Technical Assignment #1

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9/29/2008

The Washington County Regional Medical Center

11116 Medical Campus Road
Hagerstown, MD 21742

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Project Information

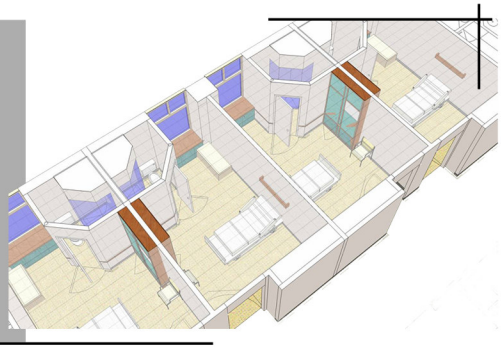
Size	500,000 sq. ft.
Height	5 levels
Project Cost	$150 million
Estimated Completion	December 2010
Delivery Method	CM @ Risk

Project Team

Owner	Washington County Health Systems
Architect	Matthei & Colin Associates
CM	Gilbane Building Company
MEP Engineers	Leach Wallace Associates, Inc.
Structural Engineers	Abatangelo-Hason, Ltd.

Architectural Design

- Located on an existing medical campus
- Various facade types; brick, arch. precast, and glass
- (275) single bed rooms with private bathrooms
- (53) emergency treatment rooms
- (2) truma and 2 cardiac rooms

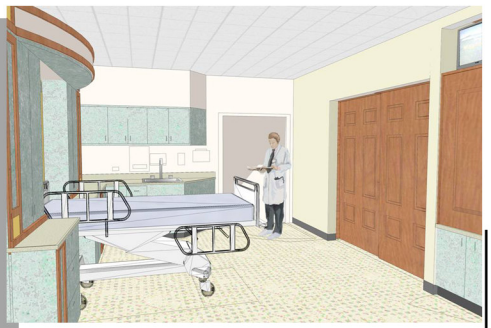


MEP Systems

- (5) AHU's totaling a maximum of 450,000 cfm.
- Central Utility Plant - (2) chillers & (2) cooling towers
- Electrical service feeds (3) substations each at 4,000 amps, 480Y/277, 13.2kV, 3 phase 4 wires.
- (2) emergency generators at 2,000 amps, 480Y/277

Structural System

- (150) deep foundation caissons under bed towers
- Spread footing foundation and grade beams under the other portions of building footprint
- Structural steel frame with 3-1/4" LWT concrete slab on 20 guage composite deck for the floors



http://www.engr.psu.edu/ae/thesis/portfolios/2009/sse112

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List of Visuals

[1]Please refer to Appendix D to achieve a basic understanding of the building layout. It shows general areas of the building.

Executive Summary

The Washington County Regional Medical Center is a project located in Hagerstown, MD and owned by Washington County Health Systems. It is designed to be a state of the art medical center with the newest and most specialized equipment in the region. The medical center will also become a regional trauma unit with the expansion of their emergency services section of the building.

The project started in March 2008 and is marked for substantial completion in December 2008. Structural concrete, structural steel, and finishing sequences propose the most schedule impacts for the medical center. Project start-up, with the deep foundation caisson work, transitions to the structural steel and together they combine for the most risk associated with the schedule. Finishes, especially in a medical building, are also very important schedule items that will impact the project close-out dates and owner move-in.

The Washington County Regional Medical Center has intricate building systems. The project site requires no demolition and, as stated before, has a structural steel frame and a concrete foundation system. The mechanical and electrical systems are complex and have many interesting features.

The new medical center will cost the owner $282 million in total project costs. Estimates using historical project data and current rates and information are included and provide for an interesting comparison to the actual building cost of the Washington County Regional Medical Center. Further information about construction costs and other major building systems costs can be found in this report.

The new medical center will be built on an existing medical campus that now contains a two story outpatient procedures facility, Robinwood Medical Center. The two facilities will join through an administrative wing of the new medical center. Attaching to the current Robinwood building will pose numerous construction issues because the building will remain operational throughout construction of the new medical center. Certain activities will have to work around Robinwood's hours of operation.

The delivery system for the new medical center's construction is a Construction Management (CM) @ Risk arrangement. The CM is Gilbane Building Company and the architect, hired by the owner on a percent fee contract, is Matthei & Colin Associates. Each major party has subcontractors and consultants to help complete their contract with the owner.

The CM currently has the project staffed with nine employees ranging from a project executive to a project engineer. They also have very qualified site personnel to run the day to day activities as superintendents.

A. Project Schedule Summary

A.1 Project Schedule Overview

The Washington County Regional Medical Center schedule, refer to Appendix A, is a general schedule showing key milestones and components that, if altered or delayed, can dramatically affect the outcome of the project. The schedule shows the construction timeline of the medical center to be just short of three years. Included with the construction on the schedule is a design timeline. The design was scheduled to be about nine months. However, a noticeable gap between the completion of the design and the release of the construction documents exists. This gap is attributed to the many phases of litigation the medical center project went through. The legal action was related to the location of the new hospital and was a case being pursued by a few members of the community. The case was eventually settled allowing the work to begin in March of 2008.

