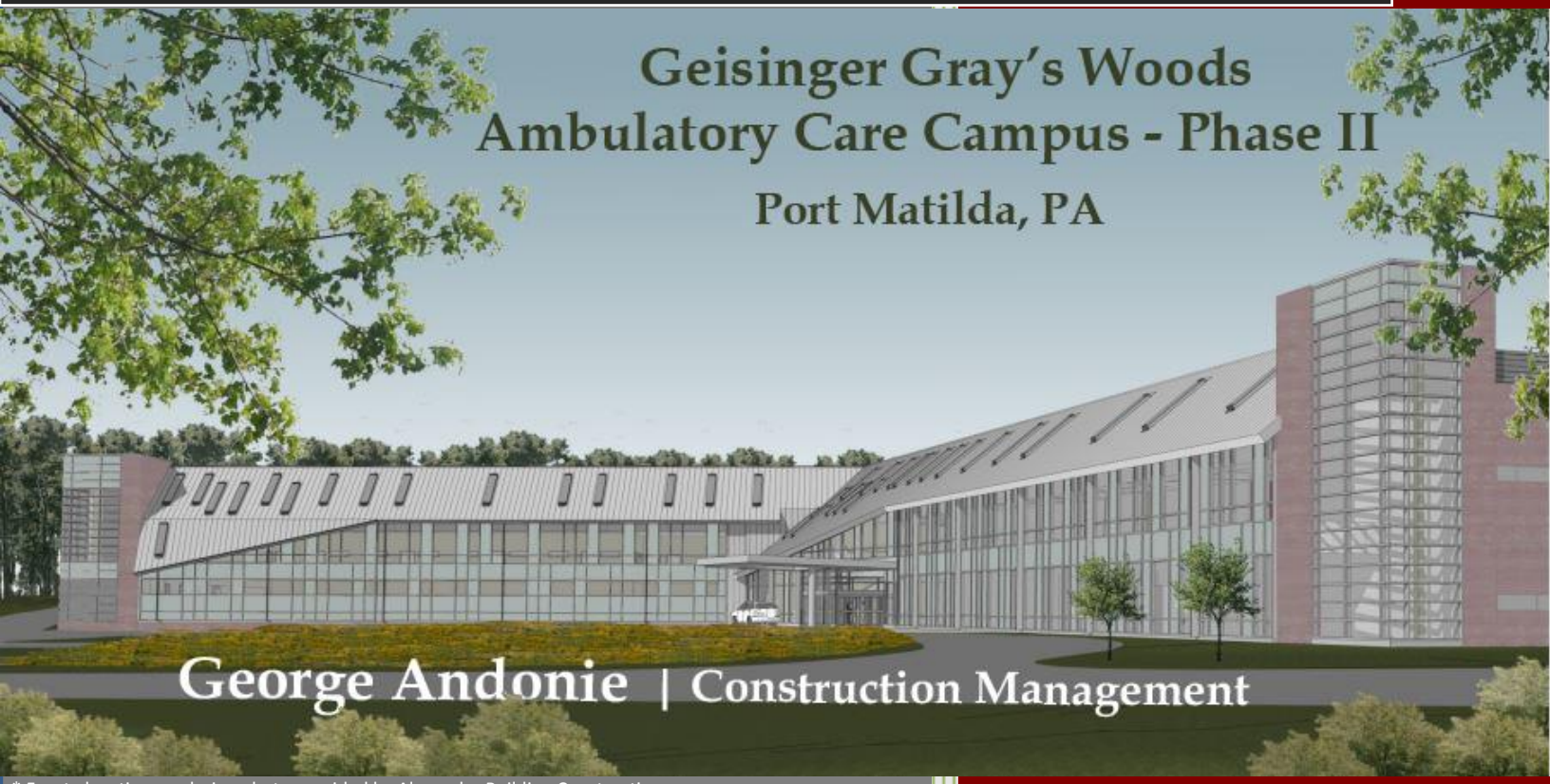
Technical Assignment #2



* Front elevation rendering photo provided by Alexander Building Construction

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October 16th, 2013

Executive Summary

The following technical report focuses on the key features affecting the execution of the 77,560SF addition to Geisinger's Grays Woods Ambulatory Care Campus. Analyses of the project schedule, detailed structural and MEP assemblies estimates, general conditions estimates, site layout planning, LEED evaluation & constructability challenges are included, and will further be looked into detail in this report.

Construction for this Phase II addition began on September 10, 2012 with an anticipated substantial completion on January 02, 2014. This translates to total project duration of approximately 18 months, or 384 working days. Building Interior is by far the most extensive phase of the project, as this is a healthcare facility that has intensive MEP work and will be tying in to an existing facility.

After reporting square foot estimates for the different building systems in Technical Report 1, a detailed structural estimate for concrete and steel were calculated in order to better understand the sources of these costs. The detailed concrete estimate totaled $494,747, while the structural steel estimate came up to a total amount of $1,734,577. An MEP Assemblies estimate was also produced based on the different mechanical, electrical, and plumbing systems found in the facility; it came up to a total of $7,150,685. The detailed structural and MEP assemblies estimates were considerably close to those SF estimates calculated in Technical Report 1, and possible factors that may have accounted to these differences were analyzed in this report.

General conditions for this project totaled $1,764,400, or 6.7% of the of the total construction contract. The general conditions estimate was based off an 18 month construction schedule, and is broken down into the following five categories: project team, field office, field operations, insurance, and building closeout. As Alexander Building Construction was not able to release the actual GC costs for this project, RS Means 2013 Data was used to price most of the items. Project team costs were based off the staffing plan discussed in technical report 1, and were calculated based on a weighted participation percentage per month to better represent the actual general conditions costs.

Using the existing conditions plan created in Technical Report I, different site plans for each critical phase of construction were created and analyzed with the purpose of illustrating the evolution of the site throughout the construction of each phase. Site Layout plans for the parking lot extension, building foundation, structural steel erection, and building's enclosure and interior were made and further analyzed in this report.

Geinger Health Systems is pursuing LEED Certified for the construction of the 78,000SF addition to the Gray's Woods Ambulatory Care Campus. The project team expects to achieve 46 out of the possible 110 LEED credits. Some sustainable features on the new building include adequate site location, sustainable sourced materials, and the use of a construction waste management program. Overall, the Gray's Woods project is markedly sustainable, and increasing its sustainability would only further increase the cost of the project without adding any value to the owner.

Finally, the main constructability issues encountered during the construction of this facility are discussed along with the respective solutions employed by the project team to overcome each one. In the case of this project, use of Infection Control Risk Assessment (ICRA) walls, unforeseen underground conditions, and finally building and MEP tie-in were discussed. Overall, Geisinger Health Systems and Alexander Building Construction combined great project execution planning through timely decision making and trade coordination and communication to successfully overcome these obstacles, while delivering the project under the agreed upon time and budget.

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Detailed Project Schedule

The initial phase of Geisinger Gray's Woods Ambulatory Care Campus was constructed back in 2007-2008. This 77,560 Phase II addition began on September 10, 2012 with an anticipated substantial completion on January 02, 2014. This translates to total project duration of approximately 18 months, or 384 working days. The detailed project schedule for this project was done using Primavera P6 and contains a little over 160 activities pertaining the design, procurement, construction and closeout of Geisinger Gray's Woods Phase II Project. The following **Table 1** summarizes the major dates and durations of the phases in the detailed schedule:

Table 1 - Project Milestone and Duration Overview:

Activity	Start	Finish	Duration (Days)
Design	01-Jun-11	05-Oct-11	89
Procurement	30-May-12	19-Oct-12	100
Construction	31-May-12	02-Dec-13	384
Site Mobilization	31-May-12	29-Jun-12	22
Garage Construction	05-Jul-12	05-Dec-12	108
Building Sitework	27-Aug-12	09-Oct-12	31
Building Structure	10-Sep-12	02-Jan-13	80
Building Envelope	19-Nov-12	31-Jul-13	178
Building Interior	31-Dec-12	04-Oct-13	236
CUP & Mech. Yard Work	04-Apr-13	15-Jul-13	71
Completion & Closeout	22-Aug-13	06-Feb-14	118

**Durations, start, and finish dates were taken from the detailed project schedule.

***See Appendix A-1 for the Detailed Project Schedule**

Site Mobilization:

Site mobilization for this project began during the last days of May, in order to begin setting up for the construction of the new parking garage and Phase II for Geisinger Gray's Woods Ambulatory Care Campus. Site mobilization takes 22 days, and mainly consists of contractor and subcontractor office trailer setup on site, as well as laying out the temporary fencing and parking laydown in order to begin construction. Once this is complete, construction for the parking garage, and subsequently phase II addition, may begin. This is discussed more in detail in the site layout section of this technical report, and you may reference to the parking lot expansion site layout plan in Appendix C-1.

Garage Construction:

Although the three-tier parking garage construction for the ambulatory care campus was managed under a different contract and will not be evaluated in this thesis, it has been included in the detailed schedule. This was done mainly because the parking garage expansion will have a huge impact in the phasing and construction of the new phase II addition. Alexander Building began the construction of this precast concrete structure on May 7th, 2012 and was able to successfully complete it 6 weeks ahead of time. Because of this, they were able to have a head start on the foundation work for the building construction. This change to the original schedule has been modified into the detailed schedule shown in this report, and will be further used for evaluation on how this impact may have allowed for a successful delivery of this project.

Building Sitework & Structure:

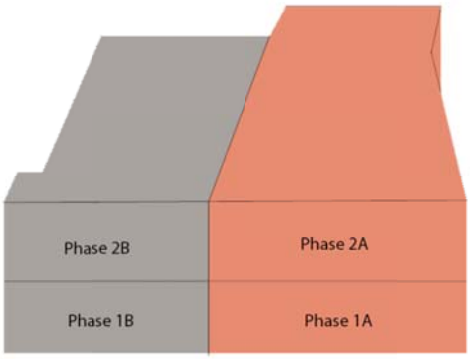
The first activity to the building Sitework consists in demolishing the existing temporary parking located where the future expansion will be built. After this demolition, mass earthwork for the building pad may begin, as well as laying out all the site utilities that will be connecting to the new building. The shallow foundation excavation, as well as most of the phasing for this project, began at the west side which is closest to the existing building. As the foundation excavation moved towards phase B, the construction team encountered a few underground plumbing issues. This impacted the complete project schedule by forcing a vertical phasing rather than horizontal phasing for the following construction of this building. The detailed schedule is divided into west (phase A) and east (phase B) for the building structure construction. Steel Erection on Phase A began on October 22nd, 2012. Once this whole section was erected completely from ground up to the roof, the raising gang and crane moved on to the next phase performing similar work until topping out. As structural steel erection was completed in each area, metal decking was placed at the floors and roofs. The last steps to completing the building structure consists on pouring 2 ½" concrete on metal decks as well as 6" slab on grade over the compacted PennDOT 2A stone.

Building Envelope:

Just as the construction of the building's structure comes to an end, work on the building envelope begins at the western facade connecting to the existing building. The building envelope construction follows a counterclockwise flow, beginning with the brick cavity walls at the west, south and east façade and moving on to the curtain wall system in the northern façade. During this phase of construction, the existing building's exterior where both phases will connect has to be demolished, and later both envelopes have to be tied in. This whole process of demolishing and tying in both building enclosures takes a total of 12 days. Phase II building is expected to be dried in and conditioned by July 9th, 2013.

Building Interior:

One of the most challenging construction aspects of the Geisinger Gray's Woods facility is the intense MEP interior work involved in this healthcare facility, and later tying it to the existing systems. Through careful coordination and material placement, each trade will move along the interior space in a similar flow. Interior work is divided into 4 quadrants: work will begin at Phase 1A, moving to phase 2A, then towards 1B and finishing up in Phase 2B as shown in Figure 2 below. Durations for the interior work at each different phase are summarized in Table 2 below. Interior work will begin with MEP rough-in at the electrical rooms, and branching out towards the different rooms within that phase. Following the MEP are the partition, lighting, openings, flooring and elevator trades. Similar sequencing for interior work is done in all four phases of this project. The main differences between Phase A and B interior work are the ICRA wall partitions, MEP tie-ins, elevators, and electrical rooms found in phase A. Phase B, in the other hand, has operating rooms, which entails a total of 20 days of work.



Phasing: A1→A2→B1→B2

Figure 1: Interior work flow sequencing

Table 2 - Durations for interior work at each phase

Phase	Duration (Days)
Phase 1A	196
Phase 2A	204
Phase 1B	221
Phase 2B	191
Total Interior	236

**Durations, taken from the detailed project schedule.

CUP & Mechanical Yard Work:

During this phase of the project, heavy mechanical equipment that will serve both phases of the project have to installed. Most of these equipment will be located in the Chiller Unit Plant Building (CUP), while others at the mechanical yard located besides it. This phase requires the installation of a new 250 ton cooling tower in the mechanical yard, and upgrading the existing generator to a 400kW generator in order to serve the whole facility. New heaters, boilers, pumps, chillers, and a new oxygen bulk storage tank have to be installed in the CUP Building. Additionally, existing electrical gear has to be modified in order to connect the existing facility to the new mechanical equipment being installed. All this process will take nearly 71 days to complete and will begin once all the interior work for the building has been completed.

Completion & Closeout:

As the project comes to a finish and all MEP equipment has been installed in place, MEP systems testing & balancing may begin. While this is going on, final interior work (openings, flooring, finishes) is being done in the rest of the building. After completing the construction for phase II, contractor punchlist and commissioning may begin. This is when the medical equipment is being installed in the different operating rooms by their respective providers. The building has to go over a series of inspections by various different organizations, until reaching substantial completion January 02, 2014. Figure 2 above shows the detailed project closeout activities that have to take place in order to allow the owner to successfully move in by February 6th, 2014.

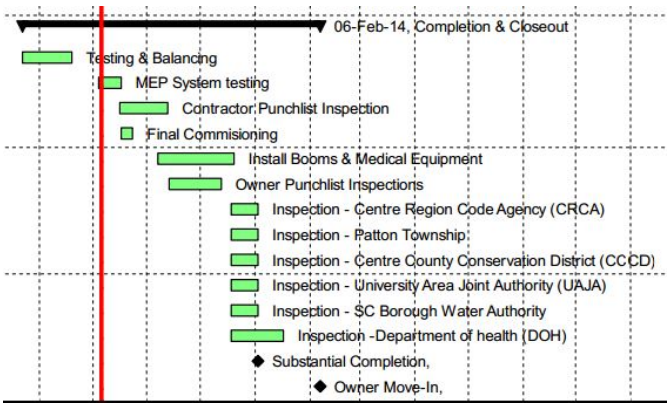


Figure 2: Closeout Activities taken from the detailed project schedule

Project Estimates

The actual building construction costs for Geisinger Gray's Woods Ambulatory Care campus addition sums up to a total of $20,145,961 (a detailed building systems cost comparison can be seen in page 9 of Technical Report 1). In order to better compare the costs of the different building systems, a structural systems estimate and assemblies MEP Estimate were performed. This allowed for more accurate systems costs than the SF Estimates reported in Tech #1, and will further be used analyze any potential cost impacts in the delivery of the 78,000SF addition to the Grays Woods Ambulatory Care Campus.

The estimates were generated using RS Means 2013 online edition, which enabled it to automatically adjust the costs for the construction in Port Matilda, PA. Costs are divided into material, labor and equipment costs and an additional 6% tax was added into the material and 10% subcontractor overhead was accounted into the overall costs. It is important to note that these costs do not take into account contractor's overhead, profit, and fees, as our focus was to compare those direct costs in construction. Following, you may find a detailed explanation and cost comparison for both of the cost estimates performed on this building.

Detailed Structural Estimate

The building's structural system is composed of structural steel members supported over a shallow cast-in-place concrete foundation. Included in this estimate will be the complete structural system of this building, which is composed of concrete slabs and foundation, structural steel members and composite metal decking. The detailed structural estimate is separated into two divisions: steel and concrete. For each division, a detailed quantity takeoff of the whole building was performed in order to attain an accurate detailed estimate. These takeoffs were later priced based on the costs obtained from RS Means 2013 and added the respective taxes and overhead to attain the final price. Table 3 below summarizes the detailed estimate for each division.

Table 3 – Detailed Structural System Estimates Overview

Structural System Overview		
Division	**Estimate Cost**	**Cost/SF**
03 - Concrete	$494,747	$6.38/SF
05 - Metals	$1,734,577	$22.35/SF

**Total Costs taken from the detailed estimate and $/SF based on 77,560SF

When comparing the cost estimates shown in Table 3 to those actual building costs, we find them considerably close. According to the actual construction costs supplied by Alexander

Building Construction, the structural steel had a total cost of $1.6 million, while the structural concrete slabs and foundation totaled $600,000. The differences in these estimated may be accounted for the difference in costs of RS Means in comparison to the actual costs from the subcontractors. The use of precast members in the shallow foundation structure and the differences in concrete delivery and placement may have also accounted to these differences in costs. With regards to steel, the steel prices for material and erection in the area may have differed from those in RS Means. Following is an explanation on how steel and concrete estimates were performed.

Steel Structure:

Steel makes up the biggest component of the building's structure. The total estimate to steel structural system for this building totaled $1,734,577, including taxes and subcontractor's overhead. This estimate takes into account all the wide flange members used in beams, columns and cross bracing, as well as miscellaneous metals such as studs, plates, and metal decking. A detailed takeoff of the building's complete structural steel was performed, and is summarized in Table 4 shown below. It is important to note that the costs stated are subtotals, as they do not include material taxes or subcontractor overhead in their final prices.

Table 4 – Structural Steel Estimate Summary

Structural Steel Estimate Summary			
Description	**Units**	**Quantity**	**Cost**
Wide Flange Members	EA	703	$1,219,755
Metal Studs	EA	621	$2,334.96
Base Plates	EA	76	$8,537.24
Gusset Plates	EA	32	$5,088.00
Metal Decking	SF	73,029	$260,201
**Quantity & Costs taken from the detailed estimate		**Subtotal**	**$1,495,916**

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

A total of 702 pieces (338 tons) of structural steel wide flange members make up the structural component of the Grays Woods addition. These took a little over 22 days to erect using a 150 ton capacity crawler crane on site. The wide flange members ranged in size anywhere from W8x10 to W33x118. There was no consistent pattern throughout the 1st floor and roof framing plans, so a complete takeoff was done for the whole building. The steel members for this estimate were taken off by hand and recorded into an Excel spreadsheet, which may be found in Appendix B-1**.** These takeoffs are broken down into beams, columns, and cross bracing wide flange members. As these takeoffs were performed, metal studs for the second floor composite metal decking were noted and later priced separately. Wide flange members were priced based

metal decking were noted and later priced separately. Wide flange members were priced based on costs per linear foot provided by RS Means. Separate takeoffs were done for metal decking, base plates and gusset plates, all which were priced based on costs per SF provided by RS Means.

