

# 2012

Brandon Tezak, LEED Green Associate  
Construction Management Option  
Faculty Advisor: Dr. Anumba  
October 12, 2012



## [TECHNICAL REPORT 2]

North Hall – American University  
Washington, D.C.

## Executive Summary

After American University's 2011 Campus Plan was approved by the District of Columbia Zoning Commission on March 8, 2012, Grunley Construction Company was awarded the construction contract on April 23, 2012 for American University's newest dormitory, North Hall. North Hall is an eight-story, tracked for LEED Gold upon completion, dormitory building located on American University's Main Campus in downtown Washington, D.C. The 122,200 square foot building will house 358 undergraduate students in 94 suite-style dorm rooms consisting of 6-bed, 4-bed, and RA units (1-bed). Grunley bid North Hall with a Guaranteed Maximum Price (GMP) of just under \$29 million. North Hall is scheduled to house students for the start of the Fall 2013 semester.

To meet the deadline and have the building ready for students for the Fall 2013 semester, Grunley must finish the project by August 9, 2013. The project is being driven by the schedule, and any delay in the schedule will have a negative impact for both American University and Grunley Construction Company. Technical Report 2 contains a Detailed Project Schedule that details the structure, rough-in, and finishes sequencing.

A Detailed Structural System Estimate as well as a General Conditions Estimate was performed as a part of Technical Report 2. The concrete structural system and foundation system was estimated at \$6,278,806.38. The general conditions cost was estimated at \$1,093,102.55.

Technical Report 2 contains a Building Information Modeling (BIM) Use Evaluation that was completed. Six different uses of BIM were identified that would benefit the goals of North Hall. The project team is already using one of the six potential uses of BIM. The other five uses outlined would be beneficial to the success of the project.

North Hall is not the perfect project as no project has no challenges during its construction. Even though North Hall has been under construction for less than five months, there are few issues the project team has run into so far. Some of these issues include slow response time to submittals and RFIs by the design team, as well as slow decisions on changes by the owner, American University, a compressed schedule, and limited working hours along with limited site accessibility. Grunley's project team is implementing steps to avoid any problems that these issues may cause for North Hall.

## Table of Contents

Executive Summary.....	1
Detailed Project Schedule.....	3
Detailed Structural System Estimate .....	4
General Conditions Estimate .....	7
Building Information Modeling Use Evaluation.....	9
Constructability Challenges .....	11
Appendix A: Detailed Project Schedule .....	13
Appendix B: Detailed.....	27
Structural System Estimate.....	27
Appendix C: General Conditions Estimate .....	35
Appendix D: BIM Execution Planning.....	37

## Detailed Project Schedule

*See Appendix A for the Detailed Project Schedule.*

North Hall is being driven by its schedule due to the need for the building being ready to move students in for the start of the Fall 2013 semester. Grunley Construction Company has been pushing the schedule from the start of the project trying to get ahead whenever possible.

### SEQUENCING

The structure of North Hall will be built from the ground up. North Hall's precast panel façade will be start being erected as the structure nears completion. The precast will follow the same sequence as the building's structure. All the rough in of the mechanical, electrical and plumbing systems as well as the wall framing will also start on the ground floor and rise floor by floor to the top of the building.

The finishes will not follow the same sequence of floors that the earlier trades followed. The finishes will start at the penthouse level and work down the building floor by floor finally working out of the building as the construction wraps up.

### CONSTRUCTION PHASING

Most of the phases of North Hall's construction are relatively independent of each other in terms of one phase does not require the pervious phase be completely finished. A major delay to one of the activities that fall on the critical path could delay the next phase. A prime example of this is the structure of the building to be completed on time. Any delay could have a negative effect on the downstream activities. Table 1 below shows the major construction phases for North Hall.

**Table 1: North Hall Construction Phasing**

North Hall Phasing			
Phase Name	Duration	Start	Finish
Site Work	259 Days	5/15/12	5/14/13
Building Structure	89 Days	7/2/12	11/2/12
Enclosure	93 Days	9/6/12	1/16/13
Rough-In	190 Days	9/6/12	5/31/13
Finishes	165 Days	12/19/12	8/9/13

## Detailed Structural System Estimate

**See Appendix B for the Detailed Structural System Estimate. Note: RS Means Costworks Database was used for all cost data.**

North Hall's structural system is almost completely comprised of structural reinforced concrete. The first and second floors are comprised of traditional reinforced concrete beams, columns and slabs. The third through eighth floor use traditional reinforced concrete for the beams and columns and a post-tensioned reinforced concrete floor slab.

### FOUNDATION

Due to the differing soil conditions throughout the site, North Hall will be supported with a series of caissons, grade beams and a continuous wall footing. There are 70 caissons ranging in diameter from 30 inches to 54 inches. The caisson are anywhere between 19 feet to 73 feet deep.

On top of some of the caissons lie 36-inch-by-36-inch grade beams. Along with the grade beams, a continuous wall footing is used to support the portion of the building on the ground floor that is only one story tall. This portion of the building will be under ground when the project is complete.

All the concrete in the foundation system is 3,000 PSI normal weight concrete with reinforcing. No formwork was used for the foundation systems, they were all earth formed in place.

### SUPERSTRUCTURE

Both the ground floor and second floor are traditional reinforced concrete construction. North Hall uses both rectangular and circular reinforced concrete columns throughout the building. All of the structure will be cast in place.

Floors three through eight use post-tensioned reinforced concrete slabs. The post-tensioned slabs allow the floor plan to be more open with fewer columns than would be required with traditional reinforced concrete construction. The suite style dorm rooms will not be cluttered with columns ultimately giving the residents more open space in their suites.

The detailed structural estimate focused on one of the typical floors of North Hall. This particular floor was one that has a post tensioned slab, which is most representative of the majority of the building. A cost per square foot was calculated and then multiplied by the square footage of each floor that has a

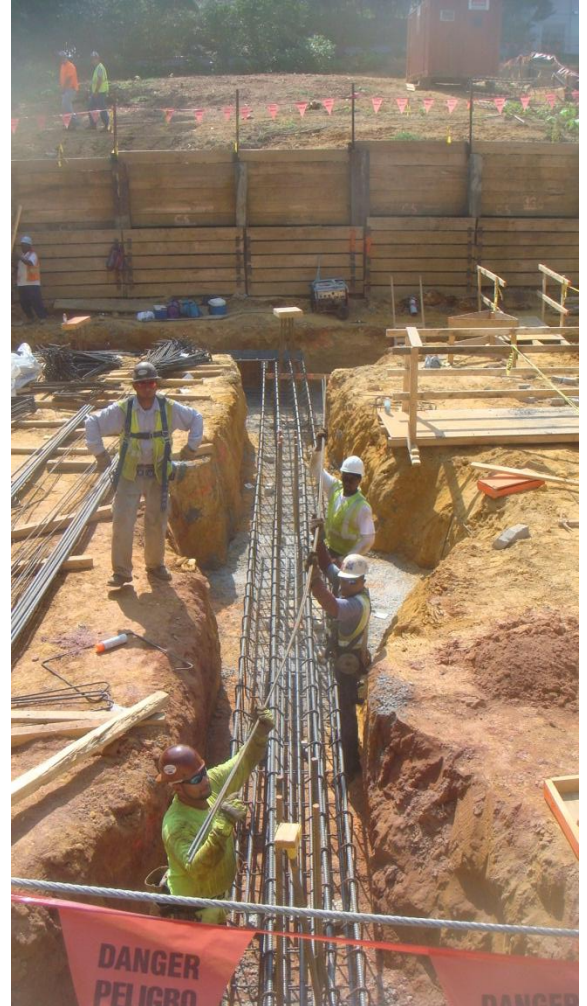


Figure 1: Grade Beam Construction, Photo Taken By Brandon Tezak

post-tensioned slab to estimate the cost for each floor's structure. Since the ground and second floors do not have any post-tensioning in their respective slabs, a value for traditional reinforced concrete was used instead of the value for post-tensioned concrete.

Table 2, shown below summarizes the cost per floor as well as the cost of the foundation system.

**Table 2: Structural System Estimated Cost Summary**

Floor	Area (SF)	Estimated Cost
<b>Foundation</b>	N/A	\$ 366,157.58
<b>One</b>	19400	\$ 543,937.21
<b>Two</b>	15400	\$ 431,785.21
<b>Three*</b>	15400	\$ 886,114.99
<b>Four*</b>	15400	\$ 886,114.99
<b>Five*</b>	15400	\$ 886,114.99
<b>Six*</b>	15400	\$ 886,114.99
<b>Seven*</b>	15400	\$ 886,114.99
<b>Eight*</b>	8800	\$ 506,351.42
<b>Total</b>		<b>\$ 6,278,806.38</b>

(\* Denotes Post-Tensioned Slab)

#### COST COMPARISON

When the estimated cost is compared to the total of the structural concrete and caisson bids, the RS Means estimated cost of \$6,278,806.38 is about 28 percent or \$1,764,706.38 higher than that of the actual cost of \$4,514,100.00, which is shown in Figure 2 on the next page. As can be found in the detailed breakdown of the structural estimate in Appendix B the cost of post-tensioned concrete seems rather high compared to that of tradition reinforced concrete. This appears to be the reason for the higher estimated value.