A.2 Foundation Schedule Impacts

The medical center consists of three, five story bed towers. Supporting these bed towers are an array of one hundred fifty deep foundation caissons. These caissons are a crucial component of the sequencing because the bed towers lead each building construction sequence. The caissons must bear on rock with an allowable service load bearing pressure of 80,000 pounds per square foot. If finding adequate bearing rock, drilling and excavating each bore, and placing concrete for each caisson can maintain schedule, this will set a good precedence for the continuation of the sequences throughout the building. The other building foundation systems consist of the following:

- Spread and strip concrete footings
- Load bearing concrete foundation walls
- Concrete grade beams

Since the caissons and the other foundation elements are each part of their own package, the other concrete foundation systems can proceed simultaneously with the caissons. The only exceptions to this are that some of the grade beams are located on top of the caissons and therefore cannot be placed until the caissons are finished.

Another consideration to the foundation systems is cold weather. The schedule shows the foundation systems to end in February of 2009. This will mean cold weather concrete placement procedures will need to be practiced to ensure the quality of the foundations.

A.3 Structural Schedule Impacts

The structural system consists of steel beams and columns with composite concrete slab on metal decks. The steel will be set throughout the winter starting in early October and ending in early March. Although not as crucial as cold weather concrete, cold weather steel erection

will need to be considered when it comes to planning the steel work. The sequencing will follow the caissons. This means the steel erection will start with the most critical parts of the building, the bed towers. Since the bed towers rise five stories, the steel columns at the base of these bed towers will be very large. Again, it is vital that the steel maintains a tight schedule because the architectural precast panels and building envelope will follow the same sequence. If the steel cannot maintain this schedule and the building envelope cannot start on time, the building enclosure milestone will not be met and as a result, will delay the interior work and push substantial completion back.

A.4 Finishing Schedule Sequence

The finishing sequencing will continue to follow the other sequences of the building. This means the bed towers will start with the finishing trades first. They will employ a top down method of finishing, starting on the fifth floor and working to the third floor of each tower. Below the third floor they will continue to move from the top down, however, they will finish more crucial departments within the hospital first because of the extensive owner furnished equipment in these areas. There are many constraints and intricate details when finishing a medical center. This attributes to a substantial time frame for the finishes that are vital for the completion and turn over of the building.

B. Building Systems Summary

The following table, Table 1, and written information describe the main building systems of the medical center. The information describes the key design and construction issues of the project.

Table 1: Building Systems Summary

Work Scope Questions	Medical Center	
	Yes	No
Is Demolition Required?	**X**	
Is there a Structural Steel Frame?	**X**	
Is there Cast in Place Concrete?	**X**	
Is Precast Concrete used?	**X**	
Describe Mechanical System	**n/a**	**n/a**
Describe Electrical System	**n/a**	**n/a**
Is Masonry used?	**X**	
Is there a Curtain Wall?	**X**	
What supports the Excavation?	**n/a**	**n/a**

B.1 Demolition

There is very little demolition for this building since it is new construction on an empty site. With the new construction, a new information technologies (IT) room must be built. The existing Robinwood Medical Center adjacent to the new hospital has a room in the basement that will be converted into an IT room for use by both the new medical center and the existing Robinwood complex. This room will need some interior partition demolition to convert it to an open IT room with an office and a bathroom.

B.2 Structural Steel Frame

The structural system is comprised of a steel frame of wide flange columns and beams. There are not too many typical sizes of steel because of the unique design; however, the bed towers are comprised mainly of three different sections. They are W21x44, W18x35, and W12x16. Some typical sizes throughout the other sections of building are W16x31, W14x22, and W16x26. There are also other areas of the building that use hollow steel sections for miscellaneous steel framing. There are two different primary bracing systems used in the steel frame. The first is a vertical chevron style brace. This style of bracing is used in the highest sections of the building that extend from the foundation through the vertical elements of the stair towers. The other type of bracing is a form of cross bracing. This type of brace has two elements. The first beam extends one full diagonal of the frame while a second only goes from one corner to the midpoint of the full diagonal piece.

The structural steel will be erected with two different cranes. A 300 ton crawler crane will erect the three bed towers in the first three sequences. For the next sequences a smaller, 150 ton crawler crane will be used. This will allow the steel erector to get rid of the larger, more expensive crane and switch to a smaller, less expensive crane to finish the erection.

B.3 Cast in Place Concrete

All the structural concrete on the project will be cast in place. These items include the foundation walls, footings, grade beams, and the slab on grade and slab on decks. A steel formwork system is used for foundation walls and a stick-built plywood forming system is used for the footings and grade beams. The decks are formed using the composite metal decking with shoring on the deck below. The edges and pour stops are formed with different sizes of lumber.

The concrete for the foundation work will be placed by a crane and bucket method. A 175 ton crawler crane will be used for the concrete and will only have to make one crucial move after the initial mobilization. The same crane used to erect the forms and place the rebar cages will be used to swing the concrete to the proper place.

B.4 Precast Architectural Concrete

The precast concrete on the project only consists of architectural panels used as a façade. These panels vary in size across the building and are located primarily on the bed towers. They will be supported by the steel frame and connected to the columns with steel angles or "C" channel. A 250 ton crawler crane will be used to erect the precast panels and will have to move to complete the erection.

B.5 Mechanical System

The mechanical system is comprised of three different elements and they are as follows:

- Central Utility Plant (CUP)
- Two Dedicated Mechanical Rooms
- Various Roof Top Units

The CUP is located in the service section of the building (first floor, plan south). It houses two 1000 ton chillers and two 3000 GPM cooling towers. The area also contains three high pressure steam boilers for hot water. The CUP has various pumps for the fire protection system as well as the mechanical system. The location of the CUP allows for ease of maintenance, service, and installation of the major systems.

The first, and larger, of two dedicated mechanical rooms is located on the third floor of the south bed tower. There are three Air Handling Units (AHUs) located in this room of sizes 90,000, 100,000, and 110,000 CFM. These units serve separate sections of the building from the second through the fifth floors.