Concrete Structure:

Since the Geisinger Gray's Woods project is supported by a 2-story steel framed structure, concrete is not a big component of the building's structural system. The estimated cost for concrete in this building totaled $494,747, including taxes and subcontractor's overhead. Concrete was mainly used in three areas for this building: foundations, slab on grade and slab on deck. A detailed takeoff for each of these components was performed, and is summarized in Table 5 shown below. It is important to note that the costs stated are subtotals, as they do not include material taxes or subcontractor overhead in their final prices.

Table 5 – Cast-In-Place Concrete Estimate Summary

CIP Concrete Estimate Summary			
Description	**Units**	**Quantity**	**Cost**
Foundations	CY	503.5	$165,177
Slab on Grade	CY	712.8	$150,988.86
Slab on Deck	CY	385.0	$123,454.71
Subtotal		**1,600 CY**	**$439,621**

**Quantity & Costs taken from the detailed estimate

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

A total of 1,600 cubic yards of concrete make up the shallow foundation, slab on grade and floor slab of the Grays Woods addition. Each system uses a different type of concrete and reinforcement methods, therefore takeoffs were done separately for each system and later priced based on RS Means cost for each different item.

The conventional shallow foundation system consists of spread/column and continuous wall footings that will support the building's columns and external walls. A total of 32 spread footings ranging from 4'x4' up to 10'x10', and a 2 ¼" wide wall footing running along the building's perimeter make up the building's shallow foundation. All the spread, strip and wall footings in the shallow foundation are placed 4 feet below final exterior grade, and range from 1.5' to 2' thicknesses. Concrete pedestals are used to support the steel columns, and are taken into account in the detailed estimate. The complete shallow foundation system is composed of 4,000psi normal weight concrete, and makes use of #3, #5, and #7 rebar for reinforcement. All

the concrete was assumed to be pumped in place from concrete trucks, and all the formwork was assumed to be plywood with a total of three uses.

The building's 5" slab on grade is reinforced with a 6x6-W2.9xW2.9 welded wire fence. It is composed of 3,000psi NW concrete, and assumed to be poured through pumps. Additional costs for curing and finishing the concrete were taken into account for this system, and are shown in a different line item in the detailed concrete estimate. Similar takeoffs were done for the 3 ½" concrete slab on deck, with the only difference being that lightweight rather than normal weight concrete was used in this system

Assemblies MEP Estimate

An MEP Assemblies estimate was created using the RS Means Online Construction Data for Mechanical, Electrical & Plumbing Assemblies. This estimate produced a total cost for the MEP systems of $7,150,685. The total costs for each division of the MEP estimate are summarized in Table 6 below. The plumbing division includes all the fireproofing, water drainage, plumbing fixtures and domestic hot water distribution for the building addition. HVAC division includes all the systems and distribution required for heating, cooling and ventilating the building. Finally, the electrical assemblies estimate contain the generator, switchgear, panelboards, lighting switches, receptacles and fixtures, and finally all communication and data services.

Table 6 – MEP Assemblies Estimate Summary

MEP Assemblies Estimate Summary			
Division	**Actual Cost**	**Estimate Cost**	**Difference**
22 - Plumbing	$1,515,591	$788,812	$726,779
23 - HVAC	$3,648,511	$3,446,561	$201,950
26 - Electrical	$3,488,440	$2,915,312	$573,128
Total MEP Estimate	**$8,652,542**	**$7,150,685**	**$1,501,857**

**Quantity & Costs taken from the detailed estimate

***See Appendix B-3 for the complete MEP Assemblies Estimate**

As seen in Table 6 above, the MEP Assemblies estimate was lower than the actual costs. This difference may be accounted to various reasons. The biggest factor to the difference in the estimate is the fact that the majority of the plumbing fixtures in the building are for medical gas. This was not taken into consideration in the MEP assemblies estimate since RS Means has no line item for these systems. Some other major exclusions from RS means that contribute to much of the system cost differences are the demolition of existing MEP distribution systems, as well as tie-in between the new and existing MEP systems. With these several considerations in mind, the $1.5 million difference in the actual cost and assemblies estimate is justifiable.

General Conditions Estimate

The general conditions estimate for the Geisinger Grays Woods Ambulatory Care Campus totaled to $1,764,400, or 6.7% of the total project cost. As Alexander Building Construction was not able to release the actual GC costs for this project, RS Means 2013 Data was used to price most of the items. The general conditions estimate is based off an 18 month construction schedule, and it's broken down into 5 main categories. These are: Project Team, Field Office, Field Operations, Insurance, and Building Closeout. Table 7 below summarizes the general conditions estimate breakdown for the Geisinger Gray's Woods Phase II addition.

Table 7 – General Conditions Estimate Summary

Category	Project Cost
Project Team	$805,642
Field Office	$21,120
Field Operations	$283,700
Insurance	$517,800
Testing and Inspections	$136,200
Total GC Costs	**$1,764,463**

**Costs taken from the general conditions estimate and based from RS Means Data

***See Appendix C-1 for the detailed General Conditions Estimate**

The project team costs include all of Alexander's employees associated with the project, and were based off the staffing plan discussed in Technical Report 1. Since not all project personnel were present during the whole 18 month duration of the project, a weighted percentage was made for each different employee based on their project participation per month. A detailed breakout of the project team participation may be seen in Appendix B-4. As it may be seen, the project manager and superintendent were the only ones to be involved during the complete project duration, while the rest of the staff was intermittently involved as they were also working in different projects.

Field office costs include all costs incurred from the office trailers on site and anything associated with them. This takes into account all trailer expenses such as office supplies, equipment, telephone, Lighting/HVAC, and travel costs. Field operations costs, in the other hand, include all those expenses incurred from constructing, operating, and maintaining activities in the field. This section takes into consideration all costs for field operations, such as temporary power/water/fencing/toilets, safety & winter protection, survey and waste management.

The last two items in the estimate are insurance and building closeout costs. Building closeout costs take into account those expenses from testing, commissioning and inspecting the building after construction is complete. Insurance costs include builder's risk, general liability, and performance bonds, and are based off the job as a total percentage of the contract ($26.2M). For this project, insurance costs sum up to $517,000, consisting nearly 29% of the GC costs, as illustrated in Figure 3 below.

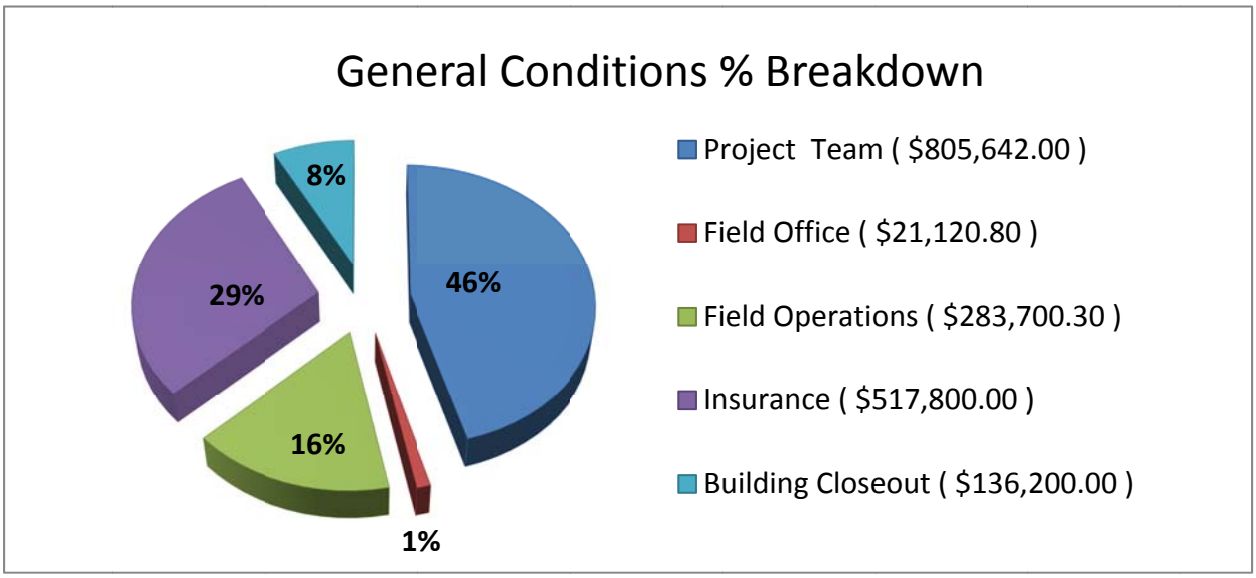


Figure 3: General conditions breakdown for each category

***See Appendix B-4 for weighted breakdown of Project Team Participation**

Site Layout Planning

The expansive site at which the Gray's Woods Ambulatory Care Campus addition will be constructed will easily allow for contractor and subcontractor trailer setup, construction and patient parking, material staging and storage areas, as well as recycling and waste bins to be set up on site. Due to the construction of a three-tier parking deck prior to beginning phase II construction, the site will undergo through various changes at each different phase of construction in order to allow for undisturbed patient parking and access to the existing facilities. For the purpose of illustrating the evolution of the site throughout the different construction phases, different site layouts for the parking lot expansion, building foundation, structural steel erection, and building's enclosure and interior have been made. The following sections detail out the site planning differences between each individual phase.

Phase 1 - Parking Lot Expansion

Although the parking lot expansion will not be directly evaluated in this thesis, it has a great impact on the schedule and phasing of the construction of Geisinger Gray's Woods Phase II expansion. This initial site shows the pre-existing conditions before groundbreaking the location at which Phase II addition will be constructed. During this phase, Alexander and subsequent subcontractors establish their trailers at the jobsite's southeastern corner out of the way for any construction activities. It is important to note that rear canopy is being constructed at the same time, therefore only the front entrance is accessible to patients. The pad where the facility's addition will be constructed serves as temporary parking lot for patients and Geisinger employees, and wasn't demolished until 2 months after parking garage construction began. Truck deliveries will be made through Abigail Road, and all the material will be stored and staged besides the parking deck construction, as illustrated in the site layout.

***See Appendix D-1 for the Parking Lot Expansion Site Layout Planning Map**

Phase 2 - Building Foundations

As the three-tier parking deck comes to a completion, Alexander will begin with the excavation for the building's foundation. During this phase, fencing around the building site will be erected, still allowing for patients to access the west park parking lot located at the building's rear entrance. The site's fence will be located in front of the contractor's trailer, and will allow access for excavation equipment and concrete trucks constantly entering and exiting the site. Demolition of the temporary parking has to take place prior to begin excavation for the building's foundation. Once the building pad is prepared, excavation and building foundation construction will begin at phase A closest to the existing building, slowly moving east.

***See Appendix D-2 for the Building Foundations Site Layout Planning Map**

Phase 3 - Structural Steel Erection

Before beginning the steel erection for the building's structure, Alexander must restrict those access roads that are under the crane swings in order to ensure safety to those transiting below. To do so, the site fence will be modified as to restrict access to construction personnel to the road passing in front of the trailer offices and connecting to the west parking lot. Half of the west parking lot will also be fenced to provide material storage trailers and parking space to subcontractors. Following Geisinger and Alexander's goal of 95% recycle material on site, a series of recycle bins are set up behind the building, as seen in Figure 4 on the right.

Figure 4: Recycle Bins and Dumpsters Installed on Site

The steel and material staging area will be setup besides the building's footprint, to allow the crane to easily pick the steel members and install them into place. The steel erection process will follow a similar phasing as the building's foundation. The 150 ton crawler crane will completely erect phase A prior towards phase B, as shown in the site layout. It is important to note that concrete trucks will also be transiting in and out of the site during this phase, as slab pouring will be done in sequence with steel erection.

***See Appendix D-3 for the Structural Steel Erection Site Layout Planning Map**

Phase 4 - Building Enclosure & Interior

The fourth and final phase for this project involves construction of the building's enclosure and interior work. At this point, most of the trades have been mobilized on site and are all working simultaneously in different areas of the building. This phase uses a similar site layout as the previous steel erection phase; the main difference between them is the lack of large equipment required for installation. The building's enclosure construction will begin at the eastern wall and working in a counterclockwise flow around the building until connecting the front part of the existing building. The building's interior work, in the other hand, will be done over four different phases. Material for interior work in the second floor will be forklifted from the staging area to the second floor through an access point left in the building's southern façade, as may be observed in Figure 5 on the left.


Figure 5: Material being lifted to second floor

***See Appendix D-4 for the Structural Steel Erection Site Layout Planning Map**

Constructability Challenges

All construction projects present their own unique challenges, and this is especially true for the construction of the 78,000SF addition to the Gray's Woods Ambulatory Care Campus. When construction work is taking besides an operating healthcare facility, the construction team must deal not only with the challenges associated with constructing the building but also the challenge of maintaining uninterrupted medical services. Following, we are going to analyze a few constructability challenges that the project team encountered and had to carefully manage during the construction of this project.

Infection Control Risk Assessment (ICRA) Partition Walls

Geisinger Health Systems and Alexander Building Construction recognize that facility patrons are their number one priority. Because the construction of the 78,000SF addition is being done to an occupied facility, it is critical that the safety of the patients, visitors, and staff take priority amongst all concerns of the construction management team. In order to reduce the risk of infection and disruption to the existing patients and faculty occupying phase I, Infection Control Risk Assessment (ICRA) walls have to be put in place as required by the ICRA elements in the AIA Guidelines.

For this construction, ICRA partition walls will have to be built in between both phases, as seen in Figure 5 on right. Not only will this allow the construction team to maintain an "unseen" presence throughout the construction of the facility, but will also ensure safety and comfort for all the occupants. ICRA Partitions are same as metal stud partition walls, but special considerations have to be taken into account in order to reduce noise, dust, infection agents, and other specific construction hazards from going through and impacting the existing facility's patients and users.

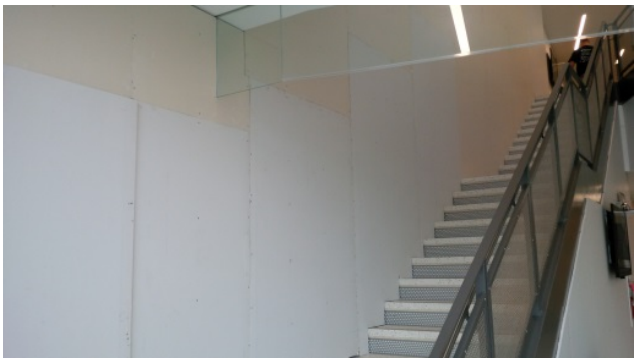


Figure 5: ICRA Partition Walls between both phases

The construction and demolition of the ICRA partition walls brings in many challenges to the project team for the construction of the Gray's Woods Ambulatory Care Campus. Because these walls are essential to the safety of the facility's occupants, they have to meet special requirements in order to receive the Infection Control Construction Permits. The ICRA partitions are required to be built as a 1-hr fire rated barrier to provide the occupants on either side adequate time to evacuate the building in case of any emergency. Once the interior work has

been completed and the building is ready to tie-in, careful effort has to be done by the construction team to demolish these walls, as well as extra work has to be done in order to restore finishes. The erection, demolition, and finish restoration incur a total duration of 26 days in the project schedule. A lot of sequencing has to be done behind the erection and demolition of these partition walls, and any delays in the construction/demolition of these walls may have a huge impact in the construction and phasing of the project. In addition to all these challenges, routine and random inspections will be required throughout the project to ensure the compliance of all Infection Control Risk Assessment procedures.

In conclusion, Geisinger Health systems and Alexander Building construction have to dedicate a lot of effort, time and money in the erection and demolition of the ICRA walls in order to ensure safety and comfort for all the users and faculty occupying the existing phase of the Ambulatory Care Campus.

Building and MEP Tie-in

One of the most challenging parts for the construction of this project will be the tie-ins between the new 78,000 addition and the existing wing of the ambulatory care campus. These tie-ins range from structural, enclosure, and MEP systems between both phases. This is especially challenging when the schedule and budget are driving the project and the existing phase is maintained fully occupational. In order to meet Geisinger's needs, it is essential that Alexander Building Construction plans and schedule these tie-ins thoroughly.

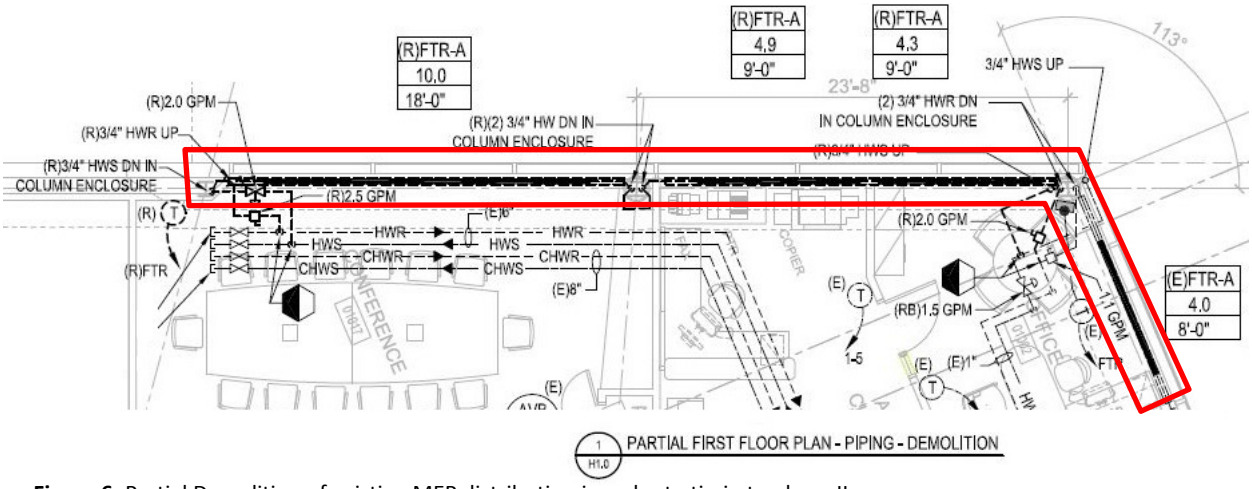


Figure 6: Partial Demolition of existing MEP distribution in order to tie-in to phase II

Highlighted in Figure 6 above is shown where the existing facility will be tying in to the new addition. In order for this to happen, partial demolition of the existing MEP systems and building façade has to take place. As both of the building's facilities will be connected to the same chiller utility plant serving the building, careful considerations have to be taken in place when performing these tie ins as they cannot interrupt any services to the existing building

Unforeseen Underground Conditions

As discussed in earlier in this report, Alexander Building Construction encountered underground plumbing issues when excavating for the building's shallow foundations. This brought many challenges to the construction team, which were forced to modify the schedule immediately. Careful planning and phasing of future construction work had to be done in order to have the least impact on overall construction schedule and cost for the construction of the addition of the Ambulatory Care Campus.

