TAYLOR HALL

George Mason University
Fairfax, VA

Technical Assignment 2

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Construction Option
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Executive Summary

The purpose of Technical Report 2 is to analyze and report critical schedule and cost data for our buildings. It is also for discovering and analyzing potential constructability and site concerns associated with the project. Finally, the analysis of an emerging trend is explained and shown how it will positively affect the building construction process.

For Taylor Hall, the schedule is the most critical item of concern for the owner. This is because there is a set date on which 295 students will call it their home. To ensure that the project stays on schedule, entire systems have been decided upon purely due to their ability to accelerate the schedule. (ie. The Infinity Structural System, said to be three times faster than concrete.) Through the analysis of critical path items, it can be seen that achieving the substantial completion after only 295 days of construction is very possible.

Secondly to schedule, the owner is concerned with cost. With a strict budget, it is important to include the most efficient and sustainable equipment and procedures available. This will not only help to cut down on upfront cost, but building maintenance and life cycle cost. An assembly estimate of the buildings primary mechanical, electrical, and plumbing systems allow for a more accurate building cost analysis. It was found that the MEP total estimate is within roughly $8 per square foot of the projected cost.

With schedule being a primary concern and cost second, the structural system has an integral role to the owner. The Infinity Structural System utilizes prefabrication of load bearing stud walls to accelerate the schedule of the superstructure by three-fold. It has been said that up to 24,000 SF of structure can be erected in 5 days. However, this patented system comes with a price.

According to a detailed structural system estimate completed in this report, the cost per square foot of the Infinity Structural System was roughly $15.50. This was achieved after several assumptions were made about the cost of design and prefabrication of the panelized stud walls. From a sub-contractor source, the cost per square foot of the Infinity System in the DC area ranges between $19 and $23, but the original cost information obtained shows a $30/SF cost. This information can be used to analyze weather this system's cost outweighs its ability to accelerate the schedule.

General Conditions estimates, including staffing, insurance and bonding, fee, and temporary facilities fees indicate how schedule can directly impact price. Since the project is a "Design-Build" management model, the project team must work together long before arriving on-site to model and discover potential schedule and budge hazards before they happen. Because of this, the GC estimate comes in at just over 13% of the total project cost.

Site plans at different stages of construction are made to help show how the campus will interact with Taylor Hall and how the project team will have to monitor the space usage closely. In the site plans contained in this report, the excavation phase, structural erection phase, and completion stage of the building are shown. It was found that the site has ample space for construction activities to take place, but has some critical constraints from the north and eastern boundaries of the site and that water runoff management is important on the southern side of the site.

With so much preconstruction focus from the job team, certain areas were discovered that may lead to speed bumps in the already tight schedule. These constructability concerns pertaining to the Infinity Structural system and it's interaction with other trades are weighed against their ability to negatively affect the schedule. They will require an immense amount of attention during the construction phase, but with proper communication and planning, all should run smoothly.

Finally, the project's LEED accreditation is analyzed to see what goals the owner has in obtaining the Silver certification. The highlights for each category in achieving the 58 points reflect George Mason University's sustainability plan and help to maintain healthy students, a healthy environment, and a cost efficient life cycle. These required points are similar to that which Penn State University requires of their new buildings on campus.

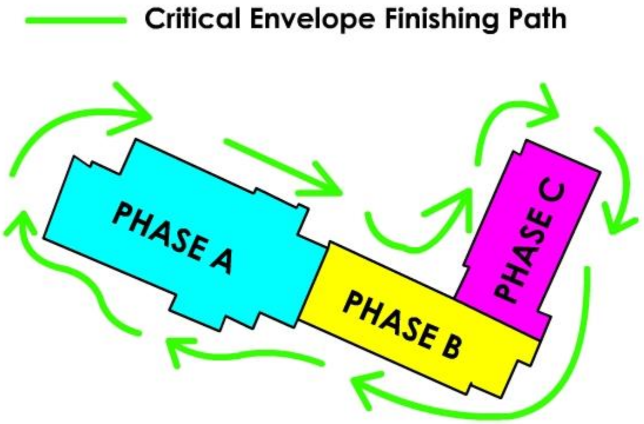
Technical Report 2 will help me in my future analyses of Taylor Hall by providing baselines of comparison for which I will measure changes that I may institute in the future. By looking into the key constituents that affect the cost, schedule and overall success of the project, I have learned valuable assets in brainstorming potential ideas for improvement.

Primavera P6 Project Schedule

A condensed schedule of 180 line items has been created based on trade and type of work. This schedule can be seen in Appendix A. With this particular type of schedule, cost loading and evaluation can be done in further technical reports where alternative systems may be presented. With a Total Project Duration of 404 days and a Construction Duration of only 295 days (assuming ground breaking to substantial completion) the project is already very efficient with its schedule.

The schedule mentions Areas A, B, C, and also mentions areas where the skin and envelope of the building are to be worked on at a given time. I've developed the following graphic to help visualize the process per floor for the superstructure and envelope systems.

Figure 1. Phase and Flow Diagram



Since the Taylor Hall project is a student dormitory, the schedule is the primary concern of the owner. For the project to best adhere to the schedule, the critical path items must be a priority for the construction team long before they take the field. The following critical path items hold the ability to make or break the project due to the short construction period.

The submission, approval, and fabrication of rebar are critical to when the building can begin taking shape. Since Balfour Beatty (the Design-Builder) is also the concrete subcontractor, this process can be carried out rather quickly and with ease.

Other than the procurement period, the under-slab preparation is a critical path item that must be happen before the project can continue. This is because it precedes the pouring of the slab on grade, another critical path item. While the under-slab rough-in is occurring, concrete work can already be ongoing with strip and bearing footings.

Since the roof is a critical path item on nearly every building (as it is on this one), getting to the roof is equally as important. This means that installing the Infinity Structural panels the whole way up the building are on the critical path before placing the cold formed trusses and decking of the roof system. Once the roof is in place, the building is dried in.

The next critical landmark in the schedule is when the building is 100% enclosed. This means that the scaffolding, sheathing, brick, and window installation are all critical path items. When the building is fully enclosed and protected from the elements, finishes can begin to be installed in the building.

Going along with the finishes, drywall installation is a critical path item immediately following building enclosure since certain drywalls can be ruined by water. The finishing process of sanding, priming, and painting these drywall segments is critical to the project being completed on time.

The last, and arguably most important, critical path item is the final building inspections and fire alarm testing. These are the most important because the C of O (Certificate of Occupancy) completely relies on the passing of these permit closeout inspections. It is also important to realize that pre-testing is required so that actual fire alarm testing runs smoothly to avoid multiple visits from the fire marshal, which could be weeks apart.

Project Estimates

MEP- Assemblies Estimate

An assemblies estimate for the electrical, mechanical, and plumbing systems were conducted using RS Means Online Assemblies Estimating calculator. The detailed reports and raw calculations/takeoffs are located in Appendix B and show the work done to come up with the numbers. No assumptions were needed for the Assemblies estimates, but conversion calculations were completed to find values not found on the drawings.

Below are tables detailing the groups and values within each of the assemblies' estimates. For comparison purposes, the cost per square foot of each assembly was also calculated.

Mechanical Assemblies Estimate Summary

Group Name	Price
Large Hydronic Heating System – 70,057 SF	**$ 570,964.55**
20,300 CFM, 50.75 ton, Rooftop AHU for College Dorm	**$ 1,411,648.55**
MECHANICAL TOTAL	**$ 1,982,613.10**
SF COST	**$28.30 /SF**

Electrical Assemblies Estimate Summary

Group Name	Price
Switchgear	**$ 32,644.65**
Panels	**$ 193,777.25**
Air Conditioning	**$ 20,316.53**
Fire Detection and Alarm System	**$ 113,386.80**
Underground Service Installation	**$ 61,146.00**
Telecom	**$ 101,930.99**
Lighting	**$ 331,369.61**
Receptacles	**$ 215,074.99**
Switches	**$ 42,034.20**
ELECTRICAL TOTAL	$ 1,111,681.02
SF COST	$15.87 /SF

Plumbing Assemblies Estimate Summary

Group Name	Price
3 Fixture Bathrooms, 2 Walls of Plumbing	**$ 34,968.65**
Water Closets	**$ 123,896.76**
Showers	**$ 203,958.44**
Lavatories	**$ 69,311.04**
Electric Water Coolers	**$ 6,112.65**
Electric Water Heaters	**$ 96,682.80**
Drinking Fountains	**$ 11,850.60**
Roof Drains	**$ 9,828.45**
PLUBMING TOTAL	$ 556,609.39
SF COST	$7.95 /SF

Compared to SF estimates completed in technical assignment 1, the overall MEP system cost does not differ greatly. From RS Means, the MEP costs were combined to be $56.04 /SF. This is slightly more than the assemblies estimate above, which equals $52.12 /SF. Actual building cost per SF numbers for MEP systems summed to $60.50. This difference may be due to the addition of special additives, such as an economizer on the AHU and in-slab rough in for branch circuiting throughout the floors.

Individually, however, the numbers differ greatly when compared to the actual and SF estimate costs. The below table illustrates the variations between estimates and system.

Cost Comparison for MEP Systems by Estimate Type ($/SF)			
System	**Square Foot**	**Assembly**	**Actual**
Mechanical	$14.26	$28.30	$15.00
Electrical	$17.38	$15.87	$20.50
Plumbing	$24.40	$7.95	$25.00
TOTAL	$56.04	$52.12	$60.50

Clearly there is something about the plumbing system in the building that is accounting for a much larger cost than that estimated by assembly. The opposite can be said for the mechanical system in place. This may be because of the hyrdonic heating system and heat exchanger was put under the mechanical system estimate and may have been under the plumber's scope of work for this particular project.

Structural - Detailed Estimate

The detailed structural system estimate was done within the RS Means Online program and the attached report in Appendix B shows the detailed breakdown. All numbers were taken off within Bluebeam Revu and measured accordingly. Interpolation was also needed in cases where items did not show up in the estimate. All interpolation calculations can be seen on the scratch notes in Appendix B and they are represented on the detailed estimate with a code "SS" followed by a number. Only Total cost with O&P values were interpolated.

Several assumptions were made during the course of the estimate. The assumptions pertaining to the Infinity Structural System are educated guesses based on my questioning of Bob McDaniel from Miller + Long, a sub-contractor specializing in installing the system. I was not able to obtain real cost data or shop drawings for the walls since it is a patented system and was only provided with very basic information.

- **Waste:** 5% waste on concrete materials
- **Reinforcement:** 3 lb/SF reinforcement on concrete SOG and 1.5 lb/SF reinforcement for SOMD. (per interview with sub-contractor)
- **Connections:** (4) ¾" diameter, 2" length bolts per steel member. 5% waste on bolts
- **Formwork:** 4.5 SFCA/LF of exterior wall (from footing calculation)
- **Infinity System: Prefabricated, load bearing stud walls**
    - 15% increase for shear wall components
    - 25% increase for shear bearing wall components
    - 50% increase on labor for prefabrication
    - 12" OC, 18 ga., 3-5/8" wide, 10' high walls for standard bear wall
    - Floors 2-4 have identical framing plans

The following table provides a summary of the estimate by group name. For a more detailed estimate, please reference the generated project report in Appendix B.

Cost Summary for Detailed Structural Estimate

Group Name	Total Cost
Slab on Grade	$ 8,589.72
Strip Footings	$ 7,392.92
Slab on Metal Deck	$ 18,060.38
Concrete Material	$ 142,053.60
Metal Deck (Roof and Floor)	$ 227,753.34
Roof Trusses	$ 25,151.56
K-Series Joists	$ 3,788.79
Bearing and Shear Stud Walls (Infinity System)	$ 234,675.08
Footings	$ 32,427.92
Bearing Plates	$ 3,445.83
Columns	$ 64,897.99
Beams	$ 68,144.42
Concrete Reinforcement + Galvanized	$ 103,170.05
Curb Edging	$ 94,349.92
Concrete Curing	$ 5,182.39

Bolts/Connections	**$ 2,840.05**
Concrete Formwork	**$ 44,511.02**
TOTAL STRUCTURAL SYSTEM	**$1,086,434.97**

The total cost of $1,086,434.97 comes out to roughly $15.50 per square foot of building space. According to my Square Foot estimate from the previous technical report, the building should have a structural square foot cost of $19.98. I believe this difference is due to the fact that RS Means assumes that there are many more load bearing steel members which are much more costly than cold-formed metal walls.

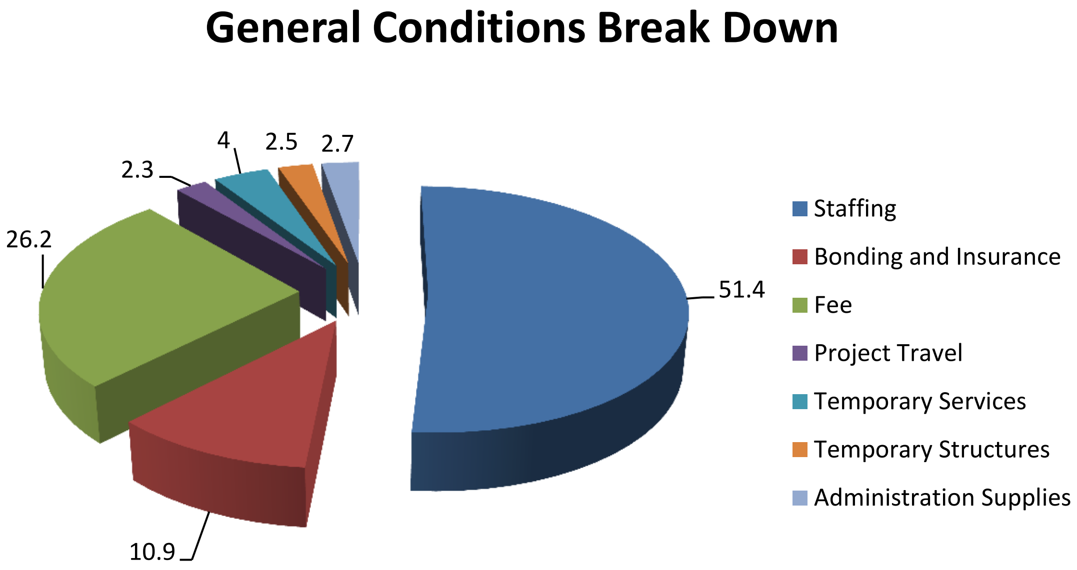
After my conversation with a specialist sub-contractor, I learned that the Infinity system should actually cost more than that of RS Means due to prefabrication costs. Per conversation with Miller + Long, the cost per square foot should be roughly $23. This means that the Infinity System's load bearing walls must come with a very high design, preconstruction, and delivery price.

Furthermore, the sub-contractor's estimate of $23/SF does not coordinate with the original $30/SF estimate that was received from the Design-Builder for Technical Assignment 1. This may be due to a late change in structural design (October 9th) due to the building being slightly over budget.

(Complete cost breakdown available in appendix B)

General Conditions Estimate

The general conditions estimate overview below shows the percentages of each component of the estimate. The estimate, in total, makes up 13.3% of the total construction cost and accounts for all necessary expenses that may take place during the project.



The Staffing plan shown in the next section correlates with the staffing plan presented in Tech 1 and the salary information was derived from industry average salaries under the assumption of a 40 hour work week. It is also assumed that staffing costs include Employee Benefits Expense (EBE) which consist of health care (18%), paid time off (10%), taxes and insurance (10%), 401k/profit sharing (7%), and on the job training for an intern (3%).

General Conditions Estimate

			Material		Labor		
Description	**Quantity**	**Units**	**$/ Unit**	**Total**	**$/Hr**	**Total**	**Total**
Project Manager	57	WK			118	269040	$ 269,040.00
Superintendant	53	WK			115	243800	$ 243,800.00
Asst. Project Manager	53	WK			90	190800	$ 190,800.00
Asst. Superintendant	53	WK			85	180200	$ 180,200.00
Project Engineer	52	WK			65	135200	$ 135,200.00
Project Executive 25%	57	WK			138	78660	$ 78,660.00
Total							**$ 1,097,700.00**
Administration Supplies	*						**$ 57,500.00**
Temporary Structures	*						**$ 54,100.00**
Temporary Services	*						**$ 84,478.50**
Project Related Travel	*						**$ 50,000.00**
SUB TOTAL FOR COSTS							**$ 1,343,778.50**
"Fee" (Overhead and Profit)							
a) Offerer's Fixed Fee in Dollars							**$ 560,000.00**
b) Fixed Fee as percent of "cost of work"							**3.5%**
Insurance and Bonds	1.45%						**$ 232,000.00**
BASELINE TOTAL GENERAL CONDITIONS AND FEE							**$ 2,135,778.50**

The fee for the project was set at 3.5% of the total building cost, in accordance with Means data. Insurance and performance bonding is assumed to be 0.75 % and 0.70% of the total project cost respectively.

All data for Temporary Services, Structures, Project Travel and Administrative Supplies were based on averages used on previous projects and in-class assignments for estimating (AE472) and have been adjusted for the Fairfax area. The durations and amounts of each activity were set in place based on 12 months of construction.

