Technical Report 1

October 5, 2009

Emily Couric Clinical Cancer Center

Charlottesville, VA

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Construction Management

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EXECUTIVE SUMMARY

This technical report is focused on understanding the building systems, costs, and schedule of the Emily Couric Clinical Cancer Center as well as getting to know the client. There is a project summary schedule that gives a brief schedule of the major project activities and milestones that take place during the design and construction of the Emily Couric Clinical Cancer Center in Charlottesville, VA located on the University of Virginia campus. A detailed explanation of the building systems includes items such as LEED certification, building enclosures, mechanical, electrical, and structural systems.

An estimate is compared to the actual cost of the building and discussed further along in the report using RS Means and D4 cost estimating programs. Both of the estimates were about 50 percent lower than the actual cost of the building. One of the major reasons I think there is such a large gap between the estimates and the actual cost is because it is going to be a LEED certified project and they have the newest technologies going into the building.

An existing conditions site plan is included in this report along with the building footprint. The local conditions have been identified and discussed as to how they affect the project. Fred Dunn, from the University of Virginia was interviewed about the project and what the owner wanted and the response to the interview is summarized toward the end of the report.

Finally, the project delivery system is analyzed and discusses the relationship between the contractors and the owners. The construction manager, Gilbane Building Company, represents the owner while the owner holds all of the contracts with the trades. A staffing plan was laid out showing the number of office staff they have and the responsibilities of each staff member.

Overall, this report has given a more detailed understanding of the project and how the project is being constructed. It will be beneficial to know this information for the following technical reports and the proposal that will be submitted later in the semester.

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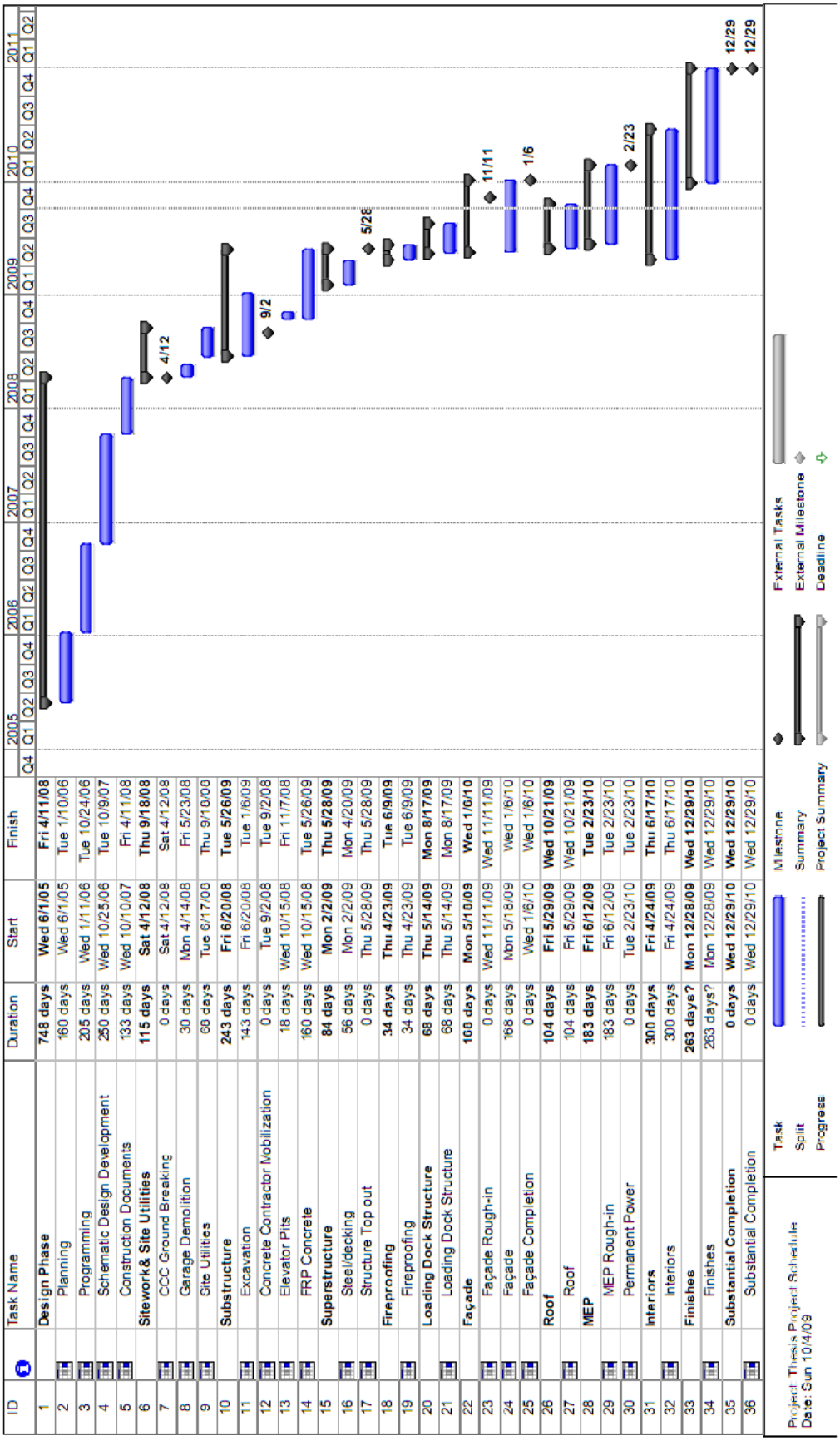
PROJECT SCHEDULE SUMMARY