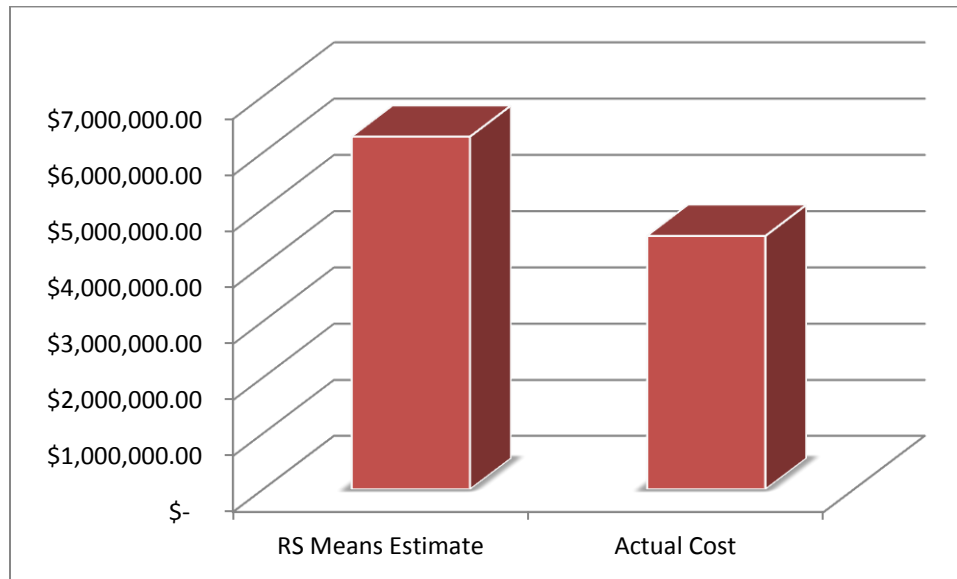


Figure 2: Structural System Cost Comparison, Devolved By Brandon Tezak

### ASSUMPTIONS

#### *Columns*

- All reinforcement was assumed to be #8 rebar for simplification purposes.
- All columns were assumed 28" by 14" for simplification purposes.
- Formwork is assumed to be reused twice.

#### *Beams*

- Formwork is assumed to be reused twice.

## General Conditions Estimate

**See Appendix C for the General Conditions Estimate. Note: RS Means Costworks Database was used for all cost data.**

North Hall's General Conditions can be broken down into two distinct categories, Site Expenses and the Project Team Staffing costs. The General Conditions Costs are relatively low for a few reasons. Grunley is expanding into a new market sector, Higher Education Construction, and to get their foot in the door they needed to be as competitive as possible and keep their costs down. Due to the very small site, Grunley decided to use a very small office trailer compared to the typical construction office trailer. Grunley's office trailer is an 8' by 40' sea container, which converted to an office. All of the onsite project staff is located in the trailer. A smaller trailer is also located on site as an office space of the American University Representative, which also serves as a meeting space for the project. Both trailers can be seen on the right side of Figure 3. The General Conditions was estimated at \$1,093,102.55.



Figure 3: Site Office Trailers, Photo Taken by Brandon Tezak

The actual budgeted General Conditions costs are much higher than the estimated costs. Grunley was able to save a substantial amount of money on some items. One example of this was that instead of having to run a Comcast Cable line to the trailers to get internet and phone access to the trailers, Grunley was able to tie into the campus wide wireless internet network that American University has. This is just one of many example of saving Grunley has made.

Figures 4 and 5 on the next page show the breakdown between the actual cost and estimated costs of North Hall's General Conditions.



### Estimated General Conditions

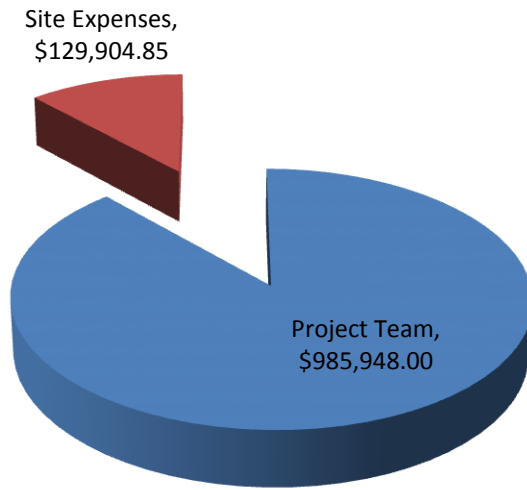


Figure 4: Estimated North Hall General Conditions Costs

### Actual Budgeted General Conditions

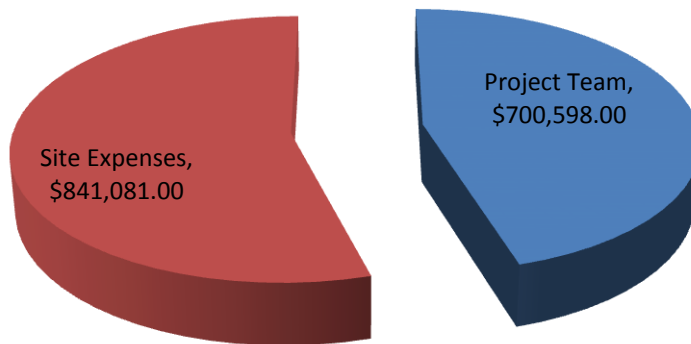


Figure 5: Actual Budgeted North Hall General Conditions

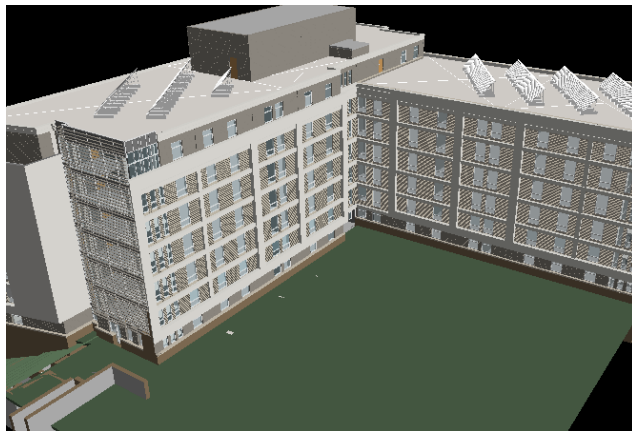
## Building Information Modeling Use Evaluation

*See Appendix D for the North Hall BIM Execution Plan Guide.*

***All processes, methods, and charts discussed or used are courtesy of Computer Integrated Construction at The Pennsylvania State University.***

Using the BIM uses outlined in the *BIM Project Execution Plan Guide*, developed by The Computer Intergrated Construction (CIC) Research Group at The Pennsylvania State University, five additional uses of 3D coordination that the project team is already using. These six uses of BIM were ranked on a three tier scale of High, Medium or Low importance to the project. These ranking will help the project team to decide to pursue these particular uses of Building Information Modeling.

The BIM uses receiving the highest ranking included 3D Coordination, Site Utilization Planning, and Design Reviews. The project team is already using 3D Coordination to reduce field conflicts. As the structure of North Hall is being constructed all sleeves in the slabs were coordinated to assure the correct location as well as that none were missed since, core drilling the concrete slabs is not an option due the post-tensioned cables within the slab. 3D coordination will also be used in erecting the precast façade as can be seen in Figure 6, as well as coordination of the MEP trades. North Hall has an extremely small and tight site. Using BIM for Site Utilization Planning would benefit all parties involved in the project. North Hall's only entrance and exit is located right next to three large dorm buildings. Due to the large amount of both construction traffic and regular campus traffic using the space on site to its ultimate capacity will make the entire area safer and reduce the congestion on the road into and out of the site. Design Review using BIM would also be a great benefit to the project. Having the subcontractors input on the design that they will ultimately be building in the field will minimize the potential problems with a design of a system by the Architect and Engineering Design Teams. Seeing these designs on a computer screen will also help increase the productivity of subcontractors since they will have a model to reference how the system they are building should look and work before they actually put any work physically into place.



**Figure 6: Precast Façade Coordination, Model Courtesy of Grunley Construction Company**

LEED Documentation and Record Modeling both received the medium ranking of importance. North Hall is track to receive LEED Gold Certification upon completion. Using BIM to track materials and their properties all in one place would help make managing the LEED documentation of the project. Documenting these materials recycled content, regional location and, effect on indoor air quality would be simplified. Taking the 3D coordination to the next level would make producing a record model of

North Hall a logical step. This would be beneficial to American University to go along with the As-Built Drawings giving them a complete representation would have they have in their new building. All of the equipment information could be added to the model.

With a record model with all the equipment information imputed Maintenance Scheduling would be the final potential use of BIM for North Hall. This particular use of BIM received a low importance ranking since it will only have benefit to American University and its maintenance staff. American would have to have the infrastructure to support a maintenance scheduling component as well as have the personnel that understand how this system operates.

## Constructability Challenges

North Hall has only been under construction since mid-May 2012. One of the Grunley Construction's superintendents, Justin Ingram, on North Hall outlined the some of the biggest constructability challenges that the project team is facing.

### SLOW DESIGN TEAM AND OWNER RESPONSE

The Architect and Engineers as well as American University have not exactly been the fastest on responding to submittals, RFI's and, changes. The architect and engineers have approximately to review and return the RFI's and submittals that Grunley submits to them. Grunley has had to go to the owner to get responses on some items so that the schedule would not negatively be affected by any delays. To remedy and hopefully speed up this process Grunley uses Newforma Project Center to manage all information exchange. Within Newforma the architect will get a message reminding them of when an RFI or submittal response is due back to Grunley. This has helped but not completely fixed the problem.

The Design Team has not been the only one waiting to the last minute. The owner, American University, has made some last minute changes to the design of some features of the building, and have taken their time deciding what those changes are going to be. This happen this summer as the site was being cleared in preparation for excavation. North Hall will be located on what was the parking lot of the President's Office Building. American University wanted to keep three parking spaces as long as they possibly could and build



Figure 7: POB Parking Construction, Photo Taken By: Brandon Tezak



Figure 8: POB Parking Complete, Photo Taken By Brandon Tezak

temporary spaces nearby. This was not a problem until the three saved spaces were located in a place where work needed to be completed and American was back and forth on exactly what they wanted for

temporary parking spaces. Grunley was given a week to take out the spaces and have three new ones built and ready to go for them the President of American University returned from vacation. Unfortunately American finally decided the afternoon before the president was scheduled to leave, giving Grunley little to no time to have a subcontractor on site the next morning ready to work. The Project Manager, Greg McHugh, and Superintendent, Justin Ingram, had a great relationship with a PAM Masonry, Inc. from

Spotsylvania, VA who came through when no delay could be afforded. A segmented block wall sported the parking spaces and all work was completed within a week as can be seen in Figures 7 and 8.

