 1,665.00	\$ 2,204.99	
#9	1344	3.400	4569.6	2.2848	032110600250	Columns, #8-#18, Grade 60	\$ 1,665.00	\$ 3,804.19	
#10	1504	4.303	6471.71	3.235856	032110600250	Columns, #8-#18, Grade 60	\$ 1,665.00	\$ 5,387.70	
#11	704	5.313	3740.35	1.870176	032110600250	Columns, #8-#18, Grade 60	\$ 1,665.00	\$ 3,113.84	
							Total \$	18,409.61	
Level 3	LF	LB/FT	LB	Ton	Cost Code	Description	Total O&P (\$)	Total Cost	
#4	5323.55	0.668	3556.13	1.7780657	032110600200	Columns, #3-#7, Grade 60	\$ 2,030.00	\$ 3,609.47	
#8	2160	2.670	5767.2	2.8836	032110600250	Columns, #8-#18, Grade 60	\$ 1,665.00	\$ 4,801.19	
#9	1170	3.400	3978	1.989	032110600250	Columns, #8-#18, Grade 60	\$ 1,665.00	\$ 3,311.69	
#10	840	4.303	3614.52	1.80726	032110600250	Columns, #8-#18, Grade 60	\$ 1,665.00	\$ 3,009.09	
#11	630	5.313	3347.19	1.673595	032110600250	Columns, #8-#18, Grade 60	\$ 1,665.00	\$ 2,786.54	
							Total \$	17,517.98	
Level 2, 4, Penthouse									
These will be assumed to have the same composition as the Level 3 Take off									
							Remaining Levels = Level 3 * 3	\$ 52,553.93	
Total Concrete	CY				Cost Code	Description	Total O&P (\$)	Total Cost	
Level 1									
Concrete (Material)	108.14				033105350300	Structural Concrete, NW, 4000PSI	\$ 103.00	\$ 11,138.73	
Concrete (Placing)	108.14				033105701000	36" Columns, Pumped	\$ 22.75	\$ 2,460.25	
							Total \$	13,598.98	
Level 3									
Concrete (Material)	87.85				033105350300	Structural Concrete, NW, 4000PSI	\$ 103.00	\$ 9,048.55	
Concrete (Placing)	87.85				033105701000	36" Columns, Pumped	\$ 22.75	\$ 1,998.59	
							Total \$	11,047.14	
Level 2, 4, Penthouse									
These will be assumed to have the same composition as the Level 3 Take off									
							Remaining Levels = Level 3 * 3	\$ 33,141.41	
							Column Total \$	146,269.05	