The estimate may be slightly higher than a typical project would expect. This may be because of the extensive pre-construction work needed to compete for the project. Planning associated with the pre-fabrication and extremely tight schedule may also lead to slight general conditions inflation.

Temporary Conditions and Expenses							
			Material		**Labor**		
Description	**Quantity**	**Units**	**$/ Unit**	**Total**	**$/ Unit**	**Total**	**Total**
Administration Supplies							
Office Supplies	12	MO	300	3600			$ 3,600.00
Office Equipment	1	LS	Already Present				$ -
Office Furniture	1	LS	Already Present				$ -
Copying / Blueprinting Specifications	1	LS		50000			$ 50,000.00
Fax Machine	1	LS	Already Present				$ -
Miscellaneous Safety Equipment	1	LS		1500			$ 1,500.00
Postage	12	MO	100	1200			$ 1,200.00
Site Fire Extinguishers	15	EA	Already Present				$ -
Expendable Small Tools	12	MO	100	1200			$ 1,200.00
Computer Equipment / Software	1	LS	Already Present				$ -
Subtotal							**$ 57,500.00**
Temporary Structures							
Scaffolding	12	MO	1200	14400			$ 14,400.00
Job Office / Trailer	12	MO	1500	18000			$ 18,000.00
Construction Fence	13	MO	900	11700			$ 11,700.00
Trailer Set-up	1	LS		5000			$ 5,000.00
Trailer Utilities Usage Cost	12	MO	By Owner				$ -
Temporary Signage	5	EA	1000	5000			$ 5,000.00
Subtotal							**$ 54,100.00**
Temporary Services							
Toilets	12	MO	800	9600			$ 9,600.00
Drinking Water / Ice	12	MO	200	2400			$ 2,400.00
Progress Photos	12	MO	250	3000			$ 3,000.00
Radios/ Phones/ Nextel	7	EA	1800	12600			$ 12,600.00
Security	1	LS		4500			$ 4,500.00
Dumpster and Trash Removal	13	MO	1200	15600			$ 15,600.00
Final building clean-up	72,057	SF	0.5	36028.5			$ 36,028.50
Snow Removal	1	LS		750			$ 750.00
Subtotal							**$ 84,478.50**
Project Related Travel							
Signage	1	LS	By Owner				$ -
Professional Survey			By Owner				$ -
Testing & Inspections			By Owner				$ -
Topping Out		EA					$ -
Business Promotion		LS					$ -
Visit Subcontractors	1	LS		15000			$ 15,000.00
Vehicle Milage	20,000	Miles	0.5	10000			$ 10,000.00
Auto Allowances	1	LS		10000			$ 10,000.00
Job Site Travel	1	LS		12500			$ 12,500.00
Temporary Living Expense	1	LS		2500			$ 2,500.00
Subtotal							**$ 50,000.00**
Total							**$246,078.50**

Site Plans throughout Construction

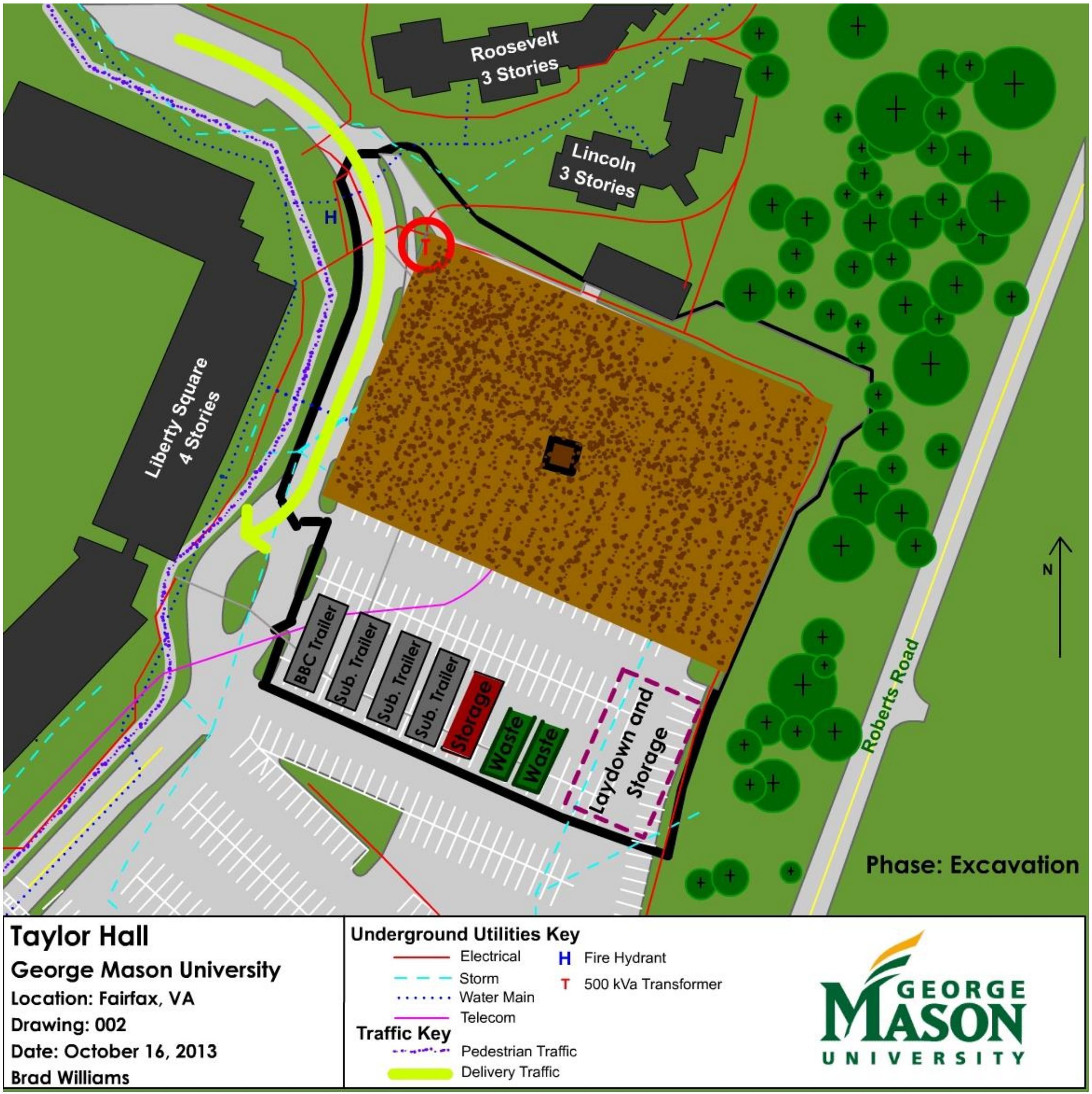
Existing Conditions

As mentioned in the previous Technical Report, the existing conditions are a faculty/student parking lot on the south eastern boarder of George Mason University's campus in Fairfax, VA. The site was proposed as a potential building location when developing the campus's Master Plan, so all utility tie-ins are already available and capable of supporting the new 295 bed dormitory.

In the above plan, it is clear that site delivery and traffic flow will be well maintained and student traffic should not be a problem since all classroom buildings are north or north-west of the site. It is also important to not the construction site is constrained by a greenhouse to the north of the site and a 100’ tree buffer to the west of the site. These boundaries may not be crossed or obstructed by any construction activity.

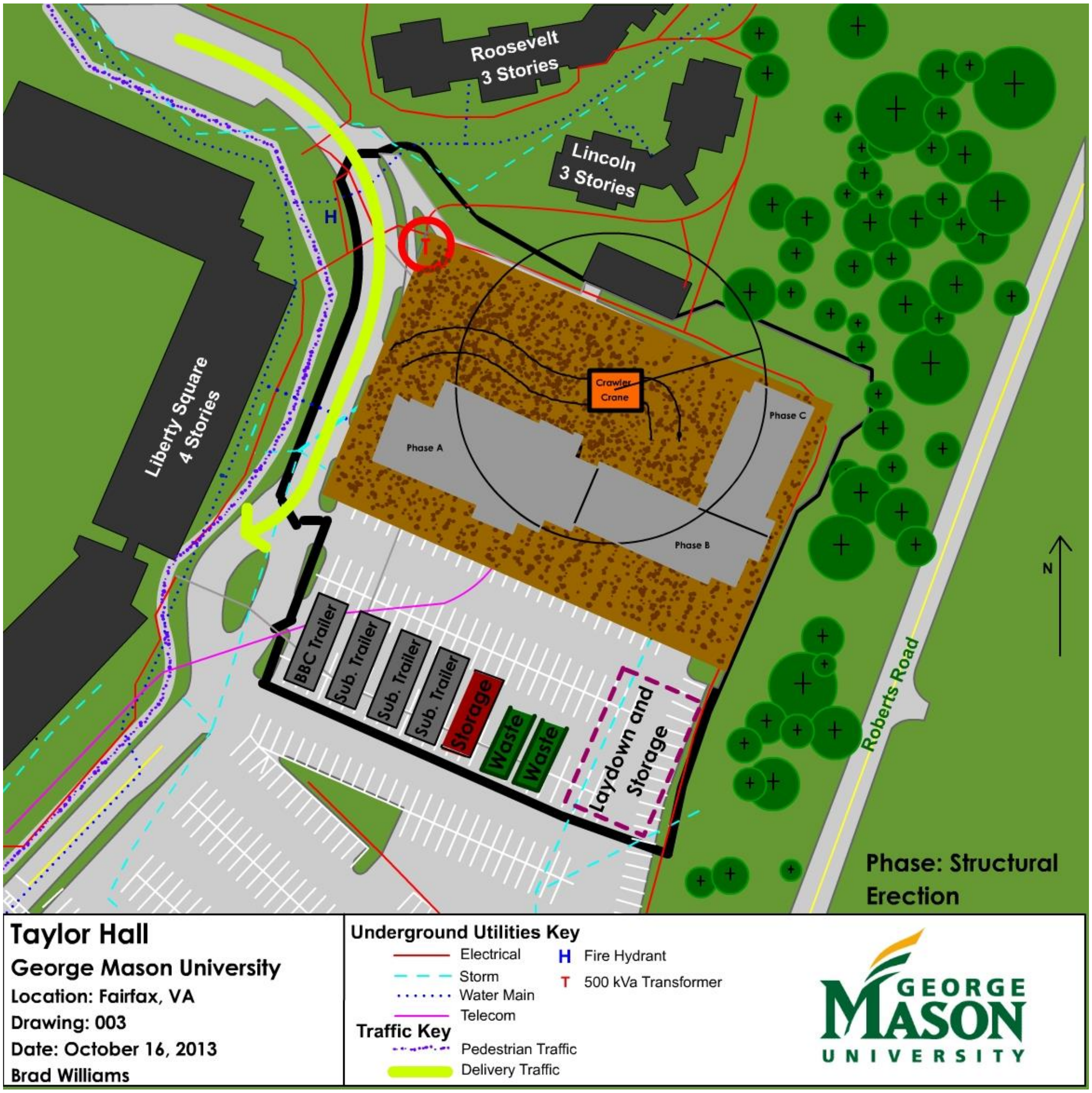
Excavation

The site is set in an existing parking lot, so there is ample room for temporary trailers, storage, waste containment, and delivery layout in the south end of the site. The excavation will take place after removing a portion of the parking lot noted above. On the above drawing, the black square indicates the elevator pit, which is the deepest excavation on the project. All other footings and strip footings are less than 5' below grade.



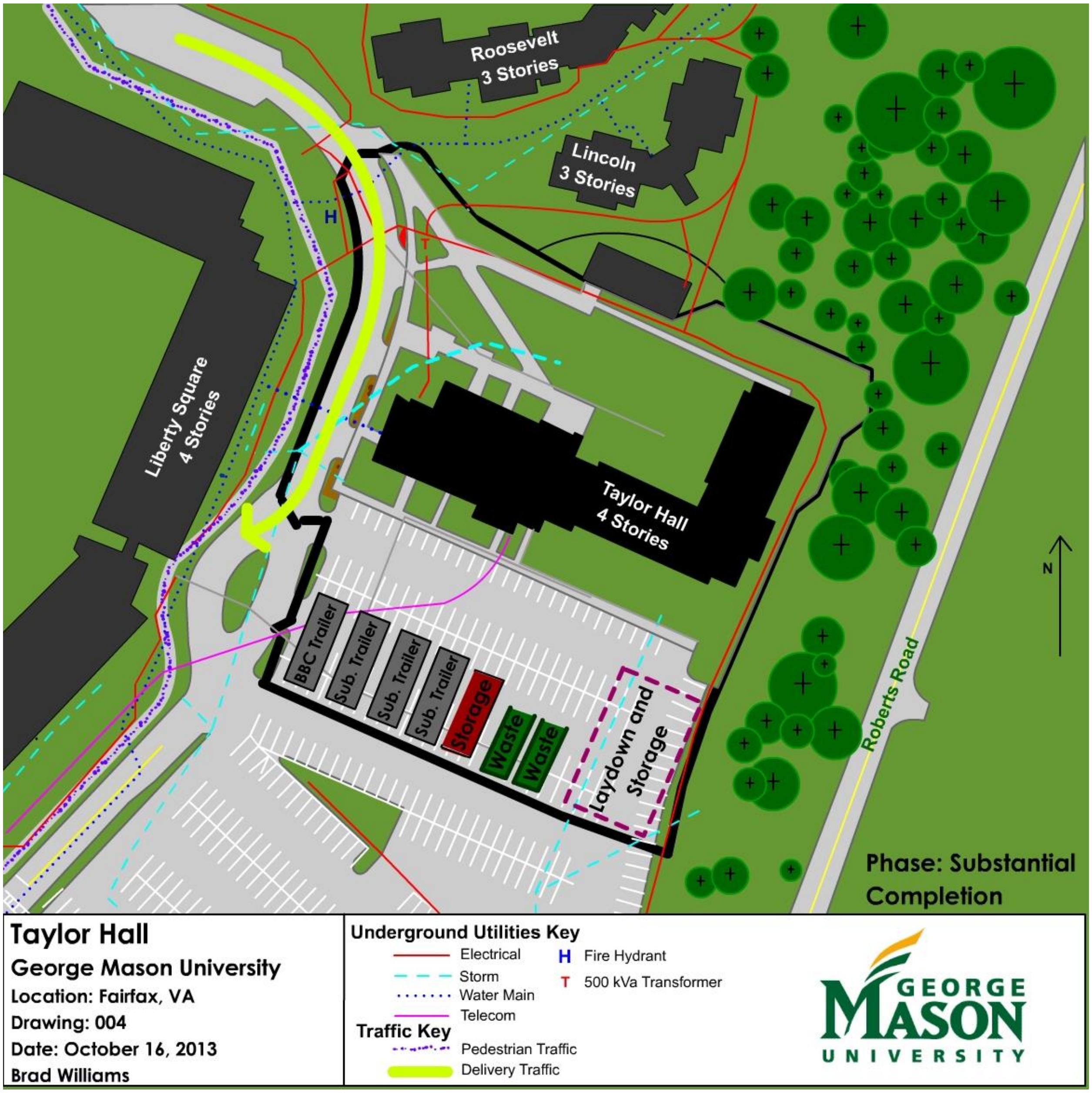
Superstructure Erection

In the above graphic representing the superstructure erection phase, you can see the building footprint represented by the gray concrete slab. The erection of the structure will take place in 3 phases (A, B, and C) and are noted above. Prefabricated load bearing stud walls, columns, and beams will be placed with a crawler crane which will have the mobility to easily relocate if a lift is outside the range.



Completion

This site plan represents the final completion stage of the building. With sidewalks in place, you can see the building easily tie-in with the network of walkways already present on campus. Once construction has ended and trailers are removed, the parking lot will be restored and used by faculty and students.



Constructability Concerns

When planning for the construction phase of the building, it is important to analyze how the major systems will come together in the field. This helps avoid the potential mishap later in the construction phase which could lead to schedule and cost implications. Throughout my research of Taylor Hall, I've found 3 major areas that may require special attention during the design phase and construction phase of a building. The phase planning of the pre-fabricated structural walls, coordination of wall penetrations, and the project completion date are critical areas specific to this project.

Infinity Structural System

Taylor Hall uses a patented structural system that is based around panelized, pre-fabricated cold formed walls. The walls are built to bear structural load as well as shear loads and sometimes both. When considering other structural systems, this was favored due to its schedule acceleration abilities. After talking with a representative (Bob McDaniel) from Miller and Long, it was mentioned that they could place up to 24,000 SF of building structural system in only 5 days. This does, however, come with a pretty significant price.

Early in the design phase of the building, it must be determined which walls are load bearing walls and which are not. This is not only important for the prefabrication department, but for phase planning. Though made of roughly the same components, the prefabricated shear and bearing walls must be in place before the metal decking of the next floor is laid out. Non load bearing walls, on the other hand, are placed after the next slab on metal deck is poured.

Designated bearing walls, shear walls, and shear-bearing walls have a significant lead time and must be designed long before foundation work has begun. It is important for the management team to coordinate this with the building schedule so that the right wall segments are being delivered in time to be lifted into place. Without proper coordination, specific designed walls may end up being placed in an improper location.

