7700 ARLINGTON BLVD.
FALLS CHURCH, VA

TECHNICAL ASSIGNMENT I

CHRISTIE SMITH

CONSTRUCTION MANAGEMENT

2012 CAPSTONE PROJECT

ADVISOR: CRAIG DUBLER

SUBMITTED: 9/23/2011

Executive Summary

Technical Assignment One is intended to get a better understanding of the conditions of 7700 Arlington Blvd. as well as get a clear idea of the scope of work that will be preformed. The project is made up of three existing structures, the Northwest, Southwest, and Main Building, which have a total square footage of 684,651. The Northwest and Southwest are four stories tall and the Main building is two stories tall. This project overall incorporates a variety of complex systems in order to comply with BRAC BP 198. The largest challenge for this project is completing it on time and under budget. Raytheon, the prior tenants, will be occupying the structure for the beginning construction mobilization while DHHQ, the future tenants, will be occupying two out of the three buildings during the second phase of construction.

The project will be complete in May 2012 with initial mobilization in October 2010. For information regarding the schedule, refer to the ***project schedule summary*** section in the following pages. The ***building systems summary*** section includes a breakdown of the progressive collapse system, seismic brace framing, façade hardening, a curtain wall system, and a few other systems. Thorough 3D coordination was done in order to implement these systems into the existing structure. 7700 Arlington Blvd. will achieve LEED Silver Certification since it is a government building, but since the focus of this thesis is on the base building side, only a little detail has been given about sustainable features. Through RS Means Cost Works, a square foot estimate and assemblies estimate was completed in the ***project cost evaluation*** section, which resulted in a 27% increase from the actual bid. Due to the fact that it is a renovation, the ***site plan of existing conditions*** section includes a detailed site plan and the ***site plans of site layout planning*** section includes the site logistics in order to show the flow of construction. To get a further understanding of the site, the ***local conditions*** section goes into detail about the soil conditions and other site factors. Also, ***client information*** is discussed in order to get a better understanding of DHHQ. Since this job is a government job, DHHQ had certain requests that needed to be followed on top of a certain budget. In order to comply will all the requirements a certain project delivery method was used in addition to a particular staff at Davis, which can be found in the ***project delivery system*** and ***staffing plan section***.

Overall, the findings of this report propose an interesting opportunity for future thesis research which will be directed towards analyzing how to efficiently implement a variety of systems into such a large building in a small period of time. Scheduling was an issue on this job and trying to understand and figure out what could have been done to help reach certain milestones will hopefully prove to help with future projects of this type.

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Project Schedule Summary

Reference Appendix A for Project Schedule Summary

The project was awarded to James G. Davis Construction on July 12, 2010 after about six months of evaluating the solicitation from offer (SFO) which is where an agency, in this case DHHQ, posts all their requirements for a space they would like to occupy. It is a public posting where different property owners will send in a bid that attempts to meet their requirements and costs. Three months later Davis was able to mobilize on the construction site.

Since there are three buildings on this jobsite a lot of coordination had to be done in order to figure out the correct sequence for the job. The 2-phase construction sequence, shown below, was developed due to the fact that Raytheon would still be occupying the space during construction and DHHQ would be moving into the space as construction is finishing up. The square foot breakdown results with Phase I being 525,645 SF and Phase II being 159,005 SF.

Figure 1 | 2-phase Construction Sequence

The first phase which is to include the Northwest building and Main building is to begin November 2010 and end July 2011. The second phase which is to include the Annex (or Southwest) building is to begin January 2011 and end May 2012. The sequence within each phase begins with Raytheon vacating the building, followed by the demolition, structure, façade/roof, building core/shell infrastructure, elevators, and tenant work. There will also be site improvements that will take about four months to complete.

There are quite a few milestones for this project due to the size of the building, but the ones to note include:

- Final Inspections – NW building: June 1, 2011
- Final Inspections – Main building: July 1, 2011
- Final Completion – Phase 1: July 29, 2011
- Final Inspections – Annex building: January 17, 2012
- Final Completion – Phase 2: May 1, 2012

Building Systems Summary

Building Systems Checklist		
Yes	***No***	***Work Scope***
X		Demolition Required
X		Structural Steel Frame
X		Cast in Place Concrete
X		Precast Concrete
X		Mechanical System
X		Electrical System
X		Masonry
X		Curtain Wall
	X	Support of Excavation
X		LEED Rating

Figure 2 | Building Systems Checklist

Demolition

Since 7700 Arlington Blvd. is an already existing structure, there will be certain systems demolished for this project. The main materials that will be demolished include the removal of the building façade, louvers & windows, elevator structure, interior stairs, existing penthouse structure, cafeteria, antenna room, and the existing parapet for the entire perimeter of the Main building which is shown in the picture to the right. In addition to these materials being removed, two mechanical systems will be removed, the entire electrical & lighting system, and the plumbing and fire protection systems will be demolished.

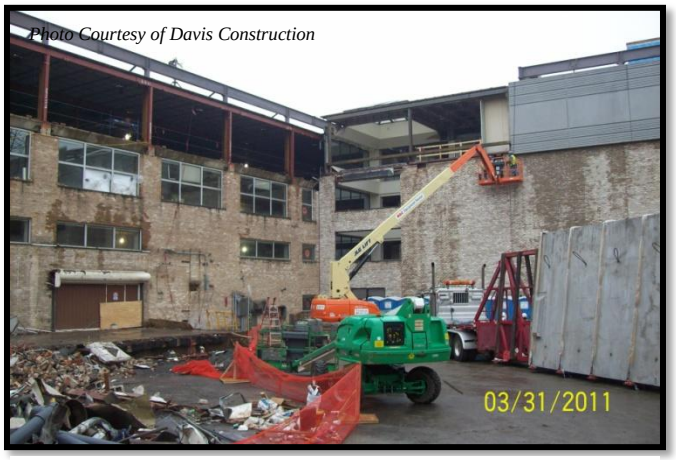

Figure 3 | Demolition of Existing Parapet for Perimeter of Main Building

The initial demolition includes the removal of asbestos and lead-based paint and lead-containing components. Removal of HVAC duct insulation, cementitious panels, textured ceiling material, boiler exhaust duct, elevator doors, and many other pieces will be removed due to asbestos from the premises in order to ensure a safe work environment. If any lead-based paint and/or lead-containing components are found they will be removed to OSHA regulations. Areas that could contain lead include electrical conduit, structural I-beams and columns, glazed ceramic wall tiles, interior door lintels, freight elevator doors, and more materials.

There are a few selective structural elements that need to be demolished. The existing fourth floor exterior wall assembly in the Northwest and Southwest buildings, along with the Northwest building roof assembly to the surface of the structural substrate will be removed. All interior partitions and associated doors and frames will need to be demolished unless otherwise noted on drawings. Other items that will be demolished include all existing ceilings and all floor finishes.