The second of two dedicated mechanical rooms is located on the first floor, (plan) west side of the building. This room holds two more AHUs of 40,000 and 90,000 CFM. These AHUs serve various sections of the first floor departments.

There are three other smaller AHUs located on different sections of the roof that serve dedicated spaces.

B.6 Electrical System

The electrical system starts with service to the CUP where the main feed comes into the building. The electrical service feeds three separate electrical substations in the CUP. These substations are all 13.2 kV at 480Y/277V delivering 4,000 amps. The substations feed into different switchgear which then services separate sections of the building. The CUP location, as previously discussed, allows for easy maintenance and service for all the electrical switchgear and systems located there. There is redundancy built into the electrical system with two emergency generators, at 480Y/277 delivering 2,000 amps each, supplying key areas and emergency lighting in the medical center.

The luminaries throughout the main areas of the building are fluorescent luminaries. However, there are also many different types of lighting in the operating rooms and other special procedures areas.

B.7 Masonry

The masonry on the project consists of a brick veneer. This veneer is located on the lower levels of the building. The brick will be supported by the steel frame with steel angles and will be erected with scaffolding moving around the building. It is also tied into the steel with masonry wall ties.

B.8 Curtain Wall

There is curtain wall on various lower portions of the building. It is an aluminum curtain wall system with ½" mullions and 1" insulated glass. Erection will start with the framing system of the curtain wall. After the frame is set, the windows are placed from the exterior of the building using an aerial platform lift. Any field modifications can then be made to the frame so the system works as a unit. The finishing caps are then placed over the framing.

B.9 Excavation Support

The excavation is supported by seven permanent retaining walls ranging from 1'-0" to 1'-7. The retaining walls are located at the loading docks in the service area and at an outdoor dining terrace outside the cafeteria. These walls contain no "tie-backs" into the soil.

Other excavated earthwork is retained in stockpiles located on the site. Soil is retained from these other excavated areas using the slope set back tolerances specified by OSHA. Topsoil is also another key element of Earth that is retained onsite and is discussed more in section D of this report.

C. Project Cost Evaluation

C.1 Actual Building Construction Cost

The following is The Washington County Regional Medical Center's actual building construction cost based on figures released from the owner and construction manager:

Building Size:	500,000 sqft
Cost per Sqft:	$300
Total Cost:	$150 million

C.2 Total Project Costs

The following is The Washington County Regional Medical Center's total building cost based on figures released from the owner and construction manager. It includes land procurement, design fees, and other expenses to completely fund the entire project from start to finish:

Building Size: 500,000 sqft
Cost per Sqft: $564
Total Cost: $282 million

C.3 Major Building Systems Costs

Table 2: Major Building Systems Cost Summary

Building System	Total Cost	Size	Cost/SQ FT
Electrical	**$20,830,000**	**500,000 sq ft**	**$41.66**
Mechanical and Plumbing	**$48,376,500**	**500,000 sq ft**	**$96.75**
Fire Protection	**$1,557,500**	**500,000 sq ft**	**$3.12**
Structural[1]	**$18,657,524**	**500,000 sq ft**	**$37.32**

[1]Figues include all concrete and steel packages

C.4 Parametric Estimate using D4 Cost

Table 3, shown below, is an estimate using D4 Cost software. The D4 Cost program predicts the cost of a building based on historical data. The four buildings were chosen because they all represented some aspect of the Washington County Regional Medical Center. Choosing the most similar projects should produce a more accurate cost prediction.

Table 3: Parametric Estimate

Project	Size	Cost/SQ FT	Total Cost
Lawrence J. Ellison Ambulatory Care Center	**369,777 sqft**	**$184.52**	**$68,231,228.00**
Baylor Regional Medical Center	**354,400 sqft**	**$261.54**	**$92,689,693.00**
Utah Valley Regional Medical Center	**218,213 sqft**	**$313.01**	**$68,303,492.00**
Florida Flagler Hospital	**294,898 sqft**	**$203.81**	**$60,102,526.00**
Average	**309,322 sqft**	**$240.72**	**$72,331,734.75**

C.5 Square Foot Estimate using 2008 R.S. Means

Appendix B shows an estimate utilizing RS Means square foot building data. Appendix C shows the RS Means reference section page. The highlighted data is information that had to be extrapolated because the data was not explicit for the size and specifics of The Washington County Regional Medical Center. RS Means also allows the choice of an exterior wall system. Since the medical center is comprised of both face brick and architectural precast panels, the median value between the two was chosen.

C.6 Cost Comparison

Table 4: Cost Comparison

COST COMPARISON	
Method	**Total Construction Costs**
D4 Cost Software	**$72,331,735.00**
RS Means Data	**$115,160,600.00**
Actual Costs	**$150,000,000.00**

An analysis of all three costs shows RS Means to be lower than the actual building cost and the D4 Cost estimate to be much lower.

A further examination of the D4 Cost data will show that the historical data for hospitals, though chosen with The Washington County Regional Medical Center in mind, can not be used so easily. The range of systems, technology, and equitable projects varies tremendously. Historical data alone can not produce an accurate cost of such a diverse and constantly growing and changing market.