This problem immediately forced Alexander to pursue a vertical sequencing rather than the typical horizontal sequencing. Rather than stopping construction, structural steel continued to be erected vertically, and later moved horizontally once the problem was resolved. This produced a domino effect in the complete phasing of the project by changing the work flow, durations, critical path, material deliveries, trade sequencing and coordination. The construction team had the challenge of keeping all the trades informed of the new changes to the construction schedule, while also managing them all in order to assure that there were no delays in the delivery of the Ambulatory Care Campus addition.

Although the project started 6 weeks ahead of schedule due to the early completion of the parking garage construction, the construction team is now back at where it should be. These unforeseen conditions encountered at the beginning of the project may be one of the reasons as to why this project has delayed a total of 6 weeks, and will be further analyzed in the following technical report to identify schedule acceleration scenarios that may lead to have the least impact on the overall project duration.

LEED Evaluation

The United States Green Building Council (USGBC) is one of the leaders in sustainable building design and construction. They offer services that define, certify, and regulate what a sustainable or "green" building is. Their Leadership in Energy and Environmental Design (LEED) program uses a point based system out of 110 to define how sustainable a building is. The building is rated based on the amount of points earned in the seven different credit categories shown in Figure 7. The LEED ratings are as following:

- LEED Certified: 40-49 Points
- LEED Silver: 50-59 Points
- LEED Gold: 60-79 Points
- LEED Platinum: 80+ Points

Figure 7: Five main LEED Categories
(Image take from www.USGBC.org)

While phase I of the Gray's Woods Ambulatory Care Campus achieved a Silver Rating, Geisinger Health Systems decided that the added costs associated with achieving this rating were too high. For this 78,000SF addition, Geisinger along with Alexander Building are pursing LEED certified. In order to achieve this desired rating, 40-49 points must be attained. The first step in a LEED analysis is to identify the LEED points that are of the most value to the owner and worth pursuing. Table 8 below summarizes those LEED points, for each category, that are expected or not expected to be met on the Gray's Woods project.

Table 8 – LEED Evaluation Summary:

LEED Evaluation Summary				
Category	**Level of Pursuit**			**Possible Points**
	Yes	**?**	**No**	
Sustainable Sites	8	2	8	18
Water Efficiency	2	3	4	9
Energy & Atmosphere	9	9	21	39
Materials & Resources	12	0	4	16
Indoor Environmental Quality	8	8	2	18
Innovation & Design Process	4	2	0	6
Regional Priority Credits	2	2	0	4
Total:	**45**	**26**	**39**	**110**

*Checklist Based on LEED 2009 New Construction Rating System

***See Appendix E-1 for the complete LEED Rating System Checklist**

As evidenced in Table 8 above, the Gray's Woods Ambulatory Care Campus is expecting to achieve 45 out of 110 possible LEED points. However, if the project team would have been able to identify five additional LEED points to increase the total 50 credits, the project would have been able to achieve LEED silver rating. Following is an analysis of each major category, focusing on the points earned on this project and potential areas where additional points could have been achieved.

Sustainable Sites: (8/18 points)

According to USGBC's website, sustainable site credits encourage strategies that minimize the impact on the ecosystem and water resources. This Ambulatory Care Campus will be located Gray's Woods, an existing 52 acre lot located near I-99 interchange at Port Matilda, PA. This extensive site not only allows for easy access to public and construction workers, but allows for the construction to easily accommodate other LEED points for materials, resources, and water efficiency, as we will discuss later on.

The Gray's Woods project obtained LEED points for site selection, public transportation access, maximization of open space, stormwater design, and light pollution reduction. Considering that this facility was constructed in a site that already houses a LEED Silver facility, it facilitated in achieving many of these points without the need to invest a lot of money. The construction was able to be done by having a minimal impact on the existing site, while also taking advantage of the existing lighting and stormwater control in the site.

Water Efficiency: (2/9 points)

The Water Efficiency category focuses on the reduction of water consumption over a building's useable life. This is done by treating wastewater, collecting rainfall, and reducing the amount of potable water used in the building or by the irrigation systems for the onsite plants. The Gray's Woods Campus does very poorly on this category, as it projects to obtain 2 out of possible 9 points. In order to achieve the further points in this category, LEED requires the building to reduce the baseline potable water consumption for the site; 2 points if reduced by 50% and 3 additional points if reduced by 100%. Given that existing wastewater drainage already existed in site, Geisinger could have invested in ways of treating this wastewater and reusing rainwater for site irrigation in order to maximize water efficiency.

Energy & Atmosphere: (9/39 points)

The energy and atmosphere section focuses mainly on the building's mechanical systems, and the impact they have on the environment. This category has the greatest weight out of all categories, offering 39 points out of the 110 total. Three prerequisites must be met before any credits can be obtained in this category: fundamental commissioning of building systems,

minimum energy performance, and fundamental refrigerant management. All of these are met for this building, giving the project eligibility for the respective credits. The largest subcategory within this option is "Optimizing Energy Performance". This credit is based on energy simulation, and the project team is only aiming for a 24% improvement in the building performance rating, which awards it 7 out of 24 possible points in this category. Some barriers to improving this rating further are the large open public spaces located at the building's northern curtain wall and the large amount of ventilation and conditioning needed in order to keep patients comfortable through the use of 100% outside air. Although the building uses variable air volume controls, there is no automatic control systems to optimize the building's energy performance as occupancy changes in each area. No points could be awarded to the facility through the use of on-site renewable energy or green power because neither of these applications is being integrated into the building's design. Therefore, this facility only achieved 9 out of possible 39 points under this category.

Material & Resources: (12/ 16 points)

The Gray's Woods project will receive all possible credits in this category, save for those 4 credits attainable by "Building Reuse". As this building is classified as new construction, the project does not qualify under this range of points. The construction team greatly focused in the use of recycling material in site. In this region, it is extremely hard to find waste management programs that specialize in recycling. Nevertheless, Alexander invested $95,000 in a waste management program in order to achieve their goal of recycling 95% of the material in site. Moreover, 20% of the material used in the construction of this project originates from within 500km of the site. Alexander's strong interest in sustainable construction allowed them to easily attain the 12 out of 16 possible points under this category.

Indoor Environmental Quality: (8/ 18 points)

The purpose of the indoor environmental quality credits is to promote better indoor air quality and access to daylight and views to the outside. Gray's Woods project obtained credits for outdoor air delivering monitoring, indoor air quality management plan during and after construction, use of low-emitting materials, and indoor lighting controls. Also, the project may possibly get additional points for daylighting and views to the exterior, as most of the building's public spaces are completely enclosed by curtain walls. The only points that Geisinger will not be able to achieve are indoor chemical/pollutant source control and controllability of systems with regard to thermal comfort. Because this is a healthcare building and the inhabitants would be exposed to low levels of indoor pollutants, the design team did not develop an extensive enough pollutant source control system to warrant a LEED point. With this in mind, this outpatient facility will receive 8 out of 18 possible points, leaving other 8 points still possible upon LEED accreditation.

Bonus Credits: (6/10 points)

The USGBC offers two additional categories that allow for extra LEED credits; these are "Innovation & Design Process" and "Regional Priority Credits". Innovation & Design processes address the sustainable design measurements not covered under the five LEED credit categories. The Gray's Woods project obtained 4 points for this category, and 2 in the Regional Priority Credits Category. The project team focused on the Innovation in design through the use of LEED Accredited professionals and Integrated Project Planning and Design. The other 4 extra credits are questionable and it is still possible that they are achieved upon LEED Inspection.

Critical Evaluation:

In analyzing the LEED Scorecard, the Geisinger Gray's Woods Ambulatory Care Campus may be considered a sustainable project. By obtaining 45 out of the possible 110 points, the project will definitely achieve a LEED Certified position. Although the project is 5 points away from being accredited LEED Silver, the project team chose not to go for this certification. While also having 26 possible points adrift, it is still very likely that this project reaches LEED Silver ranking.

The largest majority of points not pursued on the checklist include "Water Efficiency" and "Energy and Atmosphere" categories. When looking at these credits in detail, it involves much planning and investing a lot of money in order to achieve. Because of this, Geisinger decided to step down from LEED Silver and rather pursue LEED Certified for Phase II of the Ambulatory Care Campus. Nevertheless, Alexander maintained a high level of commitment to sustainable construction through the implementation of waste management program and use of local materials. In conclusion, the Gray's Woods project is markedly sustainable, and increasing its sustainability would only further increase the cost of the project without adding any value to the owner.

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References:

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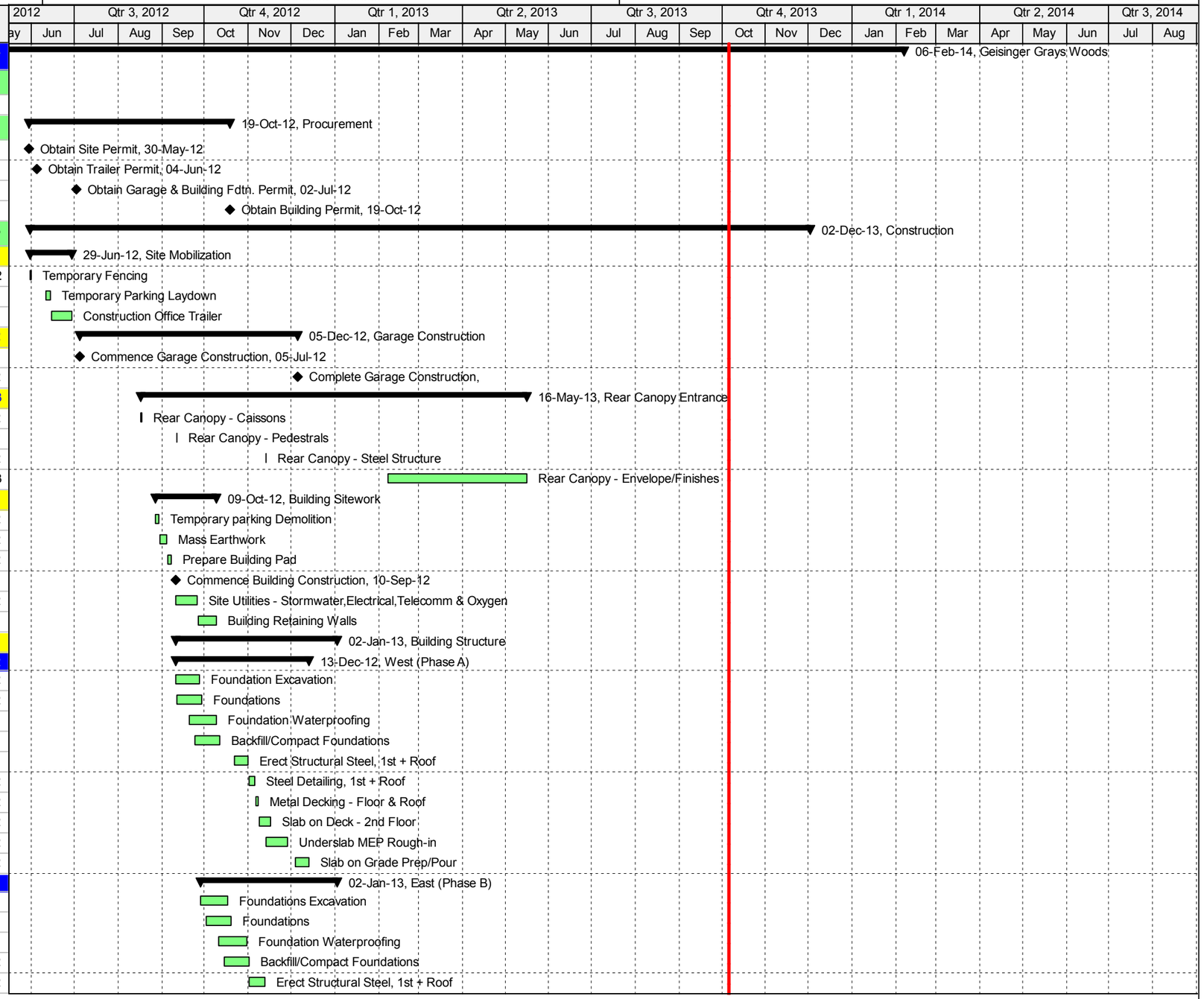
- https://www.premierinc.com/quality-safety/tools-services/safety/topics/construction/icra.jsp
- http://www.usgbc.org/leed/rating-systems
- http://www.wikiengineer.com/Construction/SustainableSites

APPENDIX A

Detailed Project Schedule

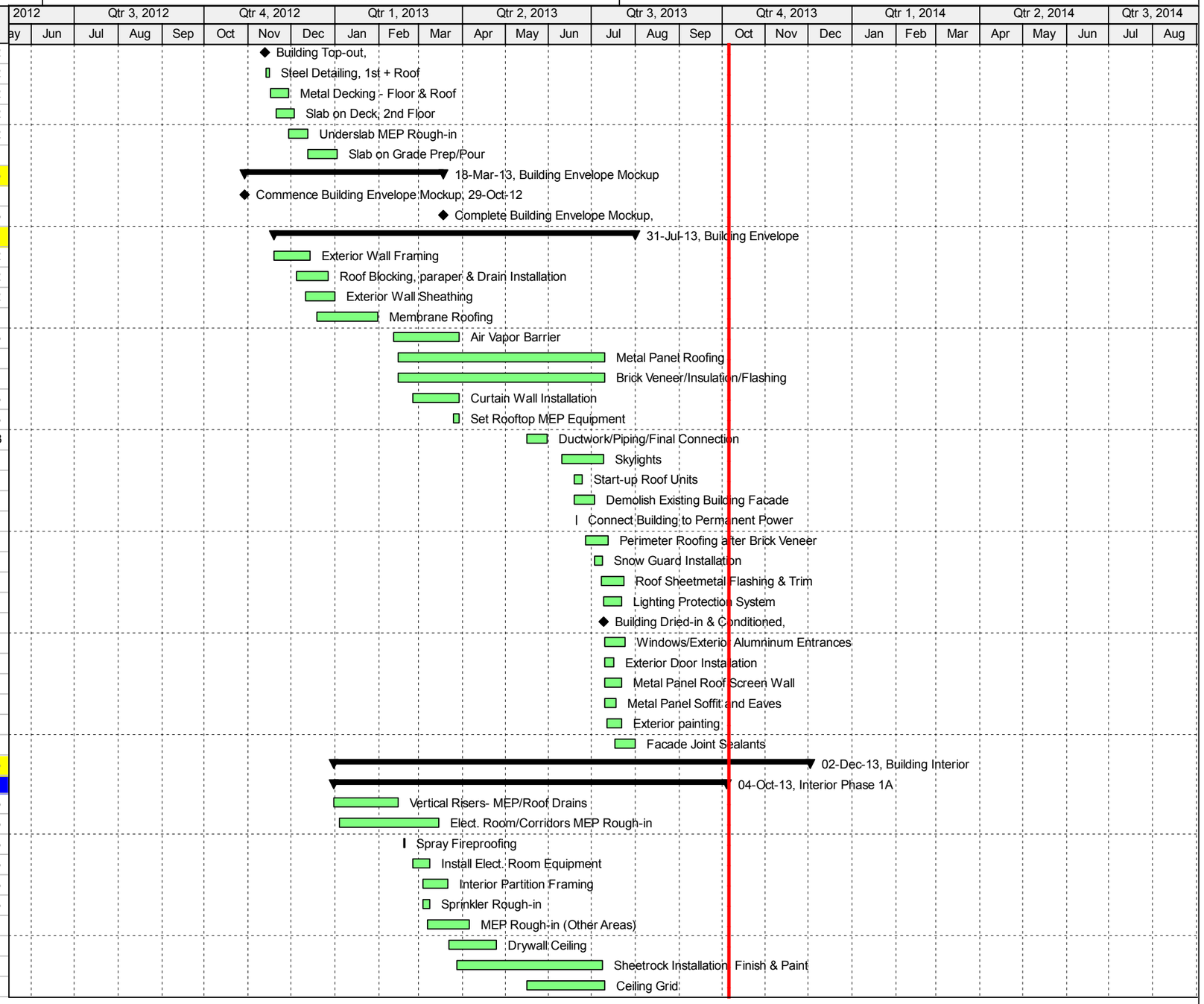
Activity Name	Original Duration	Start	Finish
Geisinger Grays Woods	686	01-Jun-11	06-Feb-14
Design Development	89	01-Jun-11	05-Oct-11
Design Development	89	01-Jun-11	05-Oct-11
Procurement	100	30-May-12	19-Oct-12
Obtain Site Permit	0	30-May-12	
Obtain Trailer Permit	0	04-Jun-12	
Obtain Garage & Building Fdtn. Permit	0	02-Jul-12	
Obtain Building Permit	0	19-Oct-12	
Construction	384	31-May-12	02-Dec-13
Site Mobilization	22	31-May-12	29-Jun-12
Temporary Fencing	1	31-May-12	31-May-12
Temporary Parking Laydown	4	11-Jun-12	14-Jun-12
Construction Office Trailer	11	15-Jun-12	29-Jun-12
Garage Construction	108	05-Jul-12	05-Dec-12
Commence Garage Construction	0	05-Jul-12	
Complete Garage Construction	0		05-Dec-12
Rear Canopy Entrance	191	17-Aug-12	16-May-13
Rear Canopy - Caissons	1	17-Aug-12	17-Aug-12
Rear Canopy - Pedestrals	1	11-Sep-12	11-Sep-12
Rear Canopy - Steel Structure	1	13-Nov-12	13-Nov-12
Rear Canopy - Envelope/Finishes	71	07-Feb-13	16-May-13
Building Sitework	31	27-Aug-12	09-Oct-12
Temporary parking Demolition	3	27-Aug-12	29-Aug-12
Mass Earthwork	3	30-Aug-12	04-Sep-12
Prepare Building Pad	3	05-Sep-12	07-Sep-12
Commence Building Construction	0	10-Sep-12	
Site Utilities - Stormwater,Electrical,Telecomm	12	10-Sep-12	25-Sep-12
Building Retaining Walls	10	26-Sep-12	09-Oct-12
Building Structure	80	10-Sep-12	02-Jan-13
West (Phase A)	68	10-Sep-12	13-Dec-12
Foundation Excavation	14	10-Sep-12	27-Sep-12
Foundations	14	11-Sep-12	28-Sep-12
Foundation Waterproofing	14	20-Sep-12	09-Oct-12
Backfill/Compact Foundations	14	24-Sep-12	11-Oct-12
Erect Structural Steel, 1st + Roof	8	22-Oct-12	31-Oct-12
Steel Detailing, 1st + Roof	3	01-Nov-12	05-Nov-12
Metal Decking - Floor & Roof	2	06-Nov-12	07-Nov-12
Slab on Deck - 2nd Floor	7	08-Nov-12	16-Nov-12
Underslab MEP Rough-in	11	13-Nov-12	28-Nov-12
Slab on Grade Prep/Pour	8	04-Dec-12	13-Dec-12
East (Phase B)	66	28-Sep-12	02-Jan-13
Foundations Excavation	14	28-Sep-12	17-Oct-12
Foundations	14	02-Oct-12	19-Oct-12
Foundation Waterproofing	14	11-Oct-12	30-Oct-12
Backfill/Compact Foundations	14	15-Oct-12	01-Nov-12
Erect Structural Steel, 1st + Roof	8	01-Nov-12	12-Nov-12