Structural Steel Frame

Since this is an existing structure and each building was built at separate times the structural system in each building varies. The main building structural system is primarily composed of concrete. The structural steel in the main building includes steel columns that extend up from the upper level slab and support a steel beam and girder framed roof. The cafeteria roof framing will be demolished and replaced with a new steel frame and gypsum roof similar to the already existing roof. A steel framed roof is the primary structural system in the Southwest building. There are steel pile sections that extend from the fourth floor to the roof. The roof consists of a metal deck on bar joists and steel girders. The roof live load capacity is limited to 30 psf and is not able to accommodate concentrated loads. Lastly, there is no prominent existing structural steel within the Northwest building.

Figure 4 | Installed Seismic Bracing

In the renovation, different structural systems will be installed to help support the structure if every under certain threats. A progressive collapse system will be implemented around the perimeter of the Northwest and the Southwest building. This system consists of W24x103 steel beams with varying W24x103 and W24x131 kickers. Kickers are used to support the progressive collapse system. The steel columns that run from the roof to the foundation include eight different types of HSS columns.

Seismic bracing enhancement is another part of the structural system that was renovated. In the Northwest building HSS 8x8x3/8 braced frames were used to support the structure while in the Southwest building HSS 6x6x61/4 and HSS 6x6x3/8 braced frames were used. HSS 6x6x3/8 and HSS7x7x3/8 were the primary seismic bracing for the Main building.

Another part of the new structural system that will be installed to help support the building against any threats is the blast proof façade. The building will incorporate an H-frame system around the entire façade. HSS 5x2x1/4" steel beams at a 16'-6' max span or HSS 5x3x1/4" steel beams at a 18'-6" max span will be used to connect to already existing columns to make up the H-frame system.

Cast in Place Concrete

Concrete spread footings with concrete basement walls and concrete flat slabs at the upper floor level are used in the Main building. The columns have capitals and drop panels that extend out approximately 1/6 of the adjacent span dimension from the column centerlines. For the Southwest building, the foundations are spread footings that occur in a crawl space beneath the ground floor. All the floors are cast in place concrete two-way flat slabs and have beams at the building perimeter. All floors including the ground level are designed to support 100 psf. The majority of the Northwest building is founded on spread footings, with a portion of the building including the lobby atrium area supported on a mat foundation.

The ground floor level consists of a 6" concrete slab on grade, which should be capable of supporting larger uniform loads. The 2nd through 4th floors and the roof are all framed with two-way flat slabs and drop panels at the columns. The slabs are design for 125 psf, at the floors, and 30 psf at the roof.

There is no major cast in place concrete activities being performed on this job since no slabs or structural systems will be demoed. Minor concrete work will need to be done if existing holes in the slab need to be filled.

Precast Concrete

Precast panels will be installed on parts of the façade of the building. The panels will be hoisted up using a mobile crane and the precast panel connections will be installed by others not noted on drawings. The picture to the right shows a precast panel being hoisted into place.

Figure 5 | Precast Panel Installation

Mechanical System

The mechanical system is designed to satisfy the requirements of meeting LEED CI Silver certification as well as provide the appropriate level of comfort for the future tenants of the building. There are three basic air conditioning systems throughout all the buildings with the first system being an all-air rooftop cooling system that distributes air to different spaces through low-pressure ductwork and ceiling diffusers. The return air will be sent back to central duct risers which are through a ceiling plenum.

The second system is a closed-loop water source heat pump system. There are interior and perimeter zones for this system with the interior zone having large heat pump air-handling units in mechanical rooms on each floor. The perimeter zone has individual heat pump units located in each office along the perimeter. A roof top unit is home to the closed-loop hydronic circulation system where it houses pumps, boilers, and cooling towers.

The third system is a chilled water/hot water system with central VAV air handling units. Low-pressure ductwork and ceiling diffusers will be used again to distribute the air throughout the building. Increased ventilation is provided for each system type by roof mounted preconditioning outside air units or by integrated heat wheels. A direct digital control system will be used to monitor and control the three HVAC systems.

There are two types of fire suppression systems that will be used throughout each building and they are a wet-pipe sprinkler system and a dry-pipe sprinkler system.

Electrical System

The electrical system for all three buildings will consist of a 480/277V, 3-phase, 4-wire, 4000A system. A 15000kVA pad-mounted outdoors transformer that belongs to the electric utility company is also

incorporated into the buildings' electrical system. Three generators will help back-up the electricity for this project.

Masonry

The typical CMU non-bearing wall with steel or precast lintels varies in size based on wall thicknesses as well as different pressures. The masonry blocks will be placed behind the façade system in order to help support it. The only area that will need scaffolding is in the open atrium.

Curtain Wall

A glazed aluminum curtain wall will be used on the front entrance to ensure performance and aesthetics. The curtain wall will be placed on the Northwest building where the main entrance is only two stories tall. The detail below shows the curtain wall system and the glazing. The detail contains gypsum board, the glazed aluminum curtain, glazing, blocking and shimming, and sealant.

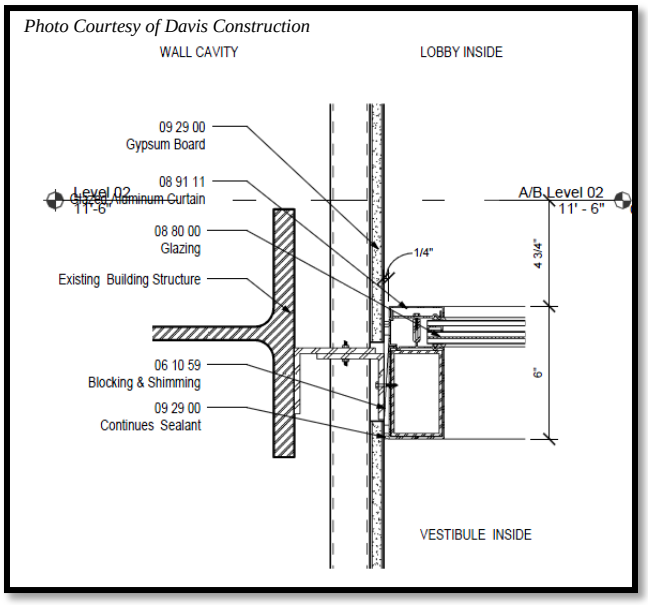

Figure 6 | Front Entrance Curtain Wall Detail

LEED Rating

7700 Arlington Blvd. will feature a vegetation roof in certain areas of the roof for the building. The HVAC system will be protected in order to ensure good filtration as well as certain materials will be used during construction like sealants or caulks. Another LEED aspect will be scheduling certain finishes together in order to reduce the absorption of VOCs by absorptive materials. A few more items that help with LEED points are housekeeping, pathway interruption, and monitoring which includes progress photos. The base building will not qualify for any LEED certifications, but the tenant side will meet LEED silver certification since the tenants are a branch of the government.

Project Cost Evaluation

The costs provided by Davis Construction are skewed a little from the actual building renovation costs due to parameters for this assignment. The assignment does not take into account renovation projects and assumes that all thesis buildings are new construction.

Renovation Parameters

Total Square Footage of Renovation: 684,651 SF

Note: Since this is an already existing structure there will be renovation work done throughout all three buildings. The reason for using the total square footage is to make sure all bases are covered.