### TIGHT SCHEDULE AND LIMITED WORK HOURS

North Hall must be completed and ready for students to move in for the start of the Fall 2013 semester at American University. The dorm rooms have already been given to students meaning that over 300 students are counting on living there. To meet this deadline Grunley must stick to their project schedule and minimize any delays that they hit along the way. In most projects that get behind schedule working nights becomes an option to get back on schedule. This will not be an option for Grunley since they are limited to working 7AM to 7PM Monday through Saturday. North Hall will border a residential part of Washington D.C. as well as three of American University's dormitories. This is the driving force to limiting the work hours. Unfortunately there is not anything that Grunley can do to make up lost time other than working on Saturdays. The project team has done a great job keeping North Hall on schedule so far.

### SITE ACCESSIBILITY

The entrance to North Hall is shared with the exit of the site. All deliveries and construction traffic must enter at the same spot. Before the construction started, the road that runs through the site was a main road for deliveries to the three existing nearby dorms. As soon as the site fence was put up, there were multiple vehicles and people wandering in to the site that did not belong. To keep out the unauthorized people and vehicles additional signage was posted along the road leading into the site. This has worked for the most part however not everyone follows the signs as can be seen in Figure 9. Along with unwanted vehicles, the road leading into the site is narrow and has a curve in it making it impossible for trucks



Figure 9: Blocked Site Entrance, Photo Taken By Brandon Tezak



Figure 10: North Hall Site Entrance, Photo Taken By Brandon Tezak

to be able to pass each other as can be seen in Figure 10. This was a problem during excavation with multiple dump trucks trying to come and go. They had a very tough time getting in and out of the site slowing down the cycle time for each truck. A laborer from whichever subcontractor is getting a delivery out has trucks coming and going is stationed outside the gate to control the flow in and out of the site so that there is no log jam of construction vehicles.

## Appendix A: Detailed Project Schedule

ID	Task Mode	Task Name	Duration	Start	Finish	3rd Quarter				1st Quarter			3rd Quarter		
						Mar	May	Jul	Sep	Nov	Jan	Mar	May	Jul	Sep
1		<b>Site Work</b>	<b>259 days</b>	<b>Tue 5/15/12</b>	<b>Tue 5/14/13</b>										
2		Moblize to Site	0 days	Tue 5/15/12	Tue 5/15/12										
3		Sediment/ Erosion Control	4 days	Thu 5/17/12	Tue 5/22/12										
4		Site Clearing	4 days	Thu 5/17/12	Tue 5/22/12										
5		Construction Entrance Washrack	1 day	Tue 5/22/12	Tue 5/22/12										
6		Site to Grade for Sheeting and Shoring	3 days	Fri 5/25/12	Tue 5/29/12										
7		Sheeting and Shoring	22 days	Mon 5/28/12	Tue 6/26/12										
8		Relocate Gas Main in NW Corner	4 days	Mon 6/4/12	Thu 6/7/12										
9		Demo Retaining Walls	8 days	Tue 6/5/12	Thu 6/14/12										
10		Install Sewer Main	10 days	Tue 6/5/12	Mon 6/18/12										
11		Electrical Manhole	5 days	Tue 6/5/12	Mon 6/11/12										
12		Install Water Main in SW Corner	7 days	Tue 6/19/12	Wed 6/27/12										
13		Positive Drainage System	4 days	Thu 6/21/12	Tue 6/26/12										
14		Excavation To Foundation Grade	11 days	Wed 6/27/12	Wed 7/11/12										
15		Sheeting and Shoring for Cistern	3 days	Thu 7/12/12	Mon 7/16/12										
16		Excavate and Install Cistern	5 days	Tue 7/17/12	Mon 7/23/12										
17		Telecom Ductback to Building	10 days	Thu 8/16/12	Wed 8/29/12										
18		Electrical Ductbank from MH to Building	10 days	Thu 8/16/12	Wed 8/29/12										
19		Sewer Main to Building	4 days	Thu 8/16/12	Tue 8/21/12										
20		Water Mains to Building	1 day	Thu 8/16/12	Thu 8/16/12										
21		Chilled Water from MH to Building	10 days	Thu 8/16/12	Wed 8/29/12										
22		Steam Line from Courtyard to Building	8 days	Wed 8/22/12	Fri 8/31/12										
23		Install Site Lighting Conduit	10 days	Tue 1/8/13	Mon 1/21/13										
24		Masonry Veneer on Foundation	20 days	Fri 3/1/13	Thu 3/28/13										

Project: Project Schedule Date: Thu 10/11/12	Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
	Split		External Tasks		Inactive Summary		Manual Summary		Critical	
	Milestone		External Milestone		Manual Task		Start-only		Critical Split	
	Summary		Inactive Task		Duration-only		Finish-only		Progress	

ID	Task Mode	Task Name	Duration	Start	Finish	3rd Quarter			1st Quarter			3rd Quarter						
						Mar	May	Jul	Sep	Nov	Jan	Mar	May	Jul	Sep			
25		Site Concrete	20 days	Fri 3/1/13	Thu 3/28/13													
26		Gas Line to Building	1 day	Fri 3/29/13	Fri 3/29/13													
27		Exterior Site Handrails	10 days	Fri 3/29/13	Thu 4/11/13													
28		Landscaping	18 days	Fri 3/29/13	Tue 4/23/13													
29		Pavers	20 days	Fri 3/29/13	Thu 4/25/13													
30		Site Stone Masonry	15 days	Wed 4/24/13	Tue 5/14/13													
31		Site Lighting Finishes	10 days	Fri 4/26/13	Thu 5/9/13													
32		Asphalt Paving	5 days	Fri 4/26/13	Thu 5/2/13													
33		<b>Building Structure</b>	<b>89 days</b>	<b>Mon 7/2/12</b>	<b>Fri 11/2/12</b>													
34		Caissons	25 days	Mon 7/2/12	Fri 8/3/12													
35		Footings and Grade Beams	15 days	Thu 7/26/12	Wed 8/15/12													
36		Tower Crane Foundation	5 days	Thu 8/2/12	Wed 8/8/12													
37		Foundation Walls and 1st Floor Columns	15 days	Thu 8/9/12	Wed 8/29/12													
38		Install Tower Crane	3 days	Thu 8/9/12	Mon 8/13/12													
39		2nd Floor Slab and Columns	15 days	Thu 8/16/12	Wed 9/5/12													
40		3rd Floor Slab and Columns	15 days	Thu 8/23/12	Wed 9/12/12													
41		4th Floor Slab and Columns	15 days	Thu 8/30/12	Wed 9/19/12													
42		5th Floor Slab and Columns	15 days	Fri 9/7/12	Thu 9/27/12													
43		6th Floor Slab and Columns	15 days	Fri 9/14/12	Thu 10/4/12													
44		7th Floor Slab and Columns	10 days	Fri 9/21/12	Thu 10/4/12													
45		8th Floor Slab and Columns	10 days	Tue 10/2/12	Mon 10/15/12													
46		Roof Slab	8 days	Mon 10/15/12	Wed 10/24/12													
47		Penthouse	7 days	Wed 10/24/12	Thu 11/1/12													
48		Structure Complete	0 days	Fri 11/2/12	Fri 11/2/12													
49		<b>Enclosure</b>	<b>93 days</b>	<b>Thu 9/6/12</b>	<b>Wed 1/16/13</b>													
50		South Elevation 2nd Floor Precast Panels	5 days	Thu 9/6/12	Wed 9/12/12													
51		Precast 1st Floor	5 days	Fri 10/5/12	Thu 10/11/12													
52		Precast 2nd Floor	5 days	Fri 10/12/12	Thu 10/18/12													
53		Precast 3rd Floor	5 days	Fri 10/19/12	Thu 10/25/12													
54		Precast 4th Floor	5 days	Fri 10/26/12	Thu 11/1/12													

Project: Project Schedule Date: Thu 10/11/12	Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
	Split		External Tasks		Inactive Summary		Manual Summary		Critical	
	Milestone		External Milestone		Manual Task		Start-only		Critical Split	
	Summary		Inactive Task		Duration-only		Finish-only		Progress	



ID	Task Mode	Task Name	Duration	Start	Finish	3rd Quarter				1st Quarter				3rd Quarter		
						Mar	May	Jul	Sep	Nov	Jan	Mar	May	Jul	Sep	
55		Precast 5th Floor	5 days	Fri 11/2/12	Thu 11/8/12											
56		Precast 6th Floor	5 days	Fri 11/9/12	Thu 11/15/12											
57		Windows 1st Floor	5 days	Fri 11/9/12	Thu 11/15/12											
58		Precast 7th Floor	5 days	Fri 11/16/12	Thu 11/22/12											
59		Windows 2nd Floor	5 days	Fri 11/16/12	Thu 11/22/12											
60		Precast 8th Floor	5 days	Fri 11/23/12	Thu 11/29/12											
61		Windows 3rd Floor	5 days	Fri 11/23/12	Thu 11/29/12											
62		Precast Penthouse	5 days	Fri 11/30/12	Thu 12/6/12											
63		Windows 4th Floor	5 days	Fri 11/30/12	Thu 12/6/12											
64		Curtin Wall	15 days	Fri 11/30/12	Thu 12/20/12											
65		Lower Roof	8 days	Fri 11/30/12	Tue 12/11/12											
66		Windows 5th Floor	5 days	Fri 12/7/12	Thu 12/13/12											
67		Upper Roof	8 days	Fri 12/7/12	Tue 12/18/12											
68		Windows 6th Floor	5 days	Fri 12/14/12	Thu 12/20/12											
69		Windows 7th Floor	5 days	Fri 12/21/12	Fri 12/28/12											
70		Sunshade System	17 days	Fri 12/21/12	Wed 1/16/13											
71		Penthouse Roof	1 day	Mon 12/24/12	Mon 12/24/12											
72		Windows 8th Floor	6 days	Mon 12/31/12	Tue 1/8/13											
73		Building Envelope Complete	0 days	Mon 1/14/13	Mon 1/14/13											
74		<b>Rough- In</b>	<b>190 days</b>	<b>Thu 9/6/12</b>	<b>Fri 5/31/13</b>											
75		Interior Handrails for Stairs	30 days	Thu 9/6/12	Wed 10/17/12											
76		Frame 1st Floor Electric Rm Walls	3 days	Thu 9/20/12	Mon 9/24/12											
77		Layout and Install Track to Ceiling 1st Floor	5 days	Fri 9/28/12	Thu 10/4/12											
78		HVAC Pipe Rough-In 1st Floor	14 days	Wed 10/3/12	Mon 10/22/12											
79		Install VAVs/Fan Coils and Ducts 1st Floor	10 days	Fri 10/5/12	Thu 10/18/12											
80		Layout and Install Track to Ceiling 2nd Floor	7 days	Fri 10/5/12	Mon 10/15/12											
81		HVAC Pipe Rough-In 2nd Floor	12 days	Tue 10/16/12	Wed 10/31/12											
82		Layout and Install Track to Ceiling 3rd Floor	7 days	Tue 10/16/12	Wed 10/24/12											
83		1st Floor AHU	6 days	Fri 10/19/12	Fri 10/26/12											
84		Install VAVs/Fan Coils and Ducts 2nd Floor	7 days	Fri 10/19/12	Mon 10/29/12											