Actual Level of Effort | Actual Work | Remaining Work | Critical Remaining Work | Milestone | summary

TASK filter: All Activities

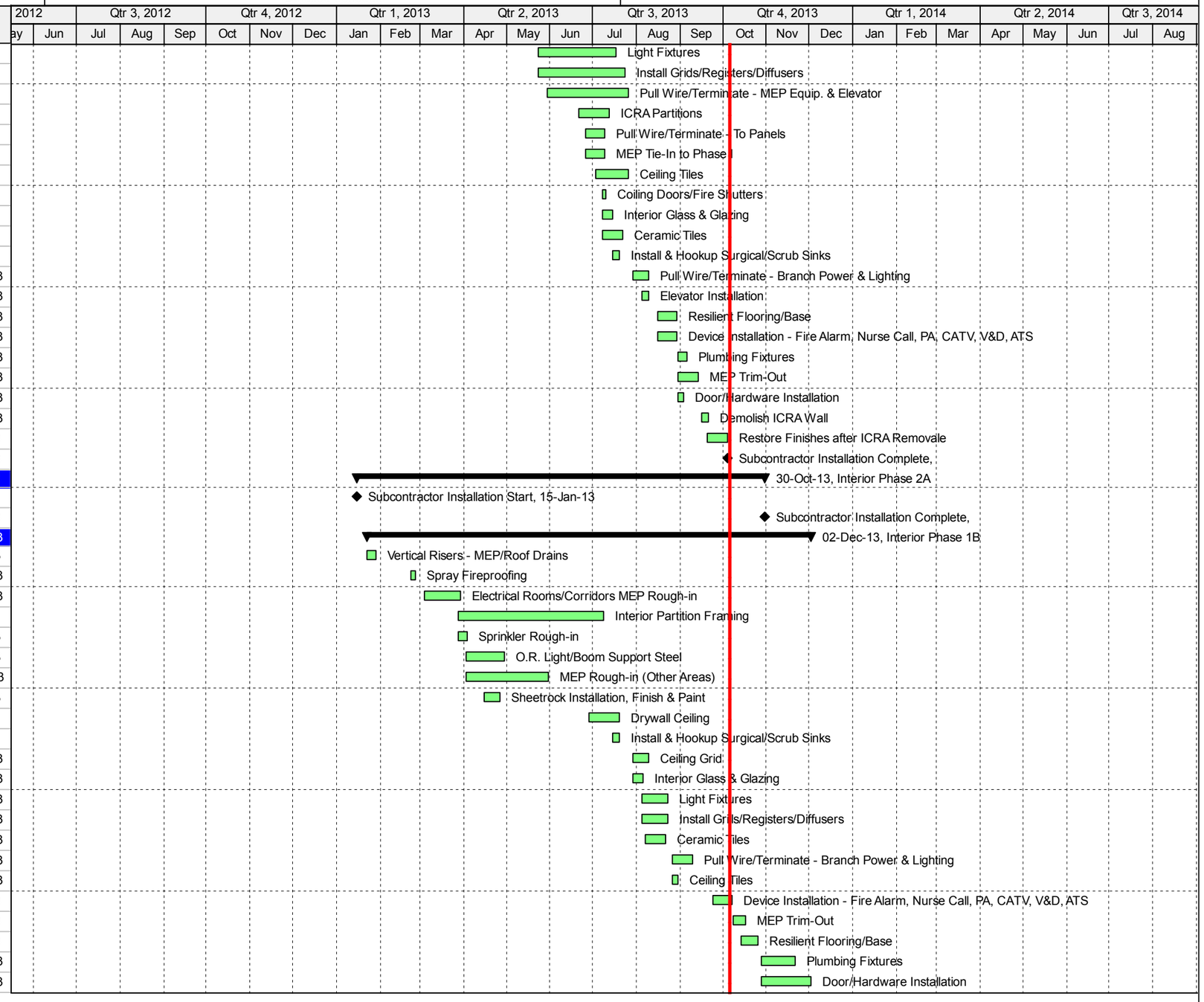
Activity Name	Original Duration	Start	Finish
Building Top-out	0		12-Nov-12
Steel Detailing, 1st + Roof	3	13-Nov-12	15-Nov-12
Metal Decking - Floor & Roof	9	16-Nov-12	29-Nov-12
Slab on Deck, 2nd Floor	9	20-Nov-12	03-Dec-12
Underslab MEP Rough-in	10	29-Nov-12	12-Dec-12
Slab on Grade Prep/Pour	13	13-Dec-12	02-Jan-13
Building Envelope Mockup	98	29-Oct-12	18-Mar-13
Commence Building Envelope Mockup	0	29-Oct-12	
Complete Building Envelope Mockup	0		18-Mar-13
Building Envelope	178	19-Nov-12	31-Jul-13
Exterior Wall Framing	19	19-Nov-12	14-Dec-12
Roof Blocking, paraper & Drain Installation	16	05-Dec-12	27-Dec-12
Exterior Wall Sheathing	14	11-Dec-12	31-Dec-12
Membrane Roofing	30	19-Dec-12	31-Jan-13
Air Vapor Barrier	35	11-Feb-13	29-Mar-13
Metal Panel Roofing	103	14-Feb-13	10-Jul-13
Brick Veneer/Insulation/Flashing	103	14-Feb-13	10-Jul-13
Curtain Wall Installation	25	25-Feb-13	29-Mar-13
Set Rooftop MEP Equipment	5	25-Mar-13	29-Mar-13
Ductwork/Piping/Final Connection	10	16-May-13	30-May-13
Skylights	21	10-Jun-13	09-Jul-13
Start-up Roof Units	4	19-Jun-13	24-Jun-13
Demolish Existing Building Facade	11	19-Jun-13	03-Jul-13
Connect Building to Permanent Power	1	20-Jun-13	20-Jun-13
Perimeter Roofing after Brick Veneer	11	27-Jun-13	12-Jul-13
Snow Guard Installation	3	03-Jul-13	08-Jul-13
Roof Sheetmetal Flashing & Trim	12	08-Jul-13	23-Jul-13
Lighting Protection System	10	09-Jul-13	22-Jul-13
Building Dried-in & Conditioned	0		09-Jul-13
Windows/Exterior Alumninum Entrances	11	10-Jul-13	24-Jul-13
Exterior Door Installation	5	10-Jul-13	16-Jul-13
Metal Panel Roof Screen Wall	9	10-Jul-13	22-Jul-13
Metal Panel Soffit and Eaves	7	10-Jul-13	18-Jul-13
Exterior painting	7	12-Jul-13	22-Jul-13
Facade Joint Sealants	11	17-Jul-13	31-Jul-13
Building Interior	236	31-Dec-12	02-Dec-13
Interior Phase 1A	196	31-Dec-12	04-Oct-13
Vertical Risers- MEP/Roof Drains	33	31-Dec-12	14-Feb-13
Elect. Room/Corridors MEP Rough-in	51	04-Jan-13	15-Mar-13
Spray Fireproofing	2	18-Feb-13	19-Feb-13
Install Elect. Room Equipment	10	25-Feb-13	08-Mar-13
Interior Partition Framing	14	04-Mar-13	21-Mar-13
Sprinkler Rough-in	5	04-Mar-13	08-Mar-13
MEP Rough-in (Other Areas)	22	07-Mar-13	05-Apr-13
Drywall Ceiling	24	22-Mar-13	24-Apr-13
Sheetrock Installation, Finish & Paint	71	28-Mar-13	08-Jul-13
Ceiling Grid	38	16-May-13*	10-Jul-13



Actual Level of Effort | Actual Work | Remaining Work | Critical Remaining Work | Milestone | summary

TASK filter: All Activities

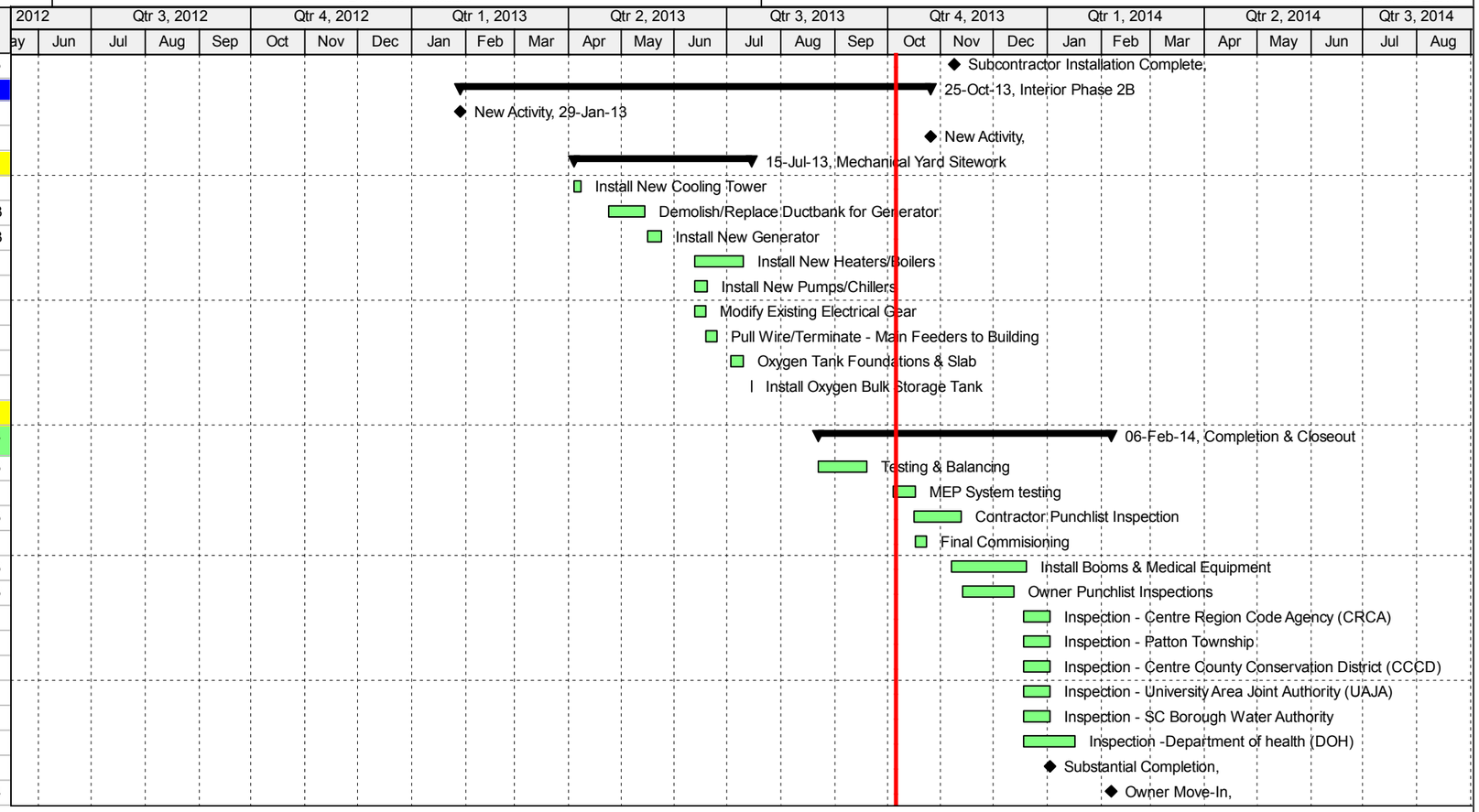
Activity Name	Original Duration	Start	Finish
Light Fixtures	38	23-May-13	17-Jul-13
Install Grids/Registers/Diffusers	42	23-May-13	23-Jul-13
Pull Wire/Termintate - MEP Equip. & Eleva	41	30-May-13	26-Jul-13
ICRA Partitions	15	21-Jun-13	12-Jul-13
Pull Wire/Terminate - To Panels	9	26-Jun-13	09-Jul-13
MEP Tie-In to Phase I	9	26-Jun-13	09-Jul-13
Ceiling Tiles	17	03-Jul-13	26-Jul-13
Coiling Doors/Fire Shutters	3	08-Jul-13	10-Jul-13
Interior Glass & Glazing	6	08-Jul-13	15-Jul-13
Ceramic Tiles	11	08-Jul-13	22-Jul-13
Install & Hookup Surgical/Scrub Sinks	5	15-Jul-13	19-Jul-13
Pull Wire/Terminate - Branch Power & Ligh	10	29-Jul-13	09-Aug-13
Elevator Installation	5	05-Aug-13	09-Aug-13
Resilient Flooring/Base	10	16-Aug-13	29-Aug-13
Device Installation - Fire Alarm, Nurse Call,	10	16-Aug-13	29-Aug-13
Plumbing Fixtures	4	30-Aug-13	05-Sep-13
MEP Trim-Out	10	30-Aug-13	13-Sep-13
Door/Hardware Installation	2	30-Aug-13	03-Sep-13
Demolish ICRA Wall	5	16-Sep-13	20-Sep-13
Restore Finishes after ICRA Removale	11	20-Sep-13	04-Oct-13
Subcontractor Installation Complete	0		04-Oct-13
Interior Phase 2A	204	15-Jan-13	30-Oct-13
Subcontractor Installation Start	0	15-Jan-13	
Subcontractor Installation Complete	0		30-Oct-13
Interior Phase 1B	221	22-Jan-13	02-Dec-13
Vertical Risers - MEP/Roof Drains	5	22-Jan-13	28-Jan-13
Spray Fireproofing	2	22-Feb-13	25-Feb-13
Electrical Rooms/Corridors MEP Rough-in	20	04-Mar-13	29-Mar-13
Interior Partition Framing	71	28-Mar-13	08-Jul-13
Sprinkler Rough-in	5	28-Mar-13	03-Apr-13
O.R. Light/Boom Support Steel	20	02-Apr-13	29-Apr-13
MEP Rough-in (Other Areas)	42	02-Apr-13	30-May-13
Sheetrock Installation, Finish & Paint	10	15-Apr-13	26-Apr-13
Drywall Ceiling	15	28-Jun-13	19-Jul-13
Install & Hookup Surgical/Scrub Sinks	5	15-Jul-13	19-Jul-13
Ceiling Grid	10	29-Jul-13	09-Aug-13
Interior Glass & Glazing	6	29-Jul-13	05-Aug-13
Light Fixtures	15	05-Aug-13	23-Aug-13
Install Grills/Registers/Diffusers	15	05-Aug-13	23-Aug-13
Ceramic Tiles	11	07-Aug-13	21-Aug-13
Pull Wire/Terminate - Branch Power & Ligh	10	26-Aug-13	09-Sep-13
Ceiling Tiles	5	26-Aug-13	30-Aug-13
Device Installation - Fire Alarm, Nurse Call,	10	24-Sep-13	07-Oct-13
MEP Trim-Out	8	08-Oct-13*	17-Oct-13
Resilient Flooring/Base	10	14-Oct-13*	25-Oct-13
Plumbing Fixtures	19	28-Oct-13*	21-Nov-13
Door/Hardware Installation	25	28-Oct-13*	02-Dec-13



Actual Level of Effort | Remaining Work | Milestone
Actual Work | Critical Remaining Work | summary

TASK filter: All Activities

Activity Name	Original Duration	Start	Finish
Subcontractor Installation Complete	0		08-Nov-13
Interior Phase 2B	191	29-Jan-13	25-Oct-13
New Activity	0	29-Jan-13	
New Activity	0		25-Oct-13
Mechanical Yard Sitework	71	04-Apr-13	15-Jul-13
Install New Cooling Tower	3	04-Apr-13	08-Apr-13
Demolish/Replace Ductbank for Generator	15	24-Apr-13	14-May-13
Install New Generator	7	16-May-13	24-May-13
Install New Heaters/Boilers	20	12-Jun-13	10-Jul-13
Install New Pumps/Chillers	6	12-Jun-13	19-Jun-13
Modify Existing Electrical Gear	5	12-Jun-13	18-Jun-13
Pull Wire/Terminate - Main Feeders to Buildin	5	19-Jun-13	25-Jun-13
Oxygen Tank Foundations & Slab	5	03-Jul-13	10-Jul-13
Install Oxygen Bulk Storage Tank	1	15-Jul-13	15-Jul-13
CUP Building Work	0		
Completion & Closeout	118	22-Aug-13	06-Feb-14
Testing & Balancing	20	22-Aug-13	19-Sep-13
MEP System testing	10	04-Oct-13	17-Oct-13
Contractor Punchlist Inspection	20	16-Oct-13*	12-Nov-13
Final Commisioning	5	17-Oct-13*	23-Oct-13
Install Booms & Medical Equipment	30	07-Nov-13*	19-Dec-13
Owner Punchlist Inspections	21	13-Nov-13*	12-Dec-13
Inspection - Centre Region Code Agency (CRCA	11	18-Dec-13*	02-Jan-14
Inspection - Patton Township	11	18-Dec-13*	02-Jan-14
Inspection - Centre County Conservation District	11	18-Dec-13*	02-Jan-14
Inspection - University Area Joint Authority (UAJA	11	18-Dec-13*	02-Jan-14
Inspection - SC Borough Water Authority	11	18-Dec-13*	02-Jan-14
Inspection -Department of health (DOH)	21	18-Dec-13*	16-Jan-14
Substantial Completion	0		02-Jan-14
Owner Move-In	0		06-Feb-14



Actual Level of Effort | Actual Work | Remaining Work | Critical Remaining Work | Milestone | summary