Renovation Construction Costs

Actual Construction Costs: $43,283,384

Actual Cost / SF: $63.22

Note: There is a 2% fee and the general conditions amount to $3.3 million. Assuming allowances to not be a part of the construction costs.

Renovation Project Costs

Actual Project Costs: $50,030,864

Actual Cost / SF: $73.07

Note: There is a 2% fee and the general conditions amount to $3.3 million Assuming allowances to be a part of the project costs.

Table 1 | Building Systems Actual Cost Summary

System	Actual Cost	Actual Cost / SF
Hazardous Material Abatement & Demolition	$2,913,794	$4.26
Concrete	$366,682	$0.54
Precast Concrete	$1,079,431	$1.58
Masonry	$171,700	$0.25
Progressive Collapse Steel	$957,015	$1.40
Seismic Bracing & Dunnage	$722,866	$1.06
Windows – Exterior	$3,087,964	$4.51
Interior Glass & Glazing	$192,230	$0.28
HVAC & Plumbing	$11,018,545	$16.10
Electrical	$7,901,992	$11.54

Reference Appendix B for Project Cost Evaluation Data

RS Means Square Foot Estimate for Renovation Building **[**RSMeans**]**

Northwest Building Renovation Square Foot Cost: $41,474,500

Cost / SF: $99.40

Southwest & Main Building Renovation Square Foot Cost: $27,339,500

Cost / SF: $102.23

Total Building Renovation Square Foot Cost: $68,814,000

Cost / SF: $100.51

Note: For the type of building in the RS Means 2011 Square Foot Estimate there is no renovation building option. This made it truly difficult to estimate the cost of the project. The numbers are only worth analyzing to a certain point since there are unique systems integrated into 7700 Arlington Blvd.

RS Means Assemblies Cost Estimate for Renovation Building **[**RSMeans**]**

Mechanical System Assembly Cost

Line Number: D30501751060

Description: A/C, rooftop, DX cooling, gas heat, curb, economizer, filters, 40 ton

Total Cost: $50,700.00 ea

- There are 11 RTUs with varying Net Total Capacity quantities
- 11 RTUs x $50,700.00 = **$557,700.00**
- Note: The actual cost will vary due to varying quantities for net total

Line Number: D30502201010

Description: A/C, self contained, single package, water cooled, hot water heat, constant volume, 5 ton

- Cost of 1 water cooled heat pump unit = **$19,125.00**

Line Number: D30501703680

Description: Split system, air cooled condensing unit, offices, 20,000 SF, 63.32 ton

Total Cost: $11.20 SF

- 159,005 SF(Southwest Building) x $11.20 = **$1,780,856.00**

Electrical System Assembly Cost

Line Number: D50101200320

Description: Service installation, includes breakers, metering, 20' conduit & wire, 3 phase, 4 wire, 120/208 V, 400 A

Total Cost: $7,650.00

- 3 Utility connections on site
- 480/277 V add 25%
- 3 units x $7,650.00 = $22,950.00
- $22,950 x 1.25 = **$28,687.50**

Plumbing System Assembly Cost

Line Number: D20101101880

Description: Water closet, vitreous china, tank type, wall hung, close coupled 2 piece

Total Cost: $2,350.00

- 140 toilets x $2,350.00 = **$329,000.00**

Line Number: D20102102000

Description: Urinal, vitreous china, wall hung

Total Cost: $1,375.00

- 28 urinals x $1,375.00 = **$38,500.00**

Table 2 | Total Assembly Costs

System	Total Cost
Mechanical	$2,357,681.00
Electrical	$28,687.00
Plumbing	$367,500.00

Project Cost Comparison

There is a clear difference between the actual renovation costs and square foot estimates due to the lack of options within RS Means. Since RS Means Square Foot estimate only accounts for new buildings it is hard to compare the numbers that resulted from the estimate with the actual costs. There are very complex systems being implemented into 7700 Arlington Blvd. and RS Means does not have an area for a progressive collapse system.

Although if the RS Means estimate is taken as a renovation estimate then there was a total difference of $18,783,136 or $7.44 /SF more than the actual cost of the project. This is a 27% increase in what was bid for the job. Through value engineering and other cost saving implementations, Davis Construction and the owner received immense amounts of savings for this project.

The RS Means Assembly cost estimate is broken down into three of the main systems in the building. The main point of showing each different assembly cost is to show where some of the money is going that was allocated for the mechanical, electrical, and plumbing systems. Only the main systems that RS Means provided are reflected in the assembly estimate. The Total Assembly Cost Table versus the Building Systems Actual Cost Summary Table reflects how many other pieces of equipment, material, and more will be included with this project.

Site Plan of Existing Conditions

Reference Appendix C for the existing conditions site plan

7700 Arlington Blvd. was originally constructed between the 1950s and 1980s and is located in Falls Church, Virginia. The two major roads that surround the building are Route 495 (The Capital Beltway) and Route 50 (Arlington Blvd.). The main entrance into the site is off of Route 50 and since this is an already existing structure there is plenty of space to store equipment, trailers, and other construction items for the duration of construction. This site was originally home to Raytheon, a company that specializes in defense, homeland security and other government markets. [Raytheon Company] Demolition and construction will be going on prior to Raytheon vacating the building. The picture below shows the existing three buildings and the entire site.

Figure 7 | Existing 7700 Arlington Blvd. Site

To further clarify what work will be done on the existing building, the scope of work is outlined below.

- Demolition of 90% of the current interior partitions
- Demolition of a third story above segment D
- Demolition of a penthouse above segment C
- Replacement of all windows
- A re-skin of the 4th floor
- Construction of new core elements
- Anti-terrorism/force protection (progressive collapse steel and façade hardening)
- Coating the existing brick façade
- Construction of a new canopy at the main entrance
- Renovation of mechanical and electrical systems in segments A and B
- New mechanical and electrical systems in segments C, D, E and F

Site Plans of Site Layout Planning

Reference Appendix D for the site plans of site layout planning

This job will have four different site layout plans, but because this is a renovation project the site plans will be a little different than if it was new construction. The most beneficial way to show what will be going on in the site is to show the major site logistics. The first site layout will be of initial mobilization logistics followed by initial construction logistics. The last two site layouts will show phase one and two of construction. Refer to Appendix D for the four different site layout plans for 7700 Arlington Blvd.

The way that each logistics plan is laid out is pretty reasonable due to the fact that it is such a large site. There is a lot of room to house all the material and different pieces of equipment for the job site. By implementing an initial mobilization logistics plan, Davis was able to have everything prepared ahead of time. All they did was wait for the signal to start construction once Raytheon moved out of the building. For the first two plans, Raytheon was redirected to use different entrances and exits to the site. The normal entrance is now the construction employee and delivery entrance and exit. The first phase utilizing as much of the building perimeter as possible in order to place precast panels and install the progressive collapse system. The disturbance zone is placed in a way that it does not disturb the deliveries coming into the site. In addition, the construction storage and lay down area is placed in the most convenient spot for all the truck deliveries. Phase two is similar to the first site plan because DHHQ will be occupying the space while the Southwest building is being complete. This is the only plan where some rearranging could have been done in order to utilize the area by the Southwest building better. Overall, the site layout plans were done well, especially due to the fact that this was an already existing structure and most of the work will be complete on the inside more so than the outside.