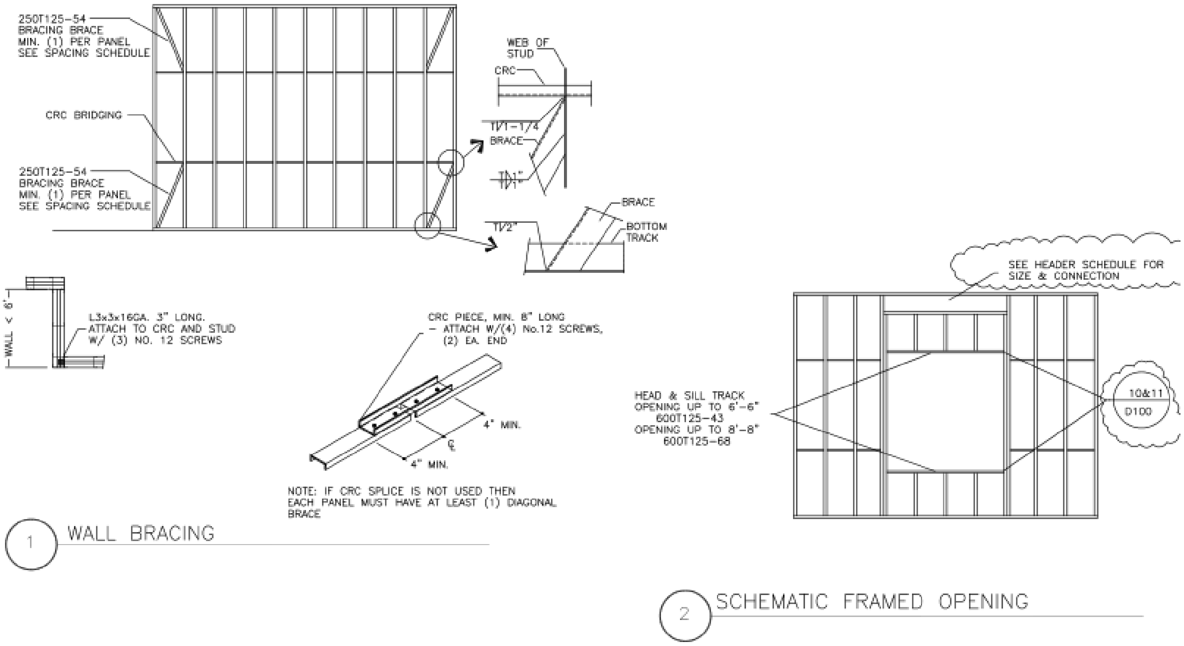


Figure 2. From Structural Sub drawings C200. It is the only hint of Bearing Wall components/design shown from the Infinity System.

After talking with Bill Moyer, Vice President of Davis Construction, on the topic of Infinity Structural Systems, he mentioned a second constructability concern to me. Without proper phasing of where the structural system is to be put in place, you may end up with exposed MEP risers and branches. Since the framing is set in place so quickly and significant time is spent laying out electrical branch conduit on the decking before the next slab is poured, mechanical and plumbing trades are routinely scheduled to install risers and branch distributions before the slab is poured. This has happened on several projects in the Northern Virginia and DC area and has lead to some contamination of systems when the slab is poured.

Other than improper installation procedures, to achieve LEED IEQc3.1 (Indoor Air Quality Management Plan – During Construction), it is required to provide a signature confirming all duct work remained dry and covered during construction. The above-mentioned constructability concern may put this credit in jeopardy.

Coordination of Wall Penetrations

Due to the majority of the structural system being prefabricated, it is absolutely critical for trades to coordinate plans early in the design process. The long lead times required for panel prefabrication mean that plumbing, electrical, and mechanical penetrations need to be finalized long before construction begins.

When the structural panels arrive on site, they will not allow for large penetrations to be relocated. Small penetrations however may have more space when penetrating the structural stud walls. By increasing communications between subcontractors early on, an efficient design to minimize wall penetrations can be developed to allow for more flexibility when the construction phase begins in the field.

Project Completion Date

Like most universities, George Mason wishes to have a completed building ready for occupancy for a new school year. It has been quite clear that the entire project is schedule driven so that the move-in date of the new freshman students is not delayed. Several critical path items may require special attention to adhere to the schedule.

The Infinity Structural System, being on the critical path, has a major role in how the remainder of the project will be on schedule. By avoiding the previously mentioned constructability concerns, this one may also be avoided. Secondly, early coordination and keeping good communication on the site may help to eliminate tension on such a tight schedule. Without many float days, there are not too many areas on the schedule for acceleration later on.

Industry Leading Practice - LEED

LEED (Leadership in Energy and Environmental Design) is a program intended to recognize efforts in designing and constructing sustainably buildings. LEED accredited buildings may be more energy efficient, healthier to live in, use local and recycled materials, and have low impact on the surrounding environment. Taylor Hall is currently set to achieve 58 points in the LEED version 3 scoring system, allowing the building to reach LEED Silver certification (George Mason University Standard).

Sustainable Sites

The first category is “Sustainable Sites” and is intended to manage impact on the surrounding environment, control population density, provide occupants with nearby alternative transportation, and to decrease the heat island affect. The category has 26 possible points with 1 prerequisite (Construction Activity Pollution Prevention). In accordance with George Mason’s Sustainability Plan, most of these points are required. Taylor Hall is expected to earn 20 of these points with the possibility of one additional point.

Water Efficiency

“Water Efficiency” is a category which aims to reduce the waste of water, manage an efficient site design in terms of water control, and to encourage innovative design. Out of the possible 10 points, Taylor Hall will be earning 3 by reducing the water usage by 35%.

George Mason University has a very specific construction site water management plan due to the protection of several tree and wildlife buffers on campus. The site water management plan is of particular importance to the Taylor Hall site for concerns of contaminating a nearby (< 300') creek that flows off campus.

Energy and Atmosphere

The "Energy and Atmosphere" category scores projects based on their abilities to optimize energy performance and to turn to on-site renewable energy as a resource. Due to the costs involved with optimizing the energy performance of the building, Taylor Hall is only expected to earn 9 points (with a possibility of 4 more) out of a possible 33 points. The majority of these 9 points come from enhanced commissioning and refrigerant management, however, the building will meet energy standards set forth by the University and optimize energy performance by 19%. This will be accomplished, in-part, due to the enthalpy heat recovery wheel to pre-condition the outside air entering the building.

Materials and Resources

"Materials and Resources" is a category intending to manage construction waste, encourage the use of local materials, use recycled materials, and use of rapidly renewable resources or certified wood. Of the 14 possible points, Taylor Hall will be earning 7 points with a large emphasis on construction waste management, recycled content of materials, and the use of materials harvested and manufactured within 500 miles. This is easily done with the amount of concrete plants and steel mills in the acceptable radius.

Indoor and Environmental Air Quality

The “Indoor and Environmental” Category exists to maintain the health of the building’s future occupants by reducing volatile organic compounds, increasing ventilation and filtration of air, and providing a comfortable and controllable environment. Luckily, most flooring, sealants, and paints are made to comply with allowable VOC limits and the replacement of MERV 13 filters has become standard practice before occupancy. Of the 15 possible points, the building will earn 10 with the possibility of 2 additional points. This score heavily reflects George Mason University’s intentions of providing its students with a top notch living environment.

Innovation and Design Process / Regional Priority

The final categories of LEED certification are “Innovation and Design Process” and “Regional Priority.” These credit categories encourage the use of having a LEED Accredited Professional on the project team and allow for a variety of options for gaining points. For one of the points, the building will be fit out with a display panel in the lobby showing live building statistics on energy consumption in the hopes that it might influence savings. Taylor Hall will be gaining 7 points from the two categories. The 6 Innovative practices are listed below and are worth 1 point each.

- Green Housekeeping
- Environmental Pest Control
- Green Landscape Management
- Low Mercury Bulbs
- Green Education
- LEED Accredited Professional

University Plan Comparison

In comparison to Penn State University's LEED Policy on buildings, Taylor Hall would be considered going above the Penn State standard. When reviewing the PSU LEED scorecard and counting a "mandatory" as a "yes" and a "significant" as a "maybe, yes" it is only required for Penn State buildings to obtain 27 points. Similarly to GMU's plan, PSU also heavily emphasizes the points within the Indoor Air Quality category to maintain the health of its students. Penn State's plan seems to heavily consider price when assigning points, however, many points listed as "minimal" effort can be achieved for little to no price increase.

George Mason University strives for excellence in the field of sustainability and feels that obtaining LEED Silver certification is of the utmost importance. With such a young and growing campus, the opportunity for "green" innovation is present and Taylor Hall will be taking full advantage of it by earning 58 points.

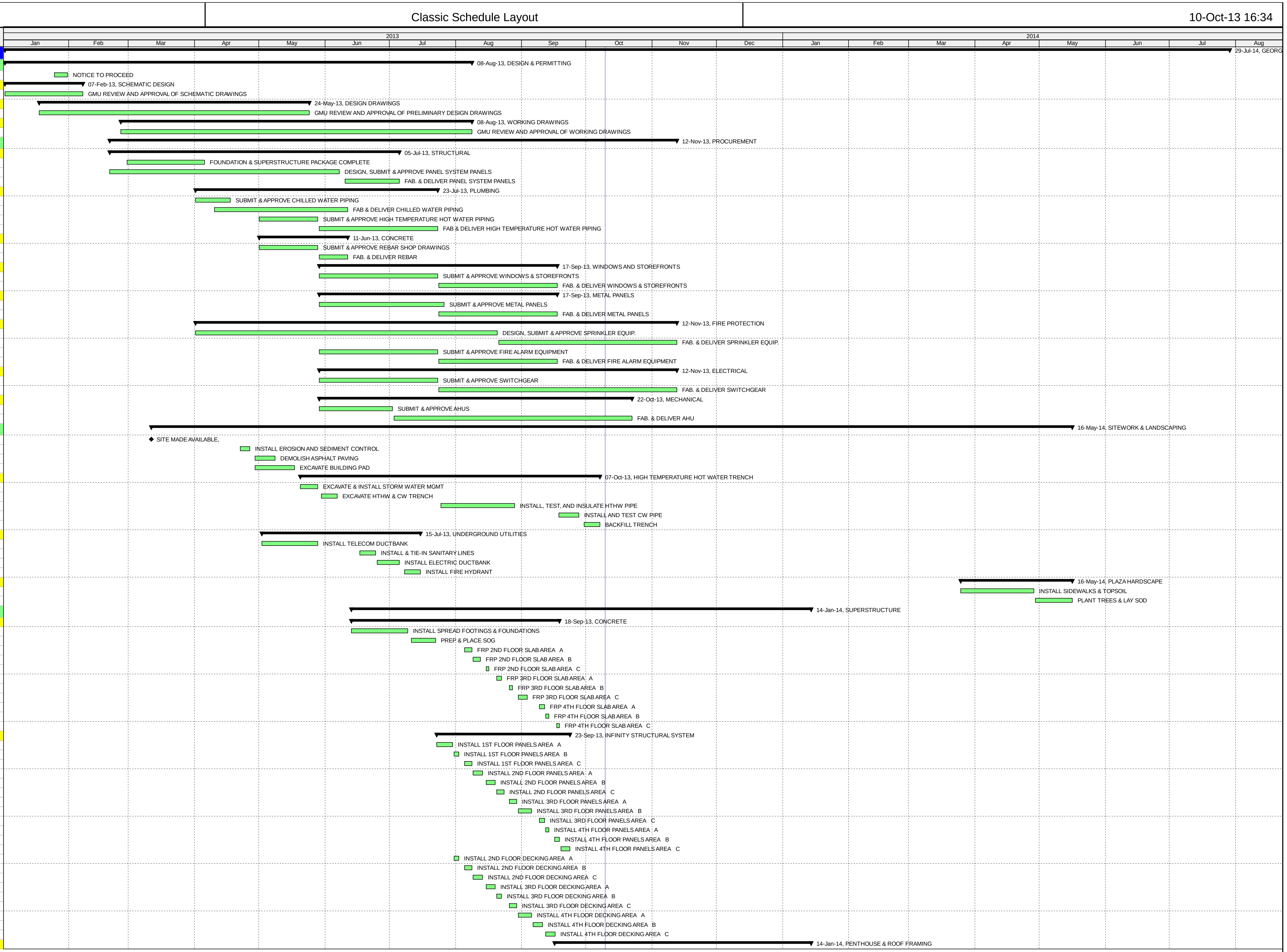
(see appendix C for LEED scorecard for Taylor Hall)

Appendix A:

Primavera Project Schedule

GEORGE MASON UNIVERSITY - TAYLOR HALL | Classic Schedule Layout | 10-Oct-13 16:34