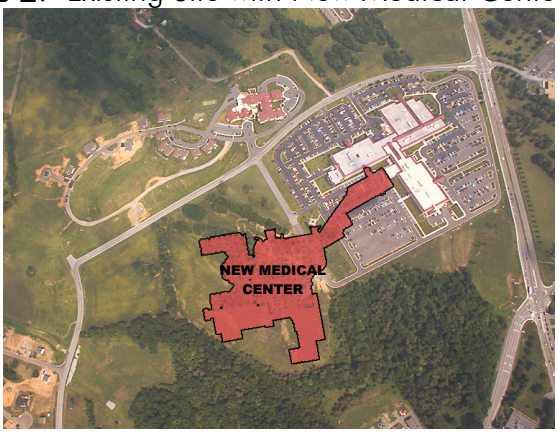
A look into the RS Means data produces one explanation for the lower figure. Technological advances in the medical field, also shown in the D4 Cost evaluation, can cause a tremendous amount of systems and equipment price fluctuations. RS Means can not control or account for these constant changes.

D. Site Plan of Existing Conditions

Existing conditions are very important when analyzing the surrounding areas of the project and the location of construction. As the following two aerial photographs show, the site for the new medical center is very open and spacious. The photograph on the left of the next page, Figure 1, shows the untouched site that the project team will have to start. The photograph on the right of the next page, Figure 2, shows a superimposed image of the building footprint on the site.

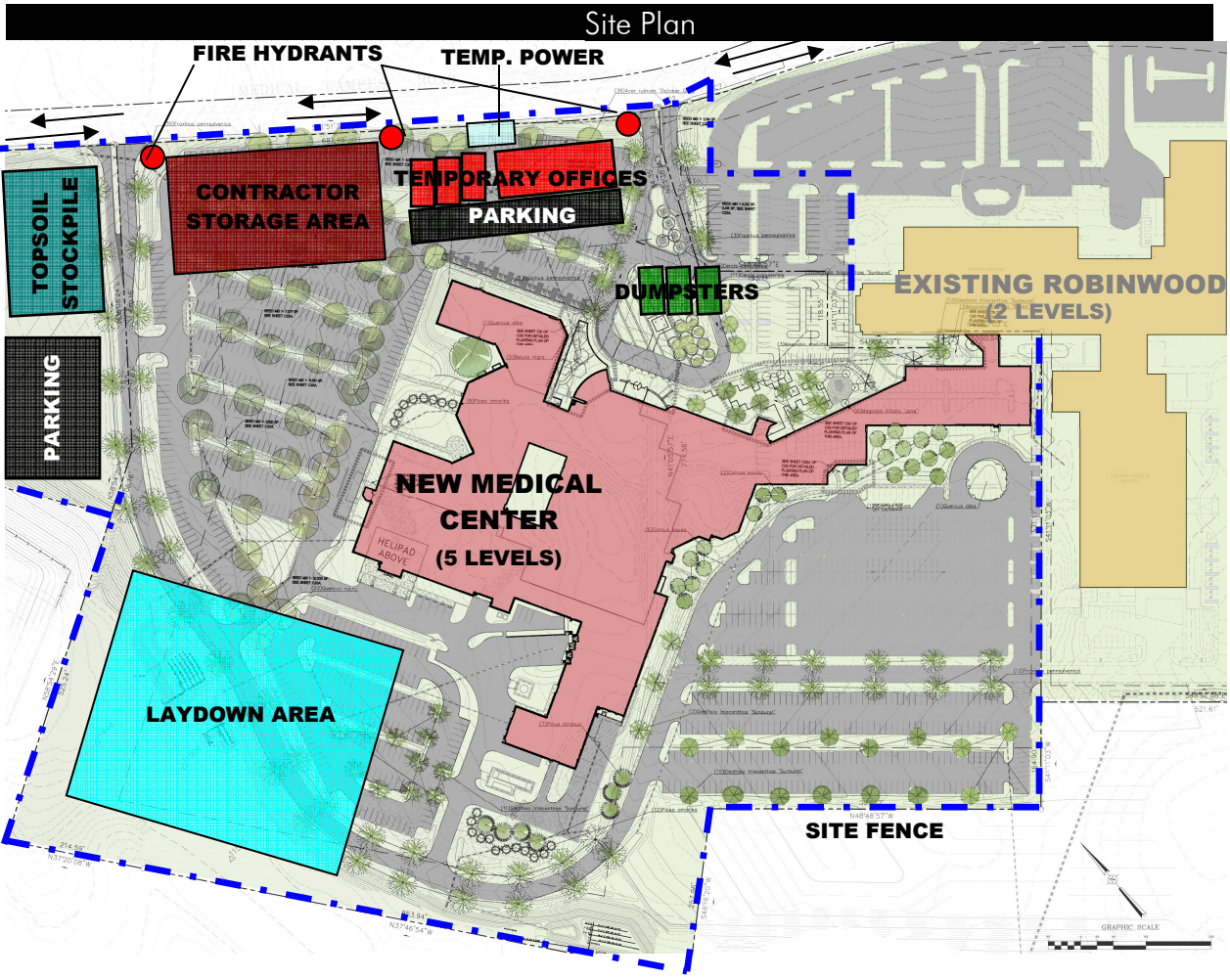
Figure 1: Existing Site

Figure 2: Existing Site with New Medical Center



The drawing below, Figure 3, shows a site utilization plan, finished site plan, and an existing site plan all overlaid on each other. Temporary facilities, parking, and site waste are only a few of the things to consider when planning for construction on the site. Also make note of the existing Robinwood Medical Center and where the new medical center will tie into this outpatient facility.