Local Conditions

7700 Arlington Blvd. sits on approximately 43.63 acres with an existing gross floor area of 684,651 square feet. The Northwest Building is four stories tall with a height of 47 feet and a gross square footage of 267,436 SF. The Southwest Building is four stories tall with a height of 43 feet 10 inches and a gross square footage of 159,005 SF. The Main Building is two stories tall with a height of 31 feet 10 inches and a gross square footage of 258,209 SF. Parking outside the building include 29 handicapped spots, 4 van handicapped spots, and 1811 regular parking spots. There are plenty of parking spots for construction employees during the project as well as lay down areas for material. Below are a few pictures that show the existing building and site conditions, including parking.

Figure 8 | Existing 7700 Arlington Blvd. Site

Figure 9 | (Left to Right): Northwest Building (green arrow), Southwest Building (red arrow), and Main Building (blue arrow)

The landscaping is another area of the existing site that needs to be taken into consideration. Preservation of the trees will take place for this construction project. A few main species of trees that will be preserved include; tsuga canedensis (hemlock spruce), acer saccharum (sugar maple), and acer rubrum (red maple)

Even though there is an already existing structure it is still a good idea to take a look at the types of soils located in the area. The six types of soils found on and around the site include; mixed alluvial (1A,A+), glenville (10B), manor (21D,E), elioak (24C), fairfax (sil) (32C), and glenelg (55B). Mixed alluvial has poor foundation support while manor, elioak, Fairfax, and glenelg have severe erodability. Below is a picture showing the different soil types on and around the construction site.

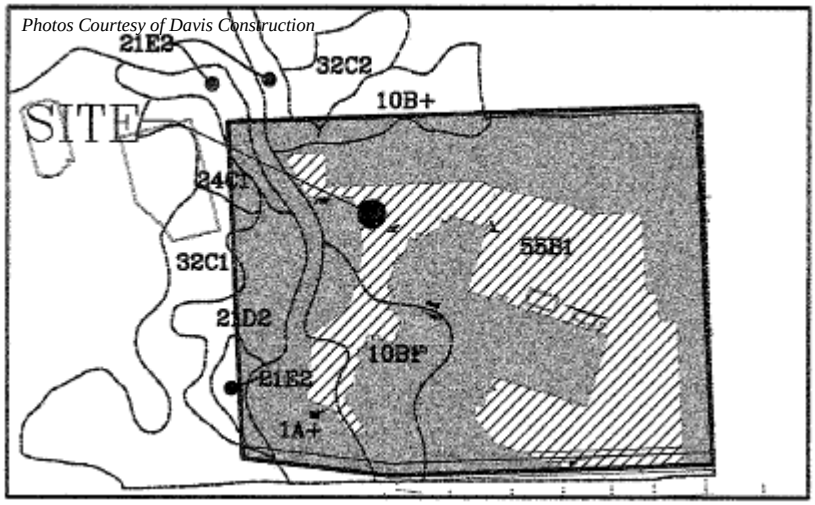

Figure 10 | Soil Types

There is no specific preferred method of construction in this area because each building on the site is made of steel and/or concrete. Every building is different and unique in its own way due to the time they were built. Also, since this building is a government building it will need to be LEED Silver Certified which means that there will be recycling on the site. Dumpsters will be placed where easy access can be obtained. One dumpster for example will be placed in the corner of the Southwest building and the Main building due to the ease of access in and out of the site. Davis Construction will coordinate all waste removal for the duration of the project.

Client Information

GBA Associates Limited Partnership is the owner responsible for the new 7700 Arlington Blvd. site. DHHQ (Defense Health Headquarters) is going to be the tenants of this new space. The reason they are building this facility is because the Defense Base Closure and Realignment Commission (BRAC) recommended that the Department of Defense relocate all facilities to be in accordance with BRAC BP 198. BRAC BP 198 is where a bunch of government buildings must be realigned in order to support certain threats. For example, 7700 Arlington Blvd. will have a blast proof façade, a progressive collapse system and more in order to comply with the BRAC Commission's recommendations. [GBA Associates LP]

Schedule is the driving factor for this project because the building must be in accordance to BRAC BP 198 by September 15 of this year. Unfortunately, the entire project was to be completed within six months which eventually became unattainable due to designing issues on the tenant side. The project started on January 1, 2010 and will be completed at the beginning of May 2012. Even though they did not hit their target date, they will still be considered to be in accordance to BRAC BP 198.

Since this is a government project there is cost issues associated with the job. The government will only be able to give a certain amount to this project. According to Davis, the budget is going well and looks like it will be on par with the bid if the rest of construction continues as planned. In the beginning though, the government had to cut out a good chunk of what they had planned in order to reach their budget. Unfortunately, some aspects of the job were sacrificed in order to get what was needed to comply with BRAC BP 198.

In all government jobs as well as Davis' jobs safety is of the upmost importance. All codes and regulations have been followed on this job to ensure a safe and working building. GBA Associates Limited Partnership and Davis have worked closely together to ensure there are no huge interruptions with the site logistics. Since this is a large site there is no excuse for unsafe work environments involving material, equipment, and most of all the workers.

As described in the Project Schedule Summary section, a detailed 2-phase sequencing process has been developed for 7700 Arlington Blvd. This includes the Main building and Northwest building in the first phase and the Southwest building in the second phase. The reason the construction is being sequenced in this manner is because the Main building and Northwest building will be turned over to GBA Associates Limited Partnership in order to comply with the September 15, 2011 deadline. The Southwest building will be turned over on May 1, 2012 which will be the completion of the entire building including the tenant work.

Through heavy communication and coordination between GBA Associates Limited Partnership and Davis, 7700 Arlington Blvd. will be a high quality building that will help ensure the safety of all those that will occupy it due to its complex systems inside and out.

Project Delivery System

The project delivery system for 7700 Arlington Blvd. is a CM at Risk. The contract type for the general contractor services with Davis is a Guaranteed Maximum Price. Due to the complexity of the project there had to be constant communication between every player on the job. There was a lot of research done to find out what the existing conditions were during the design phase of construction. Raytheon's high security did not allow for any onsite research which proved to force more communication and coordination amongst all trades. In this case, most of the subcontractors like the glass and glazing contractor were considered to be design-assist due to the tightness of the construction schedule and how much information was necessary to design something new on an existing structure. The delivery methods and contract types make sense for this type of project due to the size. All the subcontractors held by Davis are lump sum contracts which help Davis achieve the best price possible for their bid.