TASK filter: All Activities

APPENDIX B

Detailed Structural Systems Estimate

Appendix B-1: Structural Steel Detailed Estimate

Wide Flange Members													
							Material		Labor		Equipment		
Size		Length	Unit	Studs	Qty.	Tota LF	$/Unit	Total	$/Unit	Total	$/Unit	Total	TOTAL
Beams	W8x10	3.5	LF	0	1	3.5	$13.30	$46.55	$3.65	$12.78	$2.88	$10.08	$69
		5	LF	0	1	5	$13.30	$66.50	$3.65	$18.25	$2.88	$14.40	$99
		5.8	LF	0	2	11.6	$13.30	$154.28	$3.65	$42.34	$2.88	$33.41	$230
		6.5	LF	0	1	6.5	$13.30	$86.45	$3.65	$23.73	$2.88	$18.72	$129
		7.4	LF	0	2	14.8	$13.30	$196.84	$3.65	$54.02	$2.88	$42.62	$293
	W8x18	5.2	LF	0	14	72.8	$20.04	$1,458.91	$3.65	$265.72	$2.88	$209.66	$1,934
		11.3	LF	0	1	11.3	$20.04	$226.45	$3.65	$41.25	$2.88	$32.54	$300
		12.3	LF	0	14	172.2	$20.04	$3,450.89	$3.65	$628.53	$2.88	$495.94	$4,575
		20	LF	0	32	640	$20.04	$12,825.60	$3.65	$2,336.00	$2.88	$1,843.20	$17,005
	W8x35	7.5	LF	0	8	60	$46.60	$2,796.00	$3.99	$239.40	$3.14	$188.40	$3,224
		17.5	LF	0	1	17.5	$46.60	$815.50	$3.99	$69.83	$3.14	$54.95	$940
	W8x40	49	LF	0	1	49	$52.38	$2,566.62	$3.99	$195.51	$3.14	$153.86	$2,916
	W10x12	6.6	LF	0	1	6.6	$15.98	$105.47	$3.65	$24.09	$2.88	$19.01	$149
		7.2	LF	0	1	7.2	$15.98	$115.06	$3.65	$26.28	$2.88	$20.74	$162
		9.8	LF	0	7	68.6	$15.98	$1,096.23	$3.65	$250.39	$2.88	$197.57	$1,544
		10	LF	0	4	40	$15.98	$639.20	$3.65	$146.00	$2.88	$115.20	$900
		10.3	LF	0	1	10.3	$15.98	$164.59	$3.65	$37.60	$2.88	$29.66	$232
	W10x33	21.3	LF	0	1	21.3	$43.80	$932.94	$3.99	$84.99	$3.14	$66.88	$1,085
		30	LF	0	1	30	$43.80	$1,314.00	$3.99	$119.70	$3.14	$94.20	$1,528
	W12x14	7	LF	0	1	7	$21.44	$150.08	$2.49	$17.43	$1.96	$13.72	$181
		8	LF	0	1	8	$21.44	$171.52	$2.49	$19.92	$1.96	$15.68	$207
		9.4	LF	0	1	9.4	$21.44	$201.54	$2.49	$23.41	$1.96	$18.42	$243
		9.8	LF	0	2	19.6	$21.44	$420.22	$2.49	$48.80	$1.96	$38.42	$507
		10	LF	0	1	10	$21.44	$214.40	$2.49	$24.90	$1.96	$19.60	$259
	W12x19	6.5	LF	0	1	6.5	$29.36	$190.84	$2.49	$16.19	$1.96	$12.74	$220
		7.5	LF	0	2	15	$29.36	$440.40	$2.49	$37.35	$1.96	$29.40	$507
		8	LF	0	2	16	$29.36	$469.76	$2.49	$39.84	$1.96	$31.36	$541
		9.3	LF	0	3	27.9	$29.36	$819.14	$2.49	$69.47	$1.96	$54.68	$943
		9.8	LF	0	2	19.6	$29.36	$575.46	$2.49	$48.80	$1.96	$38.42	$663
		10	LF	0	11	110	$29.36	$3,229.60	$2.49	$273.90	$1.96	$215.60	$3,719
		10.3	LF	0	4	41.2	$29.36	$1,209.63	$2.49	$102.59	$1.96	$80.75	$1,393
		11	LF	0	6	66	$29.36	$1,937.76	$2.49	$164.34	$1.96	$129.36	$2,231
		15.1	LF	0	2	30.2	$29.36	$886.67	$2.49	$75.20	$1.96	$59.19	$1,021
		16.6	LF	0	6	99.6	$29.36	$2,924.26	$2.49	$248.00	$1.96	$195.22	$3,367
		18.8	LF	0	7	131.6	$29.36	$3,863.78	$2.49	$327.68	$1.96	$257.94	$4,449
		19.6	LF	0	2	39.2	$29.36	$1,150.91	$2.49	$97.61	$1.96	$76.83	$1,325
	W12x26	10	LF	0	24	240	$34.48	$8,275.20	$2.49	$597.60	$1.96	$470.40	$9,343
	W12x40	10.3	LF	0	1	10.3	$56.24	$579.27	$2.71	$27.91	$2.13	$21.94	$629
		21	LF	0	1	21	$56.24	$1,181.04	$2.71	$56.91	$2.13	$44.73	$1,283
	W12x50	8	LF	0	1	8	$66.64	$533.12	$2.93	$23.44	$2.30	$18.40	$575
	W14x22	8.08	LF	0	6	48.48	$34.48	$1,671.59	$2.22	$107.63	$1.74	$84.36	$1,864
		10.3	LF	0	2	20.6	$34.48	$710.29	$2.22	$45.73	$1.74	$35.84	$792
		13.4	LF	0	1	13.4	$34.48	$462.03	$2.22	$29.75	$1.74	$23.32	$515
		16.2	LF	0	12	194.4	$34.48	$6,702.91	$2.22	$431.57	$1.74	$338.26	$7,473
		20.9	LF	20	2	41.8	$34.48	$1,441.26	$2.22	$92.80	$1.74	$72.73	$1,607
		21.2	LF	0	3	63.6	$34.48	$2,192.93	$2.22	$141.19	$1.74	$110.66	$2,445
		23.2	LF	24	1	23.2	$34.48	$799.94	$2.22	$51.50	$1.74	$40.37	$892
	W14x30	10	LF	0	4	40	$40.08	$1,603.20	$2.43	$97.20	$1.91	$76.40	$1,777
	W16x26	8.1	LF	0	3	24.3	$34.48	$837.86	$2.19	$53.22	$1.73	$42.04	$933
		9.6	LF	0	3	28.8	$34.48	$993.02	$2.19	$63.07	$1.73	$49.82	$1,106
		10	LF	0	4	40	$34.48	$1,379.20	$2.19	$87.60	$1.73	$69.20	$1,536
		11.6	LF	0	1	11.6	$34.48	$399.97	$2.19	$25.40	$1.73	$20.07	$445
		10.3	LF	0	7	72.1	$34.48	$2,486.01	$2.19	$157.90	$1.73	$124.73	$2,769
		16.2	LF	0	1	16.2	$34.48	$558.58	$2.19	$35.48	$1.73	$28.03	$622
		17.8	LF	0	3	53.4	$34.48	$1,841.23	$2.19	$116.95	$1.73	$92.38	$2,051
		18	LF	0	1	18	$34.48	$620.64	$2.19	$39.42	$1.73	$31.14	$691
		21.3	LF	0	3	63.9	$34.48	$2,203.27	$2.19	$139.94	$1.73	$110.55	$2,454
		24.6	LF	0	1	24.6	$34.48	$848.21	$2.19	$53.87	$1.73	$42.56	$945
		26.3	LF	26	1	26.3	$34.48	$906.82	$2.19	$57.60	$1.73	$45.50	$1,010
	W16x31	19.6	LF	0	3	58.8	$41.47	$2,438.44	$2.43	$142.88	$1.91	$112.31	$2,694
		30	LF	30	2	60	$41.47	$2,488.20	$2.43	$145.80	$1.91	$114.60	$2,749
		30.6	LF	0	1	30.6	$41.47	$1,268.98	$2.43	$74.36	$1.91	$58.45	$1,402
	W 18 x 35	11	LF	0	2	22	$46.60	$1,025.20	$3.41	$75.02	$1.97	$43.34	$1,144
		23.3	LF	0	1	23.3	$46.60	$1,085.78	$3.41	$79.45	$1.97	$45.90	$1,211
		30	LF	30	43	1290	$46.60	$60,114.00	$3.41	$4,398.90	$1.97	$2,541.30	$67,054
		30	LF	0	15	450	$46.60	$20,970.00	$3.41	$1,534.50	$1.97	$886.50	$23,391
		30.66	LF	0	7	214.62	$46.60	$10,001.29	$3.41	$731.85	$1.97	$422.80	$11,156
		36	LF	36	27	972	$46.60	$45,295.20	$3.41	$3,314.52	$1.97	$1,914.84	$50,525
	W 18 x 40	19.6	LF	19	1	19.6	$53.12	$1,041.15	$3.41	$66.84	$1.97	$38.61	$1,147
		23	LF	23	1	23	$53.12	$1,221.76	$3.41	$78.43	$1.97	$45.31	$1,346
		29.2	LF	0	2	58.4	$53.12	$3,102.21	$3.41	$199.14	$1.97	$115.05	$3,416
		30	LF	0	5	150	$53.12	$7,968.00	$3.41	$511.50	$1.97	$295.50	$8,775
		30.6	LF	0	1	30.6	$53.12	$1,625.47	$3.41	$104.35	$1.97	$60.28	$1,790
		35.3	LF	0	1	35.3	$53.12	$1,875.14	$3.41	$120.37	$1.97	$69.54	$2,065
		36	LF	0	2	72	$53.12	$3,824.64	$3.41	$245.52	$1.97	$141.84	$4,212
	W18x86	21.3	LF	0	1	21.3	$114.64	$2,441.83	$3.64	$77.53	$2.09	$44.52	$2,564
		30	LF	0	5	150	$114.64	$17,196.00	$3.64	$546.00	$2.09	$313.50	$18,056
	W21x19	21	LF	0	1	21	$54.21	$1,138.41	$3.73	$78.33	$1.57	$32.97	$1,250

Beams	W21x44	10	LF	0	1	10	$63.00	$630.00	$3.73	$37.30	$1.57	$15.70	$683
		24	LF	24	1	24	$63.00	$1,512.00	$3.73	$89.52	$1.57	$37.68	$1,639
		29.3	LF	0	1	29.3	$63.00	$1,845.90	$3.73	$109.29	$1.57	$46.00	$2,001
		30	LF	30	9	270	$63.00	$17,010.00	$3.73	$1,007.10	$1.57	$423.90	$18,441
		30	LF	0	15	450	$63.00	$28,350.00	$3.73	$1,678.50	$1.57	$706.50	$30,735
		30.6	LF	0	1	30.6	$63.00	$1,927.80	$3.73	$114.14	$1.57	$48.04	$2,090
		31.3	LF	31	1	31.3	$63.00	$1,971.90	$3.73	$116.75	$1.57	$49.14	$2,138
		31.3	LF	0	1	31.3	$63.00	$1,971.90	$3.73	$116.75	$1.57	$49.14	$2,138
		35.3	LF	0	15	529.5	$63.00	$33,358.50	$3.73	$1,975.04	$1.57	$831.32	$36,165
		36	LF	0	1	36	$63.00	$2,268.00	$3.73	$134.28	$1.57	$56.52	$2,459
	W21x50	11.6	LF	0	1	11.6	$71.50	$829.40	$3.73	$43.27	$1.57	$18.21	$891
		30	LF	30	1	30	$71.50	$2,145.00	$3.73	$111.90	$1.57	$47.10	$2,304
		30	LF	0	1	30	$71.50	$2,145.00	$3.73	$111.90	$1.57	$47.10	$2,304
		32.4	LF	32	1	32.4	$71.50	$2,316.60	$3.73	$120.85	$1.57	$50.87	$2,488
		33.6	LF	36	1	33.6	$71.50	$2,402.40	$3.73	$125.33	$1.57	$52.75	$2,580
		35.3	LF	35	11	388.3	$71.50	$27,763.45	$3.73	$1,448.36	$1.57	$609.63	$29,821
		36	LF	0	10	360	$71.50	$25,740.00	$3.73	$1,342.80	$1.57	$565.20	$27,648
		36.3	LF	0	3	108.9	$71.50	$7,786.35	$3.73	$406.20	$1.57	$170.97	$8,364
	W21x73	30	LF	0	6	180	$112.05	$20,169.00	$3.96	$712.80	$1.67	$300.60	$21,182
	W24x55	17.75	LF	17	1	17.75	$78.50	$1,393.38	$3.57	$63.37	$1.50	$26.63	$1,483
		21.5	LF	21	1	21.5	$78.50	$1,687.75	$3.57	$76.76	$1.50	$32.25	$1,797
		29.3	LF	0	2	58.6	$78.50	$4,600.10	$3.57	$209.20	$1.50	$87.90	$4,897
		30	LF	30	9	270	$78.50	$21,195.00	$3.57	$963.90	$1.50	$405.00	$22,564
		30	LF	0	18	540	$78.50	$42,390.00	$3.57	$1,927.80	$1.50	$810.00	$45,128
		30	LF	60	3	90	$78.50	$7,065.00	$3.57	$321.30	$1.50	$135.00	$7,521
		30.6	LF	0	1	30.6	$78.50	$2,402.10	$3.57	$109.24	$1.50	$45.90	$2,557
		34	LF	34	1	34	$78.50	$2,669.00	$3.57	$121.38	$1.50	$51.00	$2,841
		35.3	LF	35	13	458.9	$78.50	$36,023.65	$3.57	$1,638.27	$1.50	$688.35	$38,350
		35.3	LF	0	2	70.6	$78.50	$5,542.10	$3.57	$252.04	$1.50	$105.90	$5,900
		35.9	LF	35	1	35.9	$78.50	$2,818.15	$3.57	$128.16	$1.50	$53.85	$3,000
		36	LF	0	3	108	$78.50	$8,478.00	$3.57	$385.56	$1.50	$162.00	$9,026
		36.3	LF	0	3	108.9	$78.50	$8,548.65	$3.57	$388.77	$1.50	$163.35	$9,101
	W24x62	29.3	LF	60	1	29.3	$88.50	$2,593.05	$3.57	$104.60	$1.50	$43.95	$2,742
		30	LF	60	7	210	$88.50	$18,585.00	$3.57	$749.70	$1.50	$315.00	$19,650
		36	LF	0	12	432	$88.50	$38,232.00	$3.57	$1,542.24	$1.50	$648.00	$40,422
		36.3	LF	0	1	36.3	$88.50	$3,212.55	$3.57	$129.59	$1.50	$54.45	$3,397
		39.3	LF	0	1	39.3	$88.50	$3,478.05	$3.57	$140.30	$1.50	$58.95	$3,677
	W24x68	28.3	LF	0	1	28.3	$97.00	$2,745.10	$3.57	$101.03	$1.50	$42.45	$2,889
		30	LF	60	3	90	$97.00	$8,730.00	$3.57	$321.30	$1.50	$135.00	$9,186
		30	LF	0	11	330	$97.00	$32,010.00	$3.57	$1,178.10	$1.50	$495.00	$33,683
		33	LF	0	2	66	$97.00	$6,402.00	$3.57	$235.62	$1.50	$99.00	$6,737
	W24x76	29.33	LF	60	2	58.66	$109.00	$6,393.94	$3.57	$209.42	$1.50	$87.99	$6,691
		30	LF	30	1	30	$109.00	$3,270.00	$3.57	$107.10	$1.50	$45.00	$3,422
		30	LF	60	6	180	$109.00	$19,620.00	$3.57	$642.60	$1.50	$270.00	$20,533
		30	LF	0	2	60	$109.00	$6,540.00	$3.57	$214.20	$1.50	$90.00	$6,844
	W24x84	36	LF	36	1	36	$120.00	$4,320.00	$3.67	$132.12	$1.50	$54.00	$4,506
	W26x62	28.4	LF	29	1	28.4	$88.50	$2,513.40	$3.57	$101.39	$1.50	$42.60	$2,657
	W27x84	7	LF	0	2	14	$120.00	$1,680.00	$3.33	$46.62	$1.40	$19.60	$1,746
		8	LF	0	1	8	$120.00	$960.00	$3.33	$26.64	$1.40	$11.20	$998
		13.8	LF	0	3	41.4	$120.00	$4,968.00	$3.33	$137.86	$1.40	$57.96	$5,164
		16.2	LF	0	3	48.6	$120.00	$5,832.00	$3.33	$161.84	$1.40	$68.04	$6,062
		23	LF	0	2	46	$120.00	$5,520.00	$3.33	$153.18	$1.40	$64.40	$5,738
		25	LF	0	1	25	$120.00	$3,000.00	$3.33	$83.25	$1.40	$35.00	$3,118
		29.3	LF	0	1	29.3	$120.00	$3,516.00	$3.33	$97.57	$1.40	$41.02	$3,655
		30	LF	30	1	30	$120.00	$3,600.00	$3.33	$99.90	$1.40	$42.00	$3,742
		30.6	LF	30	1	30.6	$120.00	$3,672.00	$3.33	$101.90	$1.40	$42.84	$3,817
		30.6	LF	0	1	30.6	$120.00	$3,672.00	$3.33	$101.90	$1.40	$42.84	$3,817
		35.8	LF	0	1	35.8	$120.00	$4,296.00	$3.33	$119.21	$1.40	$50.12	$4,465
		36	LF	36	1	36	$120.00	$4,320.00	$3.33	$119.88	$1.40	$50.40	$4,490
	W27x94	46.3	LF	46	1	46.3	$134.00	$6,204.20	$3.33	$154.18	$1.40	$64.82	$6,423
	W27x102	13.8	LF	0	2	27.6	$146.32	$4,038.43	$3.33	$91.91	$1.40	$38.64	$4,169
		16.2	LF	0	2	32.4	$146.32	$4,740.77	$3.33	$107.89	$1.40	$45.36	$4,894
	W30x90	30.6	LF	0	1	30.6	$136.10	$4,164.66	$3.30	$100.98	$1.39	$42.53	$4,308
		32.3	LF	32	1	32.3	$136.10	$4,396.03	$3.30	$106.59	$1.39	$44.90	$4,548
	W30x99	30	LF	30	4	120	$142.00	$17,040.00	$3.30	$396.00	$1.39	$166.80	$17,603
		38.1	LF	38	1	38.1	$142.00	$5,410.20	$3.30	$125.73	$1.39	$52.96	$5,589
	W30x108	30.3	LF	30	1	30.3	$154.00	$4,666.20	$3.30	$99.99	$1.39	$42.12	$4,808
	W30x116	35.9	LF	35	1	35.9	$166.00	$5,959.40	$3.42	$122.78	$1.44	$51.70	$6,134
	W30x118	33.6	LF	0	1	33.6	$164.10	$5,513.76	$3.42	$114.91	$1.44	$48.38	$5,677
	W30x124	32	LF	32	1	32	$172.00	$5,504.00	$3.42	$109.44	$1.44	$46.08	$5,660
	W33x130	38.1	LF	0	1	38.1	$189.00	$7,200.90	$3.42	$130.30	$1.44	$54.86	$7,386
	W33x118	30	LF	30	2	60	$169.00	$10,140.00	$3.37	$202.20	$1.42	$85.20	$10,427
		35.3	LF	35	1	35.3	$169.00	$5,965.70	$3.37	$118.96	$1.42	$50.13	$6,135
		46.8	LF	0	1	46.8	$169.00	$7,909.20	$3.37	$157.72	$1.42	$66.46	$8,133
	W36x135	39.25	LF	39	1	39.25	$193.00	$7,575.25	$3.39	$133.06	$1.43	$56.13	$7,764
	HSS8x8x5/8	10.3	LF	0	1	10.3	$50.59	$521.08	$3.14	$32.34	$2.47	$25.40	$579
	HSS8x8x3/8	17.8	LF	0	1	17.8	$50.59	$900.50	$3.14	$55.89	$2.47	$43.89	$1,000
		19.6	LF	0	1	19.6	$50.59	$991.56	$3.14	$61.54	$2.47	$48.33	$1,101
	HSS10x10x1/2	30	LF	0	9	270	$81.55	$22,018.50	$2.86	$772.20	$2.26	$610.20	$23,401
	HSS10x10x3/8	5.4	LF	0	1	5.4	$81.55	$440.37	$2.86	$15.44	$2.26	$12.20	$468
		18	LF	0	8	144	$81.55	$11,743.20	$2.86	$411.84	$2.26	$325.44	$12,480
	HSS 16x4x5/16	30	LF	0	1	30	$81.55	$2,446.50	$2.86	$85.80	$2.26	$67.80	$2,600
		33	LF	0	1	33	$81.55	$2,691.15	$2.86	$94.38	$2.26	$74.58	$2,860
	C8x11.5	11.5	LF	0	2	23	$8.34	$191.82	$30.73	$706.79	$43.60	$1,002.80	$1,901
		21.3	LF	0	1	21.3	$8.34	$177.64	$30.73	$654.55	$43.60	$928.68	$1,761
		30	LF	0	9	270	$8.34	$2,251.80	$30.73	$8,297.10	$43.60	$11,772.00	$22,321