APPENDIX C – GENERAL CONDITIONS ESTIMATE

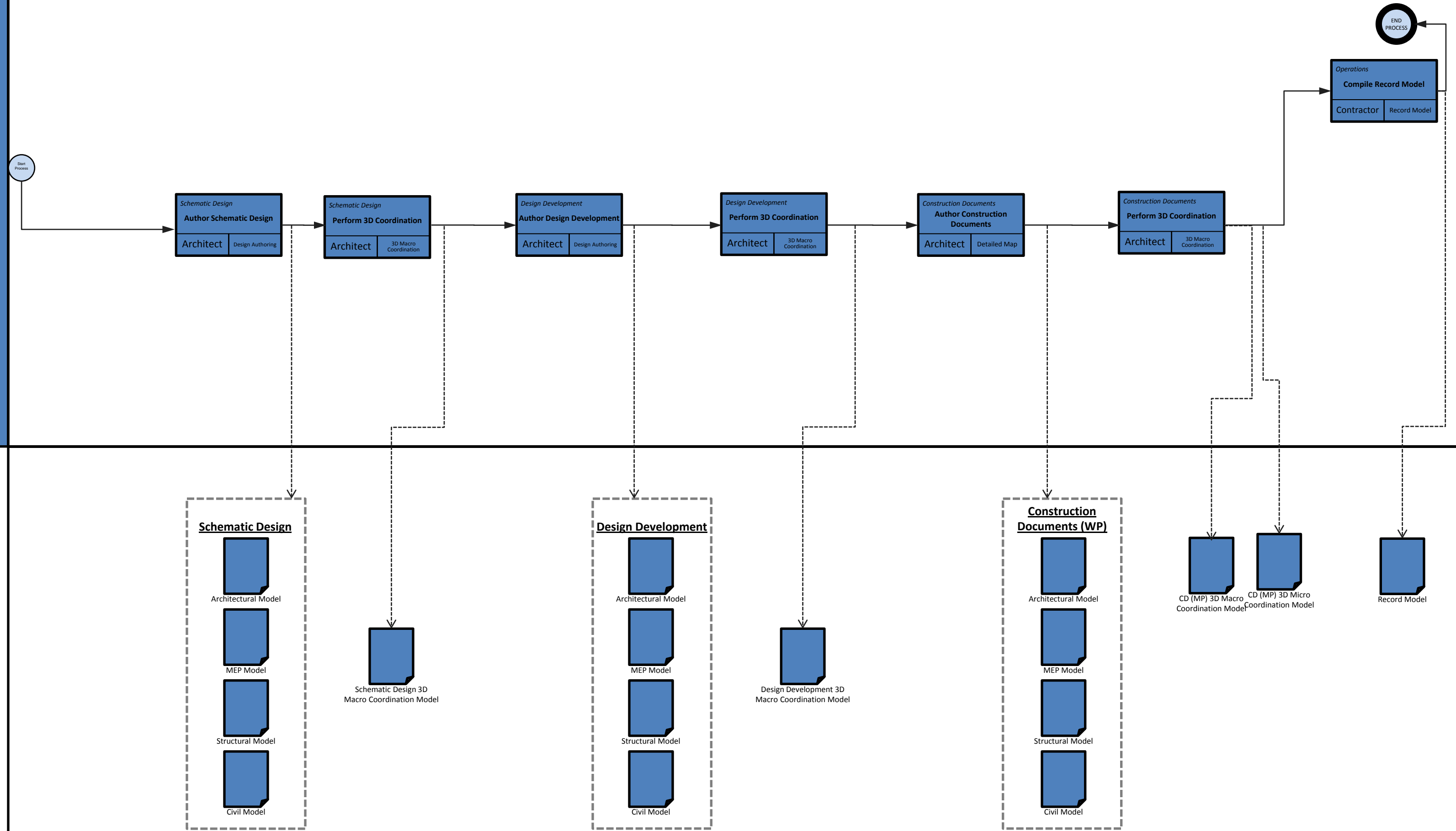
General Conditions Estimate

*RSM Means Cost Works

Project Duration - 24 months - 104 weeks

Cost Code*	Description	Quantity	Unit	Cost	Amount
	Project Management Team				\$ 2,262,520.00
013113200220	Project Director (inflate 20% from PM)	104	Week	\$ 3,930.00	\$ 408,720.00
013113200220	Project Manager	104	Week	\$ 3,275.00	\$ 340,600.00
013113200220	Project Manager	104	Week	\$ 3,275.00	\$ 340,600.00
013113200280	General Superintendent (inflate 20% from Super)	104	Week	\$ 3,630.00	\$ 377,520.00
013113200280	Superintendent	104	Week	\$ 3,025.00	\$ 314,600.00
013113200140	Project Engineer	104	Week	\$ 2,025.00	\$ 210,600.00
013113200140	Project Engineer	104	Week	\$ 2,025.00	\$ 210,600.00
013113200020	Field Accountant	104	Week	\$ 570.00	\$ 59,280.00
	Field Office				\$ 52,983.00
015213200550	(3) Trailer, Furnished, no hookups, rent, 50'x12'	24	Month	\$ 1,230.00	\$ 29,520.00
015213200700	(3) Trailer A/C	24	Month	\$ 135.00	\$ 3,240.00
015213200800	(3) Trailer Delivery, assume 100 mi	100	mi	\$ 4.95	\$ 495.00
015213400140	Telephone	24	Month	\$ 231.00	\$ 5,544.00
015213400160	Trailer Power	24	Month	\$ 121.00	\$ 2,904.00
015213400120	Office Supplies/Drawing Copies	24	Month	\$ 105.00	\$ 2,520.00
015213400100	Copier Machines	24	Month	\$ 165.00	\$ 3,960.00
-	Postage (\$200/mo)	24	Month	\$ 200.00	\$ 4,800.00
	Insurance				\$ 629,412.00
013113300020	Builders Risk (based on GMP)	76200000	(\$)	0.24%	\$ 18,288.00
013113300600	Liability	76200000	(\$)	2.02%	\$ 153,924.00
013113900020	Performance Bond	76200000	(\$)	0.60%	\$ 457,200.00
	Safety				\$ 2,600.00
-	First Aid (assume \$25/wk)	104	Week	\$ 25.00	\$ 2,600.00
	Field Operations				\$ 40,445.00
017123131100	Survey	3	Day	\$ 1,016.00	\$ 3,048.00
015813500020	Signage (20SF)	20	SF	\$ 19.70	\$ 394.00
015433406410	Temporary Toilets (3)	24	Month	\$ 504.00	\$ 12,096.00
015113800700	Temporary Water	24	Month	\$ 68.00	\$ 1,632.00
-	Small Tools & Equip (assume lump sum \$20,000)	1	Ea	\$ 20,000.00	\$ 20,000.00
015433400010	Equipment Rental	1	Ea	\$ 1,000.00	\$ 1,000.00
015113500050	Temp Power, 400 Amp	1	Ea	\$ 2,275.00	\$ 2,275.00