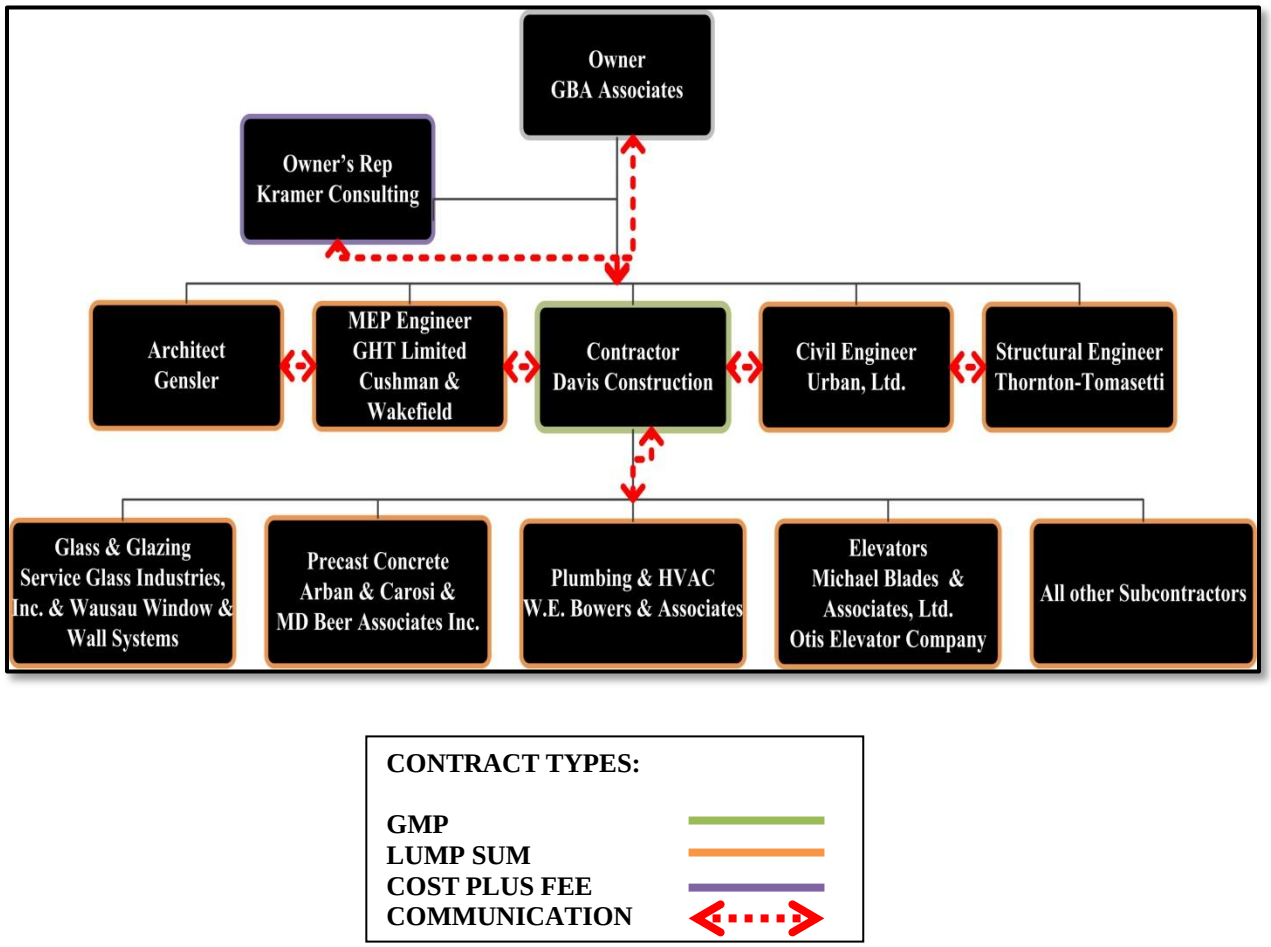

Figure 11 | 7700 Arlington Blvd. Organizational Chart

Staffing Plan

Since this project is very large, Davis knew they had to provide a staff that could get the job done on time and under budget. 7700 Arlington Blvd. required virtual construction for the façade, progressive collapse, and other systems which meant they needed to hire well trained employee(s) that understood certain programs. The field staff is relatively large due to there being three existing buildings on the site. The diagram below illustrates the staffing for Davis on and off the construction site.