Project: Project Schedule Date: Thu 10/11/12	Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
	Split		External Tasks		Inactive Summary		Manual Summary		Critical	
	Milestone		External Milestone		Manual Task		Start-only		Critical Split	
	Summary		Inactive Task		Duration-only		Finish-only		Progress	

ID	Task Mode	Task Name	Duration	Start	Finish	3rd Quarter				1st Quarter			3rd Quarter		
						Mar	May	Jul	Sep	Nov	Jan	Mar	May	Jul	Sep
85		Frame 1st Floor Walls	7 days	Fri 10/19/12	Mon 10/29/12										
86		HVAC Pipe Rough-In 3rd Floor	12 days	Thu 10/25/12	Fri 11/9/12										
87		Layout and Install Track to Ceiling 4th Floor	7 days	Thu 10/25/12	Fri 11/2/12										
88		Install VAVs/Fan Coils and Ducts 3rd Floor	7 days	Tue 10/30/12	Wed 11/7/12										
89		Frame 2nd Floor Walls	7 days	Tue 10/30/12	Wed 11/7/12										
90		Install Electrical and FA conduit and Panels 1st Floor	7 days	Tue 10/30/12	Wed 11/7/12										
91		Fire Protection Rough-In 1st Floor	7 days	Tue 10/30/12	Wed 11/7/12										
92		Plumbing Rough-In 1st Floor	7 days	Tue 10/30/12	Wed 11/7/12										
93		Install ERU	12 days	Fri 11/2/12	Mon 11/19/12										
94		HVAC Pipe Rough-In Penthouse	16 days	Fri 11/2/12	Fri 11/23/12										
95		HVAC Pipe Rough-In 4th Floor	12 days	Mon 11/5/12	Tue 11/20/12										
96		Layout and Install Track to Ceiling 5th Floor	7 days	Mon 11/5/12	Tue 11/13/12										
97		Install VAVs/Fan Coils and Ducts 4th Floor	7 days	Thu 11/8/12	Fri 11/16/12										
98		Frame 3rd Floor Walls	7 days	Thu 11/8/12	Fri 11/16/12										
99		Install Electrical and FA conduit and Panels 2nd Floor	7 days	Thu 11/8/12	Fri 11/16/12										
100		Branch Circuit Rough-In 2nd Floor	7 days	Thu 11/8/12	Fri 11/16/12										
101		Fire Protection Rough-In 2nd Floor	7 days	Thu 11/8/12	Fri 11/16/12										
102		Plumbing Rough-In 2nd Floor	7 days	Thu 11/8/12	Fri 11/16/12										
103		Elevator Machine Equipment In Room	4 days	Tue 11/13/12	Fri 11/16/12										
104		HVAC Pipe Rough-In 5th Floor	12 days	Wed 11/14/12	Thu 11/29/12										

Project: Project Schedule Date: Thu 10/11/12	Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
	Split		External Tasks		Inactive Summary		Manual Summary		Critical	
	Milestone		External Milestone		Manual Task		Start-only		Critical Split	
	Summary		Inactive Task		Duration-only		Finish-only		Progress	

ID	Task Mode	Task Name	Duration	Start	Finish	3rd Quarter			1st Quarter			3rd Quarter		
						Mar	May	Jul	Sep	Nov	Jan	Mar	May	Jul
105		Layout and Install Track to Ceiling 6th Floor	7 days	Wed 11/14/12	Thu 11/22/12									
106		Install VAVs/Fan Coils and Ducts 5th Floor	7 days	Mon 11/19/12	Tue 11/27/12									
107		Frame 4th Floor Walls	7 days	Mon 11/19/12	Tue 11/27/12									
108		Install Electrical and FA conduit and Panels 3rd Floor	7 days	Mon 11/19/12	Tue 11/27/12									
109		Branch Circuit Rough-In 1st Floor	7 days	Mon 11/19/12	Tue 11/27/12									
110		Branch Circuit Rough-In 3rd Floor	7 days	Mon 11/19/12	Tue 11/27/12									
111		Fire Protection Rough-In 3rd Floor	7 days	Mon 11/19/12	Tue 11/27/12									
112		Plumbing Rough-In 3rd Floor	7 days	Mon 11/19/12	Tue 11/27/12									
113		Install Ductwork Penthouse	7 days	Tue 11/20/12	Wed 11/28/12									
114		HVAC Pipe Rough-In 6th Floor	12 days	Fri 11/23/12	Mon 12/10/12									
115		Layout and Install Track to Ceiling 7th Floor	7 days	Fri 11/23/12	Mon 12/3/12									
116		Set and Pipe Heat Exchangers	12 days	Mon 11/26/12	Tue 12/11/12									
117		Install VAVs/Fan Coils and Ducts 6th Floor	7 days	Wed 11/28/12	Thu 12/6/12									
118		Frame 5th Floor Walls	7 days	Wed 11/28/12	Thu 12/6/12									
119		Install Electrical and FA conduit and Panels 4th Floor	7 days	Wed 11/28/12	Thu 12/6/12									
120		Branch Circuit Rough-In 4th Floor	7 days	Wed 11/28/12	Thu 12/6/12									
121		Fire Protection Rough-In 4th Floor	7 days	Wed 11/28/12	Thu 12/6/12									
122		Plumbing Rough-In 4th Floor	7 days	Wed 11/28/12	Thu 12/6/12									
123		HVAC Pipe Rough-In 7th Floor	12 days	Tue 12/4/12	Wed 12/19/12									
124		Layout and Install Track to Ceiling 8th Floor	7 days	Tue 12/4/12	Wed 12/12/12									

Project: Project Schedule Date: Thu 10/11/12	Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
	Split		External Tasks		Inactive Summary		Manual Summary		Critical	
	Milestone		External Milestone		Manual Task		Start-only		Critical Split	
	Summary		Inactive Task		Duration-only		Finish-only		Progress	

ID	Task Mode	Task Name	Duration	Start	Finish	3rd Quarter			1st Quarter			3rd Quarter		
						Mar	May	Jul	Sep	Nov	Jan	Mar	May	Jul
125		Install VAVs/Fan Coils and Ducts 7th Floor	7 days	Fri 12/7/12	Mon 12/17/12									
126		Frame 6th Floor Walls	7 days	Fri 12/7/12	Mon 12/17/12									
127		Install Electrical and FA conduit and Panels 5th Floor	7 days	Fri 12/7/12	Mon 12/17/12									
128		Branch Circuit Rough-In 5th Floor	7 days	Fri 12/7/12	Mon 12/17/12									
129		Fire Protection Rough-In 5th Floor	5 days	Fri 12/7/12	Thu 12/13/12									
130		Plumbing Rough-In 5th Floor	7 days	Fri 12/7/12	Mon 12/17/12									
131		Set and Pipe Chilled Water Pumps	12 days	Wed 12/12/12	Fri 12/28/12									
132		Pipe Steam Station	12 days	Wed 12/12/12	Fri 12/28/12									
133		HVAC Pipe Rough-In 8th Floor	12 days	Thu 12/13/12	Mon 12/31/12									
134		Install VAVs/Fan Coils and Ducts 8th Floor	7 days	Tue 12/18/12	Thu 12/27/12									
135		Frame 7th Floor Walls	7 days	Tue 12/18/12	Thu 12/27/12									
136		Install Electrical and FA conduit and Panels 6th Floor	7 days	Tue 12/18/12	Thu 12/27/12									
137		Branch Circuit Rough-In 6th Floor	7 days	Tue 12/18/12	Thu 12/27/12									
138		Fire Protection Rough-In 6th Floor	7 days	Tue 12/18/12	Thu 12/27/12									
139		Plumbing Rough-In 6th Floor	7 days	Tue 12/18/12	Thu 12/27/12									
140		Frame and Drywall Elevator Shaft	9 days	Mon 12/24/12	Mon 1/7/13									
141		Set Electrical Equipment	7 days	Mon 12/24/12	Thu 1/3/13									
142		Frame 8th Floor Walls	7 days	Fri 12/28/12	Tue 1/8/13									
143		Install Electrical and FA conduit and Panels 7th Floor	7 days	Fri 12/28/12	Tue 1/8/13									
144		Branch Circuit Rough-In 7th Floor	7 days	Fri 12/28/12	Tue 1/8/13									
145		Fire Protection Rough-In 7th Floor	7 days	Fri 12/28/12	Tue 1/8/13									

Project: Project Schedule Date: Thu 10/11/12	Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
	Split		External Tasks		Inactive Summary		Manual Summary		Critical	
	Milestone		External Milestone		Manual Task		Start-only		Critical Split	
	Summary		Inactive Task		Duration-only		Finish-only		Progress	