Figure 3: Site Plan



E. Local Conditions

E.1 Local Soil Conditions

The project is located just outside of the city of Hagerstown, MD. The large site allows for many freedoms when it comes to contractor parking, available lay-down areas, dumpster space, and other storage spaces. The site is underlain by the Conococheague Limestone formation and the site soil is primarily composed of silty clay, clayey silt, and silt with various amounts of sand and rock fragments. The soil located on the site takes an abnormally long time to dry out and becomes saturated easily. The subsurface testing concluded that there was no real concern with subsurface water condition because the test borings performed without rock coring were dry both during drilling and at the completion of the drilling operations.

E.2 Special Local Site Conditions

The site contains several sinkholes from previous construction projects including the existing Robinwood Medical Center. One significant sinkhole was noted and not remediated previously due to an abandoned project and the hole was subsequently filled. The sinkholes could cause problems if not handled properly; however, the sinkholes are not under the proposed building footprint and can easily be fixed. Therefore, no extra bearing foundation systems were developed to handle these areas.

As stated throughout the report, the new medical center will be joining an existing outpatient procedures building. This facility will continue to serve the community during construction. Many considerations need to be taken when working this close to an active medical establishment.

F. Client Information

The Washington County Regional Medical center is owned by Washington County Health Systems (WCHS), a non-profit organization, accredited by the Joint Commission on the Accreditation of Healthcare Organizations. WCHS is building the new medical center because the old hospital is becoming obsolete and the old site provides no room for expansion. The old technologies and facilities make it hard to keep up with the ever evolving healthcare world. Also the region that the hospital serves is rapidly expanding and the old hospital can not handle the growth without an expansion. The new medical center is allowing WCHS the opportunity to expand to a regional trauma unit, a goal that they look forward to achieving.

The medical center has always had a mission of delivering quality healthcare in a safe manor as demonstrated in the following quote from their website:

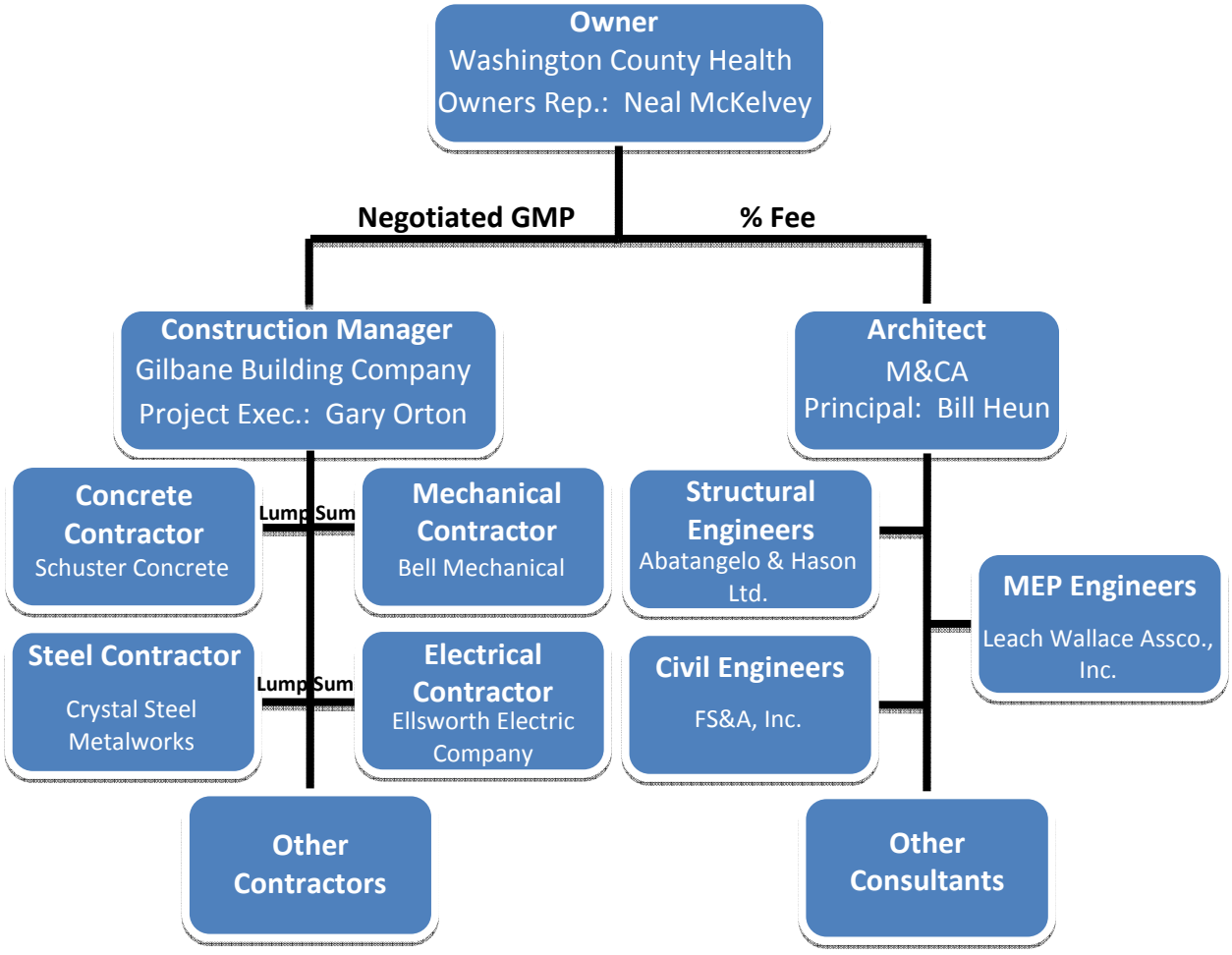
> "....offering spaces and amenities just for patients and their families, focusing on quality and safety, and bringing advanced medical technology to our region."
>
> *Source: http://www.washingtoncountyhospital.com/news/pdfdb/Case%20Statement.pdf*

WCHS expects to be occupying the new medical center in early 2011. They are excited to attain regional medical center status and are anxious to operate as a regional trauma center. The new medical center will also allow for an easy flow of inpatient and outpatient procedures between the existing Robinwood Medical Center and the medical center.