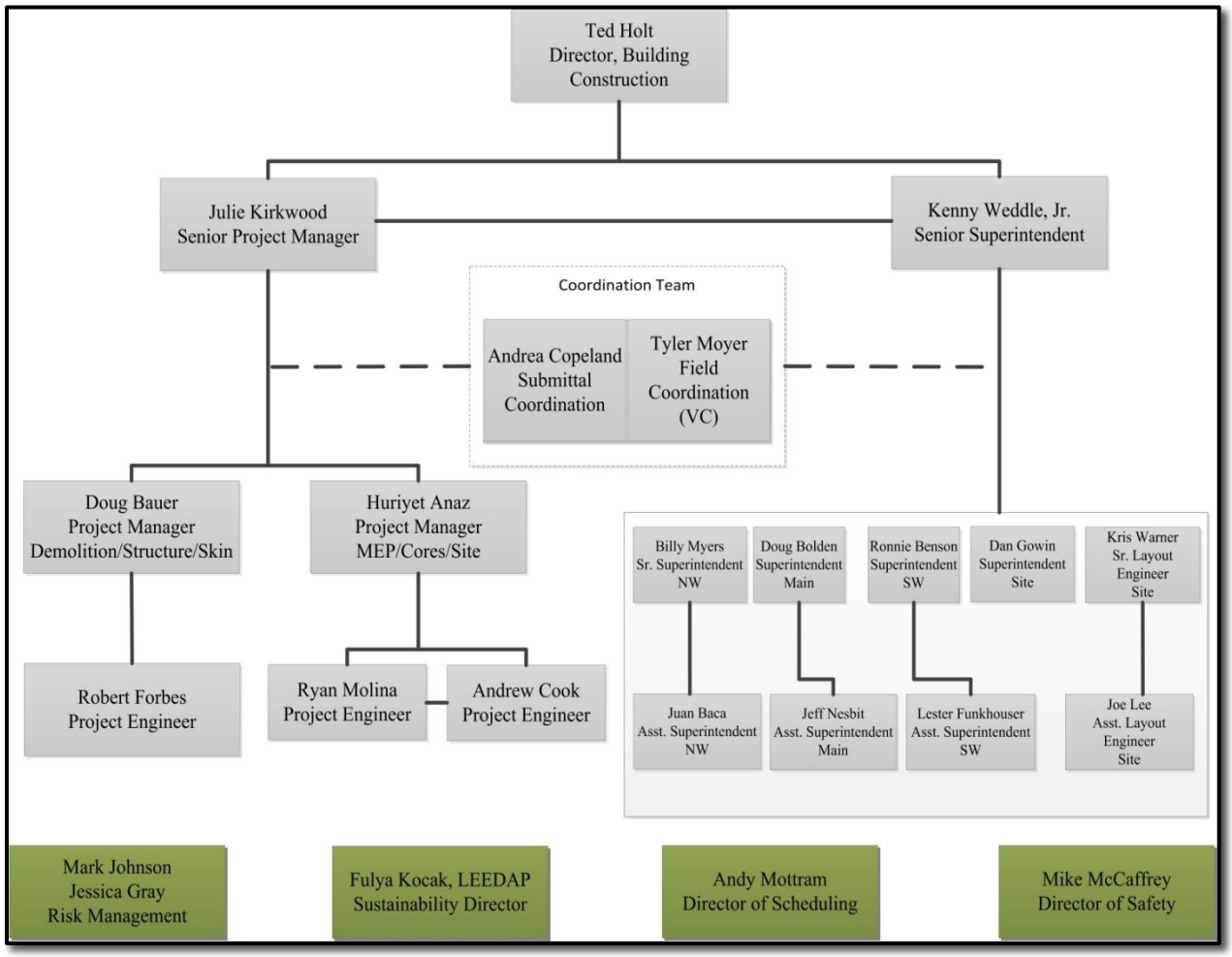

Figure 12 | Davis Construction Staffing Chart

Ted Holt is the director for this project followed by Julie Kirkwood and Kenny Weddle. Julie is in charge of managing the overall job while Kenny is responsible for all the on-site superintendents. Since the job required a lot of BIM modeling coordination, Andrea Copeland and Tyler Moyer were hired to orchestrate that part of the project. There are also four main people in the Rockville office that help keep the job running smoothly since Davis is doing both the base building and tenant work. Overall, Davis has a well rounded staff for a challenging project.

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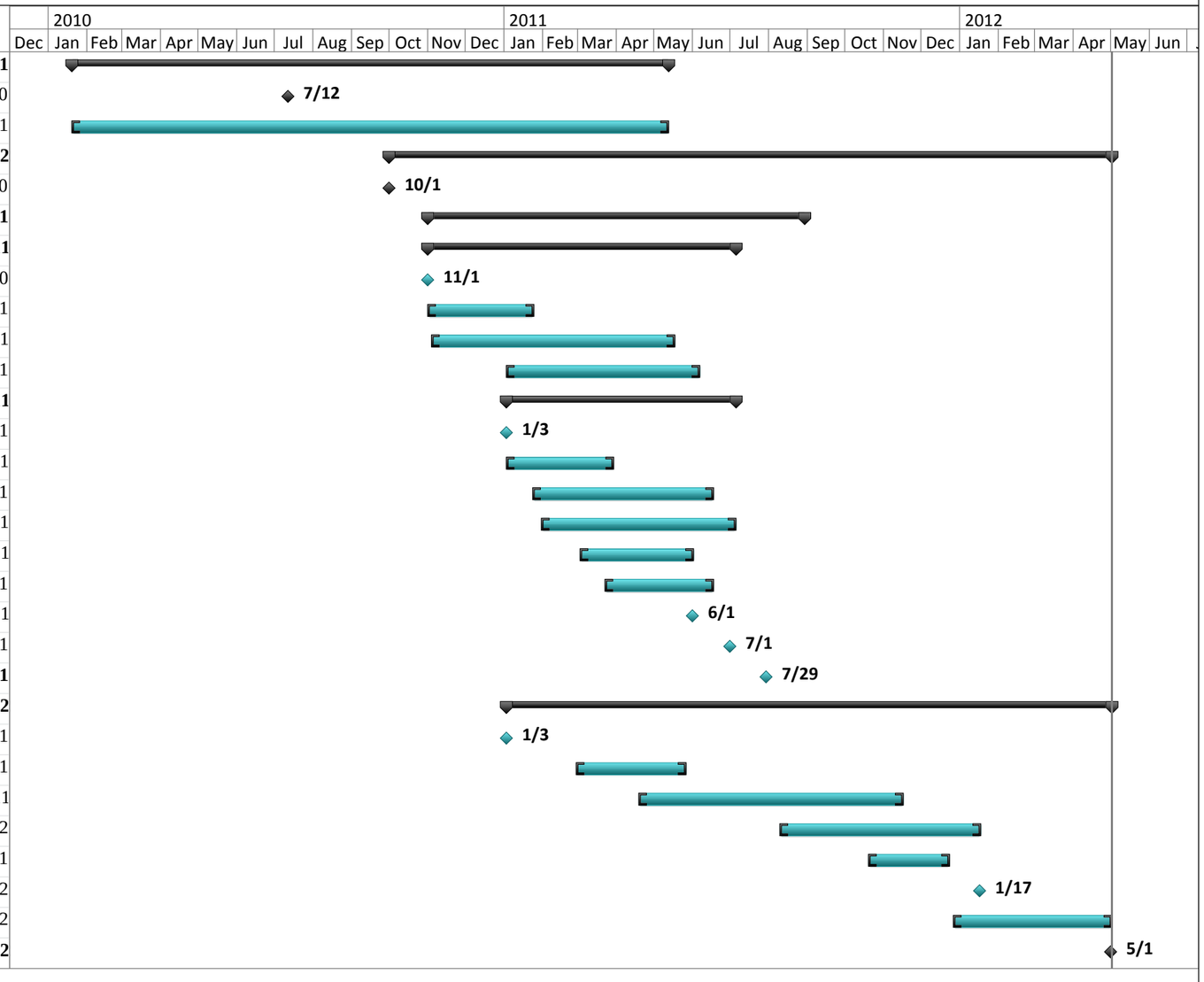
Appendix A