Activity ID	Activity Name	Original Duration	Start	Finish
GEORGE MASON UNIVERSITY - TAYLOR HALL		404	02-Jan-13	29-Jul-14
DESIGN & PERMITTING		155	02-Jan-13	08-Aug-13
A1000	NOTICE TO PROCEED	5	25-Jan-13	31-Jan-13
SCHEMATIC DESIGN		27	02-Jan-13	07-Feb-13
A1010	GMU REVIEW AND APPROVAL OF SCHEMATIC I	27	02-Jan-13	07-Feb-13
DESIGN DRAWINGS		91	18-Jan-13	24-May-13
A1020	GMU REVIEW AND APPROVAL OF PRELIMINARY	91	18-Jan-13	24-May-13
WORKING DRAWINGS		117	25-Feb-13	08-Aug-13
A1030	GMU REVIEW AND APPROVAL OF WORKING DF	117	25-Feb-13	08-Aug-13
PROCUREMENT		187	20-Feb-13	12-Nov-13
STRUCTURAL		96	20-Feb-13	05-Jul-13
A1038	FOUNDATION & SUPERSTRUCTURE PACKAGE	27	28-Feb-13*	05-Apr-13
A1040	DESIGN, SUBMIT & APPROVE PANEL SYSTEM P	77	20-Feb-13	07-Jun-13
A1100	FAB. & DELIVER PANEL SYSTEM PANELS	19	10-Jun-13	05-Jul-13
PLUMBING		80	01-Apr-13	23-Jul-13
A1050	SUBMIT & APPROVE CHILLED WATER PIPING	13	01-Apr-13	17-Apr-13
A1055	FAB & DELIVER CHILLED WATER PIPING	44	10-Apr-13	11-Jun-13
A1070	SUBMIT & APPROVE HIGH TEMPERATURE HOT	19	01-May-13	28-May-13
A1075	FAB & DELIVER HIGH TEMPERATURE HOT WAT	39	29-May-13	23-Jul-13
CONCRETE		29	01-May-13	11-Jun-13
A1080	SUBMIT & APPROVE REBAR SHOP DRAWINGS	19	01-May-13	28-May-13
A1090	FAB. & DELIVER REBAR	10	29-May-13	11-Jun-13
WINDOWS AND STOREFRONTS		78	29-May-13	17-Sep-13
A1110	SUBMIT & APPROVE WINDOWS & STOREFRON	39	29-May-13	23-Jul-13
A1120	FAB. & DELIVER WINDOWS & STOREFRONTS	39	24-Jul-13	17-Sep-13
METAL PANELS		78	29-May-13	17-Sep-13
A1130	SUBMIT & APPROVE METAL PANELS	42	29-May-13	26-Jul-13
A1140	FAB. & DELIVER METAL PANELS	39	24-Jul-13	17-Sep-13
FIRE PROTECTION		159	01-Apr-13	12-Nov-13
A1150	DESIGN, SUBMIT & APPROVE SPRINKLER EQUI	100	01-Apr-13	20-Aug-13
A1155	FAB. & DELIVER SPRINKLER EQUIP.	59	21-Aug-13	12-Nov-13
A1160	SUBMIT & APPROVE FIRE ALARM EQUIPMENT	39	29-May-13	23-Jul-13
A1190	FAB. & DELIVER FIRE ALARM EQUIPMENT	39	24-Jul-13	17-Sep-13
ELECTRICAL		118	29-May-13	12-Nov-13
A1170	SUBMIT & APPROVE SWITCHGEAR	39	29-May-13	23-Jul-13
A1180	FAB. & DELIVER SWITCHGEAR	79	24-Jul-13	12-Nov-13
MECHANICAL		103	29-May-13	22-Oct-13
A1200	SUBMIT & APPROVE AHUS	25	29-May-13	02-Jul-13
A1210	FAB. & DELIVER AHU	78	03-Jul-13	22-Oct-13
SITEWORK & LANDSCAPING		304	11-Mar-13	16-May-14
A1220	SITE MADE AVAILABLE	0		11-Mar-13
A1230	INSTALL EROSION AND SEDIMENT CONTROL	5	22-Apr-13	26-Apr-13
A1240	DEMOLISH ASPHALT PAVING	8	29-Apr-13	08-May-13
A1250	EXCAVATE BUILDING PAD	15	29-Apr-13	17-May-13
HIGH TEMPERATURE HOT WATER TRENCH		98	20-May-13	07-Oct-13
A1260	EXCAVATE & INSTALL STORM WATER MGMT	6	20-May-13	28-May-13
A1270	EXCAVATE HTHW & CW TRENCH	6	30-May-13	06-Jun-13
A1280	INSTALL, TEST, AND INSULATE HTHW PIPE	25	25-Jul-13	28-Aug-13
A1290	INSTALL AND TEST CW PIPE	8	18-Sep-13	27-Sep-13
A1300	BACKFILL TRENCH	6	30-Sep-13	07-Oct-13
UNDERGROUND UTILITIES		51	02-May-13	15-Jul-13
A1310	INSTALL TELECOM DUCTBANK	18	02-May-13	28-May-13
A1320	INSTALL & TIE-IN SANITARY LINES	6	17-Jun-13	24-Jun-13
A1330	INSTALL ELECTRIC DUCTBANK	8	25-Jun-13	05-Jul-13
A1340	INSTALL FIRE HYDRANT	6	08-Jul-13	15-Jul-13
PLAZA HARDSCAPE		39	25-Mar-14	16-May-14
A1350	INSTALL SIDEWALKS & TOPSOIL	25	25-Mar-14*	28-Apr-14
A1360	PLANT TREES & LAY SOD	14	29-Apr-14*	16-May-14
SUPERSTRUCTURE		149	13-Jun-13	14-Jan-14
CONCRETE		68	13-Jun-13	18-Sep-13
A1390	INSTALL SPREAD FOOTINGS & FOUNDATIONS	18	13-Jun-13	09-Jul-13
A1400	PREP & PLACE SOG	8	11-Jul-13	22-Jul-13
A1620	FRP 2ND FLOOR SLAB AREA A	4	05-Aug-13	08-Aug-13
A1630	FRP 2ND FLOOR SLAB AREA B	2	09-Aug-13	12-Aug-13
A1640	FRP 2ND FLOOR SLAB AREA C	2	15-Aug-13	16-Aug-13
A1650	FRP 3RD FLOOR SLAB AREA A	3	20-Aug-13	22-Aug-13
A1660	FRP 3RD FLOOR SLAB AREA B	2	26-Aug-13	27-Aug-13
A1670	FRP 3RD FLOOR SLAB AREA C	2	30-Aug-13	03-Sep-13
A1680	FRP 4TH FLOOR SLAB AREA A	3	09-Sep-13	11-Sep-13
A1690	FRP 4TH FLOOR SLAB AREA B	2	12-Sep-13	13-Sep-13
A1700	FRP 4TH FLOOR SLAB AREA C	2	17-Sep-13	18-Sep-13
INFINITY STRUCTURAL SYSTEM		44	23-Jul-13	23-Sep-13
A1410	INSTALL 1ST FLOOR PANELS AREA A	6	23-Jul-13	30-Jul-13
A1420	INSTALL 1ST FLOOR PANELS AREA B	3	31-Jul-13	02-Aug-13
A1430	INSTALL 1ST FLOOR PANELS AREA C	4	05-Aug-13	08-Aug-13
A1440	INSTALL 2ND FLOOR PANELS AREA A	3	09-Aug-13	13-Aug-13
A1450	INSTALL 2ND FLOOR PANELS AREA B	3	15-Aug-13	19-Aug-13
A1460	INSTALL 2ND FLOOR PANELS AREA C	4	20-Aug-13	23-Aug-13
A1470	INSTALL 3RD FLOOR PANELS AREA A	4	26-Aug-13	29-Aug-13
A1480	INSTALL 3RD FLOOR PANELS AREA B	4	30-Aug-13	05-Sep-13
A1490	INSTALL 3RD FLOOR PANELS AREA C	3	09-Sep-13	11-Sep-13
A1500	INSTALL 4TH FLOOR PANELS AREA A	2	12-Sep-13	13-Sep-13
A1510	INSTALL 4TH FLOOR PANELS AREA B	3	16-Sep-13	18-Sep-13
A1520	INSTALL 4TH FLOOR PANELS AREA C	3	19-Sep-13	23-Sep-13
A1530	INSTALL 2ND FLOOR DECKING AREA A	3	31-Jul-13	02-Aug-13
A1540	INSTALL 2ND FLOOR DECKING AREA B	4	05-Aug-13	08-Aug-13
A1550	INSTALL 2ND FLOOR DECKING AREA C	3	09-Aug-13	13-Aug-13
A1560	INSTALL 3RD FLOOR DECKING AREA A	3	15-Aug-13	19-Aug-13
A1570	INSTALL 3RD FLOOR DECKING AREA B	3	20-Aug-13	22-Aug-13
A1580	INSTALL 3RD FLOOR DECKING AREA C	4	26-Aug-13	29-Aug-13
A1590	INSTALL 4TH FLOOR DECKING AREA A	4	30-Aug-13	05-Sep-13
A1600	INSTALL 4TH FLOOR DECKING AREA B	3	06-Sep-13	10-Sep-13
A1610	INSTALL 4TH FLOOR DECKING AREA C	3	12-Sep-13	16-Sep-13
PENTHOUSE & ROOF FRAMING		84	16-Sep-13	14-Jan-14



▬ Actual Level of Effort
▬ Actual Work
🟩 Remaining Work
🟥 Critical Remaining Work
◆ ◆ Milestone
▼ summary

TASK filter: All Activities

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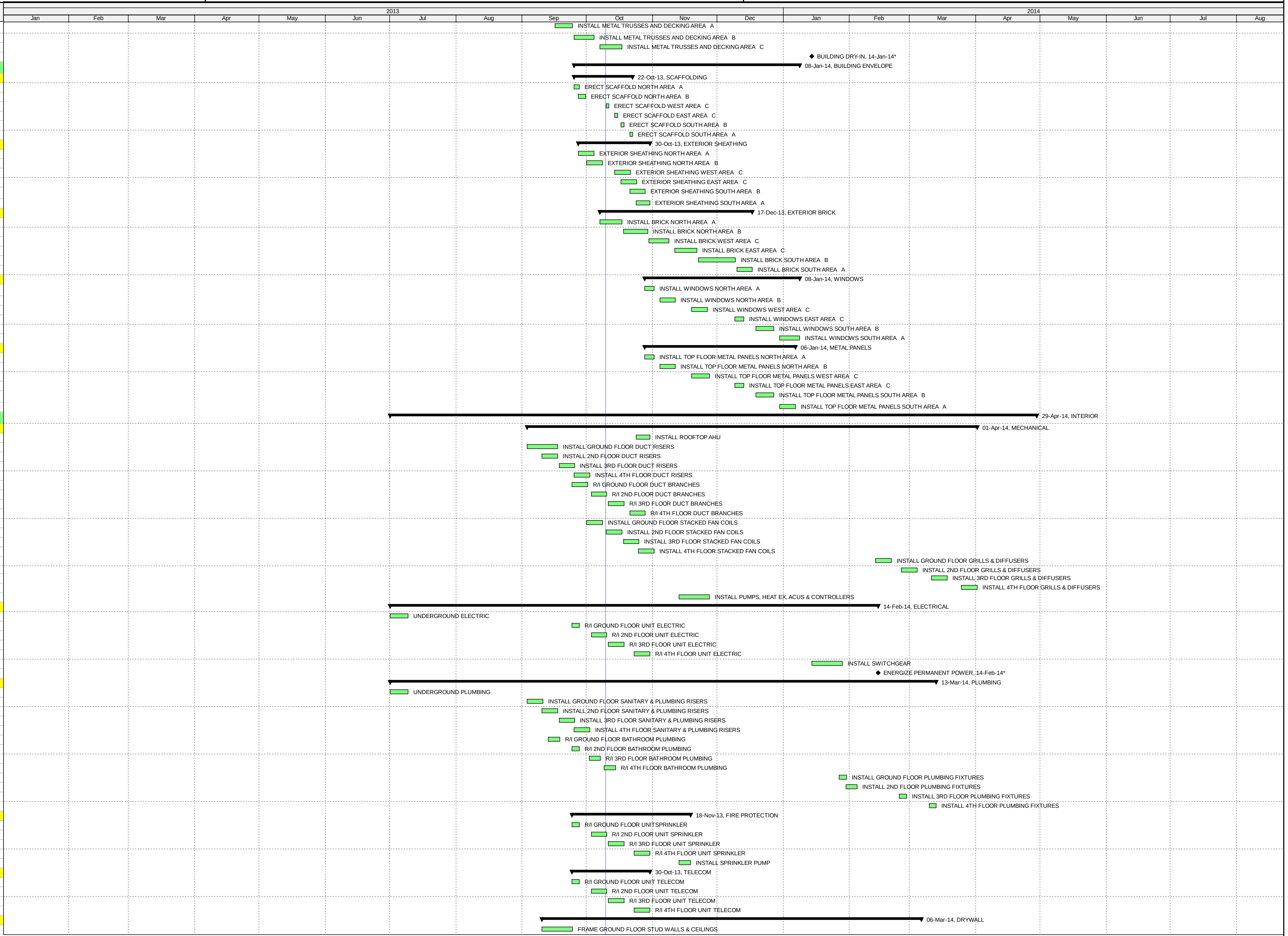
Activity ID	Activity Name	Original Duration	Start	Finish
A1710	INSTALL METAL TRUSSES AND DECKING AREA	7	16-Sep-13	24-Sep-13
A1720	INSTALL METAL TRUSSES AND DECKING AREA	8	25-Sep-13	04-Oct-13
A1730	INSTALL METAL TRUSSES AND DECKING AREA	9	07-Oct-13	17-Oct-13
A1740	BUILDING DRY-IN	0	14-Jan-14*	
BUILDING ENVELOPE		74	25-Sep-13	08-Jan-14
SCAFFOLDING		20	25-Sep-13	22-Oct-13
A1750	ERECT SCAFFOLD NORTH AREA A	3	25-Sep-13	27-Sep-13
A1760	ERECT SCAFFOLD NORTH AREA B	2	27-Sep-13	30-Sep-13
A1770	ERECT SCAFFOLD WEST AREA C	2	10-Oct-13	11-Oct-13
A1780	ERECT SCAFFOLD EAST AREA C	2	14-Oct-13*	15-Oct-13
A1790	ERECT SCAFFOLD SOUTH AREA B	2	17-Oct-13*	18-Oct-13
A1800	ERECT SCAFFOLD SOUTH AREA A	2	21-Oct-13*	22-Oct-13
EXTERIOR SHEATHING		24	27-Sep-13	30-Oct-13
A1810	EXTERIOR SHEATHING NORTH AREA A	6	27-Sep-13	04-Oct-13
A1820	EXTERIOR SHEATHING NORTH AREA B	6	01-Oct-13	08-Oct-13
A1830	EXTERIOR SHEATHING WEST AREA C	6	14-Oct-13*	21-Oct-13
A1840	EXTERIOR SHEATHING EAST AREA C	6	17-Oct-13*	24-Oct-13
A1850	EXTERIOR SHEATHING SOUTH AREA B	6	21-Oct-13*	28-Oct-13
A1860	EXTERIOR SHEATHING SOUTH AREA A	5	24-Oct-13*	30-Oct-13
EXTERIOR BRICK		51	07-Oct-13	17-Dec-13
A1870	INSTALL BRICK NORTH AREA A	9	07-Oct-13	17-Oct-13
A1880	INSTALL BRICK NORTH AREA B	8	18-Oct-13*	29-Oct-13
A1890	INSTALL BRICK WEST AREA C	8	30-Oct-13*	08-Nov-13
A1900	INSTALL BRICK EAST AREA C	9	11-Nov-13*	21-Nov-13
A1910	INSTALL BRICK SOUTH AREA B	11	22-Nov-13*	09-Dec-13
A1920	INSTALL BRICK SOUTH AREA A	6	10-Dec-13*	17-Dec-13
WINDOWS		51	28-Oct-13	08-Jan-14
A1930	INSTALL WINDOWS NORTH AREA A	5	28-Oct-13*	01-Nov-13
A1940	INSTALL WINDOWS NORTH AREA B	6	04-Nov-13*	11-Nov-13
A1950	INSTALL WINDOWS WEST AREA C	6	19-Nov-13*	26-Nov-13
A1960	INSTALL WINDOWS EAST AREA C	5	09-Dec-13*	13-Dec-13
A1970	INSTALL WINDOWS SOUTH AREA B	6	19-Dec-13*	27-Dec-13
A1980	INSTALL WINDOWS SOUTH AREA A	8	30-Dec-13*	08-Jan-14
METAL PANELS		49	28-Oct-13	06-Jan-14
A1990	INSTALL TOP FLOOR METAL PANELS NORTH AF	5	28-Oct-13*	01-Nov-13
A2000	INSTALL TOP FLOOR METAL PANELS NORTH AF	6	04-Nov-13*	11-Nov-13
A2010	INSTALL TOP FLOOR METAL PANELS WEST ARE	7	19-Nov-13*	27-Nov-13
A2020	INSTALL TOP FLOOR METAL PANELS EAST ARE	5	09-Dec-13*	13-Dec-13
A2030	INSTALL TOP FLOOR METAL PANELS SOUTH AF	6	19-Dec-13*	27-Dec-13
A2040	INSTALL TOP FLOOR METAL PANELS SOUTH AF	6	30-Dec-13*	06-Jan-14
INTERIOR		213	01-Jul-13	29-Apr-14
MECHANICAL		149	03-Sep-13	01-Apr-14
A2050	INSTALL ROOFTOP AHU	5	24-Oct-13*	30-Oct-13
A2060	INSTALL GROUND FLOOR DUCT RISERS	11	03-Sep-13	17-Sep-13
A2061	INSTALL 2ND FLOOR DUCT RISERS	6	10-Sep-13	17-Sep-13
A2062	INSTALL 3RD FLOOR DUCT RISERS	6	18-Sep-13	25-Sep-13
A2063	INSTALL 4TH FLOOR DUCT RISERS	6	25-Sep-13*	02-Oct-13
A2070	R/I GROUND FLOOR DUCT BRANCHES	6	24-Sep-13	01-Oct-13
A2071	R/I 2ND FLOOR DUCT BRANCHES	6	03-Oct-13	10-Oct-13
A2072	R/I 3RD FLOOR DUCT BRANCHES	6	11-Oct-13*	18-Oct-13
A2073	R/I 4TH FLOOR DUCT BRANCHES	6	21-Oct-13*	28-Oct-13
A2080	INSTALL GROUND FLOOR STACKED FAN COILS	6	01-Oct-13	08-Oct-13
A2081	INSTALL 2ND FLOOR STACKED FAN COILS	6	10-Oct-13	17-Oct-13
A2082	INSTALL 3RD FLOOR STACKED FAN COILS	6	18-Oct-13*	25-Oct-13
A2083	INSTALL 4TH FLOOR STACKED FAN COILS	6	25-Oct-13*	01-Nov-13
A2090	INSTALL GROUND FLOOR GRILLS & DIFFUSER:	6	13-Feb-14*	20-Feb-14
A2091	INSTALL 2ND FLOOR GRILLS & DIFFUSERS	6	25-Feb-14*	04-Mar-14
A2092	INSTALL 3RD FLOOR GRILLS & DIFFUSERS	6	11-Mar-14*	18-Mar-14
A2093	INSTALL 4TH FLOOR GRILLS & DIFFUSERS	6	25-Mar-14*	01-Apr-14
A2210	INSTALL PUMPS, HEAT EX, ACUS & CONTROLLI	11	13-Nov-13*	27-Nov-13
ELECTRICAL		160	01-Jul-13	14-Feb-14
A1380	UNDERGROUND ELECTRIC	6	01-Jul-13	09-Jul-13
A2110	R/I GROUND FLOOR UNIT ELECTRIC	4	24-Sep-13	27-Sep-13
A2111	R/I 2ND FLOOR UNIT ELECTRIC	6	03-Oct-13	10-Oct-13
A2112	R/I 3RD FLOOR UNIT ELECTRIC	6	11-Oct-13*	18-Oct-13
A2113	R/I 4TH FLOOR UNIT ELECTRIC	6	23-Oct-13*	30-Oct-13
A2240	INSTALL SWITCHGEAR	11	14-Jan-14*	28-Jan-14
A2250	ENERGIZE PERMANENT POWER	0	14-Feb-14*	
PLUMBING		180	01-Jul-13	13-Mar-14
A1370	UNDERGROUND PLUMBING	6	01-Jul-13	09-Jul-13
A2100	INSTALL GROUND FLOOR SANITARY & PLUMBII	6	03-Sep-13	10-Sep-13
A2101	INSTALL 2ND FLOOR SANITARY & PLUMBING R	6	10-Sep-13	17-Sep-13
A2102	INSTALL 3RD FLOOR SANITARY & PLUMBING R	6	18-Sep-13	25-Sep-13
A2103	INSTALL 4TH FLOOR SANITARY & PLUMBING R	6	25-Sep-13	02-Oct-13
A2190	R/I GROUND FLOOR BATHROOM PLUMBING	4	13-Sep-13	18-Sep-13
A2191	R/I 2ND FLOOR BATHROOM PLUMBING	4	24-Sep-13	27-Sep-13
A2192	R/I 3RD FLOOR BATHROOM PLUMBING	4	02-Oct-13	07-Oct-13
A2193	R/I 4TH FLOOR BATHROOM PLUMBING	4	09-Oct-13	14-Oct-13
A2200	INSTALL GROUND FLOOR PLUMBING FIXTURE:	4	27-Jan-14*	30-Jan-14
A2300	INSTALL 2ND FLOOR PLUMBING FIXTURES	4	30-Jan-14*	04-Feb-14
A2310	INSTALL 3RD FLOOR PLUMBING FIXTURES	4	24-Feb-14*	27-Feb-14
A2360	INSTALL 4TH FLOOR PLUMBING FIXTURES	4	10-Mar-14*	13-Mar-14
FIRE PROTECTION		40	24-Sep-13	18-Nov-13
A2120	R/I GROUND FLOOR UNITSPRINKLER	4	24-Sep-13	27-Sep-13
A2121	R/I 2ND FLOOR UNIT SPRINKLER	6	03-Oct-13*	10-Oct-13
A2122	R/I 3RD FLOOR UNIT SPRINKLER	6	11-Oct-13*	18-Oct-13
A2123	R/I 4TH FLOOR UNIT SPRINKLER	6	23-Oct-13*	30-Oct-13
A2230	INSTALL SPRINKLER PUMP	4	13-Nov-13*	18-Nov-13
TELECOM		27	24-Sep-13	30-Oct-13
A2130	R/I GROUND FLOOR UNIT TELECOM	4	24-Sep-13	27-Sep-13
A2270	R/I 2ND FLOOR UNIT TELECOM	6	03-Oct-13	10-Oct-13
A2320	R/I 3RD FLOOR UNIT TELECOM	6	11-Oct-13*	18-Oct-13
A2370	R/I 4TH FLOOR UNIT TELECOM	6	23-Oct-13*	30-Oct-13
DRYWALL		126	10-Sep-13	06-Mar-14
A2140	FRAME GROUND FLOOR STUD WALLS & CEILII	11	10-Sep-13	24-Sep-13