The following project summary schedule is based off a more detailed schedule provided by Gilbane Building Company, the construction manager on the project. I added a design phase to the schedule based off my conversations with the owner, Fred Dunn with the University of Virginia. He said he has been working on this project since 2005 so I estimated the durations of the planning, programming, schematic design development, and construction documents activities. I assumed the programming and design development would take the longest due to it being a university funded project and having so many decision makers.

The site work consists of demolishing the existing parking garage and obtaining site utilities. Following the site work is the substructure which includes excavation and constructing the foundations along with laying out the elevator pits. The superstructure is a steel frame with composite metal decking and follows the substructure of the building. It topped out on May 28, 2009 and concrete is placed on the metal decking. The finishes will be completed after the building has been closed in and MEP and Interiors are finishing up. Substantial completion will be December 29, 2010 allowing the owner to move in all of their equipment and prepare for opening day.



ID	Task Name	Duration	Start	Finish
1	**Design Phase**	**748 days**	**Wed 6/1/05**	**Fri 4/11/08**
2	Planning	160 days	Wed 6/1/05	Tue 1/10/06
3	Programming	205 days	Wed 1/11/06	Tue 10/24/06
4	Schematic Design Development	250 days	Wed 10/25/06	Tue 10/9/07
5	Construction Documents	133 days	Wed 10/10/07	Fri 4/11/08
6	**Sitework& Site Utilities**	**115 days**	**Sat 4/12/08**	**Thu 9/18/08**
7	CCC Ground Breaking	0 days	Sat 4/12/08	Sat 4/12/08
8	Garage Demolition	30 days	Mon 4/14/08	Fri 5/23/08
9	Site Utilities	60 days	Tue 6/17/08	Thu 9/18/08
10	**Substructure**	**243 days**	**Fri 6/20/08**	**Tue 5/26/09**
11	Excavation	143 days	Fri 6/20/08	Tue 1/6/09
12	Concrete Contractor Mobilization	0 days	Tue 9/2/08	Tue 9/2/08
13	Elevator Pits	18 days	Wed 10/15/08	Fri 11/7/08
14	FRP Concrete	160 days	Wed 10/15/08	Tue 5/26/09
15	**Superstructure**	**84 days**	**Mon 2/2/09**	**Thu 5/28/09**
16	Steel/decking	56 days	Mon 2/2/09	Mon 4/20/09
17	Structure Top out	0 days	Thu 5/28/09	Thu 5/28/09
18	**Fireproofing**	**34 days**	**Thu 4/23/09**	**Tue 6/9/09**
19	Fireproofing	34 days	Thu 4/23/09	Tue 6/9/09
20	**Loading Dock Structure**	**68 days**	**Thu 5/14/09**	**Mon 8/17/09**
21	Loading Dock Structure	68 days	Thu 5/14/09	Mon 8/17/09
22	**Façade**	**160 days**	**Mon 5/10/09**	**Wed 1/6/10**
23	Façade Rough-in	0 days	Wed 11/11/09	Wed 11/11/09
24	Façade	168 days	Mon 5/18/09	Wed 1/6/10
25	Façade Completion	0 days	Wed 1/6/10	Wed 1/6/10
26	**Roof**	**104 days**	**Fri 5/29/09**	**Wed 10/21/09**
27	Roof	104 days	Fri 5/29/09	Wed 10/21/09
28	**MEP**	**183 days**	**Fri 6/12/09**	**Tue 2/23/10**
29	MEP Rough-in	183 days	Fri 6/12/09	Tue 2/23/10
30	Permanent Power	0 days	Tue 2/23/10	Tue 2/23/10
31	**Interiors**	**300 days**	**Fri 4/24/09**	**Thu 6/17/10**
32	Interiors	300 days	Fri 4/24/09	Thu 6/17/10
33	**Finishes**	**263 days?**	**Mon 12/28/09**	**Wed 12/29/10**
34	Finishes	263 days?	Mon 12/28/09	Wed 12/29/10
35	**Substantial Completion**	**0 days**	**Wed 12/29/10**	**Wed 12/29/10**
36	Substantial Completion	0 days	Wed 12/29/10	Wed 12/29/10