Project Summary Schedule

Christie Smith
Construction Management

Project Schedule Summary
Technical Assignment I
Submitted: 9/23/11

ID	Task Name	Duration	Start	Finish
1	**Schedule Summary**	**342 days**	**Wed 1/20/10**	**Thu 5/12/11**
3	Award Contract	0 days	Mon 7/12/10	Mon 7/12/10
4	Design & Obtain Permitting / Procurement	342 days	Wed 1/20/10	Thu 5/12/11
5	**Construction**	**413 days**	**Fri 10/1/10**	**Tue 5/1/12**
7	Mobilize on Site	0 days	Fri 10/1/10	Fri 10/1/10
8	**Phase 1**	**216 days**	**Mon 11/1/10**	**Mon 8/29/11**
10	**NW Building**	**177 days**	**Mon 11/1/10**	**Tue 7/5/11**
12	NW Building Vacated	0 days	Mon 11/1/10	Mon 11/1/10
13	Demo/Abatement	61 days	Mon 11/1/10	Mon 1/24/11
14	Structure, Façade/Roof, Building Core/Shell Infrastructure, & Elevators	139 days	Thu 11/4/10	Tue 5/17/11
15	Tenant Improvements - NW	111 days	Mon 1/3/11	Mon 6/6/11
16	**Main Building**	**132 days**	**Mon 1/3/11**	**Tue 7/5/11**
18	Main Building Vacated	0 days	Mon 1/3/11	Mon 1/3/11
19	Demo/Abatement	62 days	Mon 1/3/11	Tue 3/29/11
20	Structure, Façade/Roof, Building Core/Shell Infrastructure, & Elevators	105 days	Mon 1/24/11	Fri 6/17/11
21	Tenant Improvements - NW	112 days	Mon 1/31/11	Tue 7/5/11
22	Site Improvements	65 days	Thu 3/3/11	Wed 6/1/11
23	Base Bldg Systems Start-up & Commissioning - Main & NW Bldg	63 days	Wed 3/23/11	Fri 6/17/11
24	Final Inspections - NW Bldg	0 days	Wed 6/1/11	Wed 6/1/11
25	Final Inspections - Main Bldg	0 days	Fri 7/1/11	Fri 7/1/11
26	**Final Completion Phase 1**	**0 days**	**Fri 7/29/11**	**Fri 7/29/11**
27	**Phase 2 - Annex Building**	**347 days**	**Mon 1/3/11**	**Tue 5/1/12**
29	Annex Building Vacated	0 days	Mon 1/3/11	Mon 1/3/11
30	Demo/Abatement	64 days	Mon 2/28/11	Thu 5/26/11
31	Structure, Façade/Roof, Building Core/Shell Infrastructure, & Elevators	152 days	Tue 4/19/11	Wed 11/16/11
32	Tenant Improvements - Annex	115 days	Wed 8/10/11	Tue 1/17/12
33	Base Bldg Systems Start-up & Commissioning - AnnexBldg	47 days	Thu 10/20/11	Fri 12/23/11
34	Complete/Inspections - Annex Building	0 days	Tue 1/17/12	Tue 1/17/12
35	Complete/Inspections Tenant Improvements - SW	91 days	Tue 12/27/11	Tue 5/1/12
36	**Final Completion Phase 2**	**0 days**	**Tue 5/1/12**	**Tue 5/1/12**



7700 Arlington Blvd.
Falls Church, VA

Milestone ◆ Summary ▬ Project Summary ▬ Manual Task ▬ Start-only ⊏ Finish-only ⊐

Appendix B

Project Cost Evaluation

Northwest Building Renovation Estimate:

	Square Foot Cost Estimate Report
Estimate Name:	**Northwest Building**
Building Type:	**Office, 2-4 Story with Glass and Metal Curtain Wall / Steel Frame**
Location:	**National Average**
Story Count:	**4**
Story Height (L.F.):	**12**
Floor Area (S.F.):	**267436**
Labor Type:	**Union**
Basement Included:	**No**
Data Release:	**Year 2008 Quarter 1**
Cost Per Square Foot:	**$102.23**
Building Cost:	**$27,339,500**

Costs are derived from a building model with basic components.

Scope differences and market conditions can cause costs to vary significantly.

Parameters are not within the ranges recommended by RSMeans.

		% of Total	Cost Per S.F.	Cost
A Substructure		**3.40%**	**$3.27**	**$874,000**
A1010	Standard Foundations		$1.69	$452,000
A1030	Slab on Grade		$1.15	$308,000
A2010	Basement Excavation		$0.06	$16,500
A2020	Basement Walls		$0.36	$97,500
B Shell		**24.60%**	**$23.68**	**$6,333,000**
B1010	Floor Construction		$15.12	$4,043,500
B1020	Roof Construction		$2.20	$588,500
B2020	Exterior Windows		$4.44	$1,188,000
B2030	Exterior Doors		$0.83	$222,000
B3010	Roof Coverings		$1.09	$291,000
C Interiors		**26.20%**	**$25.22**	**$6,744,500**
C1010	Partitions		$1.78	$476,000
C1020	Interior Doors		$4.21	$1,126,000
C1030	Fittings		$1.06	$283,000
C2010	Stair Construction		$4.25	$1,137,500
C3010	Wall Finishes		$1.03	$274,500
C3020	Floor Finishes		$7.04	$1,883,000
C3030	Ceiling Finishes		$5.85	$1,564,500
D Services		**45.90%**	**$44.20**	**$11,821,000**
D1010	Elevators and Lifts		$10.91	$2,918,500

D2010	Plumbing Fixtures		$1.79	$479,500
D2020	Domestic Water Distribution		$0.02	$6,000
D2040	Rain Water Drainage		$0.02	$6,500
D3050	Terminal & Package Units		$15.95	$4,265,500
D4020	Standpipes		$0.07	$17,500
D5010	Electrical Service/Distribution		$0.32	$84,500
D5020	Lighting and Branch Wiring		$10.22	$2,732,500
D5030	Communications and Security		$4.68	$1,252,500
D5090	Other Electrical Systems		$0.22	$58,000
E Equipment & Furnishings		0.00%	$0.00	$0
E1090	Other Equipment		$0.00	$0
F Special Construction		0.00%	$0.00	$0
G Building Sitework		0.00%	$0.00	$0
SubTotal		100%	$96.37	$25,772,500
Contractor Fees (General Conditions,Overhead,Profit)		2.00%	$1.93	$515,500
Architectural Fees		4.00%	$3.93	$1,051,500
User Fees		0.00%	$0.00	$0
Total Building Cost			$102.23	$27,339,500

Southwest & Main Building Renovation Estimate:

	Square Foot Cost Estimate Report
Estimate Name:	**Southwest & Main Building**
Building Type:	**Office, 2-4 Story with Glass and Metal Curtain Wall / Steel Frame**
Location:	**National Average**
Story Count:	**3 (avg.)**
Story Height (L.F.):	**14 (avg.)**
Floor Area (S.F.):	**417214**
Labor Type:	**Union**
Basement Included:	**No**
Data Release:	**Year 2008 Quarter 1**
Cost Per Square Foot:	**$99.40**
Building Cost:	**$41,474,500**

Costs are derived from a building model with basic components.

Scope differences and market conditions can cause costs to vary significantly.