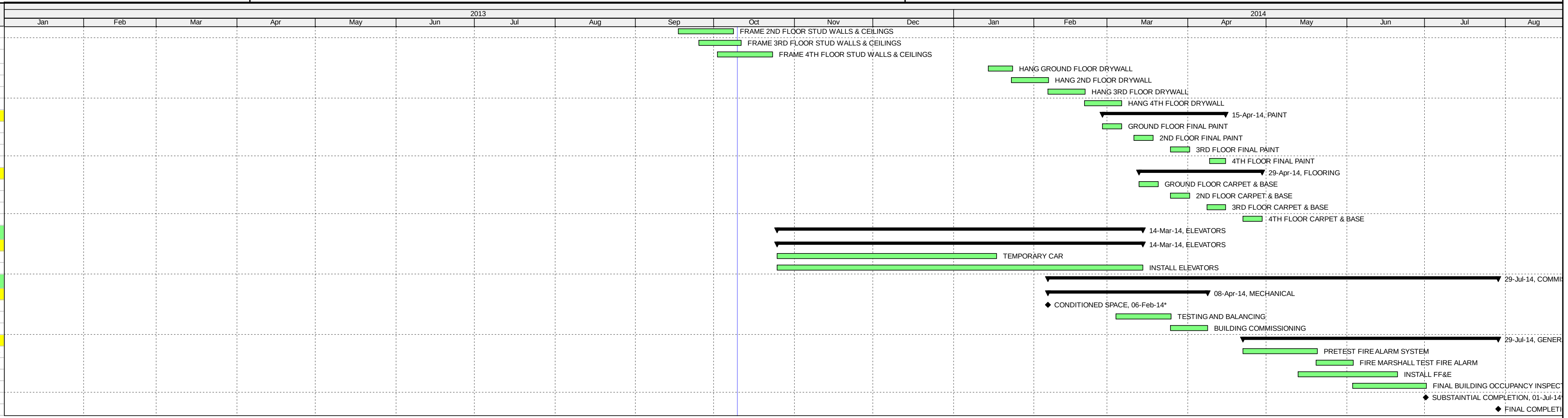


▬ Actual Level of Effort	🟩 Remaining Work	◆ ◆ Milestone
▬ Actual Work	🟥 Critical Remaining Work	▼ summary

TASK filter: All Activities

GEORGE MASON UNIVERSITY - TAYLOR HALL | Classic Schedule Layout | 10-Oct-13 16:34

Activity ID	Activity Name	Original Duration	Start	Finish
A2141	FRAME 2ND FLOOR STUD WALLS & CEILINGS	16	17-Sep-13	08-Oct-13
A2142	FRAME 3RD FLOOR STUD WALLS & CEILINGS	13	25-Sep-13	11-Oct-13
A2143	FRAME 4TH FLOOR STUD WALLS & CEILINGS	16	02-Oct-13	23-Oct-13
A2150	HANG GROUND FLOOR DRYWALL	8	14-Jan-14*	23-Jan-14
A2280	HANG 2ND FLOOR DRYWALL	11	23-Jan-14*	06-Feb-14
A2330	HANG 3RD FLOOR DRYWALL	11	06-Feb-14*	20-Feb-14
A2380	HANG 4TH FLOOR DRYWALL	11	20-Feb-14*	06-Mar-14
PAINT		34	27-Feb-14	15-Apr-14
A2160	GROUND FLOOR FINAL PAINT	6	27-Feb-14*	06-Mar-14
A2170	2ND FLOOR FINAL PAINT	6	11-Mar-14*	18-Mar-14
A2340	3RD FLOOR FINAL PAINT	6	25-Mar-14*	01-Apr-14
A2390	4TH FLOOR FINAL PAINT	5	09-Apr-14*	15-Apr-14
FLOORING		34	13-Mar-14	29-Apr-14
A2180	GROUND FLOOR CARPET & BASE	6	13-Mar-14*	20-Mar-14
A2290	2ND FLOOR CARPET & BASE	6	25-Mar-14*	01-Apr-14
A2350	3RD FLOOR CARPET & BASE	6	08-Apr-14*	15-Apr-14
A2400	4TH FLOOR CARPET & BASE	6	22-Apr-14*	29-Apr-14
ELEVATORS		99	25-Oct-13	14-Mar-14
ELEVATORS		99	25-Oct-13	14-Mar-14
A2410	TEMPORARY CAR	59	25-Oct-13*	17-Jan-14
A2420	INSTALL ELEVATORS	99	25-Oct-13*	14-Mar-14
COMMISSIONING & INSPECTIONS		123	06-Feb-14	29-Jul-14
MECHANICAL		44	06-Feb-14	08-Apr-14
A2430	CONDITIONED SPACE	0	06-Feb-14*	
A2440	TESTING AND BALANCING	16	04-Mar-14*	25-Mar-14
A2450	BUILDING COMMISSIONING	11	25-Mar-14*	08-Apr-14
GENERAL BUILDING		70	22-Apr-14	29-Jul-14
A2460	PRETEST FIRE ALARM SYSTEM	21	22-Apr-14*	20-May-14
A2470	FIRE MARSHALL TEST FIRE ALARM	11	20-May-14*	03-Jun-14
A2480	INSTALL FF&E	29	13-May-14*	20-Jun-14
A2490	FINAL BUILDING OCCUPANCY INSPECTIONS	21	03-Jun-14*	01-Jul-14
A2500	SUBSTAINTIAL COMPLETION	0	01-Jul-14*	
A2510	FINAL COMPLETION	0	29-Jul-14*	



▬	Actual Level of Effort	🟩	Remaining Work
🟦	Actual Work	🟥	Critical Remaining Work

◆ ◆ Milestone

▼▼ summary

TASK filter: All Activities

Appendix B:

Construction Project Estimates

GMU Taylor Hall - HVAC

Data Release :Year 2013 Quarter 3

Assembly Cost Estimate

Quantity	Assembly Number	Sourc	SubCo	Description	Unit	Material O&P	Installation O&P	Total O&P	Ext. Material O&P	Ext. Installation O&P	Ext. Total O&P	Labor Type	Data Release	Zip Code	Notes
70057	M1	U		70,057 Interpolated Large Hydronic Heating System	S.F.	$ 8.15	$ -	$ 8.15	$ 570,964.55	$ -	$ 570,964.55	USER	Year 2013 Quarter 3		
70057	M2	U		20,300 CFM, 50.75 ton Rooftop AHU for a college dorm, interpolated	Ea.	$ 20.15	$ -	$ 20.15	$ 1,411,648.55	$ -	$ 1,411,648.55	USER	Year 2013 Quarter 3		
								Total	**$ 1982613.10**	**$ .00**	**$ 1982613.10**				

GMU Taylor Hall

Data Release :Year 2013 Quarter 3 **Assembly Cost Estimate**

Quantity	Assembly Number	Sourc	SubCo	Description	Unit	Material O&P	Installation O&P	Total O&P	Ext. Material O&P	Ext. Installation O&P	Ext. Total O&P	Labor Type	Data Release	Zip Code	Notes
70057	1	U		Recepticles, 14.5 per 1000 SF	S.F.	$ 3.00	$ 0.07	$ 3.07	$ 210,171.00	$ 4,903.99	$ 215,074.99	USER	Year 2013 Quarter 3		
70057	2	U		Wall Switch per. SF. 2.85 per 1000 SF	S.F.	$ 0.60	$ -	$ 0.60	$ 42,034.20	$ -	$ 42,034.20	USER	Year 2013 Quarter 3		
1	I3	U		Panelboard, 4 wire w/conductor & conduit, NEHB, 120/208 V, 800 A, 1 stories, 25' horizontal.	Ea.	$19,308.29	$ -	$ 19,308.29	$ 19,308.29	$ -	$ 19,308.29	USER	Year 2013 Quarter 3		
1	D50102400580			Switchgear installation, incl switchboard, panels & circuit breaker, 277/480 V, 1200 A	Ea.	$25,751.40	$ 6,893.25	$ 32,644.65	$ 25,751.40	$ 6,893.25	$ 32,644.65	OPN	Year 2013 Quarter 3		
3	D50102502000			Panelboard, 4 wire w/conductor & conduit, NQOD, 120/208 V, 225 A, 1 stories, 25' horizontal		$ 3,657.30	$ 2,449.25	$ 6,106.55	$ 10,971.90	$ 7,347.75	$ 18,319.65	OPN	Year 2013 Quarter 3		
1	D50102504040			Panelboard, 4 wire w/conductor & conduit, NEHB, 277/480 V, 100 A, 1 stories, 25' horizontal		$ 3,481.95	$ 2,121.00	$ 5,602.95	$ 3,481.95	$ 2,121.00	$ 5,602.95	OPN	Year 2013 Quarter 3		
3	D50102501020			Panelboard, 4 wire w/conductor & conduit, NQOD, 120/208 V, 100 A, 1 stories, 25' horizontal		$ 1,703.40	$ 1,691.75	$ 3,395.15	$ 5,110.20	$ 5,075.25	$ 10,185.45	OPN	Year 2013 Quarter 3		
1	D50102502080			Panelboard, 4 wire w/conductor & conduit, NQOD, 120/208 V, 400 A, 1 stories, 25' horizontal		$ 5,185.35	$ 3,787.50	$ 8,972.85	$ 5,185.35	$ 3,787.50	$ 8,972.85	OPN	Year 2013 Quarter 3		
2	I4	U		Panelboard, 4 wire w/conductor & conduit, NEHB, 277/480 V, 225 A, 4 stories	Ea.	$12,007.35	$ -	$ 12,007.35	$ 24,014.70	$ -	$ 24,014.70	USER	Year 2013 Quarter 3		
1	I5	U		Panelboard, 4 wire w/conductor & conduit, NQOD, 277/480 V, 250 A, 1 stories	Ea.	$ 9,493.53	$ -	$ 9,493.53	$ 9,493.53	$ -	$ 9,493.53	USER	Year 2013 Quarter 3		
2	I6	U		Panelboard, 4 wire w/conductor & conduit, NQOD, 277/480 V, 100 A, 4 stories	Ea.	$ 6,961.50	$ -	$ 6,961.50	$ 13,923.00	$ -	$ 13,923.00	USER	Year 2013 Quarter 3		
3	I7	U		Panelboard, 4 wire w/conductor & conduit, NQOD, 120/208 V, 225 A, 4 stories	Ea.	$ 9,348.65	$ -	$ 9,348.65	$ 28,045.95	$ -	$ 28,045.95	USER	Year 2013 Quarter 3		
3	I8	U		Panelboard, 4 wire w/conductor & conduit, NEHB, 120/208 V, 225 A, 3 stories	Ea.	$ 8,267.95	$ -	$ 8,267.95	$ 24,803.85	$ -	$ 24,803.85	USER	Year 2013 Quarter 3		
3	I9	U		Panelboard, 4 wire w/conductor & conduit, NEHB 120/208 V, 225 A, 2 stories	Ea.	$ 7,187.25	$ -	$ 7,187.25	$ 21,561.75	$ -	$ 21,561.75	USER	Year 2013 Quarter 3		
2	I10	U		Panelboard, 4 wire w/conductor & conduit, NEHB, 120/208 V, 100 A, 4 stories	Ea.	$ 4,772.64	$ -	$ 4,772.64	$ 9,545.28	$ -	$ 9,545.28	USER	Year 2013 Quarter 3		
70057	D50202100240			Fluorescent fixtures recess mounted in ceiling, 2 watt per SF, 40 FC, 10 fixtures @40 watt per 1000 SF	S.F.	$ 1.52	$ 3.21	$ 4.73	$ 106,486.64	$ 224,882.97	$ 331,369.61	OPN	Year 2013 Quarter 3		
70057	D50201400200			Central air conditioning power, 1 watt	S.F.	$ 0.07	$ 0.22	$ 0.29	$ 4,903.99	$ 15,412.54	$ 20,316.53	OPN	Year 2013 Quarter 3		
70.06	I11	U		Telecom/Data connection per 1000 S.F, 5.18 connections	Ea.	$ 1,454.91	$ -	$ 1,454.91	$ 101,930.99	$ -	$ 101,930.99	USER	Year 2013 Quarter 3		
2	D50309100440			Communication and alarm systems, fire detection, non-addressable, 100 detectors, includes outlets, boxes, conduit and wire	Ea.	$21,242.40	$35,451.00	$ 56,693.40	$ 42,484.80	$ 70,902.00	$ 113,386.80	OPN	Year 2013 Quarter 3		
1	D50101301250			Underground service installation, includes excavation, backfill, and compaction, 100' length, 4' depth, 3 phase, 4 wire, 277/480 volts, 1200 A w/groundfault switchboard	Ea.	$48,096.00	$13,050.00	$ 61,146.00	$ 48,096.00	$ 13,050.00	$ 61,146.00	OPN	Year 2013 Quarter 3		
								Total	**$ 757304.77**	**$ 354376.25**	**1111681.02**				

GMU Taylor Hall Plumbing

Data Release :Year 2013 Quarter 3 **Assembly Cost Estimate**

Quantity	Assembly Number	Sourc	SubC	Description	Unit	Material O&P	Installation O&P	Total O&P	Ext. Material O&P	Ext. Installation O&P	Ext. Total O&P	Labor Type	Data Release	Zip Code	Notes
5	D20109264680			Bathroom, three fixture, 2 wall plumbing, water closet, corner bathtub & lavatory, stand alone	Ea.	$ 4,865.73	$2,128.00	$ 6,993.73	$ 24,328.65	$ 10,640.00	$ 34,968.65	STD	Year 2013 Quarter 3		
16	D20101201760			Water closets, battery mount, wall hung, side by side, first closet	Ea.	$ 2,038.00	$ 748.16	$ 2,786.16	$ 32,608.00	$ 11,970.56	$ 44,578.56	STD	Year 2013 Quarter 3		
30	D20101201800			Water closetss, battery mount, wall hung, side by side, each additional water closet, add	Ea.	$ 1,936.10	$ 707.84	$ 2,643.94	$ 58,083.00	$ 21,235.20	$ 79,318.20	STD	Year 2013 Quarter 3		
28	D20107101600			Shower, stall, baked enamel, molded stone receptor, 32" square	Ea.	$ 1,808.73	$ 748.16	$ 2,556.89	$ 50,644.44	$ 20,948.48	$ 71,592.92	STD	Year 2013 Quarter 3		
14	D20107102100			Shower, handicap with fixed and handheld heat, control valves,grab bar & seat	Ea.	$ 6,139.48	$3,315.20	$ 9,454.68	$ 85,952.72	$ 46,412.80	$ 132,365.52	STD	Year 2013 Quarter 3		
51	D20103101640			Lavatory w/trim, vanity top, PE on CI, 18" round	Ea.	$ 718.40	$ 640.64	$ 1,359.04	$ 36,638.40	$ 32,672.64	$ 69,311.04	STD	Year 2013 Quarter 3		
3	D20108201880			Water cooler, electric, wall hung, dual height, 14.3 GPH	Ea.	$ 1,477.55	$ 560.00	$ 2,037.55	$ 4,432.65	$ 1,680.00	$ 6,112.65	STD	Year 2013 Quarter 3		
6	D20108101920			Drinking fountain, 1 bubbler, wall mounted, non recessed, stainless steel, no back	Ea.	$ 1,553.98	$ 421.12	$ 1,975.10	$ 9,323.88	$ 2,526.72	$ 11,850.60	STD	Year 2013 Quarter 3		
3	D20202402020			Electric water heater, commercial, 100< F rise, 200 gal, 120 KW 490 GPH	Ea.	$30,570.00	$1,657.60	$ 32,227.60	$ 91,710.00	$ 4,972.80	$ 96,682.80	STD	Year 2013 Quarter 3		
3	D20402106200			Roof drain, steel galv sch 40 threaded, 4" diam piping, 10' high	Ea.	$ 2,088.95	$1,187.20	$ 3,276.15	$ 6,266.85	$ 3,561.60	$ 9,828.45	STD	Year 2013 Quarter 3		
								Total	**$ 399988.59**	**$ 156620.80**	**556609.39**				