ID	Task Mode	Task Name	Duration	Start	Finish	3rd Quarter			1st Quarter			3rd Quarter		
						Mar	May	Jul	Sep	Nov	Jan	Mar	May	Jul
146		Plumbing Rough-In 7th Floor	7 days	Fri 12/28/12	Tue 1/8/13									
147		Pipe Solar Panel System	7 days	Mon 12/31/12	Wed 1/9/13									
148		Conduit to Electrical Gear	5 days	Fri 1/4/13	Thu 1/10/13									
149		Construct Elevator 1	67 days	Tue 1/8/13	Wed 4/10/13									
150		Construct Elevator 2	67 days	Tue 1/8/13	Wed 4/10/13									
151		Install Electrical and FA conduit and Panels 8th Floor	7 days	Wed 1/9/13	Thu 1/17/13									
152		Branch Circuit Rough-In 8th Floor	7 days	Wed 1/9/13	Thu 1/17/13									
153		Fire Protection Rough-In 8th Floor	7 days	Wed 1/9/13	Thu 1/17/13									
154		Plumbing Rough-In 8th Floor	7 days	Wed 1/9/13	Thu 1/17/13									
155		Pull Electrical Feeders	6 days	Fri 1/11/13	Fri 1/18/13									
156		Fire Protection Rough-In Penthouse	5 days	Fri 1/18/13	Thu 1/24/13									
157		Frame Drywall Ceilings 8th Floor	7 days	Tue 1/22/13	Wed 1/30/13									
158		Install Fire Pump	5 days	Fri 1/25/13	Thu 1/31/13									
159		Above Ceiling Electrical Rough-In 8th Floor	7 days	Thu 1/31/13	Fri 2/8/13									
160		Frame Drywall Ceilings 7th Floor	7 days	Thu 2/7/13	Fri 2/15/13									
161		Above Ceiling Electrical Rough-In 7th Floor	7 days	Mon 2/18/13	Tue 2/26/13									
162		Frame Drywall Ceilings 6th Floor	7 days	Mon 2/25/13	Tue 3/5/13									
163		Above Ceiling Electrical Rough-In 6th Floor	7 days	Wed 3/6/13	Thu 3/14/13									
164		Frame Drywall Ceilings 5th Floor	7 days	Wed 3/13/13	Thu 3/21/13									
165		Above Ceiling Electrical Rough-In 5th Floor	7 days	Fri 3/22/13	Mon 4/1/13									

Project: Project Schedule Date: Thu 10/11/12	Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
	Split		External Tasks		Inactive Summary		Manual Summary		Critical	
	Milestone		External Milestone		Manual Task		Start-only		Critical Split	
	Summary		Inactive Task		Duration-only		Finish-only		Progress	

ID	Task Mode	Task Name	Duration	Start	Finish	3rd Quarter			1st Quarter			3rd Quarter		
						Mar	May	Jul	Sep	Nov	Jan	Mar	May	Jul
166		Frame Drywall Ceilings 4th Floor	7 days	Fri 3/29/13	Mon 4/8/13									
167		Set Gas Meter	3 days	Mon 4/1/13	Wed 4/3/13									
168		Above Ceiling Electrical Rough-In 4th Floor	7 days	Tue 4/9/13	Wed 4/17/13									
169		Frame Drywall Ceilings 3rd Floor	7 days	Tue 4/16/13	Wed 4/24/13									
170		Above Ceiling Electrical Rough-In 3rd Floor	7 days	Thu 4/25/13	Fri 5/3/13									
171		Frame Drywall Ceilings 2nd Floor	7 days	Tue 4/30/13	Wed 5/8/13									
172		Elevator Pit Ladders	4 days	Wed 5/1/13	Mon 5/6/13									
173		Above Ceiling Electrical Rough-In 2nd Floor	7 days	Thu 5/9/13	Fri 5/17/13									
174		Frame Drywall Ceilings 1st Floor	7 days	Mon 5/20/13	Tue 5/28/13									
175		Above Ceiling Electrical Rough-In 1st Floor	3 days	Wed 5/29/13	Fri 5/31/13									
176		Building Fit Out Complete	0 days	Fri 5/31/13	Fri 5/31/13									
177		<b>Finishes</b>	<b>165 days</b>	<b>Wed 12/19/12</b>	<b>Fri 8/9/13</b>									
178		Set Solar Panels on Roof With Crane	7 days	Wed 12/19/12	Fri 12/28/12									
179		Hang and Finish Drywall First Floor Electrical Room	6 days	Mon 12/24/12	Wed 1/2/13									
180		Hang and Finish Drywall Penthouse	5 days	Wed 12/26/12	Wed 1/2/13									
181		Paint Penthouse	6 days	Thu 1/3/13	Thu 1/10/13									
182		Door Frame and Temp. Door/Hardware Electrical Room	3 days	Thu 1/3/13	Mon 1/7/13									
183		Door , Frame and Hardware Penthouse	3 days	Fri 1/11/13	Tue 1/15/13									
184		Hang and Finish Drywall Walls 8th Floor	12 days	Fri 1/18/13	Mon 2/4/13									

Project: Project Schedule Date: Thu 10/11/12	Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
	Split		External Tasks		Inactive Summary		Manual Summary		Critical	
	Milestone		External Milestone		Manual Task		Start-only		Critical Split	
	Summary		Inactive Task		Duration-only		Finish-only		Progress	

ID	Task Mode	Task Name	Duration	Start	Finish	3rd Quarter			1st Quarter			3rd Quarter		
						Mar	May	Jul	Sep	Nov	Jan	Mar	May	Jul
185		Electrical Gear Testing and Energized	6 days	Mon 1/21/13	Mon 1/28/13									
186		Hang and Finish Drywall Walls 7th Floor	12 days	Tue 2/5/13	Wed 2/20/13									
187		Hang and Finish Drywall Ceilings 8th Floor	7 days	Mon 2/11/13	Tue 2/19/13									
188		ACT Ceilings and Lighting 8th Floor	5 days	Wed 2/20/13	Tue 2/26/13									
189		Spray Textured Ceilings 8th Floor	5 days	Wed 2/20/13	Tue 2/26/13									
190		Paint 8th Floor	6 days	Wed 2/20/13	Wed 2/27/13									
191		Hang and Finish Drywall Walls 6th Floor	12 days	Thu 2/21/13	Fri 3/8/13									
192		ACT Ceilings and Lighting 7th Floor	6 days	Thu 2/21/13	Thu 2/28/13									
193		Hang and Finish Drywall Ceilings 7th Floor	7 days	Wed 2/27/13	Thu 3/7/13									
194		Vanities and Millwork 8th Floor	6 days	Thu 2/28/13	Thu 3/7/13									
195		Door, Frame and Hardware 8th Floor	7 days	Thu 2/28/13	Fri 3/8/13									
196		Electrical Finishes 8th Floor	7 days	Thu 2/28/13	Fri 3/8/13									
197		Spray Textured Ceilings 7th Floor	5 days	Tue 3/5/13	Mon 3/11/13									
198		Paint 7th Floor	6 days	Fri 3/8/13	Fri 3/15/13									
199		Flooring 8th Floor	3 days	Fri 3/8/13	Tue 3/12/13									
200		Hang and Finish Drywall Walls 5th Floor	12 days	Mon 3/11/13	Tue 3/26/13									
201		ACT Ceilings and Lighting 6th Floor	5 days	Mon 3/11/13	Fri 3/15/13									
202		Install Appliances 8th Floor	4 days	Wed 3/13/13	Mon 3/18/13									
203		Plumbing Finishes 8th Floor	5 days	Wed 3/13/13	Tue 3/19/13									
204		Hang and Finish Drywall Ceilings 6th Floor	7 days	Fri 3/15/13	Mon 3/25/13									

Project: Project Schedule Date: Thu 10/11/12	Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
	Split		External Tasks		Inactive Summary		Manual Summary		Critical	
	Milestone		External Milestone		Manual Task		Start-only		Critical Split	
	Summary		Inactive Task		Duration-only		Finish-only		Progress	

ID	Task Mode	Task Name	Duration	Start	Finish	3rd Quarter			1st Quarter			3rd Quarter		
						Mar	May	Jul	Sep	Nov	Jan	Mar	May	Jul
205		Vanities and Millwork 7th Floor	6 days	Mon 3/18/13	Mon 3/25/13									
206		Door, Frame and Hardware 7th Floor	7 days	Mon 3/18/13	Tue 3/26/13									
207		Electrical Finishes 7th Floor	7 days	Mon 3/18/13	Tue 3/26/13									
208		Spray Textured Ceiling 6th Floor	5 days	Tue 3/26/13	Mon 4/1/13									
209		Paint 6th Floor	6 days	Tue 3/26/13	Tue 4/2/13									
210		Flooring 7th Floor	3 days	Tue 3/26/13	Thu 3/28/13									
211		Hang and Finish Drywall Walls 4th Floor	12 days	Wed 3/27/13	Thu 4/11/13									
212		Install Appliances 7th Floor	4 days	Fri 3/29/13	Wed 4/3/13									
213		Plumbing Finishes 7th Floor	5 days	Fri 3/29/13	Thu 4/4/13									
214		Hang and Finish Drywall Ceilings 5th Floor	7 days	Tue 4/2/13	Wed 4/10/13									
215		Vanities and Millwork 6th Floor	6 days	Wed 4/3/13	Wed 4/10/13									
216		Door, Frame and Hardware 6th Floor	6 days	Wed 4/3/13	Wed 4/10/13									
217		Electrical Finishes 6th Floor	7 days	Wed 4/3/13	Thu 4/11/13									
218		ACT Ceilings and Lighting 5th Floor	5 days	Thu 4/11/13	Wed 4/17/13									
219		Spray Textured Ceiling 5th Floor	5 days	Thu 4/11/13	Wed 4/17/13									
220		Paint 5th Floor	7 days	Thu 4/11/13	Fri 4/19/13									
221		Flooring 6th Floor	3 days	Thu 4/11/13	Mon 4/15/13									
222		Hang and Finish Drywall Walls 3rd Floor	12 days	Fri 4/12/13	Mon 4/29/13									
223		Install Appliances 6th Floor	5 days	Tue 4/16/13	Mon 4/22/13									
224		Plumbing Finishes 6th Floor	5 days	Tue 4/16/13	Mon 4/22/13									
225		Hang and Finish Drywall Ceilings 4th Floor	7 days	Thu 4/18/13	Fri 4/26/13									