G. Project Delivery System

G.1 Organizational Chart

Figure 4: Project Organizational Chart



G.2 Delivery System and Contracts

The delivery system chosen for The Washington County Regional Medical Center was a Construction Manager (CM) @ Risk approach. This approach was taken because of the nature of the relationship between Gilbane and WCHS. They began negotiating the contract as soon as the decision to build a new hospital in Hagerstown was made. The architect, M&CA, was also chosen very early on negotiated terms and conditions. M&CA was chosen because of their extensive work and expertise in the healthcare facility market. The contract between them and the owner is a percent fee type. This gives M&CA a percentage of the costs of the project. M&CA also has arrangements with several design consultants; however, the contract details could not be released. The CM @ Risk approach and the contract types between all parties is very appropriate for this type of job and this type of owner. These factors should allow for a smooth successful project.

A lump sum contract was chosen for the subcontracting roles. These were hard bid packages released to qualified subcontractors. The low bid was then used for the guaranteed maximum price (GMP) contract between the CM and the owner.

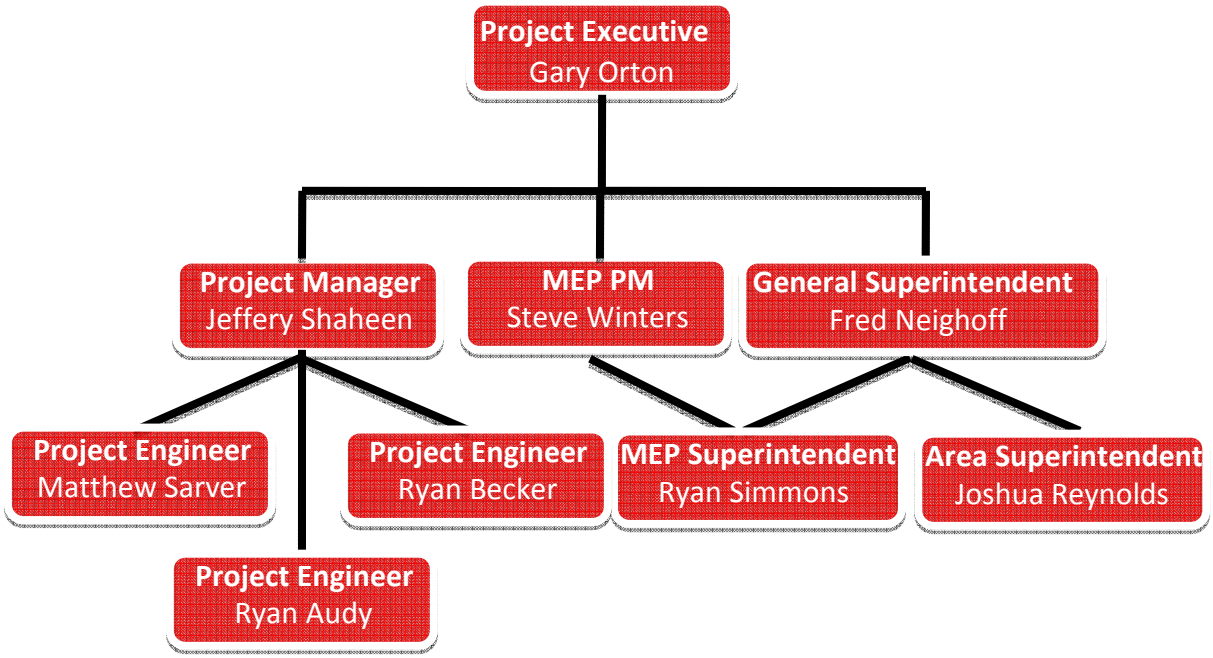
G.3 Insurance and Bonding

This project, unlike many, had no requirements for subcontractors to be bonded. Instead, the CM replaced several subcontractor bonds with their own Contractor Default Insurance (CDI). This insurance covers all the subcontractors and protects the CM if a subcontractor defaults on their contract. The benefits of the CDI is, if a subcontractor defaults on a contract, then the CM does not have to fight with surety companies for the money to cover the default. The CDI that the CM carries will immediately pick this up and hopefully allow for a smoother and more efficient solution so the project can continue to completion. The CDI only covers defaulting subcontractors. Therefore, the subcontractors must carry their own builder's risk and general liability insurance. The CM also carries both of these as an umbrella over the subcontractors and, as a final precaution, the owner also has both insurances.