BUILDING SYSTEMS SUMMARY

Yes/No	Work Scope (if yes, address these questions/issues)
Yes	**Demolition Requirements** The demolition required on site consists of taking down an existing parking garage and removing sidewalks and underground utilities. There are no hazardous materials expected to be in the demolition of the site. The materials being demolished are concrete and asphalt and other yard structures on the site. The method of demolition is to take it down little by little from top to bottom. Explosives are not permitted to be used in this area and the structure has to be carefully removed from the site. This also limits the dust irritation.
Yes	**Structural Steel Frame** A structural steel framing system will be used on the Emily Couric Clinical Cancer Center. The columns vary from W10x33 to W14x159. Temporary bracing will be used to provide for the loads subjected to the structure. A composite metal deck is then attached to the steel and covered with light weight concrete. A crane was used to place the steel and the 3" GA composite deck metal deck. The deck was then covered with 3.5" light weight concrete and WWF 6x6 W2.9xW2.9. I was unable to determine the location of the crane however, a crawler crane would be logical to use because it could move around the building to different locations to reduce the number of movements by the crane.
Yes	**Cast in Place Concrete** Cast in place concrete was used for the floors of the building. The concrete was placed with a pump truck using the deck as horizontal formwork and placing wood formwork with shoring in open spaces. Concrete caissons were drilled and cast in place to support the foundation walls.
No	**Precast Concrete**

Yes/No	Work Scope (if yes, address these questions/issues)
Yes	**Mechanical System** The mechanical system is designed as an all-air system with a local reheat unit in each room. There are 4 main air handling units located in the penthouse, each supplying 45,000 CFM to the building. They have a heating capacity of 529 MBH and a cooling capacity of 2,390 MBH. Throughout the building there are 288 air terminal units with a heating coil capacity varying from 70 to 1,790 CFM and 1,994 to 92,108 Btuh. The necessary fire dampers and firestopping procedures will be installed on this project that complies with ASTM E-814. There will also be a wet-pipe fire-suppression sprinkler system installed to protect the occupants if there were to be a fire.
Yes	**Electrical System** The electrical system consists of 480/277 Volts distributed throughout the building with 23 local transformers stepping the voltage down to 208/120 Volts. A total of 83 panel boards are located throughout the building to maintain the distribution to each of the rooms. The lighting is designed to run off of 277 Volts and they are using mostly fluorescent lights in the fixtures. There are 65 different light fixtures being installed in the building consisting of mostly recessed and suspended mounted fixtures. The fire stopping systems that will be used on this project consist of products that have been UL tested for specific conditions and should meet the fire rating of the penetration rating.
Yes	**Masonry** The masonry on this project consists of 8” CMU block as the exterior load bearing wall covered with a brick veneer façade. The brick veneer is connected to the CMU block wall by galvanized bent steel plates. There will be scaffolding placed around the building as they move up the building to place the bricks. At the floor levels the brick veneer changes and puts two rows of soldier bricks. The CMU blocks are covered with a transition membrane and insulation. There is a row of continuous stainless steel flashing around the building. They are using recycled content to help achieve LEED credits MR 4.1 and MR4.2

Yes/No	Work Scope (if yes, address these questions/issues)
Yes	**Curtain Wall** The curtain wall is an aluminum frame system by Kawneer that is a sustainable product attributing to the LEED Silver certification. This wall can contribute to two different LEED credits including optimizing energy performance and on-site renewable energy. These two credits can total up to 26 points which is a huge piece of the LEED Silver rating.
Yes	**Support of Excavation** The type of excavation was open excavation which means there was no shoring necessary. A dewatering system was not necessary for anything but while drilling the caissons because the footings do not hit the water table.
Yes	**LEED Certification** The University of Virginia is doing a number of items to obtain a LEED Silver rating. Not only are they using an energy efficient curtain wall but additionally, the design includes installing a roof garden above the fourth floor and installing sunshades on the building. The roof above the penthouse is covered in a white acrylic coating that is contributing to the heat-island effect credits.