Project: Project Schedule Date: Thu 10/11/12	Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
	Split		External Tasks		Inactive Summary		Manual Summary		Critical	
	Milestone		External Milestone		Manual Task		Start-only		Critical Split	
	Summary		Inactive Task		Duration-only		Finish-only		Progress	



ID	Task Mode	Task Name	Duration	Start	Finish	3rd Quarter				1st Quarter			3rd Quarter			
						Mar	May	Jul	Sep	Nov	Jan	Mar	May	Jul	Sep	
226		Vanities and Millwork 5th Floor	6 days	Thu 4/18/13	Thu 4/25/13											
227		Door, Frame and Hardware 5th Floor	7 days	Fri 4/19/13	Mon 4/29/13											
228		Electrical Finishes 5th Floor	7 days	Fri 4/19/13	Mon 4/29/13											
229		ACT Ceilings and Lighting 4th Floor	5 days	Mon 4/29/13	Fri 5/3/13											
230		Spray Textured Ceilings 4th Floor	5 days	Mon 4/29/13	Fri 5/3/13											
231		Paint 4th Floor	6 days	Mon 4/29/13	Mon 5/6/13											
232		Flooring 5th Floor	3 days	Mon 4/29/13	Wed 5/1/13											
233		Plumbing Finishes 5th Floor	6 days	Mon 4/29/13	Mon 5/6/13											
234		Hang and Finish Drywall Walls 2nd Floor	12 days	Tue 4/30/13	Wed 5/15/13											
235		Install Appliances 5th Floor	4 days	Thu 5/2/13	Tue 5/7/13											
236		Hand and Finish Drywall Ceilings 3rd Floor	7 days	Mon 5/6/13	Tue 5/14/13											
237		Vanities and Millwork 4th Floor	6 days	Tue 5/7/13	Tue 5/14/13											
238		Door, Frame and Hardware 4th Floor	7 days	Tue 5/7/13	Wed 5/15/13											
239		Electrical Finishes 4th Floor	7 days	Tue 5/7/13	Wed 5/15/13											
240		ACT Ceilings and Lighting 3rd Floor	5 days	Wed 5/15/13	Tue 5/21/13											
241		Spray Textured Ceiling 3rd Floor	5 days	Wed 5/15/13	Tue 5/21/13											
242		Paint 3rd Floor	6 days	Wed 5/15/13	Wed 5/22/13											
243		Flooring 4th Floor	3 days	Wed 5/15/13	Fri 5/17/13											
244		Hang and Finish Drywall Walls 1st Floor	12 days	Thu 5/16/13	Fri 5/31/13											
245		Hang and Finish Drywall Ceilings 2nd Floor	7 days	Mon 5/20/13	Tue 5/28/13											
246		Install Appliances 4th Floor	4 days	Mon 5/20/13	Thu 5/23/13											

Project: Project Schedule Date: Thu 10/11/12	Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
	Split		External Tasks		Inactive Summary		Manual Summary		Critical	
	Milestone		External Milestone		Manual Task		Start-only		Critical Split	
	Summary		Inactive Task		Duration-only		Finish-only		Progress	

ID	Task Mode	Task Name	Duration	Start	Finish	3rd Quarter				1st Quarter			3rd Quarter		
						Mar	May	Jul	Sep	Nov	Jan	Mar	May	Jul	Sep
247		Plumbing Finishes 4th Floor	5 days	Mon 5/20/13	Fri 5/24/13										
248		Vanities and Millwork 3rd Floor	6 days	Thu 5/23/13	Thu 5/30/13										
249		Door, Frame and Hardware 3rd Floor	7 days	Thu 5/23/13	Fri 5/31/13										
250		Electrical Finishes 3rd Floor	7 days	Thu 5/23/13	Fri 5/31/13										
251		ACT Ceilings and Lighting 2nd Floor	5 days	Wed 5/29/13	Tue 6/4/13										
252		Spray Textured Ceilings 1st Floor	5 days	Wed 5/29/13	Tue 6/4/13										
253		Paint 2nd Floor	6 days	Wed 5/29/13	Wed 6/5/13										
254		Hang and Finish Drywall Ceilings 1st Floor	7 days	Mon 6/3/13	Tue 6/11/13										
255		Paint 1st Floor	8 days	Mon 6/3/13	Wed 6/12/13										
256		Flooring 3rd Floor	3 days	Mon 6/3/13	Wed 6/5/13										
257		Vanities and Millwork 2nd Floor	7 days	Thu 6/6/13	Fri 6/14/13										
258		Door, Frame and Hardware 2nd Floor	9 days	Thu 6/6/13	Tue 6/18/13										
259		Install Appliances 3rd Floor	4 days	Thu 6/6/13	Tue 6/11/13										
260		Plumbing Finishes 3rd Floor	5 days	Thu 6/6/13	Wed 6/12/13										
261		Electrical Finishes 2nd Floor	9 days	Thu 6/6/13	Tue 6/18/13										
262		ACT Ceilings and Lighting 1st Floor	7 days	Wed 6/12/13	Thu 6/20/13										
263		Vanities and Millwork 1st Floor	4 days	Thu 6/13/13	Tue 6/18/13										
264		Door, Frame and Hardware 1st Floor	7 days	Thu 6/13/13	Fri 6/21/13										
265		Electrical Finishes 1st Floor	7 days	Thu 6/13/13	Fri 6/21/13										
266		Mail Box	5 days	Thu 6/13/13	Wed 6/19/13										
267		Flooring 2nd Floor	4 days	Mon 6/17/13	Thu 6/20/13										
268		Flooring 1st Floor	3 days	Wed 6/19/13	Fri 6/21/13										
269		Install Appliances 2nd Floor	4 days	Fri 6/21/13	Wed 6/26/13										

Project: Project Schedule Date: Thu 10/11/12	Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
	Split		External Tasks		Inactive Summary		Manual Summary		Critical	
	Milestone		External Milestone		Manual Task		Start-only		Critical Split	
	Summary		Inactive Task		Duration-only		Finish-only		Progress	

ID	Task Mode	Task Name	Duration	Start	Finish	3rd Quarter			1st Quarter			3rd Quarter		
						Mar	May	Jul	Sep	Nov	Jan	Mar	May	Jul
270		Plumbing Finishes 2nd Floor	5 days	Fri 6/21/13	Thu 6/27/13									
271		Plumbing Finishes 1st Floor	5 days	Mon 6/24/13	Fri 6/28/13									
272		Substantial Completion	0 days	Fri 6/28/13	Fri 6/28/13									6/28
273		Commissioning and Start Up	18 days	Mon 7/1/13	Thu 7/25/13									
274		Punchlist	10 days	Fri 7/26/13	Thu 8/8/13									
275		Demobilization	1 day	Fri 8/9/13	Fri 8/9/13									
276		Final Completion	0 days	Fri 8/9/13	Fri 8/9/13									8/9

Project: Project Schedule Date: Thu 10/11/12	Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
	Split		External Tasks		Inactive Summary		Manual Summary		Critical	
	Milestone		External Milestone		Manual Task		Start-only		Critical Split	
	Summary		Inactive Task		Duration-only		Finish-only		Progress	

# **Appendix B: Detailed Structural System Estimate**

<b>Structural Systems Summary</b>		
<b>Floor</b>	<b>Area (SF)</b>	<b>Estimated Cost</b>
Foundation		\$ 366,157.58
One	19400	\$ 543,937.21
Two	15400	\$ 431,785.21
Three*	15400	\$ 886,114.99
Four*	15400	\$ 886,114.99
Five*	15400	\$ 886,114.99
Six*	15400	\$ 886,114.99
Seven*	15400	\$ 886,114.99
Eight*	8800	\$ 506,351.42
<b>Total</b>		<b>\$6,278,806.38</b>

<b>Cost Comparison</b>	
RS Means Estimate	\$6,278,806.38
Actual Cost	\$4,514,100.00
Difference	\$1,764,706.38
	28.11%

North Hall Foundation System Estimate							
Description	Quantity	Unit	Material	Labor	Equipment	Unit Price Total	Total
Fixed end caisson piles, open style in stable ground, to 50' deep, 30" diameter, 0.182 C.Y./L.F., machine drilled, includes excavation, concrete, 50 lb. reinforcing/C.Y., excludes mobilization, boulder removal, disposal, no casings or ground water	671	V.L.F.	\$ 22.54	\$ 7.96	\$ 16.77	\$ 56.88	\$ 38,166.48
Fixed end caisson piles, open style in stable ground, to 50' deep, 36" diameter, 0.262 C.Y./L.F., machine drilled, includes excavation, concrete, 50 lb. reinforcing/C.Y., excludes mobilization, boulder removal, disposal, casings or ground water	723	V.L.F.	\$ 32.34	\$ 9.60	\$ 20.18	\$ 74.05	\$ 53,538.15
Fixed end caisson piles, open style in stable ground, to 50' deep, 48" diameter, 0.465 C.Y./L.F., machine drilled, includes excavation, concrete, 50 lb. reinforcing/C.Y., excludes mobilization, boulder removal, disposal, casings or ground water	1360	V.L.F.	\$ 57.82	\$ 12.00	\$ 25.28	\$ 111.20	\$ 151,232.00
Structural concrete, ready mix, normal weight, 3000 psi, includes local aggregate, sand, Portland cement and water, delivered, excludes all additives and treatments	685	C.Y.	\$132.40	\$ -	\$ -	\$ 145.38	\$ 99,585.30
Reinforcing Steel, in place, footings, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	2.51	Ton	\$916.05	\$502.32	\$ -	\$ 1,884.21	\$ 4,729.37
Reinforcing Steel, in place, footings, #8 to #18, A615, grade 60, incl labor for accessories, excl material for accessories	12.89	Ton	\$866.80	\$296.01	\$ -	\$ 1,466.74	\$ 18,906.28
<b>Total</b>							<b>\$366,157.58</b>