GMU Taylor Hall Structural

Data Release : Year 2 **Unit Cost Estimate**

Quantity	LineNumber	Description	Crew	Daily Output	Labor Hours	Unit	Material	Labor	Equipment	Total	Ext. Mat.	Ext. Labor	Ext. Equip.	Ext. Total	Mat. O&P	Labor O&P	Equip. O&P	Total O&P	Ext. Mat. O&P	Ext. Labor O&P	Ext. Equip. O&P	Ext. Total O&P	Labor Type	Data Release
5.04	051223174500	Column, structural tubing, square, 4" x 4" x 1/4" x 12'-0", incl shop primer, cap & base plate, bolts	E2	58	0.97	Ea.	$217.80	$ 46.17	$ 26.84	$ 290.81	$ 1,097.71	$ 232.70	$ 135.27	$ 1,465.68	$ 239.07	$ 78.73	$ 29.38	$ 347.18	$ 1,204.91	$ 396.80	$ 148.08	$ 1,749.79	STD	Year 2013 Quarter 3
30.54	051223175600	Column, structural tubing, rectangular, 8" x 4" x 3/8" x 12'-0", incl shop primer, cap & base plate, bolts	E2	54	1.04	Ea.	$481.18	$ 49.57	$ 28.36	$ 559.11	$ 14,695.24	$ 1,513.87	$ 866.11	$ 17,075.22	$ 526.76	$ 84.56	$ 31.40	$ 642.72	$ 16,087.25	$ 2,582.46	$ 958.96	$ 19,628.67	STD	Year 2013 Quarter 3
17.31	SS1	Column, structural tubing, square, 4' x 4" x 3/8" x 12', Interpolated		0	0	Ea.	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 390.58	$ -	$ -	$ 390.58	$ 6,760.94	$ -	$ -	$ 6,760.94	USER	Year 2013 Quarter 3
1.2	SS2	Column, structural tubing, square 4" x 4" x 1/2" x 12', Interpolated		0	0	Ea.	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 694.36	$ -	$ -	$ 694.36	$ 833.23	$ -	$ -	$ 833.23	USER	Year 2013 Quarter 3
8.13	SS3	Column, structural tubing, square, 6" x 4" x 3/8"		0	0	Ea.	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 535.39	$ -	$ -	$ 535.39	$ 4,352.72	$ -	$ -	$ 4,352.72	USER	Year 2013 Quarter 3
3.57	SS4	Column, structural tubing, square, 8" x 4" x 1/2" x 12', Interpolated		0	0	Ea.	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 925.52	$ -	$ -	$ 925.52	$ 3,304.11	$ -	$ -	$ 3,304.11	USER	Year 2013 Quarter 3
12.18	SS5	Column, structural tubing, rectangular, 8" x 4" x 1/4", Interpolated		0	0	Ea.	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 424.20	$ -	$ -	$ 424.20	$ 5,166.76	$ -	$ -	$ 5,166.76	USER	Year 2013 Quarter 3
3.88	SS6	Column, structural tubing, rectangular, 10" x 6" x 5/8" x 14', Interpolated,		0	0	Ea.	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,612.14	$ -	$ -	$ 1,612.14	$ -	$ -	$ -	$ 6,255.10	USER	Year 2013 Quarter 3
12.41	SS7	Column, structural tubing, rectangular 12" x 4" x 3/8" x 14'		0	0	Ea.	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 971.17	$ -	$ -	$ 971.17	$ 12,052.22	$ -	$ -	$ 12,052.22	USER	Year 2013 Quarter 3
7.48	SS8	Column, structural tubing, rectangular, 12' x 4" x 1/4" x 14', Interpolated		0	0	Ea.	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 640.97	$ -	$ -	$ 640.97	$ 4,794.46	$ -	$ -	$ 4,794.46	USER	Year 2013 Quarter 3
264.85	051223750360	Structural steel beam or girder, 100-ton project, 1 to 2 story building, W8x24, A992 steel, shop fabricated, incl shop primer, bolted connections	E2	550	0.1	L.F.	$ 34.95	$ 4.85	$ 2.81	$ 42.61	$ 9,256.51	$ 1,284.52	$ 744.23	$ 11,285.26	$ 38.49	$ 8.31	$ 3.09	$ 49.89	$ 10,194.08	$ 2,200.90	$ 818.39	$ 13,213.37	STD	Year 2013 Quarter 3
9.5	051223750700	Structural steel beam or girder, 100-ton project, 1 to 2 story building, W10x22, A992 steel, shop fabricated, incl shop primer, bolted connections	E2	600	0.09	L.F.	$ 31.91	$ 4.45	$ 2.57	$ 38.93	$ 303.15	$ 42.28	$ 24.42	$ 369.84	$ 34.95	$ 7.63	$ 2.84	$ 45.42	$ 332.03	$ 72.49	$ 26.98	$ 431.49	STD	Year 2013 Quarter 3
37.06	051223750720	Structural steel beam or girder, 100-ton project, 1 to 2 story building, W10x26, A992 steel, shop fabricated, incl shop primer, bolted connections	E2	600	0.09	L.F.	$ 37.48	$ 4.45	$ 2.57	$ 44.50	$ 1,389.01	$ 164.92	$ 95.24	$ 1,649.17	$ 41.53	$ 7.63	$ 2.84	$ 52.00	$ 1,539.10	$ 282.77	$ 105.25	$ 1,927.12	STD	Year 2013 Quarter 3
214.75	051223751520	Structural steel beam or girder, 100-ton project, 1 to 2 story building, W12x35, A992 steel, shop fabricated, incl shop primer, bolted connections	E2	810	0.07	L.F.	$ 50.65	$ 3.30	$ 1.90	$ 55.85	$ 10,877.09	$ 708.68	$ 408.03	$ 11,993.79	$ 55.72	$ 5.64	$ 2.10	$ 63.46	$ 11,965.87	$ 1,211.19	$ 450.98	$ 13,628.04	STD	Year 2013 Quarter 3
243.17	051223752700	Structural steel beam or girder, 100-ton project, 1 to 2 story building, W16x26, A992 steel, shop fabricated, incl shop primer, bolted connections	E2	1000	0.06	L.F.	$ 37.48	$ 2.67	$ 1.54	$ 41.69	$ 9,114.01	$ 649.26	$ 374.48	$ 10,137.76	$ 41.53	$ 4.57	$ 1.70	$ 47.80	$ 10,098.85	$ 1,111.29	$ 413.39	$ 11,623.53	STD	Year 2013 Quarter 3
71.46	051223752900	Structural steel beam or girder, 100-ton project, 1 to 2 story building, W16x31, A992 steel, shop fabricated, incl shop primer, bolted connections	E2	900	0.06	L.F.	$ 45.08	$ 2.96	$ 1.71	$ 49.75	$ 3,221.42	$ 211.52	$ 122.20	$ 3,555.14	$ 49.64	$ 5.05	$ 1.88	$ 56.57	$ 3,547.27	$ 360.87	$ 134.34	$ 4,042.49	STD	Year 2013 Quarter 3
38.79	051223753120	Structural steel beam or girder, 100-ton project, 1 to 2 story building, W16x50, A992 steel, shop fabricated, incl shop primer, bolted connections	E2	800	0.07	L.F.	$ 72.43	$ 3.33	$ 1.93	$ 77.69	$ 2,809.56	$ 129.17	$ 74.86	$ 3,013.60	$ 79.52	$ 5.73	$ 2.13	$ 87.38	$ 3,084.58	$ 222.27	$ 82.62	$ 3,389.47	STD	Year 2013 Quarter 3
65.83	033053403825	Structural concrete, in place, spread footing (3000 psi), 1 C.Y. to 5 C.Y., includes forms(4 uses), Grade 60 rebar, concrete (Portland cement Type I), placing and finishing	C14C	43	2.6	C.Y.	$208.23	$ 93.41	$ 0.77	$ 302.41	$ 13,707.78	$ 6,149.18	$ 50.69	$ 19,907.65	$ 229.37	$ 143.45	$ 0.84	$ 373.66	$ 15,099.43	$ 9,443.31	$ 55.30	$ 24,598.04	STD	Year 2013 Quarter 3
26.88	033053403850	Structural concrete, in place, spread footing (3000 psi), over 5 C.Y., includes forms(4 uses), Grade 60 rebar, concrete (Portland cement Type I), placing and finishing	C14C	75	1.49	C.Y.	$189.20	$ 53.38	$ 0.44	$ 243.02	$ 5,085.70	$ 1,434.85	$ 11.83	$ 6,532.38	$ 208.23	$ 82.57	$ 0.49	$ 291.29	$ 5,597.22	$ 2,219.48	$ 13.17	$ 7,829.88	STD	Year 2013 Quarter 3
11.1	SS9	Structural steel beam, W10X30, Interpolated		0	0	L.F.	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 58.90	$ -	$ -	$ 58.90	$ 653.79	$ -	$ -	$ 653.79	USER	Year 2013 Quarter 3
76.63	SS10	Structural steel beam, W12X19, Interpolated		0	0	L.F.	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 37.27	$ -	$ -	$ 37.27	$ 2,856.00	$ -	$ -	$ 2,856.00	USER	Year 2013 Quarter 3
131.13	SS11	Structural Steel Beam, W12X40, Interpolated		0	0	L.F.	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 71.60	$ -	$ -	$ 71.60	$ 9,388.91	$ -	$ -	$ 9,388.91	USER	Year 2013 Quarter 3
11.29	SS12	Structural Steel Beam, W14X68, Interpolated		0	0	L.F.	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 116.26	$ -	$ -	$ 116.26	$ 1,312.58	$ -	$ -	$ 1,312.58	USER	Year 2013 Quarter 3
16.38	SS13	Structural Steel Beam, W14x132, Interpolated		0	0	L.F.	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 220.21	$ -	$ -	$ 220.21	$ 3,607.04	$ -	$ -	$ 3,607.04	USER	Year 2013 Quarter 3
21	SS14	Structural Steel Beam, W16X57, Interpolated		0	0	L.F.	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 98.60	$ -	$ -	$ 98.60	$ 2,070.60	$ -	$ -	$ 2,070.60	USER	Year 2013 Quarter 3
70	051223650450	Steel plate, structural, for connections & stiffeners, 3/4" T, shop fabricated, incl shop primer		0	0	S.F.	$ 40.52	$ -	$ -	$ 40.52	$ 2,836.40	$ -	$ -	$ 2,836.40	$ 44.57	$ -	$ -	$ 44.57	$ 3,119.90	$ -	$ -	$ 3,119.90	STD	Year 2013 Quarter 3
5.5	051223650500	Steel plate, structural, for connections & stiffeners, 1" T, shop fabricated, incl shop primer		0	0	S.F.	$ 53.69	$ -	$ -	$ 53.69	$ 295.30	$ -	$ -	$ 295.30	$ 59.26	$ -	$ -	$ 59.26	$ 325.93	$ -	$ -	$ 325.93	STD	Year 2013 Quarter 3
277.2	033105701950	Structural concrete, placing, continuous footing, shallow, pumped, includes leveling (strike off) & consolidation, excludes material	C20	150	0.43	C.Y.	$ -	$ 13.59	$ 5.27	$ 18.86	$ -	$ 3,767.15	$ 1,460.84	$ 5,227.99	$ -	$ 20.85	$ 5.82	$ 26.67	$ -	$ 5,779.62	$ 1,613.30	$ 7,392.92	STD	Year 2013 Quarter 3
282	033105704350	Structural concrete, placing, slab on grade, pumped, up to 6" thick, includes leveling (strike off) & consolidation, excludes material	C20	130	0.49	C.Y.	$ -	$ 15.68	$ 6.08	$ 21.76	$ -	$ 4,421.76	$ 1,714.56	$ 6,136.32	$ -	$ 23.77	$ 6.69	$ 30.46	$ -	$ 6,703.14	$ 1,886.58	$ 8,589.72	STD	Year 2013 Quarter 3
637.5	033105701400	Structural concrete, placing, elevated slab, pumped, less than 6" thick, includes leveling (strike off) & consolidation, excludes material	C20	140	0.46	C.Y.	$ -	$ 14.55	$ 5.67	$ 20.22	$ -	$ 9,275.63	$ 3,614.63	$ 12,890.25	$ -	$ 22.10	$ 6.23	$ 28.33	$ -	$ 14,088.75	$ 3,971.63	$ 18,060.38	STD	Year 2013 Quarter 3
1256	033105350150	Structural concrete, ready mix, normal weight, 3000 psi, includes local aggregate, sand, Portland cement (Type I) and water, delivered, excludes all additives and treatments		0	0	C.Y.	$102.53	$ -	$ -	$ 102.53	$ 128,777.68	$ -	$ -	$ 128,777.68	$ 113.10	$ -	$ -	$ 113.10	$ 142,053.60	$ -	$ -	$ 142,053.60	STD	Year 2013 Quarter 3
2762	051223201000	Curb edging, structural steel angle w/ anchors, on concrete forms, 12.3 plf, 6" x 4", shop fabricated	E4	250	0.13	L.F.	$ 20.21	$ 6.27	$ 0.59	$ 27.07	$ 55,820.02	$ 17,317.74	$ 1,629.58	$ 74,767.34	$ 22.29	$ 11.23	$ 0.64	$ 34.16	$ 61,564.98	$ 31,017.26	$ 1,767.68	$ 94,349.92	STD	Year 2013 Quarter 3
66.2	032110500700	Reinforcing steel, average price, cut, bent and delivered, A615, grade 60, material only		0	0	Ton	$971.00	$ -	$ -	$ 971.00	$ 64,280.20	$ -	$ -	$ 64,280.20	$ 1,068.10	$ -	$ -	$ 1,068.10	$ 70,708.22	$ -	$ -	$ 70,708.22	STD	Year 2013 Quarter 3
66.2	032113100150	Galvanized coating, for reinforcing steel, add to fabricated & delivered price of uncoated reinforcing		0	0	Ton	$446.66	$ -	$ -	$ 446.66	$ 29,568.89	$ -	$ -	$ 29,568.89	$ 490.36	$ -	$ -	$ 490.36	$ 32,461.83	$ -	$ -	$ 32,461.83	STD	Year 2013 Quarter 3
175.14	033913500015	Curing, burlap, 7.5 oz., 4 uses assumed	2 Clab	55	0.29	C.S.F.	$ 14.80	$ 8.59	$ -	$ 23.39	$ 2,592.07	$ 1,504.45	$ -	$ 4,096.52	$ 16.33	$ 13.26	$ -	$ 29.59	$ 2,860.04	$ 2,322.36	$ -	$ 5,182.39	STD	Year 2013 Quarter 3
51818	053113505300	Metal floor decking, steel, non-cellular, composite, galvanized, 2" D, 20 gauge	E4	3600	0.01	S.F.	$ 2.19	$ 0.45	$ 0.04	$ 2.68	$ 113,481.42	$ 23,318.10	$ 2,072.72	$ 138,872.24	$ 2.40	$ 0.81	$ 0.04	$ 3.25	$ 124,363.20	$ 41,972.58	$ 2,072.72	$ 168,408.50	STD	Year 2013 Quarter 3
1394	053123502600	Metal roof decking, steel, open type B wide rib, galvanized, under 50 Sq, 1-1/2" D, 20 gauge	E4	3865	0.01	S.F.	$ 2.45	$ 0.42	$ 0.04	$ 2.91	$ 3,415.30	$ 585.48	$ 55.76	$ 4,056.54	$ 2.70	$ 0.76	$ 0.04	$ 3.50	$ 3,763.80	$ 1,059.44	$ 55.76	$ 4,879.00	STD	Year 2013 Quarter 3
18216	053123502100	Metal roof decking, steel, open type B wide rib, galvanized, under 50 sq., 1-1/2" D, 22 gauge	E4	4500	0.01	S.F.	$ 2.10	$ 0.36	$ 0.03	$ 2.49	$ 38,253.60	$ 6,557.76	$ 546.48	$ 45,357.84	$ 2.31	$ 0.64	$ 0.04	$ 2.99	$ 42,078.96	$ 11,658.24	$ 728.64	$ 54,465.84	STD	Year 2013 Quarter 3
323	052119100180	Open web bar joist, K Series, 40-ton job lots, 14K3, 6.0 plf, spans up to 30', shop fabricated, incl shop primer, horizontal bridging	E7	1500	0.05	L.F.	$ 5.26	$ 2.66	$ 1.23	$ 9.15	$ 1,698.98	$ 859.18	$ 397.29	$ 2,955.45	$ 5.77	$ 4.61	$ 1.35	$ 11.73	$ 1,863.71	$ 1,489.03	$ 436.05	$ 3,788.79	STD	Year 2013 Quarter 3
86	054413601160	Roof truss, using galv LB metal studs, fink (W) or King Post type, 5:12 to 8:12 pitch, 18 ga x 4" chords, 32' span, excl erection, bridging & bracing, fabrication only of trusses on-site	2 Carp	8	2	Ea.	$140.97	$ 89.19	$ -	$ 230.16	$ 12,123.42	$ 7,670.34	$ -	$ 19,793.76	$ 155.70	$ 136.76	$ -	$ 292.46	$ 13,390.20	$ 11,761.36	$ -	$ 25,151.56	STD	Year 2013 Quarter 3
395	050523102200	Bolt, hex head, plain steel, 3/4" dia x 2" L, A307, incl nut & washer	1 Sswk	120	0.07	Ea.	$ 1.18	$ 3.31	$ -	$ 4.49	$ 466.10	$ 1,307.45	$ -	$ 1,773.55	$ 1.29	$ 5.90	$ -	$ 7.19	$ 509.55	$ 2,330.50	$ -	$ 2,840.05	STD	Year 2013 Quarter 3
6278	031113455000	C.I.P. concrete forms, footing, spread, plywood, 1 use, includes erecting, bracing, stripping and cleaning	C1	305	0.1	SFCA	$ 1.81	$ 3.32	$ -	$ 5.13	$ 11,363.18	$ 20,842.96	$ -	$ 32,206.14	$ 1.99	$ 5.10	$ -	$ 7.09	$ 12,493.22	$ 32,017.80	$ -	$ 44,511.02	STD	Year 2013 Quarter 3
7181	Infinity	partition, galv. LB studs, 18ga x 3-5/8" W studs 16" O.C. x 10' H, Pre-fabricated		0	0	L.F.	$ 10.05	$ 9.36	$ -	$ 19.41	$ 72,169.05	$ 67,214.16	$ -	$ 139,383.21	$ 11.05	$ 21.63	$ -	$ 32.68	$ 79,350.05	$ 155,325.03	$ -	$ 234,675.08	USER	Year 2013 Quarter 3
Total											**$608698.77**	**$177163.10**	**$14399.22**	**$800261.09**					**$726811.12**	**$337628.94**	**$15739.81**	**$1086434.97**		