Columns	W10x33	14.6	LF	0	2	29.2	$43.67	$1,275.16	$2.02	$58.98	$1.60	$46.72	$1,381
		29.7	LF	0	5	148.5	$43.67	$6,485.00	$2.02	$299.97	$1.60	$237.60	$7,023
	W10x45	29.7	LF	0	14	415.8	$60.11	$24,993.74	$2.12	$881.50	$1.68	$698.54	$26,574
	W10x49	42.8	LF	0	3	128.4	$66.49	$8,537.32	$2.12	$272.21	$1.68	$215.71	$9,025
		29.7	LF	0	16	475.2	$66.49	$31,596.05	$2.12	$1,007.42	$1.68	$798.34	$33,402
	W10x54	14.8	LF	0	6	88.8	$74.45	$6,611.16	$2.12	$188.26	$1.68	$149.18	$6,949
		42.8	LF	0	7	299.6	$74.45	$22,305.22	$2.12	$635.15	$1.68	$503.33	$23,444
	W10x60	14.6	LF	0	6	87.6	$84.02	$7,360.15	$2.23	$195.35	$1.75	$153.30	$7,709
		42.8	LF	0	5	214	$84.02	$17,980.28	$2.23	$477.22	$1.75	$374.50	$18,832
	W10x68	29.7	LF	0	1	29.7	$90.40	$2,684.88	$2.23	$66.23	$1.75	$51.98	$2,803
	HSS10x10x5/8	42.8	LF	0	1	42.8	$81.55	$3,490.34	$2.86	$122.41	$2.26	$96.73	$3,709
Bracing	W8x31	24	LF		6	144	$44.50	$6,408.00	$4.99	$718.56	$2.77	$398.88	$7,525
	W8x40	24	LF		4	96	$57.21	$5,492.16	$4.99	$479.04	$2.77	$265.92	$6,237
	W8x48	24	LF		2	48	$68.50	$3,288.00	$4.99	$239.52	$2.77	$132.96	$3,660
	W8x55	24	LF		2	48	$78.38	$3,762.24	$4.99	$239.52	$2.77	$132.96	$4,135
	W8x58	24	LF		2	48	$82.62	$3,965.76	$4.99	$239.52	$2.77	$132.96	$4,338
Subtotal							$1,110,938.79		$64,439.04		$44,377.26		$1,219,755

Metal Decking

			Material		Labor		Equipment		
Decking	Unit	Qty.	$/Unit	Total	$/Unit	Total	$/Unit	Total	TOTAL
Floor - 2" Composite Metal Deck Galv. 18 gauge	SF	38,905	2.83	$110,101	$0.44	$17,118.20	$0.05	$1,945.25	$129,165
Roof - 3" Metal Roof Deck Galv. 20 gauge	SF	34,124	3.35	$114,315	$0.44	$15,014.56	$0.05	$1,706.20	$131,036
Subtotal			**$224,417**		**$32,133**		**$3,651**		**$260,201**

Miscellaneous Metals

				Material		Labor		
Desciption	Qty.	Units	Total SF	$/Unit	Total	$/Unit	Total	TOTAL
Base Plates								
Type A - 16"x16"x1" (1.78SF)	70	SF	124.6	$53.00	$6,603.80	-	-	$6,603.80
Type B - 25"x16"x2" (2.78SF)	5	SF	13.9	$106.00	$1,473.40	-	-	$1,473.40
Type C - 25" x 25" x 2" (4.34SF)	1	SF	4.34	$106.00	$460.04	-	-	$460.04
Gusset Plates								
1" Thick (3SF)	32	SF	96	$53.00	$5,088.00	-	-	$5,088.00
Metal Studs								
18ga, 2 1/2" Metal Studs	621	EA	-	$0.89	$552.69	$2.87	$1,782.27	$2,334.96
Subtotal				**$14,178**		**$1,782**		**$15,960**

Structural Steel Estimate Summary

Item	Material $	Labor Costs	Equipment Costs	TOTAL
Subtotal	**$1,349,533**	**$98,354**	**$48,029**	**$1,495,916**
Tax (6%)	**$80,972.00**	**-**	**-**	**$80,972**
Subcontractor Overhead (10%)	**$143,050.53**	**$9,835.41**	**$4,802.87**	**$157,689**
GRAND TOTAL	**$1,573,556**	**$108,189**	**$52,832**	**$1,734,577**

Appendix B-2: Cast-in-Place Concrete Detailed Estimate

Spread Footings + Pedestals Takeoffs

Column	# of Footings	Item Description		Area (SF)	Height (Ft.)	CY of Concrete	Perimeter (ft.)	Form SFCA	Rebar Qty.	LF/Qty Rebar	Total LF	Rebar #	Lbs/LF	Total Lbs.
4'x4' (1.5' High)	x3	Concrete	Footing	16	1.5	**2.67**								
			Pedestal	3.36	1.5	**0.56**								
		Formwork	Footing				16	**72**						
			Pedestal				7.33	**32.985**						
		Reinforcement	Horizontal R.						18	3.7	66.6	5	1.043	**208.39**
			Verttical R.						8	1.5	12	7	2.044	**73.58**
			Ties						24	7.33	175.92	3	0.376	**198.44**
4'x4' (12.6' High)	x3	Concrete	Footing	16	1.5	**2.67**								
			Pedestal	3.36	13.5	**5.04**								
		Formwork	Footing				16	**72**						
			Pedestal				7.33	**296.865**						
		Reinforcement	Horizontal R.						24	3.7	88.8	5	1.043	**277.86**
			Verttical R.						8	13.5	108	7	2.044	**662.26**
			Ties						216	7.33	1583.28	3	0.376	**1785.94**
5'x5' (1.5' High)	x5	Concrete	Footing	25	1.5	**6.94**								
			Pedestal	3.36	1.5	**0.93**								
		Formwork	Footing				20	**150**						
			Pedestal				7.33	**54.975**						
		Reinforcement	Horizontal R.						16	4.7	75.2	5	1.043	**392.17**
			Verttical R.						8	1.5	12	7	2.044	**122.64**
			Ties						24	7.33	175.92	3	0.376	**330.73**
5'x5' (12.6' High)	x3	Concrete	Footing	25	1.5	**4.17**								
			Pedestal	3.36	1.5	**0.56**								
		Formwork	Footing				20	**90**						
			Pedestal				7.33	**32.985**						
		Reinforcement	Horizontal R.						16	4.7	75.2	5	1.043	**235.30**
			Verttical R.						8	1.5	12	7	2.044	**73.58**
			Ties						24	7.33	175.92	3	0.376	**198.44**
6'x6' (1.5' High)	x6	Concrete	Footing	36	1.5	**12.00**								
			Pedestal	3.36	1.5	**1.12**								
		Formwork	Footing				24	**216**						
			Pedestal				7.33	**65.97**						
		Reinforcement	Horizontal R.						16	5.7	91.2	5	1.043	**570.73**
			Verttical R.						8	1.5	12	7	2.044	**147.17**
			Ties						24	7.33	175.92	3	0.376	**396.88**
7'x7' (1.5' High)	x9	Concrete	Footing	49	1.5	**24.50**								
			Pedestal	3.36	1.5	**1.68**								
		Formwork	Footing				28	**378**						
			Pedestal				7.33	**98.955**						
		Reinforcement	Horizontal R.						14	6.7	93.8	5	1.043	**880.50**
			Verttical R.						8	1.5	12	7	2.044	**220.75**
			Ties						24	7.33	175.92	3	0.376	**595.31**
8'x8' (1.5' High)	x2	Concrete	Footing	64	1.5	**7.11**								
			Pedestal	3.36	1.5	**0.37**								
		Formwork	Footing				32	**96**						
			Pedestal				7.33	**21.99**						
		Reinforcement	Horizontal R.						12	7.7	92.4	7	2.044	**377.73**
			Verttical R.						8	1.5	12	7	2.044	**49.06**
			Ties						24	7.33	175.92	3	0.376	**132.29**
9'x9' (1.5' High)	x22	Concrete	Footing	81	2	**132.00**								
		Formwork	Footing				36	**1584**						
		Reinforcement	Horizontal R.						16	8.7	139.2	7	2.044	**6259.55**
10'x10' (1.5' High)	x1	Concrete	Footing	100	2	**7.41**								
		Formwork	Footing				40	**80**						
		Reinforcement	Horizontal R.						18	9.7	174.6	7	2.044	**356.88**
Strip Footing (40'x10)	x1	Concrete	Footing	700	2	**51.85**								
		Formwork	Footing				160	**320**						
		Reinforcement	Horizontal R.						20	39.4	788	5	1.043	**821.88**
									50	9.4	470	5	2.044	**960.68**
									25	39.4	985	7	2.044	**2013.34**
Strip Footing (38'x8')	x1	Concrete	Footing	304	2	**22.52**								
		Formwork	Footing				92	**184**						
		Reinforcement	Horizontal R.						52	7.4	384.8	5	1.043	**401.35**
									14	37.4	523.6	7	2.044	**1070.24**

Strip Footing (11'x19.6')	x1	Concrete	Footing	216.3	2	**16.02**											
		Formwork	Footing					61.33	**122.66**								
		Reinforcement	Horizontal R.							48	10.4	499.2	5	1.043	**520.67**		
										8	19	152	5	1.043	**158.54**		
										8	19	152	7	2.044	**310.69**		
Strip Footing (7x17.6')	x1	Concrete	Footing	123.66	2	**9.16**											
		Formwork	Footing					49.33	**98.66**								
		Reinforcement	Horizontal R.							34	10.4	353.6	5	1.043	**368.80**		
										6	17	102	5	1.043	**106.39**		
										6	17	102	7	2.044	**208.49**		

Totals	Item Description	Units	Quantity
	Concrete	CY	**309.3**
	Formwork	SFCA	**4068.0**
	#3 Rebar	Tons	**1.8**
	#5 Rebar	Tons	**3.0**
	#7 Rebar	Tons	**6.0**

Wall Footing + Pedestal Takeoffs

Type	Item Description		Width (ft)	Height (ft)	LF	CY of Concrete	Total Height	Form SFCA	Rebar #	Rebar/LF	Total Rebar	Total LF	Lbs/LF	Total Lbs.
Wall Footing (1' High)	Concrete	Footing	2.25	1	900	**75**								
		Pedestal	1.25	2.5	900	**104.17**								
	Formwork	Footing	-	1	900	-	2	**1800**						
		Pedestal	-	2.5	900	-	5	**4500**						
	Reinforcement	Horizontal (Foot.)	2	-	900	-			5	1	900	1800	1.043	**1877**
		Horizontal (Foot.)	-	-	900	-			5	-	3	2700	1.043	**2816**
		Horizontal (Ped.)	-	-	900	-			5	-	6	5400	1.043	**5632**
		Vertical	-	3.5	900	-			5	2	1800	6300	1.043	**6571**

Totals	Item Description	Units	Quantity
	Concrete	CY	**179.17**
	Formwork	SFCA	**6300**
	#5 Rebar	Tons	**8**

Elevator Pit Takeoffs

Item Description		Length (ft)	Width (ft)	Height (ft)	LF	CY of Concrete	Total Height	Form SFCA	Rebar #	Rebar/LF	Total Rebar	Total LF	Lbs/LF	Total Lbs.
Concrete	Slab	10	11.66	2	-	**8.6**								
	Pedestal	-	1	4	43.2	**6.4**								
Formwork	Slab	-		2	43.2	-	4	172.8						
	Pedestal	-		4	43.2	-	8	345.6						
Reinforcement	Horizontal WE (Slab)	10	11.66	-	-	-			5	2	10	2332	1.043	**2432.28**
	Horizontal NS	11.66	10		-				5	2	12	2719.112	1.043	**2836.03**
	Horizontal (Ped.)	-	-	-	43.2	-			5	-	8	345.6	1.043	**360.46**
	Vertical	-	-	5	43.2	-			5	2	86.4	432	1.043	**450.58**

Totals	Item Description	Units	Quantity
	Concrete	CY	**15.04**
	Formwork	SFCA	**518.4**
	#5 Rebar	Tons	**3.04**

Cast-in-Place Slabs Estimate

Item Description	Qty.	Unit	Material $/Unit	Material Total	Labor $/Unit	Labor Total	Equipment $/Unit	Equipment Total	TOTAL
Slab on Grade									
NW 3,000 psi	712.833	CY	$97.00	$69,144.83	-	-	-	-	$69,241.83
Placing Concrete, Pumped	712.833	CY	-	-	$18.80	$13,401.27	$6.00	$4,277.00	$17,703.07
Concrete Curing, Blanket	38493	SF	$0.34	$13,087.62	-	-	-	-	$13,087.96
Finishing, Manual	38493	SF	-	-	$0.77	$29,639.61	-	-	$29,640.38
6x6-W2.9xW2.9 W.W.F	384.93	CSF	$22.50	$8,660.93	$27.50	$10,585.58	-	-	$19,296.50
Formwork, Plywood, 3 Use	375	SFCA	$2.47	$926.25	$2.90	$1,087.50	-	-	$2,019.12
Slab on Deck									
LW 3,000 psi	384.991	CY	$133.00	$51,203.75	-		-	-	$51,336.75
Placing Concrete, Pumped	384.991	CY	-	-	$17.45	$6,718.09	$5.60	$2,155.95	$8,897.08
Concrete Curing, Blanket	38357	SF	$0.34	$13,041.38	-	-	-	-	$13,041.72
Finishing, Manual	38357	SF	-	-	$0.77	$29,534.89	-	-	$29,535.66
6x6-W2.9xW2.9 W.W.F	383.57	CSF	$22.50	$8,630.33	$27.50	$10,548.18	-	-	$19,228.50
Formwork, Plywood, 3 Use	262.5	SFCA	$2.47	$648.38	$2.90	$761.25	-	-	$1,415.00
Subtotal			**$165,343.46**		**$102,276.35**		**$6,432.95**		**$274,443.58**

Cast-in-Place Foundations Estimate

Item Description	Qty.	Unit	Material $/Unit	Material Total	Labor $/Unit	Labor Total	Equipment $/Unit	Equipment Total	TOTAL
Concrete									
NW Concrete (4,000 psi)	503.49	CY	$102.00	$51,355.56	-	-	-	-	$51,457.56
Placing Concrete, Pumped	503.49	CY	-	-	$16.30	$8,206.82	$5.20	$2,618.13	$10,846.45
Formwork									
Formwork, Plywood, 3 Use	10886.45	SFCA	$2.47	$26,889.52	$2.90	$31,570.69	-	-	$58,465.58
Reinforcement									
#3 Rebar	1.82	Tons	$1,000.00	$1,819.01	$760.00	$1,382.45	-	-	$4,961.46
#5 Rebar	14.44	Tons	$1,000.00	$14,439.60	$760.00	$10,974.09	-	-	$27,173.69
#7 Rebar	5.97	Tons	$1,000.00	$5,972.98	$760.00	$4,539.46	-	-	$12,272.44
Subtotal			**$100,476.67**		**$56,673.52**		**$2,618.13**		**$165,177.18**

Concrete Estimate Summary

Item	Material Costs	Labor Costs	Equipment Costs	TOTAL
Subtotal	**$265,820**	**$158,950**	**$9,051**	**$433,821**
Tax (6%)	**$15,949.21**	**-**	**-**	**$15,949**
Subcontractor Overhead (10%)	**$28,176.93**	**$15,894.99**	**$905.11**	**$44,977**
GRAND TOTAL	**$484,791**	**$184,801**	**$504,703**	**$494,747**