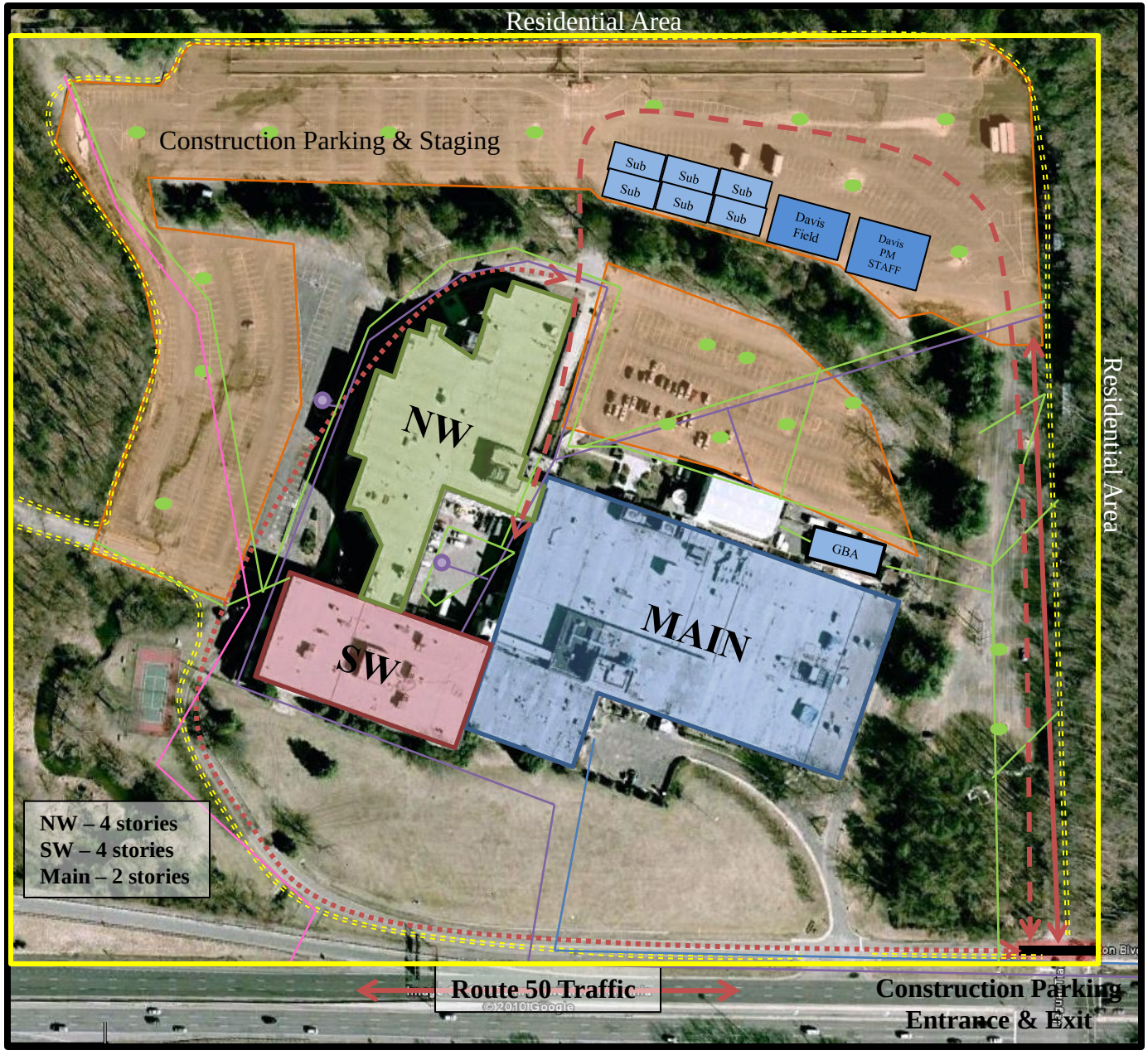
Parameters are not within the ranges recommended by RSMeans.

	% of Total	Cost Per S.F.	Cost

A Substructure		**3.80%**	**$3.59**	**$1,499,500**
A1010	Standard Foundations		$1.66	$694,000
A1030	Slab on Grade		$1.54	$641,000
A2010	Basement Excavation		$0.08	$35,000
A2020	Basement Walls		$0.31	$129,500
B Shell		**22.80%**	**$21.35**	**$8,908,500**
B1010	Floor Construction		$13.70	$5,714,500
B1020	Roof Construction		$2.93	$1,224,000
B2020	Exterior Windows		$2.49	$1,039,500
B2030	Exterior Doors		$0.83	$346,000
B3010	Roof Coverings		$1.40	$584,500
C Interiors		**26.80%**	**$25.08**	**$10,462,000**
C1010	Partitions		$1.64	$684,000
C1020	Interior Doors		$4.21	$1,756,500
C1030	Fittings		$1.06	$441,500
C2010	Stair Construction		$4.25	$1,774,000
C3010	Wall Finishes		$1.03	$428,500
C3020	Floor Finishes		$7.04	$2,937,000
C3030	Ceiling Finishes		$5.85	$2,440,500
D Services		**46.60%**	**$43.69**	**$18,227,500**
D1010	Elevators and Lifts		$10.56	$4,406,500
D2010	Plumbing Fixtures		$1.79	$748,000
D2020	Domestic Water Distribution		$0.01	$6,000
D2040	Rain Water Drainage		$0.02	$6,500
D3050	Terminal & Package Units		$15.95	$6,654,500
D4020	Standpipes		$0.04	$17,500
D5010	Electrical Service/Distribution		$0.20	$84,500
D5020	Lighting and Branch Wiring		$10.21	$4,260,000
D5030	Communications and Security		$4.68	$1,953,500
D5090	Other Electrical Systems		$0.22	$90,500
E Equipment & Furnishings		**0.00%**	**$0.00**	**$0**
E1090	Other Equipment		$0.00	$0
F Special Construction		**0.00%**	**$0.00**	**$0**
G Building Sitework		**0.00%**	**$0.00**	**$0**
SubTotal		**100%**	**$93.71**	**$39,097,500**
Contractor Fees (General Conditions,Overhead,Profit)		**2.00%**	**$1.87**	**$782,000**
Architectural Fees		**4.00%**	**$3.82**	**$1,595,000**
User Fees		**0.00%**	**$0.00**	**$0**
Total Building Cost			**$99.40**	**$41,474,500**

Appendix C

Site Plan of Existing Conditions



N

LEGEND

- Parking & Staging
- Sub — Subcontractor Trailer
- GBA — GBA Trailer
- Davis Field — Davis Trailer
- Traffic Flow
- Truck Route
- Alt. Truck Route
- Gas Line
- Water Line
- Electric Line
- Sanitary Line
- Fire Hydrant
- Existing Light Fixtures
- Existing Fence
- Building Perimeter

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Site Plan

Christie Smith | 9/23/11

Scale: NTS

Appendix D

Site Plans of Site Layout Planning

N

LEGEND

- Parking & Staging
- Sub — Subcontractor Trailer
- GBA — GBA Trailer
- Davis Field — Davis Trailer
- Traffic Flow
- Truck Route
- Alt. Truck Route
- Gas Line
- Water Line
- Electric Line
- Sanitary Line
- Fire Hydrant
- Existing Light Fixtures
- Existing Fence
- Building Perimeter

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Mobilization

Christie Smith | 9/23/11

Scale: NTS

N

LEGEND

- Parking & Staging
- Sub — Subcontractor Trailer
- GBA — GBA Trailer
- Davis Field — Davis Trailer
- Traffic Flow
- Truck Route
- Alt. Truck Route
- Gas Line
- Water Line
- Electric Line
- Sanitary Line
- Fire Hydrant
- Existing Light Fixtures
- Existing Fence
- Building Perimeter
- Dumpster
- Worker's Entrance
- Port-O-John

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Falls Church, VA

Phase 1

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Scale: NTS

N

LEGEND

- Parking & Staging
- Sub — Subcontractor Trailer
- GBA — GBA Trailer
- Davis Field — Davis Trailer
- Traffic Flow
- Truck Route
- Alt. Truck Route
- Gas Line
- Water Line
- Electric Line
- Sanitary Line
- Fire Hydrant
- Existing Light Fixtures
- Existing Fence
- Building Perimeter
- Dumpster
- Worker's Entrance
- Port-O-John

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Phase II

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Scale: NTS