PROJECT COST EVALUATION

The University of Virginia has a budget of $74 million dollars to cover everything (site demolition, architect's fees, construction manager's fees, etc.) during construction for the Emily Couric Clinical Cancer Center. It has been funded by state funds, donations, and the health system at UVA. Donations cover almost the entire cost of the building and are expected to come very close to covering it all by the end of construction.

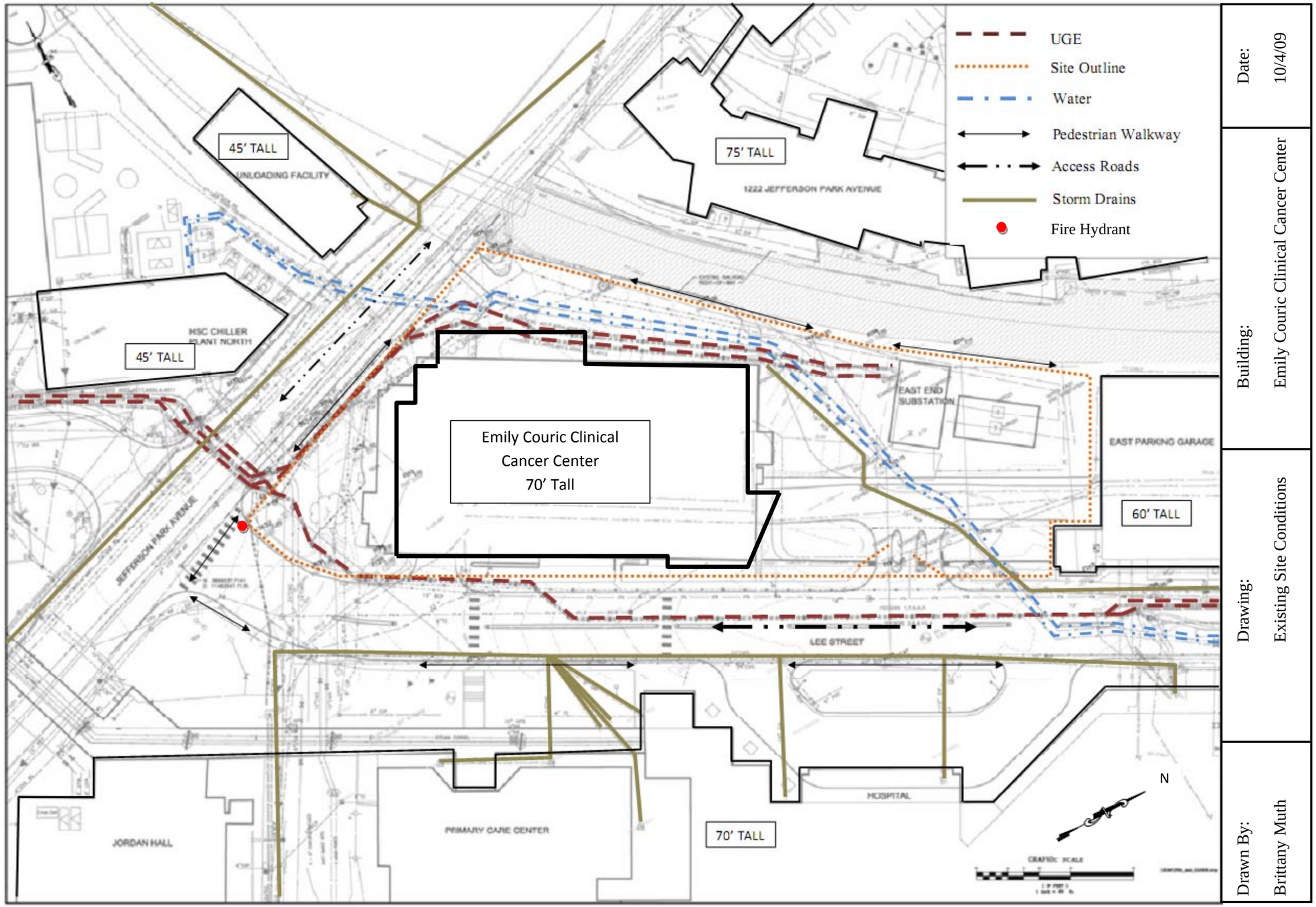
I preformed two different methods of calculating a square foot estimate to see if I could come close to the actual cost of the building; however I did not have any luck. First, I preformed a D4 cost estimate by searching for projects that are medical projects and between the height of 4 and 8 stories. The program came up with 24 different buildings ranging from 54,751 and 347,364 square feet and $5,873,737 and $63,918,839. For the RS Means estimate, I used three different estimates and took the average because there was not an exact description of my building. I used a medical office building, a 4-8 story hospital, and a 2 story outpatient surgery estimate. The results are listed below and the details are shown in Appendix A.