H. Staffing Plan

H.1 CM Staff Organizational Chart

Figure 5: CM Organizational Chart



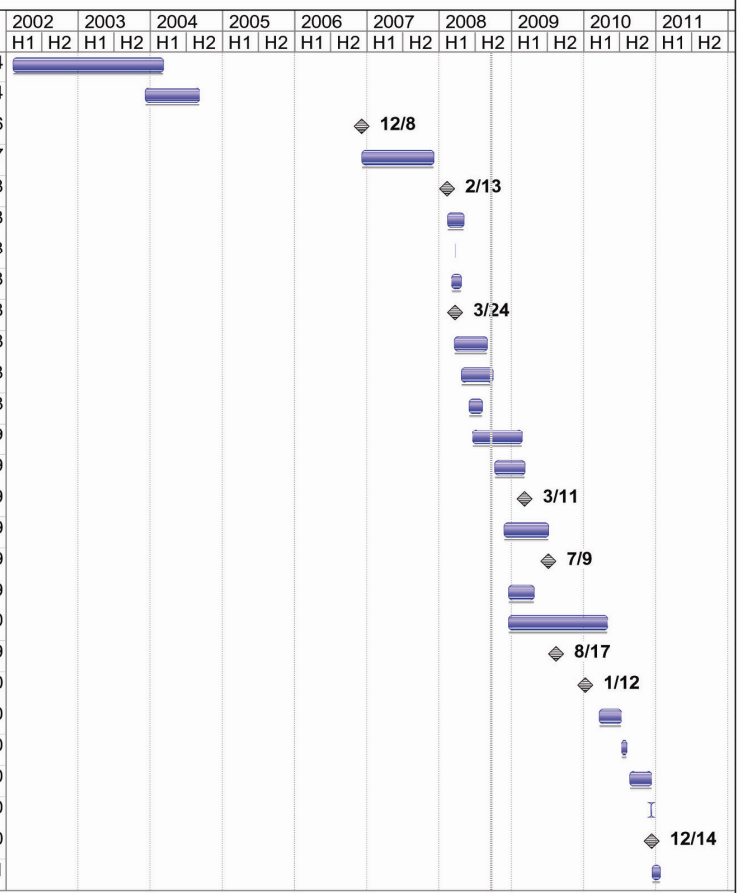
H.2 Staffing Considerations

The organizational structure, as shown above in Figure 5, establishes all the personnel that the CM has staffed on the project. All staff personnel are onsite. The project manager, general superintendent, and two of the project engineers will see the project form start to finish. The other project staff will spend their full time on the project when their specific contractors are completing their work.

Appendix A: Summary Schedule

The Washington County Regional Medical Center Schedule Summary

ID	Task Name	Duration	Start	Finish
1	Early Planning / Project Funding*	543 days	Fri 2/8/02	Tue 3/9/04
2	Design Documents	198 days	Mon 12/8/03	Wed 9/8/04
3	Construction Documents Issued	0 days	Fri 12/8/06	Fri 12/8/06
4	Preconstruction	261 days	Fri 12/8/06	Fri 12/7/07
5	Notice To Proceed	0 days	Wed 2/13/08	Wed 2/13/08
6	Award Contracts	60 days	Thu 2/14/08	Wed 5/7/08
7	Notify WCPD and MDE for Start of Work	1 day	Mon 3/24/08	Mon 3/24/08
8	Procurement	35 days	Thu 3/6/08	Wed 4/23/08
9	Begin Work On Site	0 days	Mon 3/24/08	Mon 3/24/08
10	Site Mobilization and Underground Utilities	119 days	Thu 3/20/08	Tue 9/2/08
11	Sitework Rough Grading and Blasting for Building Pad	115 days	Thu 4/24/08	Wed 10/1/08
12	Install Deep Foundation Cassions Under Towers	50 days	Mon 6/2/08	Fri 8/8/08
13	Install Other Buliding Foundations	179 days	Fri 6/20/08	Wed 2/25/09
14	Steel Superstructure	109 days	Fri 10/10/08	Wed 3/11/09
15	Steel Topping Out	0 days	Wed 3/11/09	Wed 3/11/09
16	Building Envelope and Roof	162 days	Wed 11/26/08	Thu 7/9/09
17	Building Dry-In	0 days	Thu 7/9/09	Thu 7/9/09
18	MEP Rough-In	92 days	Fri 12/19/08	Mon 4/27/09
19	Interior and MEP Finishes	357 days	Fri 12/19/08	Mon 5/3/10
20	Permanent Power Available	0 days	Mon 8/17/09	Mon 8/17/09
21	Conditioned Air Available	0 days	Tue 1/12/10	Tue 1/12/10
22	Pre-Commissioning	80 days	Tue 3/23/10	Mon 7/12/10
23	Start Up	20 days	Tue 7/13/10	Mon 8/9/10
24	Commissioning	80 days	Tue 8/24/10	Mon 12/13/10
25	Final Punchlist	3 days	Thu 12/9/10	Mon 12/13/10
26	Substantial Completion	0 days	Tue 12/14/10	Tue 12/14/10
27	Owner Move-In	30 days	Wed 12/15/10	Tue 1/25/11