Appendix B-3: MEP Assemblies Estimate

MEP Assemblies Estimate										
Assembly Type	Quantity	Assembly Number	Item Description	Unit	Material O&P	Installation O&P	Total O&P	Ext. Material O&P	Ext. Installation O&P	Ext. Total O&P
Mechanical Assemblies	1	D30401161030	AHU, rooftop, cool/heat coils, VAV, filters, 15,000 CFM	Ea.	$118,597.00	$11,492.20	$130,089.20	$118,597.00	$11,492.20	$130,089.20
	3	D30401161050	AHU, rooftop, cool/heat coils, VAV, filters, 30,000 CFM	Ea.	$176,114.00	$15,874.80	$191,988.80	$528,342.00	$47,624.40	$575,966.40
	8	D30402401030	Roof vent. system, power, centrifugal, aluminum, galvanized curb, back draft damper, 1500 CFM	Ea.	$2,443.20	$4,675.90	$7,119.10	$19,545.60	$37,407.20	$56,952.80
	6	D30402401050	Roof vent. system, power, centrifugal, aluminum, galvanized curb, back draft damper, 3500 CFM	Ea.	$4,453.75	$13,634.40	$18,088.15	$26,722.50	$81,806.40	$108,528.90
	1	D30201060780	Boiler, electric, steel, hot water, 3,600 KW, 12,283 MBH	Ea.	$100,273.00	$11,449.40	$111,722.40	$100,273.00	$11,449.40	$111,722.40
	12	D30203301010	Pump, base mounted with motor, end-suction, 2-1/2" size, 3 HP, to 150 GPM	Ea.	$11,910.60	$2,770.90	$14,681.50	$142,927.20	$33,250.80	$176,178.00
	2	D30203401010	Pump, base mounted with motor, double suction, 6" size, 50 HP, to 1200 GPM	Ea.	$23,210.40	$9,666.60	$32,877.00	$46,420.80	$19,333.20	$65,754.00
	77560	D30301153760	Packaged chiller, water cooled, with fan coil unit, medical centers, 60,000 SF, 140.00 ton	S.F.	$6.67	$5.99	$12.66	$517,325.20	$464,584.40	$981,909.60
	2	D30106502600	Solar, closed loop, space/hot water, 3/4" tubing, 12 ea 4' x 4'-4" vacuum tube collectors	Ea.	$27,689.60	$9,264.40	$36,954.00	$55,379.20	$18,528.80	$73,908.00
	2	D30501301020	Space heater, suspended, horizontal mount, hot water, propeller fan, 60 MBH	Ea.	$2,774.05	$1,179.90	$3,953.95	$5,548.10	$2,359.80	$7,907.90
	7	D30501401020	Unit heater, cabinet type, horizontal blower, hot water, 60 MBH	Ea.	$3,486.65	$1,136.20	$4,622.85	$24,406.55	$7,953.40	$32,359.95
	36	D30401341050	VAV terminal, cooling, hot water reheat, with actuator / controls, 1000 CFM	Ea.	$3,537.55	$3,867.45	$7,405.00	$127,351.80	$139,228.20	$266,580.00
	26	D30401341010	VAV terminal, cooling, hot water reheat, with actuator/controls, 200 CFM	Ea.	$2,392.30	$1,595.05	$3,987.35	$62,199.80	$41,471.30	$103,671.10
	70	D30401341030	VAV terminal, cooling, hot water reheat, with actuator / controls, 600 CFM	Ea.	$3,104.90	$2,949.75	$6,054.65	$217,343.00	$206,482.50	$423,825.50
	12	D30401341080	VAV terminal, cooling, hot water reheat, with actuator / controls, 2000 CFM	Ea.	$5,420.85	$7,603.80	$13,024.65	$65,050.20	$91,245.60	$156,295.80
	3	D30302141400	Heating/cooling system,heat pump 3 ton, one zone, SEER 14, 1200 SF	Ea.	$ 6,617.00	$ 4,304.45	$10,921.45	$19,851.00	$12,913.35	$32,764.35
	10	D30402401040	Roof vent. system, power, centrifugal, aluminum, galvanized curb, back draft damper, 2750 CFM	Ea.	$ 3,639.35	$ 10,575.40	$14,214.75	$36,393.50	$105,754.00	$142,147.50
				Mechanical Subtotal						$3,446,561.40
Electrical Assemblies	34	G40202100200	Light pole, aluminum, 20' high, 1 arm bracket	Ea.	$995.93	$1,009.03	$2,004.96	$33,861.62	$34,307.02	$68,168.64
	400	D50902101000	Generator sets, w/battery, charger, muffler and transfer switch, diesel engine with fuel tank, 400 kW	kW	$206.30	$22.12	$228.42	$82,520.00	$8,848.00	$91,368.00
	1	D50101301000	Underground service installation, includes excavation, backfill, and compaction, 100' length, 4' depth, 3 phase, 4 wire, 277/480 volts, 2000 A	Ea.	$40,788.60	$19,742.00	$60,530.60	$40,788.60	$19,742.00	$60,530.60
	550	D50102300560	Feeder installation 600 V, including RGS conduit and XHHW wire, 2000 A	L.F.	$315.57	$227.33	$542.90	$173,563.50	$125,031.50	$298,595.00
	23	D50102501080	Panelboard, 4 wire w/conductor & conduit, NQOD, 120/208 V, 225 A, 0 stories, 0' horizontal	Ea.	$2,237.25	$1,724.78	$3,962.03	$51,456.75	$39,669.94	$91,126.69
	16	D50102502060	Panelboard, 4 wire w/conductor & conduit, NQOD, 120/208 V, 400 A, 0 stories, 0' horizontal	Ea.	$3,297.00	$2,573.03	$5,870.03	$52,752.00	$41,168.48	$93,920.48
	4	D50102400200	Switchgear installation, incl switchboard, panels & circuit breaker, 120/208 V, 1 phase, 400 A	Ea.	$7,583.10	$2,629.58	$10,212.68	$30,332.40	$10,518.32	$40,850.72
	3	D50102400500	Switchgear installation, incl switchboard, panels & circuit breaker, 277/480 V, 3 phase, 400 A	Ea.	$10,738.80	$4,891.58	$15,630.38	$32,216.40	$14,674.74	$46,891.14
	1	D50102400520	Switchgear installation, incl switchboard, panels & circuit breaker, 277/480 V, 600 A	Ea.	$15,072.00	$5,626.73	$20,698.73	$15,072.00	$5,626.73	$20,698.73
	1	D50102400580	Switchgear installation, incl switchboard, panels & circuit breaker, 277/480 V, 1200 A	Ea.	$24,209.40	$7,719.08	$31,928.48	$24,209.40	$7,719.08	$31,928.48
	75600	D50201300360	Wall switches, 5.0 per 1000 SF	S.F.	$0.24	$0.96	$1.20	$18,144.00	$72,576.00	$90,720.00
	77560	D50201150640	Receptacle systems, telepoles, using EMT, high density	S.F.	$2.36	$2.42	$4.78	$183,041.60	$187,695.20	$370,736.80
	77560	D50202080600	Fluorescent fixtures, type A, 17 fixtures per 1000 SF	S.F.	$2.78	$5.94	$8.72	$215,616.80	$460,706.40	$676,323.20
	77560	D50303100560	Telephone systems, telepoles, high density	S.F.	$2.17	$1.33	$3.50	$168,305.20	$103,154.80	$271,460.00
	1	D50309100456	Communication and alarm systems: fire detection, addressable, 100 detectors, includes outlets, boxes, conduit and wire	Ea.	$31,651.20	$40,037.40	$71,688.60	$31,651.20	$40,037.40	$71,688.60
	1	D50309100880	Communication and alarm systems: includes outlets, boxes, conduit and wire, master clock systems,100 rooms	Ea.	$54,165.00	$130,065.00	$184,230.00	$54,165.00	$130,065.00	$184,230.00
	77.56	D50309200104	Internet wiring, 4 data/voice outlets per 1000 S.F.	M.S.F.	$320.28	$904.80	$1,225.08	$24,840.92	$70,176.29	$95,017.21
	1	D50102400620	Switchgear installation, incl switchboard, panels & circuit breaker, 277/480 V, 2000 A	Ea.	$40,035.00	$9,387.30	$49,422.30	$40,035.00	$9,387.30	$49,422.30
				Electrical Subtotal						$2,653,676.59

Plumbing Assemblies	1	D20202402380	Electric water heater, commercial, 100< F rise, 1000 gal, 60 KW 245 GPH	Ea.	$37,767.80	$3,124.55	$40,892.35	$37,767.80	$3,124.55	$40,892.35
	77560	D50202952000	Daylight on/off control system, 12 fixtures per 1000 SF	S.F.	$0.47	$0.36	$0.83	$36,453.20	$27,921.60	$64,374.80
	1	D50309100640	Communication and alarm systems, includes outlets, boxes, conduit and wire, intercom systems, 100 stations	Ea.	$45,875.40	$75,777.00	$121,652.40	$45,875.40	$75,777.00	$121,652.40
	1	D50309101000	Communication and alarm systems, includes outlets, boxes, conduit and wire, master TV antenna systems, 30 outlets	Ea.	$10,738.80	$23,977.20	$34,716.00	$10,738.80	$23,977.20	$34,716.00
	38780	D40104101000	Wet pipe sprinkler systems, steel, ordinary hazard, 1 floor, 500 SF	S.F.	$3.07	$2.30	$5.37	$119,054.60	$89,194.00	$208,248.60
	38780	D40104101140	Wet pipe sprinkler systems, steel, ordinary hazard, each additional floor, 500 SF	S.F.	$1.64	$2.06	$3.70	$63,599.20	$79,886.80	$143,486.00
	1	D40203100600	Wet standpipe risers, class I, steel, black, sch 40, 6" diam pipe, 1 floor	Floor	$7,736.80	$4,045.05	$11,781.85	$7,736.80	$4,045.05	$11,781.85
	1	D40203100620	Wet standpipe risers, class I, steel, black, sch 40, 6" diam pipe, additional floors	Floor	$1,883.30	$1,137.35	$3,020.65	$1,883.30	$1,137.35	$3,020.65
	1	D20402106440	Roof drain, steel galv sch 40 grooved, 8" diam piping, 10' high	Ea.	$4,453.75	$1,376.55	$5,830.30	$4,453.75	$1,376.55	$5,830.30
	30	D20402106480	Roof drain, steel galv sch 40 threaded, 8" diam piping, for each additional foot add	Ea.	$87.55	$33.21	$120.76	$2,626.50	$996.30	$3,622.80
	26	D20101102080	Water closet, vitreous china, bowl only with flush valve, wall hung	Ea.	$1,934.20	$572.47	$2,506.67	$50,289.20	$14,884.22	$65,173.42
	2	D20102102000	Urinal, vitreous china, wall hung	Ea.	$636.25	$563.73	$1,199.98	$1,272.50	$1,127.46	$2,399.96
	2	G30104101000	Hydrant, 4-1/2" valve size, two way, 0' offset, 2' deep	Ea.	$4,349.55	$975.56	$5,325.11	$8,699.10	$1,951.12	$10,650.22
	6	D20108102040	Drinking fountain, 1 bubbler, wall mounted, semi-recessed, stainless steel	Ea.	$1,654.25	$332.12	$1,986.37	$9,925.50	$1,992.72	$11,918.22
	43	D20104301920	Laboratory sink w/trim, polypropylene, cup sink, oval, 7" x 4" od	Ea.	$376.66	$563.73	$940.39	$16,196.38	$24,240.39	$40,436.77
	42	D20103101760	Lavatory w/trim, vanity top, stainless, self-rimming, 25" x 22"	Ea.	$855.12	$506.92	$1,362.04	$35,915.04	$21,290.64	$57,205.68
	43	D20104404380	Service sink w/trim, vitreous china, wall hung 22" x 20"	Ea.	$2,646.80	$830.30	$3,477.10	$113,812.40	$35,702.90	$149,515.30
	1	D20202401820	Electric water heater, commercial, 100< F rise, 50 gallon tank, 9 KW 37 GPH	Ea.	$5,166.35	$821.56	$5,987.91	$5,166.35	$821.56	$5,987.91
	3	D20202202420	Gas fired water heater, residential, 100< F rise, 100 gal tank, 63 GPH	Ea.	$3,232.15	$1,311.00	$4,543.15	$9,696.45	$3,933.00	$13,629.45
	4	E10208100720	Architectural equipment, medical equipment sterilizers, general purpose, single door, 20"x20"x28"	Ea.	$13,976.20	$0.00	$13,976.20	$55,904.80	$0.00	$55,904.80
							Plumbing Subtotal			**$1,050,447.48**
							Total	**$4,023,316**	**$3,127,370**	**$7,150,685**

APPENDIX C

General Conditions Estimate

Appendix C-1: General Conditions Estimate

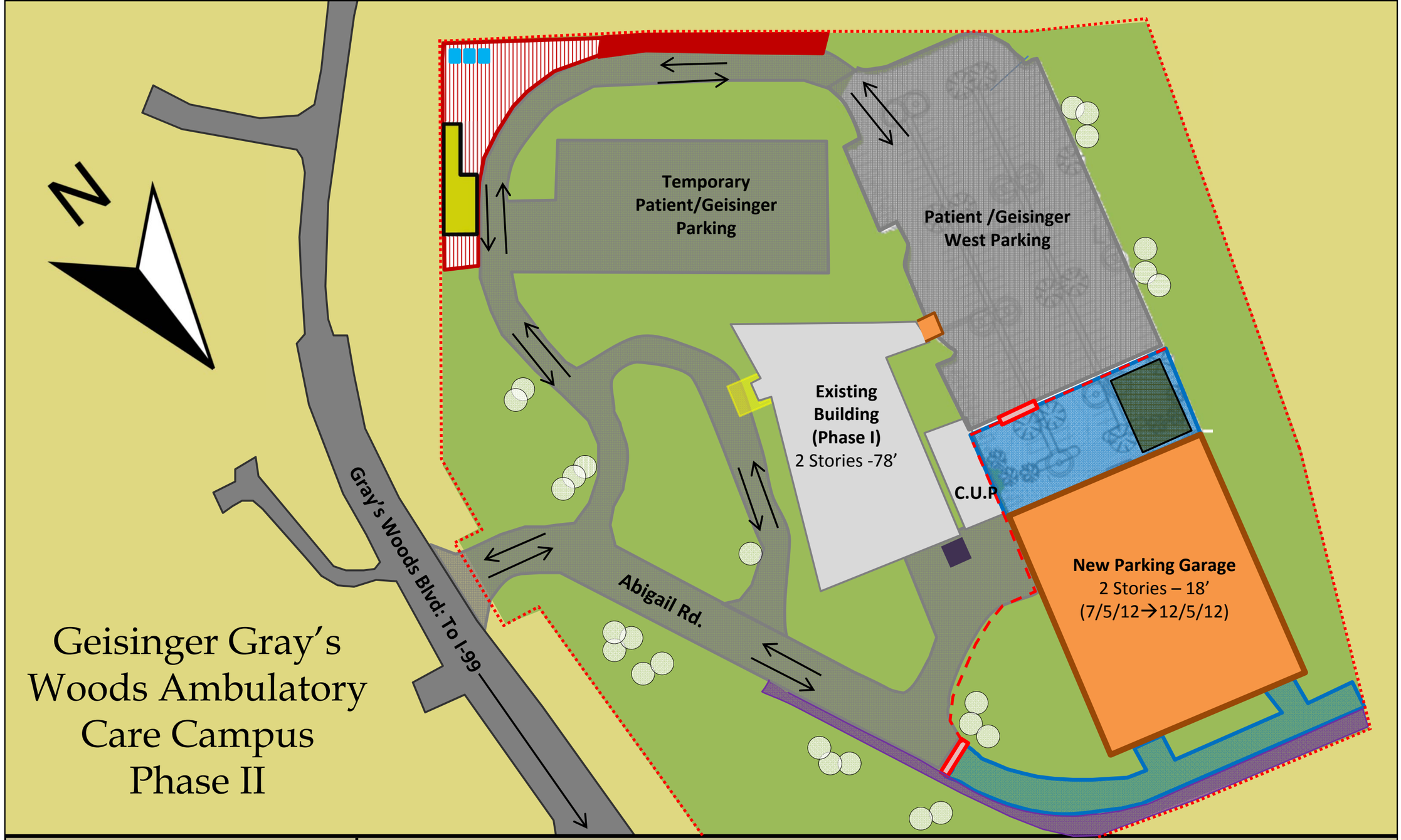
General Conditions Estimate					
Cost Code*	**Description**	**Quantity**	**Unit**	**Unit Cost**	**Total Cost**
	Project Team				
13113200200	Project Executive (Inflate 20% to PM)	7.2	Week	$3,096.00	$22,291.20
13113200200	Sr. Project Manager (Inflate 20% to PM)	23.76	Week	$2,580.00	$61,300.80
13113200200	Project Manager	72	Week	$2,150.00	$154,800.00
13113200200	MEP Project Manager	56	Week	$2,150.00	$120,400.00
13113200260	Site Superintendent	72	Week	$2,000.00	$144,000.00
13113200260	Ass. Site Superintendent (Deflate 20%)	55	Week	$1,600.00	$88,000.00
13113200120	Project Engineer	46	Week	$1,325.00	$60,950.00
13113200160	Corporate Safety Director	36	Week	$1,425.00	$51,300.00
13113200160	Senior Estimator	36	Week	$1,425.00	$51,300.00
13113200160	Accounting	36	Week	$1,425.00	$51,300.00
	Field Office				
15213200550	(2) Trailer Office Rental, Furnished, 50'x10'	38	Month	$340.00	$12,920.00
15213400100	Office Equipment & Supplies	18	Month	$200.00	$3,600.00
15213400140	Office Telephone, Avg.	18	Month	$81.00	$1,458.00
15213400160	Office Lights/HVAC, Avg.	18	Month	$152.00	$2,736.00
Avg. Mileage Cost	Vehicle Milage	720	Miles	$0.57	$406.80
	Field Operations				
15113500130	Temporary Power, 400A	1	EA	$2,625.00	$2,625
15113800700	Temporary Water, Avg.	18	Month	$63.00	$1,134
15626500020	Temporary Fencing	3500	LF	$4.01	$14,035
15433406410	Temporary Toilets (3)	18	Month	549	$9,882
15613900110	Safety/Protection	18	Month	1200	$21,600
15613900100	Winter Protection	77560	SF	$1.53	$118,667
15813500020	Signage	500	SF	$34.00	$17,000
17123131100	Survey, 3 Person Crew	3	Day	$1,252.50	$3,758
Alexander Building	*Waste Management/Cleanup	$95,000	Ea	-	$95,000
	Insurance				
13113300050	Builder's Risk, Max.	0.64%	%	-	$167,680
Alexander Building	*General Liability	$192,920	Total	-	$192,920
13113900020	Performance Bonds, Max.	0.60%	%	-	$157,200
	Building Closeout				
14523500050	Testing Steel Building, Max.	1	Ea	$5,200.00	$5,200.00
19113500100	Basic Commisioning, Max.	0.5%	%	-	$131,000
*Testimates Based off Alexander Building Construction			**GRAND TOTAL**		**$1,764,463.10**

Project Personnel Participation Breakout

.....Garage Constr.	Sitework																		
	Building Structure																		
				Building Envelope															
						Building Interior													
												Project Completion & Closeout							
Project Personnel	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Project %	Total Weeks
Project Executive	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	7.2
Sr. Project Manager	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	23.76
Project Manager	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	72
MEP Project Manager	0%	0%	0%	50%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	78%	56
Site Superintendent	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	72
Ass. Superintendent	0%	50%	75%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	50%	0%	0%	76%	55
Project Engineer	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	50%	0%	0%	0%	0%	0%	0%	64%	46
Corp. Safety Director	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	36
Senior Estimator	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	36
Accounting	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	36