	Square Foot Cost	Total Cost
D4 Average of 24 buildings	$ 232.20	$35,550,806.00
RS Means Average	$ 279.78	$ 42,835,472.00
Actual Cost	$ 483.33	$74,000,000.00

The actual cost is about 72 percent higher than the D4 cost and about 108 percent higher than the RS Means estimate. I think the difference is so large because this project is on track for a LEED Silver rating and has a lot of new technologies and sustainable designs. Another reason this project could be above the average cost is because they had to demo an existing parking garage before they could start construction on the building. The actual cost also includes the architect's fees and the construction manager's fees.

SITE PLAN OF EXISTING CONDITIONS

The following site plan is of the existing conditions and the new footprint of the building. The parking is very limited near the site and the employees have to try and find public parking if they drive to work. Most of the construction workers park in the nearby parking garage and the rest try to find other parking downtown as close to the site as possible. There will be temporary lighting located throughout the building after the floors start to be constructed. The working hours will be during daylight and it will not be necessary to light the sight during the night hours. Therefore, I did not locate any temporary lighting. The site outline is also the symbol for the fence surrounding the site during construction.


UGE
Site Outline
Water
Pedestrian Walkway
Access Roads
Storm Drains
Fire Hydrant
45' TALL
UNLOADING FACILITY
45' TALL
HSC CHILLER PLANT NORTH
75' TALL
1222 JEFFERSON PARK AVENUE
Emily Couric Clinical Cancer Center
70' Tall
EAST END SUBSTATION
EAST PARKING GARAGE
60' TALL
JEFFERSON PARK AVENUE
LEE STREET
JORDAN HALL
PRIMARY CARE CENTER
HOSPITAL
70' TALL
N
GRAPHIC SCALE
Date: 10/4/09
Building: Emily Couric Clinical Cancer Center
Drawing: Existing Site Conditions
Drawn By: Brittany Muth

LOCAL CONDITIONS

Typically in the Charlottesville, Virginia area, buildings are constructed using steel framing with composite metal decking for the structure of the project. Downtown Charlottesville is a little crowded and hard to store materials and move around the buildings being constructed. The construction workers have a difficult time finding parking near the site because they have to park in public parking areas. There is a garage near the site but it gets full quickly and they have to find other parking spots downtown. The University of Virginia owns most of the property in Charlottesville and is constructing a few projects in the area. They are very interested in becoming more sustainable and achieving LEED certification.

Along with the LEED certification, recycling is available and is being used on this project. They recycle over 90 percent of their waste materials and it is very common in the area. The tipping fees are not known for this project and are being researched.

The soils on the site in Charlottesville, VA consist of dense sand and hard consistency silts and hard consistency disintegrated rock. Due to there already being a structure on the site there was existing fill detected in their analysis that is above the natural materials. The soil is suitable for new compacted structural fill except it is not recommended for direct support for slaps and pavements due to its high swell values.

The water levels were observed between 29 and 40 feet in a few borings and the others remained dry up to 26.5 feet. A water observation well was drilled and measured at 4 days and 38 days. The depths of the water level were measured to be 35.5 and 31.5 feet in the water observation well.

CLIENT INFORMATION

The Emily Couric Clinical Cancer Center is being constructed on the University of Virginia to consolidate their cancer services into one building. The University of Virginia (UVA) is located in Charlottesville, Virginia and it was founded by Thomas Jefferson in 1819. UVA currently has over 20,000 students attending the university. They have many degree programs in ten different schools including engineering, law, and medicine.

After interviewing Fred Dunn, senior project manager, who represents the University of Virginia (UVA), I learned more about what they are expecting from the Emily Couric Clinical Cancer Center project and why they chose to build it. They way UVA operates when building a project is a complex process. First, there has to be a need defined by the department wanting a building. In this case the health services board decided they needed a building to consolidate services that they already have into one building. After the need is defined, UVA hires the facilities management department of the university to get the project started. Facilities management then hires an architect to start the design process. There were studies, involving the stakeholders, done to develop a program for the building satisfying the needs of the stakeholders. They came up with three choices small (75,000 SF), medium (100,000 SF), and large (150,000 SF). UVA decided to build the large project to satisfy the needs accordingly. There are many different users in this building who help make the decisions including radiology oncology, radiology, access hub, patient/guest services, patient support, clinical labs, and infusion labs. Then the UVA hired Gilbane Building Company to be the Construction Manager on the job. Gilbane is the CM-Agency which means they represent the owner and the owner holds all of the trade contracts except for a few general conditions items.