North Hall Structural System Estimate (Typical Floor)							
Description	Quantity	Unit	Material	Labor	Equipment	Unit Price Total	Total
<b>Floor Slab</b>							
Prestressed concrete, post-tensioned in place, large job	318	C.Y.	\$ 904.80	\$321.95	\$ 41.28	\$ 1,584.47	\$ 503,861.46
C.I.P. concrete forms, wood, exterior plyform, buy, 3/4", includes material only	14710	S.F.	\$ 0.96	\$ -	\$ -	\$ 1.06	\$ 15,592.60
Reinforcing Steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	6.06	Ton	\$1,034.25	\$363.29	\$ -	\$ 1,765.14	\$ 10,696.75
Structural concrete, placing, elevated slab, pumped, 6" to 10" thick, includes strike off & consolidation, excludes material	318	C.Y.	\$ -	\$ 10.49	\$ 4.97	\$ 22.93	\$ 7,291.74
Concrete finishing, floors, for specified Random Access Floors in ACI Classes 1, 2, 3 and 4, to achieve a Composite Overall Floor Flatness & Levelness value up to F35/F25, power screed, bull float, machine float & steel trowel (ride-on), excludes placing,	14710	S.F.	\$ -	\$ 0.17	\$ 0.06	\$ 0.34	\$ 5,001.40
<b>Columns</b>							
C.I.P. concrete forms, column, square, plywood, 24" x 24", 2 use, includes erecting, bracing, stripping and cleaning	36750	SFCA	\$ 1.37	\$ 3.66	\$ -	\$ 7.63	\$ 280,402.50
Structural concrete, placing, column, square or round, with crane and bucket, 18" thick, includes strike off & consolidation, excludes material	44	C.Y.	\$ -	\$ 34.65	\$ 22.19	\$ 81.85	\$ 3,601.40
Reinforcing Steel, in place, columns, alternate method, #8 to #18, A615, grade 60, incl labor for accessories, excl material for accessories	1263	Lb.	\$ 0.50	\$ 0.23	\$ -	\$ 0.95	\$ 1,199.85
Structural concrete, ready mix, normal weight, high early, 6000 PSI, includes local aggregate, sand, Portland cement and water, delivered, excludes all additives and	44	C.Y.	\$ 167.44	\$ -	\$ -	\$ 184.32	\$ 8,110.08
<b>Beams</b>							
C.I.P. concrete forms, beams and girders, interior, plywood, 12" wide, 2 use, includes shoring, erecting, bracing, stripping and cleaning	6120	SFCA	\$ 1.42	\$ 3.51	\$ -	\$ 7.45	\$ 45,594.00
Structural concrete, ready mix, normal weight, 6000 PSI, includes local aggregate, sand, Portland cement and water, delivered, excludes all additives and treatments	10	C.Y.	\$ 160.95	\$ -	\$ -	\$ 176.53	\$ 1,765.30
Structural concrete, placing, beam, small, elevated, with crane and bucket, includes strike off & consolidation, excludes material	10	C.Y.	\$ -	\$ 42.30	\$ 26.83	\$ 100.58	\$ 1,005.80
Reinforcing Steel, in place, beams and girders, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	0.714	Ton	\$ 965.30	\$659.30	\$ -	\$ 2,202.56	\$ 1,572.63
Reinforcing Steel, in place, beams and girders, #8 to #18, A615, grade 60, incl labor for accessories, excl material for accessories	0.241	Ton	\$ 965.30	\$390.20	\$ -	\$ 1,740.60	\$ 419.48
<b>Total</b>							<b>\$886,114.99</b>

## Take Off's

Concrete	Floor Slab	Area (SF)	Thickness (in)	Volume (CY)
		14710	7	318
	Columns (9.33' Floor to Floor)	Area (SF)	# of Columns	Volume (CY)
		2.72	50	44
	Beams	Area (SF)	LF	Volume (CY)
	TBM-1	1.33	8.5	0.42
	TBM-1	1.33	9.5	0.47
	TBM-1	1.33	9.5	0.47
	TBM-1	1.33	17.5	0.86
	TBM-1	1.33	8.5	0.42
	TBM-1	1.33	9.5	0.47
	TBM-1	1.33	9	0.44
	TBM-2	2.5	19.5	1.81
	TBM-2	2.5	18	1.67
TBM-2	2.5	22	2.04	

Formwork	Floor Slab		Area (SF)	
			14710	
	Columns	Slab to Slab Hgt. (FT)	Dimensions	Total SFCA
	50	8.75	28" x 14"	36750
	Beams	Dimensions	Total LF	SFCA
	TBM-1 (7X)	8" x 24"	72	3240
TBM-2 (3X)	12" x 30"	59.5	2880	



Reinforcing	Floor Slab					
	Area (SF)	Bar Size	Total LF	Wgt per LF	Tons	
	380	#5	300	1.043	0.16	
	14710**	#5	116134	1.043	6.06	
	** Values for 14710 SF are extrapolated					
	Columns					
	# of Columns	Column Hgt.	Bar Size	Total LF	Wgt per LF	Tons
	50	9.33	#8	473	2.67	0.631455
	Beams					
	Beam Name	Bar Size	Total LF	Wgt per LF	Tons	
	TBM-1	#4	461	0.668	0.15	
		#6	144	1.502	0.11	
		#7	144	2.044	0.15	
	TBM-2	#4	504	0.668	0.17	
		#6	180	1.502	0.14	
	#8	180	2.67	0.24		

Grade Beam Take Off				
Grade Beam Name	Total Length (LF)	Volume (CY)	Reinforcing #8 (LF)	Stirups #4 (LF)
GB1	32	32	505	384
GB2	64	64	1158	768
GB3	20	20	340	240
GB4	20	20	340	240
GB5	32	32	505	384
GB6	10	10	170	120
GB7	24	24	405	288
GB8	8	8	127	96
GB9	18	18	285	216
GB10	20	20	340	240
GB11	34	34	538	408
GB12	42	42	714	504
GB13	53	53	838	636
GB14	56	56	1008	672
GB15	36	36	684	432
GB16	36	36	684	432
GB17	64	64	1012	768
Cont Ftg.	174	116	0	696
<b>Total</b>		<b>685</b>	<b>9653</b>	<b>7524</b>
<b>Tonnage</b>			<b>12.886755</b>	<b>2.51302</b>

Caisson Take Off		
Caisson #	Caisson Size	Depth Drilled
1	30"	68.2
2	30"	42.03
3	36"	54.2
4	36"	47.6
5	36"	32.5
6	36"	23.1
7	36"	26.3
8	42"	47.6
9	42"	53
10	42"	25.6
11	42"	37.3
12	42"	47.7
13	42"	37
14	42"	35.8
15	42"	35
16	36"	33
17	42"	44.6
18	42"	35
19	42"	44
20	42"	45
21	42"	45.75
22	30"	35
23	42"	32.75
24	48"	43.5
25	48"	57.5
26	42"	72.5
27	42"	35
28	36"	41
29	30"	21
30	36"	35
31	48"	40.8
32	30"	50.5
33	42"	35

34	48"	30
35	48"	32
36	48"	44.5
37	42"	52
38	48"	38
39	36"	29.25
40	36"	36.5
41	30"	33
42	42"	38.3
43	42"	38.3
44	48"	32.5
45	42"	33.58
46	42"	34.67
47	42"	45
48	42"	51.5
49	42"	40
50	36"	39
51	36"	51
52	36"	63.5
53	36"	49
54	36"	25
55	30"	18.5
56	30"	39.25
57	30"	32.75
58	30"	19.3
59	30"	37
60	30"	37
61	30"	32.75
62	30"	24
63	30"	26.5
64	30"	54.5
65	30"	46
66	30"	53.25
67	36"	33
68	36"	38
69	36"	30
70	36"	35.5

## Appendix C: General Conditions Estimate

North Hall General Conditions Estimate							
Description	Quantity	Unit	Material	Labor	Equipmen	Unit Price Total	Total
Project Manager	70	Week	\$ -	\$2,425.00	\$ -	\$ 2,425.00	\$ 262,500.00
Superintendent	70	Week	\$ -	\$1,975.00	\$ -	\$ 1,975.00	\$ 213,500.00
Senior Superidentent	70	Week	\$ -	\$2,250.00	\$ -	\$ 2,250.00	\$ 243,250.00
Project Engineer	70	Week	\$ -	\$1,975.00	\$ -	\$ 1,975.00	\$ 213,500.00
Jr. Project Engineer (Intern)	11	Week	\$ -	\$1,680.00	\$ -	\$ 1,680.00	\$ 30,448.00
Office Trailer, furnished, buy, 20' x 8', excl. hookups	1	Ea.	\$ 8,755.20	\$ 672.80	\$ -	\$ 9,428.00	\$ 10,669.60
Standard Porta Potty Restroom	100	Month	\$ 110.00	\$ -	\$ -	\$ 110.00	\$ 13,000.00
Project signs, sign, high intensity reflectorized, buy, excl. posts	100	S.F.	\$ 34.82	\$ -	\$ -	\$ 34.82	\$ 3,840.00
Temporary electrical power equipment (pro-rated per job), underground feed, 3 uses, 200 amp	1	Ea.	\$ 880.64	\$ 334.08	\$ -	\$ 1,214.72	\$ 1,464.16
Cleaning up, cleanup of floor area, continuous, per day, during construction	122.2	M.S.F.	\$ 1.79	\$ 24.59	\$ 2.27	\$ 28.65	\$ 5,139.73
Cleaning up, cleanup of floor area, final by GC at end of job	122.2	M.S.F.	\$ 2.85	\$ 51.04	\$ 4.74	\$ 58.63	\$ 10,544.64
Temporary Fencing, chain link, rented up to 12 months, 6' high, 11 ga, over 1000'	1290	L.F.	\$ 3.37	\$ 1.74	\$ -	\$ 5.11	\$ 8,230.20
Field Office Expense, office equipment rental, average	16	Month	\$ 204.80	\$ -	\$ -	\$ 204.80	\$ 3,604.48
Field Office Expense, office supplies, average	16	Month	\$ 76.80	\$ -	\$ -	\$ 76.80	\$ 1,351.68
Field Office Expense, field office lights & HVAC	16	Month	\$ 155.65	\$ -	\$ -	\$ 155.65	\$ 2,736.16
Office Trailer, furnished, buy, 50' x 10', excl. hookups	1	Ea.	\$22,835.20	\$1,113.60	\$ -	\$ 23,948.80	\$ 26,930.40
Selective demolition, rubbish handling, dumpster, 10 C.Y., 3 ton capacity, weekly rental, includes one dump per week, cost to be added to demolition cost.	60	Week	\$ 535.00	\$ -	\$ -	\$ 535.00	\$ 35,400.00
Green Building Certification, USGBC Fees for commercial, schools, core & shell construction, project registration fees	1	Project	\$ -	\$ -	\$ -	\$ -	\$ 883.80
Green Building Certification, GBC certification Fees - new construction, design and construction review, 50,000 to 500,000 SF	122200	S.F.	\$ -	\$ -	\$ -	\$ -	\$ 6,110.00
<b>Total</b>							<b>\$ 1,093,102.85</b>