	Testing & Inspections				\$ 19,440.00
014523505570	Testing Service (2/month)	48	Ea	\$ 270.00	\$ 12,960.00
014523505570	Inspection Service (1/month)	24	Ea	\$ 270.00	\$ 6,480.00
	Waste Management				\$ 236,808.00
024119230725	(3) Dumpsters	104	Week	\$ 2,277.00	\$ 236,808.00
	Total				\$ 3,244,208.00

APPENDIX D - BIM USE EVALUATION



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
Record Modeling	HIGH	Contractor	MED	3	3	3			YES
		Facility Manager	HIGH	1	2	1	Requires training and software		
		Designer	MED	3	3	3			
Cost Estimation	MED	Contractor	HIGH	2	1	1			NO
4D Modeling	HIGH	Contractor	HIGH	2	2	2	Need training on latest software	High value to owner due to phasing complications	NO
							Infrastructure needs	Use for Phasing & Construction	
3D Coordination (Construction)	HIGH	Contractor	HIGH	3	3	3		Use for all coordination	YES
		Subcontractors	HIGH	1	3	3		Modeling learning curve possible	
		Designer	MED	2	3	3			
Engineering Analysis	MED	MEP Engineer	HIGH	2	2	2			NO
		Architect	MED	2	2	2			
Design Reviews	MED	Arch	LOW	1	2	1		Reviews to be from design model	NO
								no additional detail required	
3D Coordination (Design)	HIGH	Architect	HIGH	3	2	3		Contractor to facilitate Coord.	YES
		MEP Engineer	MED	2	2	1			
		Structural Engineer	HIGH	2	2	1			
Design Authoring	MED	Architect	HIGH	3	3	3			NO
		MEP Engineer	MED	3	3	3			
		Structural Engineer	HIGH	3	3	3			
		Civil Engineer	LOW	2	1	1			
Programming	MED								NO

* Additional BIM Uses as well as information on each Use can be found at <http://www.engr.psu.edu/ae/cic/bimex/>

APPENDIX E – REFERENCES

Rendering on Cover Page Courtesy of www.coppin.edu/CapitalPlanning/STC.aspx

Detailed Structural Estimate

"Rebar Sizes and Grades." *Rebar-Sizes*. Web. 9 Oct. 2012.

<<http://www.whitecap.com/pages/articles/rebar/Rebar-Sizes>>.

"RSMean Costworks Online Construction Cost Data - Reliable Construction Cost Estimating from RSMean." *RSMean Costworks Online Construction Cost Data - Reliable Construction Cost Estimating from RSMean*. Web. 10 Oct. 2012. <<http://www.meanscostworks.com/>>.

BIM Use Evaluation

"Project." *BIM Execution Planning*. Web. 11 Oct. 2012.

<<http://bim.psu.edu/Project/resources/default.aspx>>.