UVA chose to build this building because they have a lot of services for cancer patients already but they are spread out in different buildings throughout campus. They thought it would be a good idea to consolidate the services into one building making it easier on the patients. Dee Eadie explained it as a "one stop shopping experience in a holistic healing environment that provides hope, solace, and cutting edge cancer treatment." There are two reasons why the building was chosen to be constructed. One of the reasons was the death of the Virginia State Senator Emily Couric that was related to cancer. The other reason was there is an expected growth in cancer patients in the next fifteen years due to the aging baby boomers. The project is on its way to becoming a LEED Silver project with the newest technologies.

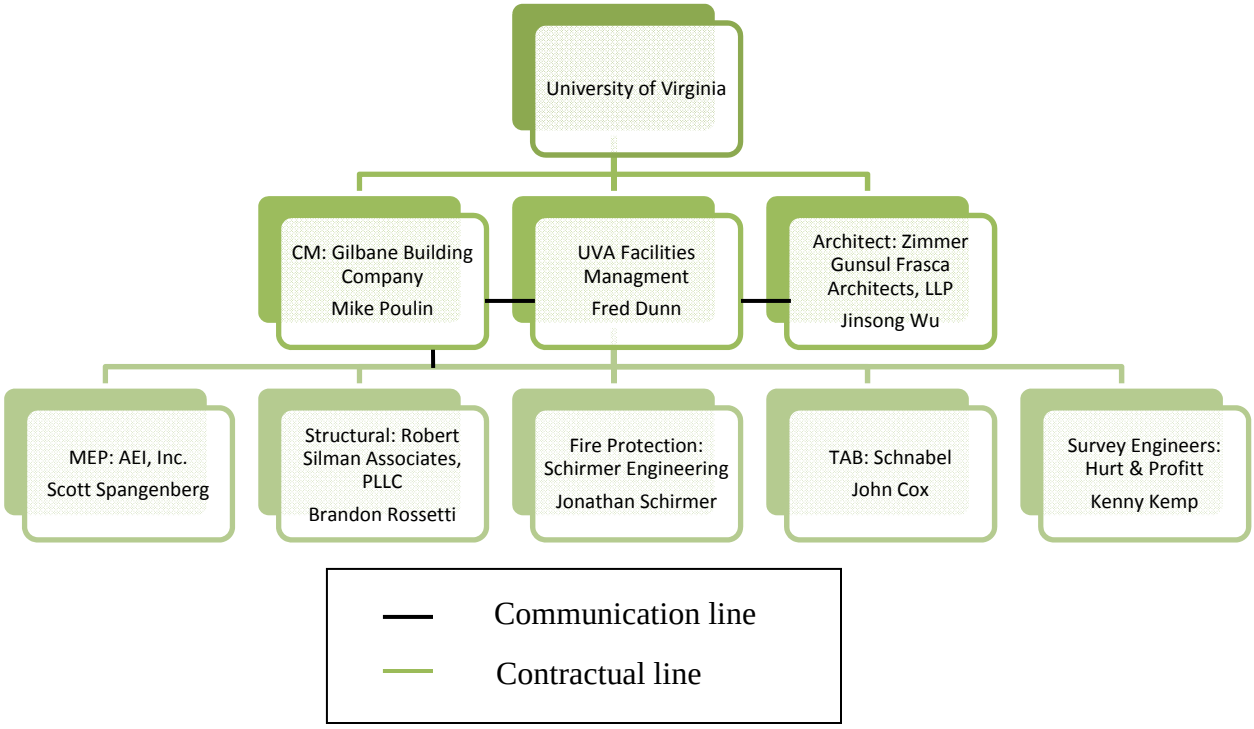
ECCCC is not a phased project for construction and the UVA is looking to the construction manager to sequence the construction activities properly and have no particular concerns about the sequencing. The only concern they really have is that the building is fully commissioned and passes all if its testing and balancing procedures. UVA has been planning this project since 2005 and is looking forward to its completion with no accidents and under the budget of $74 million. One of the most important values to Gilbane Building Company is safety and they start each

meeting by reviewing the safety of their situation. This is one of the reasons Gilbane was so appealing to the UVA. The scheduled substantial completion date is in December 2010, leaving UVA 3 months to move all of their equipment in and get ready for opening day. The university expects the quality of this building to be the best quality possible with the newest technologies in the cancer treatment world.