APPENDIX D

Site Layout Planning



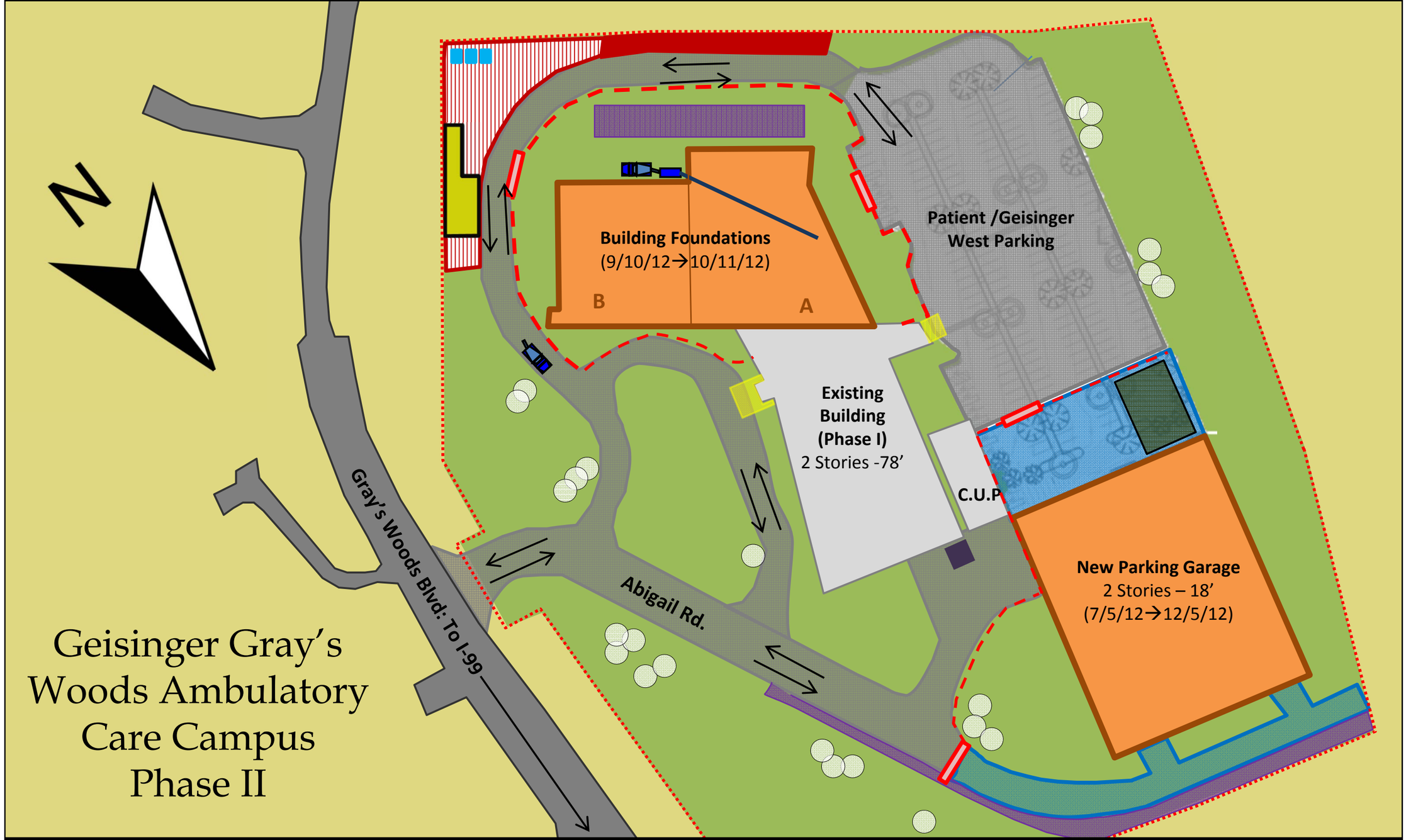
Site Layout:

Parking Lot Expansion
(Pre-Existing Conditions)

George Andonie
October 16, 2013

Legend:

- Property Line
- Site Fence
- Existing Transformer
- Existing Trees
- New Construction
- Existing Structure
- Site Gate
- Patient Access Roads
- Patient Access
- Material Staging Area
- Alexander Field Office
- Subcontractor Field Offices
- Construction Access Only
- Construction Personnel Parking
- Material Storage Trailers
- Portable Toilets



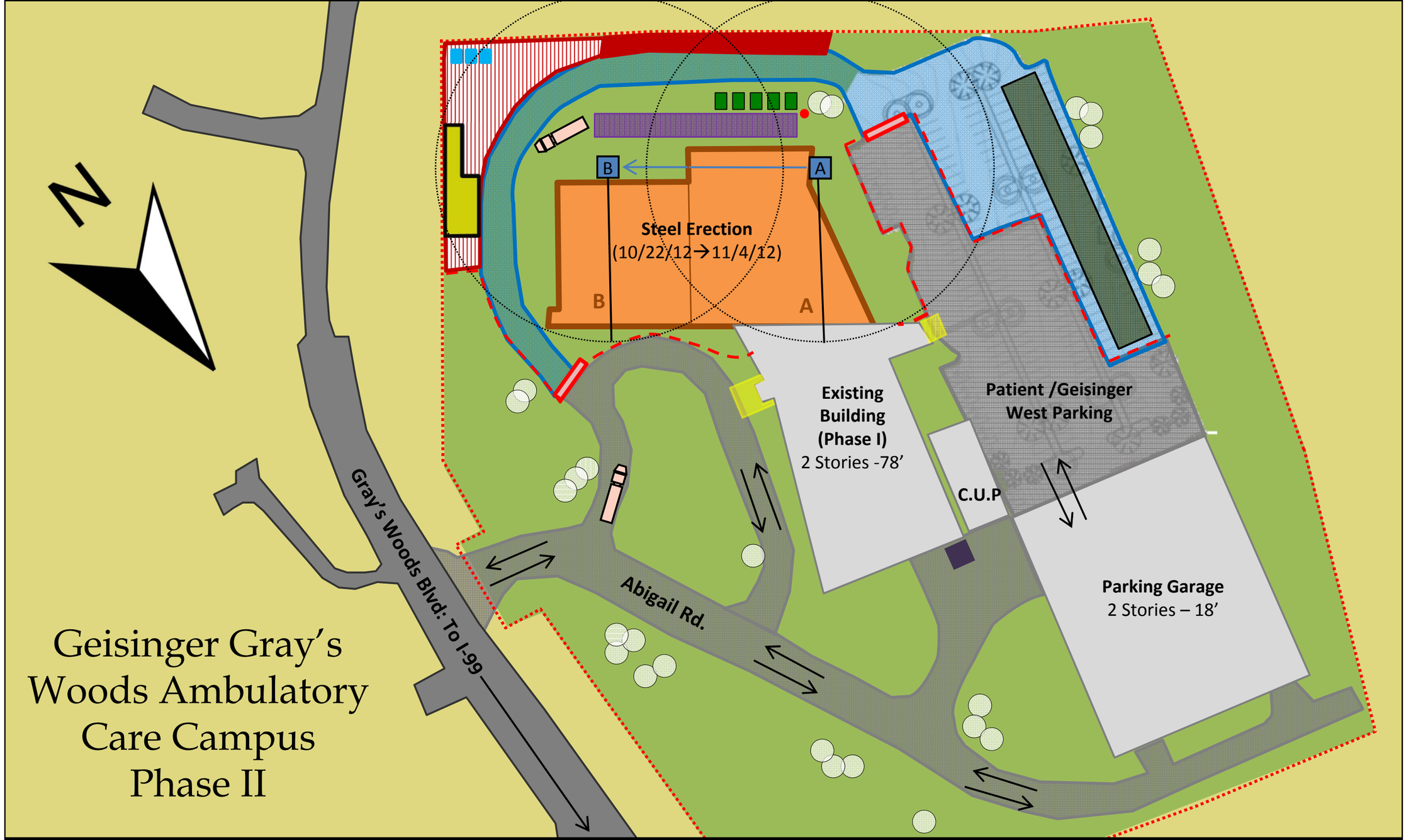
Geisinger Gray's Woods Ambulatory Care Campus Phase II

Site Layout:
Building Foundations

George Andonie
October 16, 2013

Legend:

- Property Line
- Site Fence
- Existing Transformer
- Existing Trees
- New Construction
- Existing Structure
- Site Gate
- Patient Access Roads
- Patient Access
- Material Staging Area
- Alexander Field Office
- Subcontractor Field Offices
- Construction Access Only
- Construction Personnel Parking
- Material Storage Trailers
- Portable Toilets
- Concrete Truck



Geisinger Gray's Woods Ambulatory Care Campus Phase II

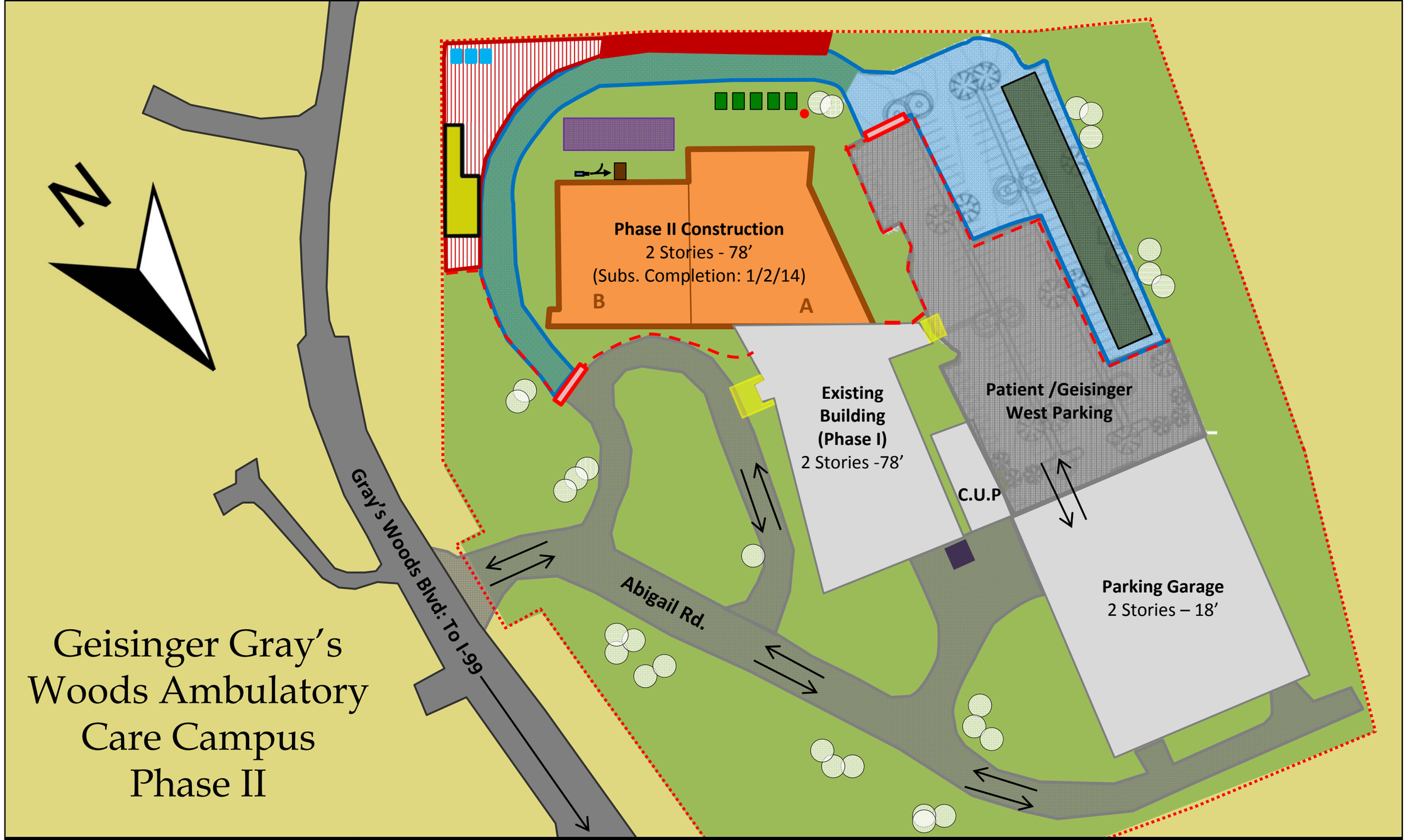
Site Layout:

Structural Steel Erection

George Andonie
October 16, 2013

Legend:

- Property Line
- Site Fence
- Existing Transformer
- Existing Trees
- New Construction
- Existing Structure
- Site Gate
- Patient Access Roads
- Patient Access
- Material Staging Area
- Alexander Field Office
- Subcontractor Field Offices Construction Access Only
- Construction Personnel Parking
- Material Storage Trailers
- Portable Toilets
- Recycle Bins/ Dumpster
- 150 Ton Crawler Crane



Geisinger Gray's Woods Ambulatory Care Campus Phase II

Site Layout:

Building Enclosure and Interior

George Andonie
October 16, 2013

Legend:

- Property Line
- Site Fence
- Existing Transformer
- Existing Trees
- New Construction
- Existing Structure
- Site Gate
- Patient Access Roads
- Patient Access
- Material Staging Area
- Alexander Field Office
- Subcontractor Field Offices
- Construction Access Only
- Construction Personnel Parking
- Material Storage Trailers
- Portable Toilets
- Recycle Bins/ Dumpster
- Forklift & Material Joist

APPENDIX E

LEED Evaluation

Appendix E-1: LEED Checklist

LEED 2009 for Healthcare: New Construction & Major Renovations

Project Checklist

Geisinger Gray's Woods-Phase 2

Addendum #8 Revised 7/27/2012

Y	?	N			
8	2	8	**Sustainable Sites**	**Possible Points:**	**18**
Y			Prereq 1	Construction Activity Pollution Prevention	
Y			Prereq 2	Environmental Site Assessment	
1			Credit 1	Site Selection	1
		1	Credit 2	Development Density and Community Connectivity	1
		1	Credit 3	Brownfield Redevelopment	1
3			Credit 4.1	Alternative Transportation—Public Transportation Access	3
		1	Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
		1	Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	1
	1		Credit 4.4	Alternative Transportation—Parking Capacity	1
	1		Credit 5.1	Site Development—Protect or Restore Habitat	1
1			Credit 5.2	Site Development—Maximize Open Space	1
1			Credit 6.1	Stormwater Design—Quantity Control	1
1			Credit 6.2	Stormwater Design—Quality Control	1
		1	Credit 7.1	Heat Island Effect—Non-roof	1
		1	Credit 7.2	Heat Island Effect—Roof	1
1			Credit 8	Light Pollution Reduction	1
		1	Credit 9.1	Connection to the Natural World—Places of Respite	1
		1	Credit 9.2	Connection to the Natural World—Direct Exterior Access for Patients	1
2	3	4	**Water Efficiency**	**Possible Points:**	**9**
Y			Prereq 1	Water Use Reduction—20% Reduction	
Y			Prereq 2	Minimize Potable Water Use for Medical Equipment Cooling	
1			Credit 1	Water Efficient Landscaping—No Potable Water Use or No Irrigation	1
	2		Credit 2	Water Use Reduction: Measurement & Verification	1 to 2
		3	Credit 3	Water Use Reduction	1 to 3
1			Credit 4.1	Water Use Reduction—Building Equipment	1
	1		Credit 4.2	Water Use Reduction—Cooling Towers	1
		1	Credit 4.3	Water Use Reduction— Food Waste Systems	1
9	9	21	**Energy and Atmosphere**	**Possible Points:**	**39**
Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
7	4	13	Credit 1	Optimize Energy Performance	1 to 24
		8	Credit 2	On-Site Renewable Energy	1 to 8
1	1		Credit 3	Enhanced Commissioning	1 to 2
1			Credit 4	Enhanced Refrigerant Management	1
	2		Credit 5	Measurement and Verification	2
	1		Credit 6	Green Power	1
	1		Credit 7	Community Contaminant Prevention—Airborne Releases	1
12	0	4	**Materials and Resources**	**Possible Points:**	**16**
Y			Prereq 1	Storage and Collection of Recyclables	
Y			Prereq 2	PBT Source Reduction—Mercury	
		3	Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3
		1	Credit 1.2	Building Reuse—Maintain Interior Non-Structural Elements	1
2			Credit 2	Construction Waste Management	1 to 2
4			Credit 3	Sustainably Sourced Materials and Products	1 to 4
1			Credit 4.1	PBT Source Reduction—Mercury in Lamps	1
2			Credit 4.2	PBT Source Reduction—Lead, Cadmium, and Copper	2
2			Credit 5	Furniture and Medical Furnishings	1 to 2
1			Credit 6	Resource Use—Design for Flexibility	1
8	8	2	**Indoor Environmental Quality**	**Possible Points:**	**18**
Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
Y			Prereq 3	Hazardous Material Removal or Encapsulation	
1			Credit 1	Outdoor Air Delivery Monitoring	1
	2		Credit 2	Acoustic Environment	1 to 2
1			Credit 3.1	Construction IAQ Management Plan—During Construction	1
1			Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
4			Credit 4	Low-Emitting Materials	1 to 4
		1	Credit 5	Indoor Chemical and Pollutant Source Control	1
1			Credit 6.1	Controllability of Systems—Lighting	1
		1	Credit 6.2	Controllability of Systems—Thermal Comfort	1
	1		Credit 7	Thermal Comfort—Design and Verification	1
	2		Credit 8.1	Daylight and Views—Daylight	2
	3		Credit 8.2	Daylight and Views—Views	1 to 3
4	2	0	**Innovation in Design**	**Possible Points:**	**6**
Y			Prereq 1	Integrative Project Planning and Design	
	1		Credit 1.1	Innovation in Design: Green Advantage Training	1
1			Credit 1.2	Innovation in Design: Green Kiosk Education & Booklet	1
	1		Credit 1.3	Innovation in Design: Green Power 100%, Green Power 200%	1
1			Credit 1.4	Innovation in Design: Smart Certification, Green Housekeeping	1
1			Credit 2	LEED Accredited Professional	1
1			Credit 3	Integrative Project Planning and Design	1
2	2	0	**Regional Priority Credits**	**Possible Points:**	**4**
1			Credit 1.1	Regional Priority: WEc1	1
	1		Credit 1.2	Regional Priority: SSc4.4	1
1			Credit 1.3	Regional Priority: SSc6.1	1
	1		Credit 1.4	Regional Priority: WEc2	1
45	26	39	**Total**	**Possible Points:**	**110**

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110