35

Electrical - Assemblies Estimate

	Size	Voltage	Qty
Switchboard	1200 A	480Y/277 V	1
Panel HDP	225 A	480Y/277 V	1
Panel LDP1	800 A	208Y/120 V	1
Panel HLP	400 A	208Y/120 V	1
Panel ESBH	250 A	480V/277 V	1
Panel ELSH	100 A	480V/277V	1
Panel LP1	225A	208Y/120V	2
Panel ESBP	400 A	208Y/120V	1
Panel ELSP	100 A	208Y/120V	1
Panel LP2	225A	208Y/120V	3
Panel LP3	225A	208Y/120V	3
Panel LP4	225A	208Y/120V	3
Panel HP4	225 A	408Y/277V	1
Panel GP4	100A	208Y/120V	1
Panel ELSH4	100A	480Y/277V	1
Panel ESBH4	100A	480Y/277V	1
Panel LR	225A	208Y/120V	1
Panel ELSP4	100 A	208Y/120V	1
Panel ESBP4	100 A	208Y/120V	1
Panel LC	100A	208Y/120V	1

* = interpolation on following page

Summary

Qt.	Qty			
1	(1)	1200 A	277V	
4	(2)	225A	277V	*
1	(1)	800 A	120 V	* Interpolate [illegible]
1	(1)	400 A	120 V	
1	(1)	250 A	277V	*
2 w/4 1 w/1	(3)	100 A	277V	*
3 w/1	(4)	225A	120V	*
2 w/4 3 w/1	(5)	100 A	120V	*

x = $12,508.29

Receptacles

	Qty	x	# of rooms	Σ
Typ. Single Room	4		22	88
Typ. Double Rooms	5		12.6	63
Typ. Triple Room	6		7	42
Corridor	25		3	75
Hall Bathroom	2		14	28
Study	4		7	28
Group Living	5		4	20
Housing	3		3	9
Single Bath	1		4	4
1st Floor Corridor (Up)	12		1	12
Multi-Purpose Room	15		1	15
Janitor	3		1	3
1st Floor Restrooms	1		2	2
1st Floor Corridor (Low)	10		1	10
Office	4		1	4
Staff Apt.	19		1	19
Laundry	23		1	23
				1,016

Total Rec. = 1,016

Total SF = 70,057

= 14.5 per 1000 SF

*Interpolation

$\frac{16.5 - 14.5}{3.25 - x} = \frac{16.5 - 10}{3.25 - 1.68}$ $x = \$3.07/SF$

Switches

*Assume 1 switch/room

200 rooms

$\frac{200 \text{ switches}}{70,057} = 2.85 \frac{\text{switches}}{kSF}$

$\frac{5.0 - 2.85}{1.12 - x} = \frac{5.0 - 2.5}{1.12 - 0.52}$ $x = \$0.60/SF$

A 225 A 277/480 V

$$\frac{5-4}{13,055.05-x} = \frac{5-1}{13,055.05-8765.25} \qquad X = \$12,007.35 \qquad (2)$$

B 250 A 277/480 V

$$\frac{400-250}{13,885.20-x} = \frac{400-225}{13,885.20-8765.25} \qquad x = \$9,493.53 \qquad (1)$$

C 100 A 277/480 V

$$\frac{5-4}{7414.35-x} = \frac{5-1}{7414.35-5602.95} \qquad x = \$6,961.50 \qquad (2)$$

D 225A 120/208 V

$$\frac{5-4}{10,419.55-x} = \frac{5-1}{10,419.55-6,106.55} \qquad x = \$9,348.65 \qquad (3)$$

$$\frac{5-3}{''} = \frac{5-1}{''} \qquad x = \$8,267.95 \qquad (3)$$

$$\frac{5-2}{''} = \frac{5-1}{''} \qquad x = \$7,187.25 \qquad (3)$$

E

100 A 120/208 V

$$\frac{5-4}{5231.80-x} = \frac{5-1}{5231.80-3395.15} \qquad X = \$4,772.64 \qquad (2)$$

Lighting

$$\frac{70,057}{4} = 17,514.25 \text{ SF/Floor}$$

Fluorescent Fixtures/Floor = 148

$$\frac{148}{17,514.25} = 0.00845 \text{ Fixtures/SF}$$

$$\frac{8.45}{1000\text{SF}} \; x$$

AC

50 HP Supply

50 HP Exhaust

$$100\text{ HP} \times \frac{746 \text{ W}}{\text{HP}} = 74,600 \text{ W}$$

$$\frac{74,600\text{W}}{70,057\text{SF}} = 1 \text{ W/SF}$$

Telecom

17 ▽ per floor public area + 1 per student in rooms

$$\frac{363 \text{ telecom}}{70,057} = 5.18 \text{ telecom}/1000 \text{ SF}$$

Interpolate

$$\frac{6-5.18}{1667.71-X} = \frac{6-4}{1667.71-1148.88}$$

$$X = \$1,454.91/\text{M.S.F.}$$

E-Generator (Diesel)

$$30\text{HP} \times 746 \text{ W/HP} = 22,320 \text{ W}$$

$\boxed{22 \text{ KW}}$

Fire detection

Conservative estimate of 200 detectors

(199 rooms)

37

Plumbing

Fixtures	W.C. #	Shower Stalls #	Bath tubs #	HC SHOWER #	Lavatories #	Water coolers #	Drinking FTN. #
1st Floor	3	2	0	1	3		
	3	2	0	1	3		
	2 2½	2	2	0	2 +4		
2nd Floor	3	2	0	1	3	1	2
	3	2	0	1	3		
	3	2	0	1	3		
	3	2	0	1	3		
	1	1	1	0	1		
3rd Floor	3	2	0	1	3	1	2
	3	2	0	1	3		
	3	2	0	1	3		
	3	2	0	1	3		
	1	1	1	0	1		
4th Floor	3	2	0	1	3	1	2
	3	2	0	1	3		
	3	2	0	1	3		
	3	2	0	1	3		
	1	1	1	0	1		

Mechanical

* Interpolation (Heating Hydronic System)

$$\frac{111,700 - 70,057}{7.33 - x} = \frac{111,700 - 57,700}{7.33 - 2.39} \qquad x = {}^{\$}8.15/SF$$

* Interpolation (Rooftop Air Handling Unit)

$$20,300 \text{ CFM} \times \frac{1 \text{ ton}}{400 \text{ CFM}} = 50.75 \text{ ton unit}$$

$$\frac{95.83 - 57.50}{19.37 - 20.03} = \frac{57.50 - 50.75}{20.03 - x} \qquad x = {}^{\$}20.15/SF$$

Structural Estimate

*Footings

Mark	Size L	Size W	Size H	CF	CY	Qty.	Sub total CY	Formwork SFCA	Sub-Total SFCA
CF1	4'	4'	1.5'	24	0.89	卌 卌 卌	13.35	24	360
CF2	4'	4'	2'	32	1.19	卌 卌 卌 卌	23.8	32	640
CF3	5'	5'	2'	50	1.85	||	3.7	40	80
CF4	6'	6'	1.5'	54	2.00	||||	8	36	144
CF5	6'	6'	2'	72	2.67	卌	13.35	48	240
CF6	7'	7'	2'	98	3.63	|	3.63	56	56
CF7	11'	11'	2'	242	8.96	|||	26.88	88	264
						TOTAL CY	92.6		1784 SFCA

Formwork
Slab Piers Footings
SFCA = 5"/LF + 4.5'/LF of Exterior + 1784
= 5/12(914') + 4.5(914) + 1784
= 6278 SFCA plywood

Infinity System

Spans up to 27'

*Base Plates

		SF	
3/4" thick			
21"×21"	卌 |	18.38	70 SF
17"×17"	卌 卌 |||	26.10	
13"×13"	卌 卌 |	12.91	
15"×15"	卌 |	9.38	
12"×12"	|||	3	
1" thick			
17×17	||		4 SF
1.5" thick			
12"×12"	|		1 SF

*Columns

		Dim.	Qty	L	
C1	HSS	4 × 4 × 3/8	(1)	13' 9 3/8"	✓
C2	HSS	4 × 4 × 3/8	(5)	12' 6 7/8"	✓
C3	HSS	4 × 4 × 3/8	(1)	14' 3 1/8"	✓
C4	HSS	6 × 4 × 3/8	(1)	14' 3 1/8"	✓
C5	HSS	6 × 4 × 3/8	(1)	14' 3 1/8"	✓
C6	HSS	4 × 4 × 3/8	(1)	14' 3 1/8"	✓
C7	HSS	4 × 4 × 3/8	(1)	14' 3 1/8"	✓
C8	HSS	8 × 4 × 3/8	(1)	14' 3 1/8"	✓
C9	HSS	8 × 4 × 3/8	(1)	14' 3 1/8"	✓
C10	HSS	8 × 4 × 3/8	(1)	14' 3 1/8"	✓
C11	HSS	6 × 4 × 3/8	(1)	14' 3 1/8"	✓
C12	HSS	6 × 4 × 3/8	(1)	14' 3 1/8"	✓
C13	HSS	6 × 4 × 3/8	(1)	14' 3 1/8"	✓
C14	HSS	8 × 4 × 3/8	(1)	14' 3 1/8"	✓
C15	HSS	8 × 4 × 3/8	(1)	14' 3 1/2"	✓
C16	HSS	6 × 4 × 3/8	(1)	14' 3 1/8"	✓
C17	HSS	4 × 4 × 1/2	(1)	14' 2 7/8"	✓
C18A	HSS	8 × 4 × 3/8	(2)	32' 3 1/4"	✓
C19A	HSS	8 × 4 × 3/8	(1)	32' 3 1/2"	✓
C19B	HSS	8 × 4 × 1/4	(1)	17' 5 3/8"	✓
C18B	HSS	8 × 4 × 1/4	(1)	17' 5 3/8"	✓
C20A	HSS	12 × 4 × 3/8	(1)	32' 3 1/2	✓
C20B	HSS	12 × 4 × 1/4	(1)	17' 5 3/8"	✓
C21A	HSS	12 × 4 × 3/8	(1)	32' 3 1/4"	✓
C21B	HSS	12 × 4 × 1/4	(1)	17' 5 3/8"	
C22A	HSS	12 × 4 × 3/8	(1)	27' 3 1/2"	✓
C22B	HSS	12 × 4 × 1/4	(1)	17' 5 3/8"	✓
C23A	HSS	12 × 4 × 3/8	(1)	27' 3 1/2	✓
C23B	HSS	12 × 4 × 1/4	(1)	17' 5 3/8"	✓

Columns Cont.		Dim	Qty	L
C24A	HSS	8×4×⅜	(1)	23' 3½" ✓
C24B	HSS	8×4×¼	(1)	17' 5⅜" ✓
C25A	HSS	8×4×⅜	(1)	24' 3½" ✓
C25B	HSS	8×4×¼	(1)	17' 5⅜" ✓
C26A	HSS	12×4×⅜	(1)	27' 3½" ✓
C26B	HSS	12×4×¼	(1)	17' 5⅜" ✓
C27A	HSS	12×4×⅜	(1)	27' 3½" ✓
C27B	HSS	12×4×¼	(1)	17' 5⅜" ✓
C28A	HSS	8×4×⅜	(1)	27' 3½" ✓
C28B	HSS	8×4×¼	(1)	17' 5⅜" ✓
C29A	HSS	8×4×⅜	(1)	27' 3½" ✓
C29B	HSS	8×4×¼	(1)	17' 5⅜" ✓
C30A	HSS	8×4×⅜	(1)	23' 3½" ✓
C30B	HSS	8×4×¼	(1)	17 5⅜" ✓
C31A	HSS	4×4×⅜	(1)	23' 3½" ✓
C31B	HSS	4×4×¼	(1)	17' 5⅜" ✓
C32A	HSS	4×4×⅜	(1)	9' 2¾" ✓
C32B	HSS	4×4×⅜	(1)	8' 10½" ✓
C32C	HSS	4×4×¼	(1)	9' 0½" ✓
C33	HSS	6×4×⅜	(1)	12' 0 7/16" ✓
C34	HSS	8×4×⅜	(1)	13' 0 7/16" ✓
C35A	HSS	4×4×⅜	(1)	23' 3½" ✓
C35B	HSS	4×4×¼	(1)	16' 11⅝" ✓
C36A	HSS	4×4×⅜	(1)	23' 6¼" ✓
C36B	HSS	4×4×¼	(1)	16' 11⅝" ✓
C37A	HSS	8×4×½	(1)	12' 10¾" ✓
C37B	HSS	8×4×½	(1)	29' 11⅜" ✓
C38A	HSS	10×6×⅝	(1)	27' 2¼" ✓
C38B	HSS	8×4×⅜	(1)	29' 9¾" ✓
C39A	HSS	10×6×⅝	(1)	27' 2¼" ✓
C39B	HSS	8×4×⅜	(1)	29' 11⅜" ✓

Beams	Dim	L	Qty
B1	W12×19	14' 7⅝"	(1) ✓
B2A	W12×19	7' 11"	(1) ✓
B2B	W12×19	7' 11"	(1) ✓
B3	W12×19	16' 2½"	(1) ✓
B4	W12×19	15' 6½"	(1) ✓
B5	W12×19	8' 5⅞"	(1) ✓
B6	W16×26	12' 10 1/16"	(1) ✓
B7	W16×50	18' 7"	(1) ✓
B8	W16×26	8' 9"	(1) ✓
B9	W16×31	13' 10½"	(1) ✓
B10	W16×26	11' 9"	(1) ✓
B11	W16×31	14' 11½"	(1) ✓
B12	W16×50	20' 2½"	(1) ✓
B13	W16×26	7' 11½"	(1) ✓
B14	W16×31	14' 9¾"	(1) ✓
B15	W16×31	13' 11¼"	(1) ✓
B16	W16×26	11' 9"	(1) ✓
B17	W16×31	13' 10½"	(1) ✓
B18	W12×40	18' 5½"	(3) ✓
B19	W16×26	15' 1⅜"	(4) ✓
B20	W12×35	17' 10¾"	(6) ✓
B21	W12×35	17' 10¾"	(6) ✓
B22	W8×24	8' 9"	(24) ✓
B23	W16×57	21' 0"	(1) ✓
B24	W12×40	21' 6½"	(2) ✓
	L 3×3×⅜	20' 6½"	(1) ✓
B25	W16×26	21' 8½"	(2) ✓
B26	W14×132	16' 4½"	(1) ✓
B27A	W12×40	16' 3½"	(1) ✓
B27B	W12×40	16' 4½"	(1) ✓
B29	W10×26	5' 0" *	(2) ✓
B30	W12×40	21' 8½"	(1) ✓
B31	W16×26	18' 3"	(1) ✓
B32	W10×22	2' 4½"	(4) ✓
B33	W16×26	15' 5½"	(3) ✓
B33A	W16×26	15' 5½	(1) ✓
B34	W10×30	11' 1¼"	(1) ✓
B35	W10×26	9' ¼"	(3) ✓
B36	W14×68	11' 3¼"	(1) ✓
B37	W12×19	5' 11¼"	(1) ✓
B38	W8×24	25' 10"	(1) ✓
B39	W8×24	5' 11⅞"	(2) ✓
B40	W8×24	8' 6¼"	(2) ✓