## Appendix D: BIM Execution Planning

**BIM PROJECT EXECUTION PLAN**  
**VERSION 2.0**  
FOR  
[North Hall – American University]  
DEVELOPED BY  
[Brandon Tezak]  
[Grunley Construction Company]

This template is a tool that is provided to assist in the development of a BIM project execution plan as required per contract. The template plan was created from the buildingSMART alliance™ (bSa) Project “BIM Project Execution Planning” as developed by The Computer Integrated Construction (CIC) Research Group of The Pennsylvania State University. The bSa project is sponsored by The Charles Pankow Foundation (<http://www.pankowfoundation.org>), Construction Industry Institute (CII) (<http://www.construction-institute.org>), Penn State Office of Physical Plant (OPP) (<http://www.opp.psu.edu>), and The Partnership for Achieving Construction Excellence (PACE) (<http://www.engr.psu.edu/pace>). The BIM Project Execution Planning Guide can be downloaded at <http://www.engr.psu.edu/BIM/PxP>.

This work is licensed under the Creative Commons Attribution-Share Alike 3.0 United States License. To view a copy of this license, visit <http://creativecommons.org/licenses/by-sa/3.0/us/> or send a letter to Creative Commons, 171 Second Street, Suite 300, San Francisco, California, 94105, USA



## SECTION A: BIM PROJECT EXECUTION PLAN OVERVIEW

To successfully implement Building Information Modeling (BIM) on a project, the project team has developed this detailed BIM Project Execution Plan. The BIM Project Execution Plan defines uses for BIM on the project (e.g. design authoring, cost estimating, and design coordination), along with a detailed design of the process for executing BIM throughout the project lifecycle.

## SECTION B: PROJECT INFORMATION

1. **PROJECT OWNER: AMERICAN UNIVERSITY**
2. **PROJECT NAME: NORTH HALL**
3. **PROJECT LOCATION AND ADDRESS: 4400 MASS. AVE. NW, WASHINGTON, D.C.**
4. **CONTRACT TYPE / DELIVERY METHOD: GUARANTEED MAXIMUM PRICE**
5. **BRIEF PROJECT DESCRIPTION:** AMERICAN UNIVERSITY STARTED EXPANDING THEIR MAIN CAMPUS IN DOWNTOWN WASHINGTON D.C. AFTER THEIR 2011 CAMPUS PLAN WAS APPROVED BY THE LOCAL ZONING BOARD. THE FIRST STEP OF AMERICAN'S PLAN IS THE CONSTRUCTION OF A NEW 122,200 SQUARE FOOT, 8 STORY SUITE STYLE DORMITORY BUILDING, NORTH HALL. THE NEW DORM WILL BE LOCATED IN THE NORTHERN PART OF AMERICAN'S CAMPUS. NORTH HALL WILL BE READY FOR STUDENTS TO OCCUPY THE ROOMS FOR THE FALL 2013 SEMESTER.
6. **ADDITIONAL PROJECT INFORMATION:** THE BIM EXECUTION PROCESS FOR THIS PROJECT DETAILS THE STRENGTHS AND WEAKNESSES OF BIM IMPLEMENTATION IN THE VARYING STAGES OF NORTH HALL.
7. **PROJECT NUMBERS:**

PROJECT INFORMATION	NUMBER
Project Number:	G12.268

8. **PROJECT SCHEDULE / PHASES / MILESTONES:**

PROJECT PHASE / MILESTONE	ESTIMATED START DATE	ESTIMATED COMPLETION DATE	PROJECT STAKEHOLDERS INVOLVED
PRELIMINARY PLANNING	March 2011	May 2011	Owner, Architect, GC
DESIGN DOCUMENTS	May 2011	March 2012	Owner, Architect, GC
CONSTRUCTION DOCUMENTS	May 2012	Ongoing	Owner, Architect, GC, Subcontractors
CONSTRUCTION	May 15, 2012	August 9, 2013	Owner, Architect, GC, Subcontractors
OCCUPANCY	August 9, 2013	Ongoing	Owner, Occupants



**SECTION C: KEY PROJECT CONTACTS**

ROLE	ORGANIZATION	CONTACT NAME
Owner	American University	Tony Esse
Project Manager	Grunley Construction	Greg McHugh
BIM Manager	Grunley Construction	Jon Skippers
Architect	Little Diversified	Richard Naab
Structural Concrete Subcontractor	Miller and Long DC	Chris Grant
Mechanical/ Plumbing Subcontractor	JCM	Tom Tran
Electrical Subcontractor	PerLectric	Tom Forman
Precast Subcontractor	Gate Precast	Tim Shaver

**SECTION D: PROJECT GOALS / BIM USES**

**1. MAJOR BIM GOALS / OBJECTIVES:**

State Major BIM Goals and Objectives

PRIORITY (HIGH/ MED/ LOW)	GOAL DESCRIPTION	POTENTIAL BIM USES
3	Reduce Field Conflicts	3D Coordination, Subcontractor Design Review
3	Reduce Site Logistics Issues	Site Utilization Planning
2	Operation and Maintenance	Record Model, Maintenance Scheduling,
2	Sustainability	LEED Documentation

**2. BIM USE ANALYSIS WORKSHEET: SEE PAGE 41**

**BIM USE ANALYSIS**  
**Version 2.0**

BIM Use*	Value to Project	Responsible Party	Value to Resp Party	Capability Rating			Additional Resources / Competencies Required to Implement	Notes	Proceed with Use
				Scale 1-3 (1 = Low)	Resources	Competency			
	High / Med / Low		High / Med / Low						YES / NO / MAYBE
Maintenance Scheduling	LOW	American	MED	2	2	3	Software to Manage process and link in model components		<b>MAYBE</b>
Record Modeling	MED	Grunley	MED	3	3	3	3D Model Manipulation, Training		<b>YES</b>
		Little	MED	2	2	2			
		American	MED	2	2	2			
Site Utilization Planning	HIGH	Grunley	HIGH	3	3	3	3D Model Manipulation, Scheduling Software		<b>YES</b>
		Subcontractors	MED	1	2	1			
		American	MED	2	2	2			
3D Coordination	HIGH	Grunley	HIGH	3	3	3	3D Model Manipulation, Clash Detection Software, Training		<b>YES</b>
		Subcontractors	HIGH	1	3	2			
Design Reviews	HIGH	Grunley	MED	3	3	3	3D Model Manipulation, Constructability Understanding		<b>YES</b>
		Subcontractors	HIGH	1	3	2			
		A/E Team	MED	2	2	1			
LEED Documentation	MED	Grunley	MED	3	3	3	LEED AP on Project Team	LEED Gold Requirement, Reputation	<b>YES</b>
		Little	MED	2	2	3		Reputation	
		American	MED	2	2	3		Reputation	

**3. BIM USES:**

X	PLAN	X	DESIGN	X	CONSTRUCT	X	OPERATE
	PROGRAMMING		DESIGN AUTHORIZING	X	SITE UTILIZATION PLANNING	X	BUILDING MAINTENANCE SCHEDULING
	SITE ANALYSIS	X	DESIGN REVIEWS		CONSTRUCTION SYSTEM DESIGN		BUILDING SYSTEM ANALYSIS
		X	3D COORDINATION	X	3D COORDINATION		ASSET MANAGEMENT
			STRUCTURAL ANALYSIS		DIGITAL FABRICATION		SPACE MANAGEMENT / TRACKING
			LIGHTING ANALYSIS		3D CONTROL AND PLANNING		DISASTER PLANNING
			ENERGY ANALYSIS	X	RECORD MODELING	X	RECORD MODELING
			MECHANICAL ANALYSIS				
			OTHER ENG. ANALYSIS				
			SUSTAINABILITY (LEED) EVALUATION				
			CODE VALIDATION				
	PHASE PLANNING (4D MODELING)		PHASE PLANNING (4D MODELING)		PHASE PLANNING (4D MODELING)		PHASE PLANNING (4D MODELING)
	COST ESTIMATION		COST ESTIMATION		COST ESTIMATION		COST ESTIMATION
	EXISTING CONDITIONS MODELING		EXISTING CONDITIONS MODELING		EXISTING CONDITIONS MODELING		EXISTING CONDITIONS MODELING

**SECTION F: BIM PROCESS DESIGN**

**1. LEVEL ONE PROCESS OVERVIEW MAP: PLEASE SEE PAGES FOLLOWING PAGES.**

Project Title

BIM USES

INFO. EXCHANGE