PROJECT DELIVERY SYSTEM

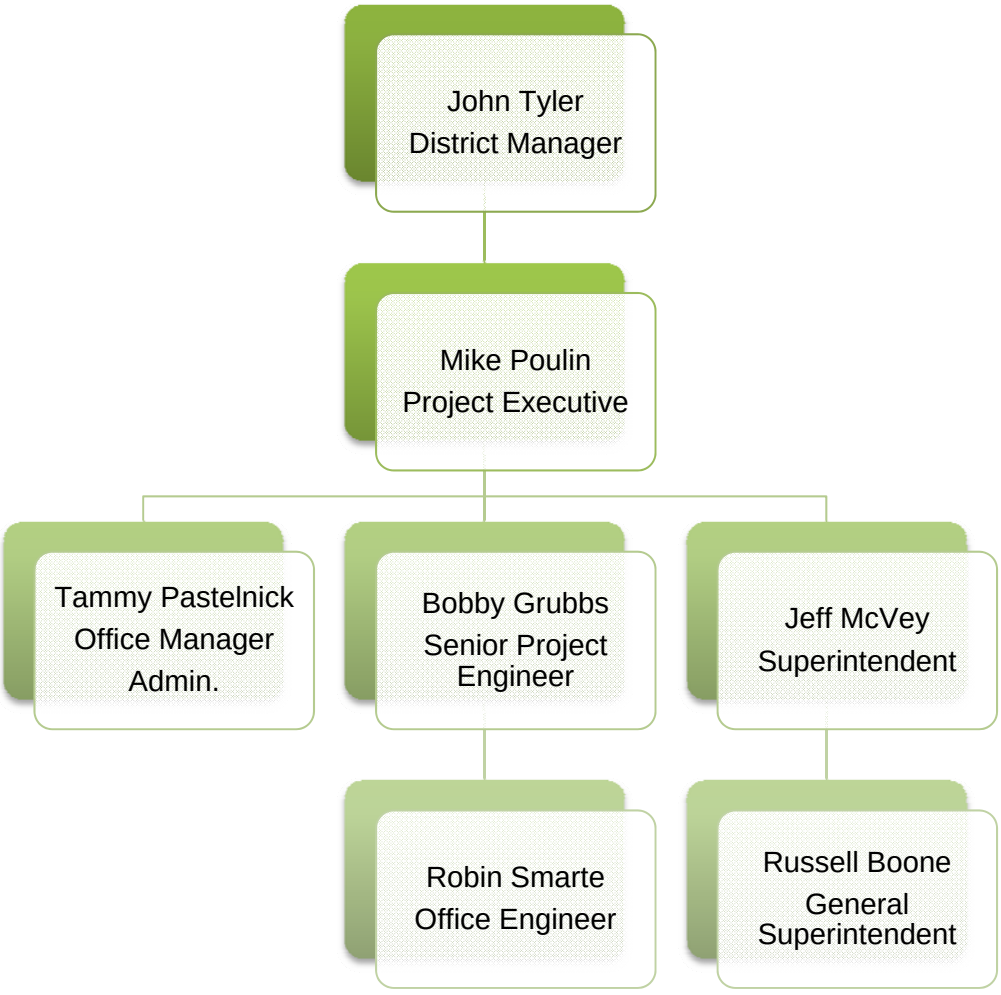
The Emily Couric Clinical Cancer Center is being delivered as a design-bid-build project. There was not a big push to get it done as fast as possible therefore the design-bid-build process seemed to be logical to use. The contractors are responsible to obtain and maintain "all-risk" builder's risk insurance in both the owner's and contractor's name. The contractor is required to have worker's compensation, employer's liability insurance, commercial general liability insurance, automobile liability insurance and occurrence-based liability insurance throughout the entire duration of the project. The contractor is required to provide a standard performance bond and a standard labor and material payment bond. Each of the subcontractors were chosen by first being pre-qualified and then by competitive bid. Having the contractors prequalify helps to guarantee the quality of the project and then you can find the contractor who will provide the quality for the best price by making it a competitive bid.

The owner holds all of the contracts of the trades and the CM helps to monitor the work and assure the work is being completed and to the owner's expectations. The contractors have agreed to report to both the owner and the CM with any questions or concerns. This was chosen because it allows the owner to be involved more because they have experience in construction. One issue could arise because the CM has no contractual agreement with the subcontractors and could have little influence on them if they are falling behind.