18.3 ton
+50% Material
+25% Labor

Interpolation for Columns Price

*Assume 4×4 HSS Columns Prices are dependent on thickness. (Area) ∴ $½ thickness is 2× $¼

4×4×½ × 12' = $694.36 ea
4×4×⅜ × 12' = $390.58 ea

$$\begin{matrix} * \; 8" \times 4" \times ⅜" = 9 \text{ in}^2 \\ 6" \times 4" \times ⅜" = 7.5 \text{ in}^2 \end{matrix} \xrightarrow{= 16.7\% \Delta} \begin{matrix} 642.72 \cdot (1 - .167) \\ \$535.39 \text{ ea.} \end{matrix}$$

$$\begin{matrix} * \; 9 \text{ in}^2 \\ 8" \times 4" \times ½" = 12 \text{ in}^2 \end{matrix} = \frac{4}{9} = 44\% \Delta \xrightarrow{\quad} \begin{matrix} 642.72 \times 1.44 \\ \$925.52 \text{ ea} \end{matrix}$$

$$\begin{matrix} * \; 9 \text{ in}^2 \\ 8" \times 4" \times ¼" = 6 \text{ in}^2 \end{matrix} \xrightarrow{\frac{3}{9} = 33\% \Delta} \begin{matrix} 642.72 \times (1 - .33) \\ \$424.20 \text{ ea} \end{matrix}$$

$$\begin{matrix} * \; 10" \times 6" \times ⅝" = 20 \text{ in}^2 \\ 10" \times 6" \times ⅜" = 12 \text{ in}^2 \\ 14' \end{matrix} \quad \frac{8}{12} = +66\% \quad \begin{matrix} \$971.17 \times 1.66 \\ = \$1612.14 \text{ ea } (14') \end{matrix}$$

$$* \; 12" \times 4" \times ⅜" = 12 \text{ in}^2 \quad \therefore = \$971.17 / 14' \text{ ea.}$$

$$12" \times 4" \times ¼" = 8 \text{ in}^2 \quad \frac{4}{12} = -33\%$$

$$\therefore = \$640.97 / 14' \text{ ea.}$$

* Interpolations Cont.

1) W10 x 30

$\frac{33-30}{64.08-x} = \frac{33-26}{64.08-52}$ $x = \$58.90$ /LF

2) W12 x 19

$\frac{22-19}{42.08-x} = \frac{22-16}{42.08-32.46}$ $x = \$37.27$ /LF

3) W12 x 40

$\frac{50-40}{87.87-x} = \frac{50-35}{87.87-63.46}$ $x = \$71.60$ /LF

4) W14 x 68

$\frac{74-68}{125.78-x} = \frac{74-53}{125.78-92.45}$ $x = \$116.26$ /LF

5) W14 x 132

$W14x120 + \left(\frac{132-120}{120} \times 100\%\right)$

$200.19 \times 1.10 = \$220.21$ /LF

6) W16 x 57

$\frac{67-57}{114.84-x} = \frac{67-50}{114.84-87.38}$ $x = \$98.60$ /LF

Roof truss Pre-fab

341' 7" of ridge line

1 truss / 4' = 86 trusses spanning 31'

Stud Walls

h = 10'

Rebar

3 lbs/SF × 18,239 SF = 54,717 lbs

1.5 lbs/SF × 51,818 SF = 77,727 lbs

$\frac{132,444 \text{ lbs}}{2000} = \boxed{66.2 \text{ ton}}$

K-Series Joists

14K1 19' 1" span × 17 = $\boxed{323 \text{ LF}}$

w 1½", Galv, 20 ga. Deck

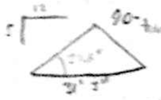
Deck

$\boxed{1,394 \text{ SF}}$

Roof

Misc. Lounge = 1½", Galv, 20 ga

Roof = 1½", Galv, 22 ga



$90 - \tan^{-1}\left(\frac{12}{5}\right) = 22.6°$

$\cos 22.6 = \frac{31.25'}{x}$

$x = 33.8'$

Slabs

same Areas as below

2" Dovetail 20 GA

$\boxed{51,818 \text{ SF}}$

$\frac{33.8-31.25}{31.25} = 8.3\%\uparrow$ from norm. Area

$\boxed{18,216 \text{ SF}}$

Slab on Deck (4" slab)

Floor	2	16,820 SF	5606.7 CF
	3	16,820 SF	5606.7 CF
	4	16,652 SF	5495.2 CF
Penthouse		1,526 SF	503.6 CF
			17,212.0 CF

$\frac{17,212.0 \text{ CF}}{27} = \boxed{637.5 \text{ CY}}$

+ L 6×6×⅜ on entire exterior

914 LF × 3 → $\boxed{2742'}$

Slab on Grade

t = 5" A = 18,239 SF

CF = 7599.58 ~ 7600/27 = $\boxed{281.5 \text{ CY}}$

Strip Footings

1.) $(.5' \times 2') + .5'^2 = 1.25$ CF/LF Interior Bearing Wall

2.) Exterior Bearing Wall = $(3' \times 1.5') + (2' \times .66')$ = 5.82 CF/LF

3) Elevation Change = $(4' \times 1.5') + (5' \times 1') = 11$ CF/LF

Type	LF
Interior BW	(1112' 10" × 1.25)/27 = 51.5 CY
Exterior BW	(914' 3" × 5.82)/27 = 197.1 CY
Elevation Ch.	(78' 1" × 11)/27 = 28.6 CY
	Total = $\boxed{277.2 \text{ CY}}$

* ASSUME 5% Waste on Concrete Material

* ASSUME 3 lb/SF Reinforcement on concrete SOG
1.5 lb/SF on Decks

* ASSUME (4) ¾" dia. 2" l Bolts per Member
+ 5% waste

* Assum 4.5 SFCA / LF of exterior wall

Infinity Structures

Load Bearing Cold Formed Panelized Walls

* Assume: 15% increase for shear wall
25% increase for shear bearing wall
50% increase Labor Pace for pre fabrication
12" OC, 18 ga., 3-5/8" wide, 10' high walls
Floors 2-4 are identical

1st Floor:

	LF		Sub total
BW (Bearing Wall)	1000' 7" × 1		: 1000.58
SW (Shear Wall)	265' 8" × 1.15		: 305.51
SBW (Shear Bearing wall)	414' 7" × 1.25		: 518.23

2nd Floor (×3)

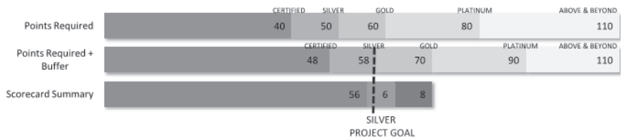
BW	1,033' 10" × 3	= 3101.5' × 1	: 3101.50
SW	243' 5" × 3	= 730.25' × 1.15	: 839.79
SBW	377' 5" × 3	= 1132.25' × 1.25	: 1415.31
			7180.92 LF

Appendix C:

Taylor Hall LEED Scorecard

LEED Dashboard- GMU Housing VIII-B

4/30/2013



	Identifier		Points Available	Submission	Ultimately Responsible For Documentation	Y	MY	MN	N
						56	6	8	
Sustainable Sites	**SSp1**	**Construction Activity Pollution Prevention**	**0**	**C**	**Contractor**	**R**			
	SSc1	Site Selection	1	D	Civil	1			
	SSc2	Development Density and Community Connectivity	5	D	Architect	5			
	SSc3	Brownfield Redevelopment	1	D	Civil				1
	SSc4.1	Alternative Transportation - Public Transportation Access	6	D	Architect	6			
	SSc4.2	Alternative Transportation - Bicycle Storage and Changing Rooms	1	D	Architect				1
	SSc4.3	Alternative Transportation - Low-Emitting and Fuel-Efficient Vehicles	3	D	Architect	3			
	SSc4.4	Alternative Transportation - Parking Capacity	2	D	Architect	2			
	SSc5.1	Site Development - Protect or Restore Habitat	1	C	Landscape Designer				1
	SSc5.2	Site Development - Maximize Open Space	1	D	Landscape Designer	1			
	SSc6.1	Storm water Design - Quantity Control	1	D	Civil	1			
	SSc6.2	Storm water Design - Quality Control	1	D	Civil			1	
	SSc7.1	Heat Island Effect - Non-roof	1	C	Landscape Designer		1		
	SSc7.2	Heat Island Effect - Roof	1	D	Architect	1			
	SSc8	Light Pollution Reduction	1	D	MEP				1
Water	**WEp1**	**Water Use Reduction**	**R**	**D**	**MEP**	**R**			
	WEc1a	Water-Efficient Landscaping - Reduce by 50%	2	D	Landscape Designer			2	
	WEc1b	Water-Efficient Landscaping - Reduce by 100%	2	D	Landscape Designer				2
	WEc2	Innovative Wastewater Technologies	2	D	MEP				2
	WEc3a	Water Use Reduction - 30%	2	D	MEP	2			
	WEc3b	Water Use Reduction - 35%	1	D	MEP	1			
	WEc3c	Water Use Reduction - 40%	1	D	MEP			1	
Energy & Atmosphere	**EAp1**	**Fundamental Commissioning of Building Energy Systems**	**R**	**C**	**Commissioning Agent**	**R**			
	EAp2	**Minimum Energy Performance**	**R**	**D**	**MEP**	**R**			
	EAp3	**Fundamental Refrigerant Management**	**R**	**D**	**MEP**	**R**			
	EAc1	Optimize Energy Performance	19	D	MEP	4	1	1	13
	EAc1a	Optimize Energy Performance (12% New / 8% Renovation)	1	D	MEP	1			
	EAc1b	Optimize Energy Performance (14% New / 10% Renovation)	1	D	MEP	1			
	EAc1c	Optimize Energy Performance (16% New / 12% Renovation)	1	D	MEP	1			
	EAc1d	Optimize Energy Performance (18% New / 14% Renovation)	1	D	MEP	1			
	EAc1e	Optimize Energy Performance (20% New / 16% Renovation)	1	D	MEP		1		
	EAc1f	Optimize Energy Performance (22% New / 18% Renovation)	1	D	MEP			1	
	EAc1g	Optimize Energy Performance (24% New / 20% Renovation)	1	D	MEP				1
	EAc1h	Optimize Energy Performance (26% New / 22% Renovation)	1	D	MEP				1
	EAc1i	Optimize Energy Performance (28% New / 24% Renovation)	1	D	MEP				1
	EAc1j	Optimize Energy Performance (30% New / 26% Renovation)	1	D	MEP				1
	EAc1k	Optimize Energy Performance (32% New / 28% Renovation)	1	D	MEP				1
	EAc1l	Optimize Energy Performance (34% New / 30% Renovation)	1	D	MEP				1
	EAc1m	Optimize Energy Performance (36% New / 32% Renovation)	1	D	MEP				1
	EAc1n	Optimize Energy Performance (38% New / 34% Renovation)	1	D	MEP				1
	EAc1o	Optimize Energy Performance (40% New / 36% Renovation)	1	D	MEP				1
	EAc1p	Optimize Energy Performance (42% New / 38% Renovation)	1	D	N/A				1
	EAc1q	Optimize Energy Performance (44% New / 40% Renovation)	1	D	N/A				1
	EAc1r	Optimize Energy Performance (46% New / 42% Renovation)	1	D	N/A				1
	EAc1s	Optimize Energy Performance (48% New / 44% Renovation)	1	D	N/A				1
	EAc2	On-Site Renewable Energy	7	D	MEP				7
	EAc2a	On-Site Renewable Energy (1%)	1	D	MEP				1
	EAc2b	On-Site Renewable Energy (3%)	1	D	MEP				1
	EAc2c	On-Site Renewable Energy (5%)	1	D	N/A				1
	EAc2d	On-Site Renewable Energy (7%)	1	D	N/A				1
	EAc2e	On-Site Renewable Energy (9%)	1	D	N/A				1
	EAc2f	On-Site Renewable Energy (11%)	1	D	N/A				1
	EAc2g	On-Site Renewable Energy (13%)	1	D	N/A				1
	EAc3	Enhanced Commissioning	2	C	Commissioning Agent	2			
	EAc4	Enhanced Refrigerant Management	2	D	MEP	2			
	EAc5	Measurement and Verification	3	C	MEP	1			2
	EAc6	Green Power	2	C	Client - Optional		2		
Materials & Resources	**MRp1**	**Storage and Collection of Recyclables**	**R**	**D**	**Architect**	**R**			
	MRc1.1a	Maintain Interior Structural Components (55% Reuse)	1	C	N/A				1
	MRc1.1b	Maintain Interior Structural Components (75% Reuse)	1	C	N/A				1
	MRc1.1c	Maintain Interior Structural Components (95% Reuse)	1	C	N/A				1
	MRc1.2	Maintain Interior Nonstructural Components (50% Reuse)	1	C	N/A				1
	MRc2a	Construction Waste Management Divert 50% from Disposal	1	C	Contractor	1			
	MRc2b	Construction Waste Management Divert 75% from Disposal	1	C	Contractor	1			
	MRc3.1a	Materials Reuse - 5% Reuse	1	C	Contractor				1
	MRc3.1b	Materials Reuse - 10% Reuse	1	C	Contractor				1
	MRc4a	Recycled Content - 10% of Content	1	C	Contractor	1			
	MRc4b	Recycled Content - 20% of Content	1	C	Contractor	1			
	MRc5a	Regional Materials - 10% Manufactured	1	C	Contractor	1			
	MRc5b	Regional Materials - 20% Manufactured	1	C	Contractor	1			
	MRc6	Rapidly Renewable Materials - 2.5%	1	C	Contractor				1
	MRc7	Certified Wood -50% FSC	1	C	Contractor	1			
Indoor Environmental Quality	**IEQp1**	**Minimum Indoor Air Quality Performance**	**R**	**D**	**MEP**	**R**			
	IEQp2	**Environmental Tobacco Smoke (ETS) Control**	**R**	**D**	**Architect**	**R**			
	IEQc1	Outdoor Air Delivery Monitoring	1	D	MEP		1		
	IEQc2	Increased Ventilation	1	D	MEP		1		
	IEQc3.1	Indoor Air Quality Management Plan - During Construction	1	C	Contractor	1			
	IEQc3.2	Indoor Air Quality Management Plan - Before Occupancy	1	C	Contractor			1	
	IEQc4.1	Low-Emitting Materials - Adhesives and Sealants	1	C	Contractor	1			
	IEQc4.2	Low-Emitting Materials - Paints and Coatings	1	C	Contractor	1			
	IEQc4.3	Low-Emitting Materials - Flooring Systems	1	C	Contractor	1			
	IEQc4.4	Low-Emitting Materials - Composite Wood and Agrifiber Products	1	C	Contractor	1			
	IEQc5	Indoor Chemical and Pollutant Source Control	1	D	MEP				1
	IEQc6.1	Controllability of Systems - Lighting	1	D	Architect	1			
	IEQc6.2	Controllability of Systems - Thermal Comfort	1	D	MEP	1			
	IEQc7.1	Thermal Comfort - Design	1	D	MEP	1			
	IEQc7.2	Thermal Comfort - Verification	1	D	Architect	1			
	IEQc8.1a	Daylight and Views - Daylight75% of Spaces	1	D	Lighting Designer			1	
	IEQc8.2	Daylight and Views - Views for Seated Spaces	1	D	Architect	1			
Innovation	**IDc1.1**	Green Housekeeping	1	C	Client	1			
	IDc1.2	Environmental Pest Control	1	C	Client	1			
	IDc1.3	Green Landscape Management	1	C	Client	1			
	IDc1.4	Low Mercury Bulbs	1	C	Contractor	1			
	IDc1.5	Green Education	1	C	Client	1			
	IDc2	LEED® Accredited Professional	1	C	Architect	1			
Regional	**RPc1**	SSc4.1	1	D	Architect	1			
	RPc2	SSc5.1	1	C	Landscape Designer				1
	RPc3	SSc6.2	1	D	Civil			1	
	RPc4	WEc2	1	D	MEP				1
	RPc5	EAc1o	1	D	MEP				1
	RPc6	EAc2a	1	D	MEP				1
						56	6	8	
						Y	MY	MN	

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△	Date	Description
	05.03.2013	PRELIMINARY DESIGN RESUBMISSION
	07.12.2013	PRELIMINARY DESIGN SUBMISSION 2
	07.12.2013	SITE UTILITIES RESUBMISSION
	07.12.2013	FOUNDATION SUBMISSION

Seal/Signature

Project Name
SHENANDOAH HOUSING VIIIB TAYLOR HALL

Project Number
09.2043.000
BCOM Code: 247-17570-002

Description
LEED SCORECARD

Scale

G00.020

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