Project: WCRMC Schedule
Date: Thu 9/18/08
*Dates are Estimated

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

Appendix B: RS Means Data Calculation

RS MEANS ESTIMATE				
Exterior Wall	S.F. Area	275,000	300,000	500,000
	L.F. Perimeter	1,116	1,200	1,872
Face Brick with Structural Facing Tile	Steel Frame	$229.15	$228.10	$219.70
Precast Concrete Panels with Exposed Aggregate	Steel Frame	$226.75	$225.75	$217.75
Perimeter Adjustment	Per 100 L.F.	$1.50	$1.40	$0.60
			Total Cost / SQFT	$225.50
			Total Cost	$112,750,000.00
Common Additives				
Description		Unit	Cost / Unit	Total Cost
Cabinets, Base, door units, metal		L.F.[1]	$243.00	$145,800.00
Drawer unit		L.F.[1]	$480.00	$360,000.00
Tall storage cabinets, open		L.F.[1]	$455.00	$273,000.00
With doors		L.F.[1]	$690.00	$345,000.00
Closed Circuit TV (Patient monitoring)				
One station camera & monitor		Each[1]	$1,750.00	$35,000.00
For additional camera add		Each[1]	$940.00	$169,200.00
Mortuary Refrigerator, End operated				
2 capacity		Each	$12,500.00	$25,000.00
6 capacity		Each	$22,500.00	$22,500.00
Nurses Call Station				
Single bedside call station		Each[1]	$299.00	$89,700.00
Ceiling speaker station		Each[1]	$136.00	$40,800.00
Emergency call station		Each[1]	$182.00	$54,600.00
Master control station for 20 stations		Each[1]	$5,775.00	$115,500.00
Sound system		Each[2]	$5,000.00	$250,000.00
Sterilizers		Each	$161,500.00	$484,500.00
			Total Cost of Additives	$2,410,600.00
			Total Cost of Construction	$115,160,600.00

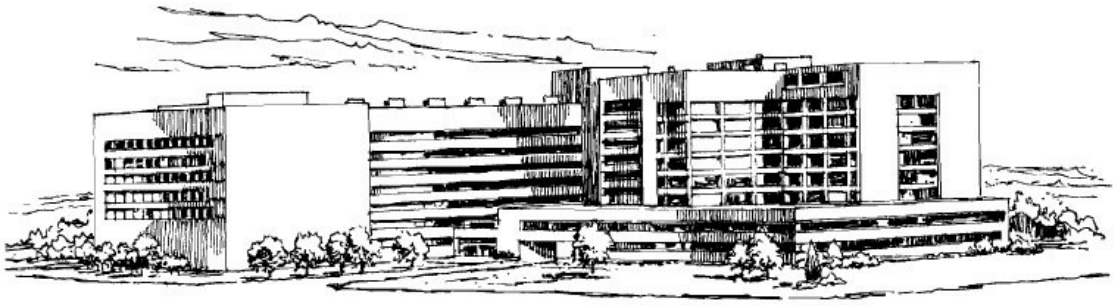
: Extrapolated values

[1] Estimated Quantities

[2] Sound system was not comparable; used other information to calculate

Appendix C: RS Means Source Sheet

COMMERCIAL/INDUSTRIAL/ INSTITUTIONAL | **M.340** | **Hospital, 4-8 Story**



Costs per square foot of floor area

Exterior Wall	S.F. Area	100000	125000	150000	175000	200000	225000	250000	275000	300000
	L.F. Perimeter	594	705	816	783	866	950	1033	1116	1200
Face Brick with Structural Facing Tile	Steel Frame	252.95	246.70	242.50	236.10	**233.70**	231.80	230.35	229.15	228.10
	R/Conc. Frame	262.40	256.00	251.80	245.35	242.95	241.05	239.55	238.30	237.30
Face Brick with Concrete Block Back-up	Steel Frame	247.30	241.10	236.95	231.20	228.90	227.05	225.55	224.45	223.45
	R/Conc. Frame	258.50	252.35	248.20	242.45	240.10	238.30	236.85	235.70	234.65
Precast Concrete Panels With Exposed Aggregate	Steel Frame	249.85	243.65	239.50	233.55	231.20	229.40	227.90	226.75	225.75
	R/Conc. Frame	259.35	253.15	249.00	243.05	240.70	238.90	237.40	236.25	235.25
Perimeter Adj., Add or Deduct	Per 100 L.F.	4.15	3.30	2.75	2.35	2.05	1.90	1.60	1.50	1.40
Story Hgt. Adj., Add or Deduct	Per 1 Ft.	1.85	1.75	1.70	1.40	1.35	1.35	1.30	1.30	1.30
For Basement, add $31.25 per square foot of basement area										

The above costs were calculated using the basic specifications shown on the facing page. These costs should be adjusted where necessary for design alternatives and owner's requirements. Reported completed project costs, for this type of structure, range from $151.70 to $369.90 per S.F.

Common additives

Description	Unit	$ Cost
Cabinets, Base, door units, metal	L.F.	243
Drawer units	L.F.	480
Tall storage cabinets, 7' high, open	L.F.	455
With doors	L.F.	690
Wall, metal 12-1/2" deep, open	L.F.	180
With doors	L.F.	325
Closed Circuit TV (Patient monitoring)		
One station camera & monitor	Each	1750
For additional camera add	Each	940
For automatic iris for low light add	Each	2425
Hubbard Tank, with accessories		
Stainless steel, 125 GPM 45 psi	Each	26,800
For electric hoist, add	Each	2925
Mortuary Refrigerator, End operated		
2 capacity	Each	12,500
6 capacity	Each	22,500

Description	Unit	$ Cost
Nurses Call Station		
Single bedside call station	Each	299
Ceiling speaker station	Each	136
Emergency call station	Each	182
Pillow speaker	Each	286
Double bedside call station	Each	365
Duty station	Each	310
Standard call button	Each	157
Master control station for 20 stations	Each	5775
Sound System		
Amplifier, 250 watts	Each	2225
Speaker, ceiling or wall	Each	181
Trumpet	Each	345
Station, Dietary with ice	Each	16,300
Sterilizers		
Single door, steam	Each	161,500
Double door, steam	Each	207,500
Portable, counter top, steam	Each	3875 - 6050
Gas	Each	40,000
Automatic washer/sterilizer	Each	55,500

150 **Important: See the Reference Section for Location Factors**

Appendix D: Footprint Reference Plan