STAFFING PLAN

Gilbane Building Company put together a staffing plan for their company as shown in the following figure. It includes a district manager, project executive, office manager, senior project engineer, office engineer, superintendent and a general superintendent. The lines on the figure show the relationship and who reports to whom. The office manager takes care of the administrative items. The senior project engineer is in charge of the typical engineering functions and the office engineer is in charge of RFI's and submittals. The superintendents are responsible for different field duties.



APPENDIX A: RS MEANS REFERENCES

Emily Couric Clinical Cancer Center					
Square Foot Building Estimate					
RS Means Source:	Year:	2009	Model #	M.340	
Page(s)	150-151		Ext. Wall Type	Brick Veneer	
Area	153104		Frame	Steel Frame	
Perimeter:	820		Story Height	14'	
The Area fall between:	150000		and	175000	
		Base Cost per Square Foot:		$269.25	
Cost Adjustment Type:	Perimeter Addjustment		Per SF Adj.	$25.30	
Cost Adjustment Type:	Story Height Adjustment		Per SF Adj.	$7.60	
		Adjusted Base cost Per Square Foot:		$302.15	
Base Building Cost:	$302.15	x	153104	=	$46,259,761.18
Basement Cost:	33.95	x	31128	=	1056795.6
				Total Cost:	$47,316,556.78
RS Means Additions					
Additions	Automatic washer/Sterilizer			Amount:	$570,000.00
				Total Cost:	$47,886,556.78
Multiplier Type:	Location (Charlottesville, VA)			Value:	0.91
Multiplier Type:	2009 RS Means			Value:	1
Allowances:					
Addition:	none			Amount:	
Addition:	none			Amount:	
		Total Square Foot Estimate for Building:			$43,576,766.67

Emily Couric Clinical Cancer Center
Square Foot Building Estimate

RS Means Source: Year:	**2009**	Model #	**M.485**
Page(s)	**182-183**	Ext. Wall Type	**Brick Veneer**
Area	**153104**	Frame	**Steel Frame**
Perimeter:	**820**	Story Height	**15'-4"**

The Area fall between: **Above** and **25000**
Base Cost per Square Foot: **$365.80**

Cost Adjustment Type:	**Perimeter Addjustment**	Per SF Adj.	**$12.17**
Cost Adjustment Type:	**Story Height Adjustment**	Per SF Adj.	**$1.69**

Adjusted Base cost Per Square Foot: **$379.65**

Base Building Cost:	**$379.65**	x	**153104**	=	**$58,126,469.46**
Basement Cost:	**28.65**	x	**31128**	=	**891817.2**

Total Cost: **$59,018,286.66**

RS Means Additions

Additions: **Sanitizer** Amount: **$117,000.00**
Total Cost: **$59,135,286.66**

Multiplier Type:	**Location (Charlottesville, VA)**	Value:	**0.91**
Multiplier Type:	**2009 RS Means**	Value:	**1**

Allowances:

Addition:	**none**	Amount:	
Addition:	**none**	Amount:	

Total Square Foot Estimate for Building: **$53,813,110.86**

Emily Couric Clinical Cancer Center
Square Foot Building Estimate

RS Means Source: Year:	**2009**	Model #	**M.410**
Page(s)	**164-165**	Ext. Wall Type	**Brick Veneer**
Area	**153104**	Frame	**Steel Frame**
Perimeter:	**820**	Story Height	**14**

The Area fall between: **14500** and **16000**
Base Cost per Square Foot: **$181.80**

Cost Adjustment Type:	**Perimeter Addjustment**	Per SF Adj.	**$28.29**
Cost Adjustment Type:	**Story Height Adjustment**	Per SF Adj.	**$9.20**
		Adjusted Base cost Per Square Foot:	**$219.29**

Base Building Cost:	**$219.29**	x	**153104**	=	**$33,574,578.06**
Basement Cost:	**none**	x		=	

Total Cost: **$33,574,578.06**

RS Means Additions

Additions	**Elevators**	Amount:	**$125,600.00**
Additions	**Smoke Detectors**	Amount:	**$374,000.00**
Additions	**Sanitizer**	Amount:	**$117,000.00**
Additions	**Emergency Lighting**	Amount:	**$2,820.00**
		Total Cost:	**$34,193,998.06**

Multiplier Type:	**Location (Charlottesville, VA)**	Value:	**0.91**
Multiplier Type:	**2009 RS Means**	Value:	**1**

Allowances:

Addition:	**none**	Amount:	
Addition:	**none**	Amount:	

Total Square Foot Estimate for Building: **$31,116,538.23**

APPENDIX B: REFERENCES

All pictures were provided by the University of Virginia.

http://www.fm.virginia.edu/fpc/FeaturedProjects/EmilyCouric/EmilyCouric.htm